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Cordex® CXC HP Controller Modbus Integrator Guide

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Read this document carefully.
Learn how to protect your equipment from damage and fully understand its functions.

NOTICE

For the latest version of software, firmware, and product documentation, visit the Alpha® website, www.alpha.com or www.alpha.ca.

NOTICE

Photographs contained in this document are for illustrative purposes only. These photographs may not match your installation.

NOTICE

Operator is cautioned to review the drawings and illustrations contained in this document before proceeding. If there are questions regarding the safe operation of this powering system, contact Alpha Technologies Ltd. or your nearest Cordex® power system representative.

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1. Safety

SAVE THESE INSTRUCTIONS: This document contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this document before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies Ltd. or the nearest Alpha® power system representative.

Safety wording and symbols

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this document. Where these symbols appear, use extra care and attention.

Attention: *The use of attention indicates specific regulatory or code requirements that may affect the placement of equipment or installation procedures.*

Note: *Notices provide additional information to help complete a specific task or procedure.*

Important: *Follow the prescribed procedures to avoid equipment damage or service interruption.*

CAUTION: *Cautions indicate safety information intended to PREVENT DAMAGE to material or equipment.*

Warning: *Warnings present safety information to PREVENT INJURY OR DEATH to personnel.*

CAUTION: *HOT! The use of Hot presents safety information to PREVENT BURNS to the technician or user*

General warning and cautions

Warning: *You must read and understand the following warnings before installing the system and its components. Failure to do so could result in personal injury or death.*

- Read and follow all instructions included in this manual.
- Only trained personnel are qualified to install or replace this equipment and its components.
- Use proper lifting techniques whenever handling equipment, parts, or batteries.

2. Introduction

2.1. Overview

The purpose of this document is to provide information on how to use Cordex® CXC HP system controller and software along with Modbus. This document contains information on setup and operation of Modbus using the controller.

2.2. Purpose and audience

The audience for this manual are engineers, technicians, IT professionals, and network operation personnel who are tasked with remote monitoring of the power system using Modbus. They should be well versed in the Modbus protocol as well as the network management, remote monitoring, or network operations center software and tools that will be used to monitor the controller.

2.3. Knowledge and permissions

It is assumed that you have a good working knowledge of, and access to, the following:

- Modbus monitoring software and tools
- Ethernet cables and TCP/IP settings needed to connect your computer to the controller
- Current version of Google Chrome, Mozilla Firefox, Microsoft Internet Explorer/Edge, or Apple Safari
- Power system that the controller currently controls
- Controller admin password and the appropriate level of permissions

3. Using Modbus

3.1. Modbus capabilities on the Cordex® CXC HP controller

A Modbus client connects to the controller over an Ethernet TCP/IP connection to request data. Modbus RTU is not directly supported, but third-party devices are available to translate from TCP/IP to RTU and vice versa. A Modbus request consists of a device ID, a register code, a register address, and a length.

The controller Modbus agent:

- Supports multiple device IDs. The DC system limited data set ID and a full data set ID for the DC system and each AMPS HP2 modular inverter system. The data mapped to these sets are shown in the Modbus reference section.

- Represents data in the coil status and input status registers as boolean data (0 or 1)
- Represents data in the input register as 32-bit floating point values. There is one exception to this: serial numbers of modules like ADIO or rectifiers are displayed as 32-bit integers.
- Value returned for a register that does not contain data is 0.
- Value returned for a register that has unknown data, corresponding to '---' on the controller UI, is 0xFFFFFFFF (or -1).
- Value returned for a status register that has been deprecated is 0.
- Value returned for an input register that has been deprecated is 999999999.
- Value returned for an input register that does not exist on the controller (but is needed for backwards compatibility or cross-compatibility with other systems) is 0xFFFFFFFF (or -1).

The Modbus agent supports three of the four common registers per device ID:

1. Coil Status (01) to hold status of relays, range 1 to 9999.
2. Input Status (02) to hold status of boolean data like alarms or digital inputs, range 10001 to 19999.
3. Input Register (04) to hole numeric values, range 30001 to 39999.

The Holding Register (03) commonly used to write data, is not supported.

3.2. Modbus setup

To enable Modbus TCP/IP on the controller, you need to configure certain parameters:

To enable the **Modbus Agent**, go to **Controller > Communication > Modbus**. Select the **EDIT** button next to **Modbus Agent** in the **Configuration** table and select **Enabled** in the dropdown list. Select the **EDIT** button next to **Byte Order** to confugure the byte order.

Figure 3-1 Enabling the Modbus agent

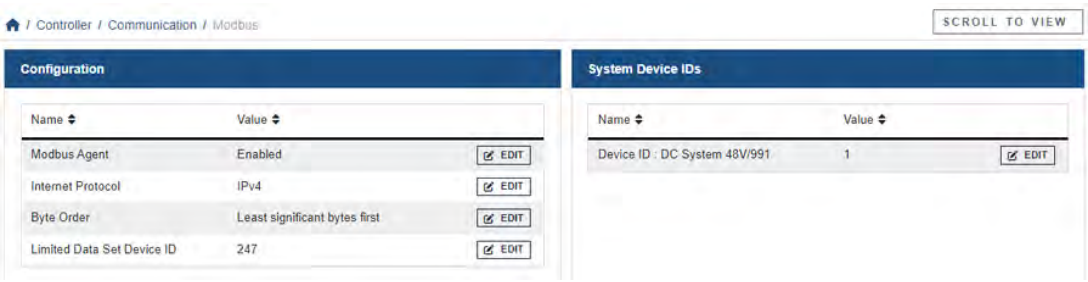


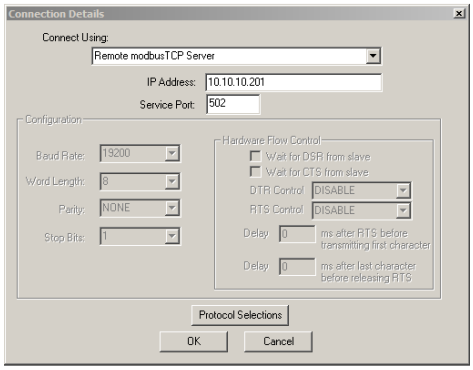
Table 3-1 Configuration

Name	Description
Modbus Agent	Enables or disables Modbus service. When enabled, the service is initialized and the controller is ready to accept requests. The controller serves data for both the limited and full data set. The default value is **Disabled**.
Internet Protocol	The Internet Protocol IPv4 or IPv6 to be used for communication.
Byte Order	Changes the byte order of 32-bit data. This setting is used to change whether the most or least significant byte comes first. This setting should be set according to the requirements of the Modbus client. The client will decode and format data needed to understand the correct byte order. The default value is **Least significant bytes first**. Reverse the bytes for the input values registers (function code 4). These values are stored as 32-bit floating point and occupy 2 registers each. By default the values are stored with least significant bytes first (little endian).
Limited Data Set ID	This ID is a small set of DC system data. See the Modbus reference section for the data mapping. The default is 247, the range is 241 to 250. The data available through this device ID provides a limited view of the DC system information.
Device ID	This table has a device ID for each supported system. Device IDs are automatically assigned when systems are created. The devices IDs must be unique. See the Modbus reference section for the data mapping. The range is 1 to 240.

