

Group: Controls

Part Number: IM 743

Date: April 2009

Supersedes: IM 743-3

# MicroTech II<sup>®</sup> Chiller Unit Controller Modbus<sup>®</sup> Communication Module

- WSC Water-Cooled Centrifugal, Single-Compressor
- WDC Water-Cooled Centrifugal, Dual-Compressor
- WPV Water-Cooled Centrifugal, Single-Compressor
- HSC Water-Cooled Single-Compressor Centrifugal, Heat Recovery
- HDC Water-Cooled Dual-Compressor Centrifugal, Heat Recovery
- TSC Water-Cooled Single-Compressor Centrifugal, Templifier
- WMC Water-Cooled Centrifugal, Magnetic Bearing
- WCC Water-Cooled Centrifugal, Counterflow
- AGZ Air-Cooled Global Scroll
- ACZ Air-Cooled Scroll Condensing Unit
- WGZ Water-Cooled Global Scroll
- AGS Air-Cooled Global Screw
- WGS Water-Cooled Global Screw
- TGZ Templifier™ Water Heater

## NOTICE

Use this manual to physically install the McQuay MicroTech II Communication Module into the chiller unit controller and connect the chiller unit controller to your network. Use the appropriate McQuay Engineering Data (ED), known as the Protocol Information document, to integrate the unit into your network. The Protocol Information document contains addressing details, protocol information, and a list of the data points available to the network. See the Reference Documents section of this manual for details. MicroTech II control integration literature is available from your local McQuay International sales representative and [www.mcquay.com](http://www.mcquay.com).

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## Revision History

|          |               |  |
|----------|---------------|--|
| IM 743-0 | April 2003    | Initial release.   |
| IM 743-1 | May 2005      | Removed references to RS 232 serial connection.<br>Added WGS, WMC, HSC, TSC, and HDC models to Reference Documents section and cover page.<br>Corrected pin connections on Figure 6.<br>Added notes under Unit Setup for Network Control and Network Address and Baud Rate sections. |
| IM 743-2 | November 2005 | Added setup for screw and scroll (non-centrifugal) chillers  |
| IM 743-3 | April 2007    | Removed RS-485 part number from replacement parts list   |
| IM 743-4 | April 2009    | Added TGZ model. Corrected Figure 2 & corresponding table with proper network pin connections. Changed Unit Setup for Modbus Network Control section to refer to unit keypad.  |

## Reference Documents

| Number             | Company              | Title   | Source         |
|--------------------|----------------------|---|----------------|
| ED15063            | McQuay International | MicroTech II Protocol Information for McQuay International Chiller Unit Controllers, Modbus Networks  | www.mcquay.com |
| IMM AGS            | McQuay International | MicroTech II Air-Cooled Screw Chiller Installation and Maintenance Manual                             | www.mcquay.com |
| IOMM ACZ/AGZ       | McQuay International | MicroTech II Air-Cooled Condensing Unit Installation, Operation, and Maintenance Manual               | www.mcquay.com |
| IOMM ACZ1          | McQuay International | MicroTech II Air-Cooled Condensing Unit Installation, Operation, and Maintenance Manual               | www.mcquay.com |
| IOMM AGZ           | McQuay International | MicroTech II Air-Cooled Scroll Chiller Installation, Operation, and Maintenance Manual                | www.mcquay.com |
| IOMM WGZ           | McQuay International | MicroTech II Water-Cooled Scroll Chiller Installation Manual  | www.mcquay.com |
| IOMM WPV           | McQuay International | MicroTech II Centrifugal Chiller Installation, Operation, and Maintenance Manual                      | www.mcquay.com |
| IOMM WSCWDC        | McQuay International | MicroTech II Chiller Unit Controller Installation, Operation, and Maintenance Manual                  | www.mcquay.com |
| OM AGS             | McQuay International | MicroTech II Controller for AGS Chillers Operating Manual   | www.mcquay.com |
| OM CentrifMicro II | McQuay International | MicroTech II Unit Controller for Centrifugal Chillers and Templifiers Operating Manual                | www.mcquay.com |
| OM WGS             | McQuay International | MicroTech II Controller for Water-Cooled Screw Chiller Operating Manual                               | www.mcquay.com |
| OM WMC             | McQuay International | MicroTech II Controller for WMC Magnetic Bearing Compressor Chiller Operating Manual                  | www.mcquay.com |
| IOMM TSC           | McQuay International | MicroTech II Templifier Single Compressor Centrifugal Installation, Operation, and Maintenance Manual | www.mcquay.com |
| -                  | Modbus               | Modbus over Serial Line Specification & Implementation Guide v1.0                                     | www.Modbus.org |

