A1800 ALPHA® meter
Communication options

Product guide
PG42-1012A

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Contents

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Safety Information

Installation, operation, and maintenance of this product can present potentially hazardous conditions (for example, high voltages) if safety procedures are not followed. To ensure that this product is used safely, it is important that you:

- Review, understand, and observe all safety notices and recommendations within this manual.
- Do not remove or copy individual pages from this manual, as this manual is intended for use in its entirety. If you remove or copy individual pages, cross-references and safety notices may be overlooked, possibly resulting in damage to the equipment, personal injury, or even death.
- Inform personnel involved in the installation, operation, and maintenance of the product about safety notices and recommendations contained in this manual.

Within this manual, safety notices appear preceding the text or step to which they apply. Safety notices are divided into the following four classifications.

NOTICE

Notice is used to alert personnel to installation, operation, or maintenance information that is important but not hazard related.

⚠ CAUTION

Caution is used to alert personnel to the presence of a hazard that will or can cause minor equipment damage, property damage, or personal injury if the notice is ignored.

⚠ WARNING

Warning is used to alert personnel to the presence of a hazard that can cause severe equipment damage, property damage, personal injury, or death if notice is ignored.

⚠ DANGER

Danger is used to alert personnel to the presence of a hazard that will cause severe equipment damage, property damage, personal injury, or death if the notice is ignored.

Revisions to this Document

The A1200 ALPHA Meter Communication Options product guide can be referred to by its document number: PG42-1012. Each revision of this manual is designated with a letter, with the first revision being 'A,' the second being 'B,' and so forth. The document number and its revision letter are located at the bottom of each page.

The following table lists the revisions to this document, the date of release, and a brief description of the changes made.

Revision	Date	Brief Description
A	06 February 2008	First release of the document.

1 DNP 3.0

Overview

The purpose of this document is to describe the specific implementation of the Distributed Network Protocol (DNP), Version 3.0 for the advanced communication board (ACB) installed on an A1880 ALPHA meter. This document, in conjunction with the DNP 3.0 Basic 4 Document Set, and the DNP Subset Definitions Document, provides complete information on how to communicate with the A1880 ALPHA via the DNP 3.0 protocol.

This implementation of DNP 3.0 is fully compliant with DNP 3.0 Subset Definition Level 2, with additional features described in this document.

Related documents

- DNP V3.00 Data Link Layer
- DNP V3.00 Application Layer
- DNP V3.00 Transport Functions
- DNP V3.00 Data Object Library

Configuration

End user configuration

Through the C12.18 (optical) interface of the A1880, various operating parameters may be changed by the end user. The parameters that directly or indirectly configure the operation of DNP 3.0 are listed in the table below and described in subsequent sections. The parameters are stored in non-volatile memory and are therefore preserved even when the A1880 is powered-down.

Description	Range	Units	Default [out of range values]	C12.19 Reference Replace ~ with MT_221_DNP_PARAMS
Time set mode	0 (never requests time) 1 (request time from chan1) 2 (request time from chan2)	None	0 [Greater than 2 ➞ 2 (request time from chan 2)]	~.TIMESET_MODE
Transmission delay	0-5000	Milliseconds	0 (0 Seconds) [>5000 ➞ 5000 milliseconds]	~.DNP_PROTOCOL.XMIT_DELAY
Data link source address	0-65519	None	4	~.DNP_PROTOCOL.SOURCE_ADDR
Data link destination address	0-65519	None	3	~.DNP_PROTOCOL.DESTINATION_ADDR
Source address validate	0 (off) 1 (on)	None	1 (on)	~.DNP_PROTOCOL.SRC_ADDR_VALIDATE
Data link confirmation mode	0 (never) 1 (only multi-frame) 2 (always)	None	0 (never) [Greater than 2 ➞ 2 (always)]	~.DNP_PROTOCOL.LINK_CONF_MODE

Description	Range	Units	Default [out of range values]	C12.19 Reference Replace ~ with MT_221_DNP_PARAMS
Data link confirmation timeout	100 - 20000	Milliseconds	3000 (3.0 seconds) [0 ➞100 milliseconds] [>20000 ➞20000 milliseconds]	~.DNP_PROTOCOL.LINK_CONF_TO
Data link retries	0-255	Retries	2	~.DNP_PROTOCOL.LINK_RETRIES
Application layer confirmation mode	0: Disable (event data only) 1: Enable (event and multi-fragment)	None	0: Disable (event data only)	~.DNP_PROTOCOL.APPL_CONF_MODE
Application layer fragment size	1-8	Frames	8 (2048 bytes) [0 Ù 1 frame, >8 ➞8 frames]	~.DNP_PROTOCOL.APPL_FRAG_SIZE
Application layer confirmation timeout	500 - 60000	Milliseconds	10000 (10.0 Seconds) [>60000 ➞60000 milliseconds]	~.DNP_PROTOCOL.APPL_CONF_TIMEOUT
Unsolicited mode enable	0: Disabled 1: Enabled		0: Disabled	~.DNP_PROTOCOL.UNSOL_RESP_MODE
Unsolicited response notification delay	0-20000	Milliseconds	20000 (20.0 Seconds) [>20000 ➞20000 milliseconds]	~.DNP_PROTOCOL.UNSOL_RESP_DLY
Unsolicited response retry delay	500 - 60000	Milliseconds	5000 (5.0 Seconds) [>60000 ➞60000 milliseconds]	~.DNP_PROTOCOL.UNSOL_RETRY_DLY
Unsolicited response maximum retries	0-255	Retries	3, Note: Value of 255 will cause infinite retries.	~.DNP_PROTOCOL.UNSOL_MAX_RETRIES
Minimum number of class 1 events for unsolicited response	0-255	Events	10	~.DNP_PROTOCOL.UNSOL_RESP_EVT1
Minimum number of class 2 events for unsolicited response	0-255	Events	25	~.DNP_PROTOCOL.UNSOL_RESP_EVT2
Minimum number of class 3 events for unsolicited response	0-255	Events	50	~.DNP_PROTOCOL.UNSOL_RESP_EVT3

Note: Changes in any of these parameters causes a "cold" restart of the DNP 3.0 communication process.

Time set mode. Designates which DNP channel (if any) that the slave will request time from. Zero indicates time is never requested, 1 indicates requests are made from channel 1 (if enabled), and 2 indicates requests are made from channel 2 (if enabled).

Transmission delay. This value specifies the minimum time after a data frame is received before a data frame is transmitted. It is specified in milliseconds, and may range from 0 to 5000 (0.0 to 5.0 seconds), inclusive. This parameter is intended for physical network environments using a multi-drop configuration such as RS485. In these environments, many active receivers are allowed, but only one transmitter can be active, or else a "collision" will occur and data transmission will be corrupted. This parameter allows master computers, or other computers on the same physical network, time to turn off their transmitter after transmitting a message. A similar configuration parameter should exist on the other computers to allow the A1880 time to turn off its transmitter after it has finished transmitting. In environments where this functionality is not needed, this parameter may be set to zero.

Data link source address. This parameter specifies the "network" address of the slave device (A1880) with respect to all other devices communicating on the same physical network.

Data link destination address. This parameter specifies the "network" address of the DNP Master station (not the A1880). This address also designates where unsolicited messages from the A1880 should be sent (when unsolicited response is enabled).

Source address validate. When enabled the A1880 slave will respond only when it is specifically addressed and when the request comes from the master specifically designated with the destination address (above).

Data link confirmation mode. This parameter has three possible values:

- Specifies that data link confirmations never be used.
- Specifies that data link confirmations only be used for multi-frame fragments.
- Specifies that data link confirmations always be used.

If data link confirmations are used, then the A1880 will request a confirmation from the master computer when transmitting data link frames. If a confirmation is not received within the timeout specified by Data link confirmation timeout, then an error is indicated. If Data link retries is non-zero, and if the maximum number of retries have not been attempted, then the A1880 will attempt to retransmit the data frame. Value 1 for this parameter is included for cases when the functionality of confirmations is desired for each frame, but application layer confirmations can only cover a whole fragment. An out-of-range value greater than 2 will set the parameter equal to 2 (always).

Data link confirmation timeout. This value specifies the data link layer confirmation time-out. It is specified in units of milliseconds and may range from 100 to 10000 (0.1 to 10.0 seconds), inclusive. It is valid only when the A1880 is acting as a data link primary; i.e., when the A1880 is transmitting a data frame with a request for a data link layer confirmation from the master computer, or the A1880 is transmitting a reset link frame. Specifically, if a confirmation is not received or if the link is not reset within the time specified by this parameter, then a data link error is indicated. If data link layer retries are enabled (see Data link retries), and if the maximum number of retries have not been attempted, then another data link layer retry will be attempted; i.e., the frame will be retransmitted. An out-of-range value of 0 will set the parameter to 100 (100 milliseconds).

Data link retries. This value specifies the maximum number of data link layer retries. Its range is from 0 to 255 inclusive. This is used when the A1880 is transmitting a data frame with a request for a data link layer confirmation from the master computer, or when the A1880 is transmitting a reset link frame. In these two cases, if the time-out specified by Data link confirmation timeout has elapsed without receiving a confirmation or without detecting the link reset, the data frame will be re-transmitted the number of times specified by this parameter. The default value of zero indicates that no retries will be attempted.

Application layer confirmation mode. This parameter affects how the A1880 requests application layer confirmations when transmitting messages to the master computer. It has these possible values:

- Disable: Specifies that an application confirmation will only be requested when a transmitted fragment contains event data. It is only when the master computer confirms the reception of event data that the A1880 will clear the event data from its event queues.
- Enable: Specifies that an application confirmation will be requested when a transmitted fragment contains event data, or when the fragment is a non-final part of a multi-fragment response - regardless of whether the fragment contains event data or not. This allows the master computer to use the functionality of application layer confirms as flow control. It is intended to be used when data link layer confirmations are not used and when the master computer requires flow control in order to provide time to process the data within A1880 transmitted fragments.

Application layer fragment size. This parameter is used to specify the maximum size of an application layer response. It is specified in number of data link frames and may range from 1 to 8. (Since, for the A1880, the data-link frames are 255 bytes, this signifies a range of maximum application fragment size of 256 to 2048 bytes.) In a technical bulletin recently published by the DNP Users Group Technical Committee, it was recommended that the application fragment size be reduced to the largest amount that will fit in a single data link

layer frame (the value of this parameter would be 1). As part of the same recommendation, it was recommended that data link confirmations not be used, and that application layer confirmations be used instead. The reasoning behind this recommendation is that application layer confirmations are more robust and informative, and that data link layer confirmations are redundant and useless if all application layer fragments use only a single data link frame. However, if a response message cannot fit in a single application layer fragment, the DNP implementation in the A1880 will respond with a multi-fragment response, and not all master computer DNP implementations correctly parse multi-fragment responses. Therefore, if the master computer cannot handle multi-fragment responses, this parameter must be set large enough to hold the largest response message. For the A1880, an example large response message would be the response to a Class 0 scan when all scan type groups are enabled. An out-of-range value of 0 will set the parameter to 1 (1 frame). A value greater than 8 will set the parameter to 8 (8 frames).

Application layer confirmation timeout. This value specifies how long the slave DNP device will wait for an application layer confirmation from the master. It is specified in units of milliseconds and may range from 500 to 60000 (0.5 to 60.0 seconds), inclusive. Out-of-range values less than 500 will set the parameter to 500 (500 milliseconds). Out-of-range values greater than 60000 will set the parameter to 60000 (60 seconds).

