Entellisys 5.0 Low-Voltage Switchgear Integrator's Guide

imagination at work

DEH-502

Warnings, Cautions, and Notes as used in this publication

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WARNING! Warning notices are used in this publication to emphasize that hazardous voltages, currents, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.

Cautions

CAUTION: Caution notices are used for situations in which equipment might be damaged if care is not taken.

Notes

NOTE: Notes call attention to information that is especially significant to understanding and operating the equipment.

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Third revision. Corresponds to Entellisys HMI version 5.0.

How to contact us

Please have your Entellisys System Summary # and Sub # ready when calling. This information can be found on the Entellisys HMI on the **System Health** screen by clicking the **Job Info** button.

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Contents

1 Control Features

Entellisys CPUs provide Voltage, Current, Power, breaker, discrete I/O status and control for 3rd party integrators. Allowing integrators to utilize the power of Entellisys for paralleling, load shedding or other power monitoring/control applications. The five main features are:

- **IEC61850 (GOOSE I/O):** A subset of the IEC 61850 standard and is used to transmit and receive discrete and analog information between devices. In Entellisys, GOOSE is implemented to communicate discrete bits of information only – status or commands – to other IEC 61850 GOOSE compliant devices. (See Section 10.2 in DEH-501)
- **PLC Inputs**: Provides external control inputs into FlexLogic.
- **Restricted Breaker Control**: Limits the ability for Entellisys HMIs or other Modbus devices to issue Open, Close or Trip commands to breakers
- **External Control Transfer**: Provides the ability for an external supervisory controller to dictate which CPU will run as the master.
- **System Status**: Provides status of all breakers and protective relays.

Both CPUA and CPUB are configured to operate as Modbus TCP servers and can service up to 4 devices on port 502 including any Remote HMI workstations. Remote HMI workstations are customer owned computers running the Entellisys Remote HMI Interactive or Viewer software.

(Note: All panel mounted HMI touchscreens are designed to operate on a different port and are not included as one of the port 502 devices.)

The Entellisys CPU recognizes one of the three available Modbus tables - the input register table. The Entellisys CPU also recognizes 3 Modbus function codes: 04, 06 and 16. (See section 3.5 on page 48)

Table 1-1 Modbus Function Codes

Function Code	Action	Supported	Table
01	Read Multiple	No	Discrete Coils (read-write)
02	Read Multiple	No	Discrete Inputs (read-only)
03	Read Multiple	No	Output Holding Registers
04	**Read Multiple**	**Yes**	**Input Registers**
05	Write Single	No	Discrete Coils
06	**Write Single**	**Yes**	**Input Registers**
15 (0F)	Write Multiple	No	Discrete Coils
16(10)	**Write Multiple**	**Yes**	**Input Registers**

CAUTION: Although the CPU protects critical areas, erroneous write commands may affect the performance of the gear.

1.1 PLC Inputs

PLC inputs provide the ability to manipulate FlexLogic execution. There are 256 PLC inputs, each of which have a corresponding operand that is accessible in FlexLogic. These inputs can be used to drive discrete output, begin a programmed FlexLogic sequence or operate a breaker directly.

Steps to sending a PLC Input to Entellisys

1. Configure the PLC Inputs in Entellisys: See Configuration on page 10.
2. Program the PLC: The PLC or other 3rd party Modbus client must be programmed to write to specific bits in the PLC Inputs State registers in the CPU Modus memory map starting at DC00. See PLC Input States (16 items) on page 135. To write to a PLC input:
   a. Determine which byte contains the PLC input to be updated. (See figure 1-2)
   b. Read the current register value.
   c. Apply a bit mask to update only relevant bits.
   d. Write back to the register.
3. **Test**: From the 3rd party Modbus client, write to each PLC input one at a time and verify that the correct PLC input has been toggled. See Status on page 10.
4. Program FlexLogic: PLC Inputs must now be programmed. See Chapter 11 in DEH-501 System User's Manual for more information on FlexLogic programming.
5. **Test FlexLogic**: FlexLogic changes must be tested.

PLC Inputs Registers holding state information

Each bit of the "PLC Input States" register represents one PLC input. Bit value 0 indicates the corresponding PLC input is in off state; and bit value is 1 indicating corresponding PLC input is in on state. See Table 1-2.

Table 1-2 PLC Input States register format

PLC Input States register	PLC Input States bit field	PLC Input X
1	0	1
	1	2
	2	3
	…	…
	15	16
2	0	17
	1	18
	…	…
…		
16	0	241
	1	242
	…	…
	15	256

Bit order

All 256 PLC inputs are stored in 16, 2 byte unsigned integer registers. The bit information is stored in the 2-byte register in little-endian format. I.e. PLC input 1 = least significant bit. Table 1-3, lists several examples to demonstrate how the bits are packed into each register.

Table 1-3 PLC Input examples

PLC Inputs On	Registers	Values	Binary
1 and 3	DC00	5	0000 0000 0000 0101
1, 3 and 16	DC00	32773	1000 0000 0000 0101
1, 3 and 20	DC00, DC00+1	5, 8	0000 0000 0000 0101 / 0000 0000 0000 1000

Example:

A 3rd party Modbus TCP client needs to be programmed to turn on PLC 23 which will, in turn, be programmed in FlexLogic to operate a breaker.

1. Determine which register PLC Input#23 resides: *2nd register, 7th bit. 23-16=7.*
2. Read DC01. *Returns 32773*
3. There are several other inputs that are configured, so a mask must be applied to manipulate just PLC input 23

   Original value: 1000 0000 0000 0101 (32773)

   Apply Mask

   To turn on PLC input 23, use the OR operation: OR 0000 0000 0100 0000 (64)

   To turn off PLC input 23, use the AND operation: AND 1111 1111 1011 1111 (65471)

   Write the result: 1000 0000 0100 0101 (32837)
4. Write 32837 to register DC01

Events:

If the “Events” parameter for the PLC Input is enabled, an event will be logged in the Events screen when the state has changed. 'x' in the text of event is a placeholder for number from range 1 to 256. Source of the events reports the CPU affected.

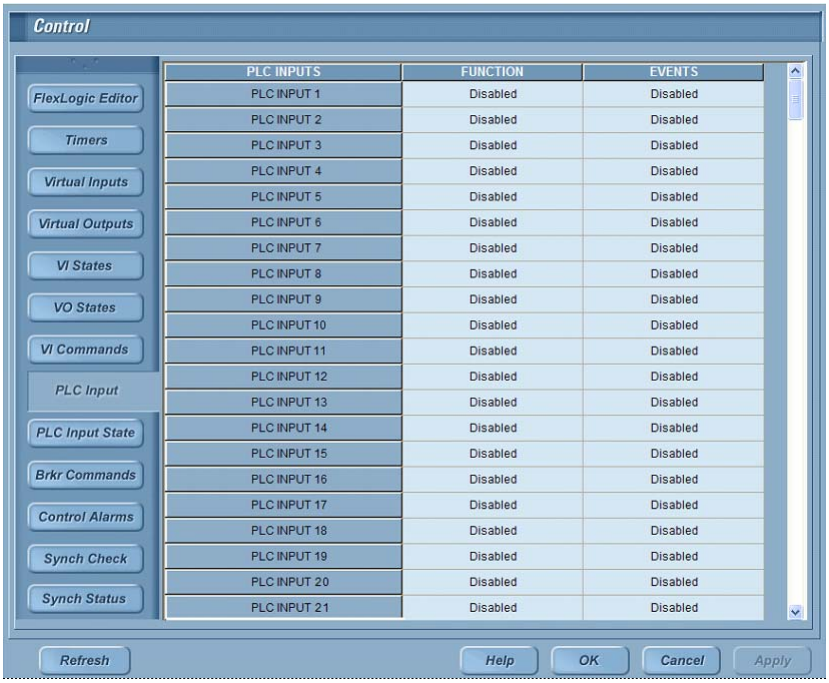
“PLC Input x On” - logged when PLC Input transitioned from low to high state.

“PLC Input x Off” - logged when PLC Input transitioned from high to low state.

1.1.1 Configuration

User must enable each PLC Input from the **PLC Input** screen (**Main Menu, User Settings, Control**).

Figure 1-1 PLC Input configuration screen



Function: Controls whether the input is either enabled or disabled. When input is disabled, FlexLogic always reads its state as low. If input is enabled, FlexLogic reads the state from corresponding Modbus register.

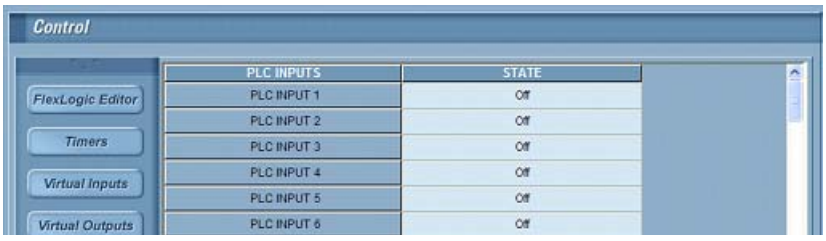
Events: When enabled, if there is transition of state, an event corresponding to the direction of the transition will be logged.

NOTE: The PLC input states are lost during a CPU power cycle event.

1.1.2 Status

To view a snapshot of the PLC input states from the HMI, open the **PLC Input State** screen (**Main Menu, User Settings, Control**). Click refresh if update the status.

Figure 1-2 PLC Input States register format



1.2 Breaker Control

In addition to PLC inputs, Modbus TCP clients can directly control the breakers by issuing breaker commands.

Because the Entellisys CPU employs only one Modbus table, breaker commands are sent to input registers rather than input coils. To send a command, a “1” must be written to the appropriate register.

Command for all breakers are relayed down to the messenger at the next protection pass, which occurs every 1/2 cycle.

NOTE: The 3rd party modbus client must send the write command to both CPUs to ensure the command reaches the Messenger.

The breaker command registers for all 30 breakers begin at address 4CD6 and repeating for each of up to 30 breakers. See SRC X Node Command Registers on page 86 for details and memory locations.

Table 1-4 Available Breaker Commands

Register offset from 4CD6	**Command**
0	Open Breaker 1
1	Close Breaker 1
2	Trip Breaker 1
3	Clear Energy on Breaker 1
5	Breaker 1 Remote Lockout Enabled
6	Breaker 1 Remote Lockout Reset

Modbus Security

For added security, a “Command Password” can be configured in the HMI. If set, the breaker command registers, as with all Entellisys command registers, will require the password to be sent first before the command. See Modbus Security on page 18 for more details on implementation. See Section 4.2 in DEH 500 System Administrator’s Manual for configuration details.

1.3 Restricted Breaker Control

In systems with certain supervisory control schemes, such as a paralleling gear application, it may be necessary to deny breaker control from the user or from other Modbus TCP clients.

Using the Restricted Breaker Control feature, a code can be added for open, close and trip operations for selected breakers. Each function (open/close/trip) can be configured independently for a selected breaker. When Restricted Breaker Control is enabled for a particular breaker, normal command registers are disabled and the CPU will expect the pre-configured code to be written to a different register for the respective breaker for open, close or trip commands.

NOTE: Restricted breaker control does NOT interfere with protective relays or FlexLogic and their ability to operate the breaker.

Enabling Restricted Breaker Control: See section 1.4.1 on page 15

Events:

Following events are issued when a restricted breaker receives either a open, close or trip command.

- **Breaker Open/Close/Trip Command Restricted Control Received**: CPU acknowledged that the "SRC X Open/Close/Trip Breaker By Restricted Control" register received the correct command code.
- **Breaker Open/Close/Trip Cmd Restricted Cntrl Incorrect Code**: CPU reported that the "SRC X Open/Close/Trip Breaker By Restricted Control" register received the incorrect command code.
- **Breaker Open/Close/Trip Cmd Restricted Control Not Enabled**: CPU reported that the "SRC X Open/Close/Trip Breaker By Restricted Control" register received a command but the Restricted Breaker Control is disabled.
- **Breaker Open/Close/Trip Command Restricted Control Enabled**: CPU acknowledged that the normal Open/Close/Trip command was rejected because the associated command was restricted for the breaker. See Setup on page 13.

Restricted Operation: (Restricted command enabled)

For restricted operations, the SRC X Node Command Registers on page 86 are ignored and the CPU will only send a open, close and trip command to a messenger if the value written to SRC X Restricted Breaker Control Registers on page 105 matches the code entered for the command in question in the "**Restricted Breaker Control"** setting screen. (See Setup on page 13)

Function Enable

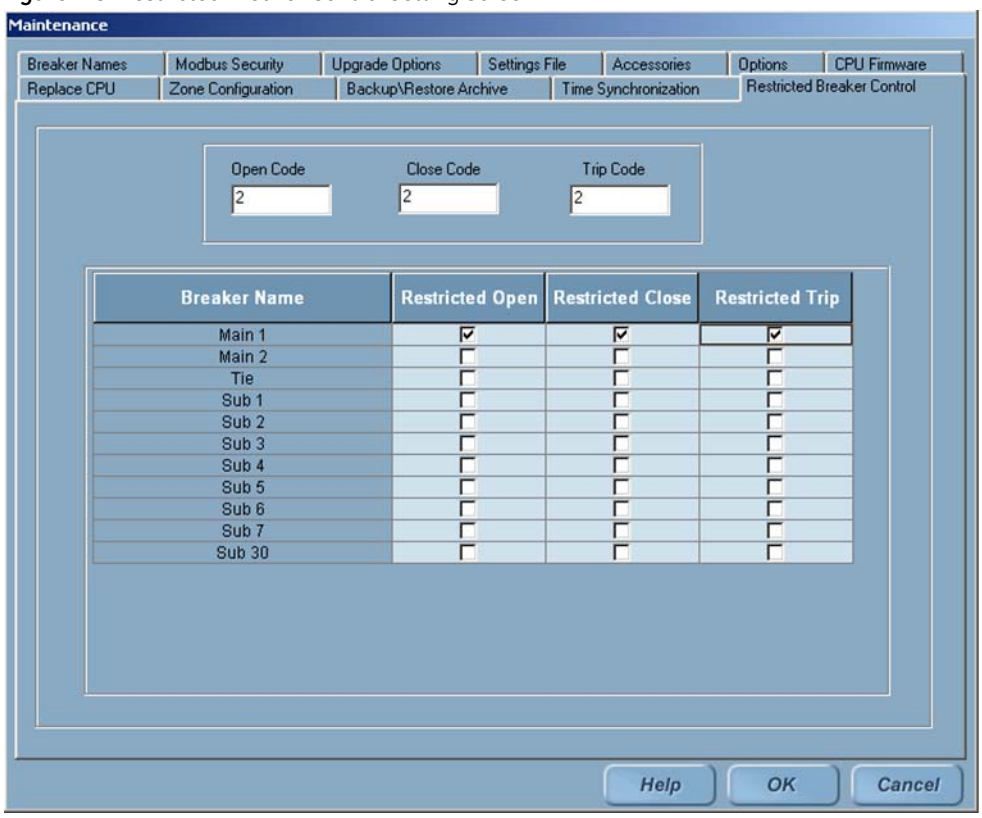
The **Restricted Breaker Control** function can only be enabled by the factory. When disabled, the user controls in it's associated configuration screen are disabled.

1.3.1 Setup

Restricted Breaker Control is available but disabled by default. It must be enabled by the factory or a GE Field Service Engineer. Once enabled, the user controls shown in Figure 1-3 will be available.

Navigate to the "Restricted Breaker Control" tab from the Main Menu, Maintenance screen - administrative login is required.

Figure 1-3 Restricted Breaker Control Setting Screen



Open / Close and Trip Code Text Boxes

Enter the code that is required to operate the associated breaker(s) in restricted mode. The default value for the Open/Close/Trip code is "2." Allowable values are from 2 to 65535.

Breaker Operation Matrix

Check the operations per breaker which require restricted control.

NOTE: Restricting operations will prevent the HMI from sending said actions to the respective breaker(s).

1.4 CPU External Control Transfer

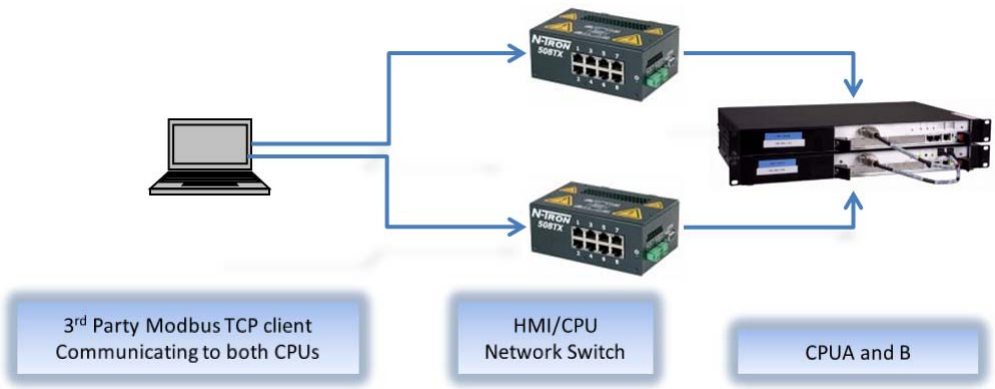
Entellisys is designed with redundant CPUs - both CPUs run protection functions simultaneously, however, the CPU control redundancy scheme utilizes primary/hot backup redundancy approach. By default, CPU A is the primary and CPU B is the backup.

The primary runs as the active CPU and the backup runs as the inactive CPU. The active CPU has contact outputs and circuit breaker control commands actuated, and the inactive CPU has contact outputs and circuit breaker control commands blocked. Only one CPU can be active at any given time. Modbus register FlexLogic Active, address 9588, holds 1 when the CPU is active and holds 0 when the CPU is inactive.

Internally Entellisys, depending on the system state, will determine which CPU should be running as the active CPU and, if necessary, automatically hand off control to optimize the performance of the gear.

In an application with a supervisory control structure, the 3rd party Modbus TCP supervisory client will communicate to both CPUs but in the event that it cannot communicate to one of the CPUs, it will need to force the remaining CPU to operate as and continue to operate as the active CPU.

Figure 1-4 Typical 3rd party redundant network configuraton



Contact GE for additional information on a specific redundant network application.

To effectively employ the **CPU External Control Transfer** into a supervisory control schema, the supervisory controller must continuously monitor the state of the communication and issue commands based on the guide lines in section 1.4.2 on page 16.

CAUTION: Redundant I/O must be used if contact inputs or outputs are being used in a FlexLogic control application.

Events:

- **CPU External Control Transfer Command Received:** CPU received a "CPU External Control Transfer" command.
- **CPU Control Transfer Return to Auto Command Rcvd:** "CPU Return To Auto Control Transfer" command

- **CPUx Assumes Control Logic By External Command:** CPU has executed the "CPU External Control Transfer" command and assumed active control.
- **CPUx Relinquishes Control Logic By External Cmd:** CPU relinquishes control after the client issues "CPU Return To Auto Control Transfer" command or other CPU requests this CPU to relinquish control.

Function Enable

The **CPU External Control Transfer** function can only be enabled by the factory. When disabled, the associated modbus command registers and FlexLogic elements remain low and ignore all write operations.

1.4.1 Operation

The only interface the user has for this function is through Modbus TCP.

Command Registers

- **CPU External Control Transfer** - Writing a "1" to this register will force the CPU to become the active CPU and begin executing FlexLogic. This process will take up to 150ms (180ms for 50Hz system).
- **CPU Return To Auto Control Transfer** - Writing a "1" to this register will return the CPU back to normal operation. Return to automatic control transfer process will take up to 250ms (300ms for 50Hz system).

Status Registers

- **CPU External Control Transfer Mode Enable**: Indicates that the function is enabled and ready.
- **Main Task Heart Beat**: This is a new register to indicate that the main task is running. Every time the main task is executed (every half cycle), this register value is incremented by one, from 1 to 65535. When the register overflows, it will reset to 1. If the main task is not running, this register is not incremented but a client can still read the register value. If the main task was never started, this register will remain zero.
- **Active FlexLogic Control:** Indicates the active CPU.
- **FlexLogic Redundancy Mode**: Indicates the CPU control transfer mode. There are two modes: CPU Auto Control Transfer Mode ("0") and CPU External Control Transfer Mode ("1").

Details:

- When a CPU receives an External Control Transfer command, it will request the other CPU to relinquish control. Once the other CPU relinquishes control, the commanded CPU will assume control and set the Active FlexLogic Control state high.
- Any External Control Transfer command requires a complementary Return to Auto Command to resume normal operation.
- If both CPUs have received an External Control Transfer command, normal operation will only resume after both CPUs have received the Return to Auto command.

NOTE: All protection relays will continue operating on both CPUs in a fully redundant fashion independent of the External Control feature.

1.4.2 Application

The 3rd party supervisory control application must be programmed to monitor the health of the communication and determine the active CPU.

1. **Verify that "External Control Transfer is enabled:** Read the CPU External Control Transfer Enabled register (95A4). Ensure that this feature is enabled before proceeding.
2. **Determine Communication Status**: Continuously read the Main Task Heart Beat register (02FF) from both CPUA and CPUB. If the "Main Task Heart Beat" is incrementing, the CPU is online and running. If the "Main Task Heart Beat" is not incrementing, then the Entellisys firmware is not running.
3. **Determine the Active CPU**: If the CPU is online and running, read the FlexLogic Active register (9588) from both CPUs. The active CPU will return a "1."
4. **Determine the "External Control Transfer Mode"**: Read the Flexlogic Redundancy Mode register (959D) to determine the mode.
5. **Command Case:** There are four conditions that require the client to force a CPU to become the active CPU.
   a. If only CPU A is online and its FlexLogic is not active, then the client will command CPU A to take control. After the system returns to normal, the client must command CPU A to Return to Auto Control Transfer.
   b. If only CPU B is online and its FlexLogic is not active, then the client will command CPU B to take control. After the system returns normal, the client must command CPU B to Return to Auto Control Transfer.
   c. If both CPU A and CPU B are online and neither are active, then the client will command either CPU A or CPU B to take control. This condition is only caused by a configuration error and must be corrected by a GE field service engineer. After the system has been restored to normal, the client must command the active CPU to Return to Auto Control Transfer.
   d. If both CPU A and CPU B are on-line AND if the Flexlogic Redundancy Mode register on either CPU A or CPU B is greater than 0 then return to Auto by sending each CPU a Return to Auto Control Transfer command.

1.4.3 FlexLogic

New protection elements have been added to FlexLogic to report the status of the Control Transfer function.

- **CPU Control Active CPU A**: High when CPU A is the active CPU either by Entellisys or an external device.
- **CPU Control Active CPU B**: High when CPU B is the active CPU either by Entellisys or an external device.

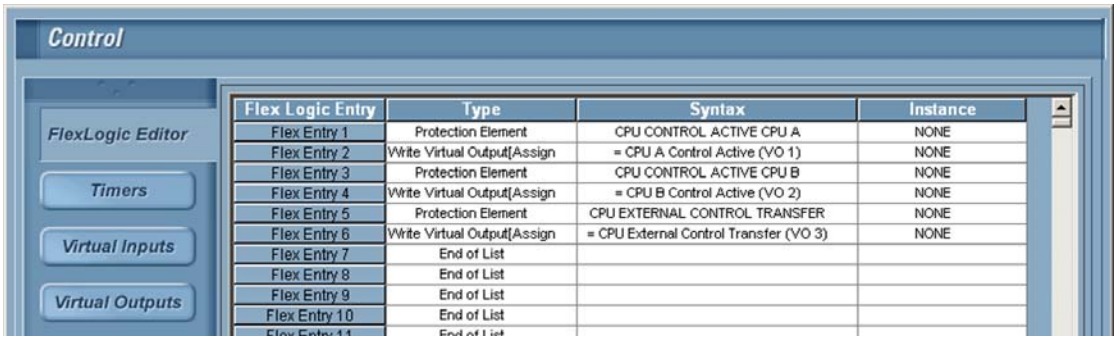
- **CPU External Control Transfer**: High when the active CPU is determined by an external device through “External Control Transfer.”

Example:

Update VOs to display the Active CPU and indicate the External Control Transfer mode.

1. Reserve 3 spare VOs and add the FlexLogic code shown in figure 1-5.
2. Add indicators to the HMI control screen and map them to their associated VOs.

Figure 1-5 Example: FlexLogic example



Flex Logic Entry	Type	Syntax	Instance
Flex Entry 1	Protection Element	CPU CONTROL ACTIVE CPU A	NONE
Flex Entry 2	Write Virtual Output[Assign	= CPU A Control Active (VO 1)	NONE
Flex Entry 3	Protection Element	CPU CONTROL ACTIVE CPU B	NONE
Flex Entry 4	Write Virtual Output[Assign	= CPU B Control Active (VO 2)	NONE
Flex Entry 5	Protection Element	CPU EXTERNAL CONTROL TRANSFER	NONE
Flex Entry 6	Write Virtual Output[Assign	= CPU External Control Transfer (VO 3)	NONE
Flex Entry 7	End of List		
Flex Entry 8	End of List		
Flex Entry 9	End of List		
Flex Entry 10	End of List		

Real Time indication

The current active CPU and the External Control Transfer Mode status are displayed at the bottom of the FlexLogic Editor widow.

1.5 Modbus Security

If Modbus security has been configured (see section 4.2 in DEH 500 Administrator's Manual), then Modbus clients must write the pre-configured password to either the Command Password Entry or Setting Password Entry registers before sending commands or updating settings on each CPU. The configured passwords are encrypted and stored on the CPU.

Operation

COMMAND and SETTING passwords each have a 30-minute timer. Each timer starts when you enter the particular password, and is restarted whenever you "use" it. For example, writing a setting restarts the SETTING password timer and writing a command register or forcing a coil restarts the COMMAND password timer. The value read at memory location 02A8 can be used to confirm whether a COMMAND password is enabled or disabled (0 for Disabled). The value read at memory location 02A9 can be used to confirm whether a SETTING password is enabled or disabled.

COMMAND or SETTING password security access is restricted to the particular port or particular TCP/IP connection on which the entry was made. Passwords must be entered when accessing the relay through other ports or connections, and the passwords must be reentered after disconnecting and reconnecting on TCP/IP.

Implementation

To write a breaker 1 open command to a CPU with a command password preset to "1234" the following must be coded at the Modbus TCP client:

1. Enter command mode: Write "1234" to memory location 02A4 (Command Password Entry).
2. Read memory location 02A8 (Command Password Status) to verify the password was accepted.
3. Write "1" to location 4CD6 (SRC x Open Breaker on page 86).
4. Exit command mode: Write "0" to memory location 02A4 (Command Password Entry).

