# Driver Manual
## (Supplement to the FieldServer Instruction Manual)

# FS-8700-80 McQuay MicroTech® Open Protocol™

| APPLICABILITY & EFFECTIVITY |
| --- |
| Effective for all systems manufactured after November 2011 |

| | |
| --- | --- |
| Driver Version: | 1.05 |
| Document Revision: | 6 |

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## 1    MCQUAY MICRO TECH OPEN PROTOCOL DESCRIPTION

This document describes the FieldServer driver used to transfer data between a FieldServer and MicroTech® unit and/or network of controllers manufactured by McQuay International.  Transfers are done using the controller's Data Terminal Communications Protocol.  In this document the protocol is referred to as the McQuay MicroTech® Open Protocol.  MicroTech controls are legacy products that may require the use of a FieldServer device in order to support existing applications in need of unit or network controller replacements and/or integration into a Building Automation System (BAS).

### 1.1    MicroTech Unit and System Controllers

McQuay International has provided BAS manufacturers licensed access to stand-alone MicroTech unit controllers.  The network access, which is called Open Protocol™, allows a BAS to monitor status and change limited control parameters in McQuay International HVAC equipment.  Monitoring and controlling MicroTech unit controllers may have required the use of a MicroTech system panel, depending on the unit type, number of units and other network requirements.  There are multiple combinations of MicroTech unit controllers and/or system panels (i.e. Open Protocol networks) that could use a FieldServer device.  FieldServer-supported devices, McQuay Open Protocol controller descriptions, and network architecture diagrams are all described in the following section.

The McQuay MicroTech® Open Protocol driver allows the FieldServer to transfer data to and from devices over either RS-232 or RS-485 using McQuay MicroTech® Open Protocol.  The FieldServer can emulate either a Server or Client.

#### 1.1.1    McQuay Equipment Types recognized by the driver.

| Code | Description |
|------|-------------|
| 200CFC | 200 Series Centrifugal Chiller |
| 100CFC | 100 Series Centrifugal Chiller |
| 001ASC | Air Cooled Screw Chiller – V2.2 Single Compressor Only |
| 000SCU | Self Contained Unit |
| 0050RPC | Reciprocating Chiller |
|  | Rooftop Unit |
|  | Water Cooled Screw Chiller |

#### 1.1.2    McQuay equipment not currently recongnized by the driver:

| Code | Description |
|------|-------------|
|  | Global Scroll chiller |
|  | Unit Ventilator |
|  | Water Source Heat Pump (WSHP) |
|  | MicroTech 2000 WSHP (through MCG (MicroTech Communications Gateway panel) |

### 1.1.3   McQuay MicroTech network products used in conjunction with the driver:

#### 1.1.3.1  MicroTech BACdrop™ panel

The MicroTech BACdrop gateway integrates a MicroTech network into a BACnet™ building automation system (BAS) facilitating monitoring and control of McQuay International equipment from the BAS.   The gateway translates between BACnet objects on an Ethernet® network and McQuay memory locations on a proprietary MicroTech network.

The BACdrop gateway is a passive device. It receives, translates, and re-transmits messages including both data and control signals from one network to the other network in either direction but does not perform any supervisory control for the various MicroTech controllers connected to it.  Figure 1 shows the important features of the BACdrop panel.

**Figure 1. BACdrop Panel**
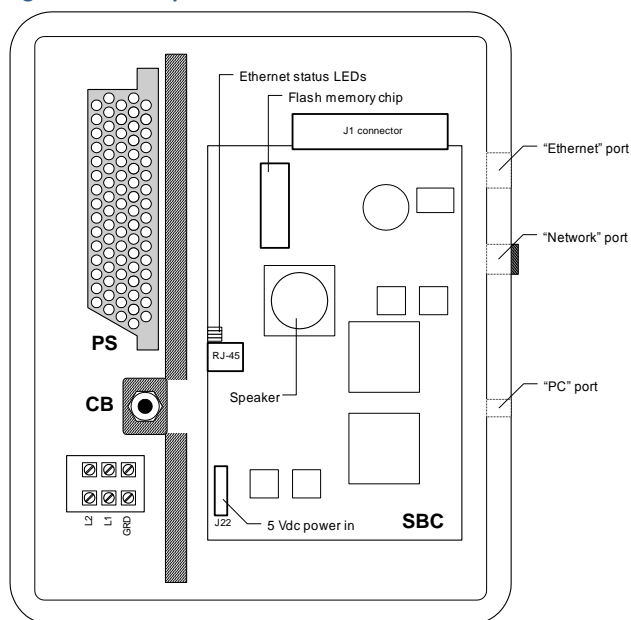


#### 1.1.3.2  OPM – Open Protocol Master Panel

The OPM Panel is used when two or more MicroTech controllers need to be interfaced with a BAS by means of a single-point connection.  The OPM acts as a passive communications link between MicroTech controllers and the BAS and does not perform any supervisory control for the various MicroTech controllers connected to it.  When an OPM is used, all supervisory control (scheduling, overrides, chiller sequencing) is handled by the BAS.   The maximum number of unit controllers per OPM depends on the BAS. For example, the OPM Panel could combine a McQuay centrifugal chiller, a McQuay applied rooftop unit, and several unit ventilators into a network that a BAS could connect to with a single cable.  Figure 2 shows the important features of the OPM panel.

**Figure 2. OPM Panel**
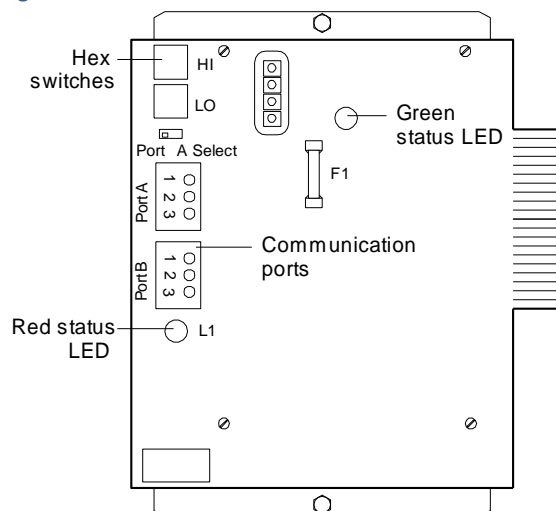


### 1.1.3.3 Alternatives to the OPM Panel

The following MicroTech network controllers, which perform specific supervisory control tasks, can be used as substitutes for the OPM Panel:

- RMC (Remote Monitoring and Control panel – Applied Air product)

- CSC (Chiller System Controller panel – chiller product)

- RMS (Remote Monitoring and Sequencing panel – chiller product)

- LWC (Loop Water Controller – WSHP product)

### 1.1.4 About MicroTech Network Architecture

All controllers in a MicroTech network are assigned a *level*: level 1, level 2, or level 3. All networks must have one level 1 controller to coordinate communications.  Multiple level 2 controllers connect to the level 1 controller with a communications *trunk*.  A trunk is defined as an isolated section of the daisy-chained network wiring.   The network wiring between all controllers is a trunk.  Multiple level 3 controllers can be connected to a level 2 controller with a separate trunk; however, this is typically not done in BACdrop applications.  *The maximum allowable length of a communications trunk is 5000 ft (1524 m).*  See Figures 6 and 7 for examples of field wiring.

## 1.2 Applying a FieldServer gateway to different MicroTech situations

There are multiple scenarios where a FieldServer gateway device may be applied to one or more MicroTech controllers.  The most common are listed below, followed by a brief description of each one.

### 1.2.1 Single standalone MicroTech 200 Series unit controller

When a FieldServer device is connected to a single MicroTech unit controller, the FieldServer connects to the "A" port of the MicroTech controller.  The unit controller is typically a level 2 device with a Comm Port Configuration of "L2 TTY/Slave".   MicroTech Level 2 devices must have an address with a non-zero value to the left of the decimal point and "00" to the right of the decimal point (for example, 01.00, 02.00, 03.00, etc).  For a level 2 device, the left side (the non-zero portion) of the address is set with the controller's rotary hex switches.

### 1.2.2 Multiple standalone MicroTech 200 Series unit controllers

#### 1.2.2.1 MicroTech Addressing and Network Architecture

When a FieldServer device is connected to two or more MicroTech controllers, a level 1 MicroTech controller is required to coordinate communications. Typically the level 1 device in this situation is an Open Protocol Master Panel (an "OPM"). However, the OPM Panel is no longer available from McQuay, so another MicroTech device may function as the Level 1 device. A 200 Series MicroTech unit controller (for example, a Self-Contained Unit (SCU) controller) can be re-configured as a level 1 device. Thus if a site has several SCUs, one of them can be re-configured as level 1 and the FieldServer connects to the "A" port of that unit controller. A Level 2 daisy chain is then connected from the "B" port of the level 1 SCU to the "B" port of the remaining Level 2 SCU's.

It is also possible to use a supervisory MicroTech network controller as the level 1 device which coordinates communications between the FieldServer device and multiple level 2 MicroTech controllers. Examples of supervisory controllers are the RMC, CSC, and RMS panels.

Another alternative is to use an NMP (Network Master Panel) controller. An NMP is the level 1 device used in a MicroTech network (see Figure 3). The NMP coordinates communications of all level 2 and level 3 MicroTech controllers in this type of network. The NMP also coordinates unit time scheduling, processes alarms, and does other functions. If an NMP is used in this way, it is necessary to "corrupt" its checksums so that the NMP application code no longer runs. The process of corrupting checksums can be performed with MicroTech Monitor® software using the read/write screen. Please contact the McQuay Controls Customer Support group at 866-462-7829 for more information about using Monitor software.

### 1.2.3 Multiple standalone MicroTech "non-200 Series" unit controllers

If a FieldServer gateway device is applied to a site that has several "standalone" unit controllers that have never been networked together, there are certain guidelines that must be followed. First, a level 1 device is required to coordinate the communications between the FieldServer device and the MicroTech unit controllers. Typically an OPM Panel is used for this purpose. However, the OPM is no longer available from McQuay. If the multiple unit controllers are "non-200 Series" MicroTech controllers such as Unit Ventilators (UVs) or Water Source Heat Pumps (WSHPs), a Level 1 MicroTech controller must be added to the network to coordinate communications of the Level 2 UVs or WSHPs.

In addition, network wiring would be required to be installed. The FieldServer would be wired to the "A" port of the Level 1 device. A "level 2 daisy-chain" would be required from the "B" port of the level 1 device to the "B" port of each level 2 device. See Figures 6 and 7 for network wiring details.

### 1.2.4 Existing MicroTech network (Custom MicroTech Monitor software, NMP Panel, etc)

#### 1.2.4.1 With level 3 devices (Unit Vents or WSHPs)

If a FieldServer gateway device is applied to a site that has an existing "MicroTech network" (meaning that it has custom MicroTech Monitor software for that site and an NMP Panel) and Unit Vents or WSHPs, changes are required as follows:

- The checksums in the NMP's application code must be corrupted so that the NMP no longer functions as a Network Master Panel. The FieldServer device connects to the A port of the NMP.

- Level 2 LMPs (Local Master Panel) must be removed from the network.

- The RS-485 daisy chain connecting all of the Unit Vents or WSHPs must be connected directly to the "B" port of the Level 1 NMP.

- Different application code must be downloaded into all Unit Vents and WSHPs.
  - In the case of Unit Vents, the "Level 3 network code" for use in a MicroTech network must be replaced with "Level 2 standalone" Unit Vent code.
  - In the case of WSHPs, the "Level 3" code for use in a MicroTech network must be replaced with "Level 2 standalone" WSHP code.
- See Figure 3 for details.