Unsolicited mode enable. This parameter indicates whether unsolicited responses can be transmitted by the A1880. Unsolicited messages contain only event data, and will always request application layer confirms. If the value of this parameter is "Enable", unsolicited responses can be transmitted; if "Disable", unsolicited responses cannot be transmitted. The destination of the unsolicited responses is specified by Data link destination address. Even if this parameter allows unsolicited responses to be transmitted, the master computer can still enable and disable unsolicited responses for specific event classes through use of function codes 20 and 21 (decimal). If unsolicited responses are allowed by this parameter, and if the A1880 is not waiting for an application layer confirmation of an earlier response, then an unsolicited response will be generated when any one of the following conditions are true:

- Any number of events for classes enabled by the master through function code 20 (decimal) have been detected and not yet reported or confirmed, and the time specified by the Unsolicited response notification delay has elapsed.
- Class 1 events have been enabled by the master through function code 20 (decimal), and the number of class 1 events detected and not yet reported or confirmed equals or exceeds the value specified by MinMinimum number of class 1 events for unsolicited response.
- Class 2 events have been enabled by the master through function code 20 (decimal), and the number of class 2 events detected and not yet reported or confirmed equals or exceeds the value specified by Minimum number of class 2 events for unsolicited response.
- Class 3 events have been enabled by the master through function code 20 (decimal), and the number of class 3 events detected and not yet reported or confirmed equals or exceeds the value specified by Minimum number of class 3 events for unsolicited response.

If these conditions are constantly being met, the frequency of unsolicited messages is limited by the confirmation, by the master, of previous unsolicited responses. Or, if the master is not confirming the unsolicited responses, the conditions will be, by definition, constantly met.

Unsolicited response notification delay. This parameter is used to specify the maximum amount of time between the detection of an event, and the unsolicited response containing the corresponding event data. It is specified in milliseconds and may range from 0 to 20000 (0.0 to 20.0 seconds), inclusive.

Unsolicited response retry delay. Specifies the time, in milliseconds, to delay after an unsolicited confirm timeout before retrying the unsolicited response. It is specified in milliseconds and may range from 500 to 60000 (0.50 to 60.0 seconds), inclusive. Out-of-range values less than 500 will set the parameter to 500 (500 milliseconds). Out-of-range values greater than 60000 will set the parameter to 60000 (60 seconds).

Unsolicited response maximum retries. Specify the maximum number of unsolicited response retries. This parameter allows you to specify up to 254 retries. Setting this parameter to 255 will cause infinite retries.

Minimum number of class 1 events for unsolicited response. This parameter specifies one condition under which unsolicited responses may be transmitted. Specifically, an unsolicited response will be generated if unsolicited responses are enabled by Unsolicited mode enable, if the A1880 is not waiting for an application layer confirmation of an earlier response, and if the number of class 1 events detected and not yet reported or confirmed equals or exceeds this value. See Unsolicited mode enable for more details on the generation of unsolicited responses. This value may range from 0 to 255, inclusive.

Minimum number of class 2 events for unsolicited response. This parameter specifies one condition under which unsolicited responses may be transmitted. Specifically, an unsolicited response will be generated if unsolicited responses are enabled by Unsolicited mode enable, if the A1880 is not waiting for an application layer confirmation of an earlier response, and if the number of class 2 events detected and not yet reported or confirmed equals or exceeds this value. See Unsolicited mode enable for more details on the generation of unsolicited responses. This value may range from 0 to 255, inclusive.

Minimum number of class 3 events for unsolicited response. This parameter specifies one condition under which unsolicited responses may be transmitted. Specifically, an unsolicited response will be generated if unsolicited responses are enabled by Unsolicited mode enable, if the A1880 is not waiting for an application layer confirmation of an earlier response, and if the number of class 3 events detected and not yet reported or confirmed equals or exceeds this value. See Unsolicited mode enable for more details on the generation of unsolicited responses. This value may range from 0 to 255, inclusive.

DNP V3.0 Device Profile

The following table provides Device Profile Information in the standard format defined in the DNP 3.0 Subset Definitions Document. The table, in combination with the "DNP V3.0 Implementation Table" on page 1-7, and the "DNP V3.0 Point List" on page 1-12, should provide complete application implementation details for including the A3/A1800 in any DNP environment.

DNP V3.0 DEVICE PROFILE DOCUMENT See also "DNP V3.0 Implementation Table" on page 1-7
Vendor Name: Elster Electricity
Device Name: A1800 ALPHA

Highest DNP Level Supported: For Requests: Level 2 For Responses: Level 2	Device Function: [ ] Master [X] Slave

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the "DNP V3.0 Implementation Table" on page 1-7):

For static (non-change-event) object requests, request qualifier codes 00 and 01 (start-stop), 07 and 08 (limited quantity), and 17 and 28 (index) are supported in addition to request qualifier code 06 (no range). Static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. Static object requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28. For change-event object requests, qualifiers 17 or 28 are always responded.
Frozen counters are supported (Obj 23, variations 0, 1, 2, 5, & 6).
16-bit and 32-bit Analog Change Events with Time may be requested (Object 32, variations 3 & 4).
The read function code for Object 50 (Time and Date), variation 1 is supported.
The read function code for Object 80 (Internal Indications), variation 1 is supported.

DNP V3.0
DEVICE PROFILE DOCUMENT
See also "DNP V3.0 Implementation Table" on page 1-7

Maximum Data Link Frame Size (octets):
Transmitted: 292
Received: 292

Maximum Application Fragment Size (octets):
Transmitted: Configurable up to 2048 ("Application layer fragment size" on page 1-3)
Received: 2048

Maximum Data Link Re-tries:
[ ] None
[ ] Fixed
[X] Configurable from 0 to 255 ("Data link retries" on page 1-3)

Maximum Application Layer Re-tries:
[X] None
[ ] Configurable

Requires Data Link Layer Confirmation:
[ ] Never
[ ] Always
[ ] Sometimes
[X] Configurable as: Never, Only for multi-frame messages, or Always. (See "Data link confirmation mode" on page 1-3)

Requires Application Layer Confirmation:
[ ] Never
[ ] Always
[ ] When reporting Event Data (Slave devices only)
[ ] When sending multi-fragment responses (Slave devices only)
[ ] Sometimes
[X] Configurable as: Only when reporting event data, or When reporting event data or multi-fragment messages. (See "Application layer confirmation mode" on page 1-3)

Timeouts while waiting for:
Data Link Confirm:
[ ] None [ ] Fixed at ___ [ ] Variable **[X] Configurable** (See "Data link confirmation timeout" on page 1-3)
Complete Appl. Fragment:
[X] None [ ] Fixed at ___ [ ] Variable [ ] Configurable
Application Confirm:
[ ] None [ ] Fixed at ___ [ ] Variable **[X] Configurable** (See "Application layer confirmation timeout" on page 1-4)
Complete Appl. Response:
[X] None [ ] Fixed at ___ [ ] Variable [ ] Configurable
Others:

Sends/Executes Control Operations:
WRITE Binary Outputs:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
SELECT/OPERATE:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
DIRECT OPERATE:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
DIRECT OPERATE - NO ACK:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Count > 1:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Pulse On:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Pulse Off:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Latch On:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Latch Off:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Queue:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Clear Queue:
[X] Never [ ] Always [ ] Sometimes [ ] Configurable
Attach explanation if 'Sometimes' or 'Configurable' was checked for any operation.

Reports Binary Input Change Events when no specific variation requested:
[ ] Never
[X] 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
[X] Binary Input Change With Time
[ ] Binary Input Change With Relative Time
[ ] Configurable (attach explanation)

DNP V3.0
DEVICE PROFILE DOCUMENT
See also "DNP V3.0 Implementation Table" on page 1-7

Sends Unsolicited Responses: [ ] Never **[X] Configurable** (see "Unsolicited mode enable" on page 1-4) [ ] Only certain objects [ ] Sometimes (attach explanation) [X] ENABLE/DISABLE UNSOLICITED Function codes supported	Sends Static Data in Unsolicited Responses: **[X] Never** [ ] When Device Restarts [ ] When Status Flags Change No other options are permitted.
Default Counter Object/Variation: [ ] No Counters Reported [ ] Configurable (attach explanation) **[X] Default Object 20**	
Default Variation: 5 **[X] Point-by-point list attached**	Counters Roll Over at: [ ] No Counters Reported [ ] Configurable (attach explanation) [ ] 16 Bits [ ] 32 Bits [ ] Other Value: **[X] Point-by-point list attached** (see "Counters" on page 1-12)
Sends Multi-Fragment Responses: **[X] Yes** [ ] No	
Sequential File Transfer Support: Append File Mode: [ ] Yes **[X] No** Custom Status Code Strings: [ ] Yes **[X] No** Permissions Field: [ ] Yes **[X] No** File Events Assigned to Class: [ ] Yes **[X] No** File Events Send Immediately: [ ] Yes **[X] No** Multiple Blocks in a Fragment: [ ] Yes **[X] No** Max Number of Files Open: 0	

DNP V3.0 Implementation Table

The following table identifies which object variations, function codes, and qualifiers the A1800 ALPHA supports in both request messages and in response messages. Note that while the A1800 ALPHA may parse many object variations, it will respond to the request variations identified below with entries in the response column. The ***italic*** areas represent functionality beyond that required by a DNP Level 2 device.

Object			Request (A1800 will parse)		Response (A1800 will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input - Any Variation	1 (read)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
1	1 (default[1])	Binary Input	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
1	2	Binary Input with Status	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
2	0	Binary Input Change - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		

Object			Request (A1800 will parse)		Response (A1800 will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
2	1	Binary Input Change without Time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	2 (default[1])	Binary Input Change with Time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	3	Binary Input Change with Relative Time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary Output Status - Any Variation	1 (read)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
10	1	Binary Output	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
10	2 (default[1])	Binary Output Status	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
12	1	Control Relay Output Block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	***00, 01 (start-stop)*** ***07, 08 (limited qty)*** 17, 28 (index)	129 (response)	echo of request
20	0	Binary Counter - Any Variation	1 (read) 7 (freeze) 8 (freeze noack) 9[3] (freeze clear) 10[3] (frz. cl. noack)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
20	1	32-Bit Binary Counter	***1 (read)*** ***7 (freeze)*** ***8 (freeze noack)*** ***9[3] (freeze clear)*** ***10[3] (frz. cl. noack)***	***00, 01 (start-stop)*** ***06 (no range)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
20	2	16-Bit Binary Counter	***1 (read)*** ***7 (freeze)*** ***8 (freeze noack)*** ***9[3] (freeze clear)*** ***10[3] (frz. cl. noack)***	***00, 01 (start-stop)*** ***06 (no range)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
20	5 (default[1])	32-Bit Binary Counter without Flag	***1 (read)*** ***7 (freeze)*** ***8 (freeze noack)*** ***9[3] (freeze clear)*** ***10[3] (frz. cl. noack)***	***00, 01 (start-stop)*** ***06 (no range)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
20	6	16-Bit Binary Counter without Flag	***1 (read)*** ***7 (freeze)*** ***8 (freeze noack)*** ***9[3] (freeze clear)*** ***10[3] (frz. cl. noack)***	***00, 01 (start-stop)*** ***06 (no range)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***

Object			Request (A1800 will parse)		Response (A1800 will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
21	0	Frozen Counter - Any Variation	1 (read)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
21	1	32-Bit Frozen Counter	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
21	2	16-Bit Frozen Counter	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
21	5	32-Bit Frozen Counter with Time of Freeze	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
21	6	16-Bit Frozen Counter with Time of Freeze	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
21	9 (default[1])	32-Bit Frozen Counter without Flag	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
21	10	16-Bit Frozen Counter without Flag	1 (read)	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
22	0	Counter Change Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
22	1 (default[1])	32-Bit Counter Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	129 (response) 130 (unsol. resp)	17, 28 (index)
22	2	16-Bit Counter Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	129 (response) 130 (unsol. resp)	17, 28 (index)
22	5	32-Bit Counter Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
22	6	16-Bit Counter Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
23	0	Frozen Counter Change Event - Any Variation	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***		
23	1 (default[1])	32-Bit Frozen Counter Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
23	2	16-Bit Frozen Counter Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***