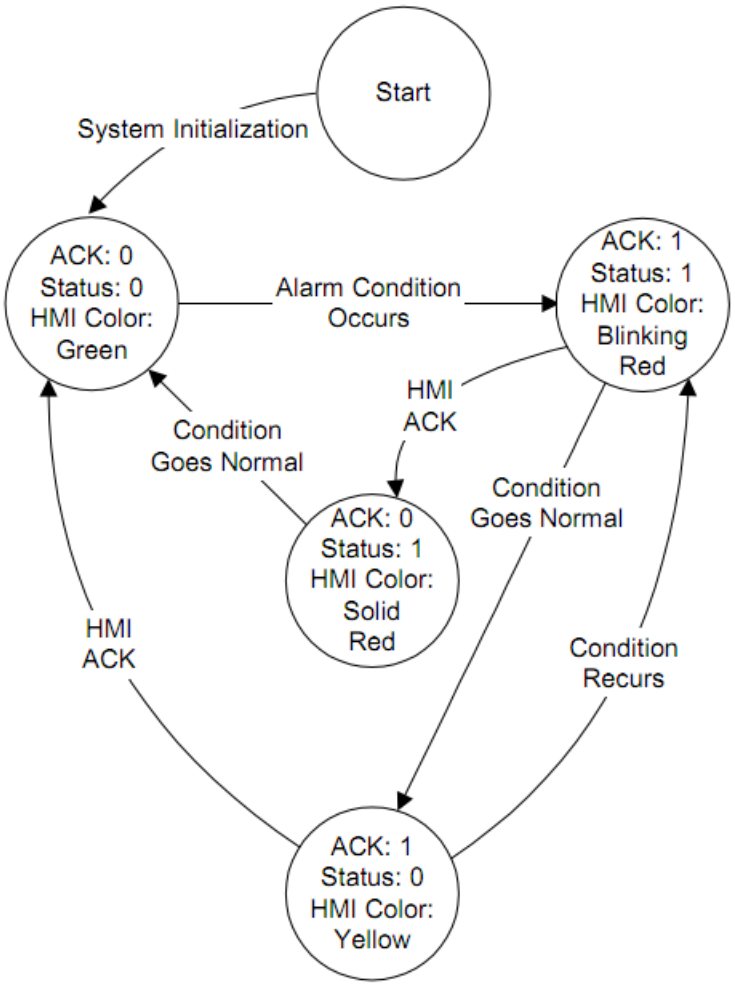
Similarly, the Setting Password Entry register on page 59 is set up at memory location 02A6. To gain SETTING level security access, the SETTING password must be entered at memory location 02A6. The entered SETTING password must match the current SETTING password setting to change settings.

1.6 Interfacing to the Alarm Handler

The Source Vectors for Alarms on page 61 is a set of registers beginning at 0428 provides the means to interface to each CUP's Alarm Handler functionality. Each pair of 32-bit values represent the current state (read only) and the acknowledge setting (read/write) for each alarm type. Each value represents the states for all of the circuit breakers in the system as denoted in Format Code F722, one bit for each. A 1 in the bit field position for a given circuit breaker in the state register indicates that the alarm condition is currently active, while a 0 indicates the condition is not currently active.

When a condition passes from inactive to active, the corresponding ACK bit in the next register will be set to 1. At this point an external program may acknowledge the alarm by writing a 0 to that bit location. It is important for the external program to first read the ACK register and mask the new value such that the states represented by the other bits remain intact. The following state table describes how the HMI interfaces with the CPU to update its indicators.

Figure 1-6 Alarm state transition diagram



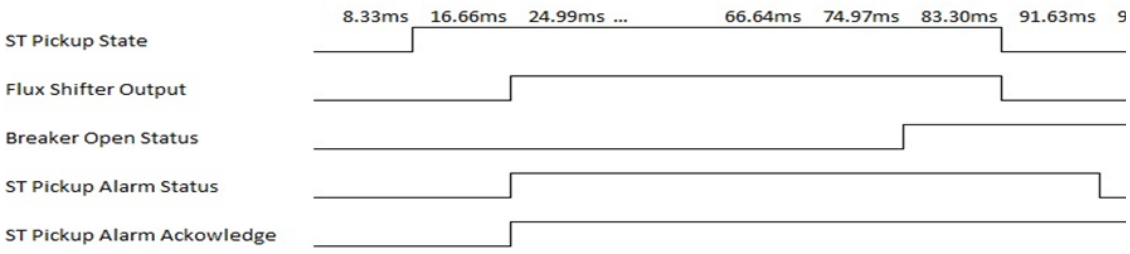
Alarm State Transition Diagram

1.6.1 Example of Long Time / Short Time Pickup alarm status in 3rd party supervisory systems

In Entellisys there are many alarms including LT and ST pickup. An alarm will be active for as long as the condition exists. The Acknowledge will persist until the user interacts with the HMI. (See Figure 1-7)

In the case of trip alarms such as ST or LT Trip Status the alarm bit will only be active for the period of time between trip and dropout. Often only a few milliseconds in duration while the breaker is opening. During that time, however, it will set both the Alarm and its associated Acknowledge bit high.

Figure 1-7 Entellisys Pickup Alarm and Status Timing Diagram. The alarm bits stay high only while the breaker is opening and is clearing the fault. As soon as the fault is cleared, the relay will drop out. The ackowledge bit will persist.



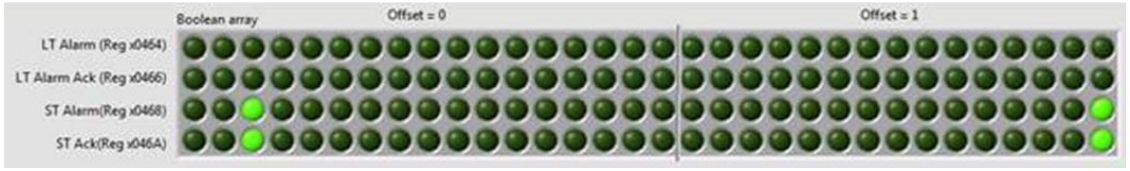
1.6.1.1 Implementation

The alarm registers are listed in Section 4 on page 62. They are defined as data format code F722 is defined as 2 registers containing breaker status for breaker 1 – 30. (See Section 5 on page 152)

For example, the **LT Over current Trip Alarm State** is two registers long. The first, register x0464, contains information on breakers 17-30 and the second, register x0465, contains information on breakers 1-16.

In Figure 1-8, the bits of the two registers are arranged left to right. In the example below, breaker 1 (right most bit) and 30 (3rd from the left) tripped on ST, thus the **ST Ack** and **ST Trip Alarm** registers will be updated to reflect the bit pattern below.

Figure 1-8 Short Time bit array. Read from left to right or MSB to LSB



The **ST Trip Alarm State** registers will only reflect the Trip condition while the breaker is opening. During that time, the ST Trip Alarm state (x0468 and x0469) will read 8192 and 1 as will and ST Ack registers.

After the fault has cleared and the Relays have dropped out, the ST Trip Alarm registers will clear and the Acknowledge will persist.

Figure 1-9 Fault has cleared but acknowledge Persists

PLC Implementation

The alarm status is updated and cleared quickly (within 50ms), so a Modbus client will not be able to detect the trip alarm with any reliability. Therefore, for most relays, 3rd party Modbus clients should read the Acknowledge registers. When an event has occurred and the Modbus client has consumed the information, the Modbus client could then take a some action that would ensure that the Acknowledgement bit is cleared before the breaker is re-closed. The of most straight forward of which would be for the client to clear though a write command.

2 Entellisys Status Definitions

2.1 System Status

Modbus TCP clients have access to states of FlexLogic operands, protection elements, breaker control, status, contact inputs/outputs, and virtual inputs/outputs through the Modbus TCP interface.

After each protection pass, all the information regarding each operand's state is updated in corresponding Modbus register. The following sections give a complete list of registers holding state information of each operand.

NOTE: The 3rd party modbus client must determine which CPU is running as the “active CPU” (Modbus register: “FlexLogic Active”) and FlexLogic health status (Modbus register: “FlexLogic Status Message”).

2.1.1 Breaker Status

Each breaker has 13 different states shown in Table 2-5. Each one of them corresponds to a different bit in the data item.

Table 2-5 Breaker Control status bit field

Bit	Value	Notes
0	Breaker Opened	
1	Breaker Closed	
2	Breaker Locked Out	
3	Closing Spring Charged	
4	Active Disconnect Connected	
5	Active Disconnect Disconnected	
6	Secondary Disconnect Connected	
7	Breaker Ready	
8	Breaker Available	
9	Breaker Open Failed	
10	Breaker Close Failed	
11	Breaker Fault	
12	Reserved	

The breaker states for all 30 breakers span across 25 consecutive modbus registers as shown in Table 2-6. See Breaker Control Operand States (25 items) on page 136 for memory locations.

Table 2-6 Breaker status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	13	Spans over two registers
Breaker 3	1	10	Spans over two registers
Breaker 4	2	7	Spans over two registers
...	...	...	...
Breaker 30	24	6	Spans over two registers

2.1.2 CPU FlexLogic Status

The following information is provided to determine the CPU's role and the state of the external control transfer feature.

The Active CPU Status uses one register. See System Operand States (1 item) on page 136 for memory location.

Table 2-7 Active CPU Status bit field

Bit	Value	Notes
0	CPU A	CPU A is active
1	CPU B	CPU B is active
2	CPU External Control Transfer	0=Active CPU determined by Entellisys 1=Active CPU determined by an external device

2.1.3 IOC Operand States

Each breaker has 2 different states shown in Table 2-8. Each one of them corresponds to a different bit in the data item.

Table 2-8 IOC status bit field

Bit	Value
0	Trip Operated
1	Trip Dropout

The breaker states for all 30 breakers span across 4 consecutive modbus registers as shown in Table 2-9. See IOC Operand States (4 items) on page 136 for memory locations.

Table 2-9 IOC status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	2	
Breaker 3	0	4	
Breaker 4	0	6	
Breaker 5	0	8	
Breaker 6	0	10	
Breaker 7	0	12	
Breaker 8	0	14	
Breaker 9	1	0	
...	...	...	
Breaker 30	3	12	

2.1.4 ST Overcurrent Operand States

Each breaker has 3 different states shown in Table 2-10. Each one of them corresponds to a different bit in the data item.

Table 2-10 ST Overcurrent status bit field

Bit	Value
0	Trip Pickup
1	Trip Operated
2	Trip Dropout

The breaker states for all 30 breakers span across 6 consecutive modbus registers as shown in Table 2-11. See ST Overcurrent Operand States (6 items) on page 136 for memory locations.

Table 2-11 ST Overcurrent status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	3	
Breaker 3	0	6	
Breaker 4	0	9	
Breaker 5	0	12	
Breaker 6	0	15	Spans over two registers
Breaker 7	1	2	
...	...	...	
Breaker 30	5	10	

2.1.5 LT Overcurrent Operand States

Each breaker has 3 different states shown in Table 2-12. Each one of them corresponds to a different bit in the data item.

Table 2-12 LT Overcurrent status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout

The breaker states for all 30 breakers span across 6 consecutive modbus registers as shown in Table 2-13. See PLC Interface (Read/Write Settings) on page 135 for memory locations.

Table 2-13 LT Overcurrent status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	3	
Breaker 3	0	6	
Breaker 4	0	9	
Breaker 5	0	12	
Breaker 6	0	15	Spans over two registers
Breaker 7	1	2	
...	...	...	
Breaker 30	5	10	

2.1.6 High Current and High Current Transient Operand States

Each breaker has 3 different states shown in Table 2-14. Each one of them corresponds to a different bit in the data item.

Table 2-14 High Current status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout

The breaker states for all 30 breakers span across 6 consecutive modbus registers as shown in Table 2-15. See High Current Operand States (6 items) on page 136 and High Current Transient Operand States (6 items) on page 136 for memory locations.

Table 2-15 High Current status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	3	
Breaker 3	0	6	
Breaker 4	0	9	
Breaker 5	0	12	
Breaker 6	0	15	Spans over two registers
Breaker 7	1	2	
...	...	...	
Breaker 30	5	10	

2.1.7 High Current Flex Relay Operand States

There are 16 Flex Relays and each have 3 different states shown in Table 2-16. Each one of them corresponds to a different bit in the data item.

Table 2-16 High Current Flex Relay status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout

The relay states for all 16 relays span across 3 consecutive modbus registers as shown in Table 2-17. See High Current Flex Relay Operand States (3 items) on page 136 for memory locations.

Table 2-17 High Current Flex Relay status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Relay 1	0	0	
Relay 2	0	3	
Relay 3	0	6	
Relay 4	0	9	
Relay 5	0	12	
Relay 6	0	15	Spans two registers
Relay 7	1	2	
...	...	...	...
Relay 16	2	13	

2.1.8 Ground Fault Operand States

Each breaker has 5 different states shown in Table 2-18. Each one of them corresponds to a different bit in the data item.

Table 2-18 Ground Fault status bit field

Bit	Value
0	Trip Pickup
1	Trip Operated
2	Trip Dropout
3	Alarm Pickup
4	Alarm Operated
5	Alarm Dropout

The breaker states for all 30 breakers span across 12 consecutive modbus registers as shown in Table 2-19. See Ground Fault Operand States (12 items) on page 136 for memory locations.

Table 2-19 Ground Fault status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	6	
Breaker 3	0	12	Spans over two registers
Breaker 4	1	2	
...	...	...	...
Breaker 30	11	4	

2.1.9 Over (and Under) Frequency Operand States

Each breaker has 6 different states shown in Table 2-20. Each one of them corresponds to a different bit in the data item.

Table 2-20 Over Frequency status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout
3	Trip Pickup
4	Trip Operated
5	Trip Dropout

The breaker states for all 30 breakers span across 12 consecutive modbus registers as shown in Table 2-21. See Over Frequency Operand States (12 items) on page 136 and Under Frequency Operand States (12 items) on page 136 for memory locations.

Table 2-21 Over Frequency status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	6	
Breaker 3	0	12	Spans over two registers
Breaker 4	1	2	
...	...	...	
Breaker 30	11	4	

2.1.10 Over (and Under) Voltage Operand States

Each breaker has 6 different states shown in Table 2-22. Each one of them corresponds to a different bit in the data item.

Table 2-22 Over Voltage status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout
3	Trip Pickup
4	Trip Operated
5	Trip Dropout

The breaker states for all 30 breakers span across 12 consecutive modbus registers as shown in Table 2-23. See Over Voltage Operand States (12 items) on page 136 and Under Voltage Operand States (12 items) on page 136 for memory locations.

Table 2-23 Over Voltage status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	6	
Breaker 3	0	12	Spans over two registers
Breaker 4	1	2	
...	...	...	
Breaker 30	11	4	

2.1.11 Under Voltage Flex Relay Operand States

There are 16 Over Voltage and 16 Under Voltage Flex Relays. Each relay has 6 different states shown in Table 2-24. Each one of them corresponds to a different bit in the data item.

Table 2-24 Over Voltage status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout
3	Trip Pickup
4	Trip Operated
5	Trip Dropout

The relay states for all 16 relays span across 6 consecutive modbus registers as shown in Table 2-25. See Under Voltage Relay Flex Operand States (6 items) on page 136 for memory locations.

Table 2-25 Over Voltage Flex status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Relay 1	0	0	
Relay 2	0	6	
Relay 3	0	12	Spans over two registers
Relay 4	1	2	
...	...	...	
Relay 16	5	10	

2.1.12 Phase Loss Operand States

Each breaker has 6 different states shown in Table 2-26. Each one of them corresponds to a different bit in the data item.

Table 2-26 Phase Loss status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout
3	Trip Pickup
4	Trip Operated
5	Trip Dropout

The breaker states for all 30 breakers span across 12 consecutive modbus registers as shown in Table 2-27. See Phase Loss Operand States (12 items) on page 136 for memory locations.

Table 2-27 Phase Loss status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	6	
Breaker 3	0	12	Spans over two registers
Breaker 4	1	2	
...	...	...	
Breaker 30	10	14	

2.1.13 Power Reversal Operand States

Each breaker has 6 different states shown in Table 2-28. Each one of them corresponds to a different bit in the data item.

Table 2-28 Power Reversal status bit field

Bit	Value
0	Alarm Pickup
1	Alarm Operated
2	Alarm Dropout
3	Trip Pickup
4	Trip Operated
5	Trip Dropout

The breaker states for all 30 breakers span across 12 consecutive modbus registers as shown in Table 2-29. See Power Reversal Operand States (12 items) on page 136 for memory locations.

Table 2-29 Power Reversal status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	6	
Breaker 3	0	12	Spans over two registers
Breaker 4	1	2	
...	...	...	
Breaker 30	10	14	

2.1.14 Over (and Under) Demand Metering Alarm Operand States

There are 16 demand alarms. Each alarm relay has 6 different states shown in Table 2-30. Each one of them corresponds to a different bit in the data item.

Table 2-30 Demand Metering status bit field

Bit	Value
0	Under-Demand Alarm Pickup
1	Under-Demand Alarm Operated
2	Under Demand Alarm Dropout
3	Over-Demand Alarm Pickup
4	Over-Demand Alarm Operated
5	Over-Demand Alarm Dropout

The Alarm states for all 16 alarms span across 6 consecutive modbus registers as shown in Table 2-31. See Over Demand Alarm Flex Operand States (3 items) on page 136 and Under Demand Alarm Flex Operand States (3 items) on page 136 for memory locations.

Table 2-31 Power Reversal status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Alarm 1	0	0	
Alarm 2	0	6	
Alarm 3	0	12	Spans over two registers
Alarm 4	1	2	
...	...	...	
Alarm 16	5	10	

2.2 Multipoint FlexLogic Operand States

2.2.1 Bus Differential Operand States

Each zone has 6 different states shown in Table 2-32. Each one of them corresponds to a different bit in the data item.

Table 2-32 Bus Differential status bit field

Bit	Value
0	Trip Dropout
1	Alarm Dropout
2	Trip Pickup
3	Alarm Pickup
4	Trip Operated
5	Alarm Operated
6	Backup Trip Operated

The zone states for all 4 relay instances span across 2 consecutive modbus registers as shown in Table 2-6. See Bus Differential Operand States (2 items) on page 136 for memory locations.

Table 2-33 Bus Differential status offsets

Zone Number	Register Offset	Bit Offset	Notes
Zone 1	0	0	
Zone 2	0	7	
Zone 3	0	14	This zone's information spans over two registers
Zone 4	1	5	
	1	12	Bits from 12 thru 15 are not used and will always be set to 0

2.2.2 MSGF Overcurrent Operand States

Each zone has 7 different states shown in Table 2-34. Each one of them corresponds to a different bit in the data item.

Table 2-34 MSGF Overcurrent status bit field

Bit	Value
0	Trip Dropout
1	Alarm Dropout
2	Trip Pickup
3	Alarm Pickup
4	Trip Operated
5	Alarm Operated
6	Backup Trip Operated

The zone states for all 4 instances span across 2 consecutive modbus registers as shown in Table 2-35. See MSGF Overcurrent Operand States (2 items) on page 136 for memory locations.

Table 2-35 MSGF Overcurrent status offsets

Zone Number	Register Offset	Bit Offset	Notes
Zone 1	0	0	
Zone 2	0	7	
Zone 3	0	14	This zone's information spans over two registers
Zone 4	1	5	
	1	12	Bits from 12 thru 15 are not used and will always be set to 0

2.2.3 HRGF Detection Operand States

Each breaker has 3 different states shown in Table 2-36. Each one of them corresponds to a different bit in the data item.

Table 2-36 HRGF Detection status bit field

Bit	Value
0	Alarm Dropout
1	Alarm Pickup
2	Alarm Operated

The breaker states for all 30 breakers span across 6 consecutive modbus registers as shown in Table 2-37. See HRGF Detection Operand States (6 items) on page 136 for memory locations.

Table 2-37 HRGF Detection status offsets

Breaker Number	Register Offset	Bit Offset	Notes
Breaker 1	0	0	
Breaker 2	0	3	
Breaker 3	0	6	
Breaker 4	0	9	
...	...	...	...

2.2.4 HRGF Location Operand States

Each zone has 2 different states shown in Table 2-38. Each one of them corresponds to a different bit in the data item.

Table 2-38 HRGF Location status bit field

Bit	Value
0	Locator in On State
1	Locator in Off State

The zone states for all 4 location function instances are contained in a single modbus register as shown in Table 2-39. See HRGF Location Operand States on page 136 for memory locations.

Table 2-39 HRGF Location status offsets

Zone Number	Register Offset	Bit Offset	Notes
Zone 1	0	0	
Zone 2	0	2	
Zone 3	0	4	
Zone 4	0	6	
	0	8	Bits from 8 thru 15 are not used and will always be set to 0

2.2.5 Reduced Energy Let - Thru Operand States

This relay has 1 state shown in Table 2-40.

Table 2-40 Multi Point RELT status bit field

Bit	Value
0	Multipoint Reduced Let-Thru Mode On

The relay state uses one modbus register as shown in Table 2-41. See Reduced Let Thru Operand States (4 item) on page 136 for memory locations.

Table 2-41 RELT status offsets

Zone Number	Register Offset	Bit Offset
Breaker 1 Single Point RELT	0	0
Breaker 2 Single Point RELT	0	1
Breaker 3 Single Point RELT	0	2
Breaker 4 Single Point RELT	0	3
Breaker 5 Single Point RELT	0	4
Breaker 6 Single Point RELT	0	5
Breaker 7 Single Point RELT	0	6
Breaker 8 Single Point RELT	0	7
Breaker 9 Single Point RELT	0	8
Breaker 10 Single Point RELT	0	9
Breaker 11 Single Point RELT	0	10
Breaker 12 Single Point RELT	0	11
Breaker 13 Single Point RELT	0	12
Breaker 14 Single Point RELT	0	13
Breaker 15 Single Point RELT	0	14
Breaker 16 Single Point RELT	0	15
Breaker 17 Single Point RELT	1	0
Breaker 18 Single Point RELT	1	1
Breaker 19 Single Point RELT	1	2
Breaker 20 Single Point RELT	1	3
Breaker 21 Single Point RELT	1	4
Breaker 22 Single Point RELT	1	5
Breaker 23 Single Point RELT	1	6
Breaker 24 Single Point RELT	1	7

Breaker 25 Single Point RELT	1	8
Breaker 26 Single Point RELT	1	9
Breaker 27 Single Point RELT	1	10
Breaker 28 Single Point RELT	1	11
Breaker 29 Single Point RELT	1	12
Breaker 30 Single Point RELT	1	13
Multipoint RELT	1	14
System Wide RELT	1	15

2.2.6 Summation MSGF Zone Operand States

Each zone has 7 different states shown in Table 2-42. Each one of them corresponds to a different bit in the data item.

Table 2-42 Summation MSGF Zone status bit field

Bit	Value
0	Trip Dropout
1	Alarm Dropout
2	Trip Pickup
3	Alarm Pickup
4	Trip Operated
5	Alarm Operated
6	Trip Restrained

The zone states for both zones reside in a single modbus register as shown in Table 2-43. See PLC Interface (Read/Write Settings) on page 135 for memory locations.

Table 2-43 Summation MSGF Zone status offsets

Zone Number	Register Offset	Bit Offset	Notes
Zone 1	0	0	
Zone 2	0	8	

2.2.7 Synch Check Operand States

Each relay has 10 different states shown in Table 2-44. Each one of them corresponds to a different bit in the data item.

Table 2-44 Synch Check status bit field

Bit	Value
0	Dead Source Operated
1	Dead Source Dropout
2	Synch Operated
3	Synch Dropout
4	Close Operated
5	Close Dropout
6	V1 Above Minimum
7	V2 Above Minimum
8	V1 Below Maximum
9	V2 Below Maximum

The relay states for all12 relays span across 8 consecutive modbus registers as shown in Table 2-45. See Synch Check Operand States (8 items) on page 136 for memory locations.

Table 2-45 Synch Check status offsets

Zone Number	Register Offset	Bit Offset	Notes
Relay 1	0	0	
Relay 2	0	10	Spans over two registers
Relay 3	1	4	
Relay 4	1	14	Spans over two registers
Relay 5	2	8	Spans over two registers
Relay 6	3	2	
Relay 7	3	12	
Relay 8	4	6	
Relay 9	5	0	
Relay 10	5	10	
Relay 11	6	4	
Relay 12	6	14	
	7	8	Bits from 8 thru 15 are not used and will always be set to 0

3 Modbus® protocol implementation

3.1 Introduction

The CPU supports a number of communications protocols to allow connection to the HMI computer, as well as other equipment which includes personal computers, RTUs, SCADA masters, and programmable logic controllers. The Modicon Modbus® RTU protocol is the most basic protocol supported. Modbus is available via ethernet as specified by the Modbus/TCP specification. Note that:

- The CPU always acts as a slave device, meaning that it never initiates communications; it only listens and responds to requests issued by a master computer.
- For Modbus, a subset of the Remote Terminal Unit (RTU) protocol format is supported that allows extensive monitoring, programming, and control functions using read and write register commands.
- The CPU will support a maximum of 8 concurrent Modbus sessions. Four sessions are reserved for use by HMI computers. A remote device that attempts to connect when all sessions are in use will receive a response message indicating the number of maximum connections has been exceeded. If a remote device does not make a request within 30 seconds, the session will be timed out and made available to the next device that establishes a session.

3.2 Physical layer

The Modbus RTU protocol is hardware-independent so that the physical layer can be any of a variety of standard hardware configurations. The CPU includes a faceplate (front panel) 100BaseT Ethernet port. Data flow is auto-configuring full or half-duplex. Each data byte is transmitted in an asynchronous format consisting of 1 start bit, 8 data bits, 1 stop bit, and possibly 1 parity bit. This produces a 10 or 11 bit data frame. The master device in any system must know the address of the slave device with which it is to communicate. In the case of ModbusTCP communications, the CPU will not act on a request from a master if the address in the request does not match the CPU's slave address. A single setting selects the slave address used for ModbusTCP. The default slave address for a CPU is 1.

3.3 Data link layer

Communications takes place in packets, which are groups of asynchronously framed byte data. The master transmits a packet to the slave and the slave responds with a packet. The end of a packet is marked by 'dead-time' on the communications line. The following describes general format for both transmit and receive packets. For exact details on packet formatting, see the subsequent sections describing each function code.

MODBUS PACKET FORMAT

DESCRIPTION	SIZE
SLAVE ADDRESS	1 byte
FUNCTION CODE	1 byte
DATA	N bytes
CRC	2 bytes
DEAD TIME	3.5 bytes transmission time

SLAVE ADDRESS

This is the address of the slave device that is intended to receive the packet sent by the master and perform the desired action. Only the addressed slave will respond to a packet that starts with its address. Note that since Modbus/TCP also relies on a correct IP address to receive the packet, and each CPU responds as a single device, it is generally not necessary to change the Modbus address of the device.

FUNCTION CODE

This is one of the supported function codes of the unit which tells the slave what action to perform. See Supported function codes on page 48 for complete details. An exception response from the slave is indicated by setting the high order bit of the function code in the response packet. See Exception responses on page 53 for further details.

DATA

This will be a variable number of bytes depending on the function code. This may include actual values, settings, or addresses sent by the master to the slave or by the slave to the master.

CRC

This is a two byte error checking code. The RTU version of Modbus includes a 16-bit cyclic redundancy check (CRC-16) with every packet which is an industry standard method used for error detection. If a Modbus slave device receives a packet in which an error is indicated by the CRC, the slave device will not act upon or respond to the packet thus preventing any erroneous operations. See CRC-16 Algorithm on page 47 for a description of how to calculate the CRC.

3.4 CRC-16 Algorithm

The CRC-16 algorithm essentially treats the entire data stream (data bits only; start, stop and parity ignored) as one continuous binary number. This number is first shifted left 16 bits and then divided by a characteristic polynomial (11000000000000101B). The 16-bit remainder of the division is appended to the end of the packet, most significant byte first. The resulting packet including CRC, when divided by the same polynomial at the receiver, will give a zero remainder if no transmission errors have occurred. This algorithm requires the characteristic polynomial to be reverse bit ordered. The most significant bit of the characteristic polynomial is dropped, since it does not affect the value of the remainder.

CRC-16 ALGORITHM

SYMBOLS	-->	data transfer
	A	16-bit working register
	Alow	low order byte of A
	Ahigh	high order byte of A
	CRC	16-bit CRC-16 result
	i,j	loop counters
	(+)	logical EXCLUSIVE-OR operator
	N	total number of data bytes
	Di	i-th data byte (i = 0 to N-1)
	G	16-bit characteristic polynomial = 1010000000000001 (binary) with MSbit dropped and bit order reversed
	shr (x)	right shift operator (th LSbit of x is shifted into a carry flag, a '0' is shifted into the MSbit of x, all other bits are shifted right one location)

ALGORITHM:

5. FFFF (hex) --> A
6. 0 --> i
7. 0 --> j
8. Di (+) Alow --> Alow
9. j + 1 --> j
10. shr (A)
11. Is there a carry? No: go to 8 Yes: G (+) A --> A and continue.
12. Is j = 8? No: go to 5 Yes: continue
13. i + 1 --> i
14. Is i = N? No: go to 3 Yes: continue
15. A --> CRC

3.5 Supported function codes

Modbus officially defines function codes from 1 to 127 though only a small subset is generally needed. The CPU supports some of these functions, as summarized in the following table. Subsequent sections describe each function code in detail.