Figure 3. MicroTech Network Configurations with Level 1 NMP Supervisory Controller
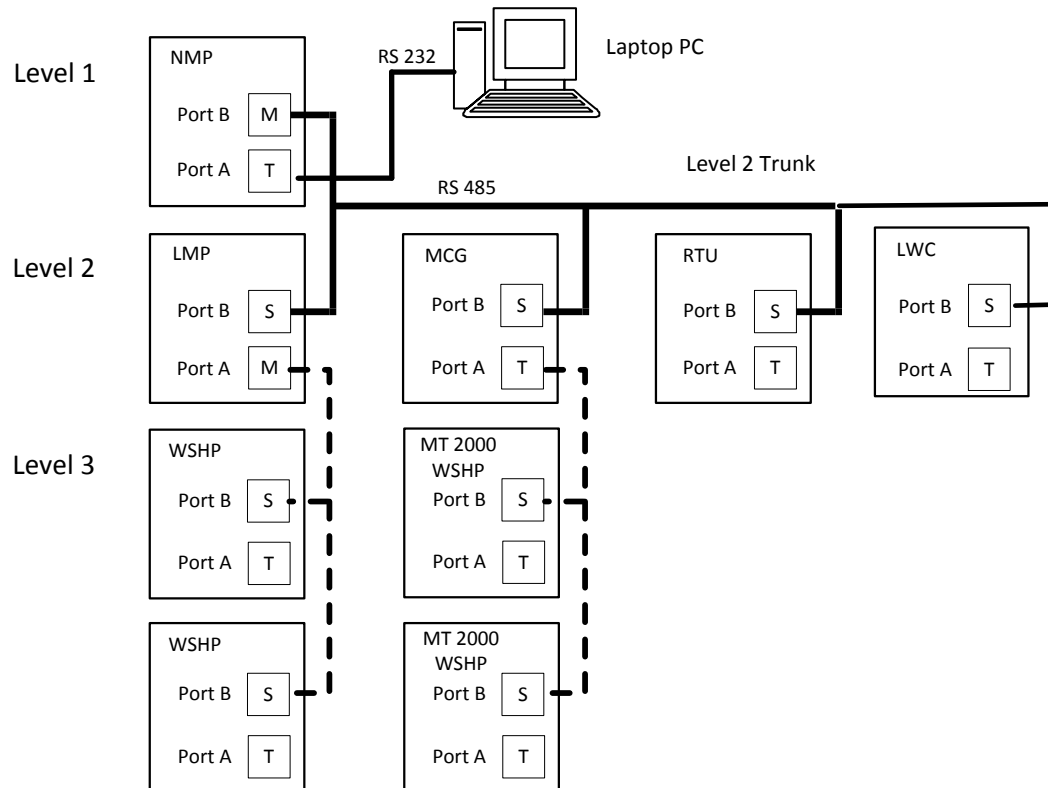


**Port Configuration**
M=Master
S=Slave
T=TTY (for PC connection)

**Notes:**

- A PC running MicroTechMonitor connects to an NMP through it's a Port configured as "TTY"

- The A Port of a Level 2 MCG is configured as "USER" to communicate with the MCG's SLTA.

- MicroTech WSHP's on a MicroTech network require a LMP (Level 2 Local Master Panel) above them.

- MicroTech 2000 WSHP's with LonWorks code (vs LonMark code) are installed below an MCG.

### 1.2.4.2  With no level 3 devices

If a FieldServer gateway device is applied to a site that has an existing "MicroTech network" (meaning that it has custom MicroTech Monitor software for that site and an NMP Panel) with only level 2 controllers and no level 3 devices (such as Unit Vents or WSHPs), changes are required as follows:

- The checksums in the NMP's application code must be corrupted so that the NMP no longer functions as a Network master Panel.  The FieldServer device connects to the "A" port of the NMP.

- No network wiring changes are necessary

## 1.2.5   Existing MicroTech Open Protocol network

If a FieldServer gateway device is applied to a site that has an existing "Open Protocol network", the following assumptions are made:

- The site has either an OPM Panel or some other level 1 MicroTech controller that is functioning as an OPM.

- Any Unit Vents or WSHPs in the network are already running the proper "Level 2" application code required for an "Open Protocol" network.

- No network wiring changes are necessary.

- See Figure 7 for details

## 1.2.6   Replacing a BACdrop Gateway panel

### 1.2.6.1  Connected a Single MicroTech unit controller

When a FieldServer device is used to replace a BACdrop panel that has been connected to one MicroTech unit controller, some re-wiring is necessary.  The RS-485 network terminals of the BACdrop panel are connected to the "B" Port of the MicroTech controller, but the FieldServer connects to the "A" port of the MicroTech controller.  The unit controller will be a level 2 device with a Comm Port Configuration of "L2 TTY/Slave".  MicroTech Level 2 devices must have an address with a non-zero value to the left of the decimal point and "00" to the right of the decimal point (for example, 01.00).  For a level 2 device, the left side (the non-zero portion) of the address is set with the controller's rotary hex switches.

### 1.2.6.2  Connected to Multiple MicroTech unit controllers

When a FieldServer device is used to replace a BACdrop panel that has been connected to multiple MicroTech unit controllers with no Level 1 supervisory panel such as an RMC, CSC, or RMS, a Level 1 device must be added.  If the unit controllers are 200 Series MicroTech, this can be accomplished by re-configuring one of the unit controllers to be Level 1.  The alternative to re-configuring one of the existing unit controllers to be a Level 1 device is to add a level 1 device such as an OPM, RMC, CSC, or RMS, but this may be difficult because all of these control panels are obsolete and no longer available. For a typical BACdrop network, the BACdrop panel is the level 1 controller and the unit controllers are level 2 controllers.   See Figures 4 and 6 for details.

**Figure 4. MicroTech Architecture**
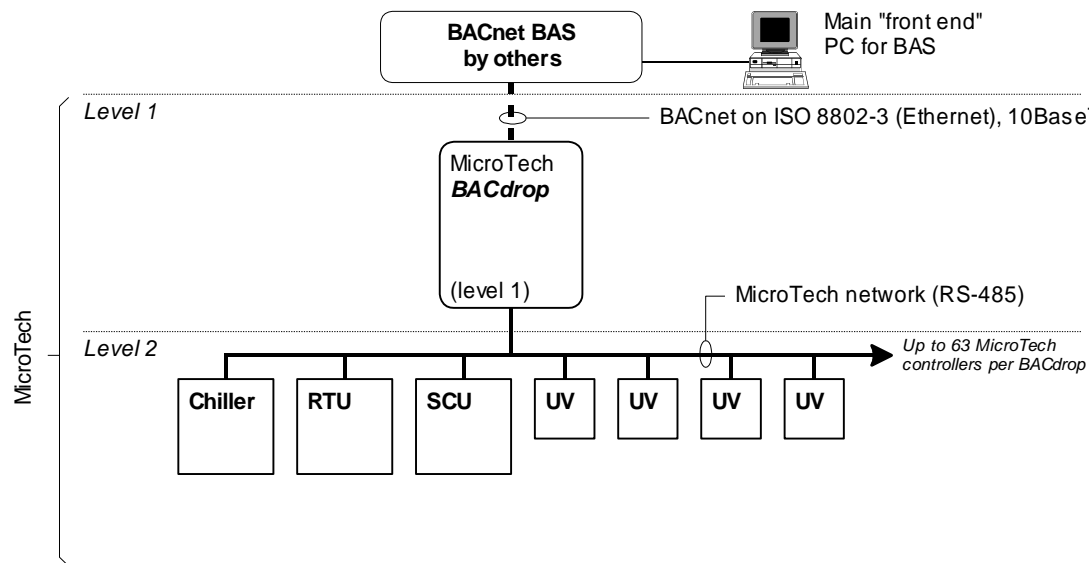


1.2.6.3 Connected to multiple MicroTech unit controllers and a supervisory panel such as an RMC, CSC, or RMS panel

When a FieldServer device will be replacing a BACdrop Gateway panel that was connected to multiple MicroTech unit controllers with a Level 1 supervisory panel such as an RMC, CSC, or RMS, some re-wiring may be necessary. The FieldServer device must be wired to the A Port of the Level 1 device. The B Port of the Level 1 device is then wired to the B Port of all Level 2 devices with a daisy chain. See Figure 5 for details.

**Figure 5.  Level 2 BACdrop Panel with Level 1 Supervisory Panel**
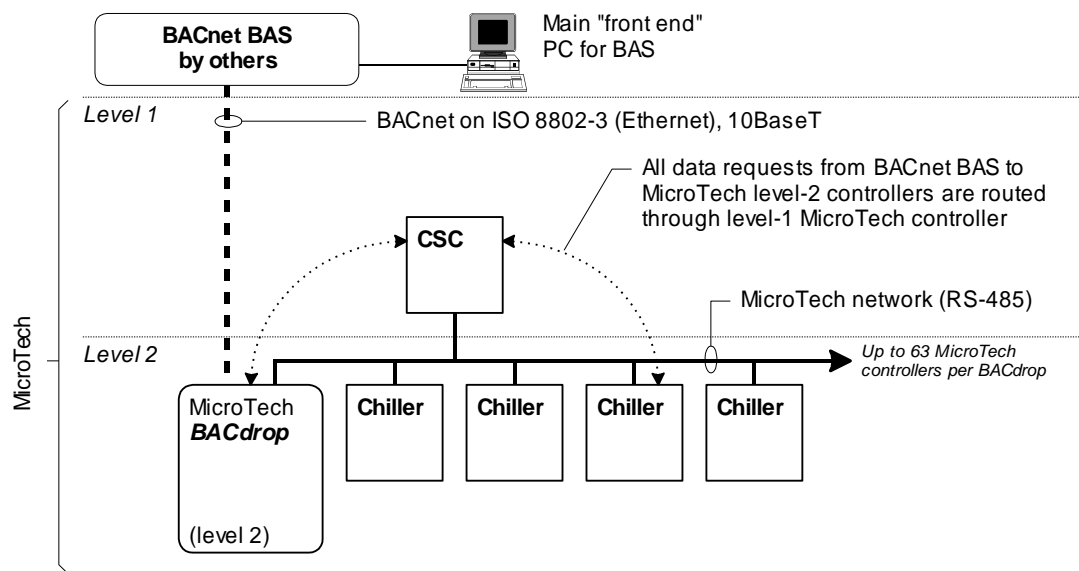
## 1.3    MicroTech Communication Port Configuration

In addition to the rules about MicroTech architecture and addressing, there is also a critical parameter called the Comm Port Configuration.  The Comm Port Configuration must also be set correctly for a unit controller to be able to communicate.  This comm port configuration for level 1 devices is different to level 2 devices.  While it is necessary to know this for proper unit controller setup and for troubleshooting communication problems, it is not critical from the FieldServer side for programming or routing.

A level 1 device must have its communication port configuration set up as "Level 1 TTY/Slave".  To change this configuration, connect to the unit controller with MicroTech Monitor software through the "A" port, proceed to the "Read/Write" screen, read memory address "0A11", and change the value to "C1" (Level 1 TTY/Slave).  After doing this, the controller must also have its rotary hex switches set to the Level 1 address of "00" to make the unit controller's network address 00.00.  Please note that power must be cycled to the controller for this new hex switch setting to take effect.

**Figure 6.  MicroTech Network with BACdrop Panel as Level 1 Device**
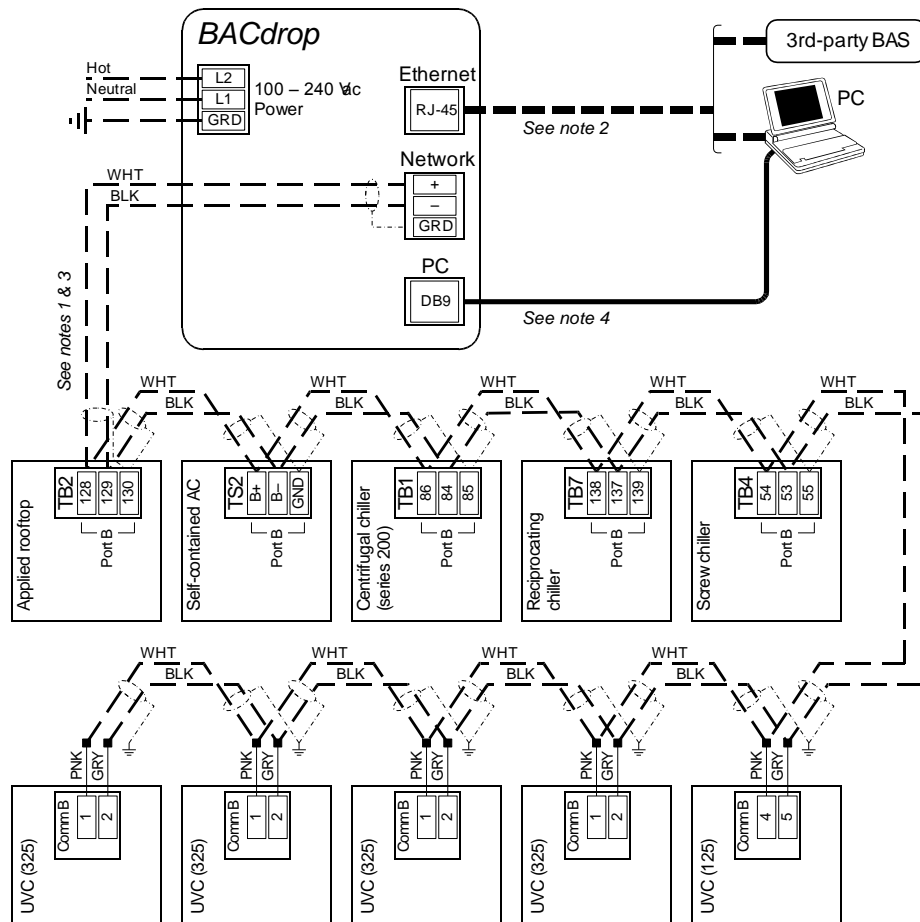


**Notes:**
1. Twisted, shielded pair cable must meet the following minimum requirements: 300 V, 60°C, 20 AWG, polyethylene insulated, with a PVC outer jacket and drain wire (Belden 8762 or equivalent). Some local codes may require the use of plenum rated cable.
2. 10BaseT Ethernet cable. To directly connect a PC to the Ethernet port, a hub or a special crossover cable must be used.
3. Cable length must not exceed 5000 ft (1524 m).
4. Standard serial cable. A null modem is not required.