## Limited Warranty

Consult your local McQuay Representative for warranty details. Refer to Form 933-43285Y. To find your local McQuay Representative, go to [www.mcquay.com](http://www.mcquay.com).

### Notice

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# Introduction

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## Recognize Safety Symbols, Words and Labels

The following symbols and labels are used throughout this manual to indicate immediate or potential hazards. It is the owner and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of property damage and/or product damage, serious personal injury or death. Improper installation, operation and maintenance can void the warranty.

### **DANGER**

Dangers indicate a hazardous situation which will result in death or serious injury if not avoided.

### **WARNING**

Warnings indicate potentially hazardous situations which can result in property damage, severe personal injury, or death if not avoided.

### **CAUTION**

Cautions indicate potentially hazardous situations which can result in personal injury or equipment damage if not avoided.

# General Information

This manual contains the information you need to install a MicroTech II® Modbus® Communication Module and integrate it into the network.

## ⚠ WARNING

**Electric shock hazard. Can cause personal injury or equipment damage.**

This equipment must be properly grounded. Only personnel knowledgeable in the operation of the equipment being controlled must perform connections and service to the MicroTech II Chiller Unit Controller.

## ⚠ CAUTION

**Static sensitive components. Can cause equipment damage.**

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

## NOTICE

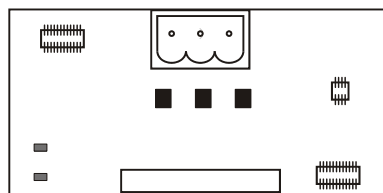
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense. **McQuay International disclaims any liability resulting from any interference or for the correction thereof.**

## Description

A Modbus Communication Module provides the interface between a MicroTech II Chiller Unit Controller and a Modbus network. It translates the Modbus variables used on the network to the variables used in the unit controller and vice versa.

The Modbus Communication Module is a printed circuit board that plugs into the MicroTech II Chiller Unit Controller. Figure 1 is an outline drawing of the printed circuit board.

*Figure 1. Modbus Communication Module – RS-485 (Component Side)*



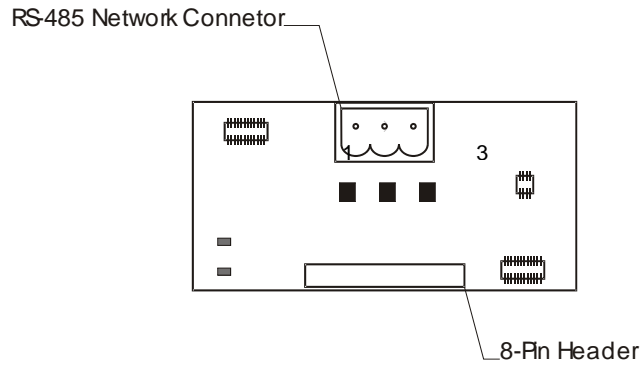
## Application

A Modbus Communication Module connects the MicroTech II Chiller Unit Controller to a network using the Modbus protocol. It is the interface between the network and the unit controller. The Modbus Communication Module translates the Modbus protocol variables into the native data formats of the unit controller.

# Component Data

Figure 2 shows the location of the major components of the Modbus Communication Module.