Client application setup

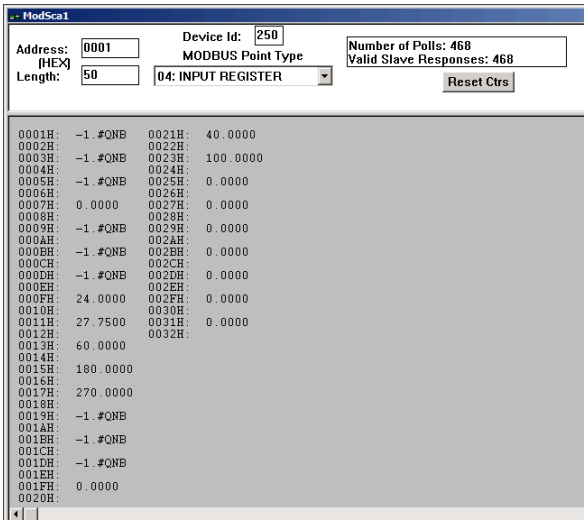
Client applications connect to the controller through TCP/IP via a Modbus client. The standard Modbus service port 502 is used. The sample application used for the following figure, is Modscan32 available at **WinTECH Software Design** www.win-tech.com.

Figure 3-2 Modbus connection configuration



Once a connection is made, data is polled automatically at the given device ID, address, and length as shown.

Figure 3-3 Modbus data example



Device ID: Provides specific data of interest for that device ID.

Address: Provides the starting address of the data block.

Length: Provides the length of the data block.

Modbus Point Type: The register channel of the data. The example shows Command code 04 - Input Register (read-only data).

Note: *The data shown have "unknown" or unsupported values represented as the floating point value of 0xFFFFFFFF (-1.#QB). Non-available data or data addresses that are not populated display as 0.*

3.3. Modbus data

There are two types of data available over Modbus: limited data set and a full system data set for the DC system and each AMPS HP2 modular inverter system.

3.3.1. Limited data set

The Limited Data Set has a small number of DC system related parameters. This data set uses only the input registers table (04). The default **Limited Data Set Device ID** is 247. For a list of available data refer to the *Limited data set data points* section.

3.3.2. Full system data set

A full system data set is available for the DC system and each AMPS HP2 modular inverter system. This data set has all parameters related to the system as well as other data such as custom, data, timers, counters, and ADIO readings. Three Modbus registers are used: coils status (01), input status (02), input register (04). The default device ID is 1.

The structure of a full system data set is much different than for the Limited Data Set. When working with the controller, it is possible to create and remove inventory to match a physical system, or to create and remove things like user alarms, custom data, timers, and counters. Because of this dynamic nature there are limits to the number of item that can be assigned Modbus addresses.

The data available for each device ID always includes controller data. The following tables show the types of data contained in the Modbus table, the starting address for each type of data, and the limitation to the number of data supported. Note that system data always starts at address 5001.

Table 3-2 Modbus address allocation for common controller data

Source	Maximum number of source items	Start of coil status register (01)	Start of input status register (02)	Start of values register (04)
Controller	1	1	10001	30001
Custom Data	128	203	10203	30203
Timers	128	717	10717	30717
Counters	128	1231	11231	31231
User alarms	64	1745	11745	31745
reserved	1	2003	12003	32003
ADIO	24	3541	13541	33541

Table 3-3 Modbus address allocation for DC system data

Source	Maximum number of source items	Start of coil status register (01)	Start of input status register (02)	Start of values register (04)
DC System	1	5001	15001	35001
DC System: Battery	1	5157	15157	35157
DC System: Loads	120	5183	15183	35183
DC system: Shunt	120	6385	16385	36385
DC system: CT	120	6627	16627	36627
DC system: Disconnect	10	6869	16869	36869
DC system: Rectifier	256	6991	16991	36991

Table 3-4 Modbus address allocation for AMPS HP system data

Source	Maximum number of source items	Start of coil status register (01)	Start of input status register (02)	Start of values register (04)
AMPS HP System	1	5001	15001	35001
AMPS HP System : Breakers/Fuses	10	6503	16503	36503
AMPS HP System : Bypass Switch	5	6625	16625	36625
AMPS HP System : T2S	4	6707	16707	36707
AMPS HP System : Inverters	32	6773	16773	36773

This table shows:

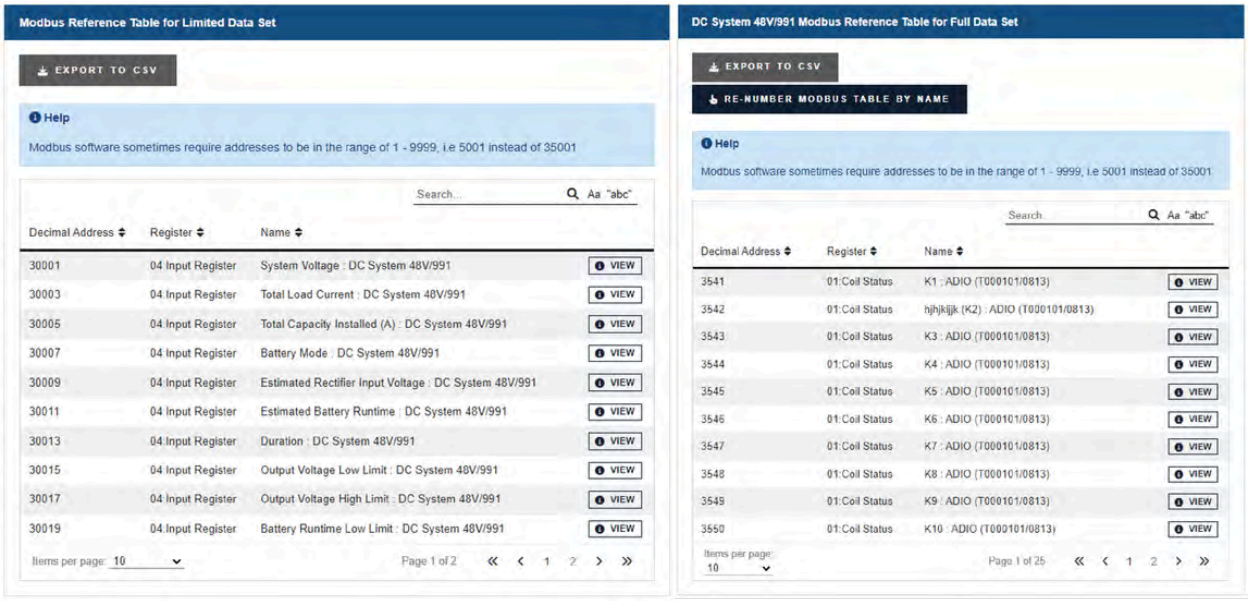
- Source item that has Modbus data available
- Maximum number of items that can be viewed over Modbus in each register
- Starting address for each type of data.

Note: *Modbus client software sometimes requires addresses to be entered in the range 1 to 9999. If this is the case, drop the leftmost digit for addresses that are greater than 9999. The Modbus client software will then use the combination of register and address to formulate the correct address for the query.*

Not all register addresses will be populated with data. For example, the controller does not actually have any coils (relays). A request for coil data at address 1 will return zero.

The Modbus reference table on the controller web interface provides specific addresses for particular data points.