3.5.1 Function Code 03H/04H – Read Actual Values or Settings

This function code allows the master to read one or more consecutive data registers (actual values or settings) from a relay. Data registers are always 16 bit (two byte) values transmitted with high order byte first. The maximum number of registers that can be read in a single packet is 125. See the MODBUS MEMORY MAP table on page 17 for exact details on the data registers. Since some PLC implementations of Modbus only support one of function codes 03h and 04h, the CPU interpretation allows either function code to be used for reading one or more consecutive data registers. The data starting address will determine the type of data being read. Function codes 03h and 04h are therefore identical. The following table shows the format of the master and slave packets. The example shows a master device requesting 3 register values starting at address 4050h from slave device 11h (17 decimal); the slave device responds with the values 40, 300, and 0 from registers 4050h, 4051h, and 4052h, respectively.

FUNCTION CODE		MODBUS DEFINITION	CPU DEFINITION
HEX	DEC		
03	3	Read Holding Registers	Read Actual Values or Settings
04	4	Read Holding Registers	Read Actual Values or Settings
05	5	Force Single Coil	Execute Operation
06	6	Preset Single Register	Store Single Setting
10	16	Preset Multiple Registers	Store Multiple Settings

Master and Slave Device Packet Transmission Example

MASTER TRANSMISSION

PACKET FORMAT	EXAMPLE (HEX)
SLAVE ADDRESS	11
FUNCTION CODE	04
DATA STARTING ADDR - hi	40
DATA STARTING ADDR - lo	50
NUMBER OF REGISTERS - hi	00
NUMBER OF REGISTERS - lo	03
CRC - lo A7 DATA #2 - lo	A7
CRC - hi 4A DATA #3 - hi	4A

SLAVE RESPONSE

PACKET FORMAT	EXAMPLE (HEX)
SLAVE ADDRESS	11
FUNCTION CODE	04
BYTE COUNT	06
DATA #1 - hi	00
DATA #1 - lo	28
DATA #2 - hi	01
DATA #2 - lo	2C
DATA #3 - hi	00
DATA #3 - lo	00
CRC - lo	0D
CRC - hi	60

3.5.2 Function Code 05H – Execute Operation

This function code allows the master to perform various operations in the CPU.

The following table shows the format of the master and slave packets. The example shows a master device requesting the slave device 11H (17 dec) to perform a reset. The hi and lo CODE VALUE bytes always have the values 'FF' and '00' respectively and are a remnant of the original Modbus definition of this function code.

Master and Slave Device Packet Transmission Example

MASTER TRANSMISSION	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	05
OPERATION CODE - hi	00
OPERATION CODE - lo	01
CODE VALUE - hi	FF
CODE VALUE - lo	00
CRC - lo	DF
CRC - hi	6A

SLAVE RESPONSE	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	05
OPERATION CODE - hi	00
OPERATION CODE - lo	01
CODE VALUE - hi	FF
CODE VALUE - lo	00
CRC - lo	DF
CRC - hi	6A

3.5.3 Function Code 06H – Store Single Setting

This function code allows the master to modify the contents of a single setting register in a CPU. Setting registers are always 16-bit (two byte) values transmitted high-order byte first. The following table shows the format of the master and slave packets. The example shows a master device storing the value 200 at memory map address 4051h to slave device 11h (17 dec).

Master and Slave Device Packet Transmission Example

MASTER TRANSMISSION	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	06
DATA STARTING ADDR - hi	40
DATA STARTING ADDR - lo	51
DATA - hi	00
DATA - lo	C8
CRC - lo	CE
CRC - hi	DD

SLAVE RESPONSE	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	06
DATA STARTING ADDR - hi	40
DATA STARTING ADDR - lo	51
DATA - hi	00
DATA - lo	C8
CRC - lo	CE
CRC - hi	DD

3.5.4 Function Code 10H – Store Multiple Settings

This function code allows the master to modify the contents of a one or more consecutive setting registers in a CPU. Setting registers are 16-bit (two byte) values transmitted high-order byte first. The maximum number of setting registers that can be stored in a single packet is 60. The following table shows the format of the master and slave packets. The example shows a master device storing the value 200 at memory map address 4051h, and the value 1 at memory map address 4052h to slave device 11h (17 dec).

Master and Slave Device Packet Transmission Example

MASTER TRANSMISSION	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	10
DATA STARTING ADDR-hi	40
DATA STARTING ADDR-lo	51
NUMBER OF SETTINGS-hi	00
NUMBER OF SETTINGS-lo	02
BYTE COUNT	04
DATA #1 - hi	00
DATA #1 - lo	C8
DATA #2 - hi	00
DATA #2 - lo	01
CRC – lo	12
CRC – hi	62

SLAVE RESPONSE	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	10
DATA STARTING ADDR - hi	40
DATA STARTING ADDR - lo	51
NUMBER OF SETTINGS - hi	00
NUMBER OF SETTINGS - lo	02
CRC - lo	07
CRC - hi	64

3.5.5 Exception responses

Programming or operation errors usually happen because of illegal data in a packet. These errors result in an exception response from the slave. The slave detecting one of these errors sends a response packet to the master with the high order bit of the function code set to 1. The following table shows the format of the master and slave packets. The example shows a master device sending the unsupported function code 39h to slave device 11.

Master and Slave Device Packet Transmission Example

MASTER TRANSMISSION	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	39
CRC - low order byte	CD
CRC - high order byte	F2

SLAVE RESPONSE	
PACKET FORMAT	**EXAMPLE (HEX)**
SLAVE ADDRESS	11
FUNCTION CODE	B9
ERROR CODE	01

SLAVE RESPONSE	
CRC - low order byte	93
CRC - high order byte	95

3.5.6 File transfers

3.5.6.1 Obtaining CPU files using Modbus protocol

The CPU has a generic file transfer facility, meaning that you use the same method to obtain all of the different types of files from the unit. The Modbus registers that implement file transfer are found in the "Modbus File Transfer (Read/Write)" and "Modbus File Transfer (Read Only)" modules, starting at address 030Eh in the Modbus Memory Map. To read a file from the CPU, use the following steps:

1. Write the filename to the "Name of file to read" register using a write multiple registers command. If the name is shorter than 80 characters, you may write only enough registers to include all the text of the filename. Filenames are not case sensitive.
2. Repeatedly read all the registers in "Modbus File Transfer (Read Only)" using a read multiple registers command. It is not necessary to read the entire data block, since the CPU will remember which was the last register read. The "position" register is initially zero and thereafter indicates how many bytes (2 times the number of registers) you have read so far. The "size of..." register indicates the number of bytes of data remaining to read, to a maximum of 244.
3. Keep reading until the "size of..." register is smaller than the number of bytes you are transferring. This condition indicates end of file. Discard any bytes you have read beyond the indicated block size.
4. If you need to re-try a block, read only the "size of..." and "block of data", without reading the position. The file pointer is only incremented when you read the position register, so the same data block will be returned as was read in the previous operation. On the next read, check to see if the position is where you expect it to be, and discard the previous block if it is not (this condition would indicate that the CPU did not process your original read request). The CPU retains connection-specific file transfer information, so files may be read simultaneously on multiple Modbus connections.

   a. Obtaining files from the CPU using other protocols

   All the files available via Modbus may also be retrieved using the standard file transfer mechanisms in other protocols (for example, TFTP).

   b. Reading event recorder files

   To read the entire event recorder contents in ASCII format (the only available format), use the following filename:

   - EVT.TXT

   c. Reading fault report files

   The file name for fault report data is **faultReport#####.txt**. The ##### refers to the fault report record number. This number is identical to the event record number associated with the fault report. A request for a non-existent fault report file will yield file with no data below the header.

d. Reading waveform capture files

Waveform records comply with COMTRADE 1999 format (IEEE Std C37.111-1999). The file names as required by the standard for waveform capture data are **wfc#####.dat** and **wfc#####.cfg**. The ##### refers to the waveform record number. Note that this number is not the same as the event number cited in the case of the fault report above. If an event has a waveform capture associated with it, the waveform number will be shown in the WF Number field as indicated in the header of the event log.

4 Modbus Memory Map

NOTE: A multiplier factor may be necessary in cases where an integer value is returned but the Range and/or Step imply a greater precision. In these cases, it is necessary to divide the returned value by 10 for a step of "0.1" or "0.5"; by 100 for a step of ".01"; and so on. Similarly, it is necessary to multiply by these factors prior to writing a settings value. This note does not apply to any step value greater than 1 (a step of "10" does not require a multiplier, for example). This note also does not apply to values returned in floating point format. See the format codes at the end of the map for more information.

NOTE: Discrete I/O output state registers (Contact Output x State - register range from x9180 to x91FF and Contact Output States - register range from xB256 to 0xB25D) contain correct information only when FlexLogic Active register (x0034) contains value 1 (yes).

Addr	Register Name	Range	Units	Step	For-mat	Factory Default
Product Information (Read Only)						
0000	FBW Product Type	0 to 65535	---	1	F716	0
0001	CPU Serial Number	---	---	---	F203	"0"
0009	External Ethernet MAC Address	---	---	---	F072	0
000C	Reserved (3 items)	---	---	---	F072	0
000F	CPU Hardware Version	0 to 655.35	---	0.01	F001	1
0010	CPU Firmware Version	0 to 655.35	---	0.01	F001	1
0011	CPU Firmware Boot Code Version	0 to 655.35	---	0.01	F001	1
0012	Build Date	---	---	---	F200	"0"
0026	Synchronizer Board Status	0 to 1	---	1	F102	0
0027	Synchronizer Board Frequency Setting	50 to 60	Hz	10	F001	60
0028	Last Energy Clear Date	0 to 4294967295	---	1	F050	0
002A	Last CPU Commissioned Date	0 to 4294967295	---	1	F050	0
002C	Expected Node Protocol Version	0 to 255	---	1	F001	1
002D	Summary Number	---	---	---	F205	"0"
0033	Line Up	0 to 99	---	1	F001	1
0034	System Frequency Detected	0 to 1000	Hz	1	F001	0

0035	CPU Modbus Map Version	0 to 65535	---	1	F001	440
0036	Reserved	0 to 1	---	1	F126	0 (No)
Installation (Read/Write)						
0080	CPU ID	0 to 1	---	1	F717	0
0081	CPU Commissioned	0 to 1	---	1	F102	0
0082	CPU Name	---	---	---	F200	"UNNAMED"
0096	System Frequency	50 to 60	Hz	10	F001	60
0097	Phase Rotation	0 to 1	---	1	F106	0
Clock (Read Write)						
00E0	RTC Set Time	0 to 4294967295	---	1	F050	0
00E2	Date Time Changed	0 to 4294967295	---	1	F050	0
Communications (Read Write)						
00EC	External Ethernet IP Address	0 to 4294967295	---	1	F003	3232235876
00EE	External Ethernet IP Subnet Mask	0 to 4294967295	---	1	F003	4294966272
00F0	External Ethernet Gateway IP Address	0 to 4294967295	---	1	F003	0
00F2	Reserved (5 items)	1 to 254	---	1	F001	254
Event Recorder (Read Only)						
0150	Events Since Last Clear	0 to 4294967295	---	1	F003	0
0152	Number of Available Events	0 to 4294967295	---	1	F003	0
0154	Event Recorder Last Cleared Date	0 to 4294967295	---	1	F050	0
Modbus File Transfer (Read/Write)						
0156	Name of file to read	---	---	---	F204	(none)
Modbus File Transfer (Read Only)						
017E	Character position of current block within file	0 to 4294967295	---	1	F003	0
0180	Size of currently-available data block	0 to 65535	---	1	F001	0
0181	Block of data from requested file (122 items)	0 to 65535	---	1	F001	0
Modbus File Transfer Area 2 (Read/Write)						
01FB	Name of file to read	---	---	---	F204	(none)
Modbus File Transfer Area 2 (Read Only)						
0223	Character position of current block within file	0 to 4294967295	---	1	F003	0
0225	Size of currently-available data block	0 to 65535	---	1	F001	0
0226	Block of data from requested file (122 items)	0 to 65535	---	1	F001	0

Passwords (Read/Write Command)						
02A0	Reserved (4 items)	0 to 4294967295	---	1	F003	0
02A4	Command Password Entry	0 to 4294967295	---	1	F003	0
02A6	Setting Password Entry	0 to 4294967295	---	1	F003	0
Passwords (Read Only)						
02A8	Command Password Status	0 to 1	---	1	F102	0 (Disabled)
02A9	Setting Password Status	0 to 1	---	1	F102	0 (Disabled)
02AA	Reserved (128 items)	---	---	---	---	---
Communication Status(Read Only)						
02FF	Main Task Heart Beat	0 to 65535	---	1	F126	0
Zone Manager						
032A	Current Topology State	0 to 255	---	1	F001	0
032B	Current Zone1 Topology	0 to 255	---	1	F001	1
032C	Current Zone2 Topology	0 to 255	---	1	F001	1
032D	Current Zone3 Topology	0 to 255	---	1	F001	1
032E	Current Zone4 Topology	0 to 255	---	1	F001	1
032F	Current Zone1 Topology PT Throwover	0 to 255	---	1	F001	1
0330	Current Zone2 Topology PT Throwover	0 to 255	---	1	F001	1
0331	Current Zone3 Topology PT Throwover	0 to 255	---	1	F001	1
0332	Current Zone4 Topology PT Throwover	0 to 255	---	1	F001	1
Event Recorder (Read/Write Command)						
0346	Event Recorder Clear Command	0 to 1	---	1	F126	0 (No)
Energy Commands (Read/Write)						
0347	Energy Clear Command	0 to 1	---	1	F126	0 (No)
Fault Report Commands (Read/Write)						
0348	Fault Trigger Command	0 to 1	---	1	F126	0 (No)
Demand						
0349	Demand Subinterval Length	1 to 60	---	1	F001	1
034A	Demand Subintervals Per Interval	1 to 15	---	1	F001	1
034B	Demand Reset All Command	0 to 1	---	1	F126	0
034C	Number Of Demand Resets All	0 to 4294967295	---	1	F003	0
034E	Last Demand Reset All DateTime	0 to 4294967295	---	1	F050	0
0350	Demand Log Clear All Command	0 to 1	---	1	F126	0

0351	Demand Log Last Cleared All Date	0 to 4294967295	--	1	F050	0
Waveform Capture						
035D	Number WF Records Available	0 to 65535	---	1	F001	0
035E	Waveform Clear Command	---	---	---	F126	0
035F	Waveform Last Clear Date	0 to4294967295	---	1	F050	0
0361	Waveform Trigger Command	---	---	---	F126	0
0362	Waveform Trigger Mode	---	---	1	F118	0
0363	Waveform Trigger Position	0 to 119	half cycles	1	F001	0
0364	Waveforms Since Last Clear	0 to 4294967295	---	1	F003	0
0366	Reserved (2 items)	0 to 65535	---	1	F001	0
0368	Waveform Trigger Thru FlexLogic	0 to 65365	---	1	F300	0
Preventive Maintenance (R/W)						
0370	Load Life Rating 800A	0 to 65535	---	1	F001	2800
0371	Load Life Rating 1600A	0 to 65535	---	1	F001	2800
0372	Load Life Rating 2000A	0 to 65535	---	1	F001	2800
0373	Load Life Rating 3200A	0 to 65535	---	1	F001	2800
0374	Load Life Rating 4000A	0 to 65535	---	1	F001	2800
0375	Load Life Rating 5000A	0 to 65535	---	1	F001	2800
0376	Mechanical Life Rating 800A	0 to 65535	---	1	F001	2800
0377	Mechanical Life Rating 1600A	0 to 65535	---	1	F001	2800
0378	Mechanical Life Rating 2000A	0 to 65535	---	1	F001	2800
0379	Mechanical Life Rating 3200A	0 to 65535	---	1	F001	2800
037A	Mechanical Life Rating 4000A	0 to 65535	---	1	F001	2800
037B	Mechanical Life Rating 5000A	0 to 65535	---	1	F001	2800
037C	Load Life Max Current 800A	1 to 50	----	1	F001	15
037D	Load Life Max Current 1600A	1 to 50	----	1	F001	15
037E	Load Life Max Current 2000A	1 to 50	----	1	F001	15
037F	Load Life Max Current 3200A	1 to 50	----	1	F001	15
0380	Load Life Max Current 4000A	1 to 50	----	1	F001	15
0381	Load Life Max Current 5000A	1 to 50	----	1	F001	15
Hardware Information (Read Only)						
03A0	Flash Lifetime	1 to 10	---	1	F001	1

Source Status Vectors (Read Only)						
040A	Expected Nodes x State	0 to 4294967295	---	1	F722	0
040C	Source Node Identifier LED x State	0 to 4294967295	---	1	F722	0
040E	Node Setting Changed x State	0 to 4294967295	---	1	F722	0
0410	Nodes Communicating x State	0 to 4294967295	---	1	F722	0
0412	Nodes Commissioned x State	0 to 4294967295	---	1	F722	0
0414	Duplicate Nodes x State	0 to 4294967295	---	1	F722	0
0416	Node Internal Diagnostics x State	0 to 4294967295	---	1	F722	0
0418	Node System Diagnostics x State	0 to 4294967295	---	1	F722	0
041A	Node Hardware Diagnostics x State	0 to 4294967295	---	1	F722	0
041C	Node Reflected CPU Diagnostics x State	0 to 4294967295	---	1	F722	0
041E	Breaker Contact Position x State	0 to 4294967295	---	1	F722	0
0420	Breaker Primary Connection x State	0 to 4294967295	---	1	F722	0
0422	Breaker Lockout x State	0 to 4294967295	---	1	F722	0
0424	Summations Suspended X State	0 to 4294967295	---	1	F722	0
0426	Breaker Tripped x State	0 to 4294967295	---	1	F722	0
Source Vectors for Alarms (Ack are R/W)						
0428	Undervoltage Trip Alarm State	0 to 4294967295	---	1	F722	0
042A	Undervoltage Trip Alarm Ack	0 to 4294967295	---	1	F722	0
042C	Undervoltage Alarm State	0 to 4294967295	---	1	F722	0
042E	Undervoltage Alarm Ack	0 to 4294967295	---	1	F722	0
0430	Overvoltage Trip Alarm State	0 to 4294967295	---	1	F722	0
0432	Overvoltage Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0434	Overvoltage Alarm State	0 to 4294967295	---	1	F722	0
0436	Overvoltage Alarm Ack	0 to 4294967295	---	1	F722	0
0438	Phase Loss Trip Alarm State	0 to 4294967295	---	1	F722	0
043A	Phase Loss Trip Alarm Ack	0 to 4294967295	---	1	F722	0
043C	Phase Loss Alarm State	0 to 4294967295	---	1	F722	0
043E	Phase Loss Alarm Ack	0 to 4294967295	---	1	F722	0
0440	Reverse Power Trip Alarm State	0 to 4294967295	---	1	F722	0
0442	Reverse Power Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0444	Reverse Power Alarm State	0 to 4294967295	---	1	F722	0

0446	Reverse Power Alarm Ack	0 to 4294967295	---	1	F722	0
0448	High Current Alarm State	0 to 4294967295	---	1	F722	0
044A	High Current Alarm Ack	0 to 4294967295	---	1	F722	0
044C	Underfrequency Trip Alarm State	0 to 4294967295	---	1	F722	0
044E	Underfrequency Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0450	Underfrequency Alarm State	0 to 4294967295	---	1	F722	0
0452	Underfrequency Alarm Ack	0 to 4294967295	---	1	F722	0
0454	Overfrequency Trip Alarm State	0 to 4294967295	---	1	F722	0
0456	Overfrequency Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0458	Overfrequency Alarm State	0 to 4294967295	---	1	F722	0
045A	Overfrequency Alarm Ack	0 to 4294967295	---	1	F722	0
045C	High Resistance Ground Fault Alarm State	0 to 4294967295	---	1	F722	0
045E	High Resistance Ground Fault Alarm Ack	0 to 4294967295	---	1	F722	0
0460	Breaker Open Failed Alarm State	0 to 4294967295	---	1	F722	0
0462	Breaker Open Failed Alarm Ack	0 to 4294967295	---	1	F722	0
0464	Long Time Overcurrent Trip Alarm State	0 to 4294967295	---	1	F722	0
0466	Long Time Overcurrent Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0468	Short Time Overcurrent Trip Alarm State	0 to 4294967295	---	1	F722	0
046A	Short Time Overcurrent Trip Alarm Ack	0 to 4294967295	---	1	F722	0
046C	Ground Fault Trip Alarm State	0 to 4294967295	---	1	F722	0
046E	Ground Fault Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0470	Ground Fault Alarm State	0 to 4294967295	---	1	F722	0
0472	Ground Fault Alarm Ack	0 to 4294967295	---	1	F722	0
0474	Analog IOC Trip Alarm State	0 to 4294967295	---	1	F722	0
0476	Analog IOC Trip Alarm Ack	0 to 4294967295	---	1	F722	0
0478	IOC Trip Alarm State	0 to 4294967295	---	1	F722	0
047A	IOC Trip Alarm Ack	0 to 4294967295	---	1	F722	0
047C	Node Control Power Lost State	0 to 4294967295	---	1	F722	0
047E	Node Control Power Lost Ack	0 to 4294967295	---	1	F722	0
0480	Node Communication Lost State	0 to 4294967295	---	1	F722	0
0482	Node Communication Lost Ack	0 to 4294967295	---	1	F722	0
0484	Breaker Load Life 50 State	0 to 4294967295	---	1	F722	0
0486	Breaker Load Life 50 Ack	0 to 4294967295	---	1	F722	0

0488	Breaker Load Life 75 State	0 to 4294967295	---	1	F722	0
048A	Breaker Load Life 75 Ack	0 to 4294967295	---	1	F722	0
048C	Breaker Load Life 90 State	0 to 4294967295	---	1	F722	0
048E	Breaker Load Life 90 Ack	0 to 4294967295	---	1	F722	0
0490	Breaker Accum Service Alarm State	0 to 4294967295	---	1	F722	0
0492	Breaker Accum Service Alarm Ack	0 to 4294967295	---	1	F722	0
0494	Breaker Mechanical Life 12 5 State	0 to 4294967295	---	1	F722	0
0496	Breaker Mechanical Life 12 5 Ack	0 to 4294967295	---	1	F722	0
0498	Breaker Mechanical Life 25 State	0 to 4294967295	---	1	F722	0
049A	Breaker Mechanical Life 25 Ack	0 to 4294967295	---	1	F722	0
049C	Breaker Mechanical Life 37 5 State	0 to 4294967295	---	1	F722	0
049E	Breaker Mechanical Life 37 5 Ack	0 to 4294967295	---	1	F722	0
04A0	Breaker Mechanical Life 50 State	0 to 4294967295	---	1	F722	0
04A2	Breaker Mechanical Life 50 Ack	0 to 4294967295	---	1	F722	0
04A4	Breaker Mechanical Life 62 5 State	0 to 4294967295	---	1	F722	0
04A6	Breaker Mechanical Life 62 5 Ack	0 to 4294967295	---	1	F722	0
04A8	Breaker Mechanical Life 75 State	0 to 4294967295	---	1	F722	0
04AA	Breaker Mechanical Life 75 Ack	0 to 4294967295	---	1	F722	0
04AC	Breaker Mechanical Life 87 5 State	0 to 4294967295	---	1	F722	0
04AE	Breaker Mechanical Life 87 5 Ack	0 to 4294967295	---	1	F722	0
04B0	Breaker Mechanical Life 100 State	0 to 4294967295	---	1	F722	0
04B2	Breaker Mechanical Life 100 Ack	0 to 4294967295	---	1	F722	0
04B4	Bus Differential Trip Alarm State	0 to 4294967295	---	1	F722	0
04B6	Bus Differential Trip Alarm Ack	0 to 4294967295	---	1	F722	0
04B8	Bus Differential Alarm State	0 to 4294967295	---	1	F722	0
04BA	Bus Differential Alarm Ack	0 to 4294967295	---	1	F722	0
04BC	Multi Source Ground Fault Trip Alarm State	0 to 4294967295	---	1	F722	0
04BE	Multi Source Ground Fault Trip Alarm Ack	0 to 4294967295	---	1	F722	0
04C0	Multi Source Ground Fault Alarm State	0 to 4294967295	---	1	F722	0
04C2	Multi Source Ground Fault Alarm Ack	0 to 4294967295	---	1	F722	0
04C4	Hardware Synch Card Lost State	0 to 4294967295	---	1	F722	0
04C6	Hardware Synch Card Lost Ack	0 to 4294967295	---	1	F722	0
04CA	Compartment ID Button Missing Alarm State	0 to 4294967295	---	1	F722	0

04CE	Compartment ID Button Missing Alarm Ack	0 to 4294967295	---	1	F722	0
04D0	Control Alarm State	0 to 4294967295	---	1	F722	0
04D2	Control Alarm Ack	0 to 4294967295	---	1	F722	0
04D4	Redundant CPU Node Comm Loss State	0 to 4294967295	---	1	F722	0
04D6	Redundant CPU Node Comm Loss Ack	0 to 4294967295	---	1	F722	0
04D8	Redundant CPU Hardware Synch Loss State	0 to 4294967295	---	1	F722	0
04DA	Redundant CPU Hardware Synch Loss Ack	0 to 4294967295	---	1	F722	0
04DC	Discrete IO Misconfigured State	0 to 4294967295	---	1	F722	0
04DE	Discrete IO Misconfigured Ack	0 to 4294967295	---	1	F722	0
04E0	Reserved (8 items)	0 to 4294967295	---	1	F722	0
04E8	HRGF Location Alarm State	0 to 4294967295	---	1	F722	0
04EA	HRGF Location Alarm Ack	0 to 4294967295	---	1	F722	0
04EC	Reserved (28 items)	0 to 4294967295	---	1	F722	0
0508	SRC X Node Ground CT Connected	0 to 4294967295	---	1	F722	0
050A	High Current Trigger Alarm State	0 to 4294967295	---	1	F722	0
050C	High Current Trigger Alarm Ack	0 to 4294967295	---	1	F722	0
050E	Reduced Let Thru Over x Hours Alarm State	0 to 4294967295	---	1	F722	0
0510	Reduced Let Thru Over x Hours Alarm Ack	0 to 4294967295	---	1	F722	0
0512	HRGF Location Contactor Operating Alarm State	0 to 4294967295	---	1	F722	0
0514	HRGF Location Contactor Operating Alarm Ack	0 to 4294967295	---	1	F722	0
0516	HRGF Location Trip Alarm State	0 to 4294967295	---	1	F722	0
0518	HRGF Location Trip Alarm Ack	0 to 4294967295	---	1	F722	0
051A	Flux Shifter Failure Alarm State	0 to 4294967295	--	1	F722	0
051C	Flux Shifter Failure Alarm Ack	0 to 4294967295	--	1	F722	0
051E	Shunt Trip Failure Alarm State	0 to 4294967295	---	1	F722	0
0520	Shunt Trip Failure Alarm Ack	0 to 4294967295	---	1	F722	0
Source Voltage (Read Only) (30 Modules)						
0542	Phase AG Voltage RMS	0 to 999999.999	V	0.001	F060	0
0544	Phase BG Voltage RMS	0 to 999999.999	V	0.001	F060	0
0546	Phase CG Voltage RMS	0 to 999999.999	V	0.001	F060	0
0548	Phase AB or AC Voltage RMS	0 to 999999.999	V	0.001	F060	0
054A	Phase BC or BA Voltage RMS	0 to 999999.999	V	0.001	F060	0