## Legend

| Symbol | Description |
|---|---|
| B+ | Field wiring terminal |
| – – – | Field wiring: discrete |
| | Field wiring: twisted, shielded pair cable with drain wire (see note 1) |
| ▬ ▬ ▬ | Field wiring: 10BaseT Ethernet |
| —— | Standard serial cable |
| — | Factory wiring |
| ■ | Crimp or solder splice |

**Figure 7. MicroTech Network with OPM Panel as Level 1 Device**



*Or other Level 1 Device (CSC, etc.)
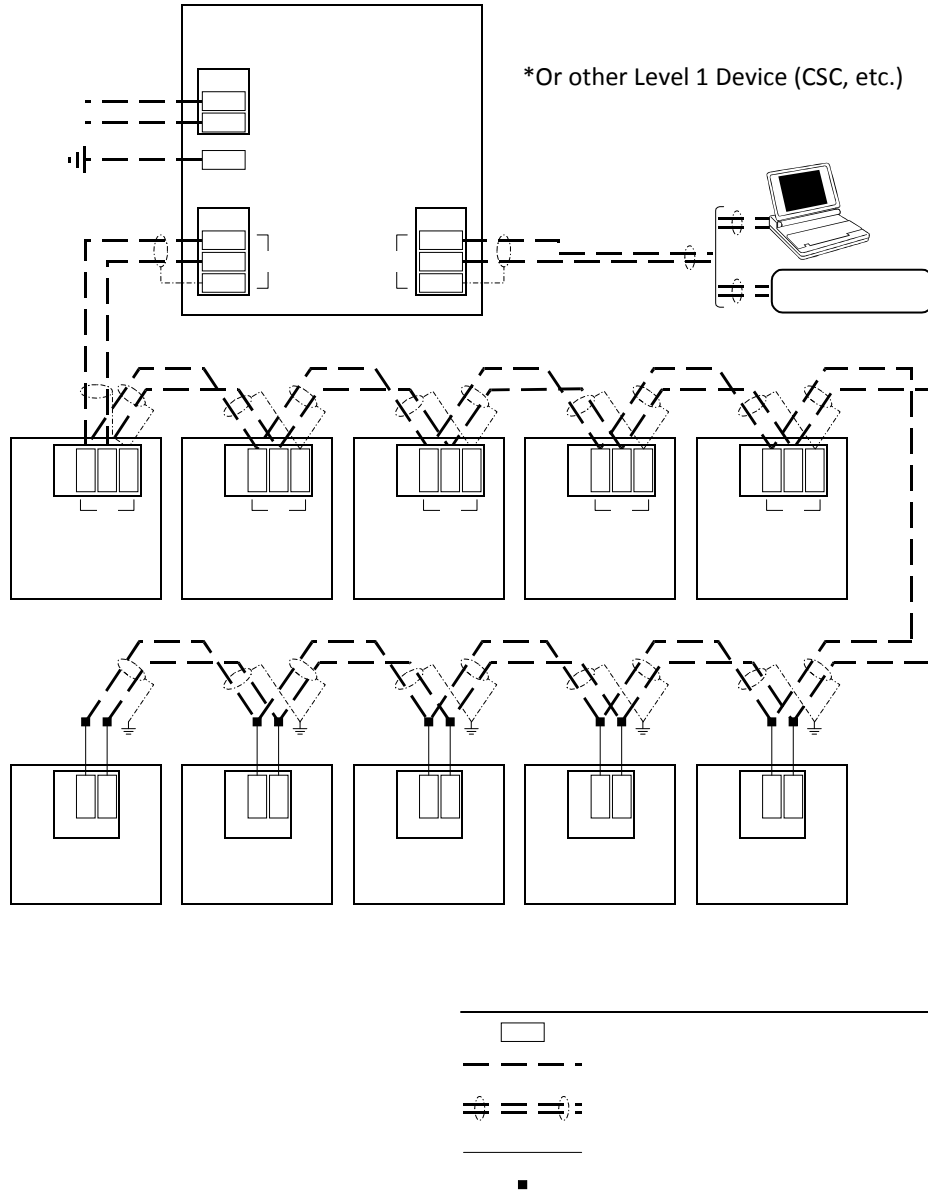
## 1.4 Reference Documents

| Document | Description | Location |
|----------|-------------|----------|
| IM 474 | Open Protocol Master (OPM) Panel | www.mcquay.com |
| IM 689 | BACdrop Gateway for MicroTech | www.mcquay.com |
| IM 658 | Network Master Panel (NMP) | Contact McQuay |
| CD 573875Y | Microtech Open Protocol Wiring Diagrams | Contact McQuay |
| IM 444 | Remote Monitoring and Control (RMC) Panel | Contact McQuay |
| IM 498 | Remote Monitoring and Sequencing (RMS) Panel | Contact McQuay |
| IM 618 | MicroTech Chiller System Controller (CSC) Panel | Contact McQuay |

## 2 DRIVER FEATURES

When emulating a Client, the driver enables the FieldServer to request 'Everything' from the McQuay, allow specific fields to be read or written and apply device scaling to be applied.

When emulating a Server, the driver provides an emulation of the byte memory of a device and responds to read and write requests.

The following **important points and limitations** should be noted.

- Arising from a feature of the McQuay MicroTech® Open Protocol is the peculiarity that when a multi-byte value is written to a McQuay device, the write is done one byte at a time (one byte of data can be transferred per poll/response message pair) allowing for the possibility that the multi byte value is only partially correct until all the messages have been completed.

- The vendor equipment is limited to a maximum of 9600 baud. Given that each message packet can only transfer one byte of data and that some data of interest is multi-byte, users of this protocol should expect low data transfer rates.

- Port expansion is not supported for this driver.

- Each MicroTech® controller is shipped from the factory with a unique job site password. The passwords are provided by the McQuay International representative at the time of startup.

- The driver does not validate passwords when configured as a Server. This means that requests to read or write data will succeed even if the password supplied with the request is incorrect.

## 3 DRIVER SCOPE OF SUPPLY

### 3.1 Supplied by FieldServer Technologies for this driver

| FieldServer Technologies Part # | Description |
|---|---|
| FS-8917-16 | RJ45 to terminal connector cable. |

### 3.2 Provided by Supplier of 3rd Party Equipment

| Part # | Description |
|---|---|
| | McQuay Motor Mount Connector for Port A connection |

## 4    HARDWARE CONNECTIONS

The FieldServer is connected to the McQuay device as shown below.

Configure the McQuay device according to manufacturer's instructions.

SERIES 200 CONTROLLER

RJ45-04
BLUE/WHITE

RJ45-08
ORANGE/WHITE

FS-COM

FS-Tx/+

FS-Rx/-

RJ45-01
BROWN

FS-8917-16

Connect to one of the RS-232
Ports on the FieldServer

FieldServer

P1
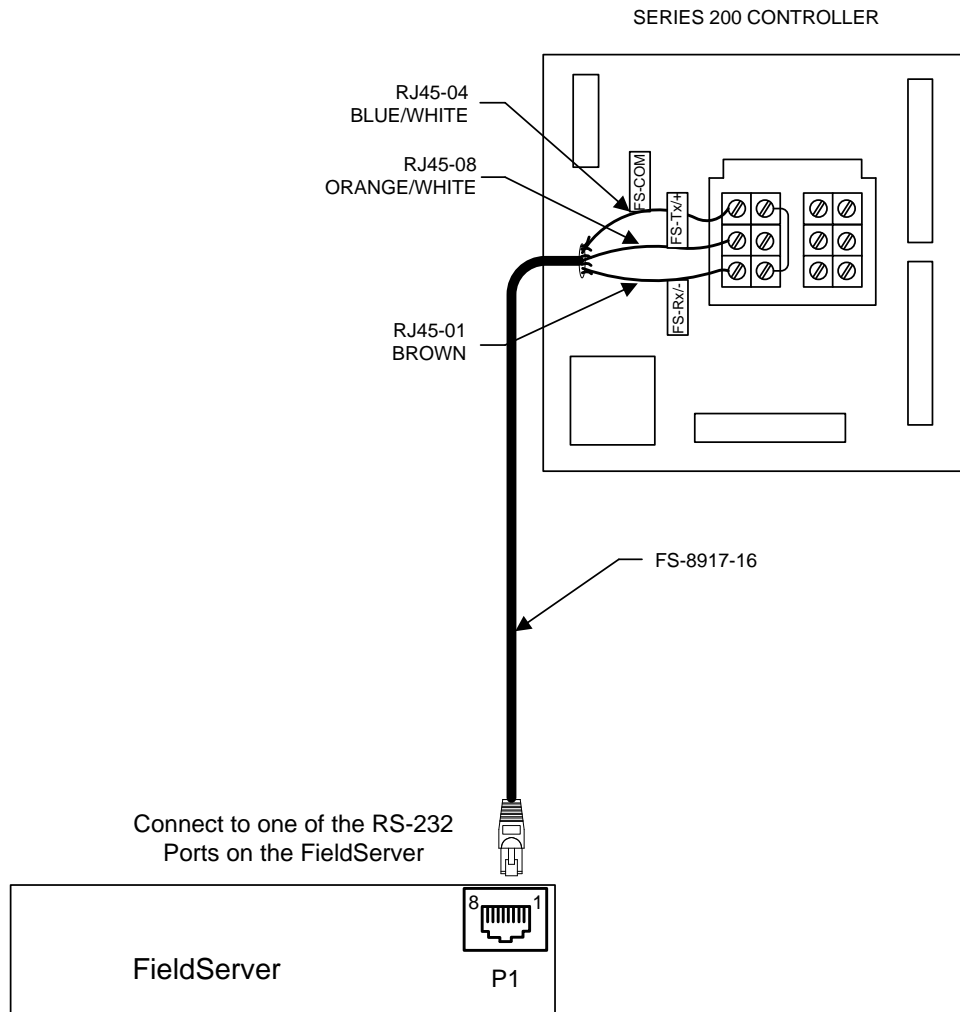
## 5    DATA ARRAY PARAMETERS

Data Arrays are "protocol neutral" data buffers for storage of data to be passed between protocols.  It is necessary to declare the data format of each of the Data Arrays to facilitate correct storage of the relevant data.

| Section Title | | |
| --- | --- | --- |
| Data_Arrays | | |
| **Column Title** | **Function** | **Legal Values** |
| Data_Array_Name | Provide name for Data Array | Up to 15 alphanumeric characters |
| Data_Array_Format | Provide data format. Each Data Array can only take on one format. | FLOAT, BIT, UInt16, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte |
| Data_Array_Length | Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array. | 1-10, 000 |

**Example**

```
//   Data Arrays
Data_Arrays
Data_Array_Name    , Data_Array_Format    , Data_Array_Length
DA_AI_01           , UInt16,               , 200
DA_AO_01           , UInt16                , 200
DA_DI_01           , Bit                   , 200
DA_DO_01           , Bit                   , 200
```

## 6    CONFIGURING THE FIELDSERVER AS A MCQUAY MICRO TECH OPEN PROTOCOL CLIENT

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer.  (See ".csv" sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a McQuay Micro Tech Open Protocol Server.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for McQuay Micro Tech Open Protocol communications, the driver independent FieldServer buffers need to be declared in the "Data Arrays" section, the destination device addresses need to be declared in the "Client Side Nodes" section, and the data required from the Servers needs to be mapped in the "Client Side Map Descriptors" section.  Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the **bold** legal value being the default.