Modbus reference tables



Modbus addressing follows these rules when changing system configuration:

- When an item is created, such as custom data, or a shunt, the item is assigned Modbus addresses for its data. These addresses will not change unless the item is removed, or the **Re-number Modbus Table by Name** button is selected.
- Removing an item leaves a gap in the address table. If a new item is created, it will fill the next available address. If there are no gaps, it is added to the end
- Modbus addresses are local to the controller. They cannot be transfered. If necessary, to align Modbus addresses between identical or similar systems, see the procedure in the *How to create identical modbus structure* section.
- When importing a configuration, the newly imported items are sorted by name first, then assigned the first available Modbus address. Existing Modbus addresses are not changed.

3.4. How to create an identical Modbus structure

The dynamic nature of creating and configuring a controller means that Modbus addresses may not be identical between identical systems. These instructions describe how to create the same Modbus structure between identical systems. If you are using the Limited Data Set only, then the Modbus addresses are already static and it is not necessary to follow these instructions. If you are using a full Modbus system data set, follow these instructions:

1. Create your system and configure all it's inventory, custom data, timers, counters, user alarms, and ADIO module.
2. Name all your inventory (for example, shunts and loads), custom data, timers, counters, user alarms, and ADIO module with a number as a prefix. For example, if you have two loads that you have already named: “Radio (150W)” and “Juniper Router”. Change the names to “(01) Radio (15W)” and “(02) Juniper Router”. This prefix helps to explicitly define the order of the Modbus data. Note the format of the number (“01”) has a preceding zero. If there are more than nine items of the same type, this preceding zero is required to ensure that the sorting is correct. If there are more than 99 items of the same type, two preceding zeros are required (“001”).

   It is not possible to apply names to power modules
3. Select the **Re-number Modbus Table By Name** button on the **Full Data Set** table. This sorts all the Modbus data of the same type alphanumerically and reassigns addresses
4. Export a clone of the system and import it to another system. On import, the Modbus items are sorted in the same way as is done when the **Re-number Modbus Table By Name** is selected.
5. Perform a **Replace ADIO** operation to transfer the ADIO configuration of an imported ADIO to an existing ADIO

After importing the clone, the Modbus structure on the two identical systems is the same.

3.5. Modbus reference

3.5.1. Full system data set data points

This section lists the data points for each type of item that is available through Modbus. Because of the dynamic nature of the configuration, it is not possible to show a static Modbus table with addresses for a system. Use the **Export to CSV** button on the web interface to generate and download a Modbus table with addresses for a specific system. Each table has three columns:

- **Name:** The name of the data.
- **Register:** The Modbus register where the data resides.
- **Format:** The format of the data. To display data correctly, Modbus clients must have the right data format specified in the correct order.

3.5.1.1. Data points

Table 3-5 Controller data points

Name	Register	Format
Disk Almost Full	02:Input Status	Boolean
Clock Error	02:Input Status	Boolean
CAN Devices In Bootloader	02:Input Status	Boolean

Table 3-5 Controller data points (continued)

Name	Register	Format
ADIO Comms Lost	02:Input Status	Boolean
Temporary License In Use	02:Input Status	Boolean
Temporary License Expired	02:Input Status	Boolean
Required Feature License Missing	02:Input Status	Boolean
Unassigned Modules	02:Input Status	Boolean
Duplicate SNMP Component Reference	02:Input Status	Boolean
Restart Required	02:Input Status	Boolean
Number Of Bit Errors High	02:Input Status	Boolean
Memory Usage High	02:Input Status	Boolean
CAN Module Communication Lost Count High	02:Input Status	Boolean
CAN Module Communication Lost Count Very High	02:Input Status	Boolean
Controller: Time Since Restart	04:Input Register	32-bit Floating Point

Table 3-6 Custom data data points

Name	Register	Format
Custom Data: Result as Numeric	04:Input Register	32-bit Floating Point

Table 3-7 Timers data points

Name	Register	Format
Interval Timer: Output	02:Input Status	Boolean
Delay Timer: Output	02:Input Status	Boolean
Delay Timer: Delay Time Remaining	04:Input Register	32-bit Floating Point

Table 3-8 Counters data points

Name	Register	Format
Down Counter: Input	02:Input Status	Boolean
Up Counter: Input	02:Input Status	Boolean
Down Counter: Output	04:Input Register	32-bit Floating Point
Up Counter: Output	04:Input Register	32-bit Floating Point

Table 3-9 User alarms data points

Name	Register	Format
Threshold User Alarm/835: User-Defined	02:Input Status	Boolean
Digital User Alarm/547: User-Defined	02:Input Status	Boolean

Table 3-10 Cordex® CXC HP L-ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean
K4	01:Coil Status	Boolean
K5	01:Coil Status	Boolean
K6	01:Coil Status	Boolean
K7	01:Coil Status	Boolean
K8	01:Coil Status	Boolean
K9	01:Coil Status	Boolean
K10	01:Coil Status	Boolean
K11	01:Coil Status	Boolean
K12	01:Coil Status	Boolean
D1	02:Input Status	Boolean

Table 3-10 Cordex® CXC HP L-ADIO data points (continued)

Name	Register	Format
D2	02:Input Status	Boolean
D3	02:Input Status	Boolean
D4	02:Input Status	Boolean
D5	02:Input Status	Boolean
D6	02:Input Status	Boolean
D7	02:Input Status	Boolean
D8	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
Temperature Sensor #3 Failure	02:Input Status	Boolean
Temperature Sensor #4 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
V3	04:Input Register	32-bit Floating Point
V4	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point
T2	04:Input Register	32-bit Floating Point
T3	04:Input Register	32-bit Floating Point
T4	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point
I2	04:Input Register	32-bit Floating Point
I3	04:Input Register	32-bit Floating Point
I4	04:Input Register	32-bit Floating Point

Table 3-11 Cordex® CXC HP 6i-ADIO data points

Name	Register	Format
CAN Serial Number	04:Input Register	32-bit Integer

Table 3-11 Cordex® CXC HP 6i-ADIO data points (continued)

Name	Register	Format
I1	04:Input Register	32-bit Floating Point
I2	04:Input Register	32-bit Floating Point
I3	04:Input Register	32-bit Floating Point
I4	04:Input Register	32-bit Floating Point
I5	04:Input Register	32-bit Floating Point
I6	04:Input Register	32-bit Floating Point

Table 3-12 Cordex® CXC HP HV-ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean
K4	01:Coil Status	Boolean
K5	01:Coil Status	Boolean
K6	01:Coil Status	Boolean
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
D3	02:Input Status	Boolean
D4	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
Ground Fault Resistance Low	02:Input Status	Boolean
Ground Fault Current High	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
GFD Current	04:Input Register	32-bit Floating Point
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point

Table 3-12 Cordex® CXC HP HV-ADIO data points (continued)

Name	Register	Format
T2	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point
DCCT1	04:Input Register	32-bit Floating Point
DCCT2	04:Input Register	32-bit Floating Point

Table 3-13 Cordex® I/M1 ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean
K4	01:Coil Status	Boolean
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point
T2	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point

Table 3-14 PSU ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean

Table 3-14 PSU ADIO data points (continued)

Name	Register	Format
K4	01:Coil Status	Boolean
K5	01:Coil Status	Boolean
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point
T2	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point