054C	Phase CA or CB Voltage RMS	0 to 999999.999	V	0.001	F060	0
054E	SRC X Voltage Reserved (30 items)					
056C	...Repeated for module number 2					
0596	...Repeated for module number 3					
05C0	...Repeated for module number 4					
05EA	...Repeated for module number 5					
0614	...Repeated for module number 6					
063E	...Repeated for module number 7					
0668	...Repeated for module number 8					
0692	...Repeated for module number 9					
06BC	...Repeated for module number 10					
06E6	...Repeated for module number 11					
0710	...Repeated for module number 12					
073A	...Repeated for module number 13					
0764	...Repeated for module number 14					
078E	...Repeated for module number 15					
07B8	...Repeated for module number 16					
07E2	...Repeated for module number 17					
080C	...Repeated for module number 18					
0836	...Repeated for module number 19					
0860	...Repeated for module number 20					
088A	...Repeated for module number 21					
08B4	...Repeated for module number 22					
08DE	...Repeated for module number 23					
0908	...Repeated for module number 24					
0932	...Repeated for module number 25					
095C	...Repeated for module number 26					
0986	...Repeated for module number 27					
09B0	...Repeated for module number 28					
09DA	...Repeated for module number 29					
0A04	...Repeated for module number 30					

FBW Current (Read Only) (30 Modules)						
0A2E	Phase A Current RMS	0 to 999999.999	A	0.001	F060	0
0A30	Phase B Current RMS	0 to 999999.999	A	0.001	F060	0
0A32	Phase C Current RMS	0 to 999999.999	A	0.001	F060	0
0A34	Neutral Current RMS	0 to 999999.999	A	0.001	F060	0
0A36	Ground Current RMS	0 to 999999.999	A	0.001	F060	0
0A38	...Repeated for module number 2					
0A42	...Repeated for module number 3					
0A4C	...Repeated for module number 4					
0A56	...Repeated for module number 5					
0A60	...Repeated for module number 6					
0A6A	...Repeated for module number 7					
0A74	...Repeated for module number 8					
0A7E	...Repeated for module number 9					
0A88	...Repeated for module number 10					
0A92	...Repeated for module number 11					
0A9C	...Repeated for module number 12					
0AA6	...Repeated for module number 13					
0AB0	...Repeated for module number 14					
0ABA	...Repeated for module number 15					
0AC4	...Repeated for module number 16					
0ACE	...Repeated for module number 17					
0AD8	...Repeated for module number 18					
0AE2	...Repeated for module number 19					
0AEC	...Repeated for module number 20					
0AF6	...Repeated for module number 21					
0B00	...Repeated for module number 22					
0B0A	...Repeated for module number 23					
0B14	...Repeated for module number 24					
0B1E	...Repeated for module number 25					
0B28	...Repeated for module number 26					

0B32	...Repeated for module number 27					
0B3C	...Repeated for module number 28					
0B46	...Repeated for module number 29					
0B50	...Repeated for module number 30					
Reduced Let Thru Command						
0B5A	Remote Multipoint Reduced Let Thru Enable	0 to 1	---	1	F126	0
0B5B	Remote Multipoint Reduced Let Thru Reset	0 to 1	---	1	F126	0
0B5C	Remote Multipoint Reduced Let Thru Factory Rst All	0 to 1	---	1	F126	0
0B5D	Remote System Reduced Let Thru Enable	0 to 1	---	1	F126	0
0B5E	Remote System Reduced Let Thru Reset	0 to 1	---	1	F126	0
0B5F	Remote System Reduced Let Thru Factory Rst All	0 to 1	---	1	F126	0
0B60	Reserved (11 Items)	0 to 1	---	1	F126	0
Reduced Let Thru Setting (Read/Write)						
0B6B	FlexLogic Multipoint Reduced Let Thru Trig-ger	0 to 65535	---	1	F300	0
0B6C	FlexLogic System Reduced Let Thru Trigger	0 to 65535	---	1	F300	0
0B6D	Reduced Let Thru Alarm Reactivation Time	1 to 24	Hour	1	F001	24
0B6E	Reserved (6 Items)					
Reduced Let Thru Status (Read Only)						
0B74	Reduced Let Thru Status	0 to 4294967295	---	1	F739	0
0B76	FlexLogic Multipoint Reduced Let Thru State	0 to 1	---	1	F108	0
0B77	FlexLogic System Reduced Let State	0 to 1	---	1	F108	0
0B78	Remote Reduced Let Thru Command Feed-back	0 to 4294967295	---	1	F739	0
0B7A	Remote Multipoint Reduced Let Thru Enable Count	0 to 8	---	1	F001	0
0B7B	Remote System Reduced Let Thru Enable Count	0 to 8	---	1	F001	0
0B7C	Reserved (7 Items)	---	---	---	---	---
SRC X Reduced Let Thru Command (30 Modules)						
0B84	SRC X Remote Reduced Let Thru Enable Load	0 to 1	---	1	F126	0 (No)
0B85	SRC X Remote Reduced Let Thru Reset Load	0 to 1	---	1	F126	0 (No)

0B86	SRC X Remote Reduced Let Thru Factory Rst All	0 to 1	---	1	F126	0 (No)
0B87	Reserved (9 Items)	---	---	---	---	---
0B90	...Repeated for Node 2					
0B9C	...Repeated for Node 3					
0BA8	...Repeated for Node 4					
0BB4	...Repeated for Node 5					
0BC0	...Repeated for Node 6					
0BCC	...Repeated for Node 7					
0BD8	...Repeated for Node 8					
0BE4	...Repeated for Node 9					
0BF0	...Repeated for Node 10					
0BFC	...Repeated for Node 11					
0C08	...Repeated for Node 12					
0C14	...Repeated for Node 13					
0C20	...Repeated for Node 14					
0C2C	...Repeated for Node 15					
0C38	...Repeated for Node 16					
0C44	...Repeated for Node 17					
0C50	...Repeated for Node 18					
0C5C	...Repeated for Node 19					
0C68	...Repeated for Node 20					
0C74	...Repeated for Node 21					
0C80	...Repeated for Node 22					
0C8C	...Repeated for Node 23					
0C98	...Repeated for Node 24					
0CA4	...Repeated for Node 25					
0CB0	...Repeated for Node 26					
0CBC	...Repeated for Node 27					
0CC8	...Repeated for Node 28					
0CD4	...Repeated for Node 29					

0CE0	...Repeated for Node 30					
SRC X Reduced Let Thru Setting (Read/Write) (30 Modules)						
0CEC	SRC X Reduced Let Thru Association	0 to 1073741823	---	1	F722	0
0CEE	SRC X Reduced Let Thru Setting Reserved					
0CF1	...Repeated for Node 2					
0CF6	...Repeated for Node 3					
0CFB	...Repeated for Node 4					
0D00	...Repeated for Node 5					
0D05	...Repeated for Node 6					
0D0A	...Repeated for Node 7					
0D0F	...Repeated for Node 8					
0D14	...Repeated for Node 9					
0D19	...Repeated for Node 10					
0D1E	...Repeated for Node 11					
0D23	...Repeated for Node 12					
0D28	...Repeated for Node 13					
0D2D	...Repeated for Node 14					
0D32	...Repeated for Node 15					
0D37	...Repeated for Node 16					
0D3C	...Repeated for Node 17					
0D41	...Repeated for Node 18					
0D46	...Repeated for Node 19					
0D4B	...Repeated for Node 20					
0D50	...Repeated for Node 21					
0D55	...Repeated for Node 22					
0D5A	...Repeated for Node 23					
0D5F	...Repeated for Node 24					
0D64	...Repeated for Node 25					
0D69	...Repeated for Node 26					
0D6E	...Repeated for Node 27					
0D73	...Repeated for Node 28					

0D78	...Repeated for Node 29					
0D7D	...Repeated for Node 30					
SRC X Reduced Let Thru Status (Read Only) (30 Modules)						
0D82	SRC X FlexLogic Reduced Let Thru State	0 to 1	---	1	F108	0
0D83	SRC X Remote Reduced Let Thru Enable Load Count	0 to 8	---	1	F001	0
0D84	Reserved (8 items)	---	---	---	---	---
0D8C	...Repeated for Node 2					
0D96	...Repeated for Node 3					
0DA0	...Repeated for Node 4					
0DAA	...Repeated for Node 5					
0DB4	...Repeated for Node 6					
0DBE	...Repeated for Node 7					
0DC8	...Repeated for Node 8					
0DD2	...Repeated for Node 9					
0DDC	...Repeated for Node 10					
0DE6	...Repeated for Node 11					
0DF0	...Repeated for Node 12					
0DFA	...Repeated for Node 13					
0E04	...Repeated for Node 14					
0E0E	...Repeated for Node 15					
0E18	...Repeated for Node 16					
0E22	...Repeated for Node 17					
0E2C	...Repeated for Node 18					
0E36	...Repeated for Node 19					
0E40	...Repeated for Node 20					
0E4A	...Repeated for Node 21					
0E54	...Repeated for Node 22					
0E5E	...Repeated for Node 23					
0E68	...Repeated for Node 24					
0E72	...Repeated for Node 25					

0E7C	...Repeated for Node 26					
0E86	...Repeated for Node 27					
0E90	...Repeated for Node 28					
0E9A	...Repeated for Node 29					
0EA4	...Repeated for Node 30					
Source Power (Read Only) (30 Modules)						
0EAE	Three Phase Real Power	-1000000000000 to 1000000000000	W	0.001	F060	0
0EB0	Phase A Real Power	-1000000000000 to 1000000000000	W	0.001	F060	0
0EB2	Phase B Real Power	-1000000000000 to 1000000000000	W	0.001	F060	0
0EB4	Phase C Real Power	-1000000000000 to 1000000000000	W	0.001	F060	0
0EB6	Three Phase Reactive Power	-1000000000000 to 1000000000000	Var	0.001	F060	0
0EB8	Phase A Reactive Power	-1000000000000 to 1000000000000	Var	0.001	F060	0
0EBA	Phase B Reactive Power	-1000000000000 to 1000000000000	Var	0.001	F060	0
0EBC	Phase C Reactive Power	-1000000000000 to 1000000000000	Var	0.001	F060	0
0EBE	Three Phase Apparent Power	0 to 1000000000000	VA	0.001	F060	0
0EC0	Phase A Apparent Power	0 to 1000000000000	VA	0.001	F060	0
0EC2	Phase B Apparent Power	0 to 1000000000000	VA	0.001	F060	0
0EC4	Phase C Apparent Power	0 to 1000000000000	VA	0.001	F060	0
0EC6	Three Phase Power Factor	-0.999 to 1	---	0.001	F013	0
0EC7	Phase A Power Factor	-0.999 to 1	---	0.001	F013	0
0EC8	Phase B Power Factor	-0.999 to 1	---	0.001	F013	0
0EC9	Phase C Power Factor	-0.999 to 1	---	0.001	F013	0
0ECA	SRC X Power Reserved (10 items)					
0ED4	...Repeated for module number 2					
0EFA	...Repeated for module number 3					

0F20	...Repeated for module number 4					
0F46	...Repeated for module number 5					
0F6C	...Repeated for module number 6					
0F92	...Repeated for module number 7					
0FB8	...Repeated for module number 8					
0FDE	...Repeated for module number 9					
1004	...Repeated for module number 10					
102A	...Repeated for module number 11					
1050	...Repeated for module number 12					
1076	...Repeated for module number 13					
109C	...Repeated for module number 14					
10C2	...Repeated for module number 15					
10E8	...Repeated for module number 16					
110E	...Repeated for module number 17					
1134	...Repeated for module number 18					
115A	...Repeated for module number 19					
1180	...Repeated for module number 20					
11A6	...Repeated for module number 21					
11CC	...Repeated for module number 22					
11F2	...Repeated for module number 23					
1218	...Repeated for module number 24					
123E	...Repeated for module number 25					
1264	...Repeated for module number 26					
128A	...Repeated for module number 27					
12B0	...Repeated for module number 28					
12D6	...Repeated for module number 29					
12FC	...Repeated for module number 30					
Source Energy (Read Only) (30 Modules)						
1322	Positive Watthour	0 to 1000000000000	Wh	0.001	F060	0
1324	Phase A Positive Watthour	0 to 1000000000000	Wh	0.001	F060	0

1326	Phase B Positive Watthour	0 to 1000000000000	Wh	0.001	F060	0
1328	Phase C Positive Watthour	0 to 1000000000000	Wh	0.001	F060	0
132A	Negative Watthour	0 to 1000000000000	Wh	0.001	F060	0
132C	Phase A Negative Watthour	0 to 1000000000000	Wh	0.001	F060	0
132E	Phase B Negative Watthour	0 to 1000000000000	Wh	0.001	F060	0
1330	Phase C Negative Watthour	0 to 1000000000000	Wh	0.001	F060	0
1332	Positive Varhour	0 to 1000000000000	Varh	0.001	F060	0
1334	Phase A Positive Varhour	0 to 1000000000000	Varh	0.001	F060	0
1336	Phase B Positive Varhour	0 to 1000000000000	Varh	0.001	F060	0
1338	Phase C Positive Varhour	0 to 1000000000000	Varh	0.001	F060	0
133A	Negative Varhour	0 to 1000000000000	Varh	0.001	F060	0
133C	Phase A Negative Varhour	0 to 1000000000000	Varh	0.001	F060	0
133E	Phase B Negative Varhour	0 to 1000000000000	Varh	0.001	F060	0
1340	Phase C Negative Varhour	0 to 1000000000000	Varh	0.001	F060	0
1342	Vahour	0 to 1000000000000	Vah	0.001	F060	0
1344	Phase A Vahour	0 to 1000000000000	Vah	0.001	F060	0
1346	Phase B Vahour	0 to 1000000000000	Vah	0.001	F060	0
1348	Phase C Vahour	0 to 1000000000000	Vah	0.001	F060	0
134A	SRC X Energy Reserved (10 items)					
1354	...Repeated for module number 2					
1386	...Repeated for module number 3					
13B8	...Repeated for module number 4					

13EA	...Repeated for module number 5					
141C	...Repeated for module number 6					
144E	...Repeated for module number 7					
1480	...Repeated for module number 8					
14B2	...Repeated for module number 9					
14E4	...Repeated for module number 10					
1516	...Repeated for module number 11					
1548	...Repeated for module number 12					
157A	...Repeated for module number 13					
15AC	...Repeated for module number 14					
15DE	...Repeated for module number 15					
1610	...Repeated for module number 16					
1642	...Repeated for module number 17					
1674	...Repeated for module number 18					
16A6	...Repeated for module number 19					
16D8	...Repeated for module number 20					
170A	...Repeated for module number 21					
173C	...Repeated for module number 22					
176E	...Repeated for module number 23					
17A0	...Repeated for module number 24					
17D2	...Repeated for module number 25					
1804	...Repeated for module number 26					
1836	...Repeated for module number 27					
1868	...Repeated for module number 28					
189A	...Repeated for module number 29					
18CC	...Repeated for module number 30					
Source Harmonic Analysis (Read Only) (30 modules)						
18FE	SRC X Phase A Voltage THD	0 to 1.0	%	0.001	F001	0
18FF	SRC X Phase B Voltage THD	0 to 1.0	%	0.001	F001	0
1900	SRC X Phase C Voltage THD	0 to 1.0	%	0.001	F001	0
1901	SRC X Phase A Current THD	0 to 1.0	%	0.001	F001	0

1902	SRC X Phase B Current THD	0 to 1.0	%	0.001	F001	0
1903	SRC X Phase C Current THD	0 to 1.0	%	0.001	F001	0
1904	SRC X Phase N Current THD	0 to 1.0	%	0.001	F001	0
1905	SRC X Phase A K Factor	0 to 6553.5	---	0.1	F001	1
1906	SRC X Phase B K Factor	0 to 6553.5	---	0.1	F001	1
1907	SRC X Phase C K Factor	0 to 6553.5	---	0.1	F001	1
1908	SRC X Phase N K Factor	0 to 6553.5	---	0.1	F001	1
1909	SRC X Harmonic Analysis Reserved (10 items)					
1913	...Repeated for module number 2					
1928	...Repeated for module number 3					
193D	...Repeated for module number 4					
1952	...Repeated for module number 5					
1967	...Repeated for module number 6					
197C	...Repeated for module number 7					
1991	...Repeated for module number 8					
19A6	...Repeated for module number 9					
19BB	...Repeated for module number 10					
19D0	...Repeated for module number 11					
19E5	...Repeated for module number 12					
19FA	...Repeated for module number 13					
1A0F	...Repeated for module number 14					
1A24	...Repeated for module number 15					
1A39	...Repeated for module number 16					
1A4E	...Repeated for module number 17					
1A63	...Repeated for module number 18					
1A78	...Repeated for module number 19					
1A8D	...Repeated for module number 20					
1AA2	...Repeated for module number 21					
1AB7	...Repeated for module number 22					
1ACC	...Repeated for module number 23					
1AE1	...Repeated for module number 24					

1AF6	...Repeated for module number 25					
1B0B	...Repeated for module number 26					
1B20	...Repeated for module number 27					
1B35	...Repeated for module number 28					
1B4A	...Repeated for module number 29					
1B5F	...Repeated for module number 30					
Source Demand Peaks (Read Only) (30 Modules)						
1B74	SRC X Maximum kW	-1000000000000 to 1000000000000	W	0.001	F060	0
1B76	SRC X Maximum kW DateTime	0 to 4294967295	---	1	F050	0
1B78	SRC X Maximum kvar	-1000000000000 to 1000000000000	var	0.001	F060	0
1B7A	SRC X Maximum kvar DateTime	0 to 4294967295	---	1	F050	0
1B7C	SRC X Maximum kVA	-1000000000000 to 1000000000000	VA	0.001	F060	0
1B7E	SRC X Maximum kVA DateTime	0 to 4294967295	---	1	F050	0
1B80	SRC X Demand Peaks Reserved (8 items)					
1B88	...Repeated for module number 2					
1B9C	...Repeated for module number 3					
1BB0	...Repeated for module number 4					
1BC4	...Repeated for module number 5					
1BD8	...Repeated for module number 6					
1BEC	...Repeated for module number 7					
1C00	...Repeated for module number 8					
1C14	...Repeated for module number 9					
1C28	...Repeated for module number 10					
1C3C	...Repeated for module number 11					
1C50	...Repeated for module number 12					
1C64	...Repeated for module number 13					
1C78	...Repeated for module number 14					
1C8C	...Repeated for module number 15					
1CA0	...Repeated for module number 16					

1CB4	...Repeated for module number 17					
1CC8	...Repeated for module number 18					
1CDC	...Repeated for module number 19					
1CF0	...Repeated for module number 20					
1D04	...Repeated for module number 21					
1D18	...Repeated for module number 22					
1D2C	...Repeated for module number 23					
1D40	...Repeated for module number 24					
1D54	...Repeated for module number 25					
1D68	...Repeated for module number 26					
1D7C	...Repeated for module number 27					
1D90	...Repeated for module number 28					
1DA4	...Repeated for module number 29					
1DB8	...Repeated for module number 30					
SRCx Node Metering Min Max Values (Read Only)						
1DCC	SRC X Three Phase Power Factor Min	-0.999 to 1	---	0.001	F013	0
1DCD	SRC X Three Phase Power Factor Min Date	0 to 4294967295	---	1	F050	0
1DCF	SRC X Phase A Power Factor Min	-0.999 to 1	---	0.001	F013	0
1DD0	SRC X Phase A Power Factor Min Date	0 to 4294967295	---	1	F050	0
1DD2	SRC X Phase B Power Factor Min	-0.999 to 1	---	0.001	F013	0
1DD3	SRC X Phase B Power Factor Min Date	0 to 4294967295	---	1	F050	0
1DD5	SRC X Phase C Power Factor Min	-0.999 to 1	---	0.001	F013	0
1DD6	SRC X Phase C Power Factor Min Date	0 to 4294967295	---	1	F050	0
1DD8	SRC X Three Phase Power Factor Max	-0.999 to 1	---	0.001	F013	0
1DD9	SRC X Three Phase Power Factor Max Date	0 to 4294967295	---	1	F050	0
1DDB	SRC X Phase A Power Factor Max	-0.999 to 1	---	0.001	F013	0
1DDC	SRC X Phase A Power Factor Max Date	0 to 4294967295	---	1	F050	0
1DDE	SRC X Phase B Power Factor Max	-0.999 to 1	---	0.001	F013	0
1DDF	SRC X Phase B Power Factor Max Date	0 to 4294967295	---	1	F050	0
1DE1	SRC X Phase C Power Factor Max	-0.999 to 1	---	0.001	F013	0
1DE2	SRC X Phase C Power Factor Max Date	0 to 4294967295	---	1	F050	0
1DE4	SRC X Last Clear Energy Date	0 to 4294967295	---	1	F050	0

1DE6	SRC X Last Commissioned Date	0 to 4294967295	---	1	F050	0
1DE8	SRC X Power Peaks Reserved (47 items)					
1E17	...Repeated for module number 2					
1E62	...Repeated for module number 3					
1EAD	...Repeated for module number 4					
1EF8	...Repeated for module number 5					
1F43	...Repeated for module number 6					
1F8E	...Repeated for module number 7					
1FD9	...Repeated for module number 8					
2024	...Repeated for module number 9					
206F	...Repeated for module number 10					
20BA	...Repeated for module number 11					
2105	...Repeated for module number 12					
2150	...Repeated for module number 13					
219B	...Repeated for module number 14					
21E6	...Repeated for module number 15					
2231	...Repeated for module number 16					
227C	...Repeated for module number 17					
22C7	...Repeated for module number 18					
2312	...Repeated for module number 19					
235D	...Repeated for module number 20					
23A8	...Repeated for module number 21					
23F3	...Repeated for module number 22					
243E	...Repeated for module number 23					
2489	...Repeated for module number 24					
24D4	...Repeated for module number 25					
251F	...Repeated for module number 26					
256A	...Repeated for module number 27					
25B5	...Repeated for module number 28					
2600	...Repeated for module number 29					
264B	...Repeated for module number 30					

Setting Enable (Read/Write)						
2696	GF Tripping Priority Enable	0 to 1	---	1	F102	0
Source Demand (30 Modules)						
26A2	SRC X Previous Internal kW	-1000000000000 to 1000000000000	W	0.001	F060	0
26A4	SRC X Previous Interval kvar	-1000000000000 to 1000000000000	var	0.001	F060	0
26A6	SRC X Previous Interval kVA	-1000000000000 to 1000000000000	VA	0.001	F060	0
26A8	SRC X Last Reset DateTime	0 to 4294967295	---	1	F050	0
26AA	SRC X Number Of Demand Resets	0 to 4294967295	---	1	F003	0
26AC	SRC X Demand Reset	0 to 1	---	1	F126	0
26AD	SRC X Demand Log Clear Command	0 to 1	---	1	F126	0
26AE	SRC X Demand Log Last Cleared Date	0 to 4294967295	---	1	F050	0
26B0	SRC X Demand Log Records Since Last Clear	0 to 4294967295	---	1	F003	0
26B2	SRC X Demand Log Interval Records Available	0 to 4294967295	---	1	F003	0
26B4	SRC X Demand Reserved (20 items)					
26C8	...Repeated for module number 2					
26EE	...Repeated for module number 3					
2714	...Repeated for module number 4					
273A	...Repeated for module number 5					
2760	...Repeated for module number 6					
2786	...Repeated for module number 7					
27AC	...Repeated for module number 8					
27D2	...Repeated for module number 9					
27F8	...Repeated for module number 10					
281E	...Repeated for module number 11					
2844	...Repeated for module number 12					
286A	...Repeated for module number 13					
2890	...Repeated for module number 14					
28B6	...Repeated for module number 15					
28DC	...Repeated for module number 16					

2902	...Repeated for module number 17					
2928	...Repeated for module number 18					
294E	...Repeated for module number 19					
2974	...Repeated for module number 20					
299A	...Repeated for module number 21					
29C0	...Repeated for module number 22					
29E6	...Repeated for module number 23					
2A0C	...Repeated for module number 24					
2A32	...Repeated for module number 25					
2A58	...Repeated for module number 26					
2A7E	...Repeated for module number 27					
2AA4	...Repeated for module number 28					
2ACA	...Repeated for module number 29					
2AF0	...Repeated for module number 30					
SRCx As Reported At Node Status (Read Only)						
2B16	SRC X Node ID	0 to 29	---	1	F001	0
2B17	Reserved (3 items)	---	---	---	F072	0
2B1A	SRC X Frame Rating	0 to 65535	---	1	F001	0
2B1B	SRC X CT Rating	0 to 65535	---	1	F001	0
2B1C	SRC X Breaker Type	0 to 65535	---	1	F715	0
2B1D	SRC X NodeProt Protection Config	0 to 255	---	---	F705	0
2B1E	SRC X Node Firmware Version	0 to 655.35	---	0.01	F001	0
2B1F	SRC X Hardware Version	0 to 255	---	1	F001	0
2B20	SRC X Message Protocol Version	0 to 65535	---	1	F001	0
2B21	SRC X Product Type	0 to 65535	---	1	F716	0
2B22	SRC X NodeProt Rating Switch	0 to 65535	---	1	F001	0
2B23	SRC X NodeProt Long Time Setting Multiplier	0 to 655.35	---	0.01	F001	0
2B24	SRC X NodeProt IOC Threshold Setting	0 to 655.35	---	0.01	F001	0
2B25	SRC X NodeProt Ground Fault Setting	0 to 655.35	---	0.01	F102	0
2B26	SRC X NodeProt Short Time Setting	0 to 6553.5	---	0.1	F102	0
2B27	SRC X Node Internal Diagnostics	0 to 65535	---	1	F701	0
2B28	SRC X Node System Diagnostics 1	0 to 65535	---	1	F702	0

2B29	SRC X Node System Diagnostics 2	0 to 65535	---	1	F703	0
2B2A	SRC X Node Hardware Diagnostics	0 to 65535	---	1	F704	0
2B2B	SRC X Node Physical Status	0 to 65535	---	1	F708	0
2B2C	SRC X Node Logic and Trip Status	0 to 65535	---	1	F709	0
2B2D	SRC X Node Last Trip Sequence Number	0 to 4294967295	---	1	F003	0
2B2F	SRC X Reflected CPU Diagnostics	0 to 65535	---	1	F706	0
2B30	SRC X Reflected CPU 0 Command	0 to 65535	---	1	F707	0
2B31	SRC X Reflected CPU 1 Command	0 to 65535	---	1	F707	0
2B32	SRC X Fan Status	0 to 1	---	1	F108	0
2B33	SRC X CT Rating Node Report	0 to 65535	---	1	F001	0
2B34	SRC X Node Serial Number	---	---	---	F205	" "
2B3A	SRC X Phase A Frequency	0 to 655.35	Hz	0.01	F001	0
2B3B	SRC X Phase B Frequency	0 to 655.35	Hz	0.01	F001	0
2B3C	SRC X Phase C Frequency	0 to 655.35	Hz	0.01	F001	0
2B3D	SRC X Topology	0 to15	---	1	F001	1
2B3E	SRC X ST ZSI Current Restrained Time	0 to 65535	ms	1	F001	0
2B3F	SRC X NodeProt ZSI Peak to Peak IOC Setting	0 to 48	1/2 Cycle	1	F001	0
2B40	Reserved (2 items)				F001	0
2B66	...Repeated for module number 2					
2BB6	...Repeated for module number 3					
2C06	...Repeated for module number 4					
2C56	...Repeated for module number 5					
2CA6	...Repeated for module number 6					
2CF6	...Repeated for module number 7					
2D46	...Repeated for module number 8					
2D96	...Repeated for module number 9					
2DE6	...Repeated for module number 10					
2E36	...Repeated for module number 11					
2E86	...Repeated for module number 12					
2ED6	...Repeated for module number 13					
2F26	...Repeated for module number 14					