### 6.1    Client Side Connection Parameters

| Section Title |
| --- |
| Connections |

| Column Title | Function | Legal Values |
| --- | --- | --- |
| Port | Specify which port the device is connected to the FieldServer | P1-P8, R1-R2[1] |
| Baud* | Specify baud rate | 300, 1200, 2400, 4800, **9600** (Vendor limitation). |
| Parity* | Specify parity | **Even** (Vendor limitation) |
| Data_Bits* | Specify data bits | **7** (Vendor limitation) |
| Stop_Bits* | Specify stop bits | **1** |
| Protocol | Specify protocol used | MCQ, McQuay |
| Poll Delay* | Time between internal polls | 0-32000 s, **1s** |

**Example**

```
//   Client Side Connections


Connections
Port            , Baud    , Parity    , Data_Bits    , Protocol    , Poll_Delay
P1              , 9600    , Even      , 7            , McQuay      , 0.100s
```

---

[1] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

## 6.2    Client Side Node Parameters

| Section Title | |
|---|---|
| Nodes | |

| Column Title | Function | Legal Values |
|---|---|---|
| Node_Name | Provide name for Node | Up to 32 alphanumeric characters |
| Protocol | Specify protocol used | MCQ, McQuay |
| Port | Specify which port the device is connected to the FieldServer | P1-P8, R1-R22 |
| PLC_Type | The name of the McQuay Equipment type being polled.  The equipment type must be known for the driver to operate correctly. | 200CFC, 100CFC, 050RPC, 001ASC, 000SCU, Type-Unknown |
| Password | Maximum of 8 characters. | Ascii characters only. |
| Node_Hi | Specify the rotary Hi address switch setting of the Mcquay controller | **0** to F |
| Node_Lo | Specify the rotary Lo address switch setting of the Mcquay controller | **0** to F |

```
//   Client Side Nodes


Nodes
Node_Name     , Node_Hi   , Node_Lo   , Protocol   , Port   , Password    , PLC_Type
Node_200CFC   , 3         , B         , McQuay    , P1     , 85760430    , 200CFC
```

---

[2] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

## 6.3 Client Side Map Descriptors

### 6.3.1 FieldServer Related Map Descriptor Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Map_Descriptor_Name | Name of this Map Descriptor | Up to 32 alphanumeric characters |
| Data_Array_Name | Name of Data Array where data is to be stored in the FieldServer | One of the Data Array Names specified in Section 5. |
| Data_Array_Offset | Starting location in Data Array | 0 to maximum specified in Section 5. |
| Function | Function of Client Map Descriptor | Rdbc, Wrbc, Wrbx |

### 6.3.2 Driver Related Map Descriptor Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Node_Name | Name of Node to fetch data from | One of the Node Names specified in Section 6.2. |
| Length* | This parameter normally refers to the length of Map Descriptor. Since one data field can be read or written per poll/response sequence, the driver assumes a length of 1. When Bytes_Per_Field is specified, must be set to 1. When used to read addresses (Appendix A.3), this parameter is used to specify the number of data elements to be read. | Any positive integer, **1**. |
| Field_Name* | The name of the data field of interest. Each address with meaningful data in the McQuay device has a name. The field names are defined in a specification for each device type. If the field name is unknown, the Address can be defined. Refer to Appendix A.2 for further information. | A field name from Appendix C.3, **Everything,** |
| Device_Scaling* | If set to No then the driver stores the raw values, if set to Yes, the data is scaled before storing. Refer to Appendix A.1.2 for information on the device scaling applied. Note that 'Device_Scaling' has no meaning when writing to a McQuay device. The Device_Scaling keyword needs to be used in conjunction with Field_Name | Yes, **No** |
| Address* | The address in the McQuay device that contains the data of interest. . Used with direct addressing – refer to Appendix A.2. | Any positive integer, **-** |
| Bytes_Per_Field* | This parameter is used with direct addressing. When reading, up to 4 consecutive address locations in the McQuay device can be combined and stored in a single Data Array element. When writing, one value from the Data Array may be sent to up to 4 consecutive address locations in the McQuay device. Refer to Appendix A.2 for more information. If this parameter is specified, length must be set to 1. | 1, 2, 3, 4 |

### 6.3.3 Timing Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Scan_Interval | Rate at which data is polled | >0.1s |

### 6.3.4   Map Descriptor Example 1 – Read Everything.

In this example the Map Descriptor tells the driver to read all data fields known for the Node.  The data fields are read sequentially and the values placed in the Data Array at a location determined by the driver.  Appendix C.3 outlines the data read and the Data Array location of each field. There is no way of telling this command to read some fields more often than others.  Each field is read in turn and when the end of the list is reached the driver starts at the beginning again.

| Map_Descriptor_Name | Data_Array_Name | Data_Array_Offset | Function | Node_Name | Length | Scan_Interval | Field_Name | Device_Scaling |
|---|---|---|---|---|---|---|---|---|
| Read Chiller 1 | DA_CHILLER1 | 0 | Rdbc | Chiller1 | 1 | 1.0s | Everything | Yes |

Many validation or error messages report the name of the Map Descriptor in the message and, thus it is strongly recommended that unique names be used.

Each field read has its value stored in this Data Array. The location is dependent on the field name. The length of the Data Array should be at least 200, so that all parameters can be stored.

This parameter connects the Map Descriptor to a Node which in turn connects the Map Descriptor to a port.

The driver will read every data field known for the device.

The values will be scaled before storage.

Example: The 'Evaporator Refrigerant Pressure' will be stored by dividing the raw value read by 10.

### 6.3.5   Map Descriptor Example 2 – Read a particular Data Field.

This example illustrates how to read data for one particular field of interest.  The data is read every 2.0 seconds and the value obtained is stored in the Data Array named DA_OPERATIONAL_MODES at location 10.

| Map_Descriptor_Name | Data_Array_Name | Data_Array_Offset | Function | Scan_Interval | Node_Name | Length | Field_Name |
|---|---|---|---|---|---|---|---|
| Chiller10_Op_Mode | DA_OPERATIONAL_MODES | 10 | Rdbc | 0s | Chiller10 | 1 | Chiller Operation Mode |

Ensure that the field name is spaced and spelled exactly as it is printed in Appendix C.3

### 6.3.6   Map Descriptor Example 3 – Write.

In this example data is written to control fields in the McQuay device using the Wrbx (write on change) function.  A write message will be generated each time the data at index 0 in the Data Array changes.  When writing multibyte fields, several messages are required to transfer the byte values to the McQuay devices. Note that 'Device_Scaling' has no meaning when writing to a McQuay device.  The user must ensure that valid numbers are written to the data fields.

| Map_Descriptor_Name | , Data_Array_Name | , Data_Array_Offset | , Function | , Node_Name | , Length | , Field_Name |
|---|---|---|---|---|---|---|
| Chiller1_Op_Mode | , DA_MODES | , 0 | , Wrbx | , Chiller1 | , 1 | , Chiller Operation Mode |

The data is only written when the contents of element zero of the array named DA_MODES changes.

The name of the data field to be written to.

## 7 CONFIGURING THE FIELDSERVER AS A MCQUAY MICRO TECH OPEN PROTOCOL SERVER

### 7.1 Server Side Connection Paramaters

| Section Title | | |
|---|---|---|
| Connections | | |

| Column Title | Function | Legal Values |
|---|---|---|
| Port | Specify which port the device is connected to the FieldServer | P1-P8, R1-R2[3] |
| Baud* | Specify baud rate | 300, 1200, 2400, 4800, **9600** (Vendor limitation) |
| Parity* | Specify parity | **Even** (Vendor limitation) |
| Data_Bits* | Specify data bits | **7** (Vendor limitation) |
| Stop_Bits* | Specify stop bits | **1**(Vendor limitation) |
| Protocol | Specify protocol used | MCQ, McQuay |

**Example**

```
//   Server Side Connections


Connections
Port            , Baud   , Parity   , Data_Bits   , Protocol   , Stop_Bits   , Poll_Delay
P1              , 9600    , Even     , 7           , McQuay     , 1           , 0.100s
```

---

[3] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

## 7.2    Server Side Node Parameters

| Section Title | |
|---|---|
| Nodes | |

| Column Title | Function | Legal Values |
|---|---|---|
| Node_Name | Provide name for node | Up to 32 alphanumeric characters |
| Protocol | Specify protocol used | MCQ, McQuay |
| Port* | Specify which port the device is connected to the FieldServer.  This parameter is optional for Server side nodes. The reason is that when a poll is received on any port an attempt will be made to match it against any Map Descriptor/node irrespective of the port.  If emulating more than one Node with the same address, however, the Nodes must be linked to specific ports. | P1-P8, R1-R2[4] |
| PLC_Type | This parameter has no meaning for a Server but it must be specified to allow the driver to complete its configuration file validation. | 200CFC, 100CFC, 050RPC, 001ASC, 000SCU, Type-Unknown |
| Password* | This parameter is ignored for a Server. Although every poll contains a password, this driver does no password validation when configured as a Server. | Ascii characters only. |
| Node_Hi | Specify the rotary Hi address switch setting of the Mcquay controller | **0** to F |
| Node_Lo | Specify the rotary Lo address switch setting of the Mcquay controller | **0** to F |

**Example**

```
//   Server Side Nodes


Nodes
Node_Name    , Node_Hi   , Node_Lo    , Protocol    , PLC_Type    , Password
Node_A       , 3         , B          , McQuay    , 200CFC       , 85760430
```

## 7.3    Server Side Map Descriptors

### 7.3.1   FieldServer Specific Map Descriptor Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Map_Descriptor_Name | Name of this Map Descriptor | Up to 32 alphanumeric characters |

---

[4] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

| | | |
|---|---|---|
| Data_Array_Name | Name of Data Array where data is to be stored in the FieldServer | One of the Data Array names from Section 5 |
| Data_Array_Offset | Starting location in Data Array | 0 to (Data_Array_Length -1) as specified in Section 5 |
| Function | Function of Client Map Descriptor | Passive |

### 7.3.2   Driver Specific Map Descriptor Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Node_Name | Name of Node to fetch data from | One of the Node Names specified in Section 7.2 |
| Length | Length of Map Descriptor | 1-10000 |
| Address | Starting address of read block. Addresses cannot be specified in hexadecimal format. | Any positive integer |

### 7.3.3   Timing Parameters

| Column Title | Function | Legal Values |
|---|---|---|
| Scada_Hold_Timeout | Specifies time Server side waits before responding to Client that node is offline on FieldServer Client side. | >1.0s |

### 7.3.4  Map Descriptor Example – Strategy 1.

This example illustrates the configuration of the FieldServer as a McQuay Micro Tech Open Protocol Server where a single Map Descriptor is used to emulate a McQuay device's memory as one large single block of bytes.  Any requests in the address range 1-0x270F can be serviced by this one Map Descriptor.  Is has the drawback that a large Data Array which will be mostly empty is used.  This does not affect performance but uses the FieldServer's memory resource.

When a poll is received, the driver looks through the Map Descriptor and finds one with a matching Node and one whose address and length cover the poll's address.

| Map_Descriptor_Name | , Data_Array_Name | , Data_Array_Offset | , Function | , Node_Name | , Address | , Length |
|---|---|---|---|---|---|---|
| Chiller1_emulation | , DA_CHILLER1 | , 0 | , Passive | , Chiller1 | , 1 | , 10000 |

Ensure that Data Array's length is at least as long as the Map Descriptor's.
A data format of BYTE is appropriate.

Passive means that the Map Descriptor responds to polls but does not generate any polls itself.

The Node name connects the Map Descriptor to a Node definition and possibly to a port.

10, 000 is the maximum length of a Data Array so there is no point in making the Map Descriptor longer.

### 7.3.5  Map Descriptor Example – Strategy 2.

In this example the memory being emulated is divided into chunks to avoid having a large sparse array.  When a poll is received, the driver looks through the Map Descriptors and finds one with a matching Node and one whose address and length cover the poll's address.

| Map_Descriptor_Name | , Data_Array_Name | , Data_Array_Offset | , Function | , Node_Name | , Address | , Length |
|---|---|---|---|---|---|---|
| Chiller1_emulation1 | , DA_CHILLER1 | , 0 | , Passive | , Chiller1 | , 1024 | , 256 |
| Chiller1_emulation2 | , DA_CHILLER1 | , 256 | , Passive | , Chiller1 | , 2048 | , 256 |

The same Data Array is used for both Map Descriptors.

By using the same Data Array and changing the offset the data can all be packed into a smaller array.

1024 = 0x400; 2048 = 0x800
These two address ranges cover almost all the data fields in a 200 series chiller. A few more Map Descriptors could be added to serve the remaining data field addresses.

## Appendix A. Useful Features

## Appendix A.1. Scaling

### Appendix A.1.1.  User Scaling:

The user can specify scaling in the configuration file which allows a value to be scaled before being stored in a Data Array or after being extracted from a data for writing to McQuay device.  This scaling is specified by using the following keywords in Map Descriptor definition.

*Data_Array_Low_Scale,*
*Data_Array_High_Scale,*
*Device_Low_Scale,*
*Device_High_Scale…..*

### Appendix A.1.2.  Device Scaling:

The raw values read from a McQuay device may be treated as raw values or they may be scaled.  Device scaling is the term used to describe the hard-coded scaling specified by McQuay for each data field. By applying device scaling the user can avoid details or knowledge of the scaling and used the converted value directly.

If this scaling is required then use the Device_Scaling parameter (see 6.3.2).  Note that this parameter needs to be used in conjunction with Field_Name.

There are 5 device scaling methods.  Refer to Appendix C.4 and Appendix C.5 for information on the application of these parameters.

Note that when device scaling is applied it is applied without consideration of the raw value.  Where the raw value has a special meaning (available in the McQuay packet documents for the equipment type of interest); this driver does not apply any special consideration to these special values.

**As a Client:**  - Device and User scaling may be applied.

**As a Server.** Device Scaling and User scaling is not applied. The raw value written to any data location is stored as is and the raw value read from a Data Array used in formatting the response to a read.

```
Map_Descriptors
Map_Descriptor_Name  , Data_Array_Name  , Data_Array_Offset  , Function  , Node_Name    , Address  , Length  , Field_Name                    , Device_Scaling  , Scan_Interval
Read_field1            , DA_TEMP_SCALED  , 0                  , Rdbc      , Node_200CFC , 1        , 1      , Outdoor Air Temperature - BAS , Yes             , 9.5s
```

## Appendix A.2. Direct Addressing

Direct addressing allows data to be read from the McQuay device when the field name is unknown. McQuay specifies the addresses in hexadecimal notation but they must be specified in the CSV file in decimal format. For example, to read McQuay address 0x0400, the address in the CSV file must be entered as 1024.