Table 3-15 Shunt Mux ADIO data points

Name	Register	Format
CAN Serial Number	04:Input Register	32-bit Integer
I1	04:Input Register	32-bit Floating Point
I2	04:Input Register	32-bit Floating Point
I3	04:Input Register	32-bit Floating Point
I4	04:Input Register	32-bit Floating Point
I5	04:Input Register	32-bit Floating Point
I6	04:Input Register	32-bit Floating Point
I7	04:Input Register	32-bit Floating Point
I8	04:Input Register	32-bit Floating Point
I9	04:Input Register	32-bit Floating Point
I10	04:Input Register	32-bit Floating Point
I11	04:Input Register	32-bit Floating Point
I12	04:Input Register	32-bit Floating Point

Table 3-15 Shunt Mux ADIO data points (continued)

Name	Register	Format
I13	04:Input Register	32-bit Floating Point
I14	04:Input Register	32-bit Floating Point
I15	04:Input Register	32-bit Floating Point
I16	04:Input Register	32-bit Floating Point

Table 3-16 8R/8D ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean
K4	01:Coil Status	Boolean
K5	01:Coil Status	Boolean
K6	01:Coil Status	Boolean
K7	01:Coil Status	Boolean
K8	01:Coil Status	Boolean
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
D3	02:Input Status	Boolean
D4	02:Input Status	Boolean
D5	02:Input Status	Boolean
D6	02:Input Status	Boolean
D7	02:Input Status	Boolean
D8	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer

Table 3-17 BDFB ADIO data points

Name	Register	Format
K1	01:Coil Status	Boolean
K2	01:Coil Status	Boolean
K3	01:Coil Status	Boolean
K4	01:Coil Status	Boolean
K5	01:Coil Status	Boolean
K6	01:Coil Status	Boolean
K7	01:Coil Status	Boolean
K8	01:Coil Status	Boolean
K9	01:Coil Status	Boolean
K10	01:Coil Status	Boolean
K11	01:Coil Status	Boolean
K12	01:Coil Status	Boolean
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
D3	02:Input Status	Boolean
D4	02:Input Status	Boolean
D5	02:Input Status	Boolean
D6	02:Input Status	Boolean
D7	02:Input Status	Boolean
D8	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
Temperature Sensor #3 Failure	02:Input Status	Boolean
Temperature Sensor #4 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
V3	04:Input Register	32-bit Floating Point

Table 3-17 BDFB ADIO data points (continued)

Name	Register	Format
V4	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point
T2	04:Input Register	32-bit Floating Point
T3	04:Input Register	32-bit Floating Point
T4	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point
I2	04:Input Register	32-bit Floating Point
I3	04:Input Register	32-bit Floating Point
I4	04:Input Register	32-bit Floating Point

Table 3-18 E2 ADIO data points

Name	Register	Format
D1	02:Input Status	Boolean
D2	02:Input Status	Boolean
D3	02:Input Status	Boolean
D4	02:Input Status	Boolean
D5	02:Input Status	Boolean
D6	02:Input Status	Boolean
D7	02:Input Status	Boolean
D8	02:Input Status	Boolean
D9	02:Input Status	Boolean
D10	02:Input Status	Boolean
D11	02:Input Status	Boolean
D12	02:Input Status	Boolean
D13	02:Input Status	Boolean
D14	02:Input Status	Boolean
D15	02:Input Status	Boolean
D16	02:Input Status	Boolean

Table 3-18 E2 ADIO data points (continued)

Name	Register	Format
D17	02:Input Status	Boolean
D18	02:Input Status	Boolean
D19	02:Input Status	Boolean
D20	02:Input Status	Boolean
D21	02:Input Status	Boolean
D22	02:Input Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
V1	04:Input Register	32-bit Floating Point
V2	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point
T2	04:Input Register	32-bit Floating Point
I1	04:Input Register	32-bit Floating Point
I2	04:Input Register	32-bit Floating Point

Table 3-19 FlexAir® ADIO data points

Name	Register	Format
Relay 1 State	01:Coil Status	Boolean
Relay 2 State	01:Coil Status	Boolean
Temperature Sensor #1 Failure	02:Input Status	Boolean
Temperature Sensor #2 Failure	02:Input Status	Boolean
Temperature Sensor #3 Failure	02:Input Status	Boolean
Temperature Sensor #4 Failure	02:Input Status	Boolean
Temperature Sensor #5 Failure	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
Input Voltage	04:Input Register	32-bit Floating Point
T1	04:Input Register	32-bit Floating Point

Table 3-19 FlexAir® ADIO data points (continued)

Name	Register	Format
T2	04:Input Register	32-bit Floating Point
T3	04:Input Register	32-bit Floating Point
T4	04:Input Register	32-bit Floating Point
T5	04:Input Register	32-bit Floating Point
Fan 1 Speed	04:Input Register	32-bit Floating Point
Fan 2 Speed	04:Input Register	32-bit Floating Point
Fan 3 Speed	04:Input Register	32-bit Floating Point
Fan 4 Speed	04:Input Register	32-bit Floating Point
Fan 5 Speed	04:Input Register	32-bit Floating Point
Fan 6 Speed	04:Input Register	32-bit Floating Point
Fan 7 Speed	04:Input Register	32-bit Floating Point
Fan 8 Speed	04:Input Register	32-bit Floating Point

Table 3-20 Smart Bypass ADIO data points

Name	Register	Format
CAN Serial Number	04:Input Register	32-bit Integer
Utility Phase L1 Voltage	04:Input Register	32-bit Floating Point
Utility Phase L2 Voltage	04:Input Register	32-bit Floating Point
Utility Phase L3 Voltage	04:Input Register	32-bit Floating Point
Inverter Phase L1 Voltage	04:Input Register	32-bit Floating Point
Inverter Phase L2 Voltage	04:Input Register	32-bit Floating Point
Inverter Phase L3 Voltage	04:Input Register	32-bit Floating Point
AC Load Phase L1 Voltage	04:Input Register	32-bit Floating Point
AC Load Phase L2 Voltage	04:Input Register	32-bit Floating Point
AC Load Phase L3 Voltage	04:Input Register	32-bit Floating Point
Utility Phase L1 Current	04:Input Register	32-bit Floating Point
Utility Phase L2 Current	04:Input Register	32-bit Floating Point
Utility Phase L3 Current	04:Input Register	32-bit Floating Point

Table 3-20 Smart Bypass ADIO data points (continued)

Name	Register	Format
Inverter Phase L1 Current	04:Input Register	32-bit Floating Point
Inverter Phase L2 Current	04:Input Register	32-bit Floating Point
Inverter Phase L3 Current	04:Input Register	32-bit Floating Point
AC Load Phase L1 Current	04:Input Register	32-bit Floating Point
AC Load Phase L2 Current	04:Input Register	32-bit Floating Point
AC Load Phase L3 Current	04:Input Register	32-bit Floating Point