2F76	...Repeated for module number 15					
2FC6	...Repeated for module number 16					
3016	...Repeated for module number 17					
3066	...Repeated for module number 18					
30B6	...Repeated for module number 19					
3106	...Repeated for module number 20					
3156	...Repeated for module number 21					
31A6	...Repeated for module number 22					
31F6	...Repeated for module number 23					
3246	...Repeated for module number 24					
3296	...Repeated for module number 25					
32E6	...Repeated for module number 26					
3336	...Repeated for module number 27					
3386	...Repeated for module number 28					
33D6	...Repeated for module number 29					
3426	...Repeated for module number 30					
SRCx Node Counters (Read/Write) - Write a 0 to these to reset them						
3476	Reserved (840 items)	0 to 65535	---	1	F001	0
SRCx Settings (Read/Write)						
37BE	SRC X Node Commissioned	0 to 1	---	1	F102	0
37BF	SRC X PT Source Node Identifier	0 to 29	---	1	F001	0
37C0	SRC X Breaker Connection	0 to 1	---	1	F712	0
37C1	Reserved (17 items)					
37D2	SRC X PT Rating	0 to 6	---	1	F719	0
37D3	SRC X UV Trip Enable	0 to 1	---	1	F102	0
37D4	SRC X UV Trip Curve Type	0 to 1	---	1	F726	1
37D5	SRC X UV Trip Pickup Setting	10 to 95	%	1	F001	50
37D6	SRC X UV Trip Time Delay	0.5 to 600	S	0.5	F001	30
37D7	SRC X UV Trip Phase Requirement	1 to 3	---	1	F001	1
37D8	SRC X UV Trip Block Volt Enable	0 to 1	---	1	F102	0
37D9	SRC X UV Trip Block Volt Setting	5 to 75	%	1	F001	5
37DA	SRC X UV Trip Open or Trip Setting	0 to 1	---	1	F727	1

37DB	SRC X UV Alarm Enable	0 to 1	---	1	F102	0
37DC	SRC X UV Alarm Curve Type	0 to 1	---	1	F726	1
37DD	SRC X UV Alarm Pickup Setting	10 to 95	%	1	F001	50
37DE	SRC X UV Alarm Time Delay	0.5 to 600	---	0.5	F001	15
37DF	SRC X UV Alarm Phase Requirement	1 to 3	---	1	F001	1
37E0	SRC X UV Alarm Block Volt Enable	0 to 1	---	1	F102	0
37E1	SRC X UV Alarm Block Volt Setting	5 to 75	%	1	F001	5
37E2	SRC X OV Trip Enable	0 to 1	---	1	F102	0
37E3	SRC X OV Trip Pickup Setting	105 to 125	%	1	F001	120
37E4	SRC X OV Trip Time Delay	0.5 to 600	S	0.5	F001	30
37E5	SRC X OV Trip Phase Requirement	1 to 3	---	1	F001	1
37E6	SRC X OV Trip Open or Trip Setting	0 to 1	---	1	F727	1
37E7	SRC X OV Alarm Enable	0 to 1	---	1	F102	0
37E8	SRC X OV Alarm Pickup Threshold	105 to 125	%	1	F001	120
37E9	SRC X OV Alarm Time Delay	0.5 to 600	---	0.5	F001	15
37EA	SRC X OV Alarm Phase Requirement	1 to 3	---	1	F001	1
37EB	Source Settings Reserved 2 (7 items)					
37F2	SRC X PL Trip Enable	0 to 1	---	1	F102	0
37F3	SRC X PL Trip Pickup Setting	8 to 50	%	1	F001	8
37F4	SRC X PL Trip Time Delay	0.5 to 600	S	0.5	F001	30
37F5	SRC X PL Trip Block Volt Enable	0 to 1	---	1	F102	0
37F6	SRC X PL Open or Trip Setting	0 to 1	---	1	F727	1
37F7	SRC X PL Alarm Enable	0 to 1	---	1	F102	0
37F8	SRC X PL Alarm Pickup Setting	8 to 50	%	1	F001	8
37F9	SRC X PL Alarm Time Delay	0.5 to 600	S	0.5	F001	15
37FA	SRC X PL Alarm Block Volt Enable	0 to 1	---	1	F102	0
37FB	SRC X PL Trip Voltage Setting	5 to 5	%	1	F001	5
37FC	SRC X PL Alarm Blocking Voltage Setting	5 to 5	%	1	F001	5
37FD	Source Settings Reserved 3 (3 items)					
3800	SRC X Rev Power Trip Enable	0 to 1	---	1	F102	0
3801	SRC X Rev Power Trip Pickup Setting	10 to 990	kW	10	F001	990
3802	SRC X Rev Power Trip Time Delay	0.5 to 600	S	0.5	F001	30
3803	SRC X Rev Power Alarm Enable	0 to 1	---	1	F102	0

3804	SRC X Rev Power Alarm Pickup Setting	10 to 990	kW	10	F001	990
3805	SRC X Rev Power Alarm Time Delay	0.5 to 600	S	0.5	F001	15
3806	SRC X Rev Power Trip or Open	0 to 1	---	1	F727	1
3807	Source Settings Reserved 4 (4 items)					
380B	SRC X High Curr Alarm Enable	0 to 1	---	1	F102	0
380C	SRC X High Curr Alarm Pickup Setting	50 to 200	%	5	F001	200
380D	SRC X High Curr Alarm Time Delay	1 to 15	S	1	F001	15
380E	Source Settings Reserved 5 (5 items)					
3813	SRC X Total Breaker Operations	0 to 65535	---	1	F001	0
3814	SRC X Total Breaker No Load Operations	0 to 65535	---	1	F001	0
3815	SRC X Total Breaker Load Operations	0 to 65535	---	1	F001	0
3816	SRC X Total Breaker Fault Operations	0 to 65535	---	1	F001	0
3817	SRC X Breaker Percent Load Life	0 to 65535	---	1	F001	0
3818	SRC X Percent Mechanical Life	0 to 65535	---	1	F001	0
3819	SRC X Time Date Last Breaker Operation	0 to 4294967295	---		F050	0
381B	SRC X Time Date Initial Energization	0 to 4294967295	---		F050	0
381D	SRC X Breaker Service Hours	0 to 4294967295	---	1	F003	0
381F	Source Settings Reserved 5 (5 items)					
3824	SRC X UF Trip Enable	0 to 1	---	1	F102	0
3825	SRC X UF Trip Pickup Setting	45 to 60	Hz	1	F001	45
3826	SRC X UF Trip Time Delay	0.1 to 600	S	0.1	F001	30
3827	SRC X UF Trip Blocking Voltage Enable	0 to 1	---	1	F102	0
3828	SRC X UF Trip or Open setting	0 to 1	---	1	F727	1
3829	SRC X UF Alarm Enable	0 to 1	---	1	F102	0
382A	SRC X UF Alarm Pickup Setting	45 to 60	Hz	1	F001	45
382B	SRC X UF Alarm Time Delay	0.1 to 600	---	0.1	F001	15
382C	SRC X UF Alarm Blocking Voltage Enable	0 to 1	---	1	F102	0
382D	SRC X OF Trip Enable	0 to 1	---	1	F102	0
382E	SRC X OF Trip Pickup Setting	50 to 70	Hz	1	F001	70
382F	SRC X OF Trip Time Delay	0.1 to 600	S	0.1	F001	30
3830	SRC X OF Trip Blocking Voltage Enable	0 to 1	---	1	F102	0
3831	SRC X OF Trip or Open setting	0 to 1	---	1	F727	1

3832	SRC X OF Alarm Enable	0 to 1	---	1	F102	0
3833	SRC X OF Alarm Pickup Setting	50 to 70	Hz	1	F001	50
3834	SRC X OF Alarm Time Delay	0.1 to 600	---	0.1	F001	15
3835	SRC X OF Alarm Blocking Voltage Enable	0 to 1	---	1	F102	0
3836	SRC X HRGF Enable	0 to 1	---	1	F102	0
3837	SRC X HRGF Pickup	0.1 to 10	---	0.1	F001	2
3838	SRC X HRGF Delay	0.5 to 5	---	0.1	F001	0.5
3839	SRC X HRGF Ground Resistance	5 to 500	---	1	F001	5
383A	SRC X HRGF CT Rating	10 to 10	---	1	F001	10
383B	Reserved (8 items)	---	---	---	---	---
3843	SRC X High Curr Trigger Alarm Enable	0 to 1	---	1	F102	0
3844	SRC X High Curr Trigger Alarm Pickup Setting	0.1 to 9	---	0.1	F001	2
3845	SRC X High Curr Trigger Alarm Delay Setting	1 to 120	---	1	F001	12
3846	SRC X High Curr Trigger Alarm WFC Enable	0 to 1	---	1	F102	0
3847	SRC X High Curr Trigger Alarm Max WF	0 to 30	---	1	F001	15
3848	SRC X High Curr Trigger Alarm WF Triggered	0 to 30	---	1	F001	0
3849	SRC X High Curr Trigger Alarm WF Count Reset	0 to 1	---	1	F126	0
384A	SRC X Settings Reserved (40 items)					
3872	...Repeated for module number 2					
3926	...Repeated for module number 3					
39DA	...Repeated for module number 4					
3A8E	...Repeated for module number 5					
3B42	...Repeated for module number 6					
3BF6	...Repeated for module number 7					
3CAA	...Repeated for module number 8					
3D5E	...Repeated for module number 9					
3E12	...Repeated for module number 10					
3EC6	...Repeated for module number 11					
3F7A	...Repeated for module number 12					
402E	...Repeated for module number 13					
40E2	...Repeated for module number 14					

4196	...Repeated for module number 15					
424A	...Repeated for module number 16					
42FE	...Repeated for module number 17					
43B2	...Repeated for module number 18					
4466	...Repeated for module number 19					
451A	...Repeated for module number 20					
45CE	...Repeated for module number 21					
4682	...Repeated for module number 22					
4736	...Repeated for module number 23					
47EA	...Repeated for module number 24					
489E	...Repeated for module number 25					
4952	...Repeated for module number 26					
4A06	...Repeated for module number 27					
4ABA	...Repeated for module number 28					
4B6E	...Repeated for module number 29					
4C22	...Repeated for module number 30					
SRC X Node Command Registers (Read / Write)						
4CD6	SRC x Open Breaker	0 to 1	---	1	F126	0 (No)
4CD7	SRC x Close Breaker	0 to 1	---	1	F126	0 (No)
4CD8	SRC x Trip Breaker	0 to 1	---	1	F126	0 (No)
4CD9	SRC x Clear Energy	0 to 1	---	1	F126	0 (No)
4CDA	Reserved	0 to 1	---	1	F126	0 (No)
4CDB	SRC x Remote Lockout Enable	0 to 1	---	1	F126	0 (No)
4CDC	SRC x Remote Lockout Reset	0 to 1	---	1	F126	0 (No)
4CDD	SRC X Machine Output Energize	0 to 1	---	1	F126	0 (No)
4CDE	SRC X Machine Output De-energize	0 to 1	---	1	F126	0 (No)
4CDF	Reserved					
4CF4	...Repeated for module number 2					
4D12	...Repeated for module number 3					
4D30	...Repeated for module number 4					
4D4E	...Repeated for module number 5					

4D6C	...Repeated for module number 6					
4D8A	...Repeated for module number 7					
4DA8	...Repeated for module number 8					
4DC6	...Repeated for module number 9					
4DE4	...Repeated for module number 10					
4E02	...Repeated for module number 11					
4E20	...Repeated for module number 12					
4E3E	...Repeated for module number 13					
4E5C	...Repeated for module number 14					
4E7A	...Repeated for module number 15					
4E98	...Repeated for module number 16					
4EB6	...Repeated for module number 17					
4ED4	...Repeated for module number 18					
4EF2	...Repeated for module number 19					
4F10	...Repeated for module number 20					
4F2E	...Repeated for module number 21					
4F4C	...Repeated for module number 22					
4F6A	...Repeated for module number 23					
4F88	...Repeated for module number 24					
4FA6	...Repeated for module number 25					
4FC4	...Repeated for module number 26					
4FE2	...Repeated for module number 27					
5000	...Repeated for module number 28					
501E	...Repeated for module number 29					
503C	...Repeated for module number 30					
Synch Check (Read/Write Setting (12 Modules)						
505A	Synch Check Enable	0 to 1	---	1	F102	0 (Disabled)
505B	Synch Check V1 Source	0 to 29	---	1	F001	0
505C	Synch Check V2 Source	0 to 29	---	1	F001	0
505D	Synch Check Max Volt Diff	0 to 90.0	V	0.5	F001	0
505E	Synch Check Max Phase Diff	0 to 60	degree	1	F001	0

505F	Synch Check Max Freq Diff	0 to 2.0	Hz	0.1	F001	0
5060	Synch Check Dead Max V1	5 to 50	%	1	F001	5
5061	Synch Check Live Min V1	50 to 100	%	1	F001	50
5062	Synch Check Dead MaxV2	5 to 50	%	1	F001	5
5063	Synch Check Live Min V2	50 to 100	%	1	F001	50
5064	Reserved (4 items)	---	---	---	---	---
5068	Synch Check Dead Source Select	0 to 5	---	1	F176	0 (None selected)
5069	Synch Check Status	0 to 65535	---	1	F001	0
506A	Synch Check Reserved (14 items)					
5078	...Repeated for module number 2					
5096	...Repeated for module number 3					
50B4	...Repeated for module number 4					
50D2	...Repeated for module number 5					
50F0	...Repeated for module number 6					
510E	...Repeated for module number 7					
512C	...Repeated for module number 8					
514A	...Repeated for module number 9					
5168	...Repeated for module number 10					
5186	...Repeated for module number 11					
51A4	...Repeated for module number 12					
ZSI Options Settings (Read/Write Setting)						
51C2	ZSI Option	0 to 2	---	1	F732	0
ZSI Zone Enables (Read/Write Setting) (4 Modules)						
51C4	ZSI Zone X Enabled	0 to 1	---	1	F126	0
51C5	ZSI Zone Enable Reserved (4 items)					
51C9	...Repeated for module number 2					
51CE	...Repeated for module number 3					
51D3	...Repeated for module number 4					
Simple Network Time Protocol (Read/Write)						
51DD	Simple Network Time Protocol (SNTP) Server IP Address	0 to 4294967295	---	1	F003	0

51DF	Simple Network Time Protocol (SNTP) Server Time Zone Bias	-43200 to 46800	---	900	F004	0
Redundant Trip Coil Enable (Read/Write)						
51E2	Redundant Trip Coil Enable	0 to 1	---	1	F102	0
ZSI ST Tier Settings (Read/Write Setting) (30 Modules)						
5200	SRC X ST ZSI Zone 1 Tier Settings (16 items)	0 to 3	---	1	F733	0
5210	SRC X ST ZSI Zone 2 Tier Settings (16 items)	0 to 3	---	1	F733	0
5220	SRC X ST ZSI Zone 3 Tier Settings (16 items)	0 to 3	---	1	F733	0
5230	SRC X ST ZSI Zone 4 Tier Settings (16 items)	0 to 3	---	1	F733	0
5240	SRC X ST External ZSI Restrained Time Setting	0 to 7	---	1	F740	0
5250	...Repeated for module number 2					
52A0	...Repeated for module number 3					
52F0	...Repeated for module number 4					
5340	...Repeated for module number 5					
5390	...Repeated for module number 6					
53E0	...Repeated for module number 7					
5430	...Repeated for module number 8					
5480	...Repeated for module number 9					
54D0	...Repeated for module number 10					
5520	...Repeated for module number 11					
5570	...Repeated for module number 12					
55C0	...Repeated for module number 13					
5610	...Repeated for module number 14					
5660	...Repeated for module number 15					
56B0	...Repeated for module number 16					
5700	...Repeated for module number 17					
5750	...Repeated for module number 18					
57A0	...Repeated for module number 19					
57F0	...Repeated for module number 20					
5840	...Repeated for module number 21					
5890	...Repeated for module number 22					

58E0	...Repeated for module number 23					
5930	...Repeated for module number 24					
5980	...Repeated for module number 25					
59D0	...Repeated for module number 26					
5A20	...Repeated for module number 27					
5A70	...Repeated for module number 28					
5AC0	...Repeated for module number 29					
5B10	...Repeated for module number 30					
ZSI GF Tier Settings (Read/Write Setting) (30 Modules)						
5B60	SRC X GF ZSI Zone 1 Tier Settings (16 items)	0 to 3	---	1	F733	0
5B70	SRC X GF ZSI Zone 2 Tier Settings (16 items)	0 to 3	---	1	F733	0
5B80	SRC X GF ZSI Zone 3 Tier Settings (16 items)	0 to 3	---	1	F733	0
5B90	SRC X GF ZSI Zone 4 Tier Settings (16 items)	0 to 3	---	1	F733	0
5BA0	SRC X GF ZSI Tier Settings Reserved (16 items)					
5BB0	...Repeated for module number 2					
5C00	...Repeated for module number 3					
5C50	...Repeated for module number 4					
5CA0	...Repeated for module number 5					
5CF0	...Repeated for module number 6					
5D40	...Repeated for module number 7					
5D90	...Repeated for module number 8					
5DE0	...Repeated for module number 9					
5E30	...Repeated for module number 10					
5E80	...Repeated for module number 11					
5ED0	...Repeated for module number 12					
5F20	...Repeated for module number 13					
5F70	...Repeated for module number 14					
5FC0	...Repeated for module number 15					
6010	...Repeated for module number 16					
6060	...Repeated for module number 17					

60B0	...Repeated for module number 18					
6100	...Repeated for module number 19					
6150	...Repeated for module number 20					
61A0	...Repeated for module number 21					
61F0	...Repeated for module number 22					
6240	...Repeated for module number 23					
6290	...Repeated for module number 24					
62E0	...Repeated for module number 25					
6330	...Repeated for module number 26					
6380	...Repeated for module number 27					
63D0	...Repeated for module number 28					
6420	...Repeated for module number 29					
6470	...Repeated for module number 30					
ZSI MSGF Zone GRP X Tier Settings (Read/Write Setting) (4 Modules)						
64C0	MSGF ZSI Zone 1 GRP X Tier Settings (16 items)	0 to 3	---	1	F733	0
64D0	MSGF ZSI Zone 2 GRP X Tier Settings (16 items)	0 to 3	---	1	F733	0
64E0	MSGF ZSI Zone 3 GRP X Tier Settings (16 items)	0 to 3	---	1	F733	0
64F0	MSGF ZSI Zone 4 GRP X Tier Settings (16 items)	0 to 3	---	1	F733	0
6500	MSGF ZSI Reserved (16 items)	---	---	----	F001	0
6510	...Repeated for module number 2					
6560	...Repeated for module number 3					
65B0	...Repeated for module number 4					
Zone X MSGF Settings (Read/Write Setting) (4 modules)						
6600	Zone X MSGF Trip Pickup Setting (16 items)	30 to 1200	---	10	F001	1200
6610	Zone X MSGF Alarm Pickup Setting (16 items)	30 to 1200	---	10	F001	1200
6620	Zone X MSGF Trip Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6630	Zone X MSGF Alarm Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6640	Zone X MSGF Trip I2T Curve (16 items)	0 to 1	---	1	F725	0

6650	Zone X MSGF Alarm I2T Curve (16 items)	0 to 1	---	1	F725	0
6660	Zone X MSGF Trip Enabled (16 items)	0 to 1	---	1	F102	0
6670	Zone X MSGF Alarm Enabled (16 items)	0 to 1	---	1	F102	0
6680	Zone X MSGF Backup Enabled (16 items)	0 to 1	---	1	F102	0
6690	Zone X MSGF Backup Time Date Enabled (16 items)	0 to 1	---	1	F102	0
66A0	Zone X MSGF Trip or Open	0 to 1	---	1	F727	0
66A1	Zone X MSGF Reserved (16 items)				F001	
66B1	...Repeated for module number 2					
6762	...Repeated for module number 3					
6813	...Repeated for module number 4					
Zone X BD Settings (Read/Write Setting) (4 modules)						
68C4	Zone X BD Trip Pickup Setting (16 items)	100 to 22000	---	100	F001	1200
68D4	Zone X BD Alarm Pickup Setting (16 items)	100 to 22000	---	100	F001	1200
68E4	Zone X BD Trip Pickup Setting2 (16 items)	100 to 22000	---	100	F001	1200
68F4	Zone X BD Alarm Pickup Setting2 (16 items)	100 to 22000	---	100	F001	1200
6904	Zone X BD Trip Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6914	Zone X BD Alarm Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6924	Zone X BD Trip Delay Band Setting2 (16 items)	0 to 6	---	1	F713	2
6934	Zone X BD Alarm Delay Band Setting2 (16 items)	0 to 6	---	1	F713	2
6944	Zone X BD Trip Enabled (16 items)	0 to 1	---	1	F102	0
6954	Zone X BD Alarm Enabled (16 items)	0 to 1	---	1	F102	0
6964	Zone X BD Backup Enabled (16 items)	0 to 1	---	1	F102	0
6974	Zone X BD Backup Time Delta Enabled (16 items)	0 to 1	---	1	F102	0
6984	Zone X BD Trip or Open	0 to 1	---	1	F727	0
6985	Zone X BD Reserved (16 items)				F001	
6995	...Repeated for module number 2					
6A66	...Repeated for module number 3					
6B37	...Repeated for module number 4					
Zone X Summation Settings (Read/Write Setting) (2 modules)						

6C08	Zone X Summation MSGF Trip Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6C18	Zone X Summation MSGF Alarm Delay Band Setting (16 items)	0 to 6	---	1	F713	2
6C28	Zone X Summation MSGF Trip I2T (16 items)	0 to 1	---	1	F725	0
6C38	Zone X Summation MSGF Alarm I2T Curve (16 items)	0 to 1	---	1	F725	0
6C48	Zone X Summation MSGF Trip Enabled (16 items)	0 to 1	---	1	F102	0
6C58	Zone X Summation MSGF Alarm Enabled (16 items)	0 to 1	---	1	F102	0
6C68	Zone X Summation MSGF Trip Pickup Setting (16 items)	30 to 1200	---	10	F001	1200
6C78	Zone X Summation MSGF Alarm Pickup Set-ting (16 items)	30 to 1200	---	10	F001	1200
6C88	Zone X Summation MSGF Trip or Open	0 to 1	---	1	F727	0
6C89	Zone X Summation Reserved (32 items)				F001	
6CA9	...Repeated for module number 2					
Options (Read Only)						
6D4A	Reserved (242 items)	---	---	---	F076	"0"
6E3C	Options Authentication State	0 to 2	---	1	F738	0 (Invalid)
6E3D	Options Timestamp	0 to 4294967295	---	1	F050	0
6E3F	Options Bit Vectors	0 to 65535	---	1	F728	0
6E40	Options Expanded Metering Count	0 to 30	---	1	F001	0
6E41	Option Expanded Metering Node x State Enable	0 to 4294967295	---	1	F722	0
6E43	Option Demand Metering Count	0 to 30	---	1	F001	0
6E44	Option Demand Metering Node x State Enable	0 to 4294967295	---	1	F722	0
6E46	Option Harmonics Metering Count	0 to 30	---	1	F001	0
6E47	Option Harmonics Metering Node x State Enable	0 to 4294967295	---	1	F722	0
6E49	Option Voltage Relay Count	0 to 30	---	1	F001	0
6E4A	Option Voltage Relay Node x State Enable	0 to 4294967295	---	1	F722	0
6E4C	Option High Current Relay Count	0 to 30	---	1	F001	0
6E4D	Option High Current Relay Node x State Enable	0 to 4294967295	---	1	F722	0

6E4F	Option Freq and Rev Pwr Relay Count	0 to 30	---	1	F001	0
6E50	Option Freq and Rev Pwr Relay Node x Enable	0 to 4294967295	---	1	F722	0
6E52	Reserved (3 items)	---	---	---	---	---
6E55	Option HRGF Location Count	0 to 4	---	1	F001	0
6E56	Option HRGF Location Function x State Enable	0 to 15	---	1	F722	0
Self Test Targets (Read Only)						
6E64	Reserved (4 items)	0 to 4294967295	0	1	F143	0
Function X HRGF Location Settings (Read/Write Setting) (4 modules)						
6E80	Function X HRGF Location Auto Mode Enabled	0 to 1	---	1	F102	1
6E81	Function X HRGF Location Main Breaker	0 to 29	---	1	F001	0
6E82	Function X HRGF Location ReAlarm Delay	0 to 99	S	1	F001	8
6E83	Function X HRGF Location Alarm ReCheck Delay	0 to 99	S	1	F001	2
6E84	Function X HRGF Location Trip Delay	0 to 999	S	1	F001	0
6E85	Function X HRGF Location Trip Enabled	0 to 1	---	1	F102	1
6E86	Function X HRGF Location Settings Reserved (4 items)			F001		
6E8A	...Repeated for module number 2					
6E94	...Repeated for module number 3					
6E9E	...Repeated for module number 4					
Function X HRGF Location (Read/Write Setting)						
6EA8	Function X HRGF Location Manual Mode Start	0 to 1	---	1	F102	0
6EA9	Function X HRGF Location Contactor Frequency	0.5 to 2	Hz	0.25	F001	1
6EAA	Function X HRGF Location Contactor Duty Cycle	0 to 100	%	1	F001	50
6EAB	Function X HRGF Location Manual Function To Start	0 to 4	---	1	F001	0
6EAC	Function X HRGF Location Manual Availability	0 to 15	---	1	F500	0
6EAD	Function X HRGF Location Test Contactor Pulsing	0 to 4	---	1	F001	0
6EAE	Function X HRGF Location Subinterval	5 to 60	s	5	F001	30

Contact Input Configuration (Read/Write Setting)(2 Modules)						
7003	Board 1 I/O Direction High	0 to 4294967295	---	---	F737	0
7005	Board 1 I/O Direction Low	0 to 4294967295	---	---	F736	0
7007	Board 2 I/O Direction High	0 to 4294967295	---	---	F737	0
7009	Board 2 I/O Direction Low	0 to 4294967295	---	---	F736	0
Discrete IO Configuration (Read Only)						
702A	Boards detected	0 to 8	---	1	F001	0
702B	Boards Used	0 to 8	---	1	F001	0
702C	Total I/O Points Available	0 to 65535	---	1	F001	0
702D	Contact Input Count	0 to 96	---	1	F001	0
702E	Contact Output Count	0 to 64	---	1	F001	0
702F	Boards Expected	0 to 2	---	1	F001	0
Expanded Digital I/O states (Read Only) (128 modules)						
703F	Contact Input x State (128 items)	0 to 1	---	1	F108	0 (Off)
70BF	Contact Output x State (128 items)	0 to 1	---	1	F108	0 (Off)
Contact Inputs (Read/Write Setting) (128 modules)						
713F	Contact Input x Name	---	---	---	F200	"Contact Input 1 "
7153	Contact Input x Events	0 to 1	---	1	F102	1 (Enabled)
7154	Contact Input x Debounce Time	0 to 4	us	1	F734	0
7155	Contact Input x Reserved (4 items)					
7159	...Repeated for module number 2					
7173	...Repeated for module number 3					
718D	...Repeated for module number 4					
71A7	...Repeated for module number 5					
71C1	...Repeated for module number 6					
71DB	...Repeated for module number 7					
71F5	...Repeated for module number 8					
720F	...Repeated for module number 9					
7229	...Repeated for module number 10					
7243	...Repeated for module number 11					
725D	...Repeated for module number 12					