If reading multiple addressing at once (i.e. if the length is greater than 1) it may be necessary to adjust the timeout for the Map Descriptor.

It is possible to read multiple addresses using one Map Descriptorbut it is only possible to write to a single address.

Refer to examples on the following pages.

## Appendix A.3. Direct Addressing Example 1– Reading direct address.

This example reads 10 data elements from a McQuay device starting at address 4096 (= 0x1000). The 10 values obtained are stored in DA_CHILLER1 starting at offset zero.

| Map_Descriptor_Name | Data_Array_Name | Data_Array_Offset | Node_Name | Address | Length | Scan_Interval | Function |
|---|---|---|---|---|---|---|---|
| Chiller1_emulation | DA_CHILLER1 | 0 | Chiller1 | 4096 | 10 | 1.0s | Rdbc |

A data format of BYTE is appropriate,

Specify the address in decimal

## Appendix A.4. Direct Addressing Example 2 – Controlling Bytes per Field – Reading

This example reads a McQuay device starting at address 4096 (= 0x1000) to 4099 incl. Before storing the data from the responses, the FieldServer combines the 4 values into a single value and stores this single value in a single Data Array element.

The driver reads address 4096 and gets a value. Call this value v0.
The driver reads address 4097 and gets a value. Call this value v1.
The driver reads address 4098 and gets a value. Call this value v2.
The driver reads address 4099 and gets a value. Call this value v3.

When the 4th address has been read, the driver calculates Total_Value = v0 + v1 * 0x100 + v2 * 0x10000 + v3 * 0x1000000. The Total_Value is stored in the Data Array.

| Map_Descriptor_Name | Data_Array_Name | Data_Array_Offset | Node_Name | Address | Length | Bytes_per_Field | Scan_Interval | Function |
|---|---|---|---|---|---|---|---|---|
| Chiller1_emulation | DA_CHILLER1 | 0 | Chiller1 | 4096 | 1 | 4 | 1.0s | Rdbc |

Specify the address in decimal

Length must be set to 1 when Bytes_per_Field is specified.

A value between 1 and 4 - tells the driver how many consecutive addresses to read from the remote device. The data value for each address is combined into a single value before it is stored.

Appendix A.5. Advanced Map Descriptor Example 3 – Controlling Bytes per Field – Writing

This example writes to a McQuay device starting at address 4096 (= 0x1000) to 4097incl.  The value written to each address location is based on a single value extracted from the FieldServer's Data Arrays.

The value v0 = (value_extracted_from_DA) AND 0xff
The value v1 = (value_extracted_from_DA shift right by 8) AND 0xff
The driver writes value v0 to address 4096.
The driver writes value v1 to address 4097.

| Map_Descriptor_Name | , Data_Array_Name | , Data_Array_Offset | , Node_Name | , Address | , Length | , Bytes_Per_Field | , Scan_Interval | , Function |
|---|---|---|---|---|---|---|---|---|
| Chiller1_emulation | , DA_CHILLER1 | , 0 | , Chiller1 | , 4096 | , 1 | , 2 | , 1.0s | , Wrbc |

Specify the address in decimal

Length must be set to 1 when Bytes_Per_Field is specified.

A value from 1 to 4 -tells the driver how many consecutive addresses to write to  The data value written to each address is based on the single value extracted from offset 0 in the Data Array DA_CHILLER1

## Appendix B. Troubleshooting

### Appendix B.1. Connection Problems

The driver produces a timeout each time a message is sent.  If the number of timeouts is the same as the number of messages sent then the McQuay device has never sent a response.  The following reasons may be applicable:

- Incorrect connection settings - the messages sent by the FieldServer cannot be interpreted by the McQuay device.

- Incorrect connection wiring – the McQuay device may require a jumper on its serial port to deflect hardware handshaking.  Refer to the vendor manual.

- Serial port failure – If the Tx LED is not flashing each time a message is sent, the port is not working

- The McQuay device is off.

- If the Node_ID and Route are incorrect, the McQuay device will not respond at all.

### Appendix B.2. Negative Acknowledgement - NAK

The Server sends a NAK message and increments the NAK stat each time a poll is unsuccessful.  An occasional NAK may indicate a corrupted message.  If the number of NAK's is the same as the number of transmitted messages to a Node, one of the following problems could apply:

- Bad Password - the password specified in the "read" command did not match any of the access level passwords stored in the MicroTech controller to which the terminal is connected.  Call FST Tech support for default passwords or call your Vendor.  FST recommends checking the password first as in almost all reports the problem was resolved by changing the password.

- Device has been polled with an invalid command code.

- Bad Node_ID / Route parameters for the node.

- The MCQ device received the message and thought it was badly formatted. This is unlikely on a repeated basis unless the connection settings were slightly wrong.

- The packet structure was invalid

- The packet was received with a parity or framing error

### Appendix B.3. Node ID problems

If the Node is incorrectly specified, the FieldServer will not get a response from the McQuay unit.  The ID used to communicate with the McQuay unit needs to be determined.  This may not be the same as shown on the Rotary switches of the unit.  Note that McQuay uses Hexadecimal notation for addressing, therefore, if connection to the Unit is with address 0201, this is in Hex and the Node ID for the FieldServer configuration needs to be 513.

Use Node_Id=256 only if it is required that connected panel should respond regardless of its own internal address.

For Driver Versions 1.05a and later, the Node_ID parameter has been replaced with the Node_Hi/Node_Lo Parameters.  Refer to Sections 6.2and 7.2

## Appendix B.4. Server Side Configuration – Consecutive Addresses

Some variables have their values stored in two consecutive address locations. When the Client polls for the value it actually sends two read messages – one for each address. When configuring the Server side, therefore, it is necessary to define two Map Descriptors for variables which require two consecutive addresses.

| Map_Descriptors | | | | | | |
|---|---|---|---|---|---|---|
| Map_Descriptor_Name | , Data_Array_Name | , Data_Array_Offset | , Function | , Node_Name | , Address | , Length |
| Supply Fan Status | , DA_AI_01 | , 01 | , Passive | , Node_A | , 1118 | , 1 |
| Supply Temp | , DA_AI_01 | , 02 | , Passive | , Node_A | , 1063 | , 1 |
| Space Temp | , DA_AI_01 | , 03 | , Passive | , Node_A | , 1066 | , 1 |
| Control Temp Part 1 | , DA_AI_01 | , 04 | , Passive | , Node_A | , 1074 | , 1 |

## Appendix B.5. Configuring the OPM to enable communication between the FieldServer and McQuay devices



Connect FieldServer to port A of the OPM (RS-232 or RS-485 depending on the Port A select)

Connect daisy chained McQuay devices to port B of the OPM

Set HI and LO rotary switches on the OPM to "00"
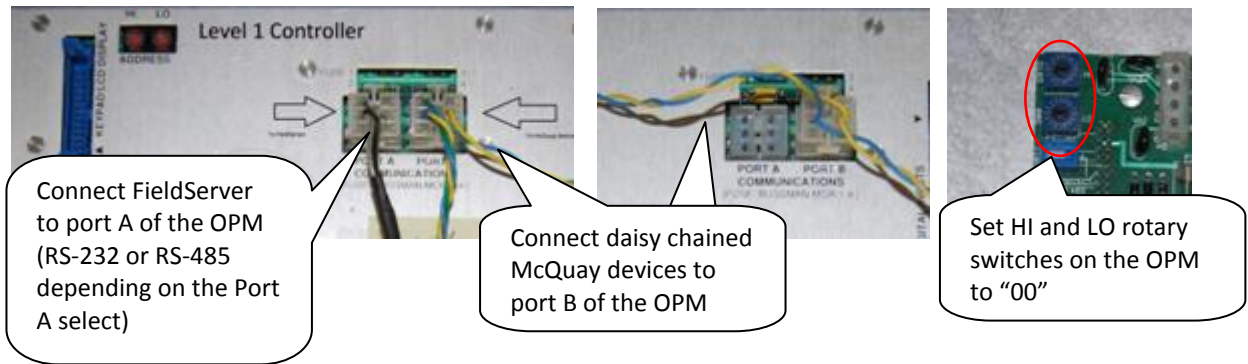
### Appendix B.5.1. Configuring multiple McQuay devices to communicate to a FieldServer without an OPM:

The FieldServer will be wired to a Level 1 Microtech controller at port A. Port B of the Level 1 MicroTech controller will be connected to the daisy chained Level 2 Microtech controllers. This has been tested with a SCU.

1. Power down the Microtech controller to be configured as Level 1. Set HI and LO rotary switches to "00". Power up the unit.

2. Connect the Microtech controller to a PC through Port A (RS-232).

3. Daisy chain other McQuay devices to Port B (RS-485)

4.  Start McQuay Open Protocol Monitoring Software

5.  Enter the User Name as "McQuay" and the password as "SGC"

6.  Once in the main menu, hit 'F7' to enter Advanced Features

7.  Hit 'F1' to enter Read/Write Memory

8.  Enter "b00.00" to change the Box Address (Node_HI and Node_LO) to "00"

9.  Enter "w0A11 C1" to write C1 to memory address 0A11.  This will set up the comm port configuration with Port A as TTY and Port B as Master

10. Test if the wiring to the daisy chained devices is correct by doing the following:

    o  To read from a controller with the rotary hex switches set to "01", change the box address to 01.00 and enter r0A11
    o  If you get a response, then it is wired correctly
    o  It is suggested that you read from each daisy chained controller

11. Shut down the McQuay Open Protocol Monitoring Software

12. Disconnect unit from the PC

13. Connect FieldServer to Port A (RS-232)

## Appendix C. Reference

### Appendix C.1. Error Messages

Those messages marked with an * are only printed once even if they occur repeatedly.

| Error Message | Action |
|---|---|
| McQuay:#1 FYI. The MapDesc called <%s> is too short | The length of the Map Descriptor used to expose driver statistics is too short. Set the length to at least 1000. You can ignore this message – the driver will abandon excess statistics. |
| McQuay:#2 FYI. You could have used a MapDesc called <%s> to expose diagnostic info. | You can safely ignore this message. It is a prompt. Refer to Appendix C.2. |
| McQuay:#3 FYI. Normally passwords are defined for each node. | This is a reminder that a password is expected when a node is defined. Refer to sections 6.2 or 7.2. Even though password checking is not enforced when the driver is configured as a Server, the driver expects one to be defined for every node. |
| McQuay:#4 Err. Node list if full. Max=%d | A maximum of 100 McQuay device nodes can be configured per FieldServer. If the limit is reached, call support. |
| McQuay:#5 Err. Node=%d has more than one password. | A node has been provided with two passwords. This is either a configuration error or two nodes with the same address are connected to different ports. The driver can only store one password per node address and cannot use the port number to differentiate them. Re-program the McQuay devices to have the same passwords if they have the same addresses. |
| *McQuay:#9 FYI. Device scaling method unknown. | Device Scaling is being applied and the driver doesn't know how to scale a variable. Please submit your configuration file with your request for support. |
| McQuay:#10 Err. Node=%s. Equip. type not recognized. | The driver doesn't recognize the equipment type specified using the PLC_Type parameter in the configuration file. Refer to Appendix C.3 for a list of valid equipment types.[5] |
| McQuay:#11 Err. Node=%s. Equip. Type not specified. | Refer to Sections 6.2, 7.2. and Appendix C.3[5] |
| McQuay:#13 Err. MapDesc=%s. Field Name unknown. | Refer to Appendix C.3 for a list of valid field names. Refer also to Sections 6.3 or 0. |
| McQuay:#14 Err. MapDesc=%s. Max Len=1 for Writes with direct addr. | Corrective action is required. When writing to a McQuay device using direct addressing the length may only be 1[5] |

---

[5] Correct the configuration by editing the CSV file and downloading it to the FieldServer, then reset the FieldServer for the changes to take effect.

| Error Message | Action |
|---|---|
| McQuay:#15 Err. MapDesc=%s. Field Name/Address Required. | Neither a field name nor an address was specified. The driver does not know what location to read. Specify a field name from Appendix C.3.5 |
| McQuay:#16 Err. MapDesc=%s. No Node. | Each Map Descriptor must be connected to a node. This is done by specifying a node name. 5 |
| McQuay:#17 Err. MapDesc=%s. Md too short. | The offset added to the length of the Map Descriptor extends beyond the Data Array. Increase the Data Array length. 5 |
| McQuay:#18 Err. MapDesc=%s. Cannot write 'Everything'. | When using 'everything' as a field name the Map Descriptor function must be Rdbc or Rdb as this is a read only function.5 |
| McQuay:#19 do diagnostic 3 | Call FieldServer Technical Support. A developer diagnostic has been called and should not have been. |
| McQuay:#20 do diagnostic 1 | |
| McQuay:#21 do diagnostic 2 | |
| McQuay:#22 Err. Illegal Node_ID [%d] - Set to 1 | Check configuration file, a Node_ID is out of range. 6 |
| McQuay:#25 Err. Max Len=1 when Bytes_Per_Field > 1. MD=%s. | The length parameter must be set to 1 when a Map Descriptor has the Bytes_Per_Field parameter specified5 |
| McQuay:#26 Err. Max Bytes_Per_Field=4. MD=%s. | Legal values for the Bytes_Per_Field parameter are whole numbers in the range 1 to 4 inclusive. 5 |
| McQuay:#27* Err. Response=NAK. Read Manual. Maybe password or Node_ID | This message is printed if a NAK response is received in the first few polls to a node. The driver guesses that the reason is that the Node_ID/route or password has been incorrectly specified in the configuration file. Verify these settings. The message is printed once and suppressed for subsequent occurrences. Refer to Appendix B.2 |
| McQuay:#28* Err. Device responded with a NAK. | The message is printed and then suppressed for subsequent occurrences, but the NAK stat is incremented for each occurrence. The driver is reporting that the McQuay device responded with a NAK under different circumstances from msg#27 which is printed if the NAK is received during the first few polls. The message indicates that the McQuay device could not respond. If the NAK's are occasional, assume that noise has corrupted an occasional message. If they occur frequently assume a systematic or connection error. Refer to Appendix B.2. |
| McQuay : #29 FYI. Config requires non-critical update. Route parameter is not used any more. In driver version V1.05a and later either use NODE_HI(0-F) and \NODE_LO(0-F) or NODE_ID(0-255), use Node_Id(256) only if it is required that connected Mcquay panel should respond regardless of its own internal address | For Driver versions 1.05a and later, the route parmeter is replaced by NODE_HI(0-F) and NODE_LO(0-F). NODE_ID is still supported for backward compatibility with previous driver versions. Use NodeID(0-255), use Node_Id(256) only if it is required that connected Mcquay panel should respond regardless of its own internal address[6] |

[6] Correct the configuration by editing the CSV file and downloading it to the FieldServer, then reset the FieldServer for the changes to take effect.