Object			Request (A1800 will parse)		Response (A1800 will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
23	5	32-Bit Frozen Counter Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
23	6	16-Bit Frozen Counter Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
30	0	Analog Input - Any Variation	1 (read)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
30	1	32-Bit Analog Input	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
30	2	16-Bit Analog Input	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
30	3 (default[1])	32-Bit Analog Input without Flag	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
30	4	16-Bit Analog Input without Flag	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index[2])***
32	0	Analog Change Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1 (default[1])	32-Bit Analog Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	16-Bit Analog Change Event without Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	129 (response) 130 (unsol. resp)	17, 28 (index)
32	3	32-Bit Analog Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
32	4	16-Bit Analog Change Event with Time	***1 (read)***	***06 (no range, or all)*** ***07, 08 (limited qty)***	***129 (response)*** ***130 (unsol. resp)***	***17, 28 (index)***
40	0	Analog Output Status - Any Variation	1 (read)	***00, 01 (start-stop)*** 06 (no range, or all) ***07, 08 (limited qty)*** ***17, 28 (index)***		
40	2 (default[1])	16-Bit Analog Output Status	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	129 (response)	00, 01 (start-stop) ***17, 28 (index)***
41	2	16-Bit Analog Output Block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	***00, 01 (start-stop)*** ***07, 08 (limited qty)*** 17, 28 (index)	129 (response)	echo of request

Object			Request (A1800 will parse)		Response (A1800 will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
50	0	Time and Date	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range, or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
50	1 (default[1])	Time and Date	***1 (read)*** 2 (write)	***00, 01 (start-stop)*** ***06 (no range or all)*** 07 (limited qty = 1) ***08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
51	1	Synchronized Time and Date CTO			129 (response) 130 (unsol. resp)	07 (limited qty = 1)
51	2	Unsynchronized Time and Date CTO			129 (response) 130 (unsol. resp)	07 (limited qty = 1)
52	1	Time Delay Coarse			129 (response)	07 (limited qty = 1)
52	2	Time Delay Fine			129 (response)	07 (limited qty = 1)
60	0	Class 0, 1, 2, and 3 Data	***1 (read)*** ***20 (enbl. unsold.)*** ***21 (dsbl. unsold.)***	***06 (no range, or all)***		
60	1	Class 0 Data	1 (read) ***20 (enbl. unsold.)*** ***21 (dsbl. unsold.)***	06 (no range, or all)		
60	2	Class 1 Data	1 (read) ***20 (enbl. unsold.)*** ***21 (dsbl. unsold.)***	06 (no range, or all) 07, 08 (limited qty)		
60	3	Class 2 Data	1 (read) ***20 (enbl. unsold.)*** ***21 (dsbl. unsold.)***	06 (no range, or all) 07, 08 (limited qty)		
60	4	Class 3 Data	1 (read) ***20 (enbl. unsold.)*** ***21 (dsbl. unsold.)***	06 (no range, or all) 07, 08 (limited qty)		
80	1	Internal Indications	***1 (read)***	***00, 01 (start-stop)*** ***06 (no range or all)*** ***07, 08 (limited qty)*** ***17, 28 (index)***	***129 (response)***	***00, 01 (start-stop)*** ***17, 28 (index[2])***
80			2 (write[4])	00 (start-stop) ***01 (start-stop)*** ***07, 08 (limited qty)*** ***17, 28 (index)***		
No Object (function code only)			13 (cold restart)			
No Object (function code only)			***14 (warm restart)***			
No Object (function code only)			23 (delay meas)			

[1] Default variations are responded when variation 0 is requested and/or in class 0, 1, 2, or 3 scans.

[2] For static (non-change-event) objects, qualifiers 17 or 28 are only responded when a request is sent with qualifiers 17 or 28 respectively. Otherwise static object requests sent with qualifiers 00, 01, 06, 07, or 08 will be responded with qualifiers 00 or 01. (For change-event objects, qualifiers 17 or 28 are always responded.)

[3] Functions 9 and 10 will be parsed but the clear operation will not occur.

[4] Writes of Internal Indications are only supported for index 7 (Restart IIN1-7).

DNP V3.0 Point List

The tables below identify all the data points provided by the A1800 ALPHA meter.

Binary Input Points
Static (Steady-State) Object Number: 1
Change Event Object Number: 2
Request Function Codes supported: 1 (read)
Static Variation reported when variation 0 requested: 1 (Binary Input without status)
Change Event Variation reported when variation 0 requested: 2 (Binary Input Change with Time)

Point Index	Name/Description	Default Change Event Assigned Class (1, 2, 3 or none)
0	Status: Configuration Error	1
1	Status: Self Check Error	1
2	Status: RAM Failure	1
3	Status: ROM Failure	1
4	Status: Registered Memory Error	1
5	Status: Clock Error	1
6	Status: Measurement Error	1
7	Status: Low Battery	1
8	Status: Loss of Potential	1
9	Status: Demand Overload	1
10	Status: Power Failure	1
11	Status: Temper Detect	1
12	Status: Reverse Rotation	1

Counters

The following table lists both Binary Counters (Object 20) and Frozen Counters (Object 21) along with the associated change event objects (Objects 22 and 23). When a freeze function is performed on a Binary Counter point, the frozen value is available in the corresponding Frozen Counter point.

Binary Counters
Static (Steady-State) Object Number: 20
Change Event Object Number: 22
Request Function Codes supported:1 (read), 7 (freeze), 8 (freeze noack).
9 (freeze and clear), 10 (freeze and clear, noack) will parse only
Static Variation reported when variation 0 requested: 5 (32-Bit Binary Counter without Flag)
Change Event Variation reported when variation 0 requested: 1 (32-Bit Change Event without Time)
Frozen Counters
Static (Steady-State) Object Number: 21
Change Event Object Number: 23
Request Function Codes supported: 1 (read)
Static Variation reported when variation 0 requested: 9 (32-Bit Frozen Binary without Flag)
Change Event Variation reported when variation 0 requested: 1 (32-Bit Frozen Counter Change Event without Time)

Point Index	Name/Description	Units	Full Scale(Roll-over)	Default Change Event Assigned Class (1, 2, 3 or none)
0	Demand Resets	None	255	2
1	Current Register, Total Data Block, Summation 1 (WHrs Delivered)	Watt Hours	999,999,999	2

Point Index	Name/Description	Units	Full Scale(Roll-over)	Default Change Event Assigned Class (1, 2, 3 or none)
2	Current Register, Total Data Block, Summation 2 (WHrs Received)	Watt Hours	999,999,999	2
3	Current Register, Total Data Block, Summation 3 (VARHrs Delivered)	VAR Hours	999,999,999	2
4	Current Register, Total Data Block, Summation 4 (VARHrs Received)	VAR Hours	999,999,999	2
5	Current Register, Total Data Block, Summation 5 (VAHrs Delivered)	VA Hours	999,999,999	2
6	Current Register, Total Data Block, Summation 6 (VARHrs Received)	VA Hours	999,999,999	2

Analog inputs

The following table lists both Analog Input objects (30) along with the associated change event objects (32).

Analog Inputs
Static (Steady-State) Object Number: 30
Change Event Object Number: 32
Request Function Codes supported: 1 (read)
Static Variation reported when variation 0 requested: 3 (32-Bit Analog Input without Flag)
Change Event Variation reported when variation 0 requested: 1 (32-Bit Analog Change Event w/o Time)

Point Index	Name/Description	Resolution (1-count)	Default Change Event Assigned Class (1, 2, 3 or none)
0	Frequency	0.01 Hz	3
1	Line 1 Amps	0.1 Amps	3
2	Line 2 Amps	0.1 Amps	3
3	Line 3 Amps	0.1 Amps	3
4	Line 1-N Volts	0.1 Volts	3
5	Line 2-N Volts	0.1 Volts	3
6	Line 3-N Volts	0.1 Volts	3
7	Line 1 Current Angle	0.1 Degree	3
8	Line 2 Current Angle	0.1 Degree	3
9	Line 3 Current Angle	0.1 Degree	3
10	Line 1-N Voltage Angle	0.1 Degree	3
11	Line 2-N Voltage Angle	0.1 Degree	3
12	Line 3-N Voltage Angle	0.1 Degree	3
13	Line 1 Watts	1 Watt	3
14	Line 2 Watts	1 Watt	3
15	Line 3 Watts	1 Watt	3
16	Three Phase (Total) Watts	1 Watt	3
17	Line 1 VARs	1 VAR	3
18	Line 2 VARs	1 VAR	3
19	Line 3 VARs	1 VAR	3

Point Index	Name/Description	Resolution (1-count)	Default Change Event Assigned Class (1, 2, 3 or none)
20	Three Phase (Total) VARs	1 VAR	3
21	Line 1 VAs	1 VA	3
22	Line 2 VAs	1 VA	3
23	Line 3 VAs	1 VA	3
24	Three Phase (Total) VAs	1 VA	3
25	Line 1 Power Factor	0.001	3
26	Line 2 Power Factor	0.001	3
27	Line 3 Power Factor	0.001	3
28	Three Phase (Total) Power Factor	0.001	3
29	Watt Demand (Delivered)	1 Watt	3
30	Watt Demand (Received)	1 Watt	3
31	VAR Demand (Delivered)	1 VAR	3
32	VAR Demand (Received)	1 VAR	3
33	VA Demand (Delivered)	1 VA	3
34	VA Demand (Received)	1 VA	3
35	Watt Maximum Demand (Delivered)	1 Watt	3
36	Watt Maximum Demand (Received)	1 Watt	3
37	VAR Maximum Demand (Delivered)	1 VAR	3
38	VAR Maximum Demand (Received)	1 VAR	3
39	VA Maximum Demand (Delivered)	1 VA	3
40	VA Maximum Demand (Received)	1 VA	3

2 Modbus

This document describes the Modbus protocol definitions used by the advanced communication board A1800 ALPHA meter. This chapter applies to any version of the physical interface layer (ASCII, RTU, TCP/IP). No attempt is made here to describe the Modbus protocol itself, only the definition of data objects (points) as related to the A1800 ALPHA meter products.

For more information on the Modbus protocol, visit their Web site at http://www.modbus.org/

Related Documents

- Modbus Application Protocol Specification V1.1 (http://www.modbus.org/).

Supported Modbus Functions

Function 3: Read Holding Registers

Provides a method to read 4xxxx registers from the device. Used to read various analog, digital, string, status and record data from the slave device.

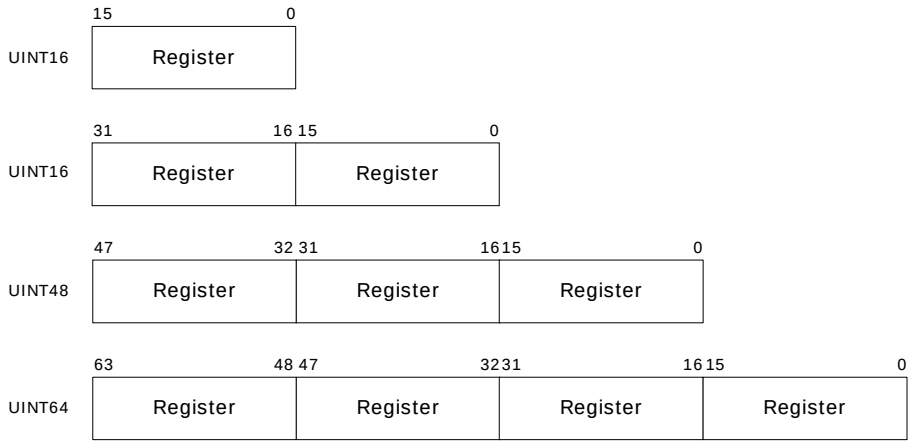
Function 8: Diagnostics

Provides a minimal set of diagnostics for setting up a serial link to the device. A subset of the sub-functions defined by the V1.1 Modbus specification is provided.