7277	...Repeated for module number 13					
7291	...Repeated for module number 14					
72AB	...Repeated for module number 15					
72C5	...Repeated for module number 16					
72DF	...Repeated for module number 17					
72F9	...Repeated for module number 18					
7313	...Repeated for module number 19					
732D	...Repeated for module number 20					
7347	...Repeated for module number 21					
7361	...Repeated for module number 22					
737B	...Repeated for module number 23					
7395	...Repeated for module number 24					
73AF	...Repeated for module number 25					
73C9	...Repeated for module number 26					
73E3	...Repeated for module number 27					
73FD	...Repeated for module number 28					
7417	...Repeated for module number 29					
7431	...Repeated for module number 30					
744B	...Repeated for module number 31					
7465	...Repeated for module number 32					
747F	...Repeated for module number 33					
7499	...Repeated for module number 34					
74B3	...Repeated for module number 35					
74CD	...Repeated for module number 36					
74E7	...Repeated for module number 37					
7501	...Repeated for module number 38					
751B	...Repeated for module number 39					
7535	...Repeated for module number 40					
754F	...Repeated for module number 41					
7569	...Repeated for module number 42					
7583	...Repeated for module number 43					

759D	...Repeated for module number 44					
75B7	...Repeated for module number 45					
75D1	...Repeated for module number 46					
75EB	...Repeated for module number 47					
7605	...Repeated for module number 48					
761F	...Repeated for module number 49					
7639	...Repeated for module number 50					
7653	...Repeated for module number 51					
766D	...Repeated for module number 52					
7687	...Repeated for module number 53					
76A1	...Repeated for module number 54					
76BB	...Repeated for module number 55					
76D5	...Repeated for module number 56					
76EF	...Repeated for module number 57					
7709	...Repeated for module number 58					
7723	...Repeated for module number 59					
773D	...Repeated for module number 60					
7757	...Repeated for module number 61					
7771	...Repeated for module number 62					
778B	...Repeated for module number 63					
77A5	...Repeated for module number 64					
77BF	...Repeated for module number 65					
77D9	...Repeated for module number 66					
77F3	...Repeated for module number 67					
780D	...Repeated for module number 68					
7827	...Repeated for module number 69					
7841	...Repeated for module number 70					
785B	...Repeated for module number 71					
7875	...Repeated for module number 72					
788F	...Repeated for module number 73					
78A9	...Repeated for module number 74					

78C3	...Repeated for module number 75					
78DD	...Repeated for module number 76					
78F7	...Repeated for module number 77					
7911	...Repeated for module number 78					
792B	...Repeated for module number 79					
7945	...Repeated for module number 80					
795F	...Repeated for module number 81					
7979	...Repeated for module number 82					
7993	...Repeated for module number 83					
79AD	...Repeated for module number 84					
79C7	...Repeated for module number 85					
79E1	...Repeated for module number 86					
79FB	...Repeated for module number 87					
7A15	...Repeated for module number 88					
7A2F	...Repeated for module number 89					
7A49	...Repeated for module number 90					
7A63	...Repeated for module number 91					
7A7D	...Repeated for module number 92					
7A97	...Repeated for module number 93					
7AB1	...Repeated for module number 94					
7ACB	...Repeated for module number 95					
7AE5	...Repeated for module number 96					
7AFF	...Repeated for module number 97					
7B19	...Repeated for module number 98					
7B33	...Repeated for module number 99					
7B4D	...Repeated for module number 100					
7B67	...Repeated for module number 101					
7B81	...Repeated for module number 102					
7B9B	...Repeated for module number 103					
7BB5	...Repeated for module number 104					
7BCF	...Repeated for module number 105					

7BE9	...Repeated for module number 106					
7C03	...Repeated for module number 107					
7C1D	...Repeated for module number 108					
7C37	...Repeated for module number 109					
7C51	...Repeated for module number 110					
7C6B	...Repeated for module number 111					
7C85	...Repeated for module number 112					
7C9F	...Repeated for module number 113					
7CB9	...Repeated for module number 114					
7CD3	...Repeated for module number 115					
7CED	...Repeated for module number 116					
7D07	...Repeated for module number 117					
7D21	...Repeated for module number 118					
7D3B	...Repeated for module number 119					
7D55	...Repeated for module number 120					
7D6F	...Repeated for module number 121					
7D89	...Repeated for module number 122					
7DA3	...Repeated for module number 123					
7DBD	...Repeated for module number 124					
7DD7	...Repeated for module number 125					
7DF1	...Repeated for module number 126					
7E0B	...Repeated for module number 127					
7E25	...Repeated for module number 128					
Contact Outputs (Read/Write Setting) (128 modules)						
7E3F	Contact Output x Name	---	---	---	F200	"Contact Output 26 "
7E53	Contact Output x Operation	0 to 65535	---	1	F300	0
7E54	Contact Output x Sealin	0 to 65535	---	1	F300	0
7E55	Contact Output x Events	0 to 1	---	1	F102	1 (Enabled)
7E56	Contact Outputs Reserved (7 items)					
7E5D	...Repeated for module number 2					

7E7B	...Repeated for module number 3					
7E99	...Repeated for module number 4					
7EB7	...Repeated for module number 5					
7ED5	...Repeated for module number 6					
7EF3	...Repeated for module number 7					
7F11	...Repeated for module number 8					
7F2F	...Repeated for module number 9					
7F4D	...Repeated for module number 10					
7F6B	...Repeated for module number 11					
7F89	...Repeated for module number 12					
7FA7	...Repeated for module number 13					
7FC5	...Repeated for module number 14					
7FE3	...Repeated for module number 15					
8001	...Repeated for module number 16					
801F	...Repeated for module number 17					
803D	...Repeated for module number 18					
805B	...Repeated for module number 19					
8079	...Repeated for module number 20					
8097	...Repeated for module number 21					
80B5	...Repeated for module number 22					
80D3	...Repeated for module number 23					
80F1	...Repeated for module number 24					
810F	...Repeated for module number 25					
812D	...Repeated for module number 26					
814B	...Repeated for module number 27					
8169	...Repeated for module number 28					
8187	...Repeated for module number 29					
81A5	...Repeated for module number 30					
81C3	...Repeated for module number 31					
81E1	...Repeated for module number 32					
81FF	...Repeated for module number 33					

821D	...Repeated for module number 34					
823B	...Repeated for module number 35					
8259	...Repeated for module number 36					
8277	...Repeated for module number 37					
8295	...Repeated for module number 38					
82B3	...Repeated for module number 39					
82D1	...Repeated for module number 40					
82EF	...Repeated for module number 41					
830D	...Repeated for module number 42					
832B	...Repeated for module number 43					
8349	...Repeated for module number 44					
8367	...Repeated for module number 45					
8385	...Repeated for module number 46					
83A3	...Repeated for module number 47					
83C1	...Repeated for module number 48					
83DF	...Repeated for module number 49					
83FD	...Repeated for module number 50					
841B	...Repeated for module number 51					
8439	...Repeated for module number 52					
8457	...Repeated for module number 53					
8475	...Repeated for module number 54					
8493	...Repeated for module number 55					
84B1	...Repeated for module number 56					
84CF	...Repeated for module number 57					
84ED	...Repeated for module number 58					
850B	...Repeated for module number 59					
8529	...Repeated for module number 60					
8547	...Repeated for module number 61					
8565	...Repeated for module number 62					
8583	...Repeated for module number 63					
85A1	...Repeated for module number 64					

85BF	...Repeated for module number 65					
85DD	...Repeated for module number 66					
85FB	...Repeated for module number 67					
8619	...Repeated for module number 68					
8637	...Repeated for module number 69					
8655	...Repeated for module number 70					
8673	...Repeated for module number 71					
8691	...Repeated for module number 72					
86AF	...Repeated for module number 73					
86CD	...Repeated for module number 74					
86EB	...Repeated for module number 75					
8709	...Repeated for module number 76					
8727	...Repeated for module number 77					
8745	...Repeated for module number 78					
8763	...Repeated for module number 79					
8781	...Repeated for module number 80					
879F	...Repeated for module number 81					
87BD	...Repeated for module number 82					
87DB	...Repeated for module number 83					
87F9	...Repeated for module number 84					
8817	...Repeated for module number 85					
8835	...Repeated for module number 86					
8853	...Repeated for module number 87					
8871	...Repeated for module number 88					
888F	...Repeated for module number 89					
88AD	...Repeated for module number 90					
88CB	...Repeated for module number 91					
88E9	...Repeated for module number 92					
8907	...Repeated for module number 93					
8925	...Repeated for module number 94					
8943	...Repeated for module number 95					

8961	...Repeated for module number 96					
897F	...Repeated for module number 97					
899D	...Repeated for module number 98					
89BB	...Repeated for module number 99					
89D9	...Repeated for module number 100					
89F7	...Repeated for module number 101					
8A15	...Repeated for module number 102					
8A33	...Repeated for module number 103					
8A51	...Repeated for module number 104					
8A6F	...Repeated for module number 105					
8A8D	...Repeated for module number 106					
8AAB	...Repeated for module number 107					
8AC9	...Repeated for module number 108					
8AE7	...Repeated for module number 109					
8B05	...Repeated for module number 110					
8B23	...Repeated for module number 111					
8B41	...Repeated for module number 112					
8B5F	...Repeated for module number 113					
8B7D	...Repeated for module number 114					
8B9B	...Repeated for module number 115					
8BB9	...Repeated for module number 116					
8BD7	...Repeated for module number 117					
8BF5	...Repeated for module number 118					
8C13	...Repeated for module number 119					
8C31	...Repeated for module number 120					
8C4F	...Repeated for module number 121					
8C6D	...Repeated for module number 122					
8C8B	...Repeated for module number 123					
8CA9	...Repeated for module number 124					
8CC7	...Repeated for module number 125					
8CE5	...Repeated for module number 126					

8D03	...Repeated for module number 127					
8D21	...Repeated for module number 128					
Force Contact Inputs (Read/Write Setting) (128 Modules)						
8D3F	Force Contact Input x State (128 items)	0 to 2	---	1	F144	0 (Disabled)
Force Contact Outputs (Read/Write Setting) (128 Modules)						
8DBF	Force Contact Output x State (128 items)	0 to 3	---	1	F131	0 (Disabled)
Flex Relay Settings (Read/Write Settings) (16 Modules)						
8E3F	Relay X High Curr Flex Alarm Breaker Selection	0 to 30	---	1	F001	30
8E40	Relay X High Curr Flex Alarm Enable	0 to 1	---	1	F102	0
8E41	Relay X High Curr Flex Alarm Pickup Setting	10 to 200	%	5	F001	200
8E42	Relay X High Curr Flex Alarm Time Delay	1 to 15	S	1	F001	15
8E43	Flex Relay Settings Reserved					
8E45	Relay X UV Flex Voltage Source	0 to 30	---	1	F001	30
8E46	Relay X UV Flex Breaker To Trip	0 to 30	---	1	F001	30
8E47	Relay X UV Flex Trip Enable	0 to 1	---	1	F102	0 (Disabled)
8E48	Relay X UV Flex Trip Pickup Setting	10 to 95	%	1	F001	10
8E49	Relay X UV Flex Trip Time Delay	0.5 to 600	S	0.5	F001	30
8E4A	Relay X UV Flex Trip Phase Requirement	1 to 3	---	1	F001	1
8E4B	Relay X UV Flex Trip Curve Type	0 to 1	---	1	F726	1
8E4C	Relay X UV Flex Trip Blocking Voltage Enable	0 to 1	---	1	F102	0 (Disabled)
8E4D	Relay X UV Flex Trip Blocking Voltage Setting	5 to 75	%	1	F001	5
8E4E	Relay X UV Flex Trip or Open Setting	0 to 1	---	1	F727	1
8E4F	Relay X UV Flex Alarm Enable	0 to 1	---	1	F102	0 (Disabled)
8E50	Relay X UV Flex Alarm Pickup Setting	10 to 95	%	1	F001	10
8E51	Relay X UV Flex Alarm Time Delay	0.5 to 600	S	0.5	F001	15
8E52	Relay X UV Flex Alarm Phase Requirement	1 to 3	---	1	F001	1
8E53	Relay X UV Flex Alarm Curve Type	0 to 1	---	1	F726	1
8E54	Relay X UV Flex Alarm Blocking Voltage Enable	0 to 1	---	1	F102	0 (Disabled)
8E55	Relay X UV Flex Alarm Blocking Voltage Setting	5 to 75	%	1	F001	5
8E56	Flex Relay Settings Reserved 2					
8E58	Alarm X Demand Flex Breaker Selection	0 to 30	---	1	F001	30

8E59	Alarm X Over Demand Flex Enable	0 to 1	---	1	F102	0 (Disabled)
8E5A	Alarm X Over Demand Flex Pickup Setting	-5000 to 5000	kW	100	F002	1500
8E5B	Alarm X Over Demand Flex Interval	1 to 15	---	1	F001	1
8E5C	Alarm X Over Demand Flex Subinterval	1 to 900	S	1	F001	1
8E5D	Alarm X Under Demand Flex Enable	0 to 1	---	1	F102	0 (Disabled)
8E5E	Alarm X Under Demand Flex Pickup Setting	-5000 to 5000	kW	100	F002	500
8E5F	Alarm X Under Demand Flex Interval	1 to 15	---	1	F001	1
8E60	Alarm X Under Demand Flex Subinterval	1 to 900	S	1	F001	1
8E61	Flex Relay Settings Reserved 3					
8E71	...Repeated for module 2					
8EA3	...Repeated for module 3					
8ED5	...Repeated for module 4					
8F07	...Repeated for module 5					
8F39	...Repeated for module 6					
8F6B	...Repeated for module 7					
8F9D	...Repeated for module 8					
8FCF	...Repeated for module 9					
9001	...Repeated for module 10					
9033	...Repeated for module 11					
9065	...Repeated for module 12					
9097	...Repeated for module 13					
90C9	...Repeated for module 14					
90FB	...Repeated for module 15					
912D	...Repeated for module 16					
SRC X Restricted Breaker Control Registers (Read / Write)						
94E3	SRC x Open Breaker by Restricted Control	2 to 65535	---	1	F126	0 (No)
94E4	SRC x Close Breaker by Restricted Control	2 to 65535	---	1	F126	0 (No)
94E5	SRC x Trip Breaker by Restricted Control	2 to 65535	---	1	F126	0 (No)
94E6	Reserved (2 items)					
94E8	...Repeated for module number 2					
94ED	...Repeated for module number 3					

94F2	...Repeated for module number 4					
94F7	...Repeated for module number 5					
94FC	...Repeated for module number 6					
9501	...Repeated for module number 7					
9506	...Repeated for module number 8					
950B	...Repeated for module number 9					
9510	...Repeated for module number 10					
9515	...Repeated for module number 11					
951A	...Repeated for module number 12					
951F	...Repeated for module number 13					
9524	...Repeated for module number 14					
9529	...Repeated for module number 15					
952E	...Repeated for module number 16					
9533	...Repeated for module number 17					
9538	...Repeated for module number 18					
953D	...Repeated for module number 19					
9542	...Repeated for module number 20					
9547	...Repeated for module number 21					
954C	...Repeated for module number 22					
9551	...Repeated for module number 23					
9556	...Repeated for module number 24					
955B	...Repeated for module number 25					
9560	...Repeated for module number 26					
9565	...Repeated for module number 27					
956A	...Repeated for module number 28					
956F	...Repeated for module number 29					
9574	...Repeated for module number 30					
FlexLogic Status (Read Only)						
9588	FlexLogic Active	0 to 1	---	1	F126	0
9589	Flexlogic Status Message	---	---	---	F200	(none)
959D	Flexlogic Redundancy Mode	0 to 2	---	1	F301	0

External Control Transfer Settings (Written by Factory)						
95A4	CPU External Control Transfer Enabled	0 to 1	---	1	F102	0
External Control Transfer Commands						
95AA	External Control Transfer Command	0 to 1	---	1	F126	0
95AB	Return to Auto Control Transfer	0 to 1	---	1	F126	0
FlexLogic (Read/Write Setting)						
95B1	FlexLogic Entry (4096 items)	0 to 65535	---	1	F300	16384
Breaker Control (Read/Write Setting) (30 modules)						
A5B1	Breaker Control x Open Flux Shifter	0 to 65535	---	1	F300	0
A5B2	Breaker Control x Open Shunt Trip	0 to 65535	---	1	F300	0
A5B3	Breaker Control x Trip Flux Shifter	0 to 65535	---	1	F300	0
A5B4	Breaker Control x Trip Shunt Trip	0 to 65535	---	1	F300	0
A5B5	Breaker Control x Close	0 to 65535	---	1	F300	0
A5B6	Breaker Control x Lockout	0 to 65535	---	1	F300	0
A5B7	Breaker Control x Lockout Reset	0 to 65535	---	1	F300	0
A5B8	Breaker Control x Reduced Let Thru	0 to 65365	---	1	F300	0
A5B9	Breaker Control x Machine Output	0 to 65365	---	1	F300	0
A5BA	Reserved items per Breaker Control (16 items)					
A5CA	...Repeated for module number 2					
A5E3	...Repeated for module number 3					
A5FC	...Repeated for module number 4					
A615	...Repeated for module number 5					
A62E	...Repeated for module number 6					
A647	...Repeated for module number 7					
A660	...Repeated for module number 8					
A679	...Repeated for module number 9					
A692	...Repeated for module number 10					
A6AB	...Repeated for module number 11					
A6C4	...Repeated for module number 12					
A6DD	...Repeated for module number 13					
A6F6	...Repeated for module number 14					

A70F	...Repeated for module number 15					
A728	...Repeated for module number 16					
A741	...Repeated for module number 17					
A75A	...Repeated for module number 18					
A773	...Repeated for module number 19					
A78C	...Repeated for module number 20					
A7A5	...Repeated for module number 21					
A7BE	...Repeated for module number 22					
A7D7	...Repeated for module number 23					
A7F0	...Repeated for module number 24					
A809	...Repeated for module number 25					
A822	...Repeated for module number 26					
A83B	...Repeated for module number 27					
A854	...Repeated for module number 28					
A86D	...Repeated for module number 29					
A886	...Repeated for module number 30					
Control Alarm Settings (30 modules)						
A89F	Alarm x FlexLogic	0 to 65365	---	1	F300	0
A8A0	Alarm FlexLogic Reserved	0 to 65535			F001	
A8A1	...Repeated for module number 2	0 to 65365	---	1	F300	0
A8A3	...Repeated for module number 3	0 to 65365	---	1	F300	0
A8A5	...Repeated for module number 4	0 to 65365	---	1	F300	0
A8A7	...Repeated for module number 5	0 to 65365	---	1	F300	0
A8A9	...Repeated for module number 6	0 to 65365	---	1	F300	0
A8AB	...Repeated for module number 7	0 to 65365	---	1	F300	0
A8AD	...Repeated for module number 8	0 to 65365	---	1	F300	0
A8AF	...Repeated for module number 9	0 to 65365	---	1	F300	0
A8B1	...Repeated for module number 10	0 to 65365	---	1	F300	0
A8B3	...Repeated for module number 11	0 to 65365	---	1	F300	0
A8B5	...Repeated for module number 12	0 to 65365	---	1	F300	0
A8B7	...Repeated for module number 13	0 to 65365	---	1	F300	0
A8B9	...Repeated for module number 14	0 to 65365	---	1	F300	0

A8BB	...Repeated for module number 15	0 to 65365	---	1	F300	0
A8BD	...Repeated for module number 16	0 to 65365	---	1	F300	0
A8BF	...Repeated for module number 17	0 to 65365	---	1	F300	0
A8C1	...Repeated for module number 18	0 to 65365	---	1	F300	0
A8C3	...Repeated for module number 19	0 to 65365	---	1	F300	0
A8C5	...Repeated for module number 20	0 to 65365	---	1	F300	0
A8C7	...Repeated for module number 21	0 to 65365	---	1	F300	0
A8C9	...Repeated for module number 22	0 to 65365	---	1	F300	0
A8CB	...Repeated for module number 23	0 to 65365	---	1	F300	0
A8CD	...Repeated for module number 24	0 to 65365	---	1	F300	0
A8CF	...Repeated for module number 25	0 to 65365	---	1	F300	0
A8D1	...Repeated for module number 26	0 to 65365	---	1	F300	0
A8D3	...Repeated for module number 27	0 to 65365	---	1	F300	0
A8D5	...Repeated for module number 28	0 to 65365	---	1	F300	0
A8D7	...Repeated for module number 29	0 to 65365	---	1	F300	0
A8D9	...Repeated for module number 30	0 to 65365	---	1	F300	0
Flexlogic Timers (Read/Write Setting) (160 modules)						
A8DB	Reserved (960 items)	0 to 2	---	1	F129	0 (millisecond)
Virtual Inputs (Read/Write Setting) (32 modules)						
AC9B	Virtual Input x Function	0 to 1	---	1	F102	0 (Disabled)
AC9C	Virtual Input x Name	---	---	---	F200	"Virtual Input 1 "
ACB0	Virtual Input x Programmed Type	0 to 1	---	1	F127	0 (Latched)
ACB1	Virtual Input x Events	0 to 1	---	1	F102	0 (Disabled)
ACB2	Virtual Input x Reserved (3 items)	---	---	---	F001	0
ACB5	...Repeated for module number 2					
ACCF	...Repeated for module number 3					
ACE9	...Repeated for module number 4					
AD03	...Repeated for module number 5					
AD1D	...Repeated for module number 6					
AD37	...Repeated for module number 7					
AD51	...Repeated for module number 8					
AD6B	...Repeated for module number 9					

AD85	...Repeated for module number 10					
AD9F	...Repeated for module number 11					
ADB9	...Repeated for module number 12					
ADD3	...Repeated for module number 13					
ADED	...Repeated for module number 14					
AE07	...Repeated for module number 15					
AE21	...Repeated for module number 16					
AE3B	...Repeated for module number 17					
AE55	...Repeated for module number 18					
AE6F	...Repeated for module number 19					
AE89	...Repeated for module number 20					
AEA3	...Repeated for module number 21					
AEBD	...Repeated for module number 22					
AED7	...Repeated for module number 23					
AEF1	...Repeated for module number 24					
AF0B	...Repeated for module number 25					
AF25	...Repeated for module number 26					
AF3F	...Repeated for module number 27					
AF59	...Repeated for module number 28					
AF73	...Repeated for module number 29					
AF8D	...Repeated for module number 30					
AFA7	...Repeated for module number 31					
AFC1	...Repeated for module number 32					
Virtual Outputs (Read/Write Setting) (480 modules)						
AFDB	Virtual Output x Name	---	---	---	F200	"Virtual Output 1 "
AFEF	Virtual Output x Events	0 to 1	---	1	F102	0 (Disabled)
AFF0	Virtual Output x Reserved	---	---	---	F001	0
AFF1	...Repeated for module number 2					
B007	...Repeated for module number 3					
B01D	...Repeated for module number 4					

B033	...Repeated for module number 5					
B049	...Repeated for module number 6					
B05F	...Repeated for module number 7					
B075	...Repeated for module number 8					
B08B	...Repeated for module number 9					
B0A1	...Repeated for module number 10					
B0B7	...Repeated for module number 11					
B0CD	...Repeated for module number 12					
B0E3	...Repeated for module number 13					
B0F9	...Repeated for module number 14					
B10F	...Repeated for module number 15					
B125	...Repeated for module number 16					
B13B	...Repeated for module number 17					
B151	...Repeated for module number 18					
B167	...Repeated for module number 19					
B17D	...Repeated for module number 20					
B193	...Repeated for module number 21					
B1A9	...Repeated for module number 22					
B1BF	...Repeated for module number 23					
B1D5	...Repeated for module number 24					
B1EB	...Repeated for module number 25					
B201	...Repeated for module number 26					
B217	...Repeated for module number 27					
B22D	...Repeated for module number 28					
B243	...Repeated for module number 29					
B259	...Repeated for module number 30					
B26F	...Repeated for module number 31					
B285	...Repeated for module number 32					
B29B	...Repeated for module number 33					
B2B1	...Repeated for module number 34					
B2C7	...Repeated for module number 35					

B2DD	...Repeated for module number 36					
B2F3	...Repeated for module number 37					
B309	...Repeated for module number 38					
B31F	...Repeated for module number 39					
B335	...Repeated for module number 40					
B34B	...Repeated for module number 41					
B361	...Repeated for module number 42					
B377	...Repeated for module number 43					
B38D	...Repeated for module number 44					
B3A3	...Repeated for module number 45					
B3B9	...Repeated for module number 46					
B3CF	...Repeated for module number 47					
B3E5	...Repeated for module number 48					
B3FB	...Repeated for module number 49					
B411	...Repeated for module number 50					
B427	...Repeated for module number 51					
B43D	...Repeated for module number 52					
B453	...Repeated for module number 53					
B469	...Repeated for module number 54					
B47F	...Repeated for module number 55					
B495	...Repeated for module number 56					
B4AB	...Repeated for module number 57					
B4C1	...Repeated for module number 58					
B4D7	...Repeated for module number 59					
B4ED	...Repeated for module number 60					
B503	...Repeated for module number 61					
B519	...Repeated for module number 62					
B52F	...Repeated for module number 63					
B545	...Repeated for module number 64					
B55B	...Repeated for module number 65					
B571	...Repeated for module number 66					

B587	...Repeated for module number 67					
B59D	...Repeated for module number 68					
B5B3	...Repeated for module number 69					
B5C9	...Repeated for module number 70					
B5DF	...Repeated for module number 71					
B5F5	...Repeated for module number 72					
B60B	...Repeated for module number 73					
B621	...Repeated for module number 74					
B637	...Repeated for module number 75					
B64D	...Repeated for module number 76					
B663	...Repeated for module number 77					
B679	...Repeated for module number 78					
B68F	...Repeated for module number 79					
B6A5	...Repeated for module number 80					
B6BB	...Repeated for module number 81					
B6D1	...Repeated for module number 82					
B6E7	...Repeated for module number 83					
B6FD	...Repeated for module number 84					
B713	...Repeated for module number 85					
B729	...Repeated for module number 86					
B73F	...Repeated for module number 87					
B755	...Repeated for module number 88					
B76B	...Repeated for module number 89					
B781	...Repeated for module number 90					
B797	...Repeated for module number 91					
B7AD	...Repeated for module number 92					
B7C3	...Repeated for module number 93					
B7D9	...Repeated for module number 94					
B7EF	...Repeated for module number 95					
B805	...Repeated for module number 96					
B81B	...Repeated for module number 97					

B831	...Repeated for module number 98					
B847	...Repeated for module number 99					
B85D	...Repeated for module number 100					
B873	...Repeated for module number 101					
B889	...Repeated for module number 102					
B89F	...Repeated for module number 103					
B8B5	...Repeated for module number 104					
B8CB	...Repeated for module number 105					
B8E1	...Repeated for module number 106					
B8F7	...Repeated for module number 107					
B90D	...Repeated for module number 108					
B923	...Repeated for module number 109					
B939	...Repeated for module number 110					
B94F	...Repeated for module number 111					
B965	...Repeated for module number 112					
B97B	...Repeated for module number 113					
B991	...Repeated for module number 114					
B9A7	...Repeated for module number 115					
B9BD	...Repeated for module number 116					
B9D3	...Repeated for module number 117					
B9E9	...Repeated for module number 118					
B9FF	...Repeated for module number 119					
BA15	...Repeated for module number 120					
BA2B	...Repeated for module number 121					
BA41	...Repeated for module number 122					
BA57	...Repeated for module number 123					
BA6D	...Repeated for module number 124					
BA83	...Repeated for module number 125					
BA99	...Repeated for module number 126					
BAAF	...Repeated for module number 127					
BAC5	...Repeated for module number 128					