Figure 2. Modbus Communication Module Major Components



## Modbus Connector

### RS-485 Network Connector

This connector connects the Modbus Communication Module to the RS-485 network.

| Pin | Function   |
|-----|------------|
| 1   | Reference  |
| 2   | Data B (+) |
| 3   | Data A (-) |

### 8-Pin Header

The 8-pin header connects the MicroTech II Chiller Unit Controller to the Modbus Communication Module.

# Installation

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The Modbus Communication Module can be factory or field installed. For field installation, the Modbus Communication Module kit may be ordered through the McQuay sales representative or through McQuay Parts. The Modbus Communication Module kit includes the Modbus Communication Module (RS-485 serial network board) and this installation manual.

## Mounting

### ⚠ CAUTION

**Electrostatic discharge hazard.**

**Can cause equipment damage.**

This equipment contains sensitive electronic components that may be damaged by electrostatic discharge from your hands. Before you handle the Modbus Communication Module, touch a grounded object, such as the metal enclosure, in order to discharge the electrostatic potential in your body.

## Mounting a Modbus Communication Module

### To mount a Modbus Communication Module:

1. Remove power from the MicroTech II Chiller Unit Controller.
2. Locate the Serial Card slot on the MicroTech II Chiller Unit Controller (see Figure 3.)
3. Remove the cover from the Serial Card slot if it has not already been removed. Use a small screwdriver to pry the cover off from one end.
4. Remove the plastic knockout in the cover.
5. Figure 4 shows the Serial Card slot that details how the 8-pin plug mates to the 8-pin header on the Modbus Communication Module.
6. Grasp the Modbus Communication Module, with the network connector on the underside. The 8-pin header on the Modbus Communication Module must mate to the 8-pin plug in the MicroTech II Chiller Unit Controller. The plug has a guide on each end to direct the Modbus Communication Module into the mating guide on the header.

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**Note:** Since it is impossible to see the connectors mate, this operation relies more on feeling the Modbus Communication Module into the connector than seeing the connectors mate.

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7. Insert the Modbus Communication Module, pointing up, into the slot, rolling it into a level position as you move it into the slot.
8. Keeping the Modbus Communication Module *level*, move it into the slot until you feel the connectors line up. The correct position seems to be level, toward the left side of the slot, and down slightly from the top.
9. When you feel the connectors align, press the Modbus Communication Module into the connector. Verify that it is firmly seated in the connector.
10. Replace the cover on the Serial Card slot. Slip the cover over the network connector plug.
11. Connect the Modbus Communication Module to the network.
  - A. Route the network cable through a knockout and to the Modbus Communication Module.
    1. Connect the Modbus Communication Module to the network (see Figure 5 and Figure 6.)
      - a. Connect one wire of the network cable to Pin 2 of the connector plug.

- b. Connect the other wire to Pin 3 of the connector plug.
- c. No wire is connected to the remaining pin.