Table 3-21 Polarium Protocol Bridge data points

Name	Register	Format
Circuit Breaker Alert	02:Input Status	Boolean
Anti-Thief Protection Alert	02:Input Status	Boolean
Short Circuit Alert	02:Input Status	Boolean
Temperature Over Limit	02:Input Status	Boolean
Battery Under Voltage	02:Input Status	Boolean
Temperature Too Low	02:Input Status	Boolean
CAN Serial Number	04:Input Register	32-bit Integer
Number of Batteries	04:Input Register	32-bit Floating Point
# Batteries with Charge Blocked	04:Input Register	32-bit Floating Point
# Battery with Charge Completed	04:Input Register	32-bit Floating Point
Total Battery Current	04:Input Register	32-bit Floating Point
Average State of Charge	04:Input Register	32-bit Floating Point
Average State of Health	04:Input Register	32-bit Floating Point
Total Nominal Capacity	04:Input Register	32-bit Floating Point
Lowest State of Health	04:Input Register	32-bit Floating Point
Highest Cycle Count	04:Input Register	32-bit Floating Point
Highest Battery Voltage	04:Input Register	32-bit Floating Point
Lowest Battery Voltage	04:Input Register	32-bit Floating Point
Lowest Float-Charging Voltage	04:Input Register	32-bit Floating Point

Table 3-21 Polarium Protocol Bridge data points (continued)

Name	Register	Format
Lowest Full-Charging Voltage	04:Input Register	32-bit Floating Point
Highest Charge Current Percentage	04:Input Register	32-bit Floating Point
Highest Temperature	04:Input Register	32-bit Floating Point
Lowest Temperature	04:Input Register	32-bit Floating Point
Bay ID	04:Input Register	32-bit Floating Point
Shelf ID	04:Input Register	32-bit Floating Point
Slot ID	04:Input Register	32-bit Floating Point

Table 3-22 DC system data points

Name	Register	Format
AC Input Voltage High	02:Input Status	Boolean
AC Input Voltage Low	02:Input Status	Boolean
Long Term AC Input Fail	02:Input Status	Boolean
Output Voltage High	02:Input Status	Boolean
Output Voltage Very High	02:Input Status	Boolean
Output Voltage Low	02:Input Status	Boolean
Output Voltage Very Low	02:Input Status	Boolean
Invalid System Voltage Reading	02:Input Status	Boolean
Battery On Discharge (Deprecated)	02:Input Status	Boolean
Rectifier Fail	02:Input Status	Boolean
Rectifier Fail Count Very High	02:Input Status	Boolean
Rectifier Fail Count High	02:Input Status	Boolean
Rectifier Minor	02:Input Status	Boolean
Rectifier Communication Lost	02:Input Status	Boolean
AC Input Fail	02:Input Status	Boolean
Fan Fail	02:Input Status	Boolean
Battery Test (Deprecated)	02:Input Status	Boolean

Table 3-22 DC system data points (continued)

Name	Register	Format
Temp Comp Measurement Fail (Deprecated)	02:Input Status	Boolean
Temp Comp Voltage Warning (Deprecated)	02:Input Status	Boolean
Battery Runtime Low	02:Input Status	Boolean
Battery Health Low (Deprecated)	02:Input Status	Boolean
Rectifier Configuration Error	02:Input Status	Boolean
Insufficient Capacity Remaining (A)	02:Input Status	Boolean
Insufficient Capacity Remaining (W)	02:Input Status	Boolean
Missing Rectifier	02:Input Status	Boolean
Rectifier AC Fail Count High	02:Input Status	Boolean
Rectifier AC Fail Count Very High	02:Input Status	Boolean
Total Load Current High	02:Input Status	Boolean
Total Load Current Very High	02:Input Status	Boolean
System Voltage	04:Input Register	32-bit Floating Point
Estimated AC Input Voltage	04:Input Register	32-bit Floating Point
Total Load Current	04:Input Register	32-bit Floating Point
Expected Load Current in AC Fail	04:Input Register	32-bit Floating Point
Battery Voltage	04:Input Register	32-bit Floating Point
Battery Current	04:Input Register	32-bit Floating Point
Total Output Current	04:Input Register	32-bit Floating Point
Total Output Power	04:Input Register	32-bit Floating Point
Total Capacity Installed (A)	04:Input Register	32-bit Floating Point
Total Capacity Installed (W)	04:Input Register	32-bit Floating Point
Estimated Capacity Remaining (A)	04:Input Register	32-bit Floating Point
Estimated Capacity Remaining (W)	04:Input Register	32-bit Floating Point
Average Rectifier Output Voltage	04:Input Register	32-bit Floating Point
Estimated AC Phase 1 Voltage	04:Input Register	32-bit Floating Point
Estimated AC Phase 2 Voltage	04:Input Register	32-bit Floating Point

Table 3-22 DC system data points (continued)

Name	Register	Format
Estimated AC Phase 3 Voltage	04:Input Register	32-bit Floating Point
Estimated Required Capacity	04:Input Register	32-bit Floating Point
Estimated Available Capacity	04:Input Register	32-bit Floating Point
Estimated Redundant Capacity	04:Input Register	32-bit Floating Point
Estimated Standby Capacity	04:Input Register	32-bit Floating Point
# Acquired Rectifiers	04:Input Register	32-bit Floating Point
# Sourcing Rectifiers	04:Input Register	32-bit Floating Point
# Failed Rectifiers	04:Input Register	32-bit Floating Point
# Minor Alarm Rectifiers	04:Input Register	32-bit Floating Point
# Non-Communicating Rectifiers	04:Input Register	32-bit Floating Point
# Communicating Rectifiers	04:Input Register	32-bit Floating Point
# AC Failed Rectifiers	04:Input Register	32-bit Floating Point
# Power Limiting Rectifiers	04:Input Register	32-bit Floating Point
# Current Limiting Rectifiers	04:Input Register	32-bit Floating Point
# Fan Fail Rectifiers	04:Input Register	32-bit Floating Point
# Rectifiers in Bootloader	04:Input Register	32-bit Floating Point
Battery Temperature	04:Input Register	32-bit Floating Point
Estimated State of Charge (Deprecated)	04:Input Register	32-bit Floating Point
Estimated Battery Runtime	04:Input Register	32-bit Floating Point
Estimated Battery Health (Deprecated)	04:Input Register	32-bit Floating Point
# Modules Supplying Power	04:Input Register	32-bit Floating Point
# Modules In Standby	04:Input Register	32-bit Floating Point
# Maximum Rectifier Ambient Temperature	04:Input Register	32-bit Floating Point
# Load Current	04:Input Register	32-bit Floating Point

Table 3-23 DC system lead-acid battery data points

Name	Register	Format
Battery Charge Current High	02:Input Status	Boolean
Battery Temperature High	02:Input Status	Boolean
Battery Temperature Low	02:Input Status	Boolean
Battery Breaker/Fuse Open	02:Input Status	Boolean
Midpoint #1 Unbalanced (Deprecated)	02:Input Status	Boolean
Midpoint #2 Unbalanced (Deprecated)	02:Input Status	Boolean
Battery Temperature Anomaly	02:Input Status	Boolean
Battery Mode	04:Input Register	32-bit Floating Point This value corresponds to the mode of the battery as follows: • Unknown = 0 • NoBattery = 1 • Disconnected = 2 • Discharging = 3 • Charging = 5 • Battery Test = 6 • Float = 10 • Equalize = 11 • Boost = 12

Table 3-24 DC System Polarium battery data points

Name	Register	Format
Battery Temperature High	02:Input Status	Boolean
Battery Temperature Low	02:Input Status	Boolean
Battery Breaker/Fuse Open	02:Input Status	Boolean
Battery On Discharge	02:Input Status	Boolean
Voltage	04:Input Register	32-bit Floating Point
Current	04:Input Register	32-bit Floating Point