BADB	...Repeated for module number 129					
BAF1	...Repeated for module number 130					
BB07	...Repeated for module number 131					
BB1D	...Repeated for module number 132					
BB33	...Repeated for module number 133					
BB49	...Repeated for module number 134					
BB5F	...Repeated for module number 135					
BB75	...Repeated for module number 136					
BB8B	...Repeated for module number 137					
BBA1	...Repeated for module number 138					
BBB7	...Repeated for module number 139					
BBCD	...Repeated for module number 140					
BBE3	...Repeated for module number 141					
BBF9	...Repeated for module number 142					
BC0F	...Repeated for module number 143					
BC25	...Repeated for module number 144					
BC3B	...Repeated for module number 145					
BC51	...Repeated for module number 146					
BC67	...Repeated for module number 147					
BC7D	...Repeated for module number 148					
BC93	...Repeated for module number 149					
BCA9	...Repeated for module number 150					
BCBF	...Repeated for module number 151					
BCD5	...Repeated for module number 152					
BCEB	...Repeated for module number 153					
BD01	...Repeated for module number 154					
BD17	...Repeated for module number 155					
BD2D	...Repeated for module number 156					
BD43	...Repeated for module number 157					
BD59	...Repeated for module number 158					
BD6F	...Repeated for module number 159					

BD85	...Repeated for module number 160					
BD9B	...Repeated for module number 161					
BDB1	...Repeated for module number 162					
BDC7	...Repeated for module number 163					
BDDD	...Repeated for module number 164					
BDF3	...Repeated for module number 165					
BE09	...Repeated for module number 166					
BE1F	...Repeated for module number 167					
BE35	...Repeated for module number 168					
BE4B	...Repeated for module number 169					
BE61	...Repeated for module number 170					
BE77	...Repeated for module number 171					
BE8D	...Repeated for module number 172					
BEA3	...Repeated for module number 173					
BEB9	...Repeated for module number 174					
BECF	...Repeated for module number 175					
BEE5	...Repeated for module number 176					
BEFB	...Repeated for module number 177					
BF11	...Repeated for module number 178					
BF27	...Repeated for module number 179					
BF3D	...Repeated for module number 180					
BF53	...Repeated for module number 181					
BF69	...Repeated for module number 182					
BF7F	...Repeated for module number 183					
BF95	...Repeated for module number 184					
BFAB	...Repeated for module number 185					
BFC1	...Repeated for module number 186					
BFD7	...Repeated for module number 187					
BFED	...Repeated for module number 188					
C003	...Repeated for module number 189					
C019	...Repeated for module number 190					

C02F	...Repeated for module number 191					
C045	...Repeated for module number 192					
C05B	...Repeated for module number 193					
C071	...Repeated for module number 194					
C087	...Repeated for module number 195					
C09D	...Repeated for module number 196					
C0B3	...Repeated for module number 197					
C0C9	...Repeated for module number 198					
C0DF	...Repeated for module number 199					
C0F5	...Repeated for module number 200					
C10B	...Repeated for module number 201					
C121	...Repeated for module number 202					
C137	...Repeated for module number 203					
C14D	...Repeated for module number 204					
C163	...Repeated for module number 205					
C179	...Repeated for module number 206					
C18F	...Repeated for module number 207					
C1A5	...Repeated for module number 208					
C1BB	...Repeated for module number 209					
C1D1	...Repeated for module number 210					
C1E7	...Repeated for module number 211					
C1FD	...Repeated for module number 212					
C213	...Repeated for module number 213					
C229	...Repeated for module number 214					
C23F	...Repeated for module number 215					
C255	...Repeated for module number 216					
C26B	...Repeated for module number 217					
C281	...Repeated for module number 218					
C297	...Repeated for module number 219					
C2AD	...Repeated for module number 220					
C2C3	...Repeated for module number 221					

C2D9	...Repeated for module number 222					
C2EF	...Repeated for module number 223					
C305	...Repeated for module number 224					
C31B	...Repeated for module number 225					
C331	...Repeated for module number 226					
C347	...Repeated for module number 227					
C35D	...Repeated for module number 228					
C373	...Repeated for module number 229					
C389	...Repeated for module number 230					
C39F	...Repeated for module number 231					
C3B5	...Repeated for module number 232					
C3CB	...Repeated for module number 233					
C3E1	...Repeated for module number 234					
C3F7	...Repeated for module number 235					
C40D	...Repeated for module number 236					
C423	...Repeated for module number 237					
C439	...Repeated for module number 238					
C44F	...Repeated for module number 239					
C465	...Repeated for module number 240					
C47B	...Repeated for module number 241					
C491	...Repeated for module number 242					
C4A7	...Repeated for module number 243					
C4BD	...Repeated for module number 244					
C4D3	...Repeated for module number 245					
C4E9	...Repeated for module number 246					
C4FF	...Repeated for module number 247					
C515	...Repeated for module number 248					
C52B	...Repeated for module number 249					
C541	...Repeated for module number 250					
C557	...Repeated for module number 251					
C56D	...Repeated for module number 252					

C583	...Repeated for module number 253					
C599	...Repeated for module number 254					
C5AF	...Repeated for module number 255					
C5C5	...Repeated for module number 256					
C5DB	...Repeated for module number 257					
C5F1	...Repeated for module number 258					
C607	...Repeated for module number 259					
C61D	...Repeated for module number 260					
C633	...Repeated for module number 261					
C649	...Repeated for module number 262					
C65F	...Repeated for module number 263					
C675	...Repeated for module number 264					
C68B	...Repeated for module number 265					
C6A1	...Repeated for module number 266					
C6B7	...Repeated for module number 267					
C6CD	...Repeated for module number 268					
C6E3	...Repeated for module number 269					
C6F9	...Repeated for module number 270					
C70F	...Repeated for module number 271					
C725	...Repeated for module number 272					
C73B	...Repeated for module number 273					
C751	...Repeated for module number 274					
C767	...Repeated for module number 275					
C77D	...Repeated for module number 276					
C793	...Repeated for module number 277					
C7A9	...Repeated for module number 278					
C7BF	...Repeated for module number 279					
C7D5	...Repeated for module number 280					
C7EB	...Repeated for module number 281					
C801	...Repeated for module number 282					
C817	...Repeated for module number 283					

C82D	...Repeated for module number 284					
C843	...Repeated for module number 285					
C859	...Repeated for module number 286					
C86F	...Repeated for module number 287					
C885	...Repeated for module number 288					
C89B	...Repeated for module number 289					
C8B1	...Repeated for module number 290					
C8C7	...Repeated for module number 291					
C8DD	...Repeated for module number 292					
C8F3	...Repeated for module number 293					
C909	...Repeated for module number 294					
C91F	...Repeated for module number 295					
C935	...Repeated for module number 296					
C94B	...Repeated for module number 297					
C961	...Repeated for module number 298					
C977	...Repeated for module number 299					
C98D	...Repeated for module number 300					
C9A3	...Repeated for module number 301					
C9B9	...Repeated for module number 302					
C9CF	...Repeated for module number 303					
C9E5	...Repeated for module number 304					
C9FB	...Repeated for module number 305					
CA11	...Repeated for module number 306					
CA27	...Repeated for module number 307					
CA3D	...Repeated for module number 308					
CA53	...Repeated for module number 309					
CA69	...Repeated for module number 310					
CA7F	...Repeated for module number 311					
CA95	...Repeated for module number 312					
CAAB	...Repeated for module number 313					
CAC1	...Repeated for module number 314					

CAD7	...Repeated for module number 315					
CAED	...Repeated for module number 316					
CB03	...Repeated for module number 317					
CB19	...Repeated for module number 318					
CB2F	...Repeated for module number 319					
CB45	...Repeated for module number 320					
CB5B	...Repeated for module number 321					
CB71	...Repeated for module number 322					
CB87	...Repeated for module number 323					
CB9D	...Repeated for module number 324					
CBB3	...Repeated for module number 325					
CBC9	...Repeated for module number 326					
CBDF	...Repeated for module number 327					
CBF5	...Repeated for module number 328					
CC0B	...Repeated for module number 329					
CC21	...Repeated for module number 330					
CC37	...Repeated for module number 331					
CC4D	...Repeated for module number 332					
CC63	...Repeated for module number 333					
CC79	...Repeated for module number 334					
CC8F	...Repeated for module number 335					
CCA5	...Repeated for module number 336					
CCBB	...Repeated for module number 337					
CCD1	...Repeated for module number 338					
CCE7	...Repeated for module number 339					
CCFD	...Repeated for module number 340					
CD13	...Repeated for module number 341					
CD29	...Repeated for module number 342					
CD3F	...Repeated for module number 343					
CD55	...Repeated for module number 344					
CD6B	...Repeated for module number 345					

CD81	...Repeated for module number 346					
CD97	...Repeated for module number 347					
CDAD	...Repeated for module number 348					
CDC3	...Repeated for module number 349					
CDD9	...Repeated for module number 350					
CDEF	...Repeated for module number 351					
CE05	...Repeated for module number 352					
CE1B	...Repeated for module number 353					
CE31	...Repeated for module number 354					
CE47	...Repeated for module number 355					
CE5D	...Repeated for module number 356					
CE73	...Repeated for module number 357					
CE89	...Repeated for module number 358					
CE9F	...Repeated for module number 359					
CEB5	...Repeated for module number 360					
CECB	...Repeated for module number 361					
CEE1	...Repeated for module number 362					
CEF7	...Repeated for module number 363					
CF0D	...Repeated for module number 364					
CF23	...Repeated for module number 365					
CF39	...Repeated for module number 366					
CF4F	...Repeated for module number 367					
CF65	...Repeated for module number 368					
CF7B	...Repeated for module number 369					
CF91	...Repeated for module number 370					
CFA7	...Repeated for module number 371					
CFBD	...Repeated for module number 372					
CFD3	...Repeated for module number 373					
CFE9	...Repeated for module number 374					
CFFF	...Repeated for module number 375					
D015	...Repeated for module number 376					

D02B	...Repeated for module number 377					
D041	...Repeated for module number 378					
D057	...Repeated for module number 379					
D06D	...Repeated for module number 380					
D083	...Repeated for module number 381					
D099	...Repeated for module number 382					
D0AF	...Repeated for module number 383					
D0C5	...Repeated for module number 384					
D0DB	...Repeated for module number 385					
D0F1	...Repeated for module number 386					
D107	...Repeated for module number 387					
D11D	...Repeated for module number 388					
D133	...Repeated for module number 389					
D149	...Repeated for module number 390					
D15F	...Repeated for module number 391					
D175	...Repeated for module number 392					
D18B	...Repeated for module number 393					
D1A1	...Repeated for module number 394					
D1B7	...Repeated for module number 395					
D1CD	...Repeated for module number 396					
D1E3	...Repeated for module number 397					
D1F9	...Repeated for module number 398					
D20F	...Repeated for module number 399					
D225	...Repeated for module number 400					
D23B	...Repeated for module number 401					
D251	...Repeated for module number 402					
D267	...Repeated for module number 403					
D27D	...Repeated for module number 404					
D293	...Repeated for module number 405					
D2A9	...Repeated for module number 406					
D2BF	...Repeated for module number 407					

D2D5	...Repeated for module number 408					
D2EB	...Repeated for module number 409					
D301	...Repeated for module number 410					
D317	...Repeated for module number 411					
D32D	...Repeated for module number 412					
D343	...Repeated for module number 413					
D359	...Repeated for module number 414					
D36F	...Repeated for module number 415					
D385	...Repeated for module number 416					
D39B	...Repeated for module number 417					
D3B1	...Repeated for module number 418					
D3C7	...Repeated for module number 419					
D3DD	...Repeated for module number 420					
D3F3	...Repeated for module number 421					
D409	...Repeated for module number 422					
D41F	...Repeated for module number 423					
D435	...Repeated for module number 424					
D44B	...Repeated for module number 425					
D461	...Repeated for module number 426					
D477	...Repeated for module number 427					
D48D	...Repeated for module number 428					
D4A3	...Repeated for module number 429					
D4B9	...Repeated for module number 430					
D4CF	...Repeated for module number 431					
D4E5	...Repeated for module number 432					
D4FB	...Repeated for module number 433					
D511	...Repeated for module number 434					
D527	...Repeated for module number 435					
D53D	...Repeated for module number 436					
D553	...Repeated for module number 437					
D569	...Repeated for module number 438					

D57F	...Repeated for module number 439					
D595	...Repeated for module number 440					
D5AB	...Repeated for module number 441					
D5C1	...Repeated for module number 442					
D5D7	...Repeated for module number 443					
D5ED	...Repeated for module number 444					
D603	...Repeated for module number 445					
D619	...Repeated for module number 446					
D62F	...Repeated for module number 447					
D645	...Repeated for module number 448					
D65B	...Repeated for module number 449					
D671	...Repeated for module number 450					
D687	...Repeated for module number 451					
D69D	...Repeated for module number 452					
D6B3	...Repeated for module number 453					
D6C9	...Repeated for module number 454					
D6DF	...Repeated for module number 455					
D6F5	...Repeated for module number 456					
D70B	...Repeated for module number 457					
D721	...Repeated for module number 458					
D737	...Repeated for module number 459					
D74D	...Repeated for module number 460					
D763	...Repeated for module number 461					
D779	...Repeated for module number 462					
D78F	...Repeated for module number 463					
D7A5	...Repeated for module number 464					
D7BB	...Repeated for module number 465					
D7D1	...Repeated for module number 466					
D7E7	...Repeated for module number 467					
D7FD	...Repeated for module number 468					
D813	...Repeated for module number 469					

D829	...Repeated for module number 470					
D83F	...Repeated for module number 471					
D855	...Repeated for module number 472					
D86B	...Repeated for module number 473					
D881	...Repeated for module number 474					
D897	...Repeated for module number 475					
D8AD	...Repeated for module number 476					
D8C3	...Repeated for module number 477					
D8D9	...Repeated for module number 478					
D8EF	...Repeated for module number 479					
D905	...Repeated for module number 480					
Virtual Input Commands (Read/Write Command) (32 modules) **B30 B90 C30 C60 D30 D60 F35 F60 G60 L60 L90 M60 R30 S35 T35 T60**						
D91B	Virtual Input x State	0 to 1	---	1	F108	0 (Off)
D91C	...Repeated for module number 2	0 to 1	---	1	F108	0 (Off)
D91D	...Repeated for module number 3	0 to 1	---	1	F108	0 (Off)
D91E	...Repeated for module number 4	0 to 1	---	1	F108	0 (Off)
D91F	...Repeated for module number 5	0 to 1	---	1	F108	0 (Off)
D920	...Repeated for module number 6	0 to 1	---	1	F108	0 (Off)
D921	...Repeated for module number 7	0 to 1	---	1	F108	0 (Off)
D922	...Repeated for module number 8	0 to 1	---	1	F108	0 (Off)
D923	...Repeated for module number 9	0 to 1	---	1	F108	0 (Off)
D924	...Repeated for module number 10	0 to 1	---	1	F108	0 (Off)
D925	...Repeated for module number 11	0 to 1	---	1	F108	0 (Off)
D926	...Repeated for module number 12	0 to 1	---	1	F108	0 (Off)
D927	...Repeated for module number 13	0 to 1	---	1	F108	0 (Off)
D928	...Repeated for module number 14	0 to 1	---	1	F108	0 (Off)
D929	...Repeated for module number 15	0 to 1	---	1	F108	0 (Off)
D92A	...Repeated for module number 16	0 to 1	---	1	F108	0 (Off)
D92B	...Repeated for module number 17	0 to 1	---	1	F108	0 (Off)
D92C	...Repeated for module number 18	0 to 1	---	1	F108	0 (Off)
D92D	...Repeated for module number 19	0 to 1	---	1	F108	0 (Off)

D92E	...Repeated for module number 20	0 to 1	---	1	F108	0 (Off)
D92F	...Repeated for module number 21	0 to 1	---	1	F108	0 (Off)
D930	...Repeated for module number 22	0 to 1	---	1	F108	0 (Off)
D931	...Repeated for module number 23	0 to 1	---	1	F108	0 (Off)
D932	...Repeated for module number 24	0 to 1	---	1	F108	0 (Off)
D933	...Repeated for module number 25	0 to 1	---	1	F108	0 (Off)
D934	...Repeated for module number 26	0 to 1	---	1	F108	0 (Off)
D935	...Repeated for module number 27	0 to 1	---	1	F108	0 (Off)
D936	...Repeated for module number 28	0 to 1	---	1	F108	0 (Off)
D937	...Repeated for module number 29	0 to 1	---	1	F108	0 (Off)
D938	...Repeated for module number 30	0 to 1	---	1	F108	0 (Off)
D939	...Repeated for module number 31	0 to 1	---	1	F108	0 (Off)
D93A	...Repeated for module number 32	0 to 1	---	1	F108	0 (Off)
PLC Inputs (Read/Write Setting) (256 modules)						
D93B	PLC Input x Function	0 to 1	---	1	F102	0 (Disabled)
D93C	PLC Input x Events	0 to 1	---	1	F102	0 (Disabled)
D93D	...Repeated for module number 2					
D93F	...Repeated for module number 3					
D941	...Repeated for module number 4					
D943	...Repeated for module number 5					
D945	...Repeated for module number 6					
D947	...Repeated for module number 7					
D949	...Repeated for module number 8					
D94B	...Repeated for module number 9					
D94D	...Repeated for module number 10					
D94F	...Repeated for module number 11					
D951	...Repeated for module number 12					
D953	...Repeated for module number 13					
D955	...Repeated for module number 14					
D957	...Repeated for module number 15					
D959	...Repeated for module number 16					
D95B	...Repeated for module number 17					

D95D	...Repeated for module number 18					
D95F	...Repeated for module number 19					
D961	...Repeated for module number 20					
D963	...Repeated for module number 21					
D965	...Repeated for module number 22					
D967	...Repeated for module number 23					
D969	...Repeated for module number 24					
D96B	...Repeated for module number 25					
D96D	...Repeated for module number 26					
D96F	...Repeated for module number 27					
D971	...Repeated for module number 28					
D973	...Repeated for module number 29					
D975	...Repeated for module number 30					
D977	...Repeated for module number 31					
D979	...Repeated for module number 32					
D97B	...Repeated for module number 33					
D97D	...Repeated for module number 34					
D97F	...Repeated for module number 35					
D981	...Repeated for module number 36					
D983	...Repeated for module number 37					
D985	...Repeated for module number 38					
D987	...Repeated for module number 39					
D989	...Repeated for module number 40					
D98B	...Repeated for module number 41					
D98D	...Repeated for module number 42					
D98F	...Repeated for module number 43					
D991	...Repeated for module number 44					
D993	...Repeated for module number 45					
D995	...Repeated for module number 46					
D997	...Repeated for module number 47					
D999	...Repeated for module number 48					

D99B	...Repeated for module number 49					
D99D	...Repeated for module number 50					
D99F	...Repeated for module number 51					
D9A1	...Repeated for module number 52					
D9A3	...Repeated for module number 53					
D9A5	...Repeated for module number 54					
D9A7	...Repeated for module number 55					
D9A9	...Repeated for module number 56					
D9AB	...Repeated for module number 57					
D9AD	...Repeated for module number 58					
D9AF	...Repeated for module number 59					
D9B1	...Repeated for module number 60					
D9B3	...Repeated for module number 61					
D9B5	...Repeated for module number 62					
D9B7	...Repeated for module number 63					
D9B9	...Repeated for module number 64					
D9BB	...Repeated for module number 65					
D9BD	...Repeated for module number 66					
D9BF	...Repeated for module number 67					
D9C1	...Repeated for module number 68					
D9C3	...Repeated for module number 69					
D9C5	...Repeated for module number 70					
D9C7	...Repeated for module number 71					
D9C9	...Repeated for module number 72					
D9CB	...Repeated for module number 73					
D9CD	...Repeated for module number 74					
D9CF	...Repeated for module number 75					
D9D1	...Repeated for module number 76					
D9D3	...Repeated for module number 77					
D9D5	...Repeated for module number 78					
D9D7	...Repeated for module number 79					

D9D9	...Repeated for module number 80					
D9DB	...Repeated for module number 81					
D9DD	...Repeated for module number 82					
D9DF	...Repeated for module number 83					
D9E1	...Repeated for module number 84					
D9E3	...Repeated for module number 85					
D9E5	...Repeated for module number 86					
D9E7	...Repeated for module number 87					
D9E9	...Repeated for module number 88					
D9EB	...Repeated for module number 89					
D9ED	...Repeated for module number 90					
D9EF	...Repeated for module number 91					
D9F1	...Repeated for module number 92					
D9F3	...Repeated for module number 93					
D9F5	...Repeated for module number 94					
D9F7	...Repeated for module number 95					
D9F9	...Repeated for module number 96					
D9FB	...Repeated for module number 97					
D9FD	...Repeated for module number 98					
D9FF	...Repeated for module number 99					
DA01	...Repeated for module number 100					
DA03	...Repeated for module number 101					
DA05	...Repeated for module number 102					
DA07	...Repeated for module number 103					
DA09	...Repeated for module number 104					
DA0B	...Repeated for module number 105					
DA0D	...Repeated for module number 106					
DA0F	...Repeated for module number 107					
DA11	...Repeated for module number 108					
DA13	...Repeated for module number 109					
DA15	...Repeated for module number 110					

DA17	...Repeated for module number 111					
DA19	...Repeated for module number 112					
DA1B	...Repeated for module number 113					
DA1D	...Repeated for module number 114					
DA1F	...Repeated for module number 115					
DA21	...Repeated for module number 116					
DA23	...Repeated for module number 117					
DA25	...Repeated for module number 118					
DA27	...Repeated for module number 119					
DA29	...Repeated for module number 120					
DA2B	...Repeated for module number 121					
DA2D	...Repeated for module number 122					
DA2F	...Repeated for module number 123					
DA31	...Repeated for module number 124					
DA33	...Repeated for module number 125					
DA35	...Repeated for module number 126					
DA37	...Repeated for module number 127					
DA39	...Repeated for module number 128					
DA3B	...Repeated for module number 129					
DA3D	...Repeated for module number 130					
DA3F	...Repeated for module number 131					
DA41	...Repeated for module number 132					
DA43	...Repeated for module number 133					
DA45	...Repeated for module number 134					
DA47	...Repeated for module number 135					
DA49	...Repeated for module number 136					
DA4B	...Repeated for module number 137					
DA4D	...Repeated for module number 138					
DA4F	...Repeated for module number 139					
DA51	...Repeated for module number 140					
DA53	...Repeated for module number 141					

DA55	...Repeated for module number 142					
DA57	...Repeated for module number 143					
DA59	...Repeated for module number 144					
DA5B	...Repeated for module number 145					
DA5D	...Repeated for module number 146					
DA5F	...Repeated for module number 147					
DA61	...Repeated for module number 148					
DA63	...Repeated for module number 149					
DA65	...Repeated for module number 150					
DA67	...Repeated for module number 151					
DA69	...Repeated for module number 152					
DA6B	...Repeated for module number 153					
DA6D	...Repeated for module number 154					
DA6F	...Repeated for module number 155					
DA71	...Repeated for module number 156					
DA73	...Repeated for module number 157					
DA75	...Repeated for module number 158					
DA77	...Repeated for module number 159					
DA79	...Repeated for module number 160					
DA7B	...Repeated for module number 161					
DA7D	...Repeated for module number 162					
DA7F	...Repeated for module number 163					
DA81	...Repeated for module number 164					
DA83	...Repeated for module number 165					
DA85	...Repeated for module number 166					
DA87	...Repeated for module number 167					
DA89	...Repeated for module number 168					
DA8B	...Repeated for module number 169					
DA8D	...Repeated for module number 170					
DA8F	...Repeated for module number 171					
DA91	...Repeated for module number 172					

DA93	...Repeated for module number 173					
DA95	...Repeated for module number 174					
DA97	...Repeated for module number 175					
DA99	...Repeated for module number 176					
DA9B	...Repeated for module number 177					
DA9D	...Repeated for module number 178					
DA9F	...Repeated for module number 179					
DAA1	...Repeated for module number 180					
DAA3	...Repeated for module number 181					
DAA5	...Repeated for module number 182					
DAA7	...Repeated for module number 183					
DAA9	...Repeated for module number 184					
DAAB	...Repeated for module number 185					
DAAD	...Repeated for module number 186					
DAAF	...Repeated for module number 187					
DAB1	...Repeated for module number 188					
DAB3	...Repeated for module number 189					
DAB5	...Repeated for module number 190					
DAB7	...Repeated for module number 191					
DAB9	...Repeated for module number 192					
DABB	...Repeated for module number 193					
DABD	...Repeated for module number 194					
DABF	...Repeated for module number 195					
DAC1	...Repeated for module number 196					
DAC3	...Repeated for module number 197					
DAC5	...Repeated for module number 198					
DAC7	...Repeated for module number 199					
DAC9	...Repeated for module number 200					
DACB	...Repeated for module number 201					
DACD	...Repeated for module number 202					
DACF	...Repeated for module number 203					

DAD1	...Repeated for module number 204					
DAD3	...Repeated for module number 205					
DAD5	...Repeated for module number 206					
DAD7	...Repeated for module number 207					
DAD9	...Repeated for module number 208					
DADB	...Repeated for module number 209					
DADD	...Repeated for module number 210					
DADF	...Repeated for module number 211					
DAE1	...Repeated for module number 212					
DAE3	...Repeated for module number 213					
DAE5	...Repeated for module number 214					
DAE7	...Repeated for module number 215					
DAE9	...Repeated for module number 216					
DAEB	...Repeated for module number 217					
DAED	...Repeated for module number 218					
DAEF	...Repeated for module number 219					
DAF1	...Repeated for module number 220					
DAF3	...Repeated for module number 221					
DAF5	...Repeated for module number 222					
DAF7	...Repeated for module number 223					
DAF9	...Repeated for module number 224					
DAFB	...Repeated for module number 225					
DAFD	...Repeated for module number 226					
DAFF	...Repeated for module number 227					
DB01	...Repeated for module number 228					
DB03	...Repeated for module number 229					
DB05	...Repeated for module number 230					
DB07	...Repeated for module number 231					
DB09	...Repeated for module number 232					
DB0B	...Repeated for module number 233					
DB0D	...Repeated for module number 234					

DB0F	...Repeated for module number 235					
DB11	...Repeated for module number 236					
DB13	...Repeated for module number 237					
DB15	...Repeated for module number 238					
DB17	...Repeated for module number 239					
DB19	...Repeated for module number 240					
DB1B	...Repeated for module number 241					
DB1D	...Repeated for module number 242					
DB1F	...Repeated for module number 243					
DB21	...Repeated for module number 244					
DB23	...Repeated for module number 245					
DB25	...Repeated for module number 246					
DB27	...Repeated for module number 247					
DB29	...Repeated for module number 248					
DB2B	...Repeated for module number 249					
DB2D	...Repeated for module number 250					
DB2F	...Repeated for module number 251					
DB31	...Repeated for module number 252					
DB33	...Repeated for module number 253					
DB35	...Repeated for module number 254					
DB37	...Repeated for module number 255					
DB39	...Repeated for module number 256					
GOOSE Status (Read Setting)						
DBBB	GOOSE Input Health Status	0 to 65535	---	1	F741	0
DBFB	GOOSE System Health Status	0 to 65535	---	1	F742	0
DBFC	GOOSE Input System Health Status	0 to 65535	---	1	F743	0
DBFD	GOOSE Output System Health Status	0 to 65535	---	1	F744	0
PLC Interface (Read/Write Settings)						
DC00	PLC Input States (16 items)	0 to 65535	---	1	F500	0
DC10	Virtual Input States (2 items)	0 to 65535	---	1	F500	0
DC12	Virtual Output States (30 items)	0 to 65535	---	1	F500	0