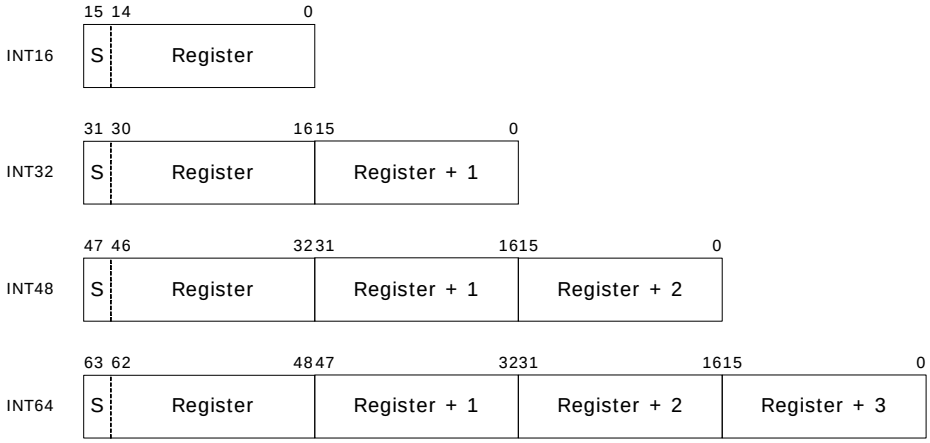
Data Types

This section defines the data types utilized by the A1800 ALPHA implementation of Modbus.

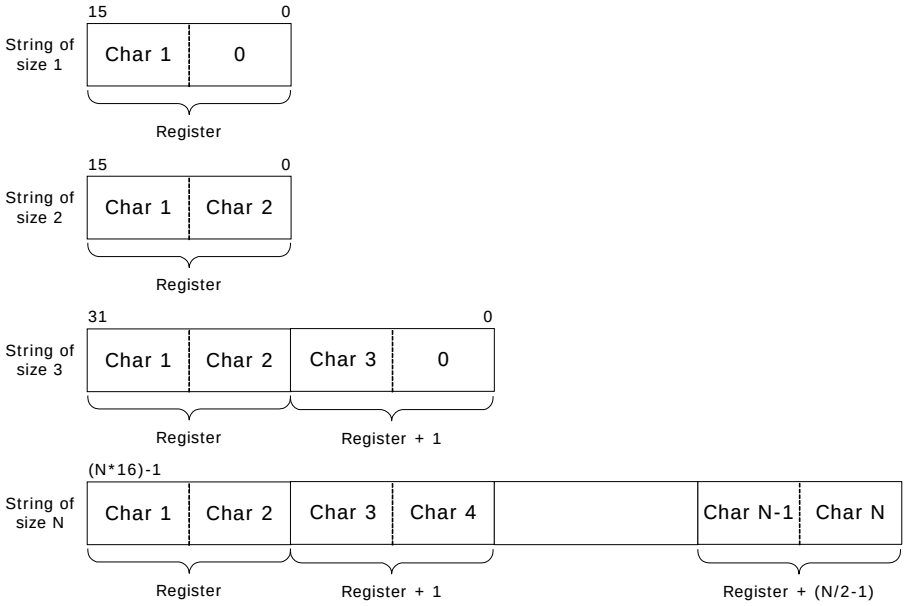
Unsigned integers (16, 32, 48, and 64 bits)



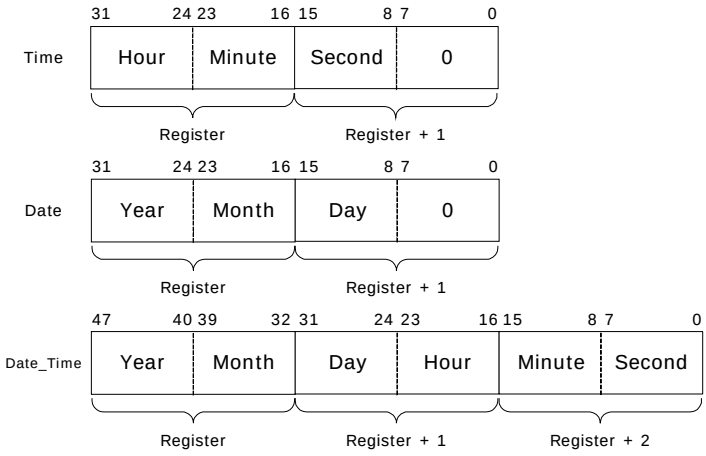
Signed integers (16, 32, 48, and 64 bits)



Character strings



Time and date



Exception Responses

When the meter receives a message from a Modbus master one of the following actions will occur (assuming the slave device has been correctly addressed):

- The Slave device determines the integrity of the message is good and responses normally.
- The Slave device determines the integrity of the message is bad due to parity, CRC, or checksum error and does not respond, forcing the Master to time-out and retry.
- The Slave device determines the integrity of the message is good but its content prevents a proper response, forcing a Modbus exception response.

The Slave device notifies the Master of the exception by setting the high bit of the returned function code. It also sends back an exception code indicating the nature of the problem.

Standard Modbus Exception Codes

The exception codes that may be reported by the A1800 ALPHA meter are listed in the following table:

Exception Code	Name	Description
1	Illegal Function	Function code is not supported.
2	Illegal Data Address	Register address is invalid
3	Illegal Data Value	Value in data field is invalid.
4	Slave Device Failure	Unrecoverable error when slave was attempting to perform requested operation.
6	Slave Device Busy	Device is currently busy, request may be retried later.

A1800 ALPHA meter Modbus Register Map

User Mappable 4x Registers (40001 - 40999)

Modbus registers 40001 through 40999 are user defined with the following factory defaults:

Access: Function 3 (Read)

Block 1: Line Magnitudes.

Base Register: 40001

Object Type: UINT16

Scale: x100

Register	Description	Scale (1 Count)
40001	Frequency	0.01 Hertz
40002	Line 1 Current	0.01 Amp
40003	Line 2 Current	0.01 Amp
40004	Line 3 Current	0.01 Amp
40005	Line 1 Voltage	0.01 Volt
40006	Line 2 Voltage	0.01 Volt

Register	Description	Scale (1 Count)
40007	Line 3 Voltage	0.01 Volt

Block 2: System Angles.

Base Register: 40008

Object Type: UINT16

Scale: x10

Register	Description	Scale (1 Count)
40008	Line 1 Current Angle wrt/ Line 1 Voltage	0.1 Degree
40009	Line 2 Current Angle wrt/ Line 1 Voltage	0.1 Degree
40010	Line 3 Current Angle wrt/ Line 1 Voltage	0.1 Degree
40011	Line 1 Voltage Angle wrt/ Line 1 Voltage	0.1 Degree
40012	Line 2 Voltage Angle wrt/ Line 1 Voltage	0.1 Degree
40013	Line 3 Voltage Angle wrt/ Line 1 Voltage	0.1 Degree

Block 3: Power.

Base Register: 40014

Object Type: INT32

Scale: x100

Register	Description	Scale (1 Count)
40014 - 40015	Line 1 Watts	0.01 Watts
40016 - 40017	Line 2 Watts	0.01 Watts
40018 - 40019	Line 3 Watts	0.01 Watts
40020 - 40021	Total (System) Watts	0.01 Watts
40022 - 40023	Line 1 VARs	0.01 VARs
40024 - 40025	Line 2 VARs	0.01 VARs
40026 - 40027	Line 3 VARs	0.01 VARs
40028 - 40029	Total (System) VARs	0.01 VARs
40030 - 40021	Line 1 VAs	0.01 VAs
40032 - 40023	Line 2 VAs	0.01 VAs
40034 - 40035	Line 3 VAs	0.01 VAs
40036 - 40037	Total (System) VAs	0.01 VAs

Block 4: Power Factors.

Base Register: 40038

Object Type: INT16

Scale: x10000

Register	Description	Scale (1 Count)
40038	Line 1 Power Factor	0.0001
40039	Line 2 Power Factor	0.0001
40040	Line 3 Power Factor	0.0001
40041	Total (System) Power	0.0001

Note: Positive values are lagging, negative are leading, i.e., -8340 would indicate 0.834 leading.

Block 5: Energy.

Base Register: 40042

Object Type: INT48

Scale: x1

Register	Description	Scale (1 Count)
40042 - 40044	Watt-hours, delivered	1 WattHr
40045 - 40047	Watt-hours, received	1 WattHr
40048 - 40050	VAR-hours, delivered	1 VARHr
40051 - 40053	VAR-hours, received	1 VARHr
40054 - 40056	VA-hours, delivered	1 VAHr
40057 - 40059	VA-hours, received	1 VAHr

Note: Energy values will roll over at ±99,999,999,999 (self-contained meters) or ±9,999,999,999 (transformer rated, class amps <= 20).

Fixed (Unmappable) 4x Registers

General Manufacturer Identification Block - A1800 ALPHA meter.

Access: Function 3 (Read)

C12.19 Equivalence: ST-1 (A1800 ALPHA meter)

Synopsis: Contains information related to manufacturer, model, revision, etc. of the A1800 ALPHA meter. This is essentially a direct image of the C12.19 ST-1 table (General Manufacturer Identification Table) in the A1800 ALPHA meter.

Register	Description	Data Type	Notes
41000 - 41001	Manufacture String	STRING	4 Byte String
41002 - 41005	Model String	STRING	8 Byte String
41006	Hardware Version	UINT16	
41007	Hardware Revision	UINT16	
41008	Firmware Version	UINT16	
41009	Firmware Revision	UINT16	
41010 - 41017	Serial Number String	STRING	16 Byte String

General Manufacturer Identification Block - ACB Option Board.

Access: Function 3 (Read)

C12.19 Equivalence: ST-1 (ACB)

Synopsis: Contains information related to manufacturer, model, revision, etc. of the ICP option board. This is essentially a direct image of the C12.19 ST-1 table (General Manufacturer Identification Table) in the ACB option board.

Register	Description	Data Type	Notes
41018 - 41019	Manufacture String	STRING	4 Byte String
41020 - 41023	Model String	STRING	8 Byte String
41024	Hardware Version	UINT16	
41025	Hardware Revision	UINT16	
41026	Firmware Version	UINT16	
41027	Firmware Revision	UINT16	
41028 - 41035	Serial Number String	STRING	16 Byte String

Elster Specific Product Identification Block.

Access: Function 3 (Read)

C12.19 Equivalence: MT-1 (A1800 ALPHA meter)

Synopsis: This is a direct image of the C12.19 MT-1 table (Elster Specific Product Identification Table) in the A1800 ALPHA meter.

Register	Description	Data Type	Notes
41036 - 41041	Smart Style Number	STRING	11 Byte String
41042 - 41043	Firmware SSPEC	BCD	3 Byte BCD
41044	DSP Version	STRING	2 Byte String
41045	DSP Revision	UINT16	
41046	SM Version	UINT16	
41047	SM Revision	UINT16	
41048	TRueQ Version	STRING	2 Byte String
41049	TRueQ Revision	UINT16	
41050	Service Handler Version	STRING	2 Byte String
41051	Service Handler Revision	UINT16	
41052 - 41053	Current Key Configuration	UINT32	
41054	Option Board 1 Type	STRING	2 Byte String
41055 - 41056	Option Board 1 SSPEC	BCD	3 Byte BCD
41057	Option Board 1 FW Group	UINT16	
41058	Option Board 1 Revision	UINT16	
41059	Option Board 2 Type	STRING	2 Byte String
41060 - 41061	Option Board 2 SSPEC	BCD	3 Byte BCD
41062	Option Board 2 FW Group	UINT16	
41063	Option Board 2 Revision	UINT16	

Register	Description	Data Type	Notes
41064	Option Board 3 Type	STRING	2 Byte String
41065 - 41066	Option Board 3 SSPEC	BCD	3 Byte BCD
41067	Option Board 3 FW Group	UINT16	
41068	Option Board 3 Revision	UINT16	
41069	Option Board 4 Type	STRING	2 Byte String
41070 - 41071	Option Board 4 SSPEC	BCD	3 Byte BCD
41072	Option Board 4 FW Group	UINT16	
41073	Option Board 4 Revision	UINT16	
41074	Option Board 5 Type	STRING	2 Byte String
41075 - 41076	Option Board 5 SSPEC	BCD	3 Byte BCD
41077	Option Board 5 FW Group	UINT16	
41078	Option Board 5 Revision	UINT16	
41079	Option Board 6 Type	STRING	2 Byte String
41080 - 41081	Option Board 6 SSPEC	BCD	3 Byte BCD
41082	Option Board 6 FW Group	UINT16	
41083	Option Board 6 Revision	UINT16	
41084	Option Board 7 Type	STRING	2 Byte String
41085 - 41086	Option Board 7 SSPEC	BCD	3 Byte BCD
41087	Option Board 7 FW Group	UINT16	
41088	Option Board 7 Revision	UINT16	
41089	Option Board 8 Type	STRING	2 Byte String
41090 - 41091	Option Board 8 SSPEC	BCD	3 Byte BCD
41092	Option Board 8 FW Group	UINT16	
41093	Option Board 8 Revision	UINT16	

Mode and Status Block.