Table 3-24 DC System Polarium battery data points (continued)

Name	Register	Format
Power	04:Input Register	32-bit Floating Point
Battery Mode	04:Input Register	32-bit Floating Point This value corresponds to the mode of the battery as follows: • Unknown = 0 • NoBattery = 1 • Discharging = 3 • Charging = 5 • Float = 10
Battery Capacity Rating	04:Input Register	32-bit Floating Point
Active Temperature	04:Input Register	32-bit Floating Point
Minimum Temperature	04:Input Register	32-bit Floating Point
Maximum Temperature	04:Input Register	32-bit Floating Point
Breaker/Fuse	04:Input Register	32-bit Floating Point This value corresponds to the combined status of the breakers of all the batteries in the system, as follows: • All breakers closed = 0 • One or more breakers open = 1

Table 3-25 DC system loads data points

Name	Register	Format
Inverter System Load: Load Voltage High	02:Input Status	Boolean
Inverter System Load: Load Current High	02:Input Status	Boolean
Inverter System Load: Load Breaker/Fuse Open	02:Input Status	Boolean
Inverter System Load: Load Voltage Low	02:Input Status	Boolean

Table 3-25 DC system loads data points (continued)

Name	Register	Format
Load: Load Voltage High	02:Input Status	Boolean
Load: Load Current High	02:Input Status	Boolean
Load: Load Breaker/Fuse Open	02:Input Status	Boolean
Load: Load Voltage Low	02:Input Status	Boolean
Inverter System Load: Current	04:Input Register	32-bit Floating Point
Ref. Load: Current	04:Input Register	32-bit Floating Point
Load: Current	04:Input Register	32-bit Floating Point

An example of each type of load is given in the table: Inverter System Load, Load, and Referenced Load (Ref. Load)

Table 3-26 DC system disconnects data points

Name	Register	Format
Disconnect: Disconnect Inhibit	02:Input Status	Boolean
Disconnect: Disconnect Pending	02:Input Status	Boolean
Disconnect: Disconnect Active	02:Input Status	Boolean
Disconnect: Disconnect Open	02:Input Status	Boolean
Disconnect: Manually Closed	02:Input Status	Boolean
Disconnect: Manually Open	02:Input Status	Boolean
Disconnect: Contactor State Error	02:Input Status	Boolean

Table 3-27 DC system shunts data point

Name	Register	Format
Shunt/348: Current	04:Input Register	32-bit Floating Point

Table 3-28 DC system current transducer (CT) data point

Name	Register	Format
CT/397: Current	04:Input Register	32-bit Floating Point

Table 3-29 DC system rectifiers data points

Name	Register	Format
CAN Serial Number	04:Input Register	32-bit Integer
AC Input Voltage	04:Input Register	32-bit Floating Point
Output Current	04:Input Register	32-bit Floating Point
Ambient Temperature	04:Input Register	32-bit Floating Point
Output Voltage	04:Input Register	32-bit Floating Point
Bay ID	04:Input Register	32-bit Floating Point
Shelf ID	04:Input Register	32-bit Floating Point
Slot ID	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points

Name	Register	Format
T2S Comms Lost	02:Input Status	Boolean
Inverter Comms Lost	02:Input Status	Boolean
Inverter Fan Failure	02:Input Status	Boolean
Inverter Internal Error	02:Input Status	Boolean
Inverter Restarts	02:Input Status	Boolean
Inverter Overload	02:Input Status	Boolean
Inverter Configuration Error	02:Input Status	Boolean
Inverter Output Voltage Change in Progress	02:Input Status	Boolean
Inverter Not Ready	02:Input Status	Boolean
Inverter Temperature Derating	02:Input Status	Boolean