## Appendix C.2. Statistics

The driver reports statistics according to the standard FieldServer communication statistics listed in the following table:

| Statistic | Description |
|---|---|
| NAK | Each time a negative acknowledgement message is received. |
| CHECKSUM | Each time that a message is received that contains a non-ASCII character. |
| NOISE | An acknowledgement message contains an unrecognized code. |
| NO START | Each time a message is received that doesn't begin with a space. |
| PROTOCOL | All other errors are reported as protocol errors |

Specific driver statistics can also be exposed by writing data to a Data Array called . "McQuay-stats". A special Map Descriptor is required.

The following data is stored. The location in the Data Array is obtained by multiplying the port number by 50 and then using the location offset indicated in the table below.

| Location | Statistic |
|---|---|
| 0 | MCQ_STAT_PASSWORD |
| 10 | MCQ_STAT_NAK |
| 11 | MCQ_STAT_NOISE |
| 12 | MCQ_STAT_NOISE_CODE |
| 13 | MCQ_STAT_NON_ASCII_CHARS |
| 14 | MCQ_STAT_BAD_START_BYTE |
| 15 | MCQ_STAT_OTHER_CMPLT_ERR |
| 16 | MCQ_STAT_CLIENT_BYTES_RCVD |

| Location | Statistic |
|---|---|
| 17 | MCQ_STAT_CLIENT_FRAGS_RCVD |
| 18 | MCQ_STAT_CLIENT_MSGSS_RCVD |
| 19 | MCQ_STAT_CLIENT_BYTES_SENT |
| 20 | MCQ_STAT_CLIENT_FRAGS_SENT |
| 21 | MCQ_STAT_CLIENT_MSGSS_SENT |
| 22 | MCQ_STAT_SERVER_BYTES_SENT |
| 23 | MCQ_STAT_SERVER_MSGSS_SENT |
| 24 | MCQ_STAT_SERVER_NAKS_SENT |

The following example shows the configuration of this Map Descriptor. This section of text may be copoied directly into the CSV file.

```
Nodes
Node_Name              , Station               , Port                    , Protocol   , PLC_Type
Mcq_stats              , 0                     , P1                      , McQuay   , 200CFC


Data_Arrays
Data_Array_Name        , Data_Format          , Data_Array_Length
DA_MCQ_STATS           , UINT32               , 2000


Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset  , Function , Node_Name  , Address , Length
McQuay-Stats           , DA_MCQ_STATS     , 0                      , Passive    , Mcq_stats   , 1          , 2000
```

The Data Array DA_MCQ_STATS (in this example) is used to store driver specific statistics. Only one of these Map Descriptors may be specified per FieldServer.

## Appendix C.3. McQuay Equipment Types recognized by the driver.

| Code | Description |
|------|-------------|
| 200CFC | 200 Series Centrifugal Chiller |
| 100CFC | 100 Series Centrifugal Chiller |
| 001ASC | Air Screw Chiller |
| 000SCU | Self Contained Unit |
| 0050RPC | Reciprocating Chiller |

## Appendix C.4. Device Scaling Method

There are 5 device scaling methods.  X refers to the raw value obtained from the McQuay device. The method that will be applied to each field is shown in the following table.

| Method Id. | Device Scaling Method |
|------------|------------------------|
| 1 | X |
| 2 | X/10 |
| 3 | (X–1000)/10 |
| 4 | X/2 |
| 5 | X-100 |
| 6 | (X–100)/10 |
| 7 | (X/5)+20 |
| 8 | (X/5)+55 |
| 9 | (X/5) |
| 10 | (X/5)-100 |
| 11 | ((X-51)*419)/51 |
| 12 | (X-125)/500 |
| 13 | (X*0.02) |

Note that when device scaling is applied it is applied without consideration of the raw value.  Where the raw value has a special meaning (available in the McQuay packet documents for the equipment type of interest); this driver does not apply any special consideration to these special values.

## Appendix C.5. Data Field Name Tables[7]

It is possible to read the device by specifying the address only. Refer to example in  0

### Appendix C.5.1.　　　　Equipment Type: 200CFC 200 Series Centrifugal Chiller

| Array Location | Read/Write/Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|----------------|-----------------|------------|-----------------|--------------|------------------------|
| 1 | r | Model | 3 | 0x0A08 | 1 |
| 4 | r | Refrigerant | 1 | 0x0A0B | 1 |
| 5 | r | Units of Measure | 1 | 0x0A0C | 1 |

---

[7] Additional information may be obtained from McQuay International. Request the following document: MicroTech® Series 200 Centrifugal Chiller Data Communications Packet for Open Protocol™ Cent2_22.doc

| Array Location | Read/Write/Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 6 | r | Software Version | 2 | 0x0A0D | 1 |
| 8 | r | Software Revision | 1 | 0x0A0F | 1 |
| 11 | r | Chiller Unit Temperature Type | 1 | 0x084B | 1 |
| 12 | r | Communication Status | 1 | 0x040C | 1 |
| 13 | r | Compressor Lift Pressure | 2 | 0x046A | 2 |
| 15 | r | Compressor Motor Current | 2 | 0x044C | 1 |
| 17 | r | Compressor Motor Current Percent | 1 | 0x044A | 1 |
| 18 | r | Compressor Number of Starts | 2 | 0x085F | 1 |
| 20 | r | Compressor Operating Hours | 2 | 0x0851 | 1 |
| 22 | r | Compressor Suction Temperature | 2 | 0x043A | 3 |
| 24 | r | Compressor Superheat - Discharge | 2 | 0x046E | 2 |
| 26 | r | Compressor Superheat -Suction | 2 | 0x046C | 2 |
| 28 | r | Condenser Approach Temperature | 2 | 0x0484 | 2 |
| 30 | r | Condenser Heat Recovery Unit Present | 1 | 0x083F | 1 |
| 31 | r | Condenser Heat Recovery Temperature - Delta | 2 | 0x048A | 2 |
| 33 | r | Condenser Heat Recovery Water Temp. - Entering | 2 | 0x0454 | 3 |
| 35 | r | Condenser Heat Recovery Water Temp. - Leaving | 2 | 0x0456 | 3 |
| 37 | r | Condenser Pump Status | 1 | 0x0425 | 1 |
| 38 | r | Condenser Pump # 1 Operating Hours | 2 | 0x085A | 1 |
| 40 | r | Condenser Pump # 2 Operating Hours | 2 | 0x085D | 1 |
| 42 | r | Condenser Refrigerant Pressure | 2 | 0x0440 | 2 |
| 44 | r | Condenser Refrigerant Temperature | 2 | 0x0466 | 3 |
| 46 | r | Condenser Subcooling Temperature | 2 | 0x0480 | 2 |
| 48 | r | Condenser Water Flow Rate | 2 | 0x0452 | 1 |
| 50 | r | Condenser Water Flow Status | 1 | 0x045F | 1 |
| 51 | r | Condenser Water Rate Sensor | 1 | 0x083D | 1 |
| 52 | r | Condenser Water Temperature - Delta | 2 | 0x0488 | 2 |
| 54 | r | Condenser Water Temperature - Entering | 2 | 0x0436 | 3 |
| 56 | r | Condenser Water Temperature - Leaving | 2 | 0x0434 | 3 |
| 58 | r | Cooling Tower Control | 1 | 0x0926 | 1 |
| 59 | r | Cooling Tower Stage | 1 | 0x049A | 1 |
| 60 | r | Cooling Tower Valve Position | 1 | 0x049B | 1 |
| 61 | r | Discharge Refrigerant Temperature | 2 | 0x043E | 3 |
| 63 | r | Evaporator Approach Temperature | 2 | 0x0482 | 2 |
| 65 | r | Evaporator Pump Status | 1 | 0x0423 | 1 |
| 66 | r | Evaporator Pump #1 Operating Hours | 2 | 0x0854 | 1 |
| 68 | r | Evaporator Pump #2Operating Hours | 2 | 0x0857 | 1 |
| 70 | r | Evaporator Refrigerant Pressure | 2 | 0x0438 | 2 |
| 72 | r | Evaporator Refrigerant Temperature | 2 | 0x0464 | 3 |
| 74 | r | Evaporator Water Flow Rate | 2 | 0x0450 | 1 |
| 76 | r | Evaporator Water Flow Status | 1 | 0x045E | 1 |
| 77 | r | Evaporator Water Rate Sensor | 1 | 0x083C | 1 |
| 78 | r | Evaporator Water Temperature - Delta | 2 | 0x0486 | 2 |
| 80 | r | Evaporator Water Temperature - Entering | 2 | 0x0432 | 3 |
| 82 | r | Evaporator Water Temperature - Leaving | 2 | 0x0430 | 3 |
| 84 | r | Fault - Current Active | 1 | 0x1C00 | 1 |
| 85 | r | Last Start Hour | 1 | 0x0861 | 1 |
| 86 | r | Last Start Minute | 1 | 0x0862 | 1 |
| 87 | r | Last Start Month | 1 | 0x0863 | 1 |
| 88 | r | Last Start Date | 1 | 0x0864 | 1 |
| 89 | r | Last Start Year | 1 | 0x0865 | 1 |

| Array Location | Read/Write/Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 90 | r | Last Stop Hour | 1 | 0x0866 | 1 |
| 91 | r | Last Stop Minute | 1 | 0x0867 | 1 |
| 92 | r | Last Stop Month | 1 | 0x0868 | 1 |
| 93 | r | Last Stop Date | 1 | 0x0869 | 1 |
| 94 | r | Last Stop Year | 1 | 0x086A | 1 |
| 95 | r | Liquid Line Refrigerant Temperature | 2 | 0x043C | 3 |
| 97 | r | Oil Pressure - Feed | 2 | 0x0446 | 2 |
| 99 | r | Oil Pressure - Net | 2 | 0x0468 | 2 |
| 101 | r | Oil Pressure - Vent | 2 | 0x04AC | 2 |
| 103 | r | Oil Temperature - Feed | 2 | 0x0442 | 3 |
| 105 | r | Oil Temperature - Sump | 2 | 0x0444 | 3 |
| 107 | r | Outdoor Air Temperature - Network | 1 | 0x0474 | 2 |
| 108 | r | Refrigerant Detection Sensor | 1 | 0x083E | 1 |
| 109 | r | Refrigerant Leak Detection Limit | 1 | 0x044B | 1 |
| 110 | r | Unit Status | 1 | 0x0420 | 1 |
| 111 | b | Capacity Limit Percent | 1 | 0x0475 | 1 |
| 112 | b | Clear Current Fault | 1 | 0x041E | 1 |
| 113 | b | Chiller Operation Mode | 1 | 0x0477 | 1 |
| 114 | b | Chilled Water Temperature Setpoint | 1 | 0x0476 | 4 |
| 115 | b | Communications Signal | 1 | 0x047D | 1 |
| 116 | b | Outdoor Air Temperature - BAS | 1 | 0x0473 | 5 |
| 117 | b | Master/Slave Setpoint | 1 | 0x093C | 1 |
| 118 | b | Lead/Lag Mode Setpoint | 1 | 0x093D | 1 |
| 119 | b | Enable Lag Setpoint | 1 | 0x093E | 1 |
| 120 | b | Disable Lag Setpoint | 1 | 0x093F | 1 |
| 121 | b | Lag Standby Setpoint | 1 | 0x0942 | 1 |
| 122 | b | Lead/Lag Switch Setpoint (Day) | 1 | 0x0948 | 1 |
| 123 | b | Lead/Lag Switch Setpoint (Hour) | 1 | 0x0949 | 1 |
| 124 | r | Lead/Lag Status | 1 | 0x0401 | 1 |
| 125 | r | Lead Unit | 1 | 0x0402 | 1 |
| 126 | r | Lead Unit Status | 1 | 0x0403 | 1 |
| 127 | r | Lag Unit Status | 1 | 0x0404 | 1 |
| 128 | r | Lead Motor Current | 1 | 0x0405 | 1 |
| 129 | r | Lag Motor Current | 1 | 0x0406 | 1 |
| 130 | r | Lead Status | 1 | 0x0407 | 1 |
| 131 | r | Lag Status | 1 | 0x0408 | 1 |
| 132 | b | Chiller Control mode | 1 | 0x900 | 1 |
| 133 | b | Chilled Water Temperature Local Setpoint | 1 | 0x901 | 4 |
| 134 | r | Chilled Water Temperature - Active Setpoint | 1 | 0x905 | 4 |