Access: Function 3 (Read)

C12.19 Equivalence: ST-3 (A1800 ALPHA meter)

Synopsis: This is a direct image of the C12.19 ST-3 table (Mode and Status Table) in the A1800 ALPHA meter.

Register	Description	Data Type
41094	Mode • Bits 15 - 3: Not Defined (0) • Bit 2: Meter Shop Mode • Bit 1: Test Mode • Bit 0: Metering Mode	UINT16

Register	Description	Data Type
41095	Status Word 1 • Bit 15 : 0 • Bit 14 : 0 • Bit 13 : Reverse Rotation • Bit 12 : Tamper Detect • Bit 11 : Power Failure • Bit 10 : Demand Overload • Bit 9 : Low / Loss of Potential • Bit 8 : Low Battery • Bit 7 : Measurement Error • Bit 6 : Clock Error • Bit 5 : Nonvol Memory Error • Bit 4 : ROM Failure • Bit 3 : RAM Failure • Bit 2 : Self Check Error • Bit 1 : Config Error • Bit 0 : 0	UINT16
41096	Status Word 2 (Currently not defined)	UINT16
41097	Occurrences • Bits 15 - 7 : Not Defined (0) • Bit 6 : Button Press Clear Data • Bit 5 : Button Press Demand Reset • Bit 4 : Time Changed • Bit 3 : Pending Table Activated • Bit 2 : Self Read Data Available • Bit 1 : Previous Season Data Available • Bit 0 : Demand Reset Data Available	UINT16
41098	Current State of Resource Errors • Bits 15 - 2 : Not Defined (0) • Bit 1 : IIC Error • Bit 0 : EEPROM Error	UINT16
41099	Current State of Latched Errors • Bits 15 - 6 : Not Defined (0) • Bit 5 : DSP Download Error • Bit 4 : Table CRC Error • Bit 3 : Spare Latched Error • Bit 2 : 32 KHz Crystal Error • Bit 1 : Tariff EEPROM Read Error • Bit 0 : Tariff EEPROM Write Error	UINT16

Register	Description	Data Type
41100 - 41101	Current State of Latched Warnings • Bit 31 - 24: Not Defined (0) • Bit 23: Sag Log Overflow • Bit 22: Line 3 Outage • Bit 21: Line 2 Outage • Bit 20: Line 1Outage • Bit 19: Line 3Sag • Bit 18: Line 2Sag • Bit 17: Line 1 Sag • Bit 16: Line 3 Missing • Bit 15: Line 2 Missing • Bit 14: Line 1 Missing • Bit 13: History Log Overflow • Bit 12: Service Current Test Failure • Bit 11: Service Voltage Test Failure • Bit 10: Demand Threshold Exceeded • Bit 9: Inst. Profiling Set 2 Overflow • Bit 8: Inst. Profiling Set 1 Overflow • Bit 7: Pulse Profiling Overflow • Bit 6: Protected Tables Unlocked • Bit 5: ST-23 Write Warning • Bit 4: Event Log Overflow • Bit 3: End of Calendar Warning • Bit 2: Line Frequency Warning • Bit 1: TRueQ Log Overflow • Bit 0: Qualified Power Fail	UINT32
41102 - 41103	Current State of Latched TRueQ Warnings • Bit 31: TRueQ Warning [31] • Bit 30: TRueQ Warning [30] • Bit 29: TRueQ Warning [29] • Bit 28: TRueQ Warning [28] • Bit 27: TRueQ Warning [27] • Bit 26: TRueQ Warning [26] • Bit 25: TRueQ Warning [25] • Bit 24: TRueQ Warning [24] • Bit 23: TRueQ Warning [23] • Bit 22: TRueQ Warning [22] • Bit 21: TRueQ Warning [21] • Bit 20: TRueQ Warning [20] • Bit 19: TRueQ Warning [19] • Bit 18: TRueQ Warning [18] • Bit 17: TRueQ Warning [17] • Bit 16: TRueQ Warning [16] • Bit 15: TRueQ Warning [15] • Bit 14: TRueQ Warning [14] • Bit 13: TRueQ Warning [13] • Bit 12: TRueQ Warning [12 • Bit 11: TRueQ Warning [11] • Bit 10: TRueQ Warning [10] • Bit 9: TRueQ Warning [9] • Bit 8: TRueQ Warning [8] • Bit 7: TRueQ Warning [7] • Bit 6: TRueQ Warning [6] • Bit 5: TRueQ Warning [5] • Bit 4: TRueQ Warning [4] • Bit 3: TRueQ Warning [3] • Bit 2: TRueQ Warning [2] • Bit 1: TRueQ Warning [1] • Bit 0: TRueQ Warning [0]	UINT32

Register	Description	Data Type
41104	Non-latches Warnings • Bits 15 - 12 : Not Defined (0) • Bit 11 : MC Tamper Warning • Bit 10 : TC Tamper Warning • Bit 9 : Internal Meter Warning • Bit 8 : TRueQ Failure • Bit 7 : Extended Memory Option Board Expected but Missing • Bit 6 : ITM3 Option Board Missing • Bit 5 : ITM3 Option Board Self Test Error • Bit 4 : ITM3 Option Board Checksum Error • Bit 3 : ITM3 Option Board Battery Low • Bit 2 : Warning Locks Display • Bit 1 : Display Bad Item • Bit 0 : Tier Override Warning	UINT16

Communication Status.

Access: Function 3 (Read)

Synopsis: Provides information concerning errors at the communications physical layer. All counters will 'wrap-around' when overflowed.

Register	Description	Notes
41105	Port 1: Parity Errors	
41106	Port 1: Frame Errors	
41107	Port 1: Overrun Errors	
41108	Port 1: Receive Buffer Overflow Errors	
41109	Port 2: Parity Errors	
41100	Port 2: Frame Errors	
41111	Port 2: Overrun Errors	
41112	Port 2: Receive Buffer Overflow Errors	
41113	Host Port: Parity Errors	
41114	Host Port: Frame Errors	
41115	Host Port: Overrun Errors	
41116	Host Port: Receive Buffer Overflow Errors	
41117	Host Port: Transmit Retries	
41118	Host Port: Transmit Failures	
41119	Host Port: Receive Timeouts	
41120 - 41121	Network Port: Number of Received Packets	
41122 - 41123	Network Port: Number of Transmitted Packets	
41124 - 41125	Network Port: Number of Inbound Traffic Errors	
41126 - 41127	Network Port: Number of Outbound Traffic Errors	
41128 - 41129	Network Port: Number of Packets Lost	
41130 - 41131	Network Port: Number of Single Frame Collisions	
41132 - 41133	Network Port: Number of Receive Framing Errors	
41134 - 41135	Network Port: Number of Receive CRC Errors	

Register	Description	Notes
41136 - 41137	Network Port: Number of Miscellaneous Receive Errors	
41138 - 41139	Network Port: Number of Miscellaneous Transmit Errors	

Current Register Data.

Access: Function 3 (Read Only)

C12.19 Equivalence: ST-23 (A1800 ALPHA meter)

Synopsis: Provides access to all current summations, demands, and coincident values. These values are defined as:

Item	Summation	Demand	Coincident
1	WattHrs, delivered	WattHrs, delivered	User Defined
2	WattHrs, received	WattHrs, received	User Defined
3	VARHrs, delivered	VARHrs, delivered	User Defined
4	VARHrs, received	VARHrs, received	User Defined
5	VAHrs, delivered	VAHrs, delivered	N/A
6	VAHrs, received	VAHrs, received	N/A
7	Not Defined	N/A	N/A
8	Not Defined	N/A	N/A

Register	Description	Data Type
42000	Total Demand Resets	UINT16
42001 - 42003	Total: Summation 1	INT48
42004 - 42006	Total: Summation 2	INT48
42007 - 42009	Total: Summation 3	INT48
42010 - 42012	Total: Summation 4	INT48
42013 - 42015	Total: Summation 5	INT48
42016 - 42018	Total: Summation 6	INT48
42019 - 42021	Total: Summation 7	INT48
42022 - 42024	Total: Summation 8	INT48
42025 - 42027	Total: Demand 1 (Date/Time)	DATE_TIME
42028 - 42030	Total: Demand 1 (Cumulative Demand)	INT48
42031 - 42033	Total: Demand 1 (Max. Indicating Demand)	INT48
42034 - 42036	Total: Demand 2 (Date/Time)	DATE_TIME
42037 - 42039	Total: Demand 2 (Cumulative Demand)	INT48
42040 - 42042	Total: Demand 2 (Max. Indicating Demand)	INT48
42043 - 42045	Total: Demand 3 (Date/Time)	DATE_TIME
42046 - 42048	Total: Demand 3 (Cumulative Demand)	INT48
42049 - 42051	Total: Demand 3 (Max. Indicating Demand)	INT48
42052 - 42054	Total: Demand 4 (Date/Time)	DATE_TIME
42055 - 42057	Total: Demand 4 (Cumulative Demand)	INT48

Register	Description	Data Type
42058 - 42060	Total: Demand 4 (Max. Indicating Demand)	INT48
42061 - 42063	Total: Demand 5 (Date/Time)	DATE_TIME
42064 - 42066	Total: Demand 5 (Cumulative Demand)	INT48
42067 - 42069	Total: Demand 5 (Max. Indicating Demand)	INT48
42070 - 42072	Total: Demand 6 (Date/Time)	DATE_TIME
42073 - 42075	Total: Demand 6 (Cumulative Demand)	INT48
42076 - 42078	Total: Demand 6 (Max. Indicating Demand)	INT48
42079 - 42081	Total: Coincident 1	INT48
42082 - 42084	Total: Coincident 2	INT48
42085 - 42087	Total: Coincident 3	INT48
42088 - 42090	Total: Coincident 4	INT48
42091 - 42093	Tier 1: Summation 1	INT48
42094 - 42096	Tier 1: Summation 2	INT48
42097 - 42099	Tier 1: Summation 3	INT48
42100 - 42102	Tier 1: Summation 4	INT48
42103 - 42105	Tier 1: Summation 5	INT48
42106 - 42108	Tier 1: Summation 6	INT48
42109 - 42111	Tier 1: Summation 7	INT48
42112 - 42114	Tier 1: Summation 8	INT48
42115 - 42117	Tier 1: Demand 1 (Date/Time)	DATE_TIME
42118 - 42120	Tier 1: Demand 1 (Cumulative Demand)	INT48
42121 - 42123	Tier 1: Demand 1 (Max. Indicating Demand)	INT48
42124 - 42126	Tier 1: Demand 2 (Date/Time)	DATE_TIME
42127 - 42129	Tier 1: Demand 2 (Cumulative Demand)	INT48
42130 - 42132	Tier 1: Demand 2 (Max. Indicating Demand)	INT48
42133 - 42135	Tier 1: Demand 3 (Date/Time)	DATE_TIME
42136 - 42138	Tier 1: Demand 3 (Cumulative Demand)	INT48
42139 - 42141	Tier 1: Demand 3 (Max. Indicating Demand)	INT48
42142 - 42144	Tier 1: Demand 4 (Date/Time)	DATE_TIME
42145 - 42147	Tier 1: Demand 4 (Cumulative Demand)	INT48
42148 - 42150	Tier 1: Demand 4 (Max. Indicating Demand)	INT48
42151 - 42153	Tier 1: Demand 5 (Date/Time)	DATE_TIME
42154 - 42156	Tier 1: Demand 5 (Cumulative Demand)	INT48
42157 - 42159	Tier 1: Demand 5 (Max. Indicating Demand)	INT48
42160 - 42162	Tier 1: Demand 6 (Date/Time)	DATE_TIME
42163 - 42165	Tier 1: Demand 6 (Cumulative Demand)	INT48
42166 - 42168	Tier 1: Demand 6 (Max. Indicating Demand)	INT48
42169 - 42171	Tier 1: Coincident 1	INT48
42172 - 42174	Tier 1: Coincident 2	INT48