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
Inverter Low Input Voltage Brownout	02:Input Status	Boolean
Inverter Fan Life Elapsed	02:Input Status	Boolean
Inverter Off	02:Input Status	Boolean
Inverter AC Input Voltage Low	02:Input Status	Boolean
Inverter AC Input Voltage High	02:Input Status	Boolean
Inverter AC Input Error	02:Input Status	Boolean
Inverter Frequency Out of Range	02:Input Status	Boolean
Inverter DC Input Voltage Low	02:Input Status	Boolean
Inverter DC Input Voltage High	02:Input Status	Boolean
T2S Digital Input 1	02:Input Status	Boolean
T2S Digital Input 2	02:Input Status	Boolean
Redundancy Lost	02:Input Status	Boolean
All Redundancy Lost	02:Input Status	Boolean
Phase Saturated	02:Input Status	Boolean
Main Source Lost	02:Input Status	Boolean
Secondary Source Lost	02:Input Status	Boolean
T2S Fail	02:Input Status	Boolean
T2S Log Nearly Full	02:Input Status	Boolean
System Error	02:Input Status	Boolean
Inverter Imminent Shutdown	02:Input Status	Boolean
TUS Synchronization Error	02:Input Status	Boolean
TUS Internal Error	02:Input Status	Boolean
TUS Configuration Error	02:Input Status	Boolean
T2S Refusing Commands	02:Input Status	Boolean
Missing T2S	02:Input Status	Boolean
AC Output Power (VA)	04:Input Register	32-bit Floating Point
Average Output Loading	04:Input Register	32-bit Floating Point
DC Input	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
System Mode	04:Input Register	32-bit Floating Point • Line = 1 • Inverter = 2 • AC Input Power Limit = 3 • Bypass = 4 • Manual = 5 • Unlicensed = 6
Phase 1 Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 2 Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 3 Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 1 Output Power (W)	04:Input Register	32-bit Floating Point
Phase 2 Output Power (W)	04:Input Register	32-bit Floating Point
Phase 3 Output Power (W)	04:Input Register	32-bit Floating Point
AC Output Voltage	04:Input Register	32-bit Floating Point
DC Input Current	04:Input Register	32-bit Floating Point
DC Input Voltage	04:Input Register	32-bit Floating Point
DC Input Power	04:Input Register	32-bit Floating Point
System On Bypass	04:Input Register	32-bit Floating Point
AC Input Power (VA)	04:Input Register	32-bit Floating Point
# Communicating Inverters	04:Input Register	32-bit Floating Point
# Failed Inverters	04:Input Register	32-bit Floating Point
# Replace Fan Inverters	04:Input Register	32-bit Floating Point
# Comms Lost Inverters	04:Input Register	32-bit Floating Point
# Comms Lost T2S	04:Input Register	32-bit Floating Point
# T2S Not Accepting Commands	04:Input Register	32-bit Floating Point
# T2S	04:Input Register	32-bit Floating Point
Number Of Phases	04:Input Register	32-bit Floating Point
Number Of DC Input Groups (Feeds)	04:Input Register	32-bit Floating Point
Supported by All T2S	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
Supported by All Inverters	04:Input Register	32-bit Floating Point
Expected DC Input Current in AC Failure	04:Input Register	32-bit Floating Point
Highest Phase Power % of Use	04:Input Register	32-bit Floating Point
Phase 1 AC Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 1 Output Voltage	04:Input Register	32-bit Floating Point
Phase 1 Output Current	04:Input Register	32-bit Floating Point
Phase 1 Output Frequency	04:Input Register	32-bit Floating Point
Phase 1 Phase Power (VA) % of Use	04:Input Register	32-bit Floating Point
Phase 1 Number Of Inverters On	04:Input Register	32-bit Floating Point
Phase 1 Phase Power (W) % of Use	04:Input Register	32-bit Floating Point
Phase 1 Measured DC Input To Output Power Ratio	04:Input Register	32-bit Floating Point
Phase 1 AC Input Power (W)	04:Input Register	32-bit Floating Point
Phase 1 AC Input Power (VA)	04:Input Register	32-bit Floating Point
Phase 1 AC Output Power (W)	04:Input Register	32-bit Floating Point
Phase 1 DC Input Power	04:Input Register	32-bit Floating Point
Phase 1 Current Number Of Redundant Inverters	04:Input Register	32-bit Floating Point
Phase 1 Number of Inverters Detected	04:Input Register	32-bit Floating Point
Phase 1 Number Of Inverters Off	04:Input Register	32-bit Floating Point
Phase 1 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
Phase 2 AC Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 2 Output Voltage	04:Input Register	32-bit Floating Point
Phase 2 Output Current	04:Input Register	32-bit Floating Point
Phase 2 Output Frequency	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
Phase 2 Phase Power (VA) % of Use	04:Input Register	32-bit Floating Point
Phase 2 Number Of Inverters On	04:Input Register	32-bit Floating Point
Phase 2 Phase Power (W) % of Use	04:Input Register	32-bit Floating Point
Phase 2 Measured DC Input To Output Power Ratio	04:Input Register	32-bit Floating Point
Phase 2 AC Input Power (W)	04:Input Register	32-bit Floating Point
Phase 2 AC Input Power (VA)	04:Input Register	32-bit Floating Point
Phase 2 AC Output Power (W)	04:Input Register	32-bit Floating Point
Phase 2 DC Input Power	04:Input Register	32-bit Floating Point
Phase 2 Current Number Of Redundant Inverters	04:Input Register	32-bit Floating Point
Phase 2 Number of Inverters Detected	04:Input Register	32-bit Floating Point
Phase 2 Number Of Inverters Off	04:Input Register	32-bit Floating Point
Phase 2 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
Phase 3 AC Output Power (VA)	04:Input Register	32-bit Floating Point
Phase 3 Output Voltage	04:Input Register	32-bit Floating Point
Phase 3 Output Current	04:Input Register	32-bit Floating Point
Phase 3 Output Frequency	04:Input Register	32-bit Floating Point
Phase 3 Phase Power (VA) % of Use	04:Input Register	32-bit Floating Point
Phase 3 Number Of Inverters On	04:Input Register	32-bit Floating Point
Phase 3 Phase Power (W) % of Use	04:Input Register	32-bit Floating Point
Phase 3 Measured DC Input To Output Power Ratio	04:Input Register	32-bit Floating Point
Phase 3 AC Input Power (W)	04:Input Register	32-bit Floating Point
Phase 3 AC Input Power (VA)	04:Input Register	32-bit Floating Point
Phase 3 AC Output Power (W)	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
Phase 3 DC Input Power	04:Input Register	32-bit Floating Point
Phase 3 Current Number Of Redundant Inverters	04:Input Register	32-bit Floating Point
Phase 3 Number of Inverters Detected	04:Input Register	32-bit Floating Point
Phase 3 Number Of Inverters Off	04:Input Register	32-bit Floating Point
Phase 3 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
AC Group 1 Input Voltage	04:Input Register	32-bit Floating Point
AC Group 1 Input Current	04:Input Register	32-bit Floating Point
AC Group 1 Input Frequency	04:Input Register	32-bit Floating Point
AC Group 1 AC Input Power (VA)	04:Input Register	32-bit Floating Point
AC Group 1 Number Of Inverters On	04:Input Register	32-bit Floating Point
AC Group 1 AC Input Power (W)	04:Input Register	32-bit Floating Point
AC Group 1 Number of Inverters Detected	04:Input Register	32-bit Floating Point
AC Group 1 Number Of Inverters Off	04:Input Register	32-bit Floating Point
AC Group 1 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
AC Group 2 Input Voltage	04:Input Register	32-bit Floating Point
AC Group 2 Input Current	04:Input Register	32-bit Floating Point
AC Group 2 Input Frequency	04:Input Register	32-bit Floating Point
AC Group 2 AC Input Power (VA)	04:Input Register	32-bit Floating Point
AC Group 2 Number Of Inverters On	04:Input Register	32-bit Floating Point
AC Group 2 AC Input Power (W)	04:Input Register	32-bit Floating Point
AC Group 2 Number of Inverters Detected	04:Input Register	32-bit Floating Point
AC Group 2 Number Of Inverters Off	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
AC Group 2 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
AC Group 3 Input Voltage	04:Input Register	32-bit Floating Point
AC Group 3 Input Current	04:Input Register	32-bit Floating Point
AC Group 3 Input Frequency	04:Input Register	32-bit Floating Point
AC Group 3 AC Input Power (VA)	04:Input Register	32-bit Floating Point
AC Group 3 Number Of Inverters On	04:Input Register	32-bit Floating Point
AC Group 3 AC Input Power (W)	04:Input Register	32-bit Floating Point
AC Group 3 Number of Inverters Detected	04:Input Register	32-bit Floating Point
AC Group 3 Number Of Inverters Off	04:Input Register	32-bit Floating Point
AC Group 3 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
DC Group 1 Input Voltage	04:Input Register	32-bit Floating Point
DC Group 1 Input Current	04:Input Register	32-bit Floating Point
DC Group 1 DC Input Power	04:Input Register	32-bit Floating Point
DC Group 1 Number Of Inverters On	04:Input Register	32-bit Floating Point
DC Group 1 Number Of Inverters Off	04:Input Register	32-bit Floating Point
DC Group 1 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
DC Group 1 Number of Inverters Detected	04:Input Register	32-bit Floating Point
DC Group 2 Input Voltage	04:Input Register	32-bit Floating Point
DC Group 2 Input Current	04:Input Register	32-bit Floating Point
DC Group 2 DC Input Power	04:Input Register	32-bit Floating Point
DC Group 2 Number Of Inverters On	04:Input Register	32-bit Floating Point

Table 3-30 AMPS HP modular inverter system data points (continued)

Name	Register	Format
DC Group 2 Number Of Inverters Off	04:Input Register	32-bit Floating Point
DC Group 2 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
DC Group 2 Number of Inverters Detected	04:Input Register	32-bit Floating Point
DC Group 3 Input Voltage	04:Input Register	32-bit Floating Point
DC Group 3 Input Current	04:Input Register	32-bit Floating Point
DC Group 3 DC Input Power	04:Input Register	32-bit Floating Point
DC Group 3 Number Of Inverters On	04:Input Register	32-bit Floating Point
DC Group 3 Number Of Inverters Off	04:Input Register	32-bit Floating Point
DC Group 3 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
DC Group 3 Number of Inverters Detected	04:Input Register	32-bit Floating Point
DC Group 4 Input Voltage	04:Input Register	32-bit Floating Point
DC Group 4 Input Current	04:Input Register	32-bit Floating Point
DC Group 4 DC Input Power	04:Input Register	32-bit Floating Point
DC Group 4 Number Of Inverters On	04:Input Register	32-bit Floating Point
DC Group 4 Number Of Inverters Off	04:Input Register	32-bit Floating Point
DC Group 4 Number Of Inverters Failed	04:Input Register	32-bit Floating Point
DC Group 4 Number of Inverters Detected	04:Input Register	32-bit Floating Point