DC30	Contact Input States (8 items)	0 to 65535	---	1	F500	0
DC38	Contact Output States (8 items)	0 to 65535	---	1	F500	0
DC40	Breaker Control Operand States (25 items)	0 to 65535	---	1	F500	0
DC59	Bus Differential Operand States (2 items)	0 to 65535	---	1	F500	0
DC5B	Over Demand Alarm Flex Operand States (3 items)	0 to 65535	---	1	F500	0
DC5E	Under Demand Alarm Flex Operand States (3 items)	0 to 65535	---	1	F500	0
DC63	Reduced Let Thru Operand States (4 item)	0 to 65535	---	1	F500	0
DC67	Ground Fault Operand States (12 items)	0 to 65535	---	1	F500	0
DC73	High Current Operand States (6 items)	0 to 65535	---	1	F500	0
DC79	High Current Flex Relay Operand States (3 items)	0 to 65535	---	1	F500	0
DC7C	High Current Transient Operand States (6 items)	0 to 65535	---	1	F500	0
DC82	HRGF Detection Operand States (6 items)	0 to 65535	---	1	F500	0
DC88	HRGF Location Operand States	0 to 65535	---	1	F500	0
DC89	IOC Operand States (4 items)	0 to 65535	---	1	F500	0
DC8D	LT Overcurrent Operand States (6 items)	0 to 65535	---	1	F500	0
DC93	MSGF Overcurrent Operand States (2 items)	0 to 65535	---	1	F500	0
DC95	System Operand States (1 item)	0 to 65535	---	1	F500	0
DC96	Over Frequency Operand States (12 items)	0 to 65535	---	1	F500	0
DCA2	Over Voltage Operand States (12 items)	0 to 65535	---	1	F500	0
DCAE	Phase Loss Operand States (12 items)	0 to 65535	---	1	F500	0
DCBA	Power Reversal Operand States (12 items)	0 to 65535	---	1	F500	0
DCD2	ST Overcurrent Operand States (6 items)	0 to 65535	---	1	F500	0
DCD8	Summation MSGF Zone Operand States	0 to 65535	---	1	F500	0
DCD9	Synch Check Operand States (8 items)	0 to 65535	---	1	F500	0
DCE1	Under Frequency Operand States (12 items)	0 to 65535	---	1	F500	0
DCED	Under Voltage Operand States (12 items)	0 to 65535	---	1	F500	0
DCF9	Under Voltage Relay Flex Operand States (6 items)	0 to 65535	---	1	F500	0
DCFF	Xfmr Differential Flex Operand States (1 item)	0 to 65535	---	1	F500	0
DD00	Breaker IO Flex Operand States (15 items)	0 to 65535	---	1	F500	0

DD0F	GOOSE Input Flex Operand States (16 item)	0 to 65535	---	1	F500	0
Source Group Settings (Read/Write Settings) (30 Modules)						
DE3F	SRC X ZSI Peak to Peak IOC Setting	0 to 48	1/2 Cycle	1	F001	0
DE4F	Reserved					
DE5F	...Repeated for module number 2					
DE7F	...Repeated for module number 3					
DE9F	...Repeated for module number 4					
DEBF	...Repeated for module number 5					
DEDF	...Repeated for module number 6					
DEFF	...Repeated for module number 7					
DF1F	...Repeated for module number 8					
DF3F	...Repeated for module number 9					
DF5F	...Repeated for module number 10					
DF7F	...Repeated for module number 11					
DF9F	...Repeated for module number 12					
DFBF	...Repeated for module number 13					
DFDF	...Repeated for module number 14					
DFFF	...Repeated for module number 15					
E01F	...Repeated for module number 16					
E03F	...Repeated for module number 17					
E05F	...Repeated for module number 18					
E07F	...Repeated for module number 19					
E09F	...Repeated for module number 20					
E0BF	...Repeated for module number 21					
E0DF	...Repeated for module number 22					
E0FF	...Repeated for module number 23					
E11F	...Repeated for module number 24					
E13F	...Repeated for module number 25					
E15F	...Repeated for module number 26					
E17F	...Repeated for module number 27					

E19F	...Repeated for module number 28					
E1BF	...Repeated for module number 29					
E1DF	...Repeated for module number 30					
Source Group Settings (Read/Write Settings) (30 Modules)						
E1FF	SRC X IOC Enabled (16 items)	0 to 1	---	1	F718	1
E20F	SRC X IOC Pickup Setting Multiplier (16 items)	1.5 - 15	---	0.5	F001	6
E21F	SRC X Short Time Protection Switch (16 items)	0 to 1	---	1	F102	1
E22F	SRC X Short Time Pickup Setting (16 items)	1.5 to 9.0	---	0.5	F001	4
E23F	SRC X Short Time I2T Curve (16 items)	0 to 2	---	1	F725	0
E24F	SRC X Short Time Delay Band Setting (16 items)	0 to 6	---	1	F713	2 (band 3)
E25F	SRC X Long Time Delay Band Setting (16 items)	0 to 3	---	1	F711	1 (band 2)
E26F	SRC X GF Protection Switch (16 items)	0 to 1	---	1	F102	0
E27F	SRC X GF Protection Trip Pickup Setting (16 items)	.2 to.6	---	0.01	F001	0.24
E28F	SRC X GF Protection Trip I2T Curve (16 items)	0 to 1	---	1	F102	1
E29F	SRC X GF Protection Trip Delay Band Setting (16 items)	0 to 6	---	1	F713	2 (band 3)
E2AF	SRC X GF Protection Trip Priority (16 items)	0 to 30	---	1	F001	0
E2BF	SRC X GF Protection Alarm Enable (16 items)	0 to 1	---	1	F102	0
E2CF	SRC X GF Protection Alarm Pickup Setting (16 items)	0.2 to 0.6	---	0.01	F001	0.24
E2DF	SRC X GF Protection Alarm I2T Curve (16 items)	0 to 1	---	1	F102	1
E2EF	SRC X GF Protection Alarm Delay Band Setting (16 items)	0 to 6	---	1	F713	2 (band 3)
E2FF	...Repeated for module number 2					
E3FF	...Repeated for module number 3					
E4FF	...Repeated for module number 4					
E5FF	...Repeated for module number 5					
E6FF	...Repeated for module number 6					
E7FF	...Repeated for module number 7					
E8FF	...Repeated for module number 8					

E9FF	...Repeated for module number 9					
EAFF	...Repeated for module number 10					
EBFF	...Repeated for module number 11					
ECFF	...Repeated for module number 12					
EDFF	...Repeated for module number 13					
EEFF	...Repeated for module number 14					
EFFF	...Repeated for module number 15					
F0FF	...Repeated for module number 16					
F1FF	...Repeated for module number 17					
F2FF	...Repeated for module number 18					
F3FF	...Repeated for module number 19					
F4FF	...Repeated for module number 20					
F5FF	...Repeated for module number 21					
F6FF	...Repeated for module number 22					
F7FF	...Repeated for module number 23					
F8FF	...Repeated for module number 24					
F9FF	...Repeated for module number 25					
FAFF	...Repeated for module number 26					
FBFF	...Repeated for module number 27					
FCFF	...Repeated for module number 28					
FDFF	...Repeated for module number 29					
FEFF	...Repeated for module number 30					

5 Modbus Memory Map Format Codes

Format Name	Format Type/Bitmask	Format Definition
F001	UINT16	UNSIGNED 16 BIT INTEGER
F002	SINT16	SIGNED 16 BIT INTEGER
F003	UINT32	UNSIGNED 32 BIT INTEGER (2 registers)
		High order word is stored in the first register.
		Low order word is stored in the second register.
F004	SINT32	SIGNED 32 BIT INTEGER (2 registers)
		High order word is stored in the first register.
		Low order word is stored in the second register.
F013	POWER_FACTOR	POWER FACTOR (SIGNED 16 BIT INTEGER)
		Positive values indicate lagging power factor; negative values indicate leading.
F050	UINT32	TIME and DATE (UNSIGNED 32 BIT INTEGER)
		Gives the current time in seconds elapsed since 00:00:00 January 1, 1970.
F060	FLOATING_POINT	IEEE FLOATING POINT (32 bits)
F072	HEX6	6 BYTES - 12 ASCII DIGITS
F102	ENUMERATION	DISABLED/ENABLED
	0	Disabled
	1	Enabled
F106	ENUMERATION	PHASE ROTATION
	0	ABC
	1	ACB
F108	ENUMERATION	OFF/ON
	0	Off
	1	On

Format Name	Format Type/Bitmask	Format Definition
F118	ENUMERATION	WAVEFORM CAPTURE MODE
	0	Automatic Overwrite
	1	Protected
F126	ENUMERATION	NO/YES CHOICE
	0	No
	1	Yes
F127	ENUMERATION	LATCHED OR SELF-RESETTING
	0	Latched
	1	Self-Reset
F131	ENUMERATION	FORCED CONTACT OUTPUT STATE
	0	Disabled
	1	Energized
	2	De-energized
	3	Freeze
F144	ENUMERATION	FORCED CONTACT INPUT STATE
	0	Disabled
	1	Open
	2	Closed
F176	ENUMERATION	SYNCHROCHECK DEAD SOURCE SELECT
	0	None
	1	LV1 and DV2
	2	DV1 and LV2
	3	DV1 or DV2
	4	DV1 xor DV2
	5	DV1 and DV2
F200	TEXT40	40 CHARACTER ASCII TEXT

Format Name	Format Type/Bitmask	Format Definition
		20 registers -16 Bits: 1st Char MSB, 2nd Char. LSB
F203	TEXT16	16 CHARACTER ASCII TEXT
F204	TEXT80	80 CHARACTER ASCII TEXT
F205	TEXT12	12 CHARACTER ASCII TEXT
F300	UINT16	FLEXLOGIC BASE TYPE (6 bit type) The flexlogic BASE type is 6 bits and is combined with a 9 bit descriptor and 1 bit for protection element to form a 16 bit value. The combined bits are of the form: PTTTTTTD-DDDDDDDD where P bit if set, indicates that the flexlogic type is associated with a protection element state and T represents bits for the BASE type, and D represents bits for the descriptor. The values in square brackets indicate the base type with P prefix [PTTTTTT] and the values in round brackets indicate the descriptor range. [0] Off(0) this is boolean FALSE value [0] On (1)This is boolean TRUE value [2] CONTACT INPUTS (1 - 96) [3] CONTACT INPUTS OFF (1-96) [4] VIRTUAL INPUTS (1-64) [6] VIRTUAL OUTPUTS (1-64) [10] CONTACT OUTPUTS VOLTAGE DETECTED (1-64) [11] CONTACT OUTPUTS VOLTAGE OFF DETECTED (1-64) [12] CONTACT OUTPUTS CURRENT DETECTED (1-64) [13] CONTACT OUTPUTS CURRENT OFF DETECTED (1-64) [14] REMOTE INPUTS (1-32) [28] INSERT (Via Keypad only) [32] END [34] NOT (1 INPUT) [36] 2 INPUT XOR (0) [38] LATCH SET/RESET (2 INPUTS) [40] OR (2-16 INPUTS) [42] AND (2-16 INPUTS)

Format Name	Format Type/Bitmask	Format Definition
		[44] NOR (2-16 INPUTS)
		[46] NAND (2-16 INPUTS)
		[48] TIMER (1-32)
		[50] ASSIGN VIRTUAL OUTPUT (1 - 64)
		[52] SELF-TEST ERROR (See F141 for range)
		[56] ACTIVE SETTING GROUP (1-8)
		[62] MISCELLANEOUS EVENTS (See F146 for range)
		[64-127] ELEMENT STATES (Refer to Memory Map Element States Section)
F500	UINT16	PACKED BITFIELD
		First register indicates I/O state with bits 0(MSB)-15(LSB) corresponding to I/0 state 1-16. Second register indicates I/O state with bits 0-15 corresponding to I/0 state 17-32 (if required). Third register indicates I/O state with bits 0-15 corresponding to I/0 state 33-48 (if required). Fourth register indicates I/O state with bits 0-15 corresponding to I/0 state 49-64 (if required). The number of registers required is determined by the specific data item. A bit value of 0 = Off, 1 = On
F701	BITFIELD	SRCx Node Internal Diagnostics Bit Mask
	0	Power-on Self Test Error Detected
	1	Built-In-Test Error Detected
	2	Invalid Data Detected
	3	Jamb sync occurred over threshold
	4	Invalid node configuration detected
	5	Invalid CRC check of node firmware
	6	IButton Missing
	7	EEPROM Configuration Invalid
	8	Not Used
	9	Not Used
	10	Not Used
	11	Not Used

Format Name	Format Type/Bitmask	Format Definition
	12	Not Used
	13	Not Used
	14	Not Used
	15	Not Used
F702	BITFIELD	SRCx Node System Diagnostics 1
	0	Node not receiving a broadcast message from CPU A
	1	Node not receiving a broadcast message from CPU B
	2	No link pulse from CPU A
	3	No link pulse from CPU B
	4	Invalid system frequency received from CPU A
	5	Invalid system frequency received from CPU B
	6	Invalid IOC pickup setting multiplier received from CPU A
	7	Invalid IOC pickup setting multiplier received from CPU B
	8	Invalid ST setting received from CPU A
	9	Invalid ST setting received from CPU B
	10	Invalid GF setting received from CPU A
	11	Invalid GF setting received from CPU B
	12	Invalid command received from CPU A
	13	Invalid command received from CPU B
	14	CPU A command not completed due to arbitration
	15	CPU B command not completed due to arbitration
F703	BITFIELD	SRCx Node System Diagnostics 2
	0	CPU A command timed out
	1	CPU B command timed out
	2	Node synch not locked
	3	Unknown Message Received on Port 0

Format Name	Format Type/Bitmask	Format Definition
	4	Unknown Message Received on Port 1
	5	Not Used
	6	Not Used
	7	Not Used
	8	Not Used
	9	Not Used
	10	Not Used
	11	iButton rejected due to value(s) out of range
	12	Not Used
	13	Not Used
	14	Not Used
	15	Not Used
F704	BITFIELD	SRCx Node Hardware Diagnostics
	0	Secondary Control Power
	1	Not Used
	2	Not Used
	3	Not Used
	4	AD AIOC Failure
	5	Node Not Calibrated
	6	Not Used
	7	Not Used
	8	Not Used
	9	Control_Power1_Status
	10	Control_Power2_Status
	11	App Flash CRC Fail
	12	Boot Flash CRC Fail

Format Name	Format Type/Bitmask	Format Definition
	13	Option Box Failure
	14	Not Used
	15	Not Used
F705	BITFIELD	SRCx NodeProt Protection Function Configuration
	0	Ground Fault Protection Enabled
	1	Instantaneous Overcurrent Protection Enabled
	2	Short Time Protection Enabled
	3	Switchable ST/IOC Protection Enabled/Disabled
	4	Switchable GF
	5	Not Used
	6	Not Used
	7	Not Used
	8	Not Used
	9	Not Used
	10	Not Used
	11	Not Used
	12	Not Used
	13	Not Used
	14	Not Used
	15	Not Used
F706	BITFIELD	SRCx Reflected CPU Diagnostics
	0	CPU A is using the hardware clock
	1	CPU A is not receiving data from one or more nodes
	2	CPU A Identifier
	3	CPU A Running Flex Logic
	4	CPU 0 FTO State - CPU is in external control transfer mode

Format Name	Format Type/Bitmask	Format Definition
	5	Not Used
	6	Not Used
	7	Not Used
	8	CPU B is using the hardware clock
	9	CPU B is not receiving data from one or more nodes
	10	CPU B Identifier
	11	CPU A Running Flex Logic
	12	CPU 1 FTO State - CPU is in external control transfer mode
	13	Not Used
	14	Not Used
	15	Not Used
F707	BITFIELD	SRCx Reflected CPU Commands
	0	No Op
	1	Open
	2	Close
	3	Trip
	4	Network Interlock
	5	Reset Interlock
	6	Light LED
	7	Messenger Machine Output On
	8	Start Firmware Download
	9	Switch Firmware
	10	Cancel Firmware Download
	11	Ignore CPU Message
	12	Firmware Packet Present
	13	Flux Shifter Open

Format Name	Format Type/Bitmask	Format Definition
	14	Flux Shifter Trip
	15	FTO Command - requesting to assume control
F708	BITFIELD	SRCx Node Physical Status
	0	Breaker Contacts Open
	1	Breaker Contacts Closed
	2	Lockout
	3	Closing Spring Charged
	4	Primary Connected
	5	Primary Disconnected
	6	Secondary Connected
	7	Door Interlock
	8	Analog IOC
	9	Shunt Trip Circuit Failure
	10	ZSI Input Active
	11	Downstream ZSI Enabled
	12	Messenger Machine Input 1
	13	Messenger Machine Input 2
	14	Messenger Machine Output
	15	Not Used
F709	BITFIELD	SRCx Node Logic and Trip Status
	0	Synchronization Source Bit 0
	1	Synchronization Source Bit 1
	2	Download Source Bit 0
	3	Download Source Bit 1
	4	Download Complete
	5	Test Mode

Format Name	Format Type/Bitmask	Format Definition
	6	GF Suspend
	7	Not Used
	8	Trip Flag
	9	Trip due to LT
	10	Trip due to ST
	11	Trip due to GF
	12	Trip due to IOC
	13	Phase Indicator Bit 0
	14	Phase Indicator Bit 1
	15	Not Used
F711	ENUMERATION	SRCx Long Time Delay Band Setting
	0	BAND 1
	1	BAND 2
	2	BAND 3
	3	BAND 4
F712	ENUMERATION	SRCx Breaker Connection
	0	Forward
	1	Reverse
F713	ENUMERATION	Delay Band Settings
	0	BAND 1
	1	BAND 2
	2	BAND 3
	3	BAND 4
	4	BAND 5
	5	BAND 6
	6	BAND 7

Format Name	Format Type/Bitmask	Format Definition
F714	ENUMERATION	SRCx Ground Fault Protection or Alarm Select
	0	Trip
	1	Alarm
F715	ENUMERATION	UL or ANSI
	0	UL
	1	EG
	2	Other
	3	EGE Envelope 1
	4	EGE Envelope 2
	5	EGE Envelope 3
F716	ENUMERATION	Product Type
	0	Low Voltage Switchgear
	1	Medium Voltage Switchgear
	2	Paralleling Switchgear
F717	ENUMERATION	CPU Identifier
	0	CPU A
	1	CPU B
F718	ENUMERATION	IOC Protection Type
	0	Disabled
	1	Enabled
F719	ENUMERATION	SRCx PT Wiring
	0	None
	1	PT Rating 600V Delta
	2	PT Rating 600V Wye
	3	PT Rating 480V Delta
	4	PT Rating 480V Wye

Format Name	Format Type/Bitmask	Format Definition
	5	PT Rating 240V Delta
	6	PT Rating 208V Wye
	7	PT Rating 400V Delta
	8	PT Rating 400V Wye
	9	PT Rating 415V Delta
	10	PT Rating 415V Wye
F722	UINT32	Node 0-29 Bit Field Vector
	0	Bit field representing a 0 or 1 for Node 0
	1	Bit field representing a 0 or 1 for Node 1
	2	Bit field representing a 0 or 1 for Node 2
	3	Bit field representing a 0 or 1 for Node 3
	4	Bit field representing a 0 or 1 for Node 4
	5	Bit field representing a 0 or 1 for Node 5
	6	Bit field representing a 0 or 1 for Node 6
	7	Bit field representing a 0 or 1 for Node 7
	8	Bit field representing a 0 or 1 for Node 8
	9	Bit field representing a 0 or 1 for Node 9
	10	Bit field representing a 0 or 1 for Node 10
	11	Bit field representing a 0 or 1 for Node 11
	12	Bit field representing a 0 or 1 for Node 12
	13	Bit field representing a 0 or 1 for Node 13
	14	Bit field representing a 0 or 1 for Node 14
	15	Bit field representing a 0 or 1 for Node 15
	16	Bit field representing a 0 or 1 for Node 16
	17	Bit field representing a 0 or 1 for Node 17
	18	Bit field representing a 0 or 1 for Node 18

Format Name	Format Type/Bitmask	Format Definition
	19	Bit field representing a 0 or 1 for Node 19
	20	Bit field representing a 0 or 1 for Node 20
	21	Bit field representing a 0 or 1 for Node 21
	22	Bit field representing a 0 or 1 for Node 22
	23	Bit field representing a 0 or 1 for Node 23
	24	Bit field representing a 0 or 1 for Node 24
	25	Bit field representing a 0 or 1 for Node 25
	26	Bit field representing a 0 or 1 for Node 26
	27	Bit field representing a 0 or 1 for Node 27
	28	Bit field representing a 0 or 1 for Node 28
	29	Bit field representing a 0 or 1 for Node 29
	30	Not Used
	31	Not Used
F725	ENUMERATION	I2T Curve Setting
	0	Disabled
	1	Enabled
	2	Enabled Limited
F726	ENUMERATION	SRCX curve type
	0	Inverse time curve
	1	Constant time curve
F727	ENUMERATION	SRCX Trip or Open setting
	0	Open and don't activate lockout
	1	Trip and activate lockout
F728	BITFIELD	Option Bit Vectors
F732	ENUMERATION	ZSI Option
	0	ST ZSI

Format Name	Format Type/Bitmask	Format Definition
	1	GF ZSI
	2	ST and GF ZSI
F733	ENUMERATION	ZSI Zone Tier Settings
	0	ZSI Tier 0
	1	ZSI Tier 1
	2	ZSI Tier 2
	3	ZSI Tier 3
F734	ENUMERATION	Contact IO Debounce values
	0	Disabled
	1	Enabled_00016
	2	Enabled_00104
	3	Enabled_04088
	4	Enabled_32760
F735	ENUMERATION	Multipoint delay band settings
	0	BAND 1
	1	BAND 2
	2	BAND 3
	3	BAND 4
	4	BAND 5
	5	BAND 6
	6	BAND 7
F736	UINT32	Contact Input Configuration Low Vector
	0	0 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	1	1 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	2	2 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	3	3 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output

Format Name	Format Type/Bitmask	Format Definition
	4	4 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	5	5 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	6	6 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	7	7 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	8	8 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	9	9 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	10	10 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	11	11 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	12	12 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	13	13 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	14	14 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	15	15 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	16	16 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	17	17 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	18	18 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	19	19 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	20	20 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	21	21 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	22	22 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	23	23 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	24	24 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	25	25 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	26	26 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	27	27 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	28	28 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	29	29 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output

Format Name	Format Type/Bitmask	Format Definition
	30	30 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	31	31 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
F737	UINT32	Contact Input Configuration High Vector
	0	32 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	1	33 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	2	34 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	3	35 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	4	36 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	5	37 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	6	38 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	7	39 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	8	40 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	9	41 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	10	42 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	11	43 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	12	44 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	13	45 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	14	46 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	15	47 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	16	48 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	17	49 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	18	50 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	19	51 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	20	52 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	21	53 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	22	54 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output

Format Name	Format Type/Bitmask	Format Definition
	23	55 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	24	56 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	25	57 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	26	58 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	27	59 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	28	60 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	29	61 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	30	62 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
	31	63 - I/O x + (bit number) Input, 1 - I/O x + (bit number) Output
F738	ENUMERATION	Option String Authentication Status
	0	New and Old Both Option strings Invalid
	1	Using Valid New Option String
	2	Using Valid Old Option String
F739	Bit Field	Reduced Let Thru Bit Vector
	0	Bit field representing 0 or 1 for Node 0 RELT
	1	Bit field representing 0 or 1 for Node 1 RELT
	2	Bit field representing 0 or 1 for Node 2 RELT
	3	Bit field representing 0 or 1 for Node 3 RELT
	4	Bit field representing 0 or 1 for Node 4 RELT
	5	Bit field representing 0 or 1 for Node 5 RELT
	6	Bit field representing 0 or 1 for Node 6 RELT
	7	Bit field representing 0 or 1 for Node 7 RELT
	8	Bit field representing 0 or 1 for Node 8 RELT
	9	Bit field representing 0 or 1 for Node 9 RELT
	10	Bit field representing 0 or 1 for Node 10 RELT
	11	Bit field representing 0 or 1 for Node 11 RELT

Format Name	Format Type/Bitmask	Format Definition
	12	Bit field representing 0 or 1 for Node 12 RELT
	13	Bit field representing 0 or 1 for Node 13 RELT
	14	Bit field representing 0 or 1 for Node 14 RELT
	15	Bit field representing 0 or 1 for Node 15 RELT
	16	Bit field representing 0 or 1 for Node 16 RELT
	17	Bit field representing 0 or 1 for Node 17 RELT
	18	Bit field representing 0 or 1 for Node 18 RELT
	19	Bit field representing 0 or 1 for Node 19 RELT
	20	Bit field representing 0 or 1 for Node 20 RELT
	21	Bit field representing 0 or 1 for Node 21 RELT
	22	Bit field representing 0 or 1 for Node 22 RELT
	23	Bit field representing 0 or 1 for Node 23 RELT
	24	Bit field representing 0 or 1 for Node 24 RELT
	25	Bit field representing 0 or 1 for Node 25 RELT
	26	Bit field representing 0 or 1 for Node 26 RELT
	27	Bit field representing 0 or 1 for Node 27 RELT
	28	Bit field representing 0 or 1 for Node 28 RELT
	29	Bit field representing 0 or 1 for Node 29 RELT
	30	Bit field representing 0 or 1 for Multipoint RELT
	31	Bit field representing 0 or 1 for System RELT
F740	ENUMERATION	ST Restrained Delay Band Settings
	0	Disabled
	1	Band 1
	2	Band 2
	3	Band 3

Format Name	Format Type/Bitmask	Format Definition
	4	Band 4
	5	Band 5
	6	Band 6
	7	Band 7
F741	Bit Field	GOOSE Input Health Status
	0	Input Data Updated
	1	Input Time to Live Expired
	2	Input Out of Sequence Detected
	3	Input Configuration Revision Mismatch
	4	Input Need Commissioning
	5	Input Test Mode
	6	Input Goose Control Block Reference Mismatch
	7	Input App ID Mismatch
	8	Input Data Set Mismatch
	9	Input Incorrect Data Type
	10	Input Data Item Not Configured
	11	Spare
	12	Spare
	13	Spare
	14	Spare
	15	Input Heartbeat Received
F742	Bit Field	GOOSE System Health Status
	0	OSI File Configuration Failure
	1	Network Driver Initialization Failure
	2	Memory Initialization Failure

Format Name	Format Type/Bitmask	Format Definition
	3	Log File Configuration Failure
F743	Bit Field	GOOSE Input System Health Status
	0	File Read Failure
	1	File Parse Failure
	2	Data Type Creation Failure
	3	Data Item Creation Failure
	4	SCL Initialization Failure
	5	GOOSE Control Block Initialization Failure
	6	Memory Initialization Failure
	7	MAC Address Initialization Failure
	8	Destination MAC Address Mismatch
	9	Configuration Timeout
	10	VLAN Priority Parse Failure
	11	VLAN ID Parse Failure
	12	Data Index Mapping Error
F744	Bit Field	GOOSE Output System Health Status
	0	File Read Failure
	1	File Parse Failure
	2	Data Type Creation Failure
	3	Data Item Creation Failure
	4	SCL Initialization Failure
	5	GOOSE Control Block Initialization Failure
	6	VLAN Priority Initialization Failure
	7	VLAN ID Initialization Failure
	8	Data Map File Read Failure

Format Name	Format Type/Bitmask	Format Definition
	9	MAC Address Parse Failure
	10	Data Mapping Error
	11	Configuration Timeout