Register	Description	Data Type
42175 - 42177	Tier 1: Coincident 3	INT48
42178 - 42180	Tier 1: Coincident 4	INT48
42181 - 42183	Tier 2: Summation 1	INT48
42184 - 42186	Tier 2: Summation 2	INT48
42187 - 42189	Tier 2: Summation 3	INT48
42190 - 42192	Tier 2: Summation 4	INT48
42193 - 42195	Tier 2: Summation 5	INT48
42196 - 42198	Tier 2: Summation 6	INT48
42199 - 42201	Tier 2: Summation 7	INT48
42202 - 42204	Tier 2: Summation 8	INT48
42205 - 42207	Tier 2: Demand 1 (Date/Time)	DATE_TIME
42208 - 42210	Tier 2: Demand 1 (Cumulative Demand)	INT48
42211 - 42213	Tier 2: Demand 1 (Max. Indicating Demand)	INT48
42214 - 42216	Tier 2: Demand 2 (Date/Time)	DATE_TIME
42217 - 42219	Tier 2: Demand 2 (Cumulative Demand)	INT48
42220 - 42222	Tier 2: Demand 2 (Max. Indicating Demand)	INT48
42223 - 42225	Tier 2: Demand 3 (Date/Time)	DATE_TIME
42226 - 42228	Tier 2: Demand 3 (Cumulative Demand)	INT48
42229 - 42231	Tier 2: Demand 3 (Max. Indicating Demand)	INT48
42232 - 42234	Tier 2: Demand 4 (Date/Time)	DATE_TIME
42235 - 42237	Tier 2: Demand 4 (Cumulative Demand)	INT48
42238 - 42230	Tier 2: Demand 4 (Max. Indicating Demand)	INT48
42241 - 42243	Tier 2: Demand 5 (Date/Time)	DATE_TIME
42244 - 42246	Tier 2: Demand 5 (Cumulative Demand)	INT48
42247 - 42249	Tier 2: Demand 5 (Max. Indicating Demand)	INT48
42250 - 42252	Tier 2: Demand 6 (Date/Time)	DATE_TIME
42253 - 42255	Tier 2: Demand 6 (Cumulative Demand)	INT48
42256 - 42258	Tier 2: Demand 6 (Max. Indicating Demand)	INT48
42259 - 42261	Tier 2: Coincident 1	INT48
42262 - 42264	Tier 2: Coincident 2	INT48
42265 - 42267	Tier 2: Coincident 3	INT48
42268 - 42270	Tier 2: Coincident 4	INT48
42271 - 42273	Tier 3: Summation 1	INT48
42274 - 42276	Tier 3: Summation 2	INT48
42277 - 42279	Tier 3: Summation 3	INT48
42280 - 42282	Tier 3: Summation 4	INT48
42283 - 42285	Tier 3: Summation 5	INT48
42286 - 42288	Tier 3: Summation 6	INT48
42289 - 42291	Tier 3: Summation 7	INT48

Register	Description	Data Type
42292 - 42294	Tier 3: Summation 8	INT48
42295 - 42297	Tier 3: Demand 1 (Date/Time)	DATE_TIME
42298 - 42300	Tier 3: Demand 1 (Cumulative Demand)	INT48
42301 - 42303	Tier 3: Demand 1 (Max. Indicating Demand)	INT48
42304 - 42306	Tier 3: Demand 2 (Date/Time)	DATE_TIME
42307 - 42309	Tier 3: Demand 2 (Cumulative Demand)	INT48
42310 - 42312	Tier 3: Demand 2 (Max. Indicating Demand)	INT48
42313 - 42315	Tier 3: Demand 3 (Date/Time)	DATE_TIME
42316 - 42318	Tier 3: Demand 3 (Cumulative Demand)	INT48
42319 - 42321	Tier 3: Demand 3 (Max. Indicating Demand)	INT48
42322 - 42324	Tier 3: Demand 4 (Date/Time)	DATE_TIME
42325 - 42327	Tier 3: Demand 4 (Cumulative Demand)	INT48
42328 - 42330	Tier 3: Demand 4 (Max. Indicating Demand)	INT48
42331 - 42333	Tier 3: Demand 5 (Date/Time)	DATE_TIME
42334 - 42336	Tier 3: Demand 5 (Cumulative Demand)	INT48
42337 - 42339	Tier 3: Demand 5 (Max. Indicating Demand)	INT48
42340 - 42342	Tier 3: Demand 6 (Date/Time)	DATE_TIME
42343 - 42345	Tier 3: Demand 6 (Cumulative Demand)	INT48
42346 - 42348	Tier 3: Demand 6 (Max. Indicating Demand)	INT48
42349 - 42351	Tier 3: Coincident 1	INT48
42352 - 42354	Tier 3: Coincident 2	INT48
42355 - 42357	Tier 3: Coincident 3	INT48
42358 - 42360	Tier 3: Coincident 4	INT48
42361 - 42363	Tier 4: Summation 1	INT48
42364 - 42366	Tier 4: Summation 2	INT48
42367 - 42369	Tier 4: Summation 3	INT48
42370 - 42372	Tier 4: Summation 4	INT48
42373 - 42375	Tier 4: Summation 5	INT48
42376 - 42378	Tier 4: Summation 6	INT48
42379 - 42381	Tier 4: Summation 7	INT48
42382 - 42384	Tier 4: Summation 8	INT48
42385 - 42387	Tier 4: Demand 1 (Date/Time)	DATE_TIME
42388 - 42390	Tier 4: Demand 1 (Cumulative Demand)	INT48
42391 - 42393	Tier 4: Demand 1 (Max. Indicating Demand)	INT48
42394 - 42396	Tier 4: Demand 2 (Date/Time)	DATE_TIME
42397 - 42399	Tier 4: Demand 2 (Cumulative Demand)	INT48
42400 - 42402	Tier 4: Demand 2 (Max. Indicating Demand)	INT48
42403 - 42405	Tier 4: Demand 3 (Date/Time)	DATE_TIME
42406 - 42408	Tier 4: Demand 3 (Cumulative Demand)	INT48

Register	Description	Data Type
42409 - 42411	Tier 4: Demand 3 (Max. Indicating Demand)	INT48
42412 - 42414	Tier 4: Demand 4 (Date/Time)	DATE_TIME
42415 - 42417	Tier 4: Demand 4 (Cumulative Demand)	INT48
42418 - 42420	Tier 4: Demand 4 (Max. Indicating Demand)	INT48
42421 - 42423	Tier 4: Demand 5 (Date/Time)	DATE_TIME
42424 - 42426	Tier 4: Demand 5 (Cumulative Demand)	INT48
42427 - 42429	Tier 4: Demand 5 (Max. Indicating Demand)	INT48
42430 - 42432	Tier 4: Demand 6 (Date/Time)	DATE_TIME
42433 - 42435	Tier 4: Demand 6 (Cumulative Demand)	INT48
42436 - 42438	Tier 4: Demand 6 (Max. Indicating Demand)	INT48
42439 - 42441	Tier 4: Coincident 1	INT48
42442 - 42444	Tier 4: Coincident 2	INT48
42445 - 42447	Tier 4: Coincident 3	INT48
42448 - 42450	Tier 4: Coincident 4	INT48

Previous Season Data.

Access: Function 3 (Read Only)

C12.19 Equivalence: ST-24 (A1800 ALPHA meter)

Synopsis: Provides access to all current summations, demands, and coincident values recorded during the last season change. These values are defined as:

Item	Summation	Demand	Coincident
1	WattHrs, delivered	WattHrs, delivered	User Defined
2	WattHrs, received	WattHrs, received	User Defined
3	VARHrs, delivered	VARHrs, delivered	User Defined
4	VARHrs, received	VARHrs, received	User Defined
5	VAHrs, delivered	VAHrs, delivered	N/A
6	VAHrs, received	VAHrs, received	N/A
7	Not Defined	N/A	N/A
8	Not Defined	N/A	N/A

Register	Description	Data Type
43000	Total Demand Resets	UINT16
43001 - 43003	Total: Summation 1	INT48
43004 - 43006	Total: Summation 2	INT48
43007 - 43009	Total: Summation 3	INT48
43010 - 43012	Total: Summation 4	INT48
43013 - 43015	Total: Summation 5	INT48
43016 - 43018	Total: Summation 6	INT48
43019 - 43021	Total: Summation 7	INT48

Register	Description	Data Type
43022 - 43024	Total: Summation 8	INT48
43025 - 43027	Total: Demand 1 (Date/Time)	DATE_TIME
43028 - 43030	Total: Demand 1 (Cumulative Demand)	INT48
43031 - 43033	Total: Demand 1 (Max. Indicating Demand)	INT48
43034 - 43036	Total: Demand 2 (Date/Time)	DATE_TIME
43037 - 43039	Total: Demand 2 (Cumulative Demand)	INT48
43040 - 43042	Total: Demand 2 (Max. Indicating Demand)	INT48
43043 - 43045	Total: Demand 3 (Date/Time)	DATE_TIME
43046 - 43048	Total: Demand 3 (Cumulative Demand)	INT48
43049 - 43051	Total: Demand 3 (Max. Indicating Demand)	INT48
43052 - 43054	Total: Demand 4 (Date/Time)	DATE_TIME
43055 - 43057	Total: Demand 4 (Cumulative Demand)	INT48
43058 - 43060	Total: Demand 4 (Max. Indicating Demand)	INT48
43061 - 43063	Total: Demand 5 (Date/Time)	DATE_TIME
43064 - 43066	Total: Demand 5 (Cumulative Demand)	INT48
43067 - 43069	Total: Demand 5 (Max. Indicating Demand)	INT48
43070 - 43072	Total: Demand 6 (Date/Time)	DATE_TIME
43073 - 43075	Total: Demand 6 (Cumulative Demand)	INT48
43076 - 43078	Total: Demand 6 (Max. Indicating Demand)	INT48
43079 - 43081	Total: Coincident 1	INT48
43082 - 43084	Total: Coincident 2	INT48
43085 - 43087	Total: Coincident 3	INT48
43088 - 43090	Total: Coincident 4	INT48
43091 - 43093	Tier 1: Summation 1	INT48
43094 - 43096	Tier 1: Summation 2	INT48
43097 - 43099	Tier 1: Summation 3	INT48
43100 - 43102	Tier 1: Summation 4	INT48
43103 - 43105	Tier 1: Summation 5	INT48
43106 - 43108	Tier 1: Summation 6	INT48
43109 - 43111	Tier 1: Summation 7	INT48
43112 - 43114	Tier 1: Summation 8	INT48
43115 - 43117	Tier 1: Demand 1 (Date/Time)	DATE_TIME
43118 - 43120	Tier 1: Demand 1 (Cumulative Demand)	INT48
43121 - 43123	Tier 1: Demand 1 (Max. Indicating Demand)	INT48
43124 - 43126	Tier 1: Demand 2 (Date/Time)	DATE_TIME
43127 - 43129	Tier 1: Demand 2 (Cumulative Demand)	INT48
43130 - 43132	Tier 1: Demand 2 (Max. Indicating Demand)	INT48
43133 - 43135	Tier 1: Demand 3 (Date/Time)	DATE_TIME
43136 - 43138	Tier 1: Demand 3 (Cumulative Demand)	INT48