Appendix C.5.2.          Equipment Type: 050RPC Reciprocating Chiller

| Array Location | Read/Write/Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 3 | r | Circuit #1 Condenser Approach Temperature | 2 | 0x0497 | 2 |
| 5 | r | Circuit #1 Condenser Pressure | 2 | 0x0467 | 2 |
| 7 | r | Circuit #1 Alarm Conditions: Condenser Pressure | 2 | 0x0822 | 2 |
| 9 | r | Circuit #1 Alarm Conditions: Evaporator Pressure | 2 | 0x0820 | 2 |
| 11 | r | Circuit #1 Alarm Conditions: Liquid Line Temp | 2 | 0x0826 | 6 |
| 13 | r | Circuit #1 Alarm Conditions: Suction Temperature | 2 | 0x0824 | 6 |
| 14 | r | Circuit #1 Current Alarm | 1 | 0x0831 | 1 |
| 16 | r | Circuit #1 Evaporator Pressure | 2 | 0x0463 | 2 |

| Array Location | Read/Write/Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 18 | r | Circuit #1 Liquid Line Temperature | 2 | 0x0479 | 6 |
| 19 | r | Circuit #1 Previous Alarm | 1 | 0x0833 | 1 |
| 20 | r | Circuit #1 Status | 1 | 0x0428 | 1 |
| 22 | r | Circuit #1 Subcooling Temperature | 2 | 0x049B | 2 |
| 24 | r | Circuit #1 Suction Temperature | 2 | 0x0475 | 6 |
| 26 | r | Circuit #1 Superheat Temperature | 2 | 0x0493 | 2 |
| 28 | r | Circuit #2 Condenser Approach Temperature | 2 | 0x0499 | 2 |
| 30 | r | Circuit #2 Condenser Pressure | 2 | 0x0469 | 2 |
| 32 | r | Circuit #2 Alarm Conditions: Condenser Pressure | 2 | 0x082A | 2 |
| 34 | r | Circuit #2 Alarm Conditions: Evaporator Pressure | 2 | 0x0828 | 2 |
| 36 | r | Circuit #2 Alarm Conditions: Liquid Line Tempe | 2 | 0x082E | 6 |
| 38 | r | Circuit #2 Alarm Conditions: Suction Temperature | 2 | 0x082C | 6 |
| 39 | r | Circuit #2 Current Alarm | 1 | 0x0832 | 1 |
| 41 | r | Circuit #2 Evaporator Pressure | 2 | 0x0465 | 2 |
| 43 | r | Circuit #2 Liquid Line Temperature | 2 | 0x047B | 6 |
| 44 | r | Circuit #2 Previous Alarm | 1 | 0x0834 | 1 |
| 45 | r | Circuit #2 Status | 1 | 0x0429 | 1 |
| 47 | r | Circuit #2 Subcooling Temperature | 2 | 0x049D | 2 |
| 49 | r | Circuit #2 Suction Temperature | 2 | 0x0477 | 6 |
| 51 | r | Circuit #2 Superheat Temperature | 2 | 0x0495 | 2 |
| 53 | r | Compressor #1 Operating Hours | 2 | 0x0862 | 1 |
| 55 | r | Compressor #1 Starts | 2 | 0x086A | 1 |
| 57 | r | Compressor #2 Operating Hours | 2 | 0x0864 | 1 |
| 59 | r | Compressor #2 Starts | 2 | 0x086C | 1 |
| 61 | r | Compressor #3 Operating Hours | 2 | 0x0866 | 1 |
| 63 | r | Compressor #3 Starts | 2 | 0x086E | 1 |
| 65 | r | Compressor #4 Operating Hours | 2 | 0x0868 | 1 |
| 67 | r | Compressor #4 Starts | 2 | 0x0870 | 1 |
| 69 | r | Condenser Entering Water Temperature | 2 | 0x0470 | 6 |
| 71 | r | Condenser Leaving Water Temperature | 2 | 0x0472 | 6 |
| 73 | r | Evaporator Entering Water Temperature | 2 | 0x046E | 6 |
| 75 | r | Evaporator Leaving Water Temperature | 2 | 0x0461 | 6 |
| 76 | r | Heat/Cool Switch | 1 | 0x08B4 | 1 |
| 78 | r | OaT | 2 | 0x047D | 6 |
| 79 | r | Stage of Capacity | 1 | 0x042B | 1 |
| 80 | r | Unit % RLA | 1 | 0x0474 | 1 |
| 81 | r | Unit Status | 1 | 0x0427 | 1 |
| 82 | b | Clear Circuit #1 Alarm | 1 | 0x091A | 1 |
| 83 | b | Clear Circuit #2 Alarm | 1 | 0x091B | 1 |
| 84 | b | Condenser Leaving Water Temperature Setpoint | 1 | 0x097D | 1 |
| 85 | b | Evaporator Entering Water Temperature Setpoint | 1 | 0x090D | 4 |
| 86 | b | Evaporator Leaving Water Temperature Setpoint | 1 | 0x0905 | 4 |
| 87 | b | Maximum Water Reset Setpoint | 1 | 0x090C | 4 |
| 88 | b | Network Command | 1 | 0x044F | 1 |
| 89 | b | Network Demand Limit | 1 | 0x044D | 1 |
| 90 | b | Network Leaving Water Temperature Reset | 1 | 0x044E | 1 |
| 91 | b | Reset Option Setpoint | 1 | 0x090B | 1 |

Appendix C.5.3.          Equipment Type: 100CFC 100 Series Centrifugal Chiller

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 1 | r | Alarm Contact | 1 | 0x0217 | 1 |
| 2 | r | Approach Condenser | 1 | 0x0418 | 1 |
| 3 | r | Calculated Leaving Evaporator Temp Setpoint | 1 | 0x0420 | 7 |

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 4 | r | Calculated Network Amp Limit Setpoint | 1 | 0x0423 | 1 |
| 5 | r | Compressor Discharge Temp. | 1 | 0x0407 | 1 |
| 6 | r | Compressor Suction Temp. - Lo Resolution | 1 | 0x0403 | 1 |
| 7 | r | Compressor Suction Temp. - Hi Resolution | 1 | 0x041C | 7 |
| 8 | r | Condenser Pump | 1 | 0X021C | 1 |
| 9 | r | Condenser Refrigerant Pressure | 1 | 0x0411 | 1 |
| 10 | r | Condenser Refrigerant Temp. | 1 | 0x0408 | 1 |
| 11 | r | Condenser Water Flow Switch | 1 | 0X050F | 1 |
| 12 | r | Cooling Tower Stage 1 | 1 | 0x0218 | 1 |
| 13 | r | Cooling Tower Stage 2 | 1 | 0x0219 | 1 |
| 14 | r | Current Fault | 1 | 0x0428 | 1 |
| 15 | r | Fault Last | 1 | 0x0834 | 1 |
| 16 | r | Fault 2 | 1 | 0x0835 | 1 |
| 17 | r | Fault 3 | 1 | 0x0836 | 1 |
| 18 | r | Fault 4 | 1 | 0x0837 | 1 |
| 19 | r | Fault 5 | 1 | 0x0838 | 1 |
| 20 | r | Fault 6 | 1 | 0x0839 | 1 |
| 21 | r | Fault 7 | 1 | 0x083A | 1 |
| 22 | r | Fault 8 | 1 | 0x083B | 1 |
| 23 | r | Entering Condenser Water Temp. - Lo Resolution | 1 | 0x0405 | 1 |
| 24 | r | Entering Condenser Water Temp. - Hi Resolution | 1 | 0x041E | 8 |
| 25 | r | Entering Evaporator Water Temp. - Lo Resolution | 1 | 0x0401 | 1 |
| 26 | r | Entering Evaporator Water Temp. - Hi Resolution | 1 | 0x041A | 1 |
| 27 | r | Entering Water Reset | 1 | 0x0438 | 1 |
| 28 | r | Evaporator Low Pressure Switch | 1 | 0x050E | 1 |
| 29 | r | Evaporator Pump | 1 | 0X021B | 1 |
| 30 | r | Evaporator Refrigerant Pressure | 1 | 0x0410 | 1 |
| 31 | r | Evaporator Refrigerant Temp. - Lo Resolution | 1 | 0x0402 | 1 |
| 32 | r | Evaporator Refrigerant Temp. - Hi Resolution | 1 | 0x041B | 7 |
| 33 | r | Evaporator Water Flow Switch | 1 | 0X050F | 1 |
| 34 | r | High Discharge Pressure Switch | 1 | 0X050E | 1 |
| 35 | r | Hot Gas Solenoid | 1 | 0x0212 | 1 |
| 36 | r | Leaving Condenser Water Temp. - Lo Resolution | 1 | 0x0406 | 1 |
| 37 | r | Leaving Condenser Water Temp. - Hi Resolution | 1 | 0x041F | 8 |
| 38 | r | Leaving Evaporator Water Temp. - Lo Resolution | 1 | 0x0400 | 1 |
| 39 | r | Leaving Evaporator Water Temp. - Hi Resolution | 1 | 0x0419 | 7 |
| 40 | r | LED Front Panel | 1 | 0x021F | 1 |
| 41 | r | Lift Pressure | 1 | 0x0412 | 1 |
| 42 | r | Liquid Injection Solenoid | 1 | 0x0216 | 1 |
| 43 | r | Liquid Line Refrigerant Temp. - Lo Resolution | 1 | 0x0404 | 1 |
| 44 | r | Liquid Line Refrigerant Temp. - Hi Resolution | 1 | 0x041D | 8 |
| 45 | r | Liquid Subcool | 1 | 0x0417 | 1 |
| 46 | r | Load Solenoid | 1 | 0x0211 | 1 |
| 47 | r | Low Evaporator Pressure Limit | 1 | 0x043B | 1 |
| 48 | r | Manual Amp Limit | 1 | 0X043D | 1 |
| 49 | r | Manual Amp Limit Setpoint | 1 | 0x0901 | 1 |
| 50 | r | Maximum Amp Limit | 1 | 0X043C | 1 |
| 51 | r | Motor Control Latch Relay | 1 | 0x0213 | 1 |
| 52 | r | Motor Control Relay | 1 | 0x021E | 1 |
| 54 | r | Motor Current Amps | 2 | 0x0435 | 1 |
| 55 | r | Motor Current Percent | 1 | 0x040C | 1 |
| 56 | r | Motor Temperature Switch | 1 | 0x050E | 1 |
| 58 | r | Number of Starts | 2 | 0X0432 | 1 |