Figure 3. Serial Card Slot Location on Unit Controller

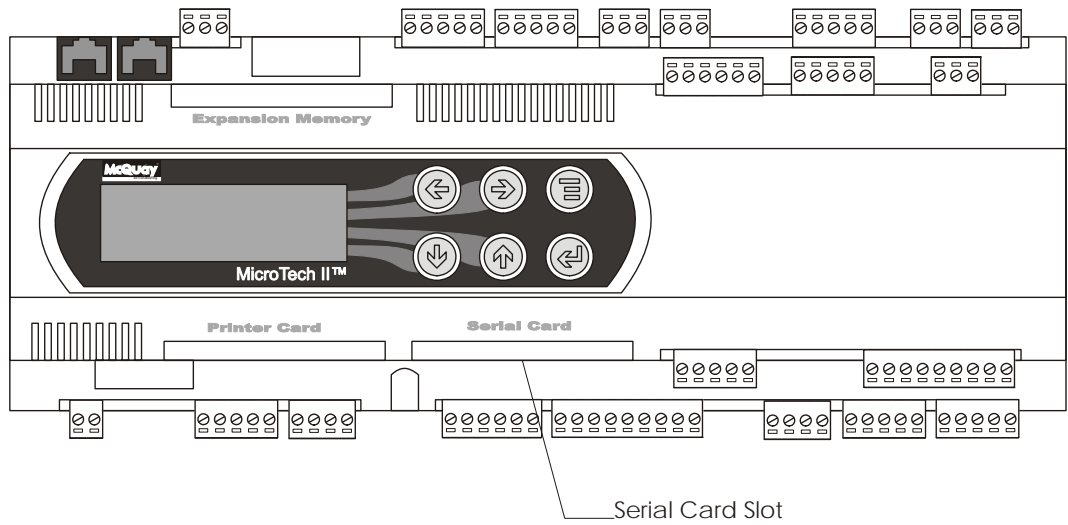


Figure 4. Serial Card Slot Detail

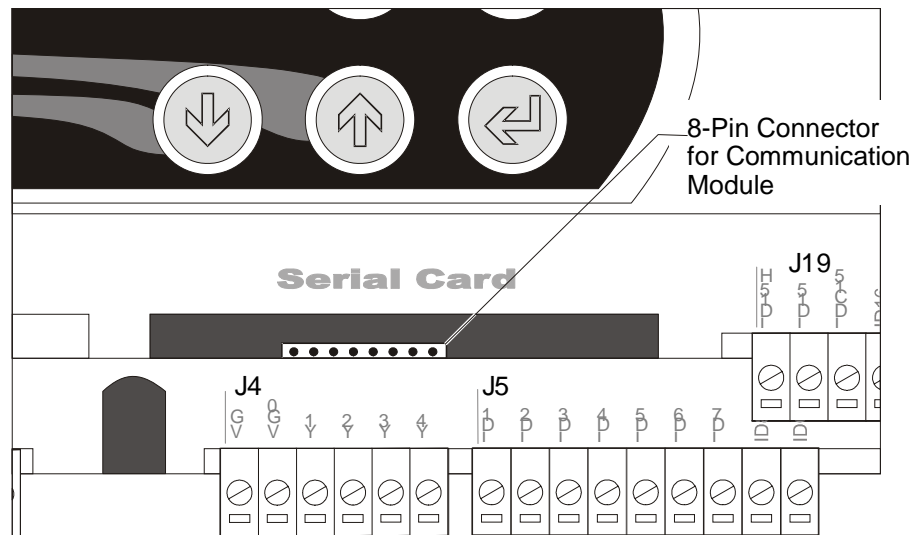


Figure 5. Network Cable Routing and Connections

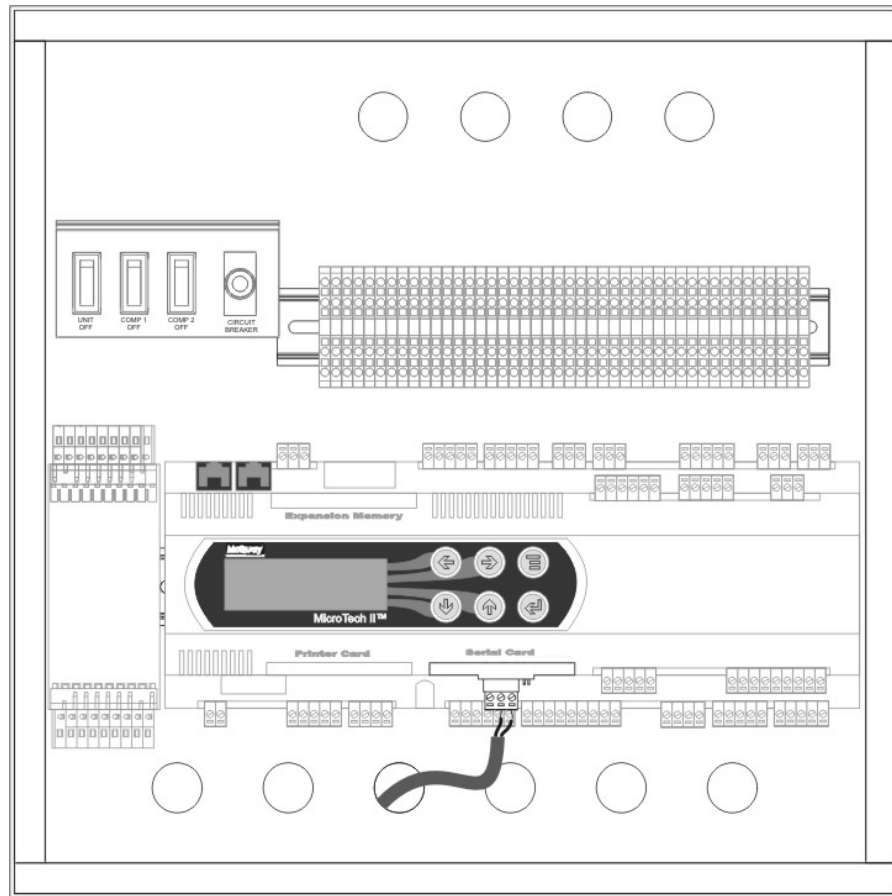
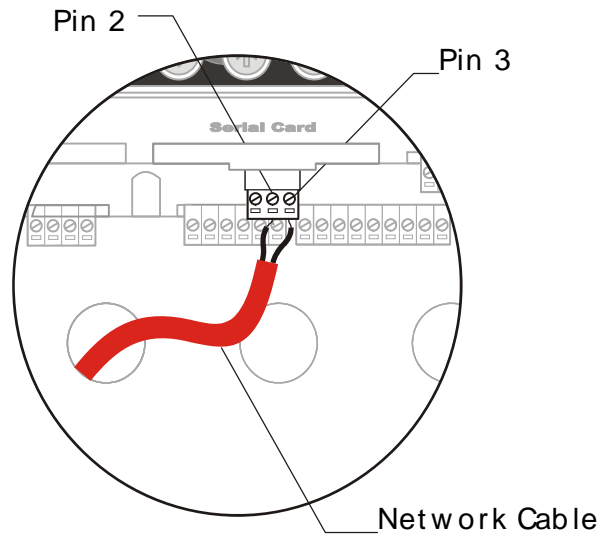


Figure 6. Network Connection Detail



## Replacing an Existing Modbus Communication Module

### To replace a Modbus Communication Module:

1. Remove power from the MicroTech II Chiller Unit Controller.
2. Locate the Serial Card slot on the MicroTech II Chiller Unit Controller (see Figure 3.)
3. Pull the network cable connector from the Modbus Communication Module.
4. Remove the cover from the Serial Card slot. Use a small screwdriver to pry it off from one end.
5. Grasp the Modbus Communication Module and carefully pull it from the controller.
6. Install the new Modbus Communication Module.
7. Figure 4 shows the Serial Card slot that details how the 8-pin plug mates to the 8-pin header on the Modbus Communication Module.
8. Grasp the Modbus Communication Module, with the network connector on the underside. The 8-pin header on the Modbus Communication Module must mate to the 8-pin plug in the unit controller. The plug has a guide on each end to direct the Modbus Communication Module into the mating guide on the header.

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**Note:** Since it is impossible to see the connectors mate, this operation relies more on feeling the Modbus Communication Module into the connector than seeing the connectors mate.

---

9. Insert the Modbus Communication Module, pointing up, into the slot, rolling it into a level position as you move it into the slot.
10. Keeping the Modbus Communication Module *level*, move it into the slot until you feel the connectors line up. The correct position seems to be level, toward the left side of the slot, and down slightly from the top.
11. When you feel the connectors align, press the Modbus Communication Module into the connector. Verify that it is firmly seated in the connector.
12. Replace the cover on the Serial Card slot. Slip the cover over the network connector plug.
13. Insert the network cable connector into the Modbus Communication Module.