Register	Description	Data Type
43139 - 43141	Tier 1: Demand 3 (Max. Indicating Demand)	INT48
43142 - 43144	Tier 1: Demand 4 (Date/Time)	DATE_TIME
43145 - 43147	Tier 1: Demand 4 (Cumulative Demand)	INT48
43148 - 43150	Tier 1: Demand 4 (Max. Indicating Demand)	INT48
43151 - 43153	Tier 1: Demand 5 (Date/Time)	DATE_TIME
43154 - 43156	Tier 1: Demand 5 (Cumulative Demand)	INT48
43157 - 43159	Tier 1: Demand 5 (Max. Indicating Demand)	INT48
43160 - 43162	Tier 1: Demand 6 (Date/Time)	DATE_TIME
43163 - 43165	Tier 1: Demand 6 (Cumulative Demand)	INT48
43166 - 43168	Tier 1: Demand 6 (Max. Indicating Demand)	INT48
43169 - 43171	Tier 1: Coincident 1	INT48
43172 - 43174	Tier 1: Coincident 2	INT48
43175 - 43177	Tier 1: Coincident 3	INT48
43178 - 43180	Tier 1: Coincident 4	INT48
43181 - 43183	Tier 2: Summation 1	INT48
43184 - 43186	Tier 2: Summation 2	INT48
43187 - 43189	Tier 2: Summation 3	INT48
43190 - 43192	Tier 2: Summation 4	INT48
43193 - 43195	Tier 2: Summation 5	INT48
43196 - 43198	Tier 2: Summation 6	INT48
43199 - 43201	Tier 2: Summation 7	INT48
43202 - 43204	Tier 2: Summation 8	INT48
43205 - 43207	Tier 2: Demand 1 (Date/Time)	DATE_TIME
43208 - 43210	Tier 2: Demand 1 (Cumulative Demand)	INT48
43211 - 43212	Tier 2: Demand 1 (Max. Indicating Demand)	INT48
43214 - 43215	Tier 2: Demand 2 (Date/Time)	DATE_TIME
43217 - 43218	Tier 2: Demand 2 (Cumulative Demand)	INT48
43220 - 43221	Tier 2: Demand 2 (Max. Indicating Demand)	INT48
43223 - 43224	Tier 2: Demand 3 (Date/Time)	DATE_TIME
43226 - 43227	Tier 2: Demand 3 (Cumulative Demand)	INT48
43229 - 43230	Tier 2: Demand 3 (Max. Indicating Demand)	INT48
43232 - 43233	Tier 2: Demand 4 (Date/Time)	DATE_TIME
43235 - 43236	Tier 2: Demand 4 (Cumulative Demand)	INT48
43238 - 43239	Tier 2: Demand 4 (Max. Indicating Demand)	INT48
43241 - 43242	Tier 2: Demand 5 (Date/Time)	DATE_TIME
43244 - 43245	Tier 2: Demand 5 (Cumulative Demand)	INT48
43247 - 43248	Tier 2: Demand 5 (Max. Indicating Demand)	INT48
43250 - 43251	Tier 2: Demand 6 (Date/Time)	DATE_TIME
43253 - 43254	Tier 2: Demand 6 (Cumulative Demand)	INT48

Register	Description	Data Type
43256 - 43257	Tier 2: Demand 6 (Max. Indicating Demand)	INT48
43259 - 43260	Tier 2: Coincident 1	INT48
43262 - 43263	Tier 2: Coincident 2	INT48
43265 - 43266	Tier 2: Coincident 3	INT48
43268 - 43269	Tier 2: Coincident 4	INT48
43271 - 43272	Tier 3: Summation 1	INT48
43274 - 43275	Tier 3: Summation 2	INT48
43277 - 43278	Tier 3: Summation 3	INT48
43280 - 43282	Tier 3: Summation 4	INT48
43283 - 43285	Tier 3: Summation 5	INT48
43286 - 43288	Tier 3: Summation 6	INT48
43289 - 43291	Tier 3: Summation 7	INT48
43292 - 43294	Tier 3: Summation 8	INT48
43295 - 43297	Tier 3: Demand 1 (Date/Time)	DATE_TIME
43298 - 43300	Tier 3: Demand 1 (Cumulative Demand)	INT48
43301 - 43303	Tier 3: Demand 1 (Max. Indicating Demand)	INT48
43304 - 43306	Tier 3: Demand 2 (Date/Time)	DATE_TIME
43307 - 43309	Tier 3: Demand 2 (Cumulative Demand)	INT48
43310 - 43312	Tier 3: Demand 2 (Max. Indicating Demand)	INT48
43313 - 43315	Tier 3: Demand 3 (Date/Time)	DATE_TIME
43316 - 43318	Tier 3: Demand 3 (Cumulative Demand)	INT48
43319 - 43321	Tier 3: Demand 3 (Max. Indicating Demand)	INT48
43322 - 43324	Tier 3: Demand 4 (Date/Time)	DATE_TIME
43325 - 43327	Tier 3: Demand 4 (Cumulative Demand)	INT48
43328 - 43330	Tier 3: Demand 4 (Max. Indicating Demand)	INT48
43331 - 43333	Tier 3: Demand 5 (Date/Time)	DATE_TIME
43334 - 43336	Tier 3: Demand 5 (Cumulative Demand)	INT48
43337 - 43339	Tier 3: Demand 5 (Max. Indicating Demand)	INT48
43340 - 43342	Tier 3: Demand 6 (Date/Time)	DATE_TIME
43343 - 43345	Tier 3: Demand 6 (Cumulative Demand)	INT48
43346 - 43348	Tier 3: Demand 6 (Max. Indicating Demand)	INT48
43349 - 43351	Tier 3: Coincident 1	INT48
43352 - 43354	Tier 3: Coincident 2	INT48
43355 - 43357	Tier 3: Coincident 3	INT48
43358 - 43360	Tier 3: Coincident 4	INT48
43361 - 43363	Tier 4: Summation 1	INT48
43364 - 43366	Tier 4: Summation 2	INT48
43367 - 43369	Tier 4: Summation 3	INT48
43370 - 43372	Tier 4: Summation 4	INT48

Register	Description	Data Type
43373 - 43375	Tier 4: Summation 5	INT48
43376 - 43378	Tier 4: Summation 6	INT48
43379 - 43381	Tier 4: Summation 7	INT48
43382 - 43384	Tier 4: Summation 8	INT48
43385 - 43387	Tier 4: Demand 1 (Date/Time)	DATE_TIME
43388 - 43390	Tier 4: Demand 1 (Cumulative Demand)	INT48
43391 - 43393	Tier 4: Demand 1 (Max. Indicating Demand)	INT48
43394 - 43396	Tier 4: Demand 2 (Date/Time)	DATE_TIME
43397 - 43399	Tier 4: Demand 2 (Cumulative Demand)	INT48
43400 - 43402	Tier 4: Demand 2 (Max. Indicating Demand)	INT48
43403 - 43405	Tier 4: Demand 3 (Date/Time)	DATE_TIME
43406 - 43408	Tier 4: Demand 3 (Cumulative Demand)	INT48
43409 - 43411	Tier 4: Demand 3 (Max. Indicating Demand)	INT48
43412 - 43414	Tier 4: Demand 4 (Date/Time)	DATE_TIME
43415 - 43417	Tier 4: Demand 4 (Cumulative Demand)	INT48
43418 - 43420	Tier 4: Demand 4 (Max. Indicating Demand)	INT48
43421 - 43423	Tier 4: Demand 5 (Date/Time)	DATE_TIME
43424 - 43426	Tier 4: Demand 5 (Cumulative Demand)	INT48
43427 - 43429	Tier 4: Demand 5 (Max. Indicating Demand)	INT48
43430 - 43432	Tier 4: Demand 6 (Date/Time)	DATE_TIME
43433 - 43435	Tier 4: Demand 6 (Cumulative Demand)	INT48
43436 - 43438	Tier 4: Demand 6 (Max. Indicating Demand)	INT48
43439 - 43441	Tier 4: Coincident 1	INT48
43442 - 43444	Tier 4: Coincident 2	INT48
43445 - 43447	Tier 4: Coincident 3	INT48
43448 - 43450	Tier 4: Coincident 4	INT48

Previous Demand Reset Data.

Access: Function 3 (Read Only)

C12.19 Equivalence: ST-25 (A1800 ALPHA meter)

Synopsis: Provides access to all current summations, demands, and coincident values recorded during the last demand reset. These values are defined as:

Item	Summation	Demand	Coincident
1	WattHrs, delivered	WattHrs, delivered	User Defined
2	WattHrs, received	WattHrs, received	User Defined
3	VARHrs, delivered	VARHrs, delivered	User Defined
4	VARHrs, received	VARHrs, received	User Defined
5	VAHrs, delivered	VAHrs, delivered	N/A
6	VAHrs, received	VAHrs, received	N/A
7	Not Defined	N/A	N/A

Item	Summation	Demand	Coincident
8	Not Defined	N/A	N/A

Register	Description	Data Type
44000	Total Demand Resets	UINT16
44001 - 44003	Total: Summation 1	INT48
44004 - 44006	Total: Summation 2	INT48
44007 - 44009	Total: Summation 3	INT48
44010 - 44012	Total: Summation 4	INT48
44013 - 44015	Total: Summation 5	INT48
44016 - 44018	Total: Summation 6	INT48
44019 - 44021	Total: Summation 7	INT48
44022 - 44024	Total: Summation 8	INT48
44025 - 44027	Total: Demand 1 (Date/Time)	DATE_TIME
44028 - 44030	Total: Demand 1 (Cumulative Demand)	INT48
44031 - 44033	Total: Demand 1 (Max. Indicating Demand)	INT48
44034 - 44036	Total: Demand 2 (Date/Time)	DATE_TIME
44037 - 44039	Total: Demand 2 (Cumulative Demand)	INT48
44040 - 44042	Total: Demand 2 (Max. Indicating Demand)	INT48
44043 - 44045	Total: Demand 3 (Date/Time)	DATE_TIME
44046 - 44048	Total: Demand 3 (Cumulative Demand)	INT48
44049 - 44051	Total: Demand 3 (Max. Indicating Demand)	INT48
44052 - 44054	Total: Demand 4 (Date/Time)	DATE_TIME
44055 - 44057	Total: Demand 4 (Cumulative Demand)	INT48
44058 - 44060	Total: Demand 4 (Max. Indicating Demand)	INT48
44061 - 44063	Total: Demand 5 (Date/Time)	DATE_TIME
44064 - 44066	Total: Demand 5 (Cumulative Demand)	INT48
44067 - 44069	Total: Demand 5 (Max. Indicating Demand)	INT48
44070 - 44072	Total: Demand 6 (Date/Time)	DATE_TIME
44073 - 44075	Total: Demand 6 (Cumulative Demand)	INT48
44076 - 44078	Total: Demand 6 (Max. Indicating Demand)	INT48
44079 - 44081	Total: Coincident 1	INT48
44082 - 44084	Total: Coincident 2	INT48
44085 - 44087	Total: Coincident 3	INT48
44088 - 44090	Total: Coincident 4	INT48
44091 - 44093	Tier 1: Summation 1	INT48
44094 - 44096	Tier 1: Summation 2	INT48
44097 - 44099	Tier 1: Summation 3	INT48
44100 - 44102	Tier 1: Summation 4	INT48