Table 3-31 AMPS HP modular inverter system bypass switch with XMBS data points

Name	Register	Format
State	02:Input Status	Boolean
Bypass Active	02:Input Status	Boolean
Utility-Inverter Sync. Request Fault	02:Input Status	Boolean
Bypass Hardware Fault	02:Input Status	Boolean

Table 3-32 AMPS HP modular inverter system bypass switch data points

Name	Register	Format
State	02:Input Status	Boolean
Bypass Active	02:Input Status	Boolean

Table 3-33 AMPS HP modular inverter system breakers/fuse data points

Name	Register	Format
State	02:Input Status	Boolean
Open Breaker/Fuse	02:Input Status	Boolean

Table 3-34 AMPS HP modular inverter system T2S data points

Name	Register	Format
CAN Serial Number	04:Input Register	32-bit Integer
# Communicating Inverters	04:Input Register	32-bit Floating Point
# Comms Lost Inverters	04:Input Register	32-bit Floating Point

Table 3-35 AMPS HP modular inverter system TSI inverters data points

Name	Register	Format
AC Output Status	04:Input Register	32-bit Floating Point • On = 0

Table 3-35 AMPS HP modular inverter system TSI inverters data points (continued)

Name	Register	Format
		• Manual Off = 1 • Irrecoverable Error = 2 • Recoverable Error = 3
AC Input Status	04:Input Register	32-bit Floating Point See AC Output Status to decode
DC Input Status	04:Input Register	32-bit Floating Point See AC Output Status to decode
Phase	04:Input Register	32-bit Floating Point
AC In Group	04:Input Register	32-bit Floating Point
DC In Group	04:Input Register	32-bit Floating Point
AC Output Power (VA)	04:Input Register	32-bit Floating Point
Loading (VA)	04:Input Register	32-bit Floating Point
DC In Current	04:Input Register	32-bit Floating Point
Nominal Output Power	04:Input Register	32-bit Floating Point
Nominal Input Voltage	04:Input Register	32-bit Floating Point
Bay ID	04:Input Register	32-bit Floating Point
Shelf ID	04:Input Register	32-bit Floating Point
Slot ID	04:Input Register	32-bit Floating Point
Active Alerts	04:Input Register	32-bit Floating Point
Software Version	04:Input Register	32-bit Floating Point
Input Current	04:Input Register	32-bit Floating Point
AC Input Power (VA)	04:Input Register	32-bit Floating Point
Input Frequency	04:Input Register	32-bit Floating Point
DC Input Voltage	04:Input Register	32-bit Floating Point
Output Current	04:Input Register	32-bit Floating Point
AC Output Power (W)	04:Input Register	32-bit Floating Point
Loading (W)	04:Input Register	32-bit Floating Point
Temperature	04:Input Register	32-bit Floating Point

3.5.2. Limited data set data points

This section lists the available data points when using the limited data set.

3.5.2.1. Data points

This section lists the Modbus data values available for the limited data set.

Table 3-36 Limited data set data points

Decimal address	Register	Name	Format
30001	04:Input Register	System Voltage	32-bit Floating Point
30003	04:Input Register	Total Load Current	32-bit Floating Point
30005	04:Input Register	Total Capacity Installed in Amps	32-bit Floating Point
30007	04:Input Register	Battery Mode	32-bit Floating Point This value corresponds to the mode of the battery as follows: • Unknown = 0 • NoBattery = 1 • Disconnected = 2 • Discharging = 3 • Conditioning (FL or EQ) = 4 • Charging = 5 • Battery Test = 6
30009	04:Input Register	Estimated Rectifier AC Input Voltage	32-bit Floating Point
30011	04:Input Register	Estimated Battery Runtime	32-bit Floating Point
30013	04:Input Register	Last Discharge Duration	32-bit Floating Point
30015	04:Input Register	Output Voltage Low Alarm Limit	32-bit Floating Point
30017	04:Input Register	Output Voltage High Alarm Limit	32-bit Floating Point
30019	04:Input Register	Battery Runtime Low Alarm Limit	32-bit Floating Point
30021	04:Input Register	AC Mains Voltage Low Alarm Limit	32-bit Floating Point
30023	04:Input Register	AC Mains Voltage Hight Alarm Limit	32-bit Floating Point
30025	04:Input Register	Battery: Capacity Rating	32-bit Floating Point

Table 3-36 Limited data set data points (continued)

Decimal address	Register	Name	Format
30027	04:Input Register	Battery: Average Temperature	32-bit Floating Point
30029	04:Input Register	Battery: Current	32-bit Floating Point
30031	04:Input Register	Battery: Temperature Low Alarm Limit	32-bit Floating Point
30033	04:Input Register	Battery Temperature High Limit	32-bit Floating Point
30035	04:Input Register	Battery Charge Current High Limit	32-bit Floating Point

If the DC System on the Controller has a Polarium battery instead of a Lead-Acid battery, the last six registers of this table will be as follows:

Decimal Address	Register	Name	Format
30025	04:Input Register	Battery: Capacity Rating	32-bit Floating Point
30027	04:Input Register	Battery: Active Temperature	32-bit Floating Point
30029	04:Input Register	Battery: Current	32-bit Floating Point
30031	04:Input Register	Unsupported Value	32-bit Floating Point
30033	04:Input Register	Unsupported Value	32-bit Floating Point
30035	04:Input Register	Unsupported Value	32-bit Floating Point

4. Glossary

AC	Alternating current
ACCT	Alternating current current transducer
ADIO	Analog-digital input-output
Alarm	An alarm has user configurable fields like a name, priority, and it can is able to sent SNMP or email notifications when it becomes active or cleared.
ALCO	Alarm cutoff
Alert	An alert is status information about a module like a converter or rectifier. For example, "Module Fail" or "Current Limit".
CAN	Controller Area Network
CT	Current transducer
CX	Cordex® series; for example CXC for Cordex® System Controller
CXC	Cordex® controller
CXC HP	Cordex® CXC high performance controller
CXD	Cordex® DC-DC converter
CXR	Cordex® rectifier
DC	Direct current
DCCT	Direct current current transducer
DHCP	Dynamic Host Configuration Protocol
DOD	Depth of discharge
FCC	Federal Communications Commission
GUI	Graphical user interface
Hint	A hint is information about the state of the system or possible configuration problems.
ICMP	Internet Control Message Protocol
IEC®	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
LCD	Liquid crystal display
LED	Light-emitting diode
LVD	Low voltage disconnect
LVBD	Low voltage battery disconnect

MAC	Media Access Control; MAC address
MIB	Management Information Base; a database of entities most often associated with SNMP
MOV	Metal oxide varistor
MUX	Multiplexer
NEBS	Network Equipment-Building System; a set of safety, spatial and environmental guidelines for telecom
OLED	Organic light-emitting diode; in-shelf controller display
RFC	Request For Comments; a formal document (or standard) from the Internet Engineering Task Force (IETF)
SCI	Serial Communication Interface
SELV	Safety extra low voltage
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SOC	State of charge
TCP/IP	Transmission Control Protocol / Internet Protocol
Trap	An unsolicited SNMP event notification

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