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method |
|---|---|---|---|---|---|
| 59 | r | Oil Delta Pressure | 1 | 0X040D | 1 |
| 60 | r | Oil Feed Temp. | 1 | 0x0409 | 1 |
| 61 | r | Oil Gage Pressure | 1 | 0x0415 | 1 |
| 62 | r | Oil Heater | 1 | 0x0215 | 1 |
| 63 | r | Oil Pressure Differential Switch | 1 | 0X050E | 1 |
| 64 | r | Oil Pump | 1 | 0X021D | 1 |
| 65 | r | Oil Sump Temp. | 1 | 0X040A | 1 |
| 67 | r | Operating Hours | 2 | 0x0430 | 1 |
| 68 | r | Panel Rocker Switch | 1 | 0X050E | 1 |
| 69 | r | Remote Amp Limit | 1 | 0X043E | 1 |
| 70 | r | Remote Chilled Water Reset | 1 | 0x0439 | 1 |
| 71 | r | Remote Reset or Amp Limit Signal | 1 | 0X040B | 1 |
| 72 | r | Remote Start/Stop Switch | 1 | 0X050F | 1 |
| 73 | r | Soft Load Limit | 1 | 0X043A | 1 |
| 74 | r | Starter Fault Switch | 1 | 0X050F | 1 |
| 75 | r | Starter Transition Switch | 1 | 0X050F | 1 |
| 76 | r | Superheat | 1 | 0x0416 | 1 |
| 77 | r | Surge Guard Switch | 1 | 0X050E | 1 |
| 78 | r | Unit Status | 1 | 0x0424 | 1 |
| 79 | r | Unload Solenoid | 1 | 0x0210 | 1 |
| 80 | r | Vanes Closed Switch | 1 | 0X050F | 1 |
| 81 | r | Watchdog Output | 1 | 0x0214 | 1 |
| 82 | b | Clear Current Fault | 1 | 0X042A | 1 |
| 83 | b | Comm Port Baud Rate | 1 | 0x0801 | 1 |
| 84 | b | Correct Checksum | 1 | 0x0800 | 1 |
| 85 | b | Leaving Evaporator Temperature Setpoint | 1 | 0x0900 | 7 |
| 86 | b | Maximum Chilled Water Reset Setpoint | 1 | 0x0820 | 9 |
| 87 | b | Network Amp Reset | 1 | 0x0450 | 1 |
| 88 | b | Network Chilled Water Reset | 1 | 0X044F | 1 |
| 89 | b | Network Start Stop | 1 | 0x0451 | 1 |
| 90 | b | Reset Option | 1 | 0x0822 | 1 |
| 91 | b | Soft Reset | 1 | 0x0204 | 1 |
| 92 | b | Start Mode | 1 | 0x0824 | 1 |
| 93 | b | Startup Differential Temp. | 1 | 0x0826 | 9 |
| 94 | b | Shutdown Differential Temp. | 1 | 0x0827 | 9 |

Appendix C.5.4.                Equipment Type : 001ASC Air Cooled Screw Chiller

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method[8] |
|---|---|---|---|---|---|
| 1 | r | Active Chilled Water Temperature Setpoint | 1 | 0x045A | 4 |
| 2 | r | Ckt#1 Condenser Pressure | 2 | 0x0467 | 2 |
| 4 | r | Ckt#1 Alarm Conditions: Capacity | 1 | 0x1F13 | 1 |
| 5 | r | Ckt#1 Alarm Conditions: Condenser Pressure | 2 | 0x1F09 | 2 |
| 7 | r | Ckt#1 Alarm Conditions: Evap Leaving Water Temp | 2 | 0x1F0F | 1 |
| 9 | r | Ckt#1 Alarm Conditions: Evap Pressure | 2 | 0x1F07 | 2 |
| 11 | r | Ckt#1 Alarm Conditions: Fan Stage | 1 | 0x1F14 | 1 |
| 12 | r | Ckt#1 Alarm Conditions: Liquid Line Temperature | 2 | 0x1F0D | 10 |
| 14 | r | Ckt#1 Alarm Conditions: Outside Air Temp | 2 | 0x1F11 | 10 |
| 16 | r | Ckt#1 Alarm Conditions: Suction Temperature | 2 | 0x1F0B | 10 |
| 18 | r | Ckt#1 Current Alarm | 1 | 0x08B9 | 1 |
| 19 | r | Ckt#1 Current Alarm HourMinuteMonthDateYear | 1 | 0x1F02 | 1 |

[8] See Appendix A.1.

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method[8] |
|---|---|---|---|---|---|
| 20 | r | Ckt#1 Evaporator Pressure | 2 | 0x0463 | 2 |
| 22 | r | Ckt#1 Liquid Line Temperature | 2 | 0x0479 | 10 |
| 24 | r | Ckt#1 Status | 1 | 0x0428 | 1 |
| 25 | r | Ckt#1 Subcooling Temperature | 2 | 0x04DF | 2 |
| 27 | r | Ckt#1 Suction Temperature | 2 | 0x0475 | 10 |
| 29 | r | Ckt#1 Superheat Temperature | 2 | 0x04D7 | 2 |
| 31 | r | Compressor #1 Operating Hours | 2 | 0x0862 | 1 |
| 33 | r | Compressor #1 Starts | 2 | 0x086A | 1 |
| 35 | r | Evaporator Entering Water Temperature | 2 | 0x046E | 10 |
| 37 | r | Evaporator Leaving Water Temperature | 2 | 0x0461 | 10 |
| 39 | r | Outdoor Air Temperature | 2 | 0x047D | 10 |
| 41 | r | Stage of Cooling | 1 | 0x042B | 1 |
| 42 | r | Unit Status | 1 | 0x0427 | 1 |
| 43 | b | Clear Ckt#1 Alarm | 1 | 0x091A | 1 |
| 44 | b | Evaporator Entering Water Temperature Setpoint | 1 | 0x090D | 2 |
| 45 | b | Evaporator Leaving Water Temperature Setpoint | 1 | 0x0905 | 2 |
| 46 | b | Maximum Chilled Water Reset Setpoint | 1 | 0x090C | 2 |
| 47 | b | Network Command | 1 | 0x044F | 1 |
| 48 | b | Network Demand Limit | 1 | 0x044D | 1 |
| 49 | b | Network Evaporator Leaving Water Temp Reset | 1 | 0x044E | 1 |
| 50 | b | Reset Option Setpoint | 1 | 0x090B | 1 |

Appendix C.5.5.          Equipment Type : Self-Contained Units (SCUs)

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method[9] |
|---|---|---|---|---|---|
| 1 | r | Air Velocity | 1 | 0x0434 | 11 |
| 2 | r | Airflow Status | 1 | 0x045C | 1 |
| 3 | r | Current Alarm | 1 | 0x0801 | 1 |
| 4 | r | Previous Alarm | 1 | 0x1301 | 1 |
| 5 | r | Building Static Pressure | 1 | 0x0435 | 12 |
| 6 | r | Compressor #1 Alarm | 1 | 0x081C | 1 |
| 7 | r | Compressor #1 Operating Hours | 2 | 0x08AF | 1 |
| 9 | r | Compressor #2 Alarm | 1 | 0x081D | 1 |
| 10 | r | Compressor #2 Operating Hours | 2 | 0x08B2 | 1 |
| 12 | r | Compressor #3 Alarm | 1 | 0x081E | 1 |
| 13 | r | Compressor #3 Operating Hours | 2 | 0x08B5 | 1 |
| 15 | r | Compressor #4 Alarm | 1 | 0x081F | 1 |
| 16 | r | Compressor #4 Operating Hours | 2 | 0x08B8 | 1 |
| 18 | r | Compressor #5 Alarm | 1 | 0x0820 | 1 |
| 19 | r | Compressor #5 Operating Hours | 2 | 0x08BB | 1 |
| 21 | r | Compressor #6 Alarm | 1 | 0x0821 | 1 |
| 22 | r | Compressor #6 Operating Hours | 2 | 0x08BE | 1 |
| 24 | r | Control Temperature | 1 | 0x0432 | 1 |
| 25 | r | Cool Stage | 1 | 0x043F | 1 |
| 26 | r | Cooling Control Status | 1 | 0x044A | 1 |
| 27 | r | Dew Point Temperature | 1 | 0x042F | 1 |
| 28 | r | Duct Static Pressure #1 | 1 | 0x0435 | 13 |
| 29 | r | Duct Static Pressure #2 | 1 | 0x0434 | 13 |
| 30 | r | Economizer Enable | 1 | 0x045A | 1 |
| 31 | r | Economizer Operating Hours | 2 | 0x08C4 | 1 |
| 33 | r | Economizer Position | 1 | 0x042E | 1 |

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[9] See Appendix A.1.

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method[9] |
|---|---|---|---|---|---|
| 34 | r | Entering Water Temperature | 1 | 0x042C | 1 |
| 35 | r | Fan - High Speed Operating Hours | 2 | 0x08AC | 1 |
| 37 | r | Fan - Low Speed Operating Hours | 2 | 0x08A9 | 1 |
| 39 | r | Fan Operation | 1 | 0x0462 | 1 |
| 40 | r | Fan Speed | 1 | 0x0436 | 1 |
| 41 | r | Heat Stage | 1 | 0x043E | 1 |
| 42 | r | Heating Control Status | 1 | 0x044C | 1 |
| 43 | r | Heating Operating Hours | 2 | 0x08C1 | 1 |
| 45 | r | Leaving Water Temperature | 1 | 0x042D | 1 |
| 46 | r | Mixed Air Temperature | 1 | 0x042B | 1 |
| 47 | r | Motor Amps | 1 | 0x0436 | 1 |
| 48 | r | Motor Speed | 1 | 0x04BB | 1 |
| 49 | r | Network Communications Status | 1 | 0x0470 | 1 |
| 50 | r | Outdoor Air Damper Status | 1 | 0x045F | 1 |
| 51 | r | Outdoor Air Temperature | 1 | 0x0429 | 5 |
| 52 | r | Override Hours | 2 | 0x08C7 | 1 |
| 54 | r | Refrigerant Pressure | 1 | 0x0431 | 1 |
| 55 | r | Relative Humidity | 1 | 0x0431 | 1 |
| 56 | r | Return Air Temperature | 1 | 0x0428 | 1 |
| 57 | r | Space Temperature | 1 | 0x042A | 1 |
| 58 | r | Supply Air Temperature | 1 | 0x0427 | 1 |
| 59 | r | Supply Fan Status | 1 | 0x045E | 1 |
| 60 | r | Unit Enabled Status | 1 | 0x0488 | 1 |
| 61 | r | Unit Status | 1 | 0x043D | 1 |
| 62 | r | Variable Inlet Vane Position | 1 | 0x0436 | 1 |
| 63 | r | Water Flow Required | 1 | 0x0445 | 1 |
| 64 | r | Water Flow | 1 | 0x045B | 1 |
| 65 | r | Water Pump Start/Stop | 1 | 0x0461 | 1 |
| 66 | b | Building Static Pressure Setpoint | 1 | 0x0923 | 12 |
| 67 | b | Clear Alarm | 1 | 0x04CE | 1 |
| 68 | b | Clear Alarm Buffer | 1 | 0x048A | 1 |
| 69 | b | Control Mode | 1 | 0x044F | 1 |
| 70 | b | Control Temperature Source | 1 | 0x0926 | 1 |
| 71 | b | Cooling Control Deadband | 1 | 0x088D | 1 |
| 72 | b | Cooling Control Setpoint | 1 | 0x0907 | 1 |
| 73 | b | Cooling Supply Deadband | 1 | 0x0878 | 1 |
| 74 | b | Cooling Supply Setpoint | 1 | 0x090E | 1 |
| 75 | b | Dew Point Deadband | 1 | 0x094E | 1 |
| 76 | b | Dew Point Sensor Type | 1 | 0x0949 | 1 |
| 77 | b | Dew Point Setpoint | 1 | 0x094D | 1 |
| 78 | b | Duct Static Pressure Setpoint | 1 | 0x0917 | 13 |
| 79 | b | Duct Static/Building Static Pressure Deadband | 1 | 0x089B | 13 |
| 80 | b | Economizer (Air) Changeover Differential | 1 | 0x0932 | 1 |
| 81 | b | Economizer (Air) Changeover Temperature Setpoint | 1 | 0x0931 | 5 |
| 82 | b | Economizer (Air) Method | 1 | 0x083B | 1 |
| 83 | b | Economizer (Water) Changeover Temperature Offset | 1 | 0x091A | 1 |
| 84 | b | Fan On Heating Setpoint | 1 | 0x0939 | 1 |
| 85 | b | Head Pressure Deadband | 1 | 0x08E1 | 1 |
| 86 | b | Head Pressure Setpoint | 1 | 0x093A | 1 |
| 87 | b | Heating Control Deadband | 1 | 0x0894 | 1 |
| 88 | b | Heating Control Setpoint | 1 | 0x0905 | 1 |
| 89 | b | Heating Supply Deadband | 1 | 0x0871 | 1 |
| 90 | b | Heating Supply Setpoint | 1 | 0x0914 | 1 |

| Array Location | Read/ Write/ Both | Field Name | Number of Bytes | Base Address | Device Scaling Method[9] |
|---|---|---|---|---|---|
| 91 | b | Humidity Control Type | 1 | 0x0947 | 1 |
| 92 | b | Humidity Deadband | 1 | 0x094C | 1 |
| 93 | b | Humidity Setpoint | 1 | 0x094B | 1 |
| 94 | b | Low Entering H20 Comp. Lockout Differential | 1 | 0x092C | 1 |
| 95 | b | Low Entering Water Compressor Lockout Setpoint | 1 | 0x092B | 1 |
| 96 | b | Min Vane Position/Fan Speed | 1 | 0x0951 | 1 |
| 97 | b | Minimum Outdoor Air Damper Position | 1 | 0x0934 | 1 |
| 98 | b | Minimum Supply Air Temperature Control | 1 | 0x0919 | 1 |
| 99 | b | Unoccupied Cooling Space Differential | 1 | 0x0904 | 1 |
| 100 | b | Unoccupied Cooling Space Setpoint | 1 | 0x0903 | 1 |
| 101 | b | Unoccupied Heating Space Differential | 1 | 0x0902 | 1 |
| 102 | b | Unoccupied Heating Space Setpoint | 1 | 0x0901 | 1 |
| 103 | b | Water Flow Signal | 1 | 0x0444 | 1 |