Register	Description	Data Type
44103 - 44105	Tier 1: Summation 5	INT48
44106 - 44108	Tier 1: Summation 6	INT48
44109 - 44111	Tier 1: Summation 7	INT48
44112 - 44114	Tier 1: Summation 8	INT48
44115 - 44117	Tier 1: Demand 1 (Date/Time)	DATE_TIME
44118 - 44120	Tier 1: Demand 1 (Cumulative Demand)	INT48
44121 - 44123	Tier 1: Demand 1 (Max. Indicating Demand)	INT48
44124 - 44126	Tier 1: Demand 2 (Date/Time)	DATE_TIME
44127 - 44129	Tier 1: Demand 2 (Cumulative Demand)	INT48
44130 - 44132	Tier 1: Demand 2 (Max. Indicating Demand)	INT48
44133 - 44135	Tier 1: Demand 3 (Date/Time)	DATE_TIME
44136 - 44138	Tier 1: Demand 3 (Cumulative Demand)	INT48
44139 - 44141	Tier 1: Demand 3 (Max. Indicating Demand)	INT48
44142 - 44144	Tier 1: Demand 4 (Date/Time)	DATE_TIME
44145 - 44147	Tier 1: Demand 4 (Cumulative Demand)	INT48
44148 - 44150	Tier 1: Demand 4 (Max. Indicating Demand)	INT48
44151 - 44153	Tier 1: Demand 5 (Date/Time)	DATE_TIME
44154 - 44156	Tier 1: Demand 5 (Cumulative Demand)	INT48
44157 - 44159	Tier 1: Demand 5 (Max. Indicating Demand)	INT48
44160 - 44162	Tier 1: Demand 6 (Date/Time)	DATE_TIME
44163 - 44165	Tier 1: Demand 6 (Cumulative Demand)	INT48
44166 - 44168	Tier 1: Demand 6 (Max. Indicating Demand)	INT48
44169 - 44171	Tier 1: Coincident 1	INT48
44172 - 44174	Tier 1: Coincident 2	INT48
44175 - 44177	Tier 1: Coincident 3	INT48
44178 - 44180	Tier 1: Coincident 4	INT48
44181 - 44183	Tier 2: Summation 1	INT48
44184 - 44186	Tier 2: Summation 2	INT48
44187 - 44189	Tier 2: Summation 3	INT48
44190 - 44192	Tier 2: Summation 4	INT48
44193 - 44195	Tier 2: Summation 5	INT48
44196 - 44198	Tier 2: Summation 6	INT48
44199 - 44201	Tier 2: Summation 7	INT48
44202 - 44204	Tier 2: Summation 8	INT48
44205 - 44207	Tier 2: Demand 1 (Date/Time)	DATE_TIME
44208 - 44210	Tier 2: Demand 1 (Cumulative Demand)	INT48
44211 - 44212	Tier 2: Demand 1 (Max. Indicating Demand)	INT48
44214 - 44215	Tier 2: Demand 2 (Date/Time)	DATE_TIME
44217 - 44218	Tier 2: Demand 2 (Cumulative Demand)	INT48

Register	Description	Data Type
44220 - 44221	Tier 2: Demand 2 (Max. Indicating Demand)	INT48
44223 - 44224	Tier 2: Demand 3 (Date/Time)	DATE_TIME
44226 - 44227	Tier 2: Demand 3 (Cumulative Demand)	INT48
44229 - 44230	Tier 2: Demand 3 (Max. Indicating Demand)	INT48
44232 - 44233	Tier 2: Demand 4 (Date/Time)	DATE_TIME
44235 - 44236	Tier 2: Demand 4 (Cumulative Demand)	INT48
44238 - 44239	Tier 2: Demand 4 (Max. Indicating Demand)	INT48
44241 - 44242	Tier 2: Demand 5 (Date/Time)	DATE_TIME
44244 - 44245	Tier 2: Demand 5 (Cumulative Demand)	INT48
44247 - 44248	Tier 2: Demand 5 (Max. Indicating Demand)	INT48
44250 - 44251	Tier 2: Demand 6 (Date/Time)	DATE_TIME
44253 - 44254	Tier 2: Demand 6 (Cumulative Demand)	INT48
44256 - 44257	Tier 2: Demand 6 (Max. Indicating Demand)	INT48
44259 - 44260	Tier 2: Coincident 1	INT48
44262 - 44263	Tier 2: Coincident 2	INT48
44265 - 44266	Tier 2: Coincident 3	INT48
44268 - 44269	Tier 2: Coincident 4	INT48
44271 - 44272	Tier 3: Summation 1	INT48
44274 - 44275	Tier 3: Summation 2	INT48
44277 - 44278	Tier 3: Summation 3	INT48
44280 - 44282	Tier 3: Summation 4	INT48
44283 - 44285	Tier 3: Summation 5	INT48
44286 - 44288	Tier 3: Summation 6	INT48
44289 - 44291	Tier 3: Summation 7	INT48
44292 - 44294	Tier 3: Summation 8	INT48
44295 - 44297	Tier 3: Demand 1 (Date/Time)	DATE_TIME
44298 - 44300	Tier 3: Demand 1 (Cumulative Demand)	INT48
44301 - 44303	Tier 3: Demand 1 (Max. Indicating Demand)	INT48
44304 - 44306	Tier 3: Demand 2 (Date/Time)	DATE_TIME
44307 - 44309	Tier 3: Demand 2 (Cumulative Demand)	INT48
44310 - 44312	Tier 3: Demand 2 (Max. Indicating Demand)	INT48
44313 - 44315	Tier 3: Demand 3 (Date/Time)	DATE_TIME
44316 - 44318	Tier 3: Demand 3 (Cumulative Demand)	INT48
44319 - 44321	Tier 3: Demand 3 (Max. Indicating Demand)	INT48
44322 - 44324	Tier 3: Demand 4 (Date/Time)	DATE_TIME
44325 - 44327	Tier 3: Demand 4 (Cumulative Demand)	INT48
44328 - 44330	Tier 3: Demand 4 (Max. Indicating Demand)	INT48
44331 - 44333	Tier 3: Demand 5 (Date/Time)	DATE_TIME
44334 - 44336	Tier 3: Demand 5 (Cumulative Demand)	INT48

Register	Description	Data Type
44337 - 44339	Tier 3: Demand 5 (Max. Indicating Demand)	INT48
44340 - 44342	Tier 3: Demand 6 (Date/Time)	DATE_TIME
44343 - 44345	Tier 3: Demand 6 (Cumulative Demand)	INT48
44346 - 44348	Tier 3: Demand 6 (Max. Indicating Demand)	INT48
44349 - 44351	Tier 3: Coincident 1	INT48
44352 - 44354	Tier 3: Coincident 2	INT48
44355 - 44357	Tier 3: Coincident 3	INT48
44358 - 44360	Tier 3: Coincident 4	INT48
44361 - 44363	Tier 4: Summation 1	INT48
44364 - 44366	Tier 4: Summation 2	INT48
44367 - 44369	Tier 4: Summation 3	INT48
44370 - 44372	Tier 4: Summation 4	INT48
44373 - 44375	Tier 4: Summation 5	INT48
44376 - 44378	Tier 4: Summation 6	INT48
44379 - 44381	Tier 4: Summation 7	INT48
44382 - 44384	Tier 4: Summation 8	INT48
44385 - 44387	Tier 4: Demand 1 (Date/Time)	DATE_TIME
44388 - 44390	Tier 4: Demand 1 (Cumulative Demand)	INT48
44391 - 44393	Tier 4: Demand 1 (Max. Indicating Demand)	INT48
44394 - 44396	Tier 4: Demand 2 (Date/Time)	DATE_TIME
44397 - 44399	Tier 4: Demand 2 (Cumulative Demand)	INT48
44400 - 44402	Tier 4: Demand 2 (Max. Indicating Demand)	INT48
44403 - 44405	Tier 4: Demand 3 (Date/Time)	DATE_TIME
44406 - 44408	Tier 4: Demand 3 (Cumulative Demand)	INT48
44409 - 44411	Tier 4: Demand 3 (Max. Indicating Demand)	INT48
44412 - 44414	Tier 4: Demand 4 (Date/Time)	DATE_TIME
44415 - 44417	Tier 4: Demand 4 (Cumulative Demand)	INT48
44418 - 44420	Tier 4: Demand 4 (Max. Indicating Demand)	INT48
44421 - 44423	Tier 4: Demand 5 (Date/Time)	DATE_TIME
44424 - 44426	Tier 4: Demand 5 (Cumulative Demand)	INT48
44427 - 44429	Tier 4: Demand 5 (Max. Indicating Demand)	INT48
44430 - 44432	Tier 4: Demand 6 (Date/Time)	DATE_TIME
44433 - 44435	Tier 4: Demand 6 (Cumulative Demand)	INT48
44436 - 44438	Tier 4: Demand 6 (Max. Indicating Demand)	INT48
44439 - 44441	Tier 4: Coincident 1	INT48
44442 - 44444	Tier 4: Coincident 2	INT48
44445 - 44447	Tier 4: Coincident 3	INT48
44448 - 44450	Tier 4: Coincident 4	INT48

Tariff Data Information.

Access: Function 3 (Read Only)

Synopsis: Informational data with respect to the Current Register, Previous Season, and Previous Demand data tables (Sec. 5.2.6, 5.2.7, 5.2.8).

Register	Description	Units	Data Type
45000	Number of valid summations	0 - 8	UINT16
45001	Number of valid demands	0 - 6	UINT16
45002	Number of valid coincidents	0 - 4	UINT16
45003	Number of valid tiers	0 - 4	UINT16
45004	Data Scale		INT16
45005 - 45007	Time / Date stamp when season changed		DATE_TIME
45008	Previous season identifier		UINT16
45009 - 45011	Time / Date stamp when demand reset occurred.		DATE_TIME
45012	Season identifier at time of demand reset		UINT16

Diagnostics (Function 8)

The A1800 ALPHA meter supports a minimal set of diagnostic support via Modbus Function 8.

Sub-Function Code		Name
Hex	Decimal	
0	0	Return Query Data (Echo)
0A	10	Clear Counters
0B	11	Return Bus Message Count
0C	12	Return Bus Communication Error Count
0D	13	Return Bus Exception Error Count
0E	14	Return Slave Message Count
0F	15	Return Slave No Response Count

Sub-Function 0 (0x00) Return Query Data

- Request:

  Function: 8

  Subfunction: 0

  Data: Any Value
- Response:

  Function: 8

  Subfunction: 0

  Data: Same as sent

This is essentially a Modbus packet echo (loopback).

Sub-Function 10 (0x0A Hex) Clear Counters

- Request:

  Function: 8

  Subfunction: 10

  Data: 0
- Response:

  Function: 8

  Subfunction: 10

  Data: 0

Clears the counters used for sub-functions 11 through 15.

Sub-Function 11 (0x0B) Return Bus Message Count

- Request:

  Function: 8

  Subfunction: 11

  Data: 0
- Response:

  Function: 8

  Subfunction: 11

  Data: Counter Value

Returns the total number of received messages since the last power-up, Modbus reset, or Clear Counters operation. Note, these messages do not necessarily have to be addressed to this slave device.

Sub-Function 12 (0x0C) Return Bus Communications Error Count

- Request:

  Function: 8

  Subfunction: 12

  Data: 0
- Response:

  Function: 8

  Subfunction: 12

  Data: Counter Value

Returns the total number of CRC errors encountered by this device since the last power-up, Modbus reset, or Clear Counters operation. Note, these CRC errors do not necessarily have to be associated with messages addressed to this slave device.

Sub-Function 13 (0x0D) Return Bus Exception Error Count

- Request:

  Function: 8

  Subfunction: 13

  Data: 0
- Response:

  Function: 8

  Subfunction: 13

  Data: Counter Value

Returns the total number of bus exceptions returned by this device since the last power-up, Modbus reset, or Clear Counters operation.

Sub-Function 14 (0x0E) Return Slave Message Count

- Request:

  Function: 8

  Subfunction: 14

  Data: 0

- Response:

  Function: 8

  Subfunction: 14

  Data: Counter Value

Returns the total number of received messages which have been addressed to and processed by this device since the last power-up, Modbus reset, or Clear Counters operation.

Sub-Function 15 (0x0F) Return Slave No Response Count

- Request:

  Function: 8

  Subfunction: 15

  Data: 0

- Response:

  Function: 8

  Subfunction: 15

  Data: Counter Value

Returns the total number of received messages which have been addressed to this device but have not been processed (normal or exception response) since the last power-up, Modbus reset, or Clear Counters operation.

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Elster Group is a world leader in Advanced Metering Infrastructure (AMI) and integrated metering and utilization solutions to the gas, electricity and water industries. Elster's high quality AMI and AMR products, systems, and solutions reflect the wealth of knowledge and experience gained from over 170 years of dedication to measuring precious resources and energy. Elster provides world class solutions and advanced technologies to help utilities more easily, efficiently and reliably obtain and use advanced metering intelligence to improve customer service, enhance operational efficiency, and increase revenues. Elster's AMI solutions enable utilities to cost-effectively generate, deliver, manage and conserve the life-essential resources of gas, electricity and water. The group has over 7,500 staff and operations in 38 countries, focused in North and South America, Europe, and Asia.

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Printed in the United States of America.