## Unit Setup for Modbus Network Control

### Setup for Centrifugal Chiller MicroTech II Network Control:

1. Disable the chiller. The chiller should not be operating while performing this setup.
2. At the chiller unit keypad:
  - a. In the Set Unit Setpoint screen 14, set the BAS Protocol to Modbus. Use the Manager Password of "2001."
  - b. In the Set Unit Setpoint screen 1, set the Control Source to Local
3. Verify with the chiller/control company technician that the chiller is operational on BAS.
4. In the Set Unit Setpoint screen 1, set the Control Source to BAS.

### Setup for all Other Chillers MicroTech II Network Control:

1. Set the Set Unit Setpoint screen 1 initially to Source = Keypad.
2. Verify that Modbus is selected as the Protocol in the applicable menu screen shown in the table below.
3. Verify with the chiller/control company technician that the chiller is operational on a BAS.
4. Set the Unit Setpoint screen 1 to Source = Network.

| Model              | AGZ-A | ACZ-A | AGZ-B | ACZ-B | AGS-A,<br>B, DP | AGS-C | AGS-D | WGS  | WGZ,<br>TGZ |
|--------------------|-------|-------|-------|-------|-----------------|-------|-------|------|-------------|
| <b>Menu Screen</b> | 7     | 6     | 10    | 7     | 12              | 16    | 17    | 15   | 10          |
| <b>Password</b>    | 2001  | 2001  | 2001  | 2001  | 8945            | 8453  | 8745  | 8745 | 2001        |

**NOTE:** Models AGZ-A/B, ACZ-A/B, and WGZ/TGZ have one unit controller, while models AGS-B/C and WGS have one unit controller and multiple circuit controllers. Unit settings for AGS-B/C and WGS models are adjusted on the unit controller.

# Integration

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Integrating the Modbus Communications Module into a BAS involves three steps:

- Connecting the unit (node) to the network
- Addressing and establishing communications with the unit
- Configuring the unit to the building

## Connecting to the Network

### Network Topology

Standard Modbus network rules apply. The network is a daisy-chain of Modbus controllers including all slaves and the master. The Modbus standard recommends that the network be terminated on each end with the characteristic impedance of the network (about 120 ohms). Follow the guidelines stated in the Modbus specifications (see Reference Documents section for details.)

## Addressing and Establishing Communications

### Network Address and Baud Rate

Valid slave nodes addresses are in the range of 0 – 247 decimal. The individual slave devices are assigned addresses in the range of 1 – 247. A master addresses a slave by placing the slave address in the address field of the message. When the slave returns its response, it places its own address in the response address field to let the master know which slave is responding. Address 0 is the broadcast address. When the address is 0, all slaves respond to the message.

The network address for a MicroTech II Chiller Unit Controller is set in the unit controller keypad display. The Modbus network address and data transmission rate (Baud Rate) is only available in the keypad/display when the protocol is set to Modbus. You must set the protocol, network address (ident number), and baud rate before you can communicate on the Modbus network.

#### To set the protocol, network address, and baud rate on a unit controller:

1. Navigate to the SET UNIT SP menus.
2. Navigate down the SET UNIT SP menus to the Protocol = screen.
3. Change protocol to Modbus. You must enter the Manager Password of “2001.”

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**Note:** Password screens listed are for Centrifugal Chillers. Passwords/screens for other models may be different.

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4. Two more parameters appear in the screen: one for the network address (ID Number or Ident No.) and one for the data transmission rate (Baud Rate).

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**Note:** See the appropriate Operation Manual for specific instructions for changing variables with the keypad/display.

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5. Set the ID Number variable to the network address of the MicroTech II Chiller Unit Controller. (Contact the integrator for the desired network address.)
6. Set the Baud Rate variable to the data transmission rate of the network.

## Configuring the Unit Controller

The Modbus Communication Module and MicroTech II Chiller Unit Controller are configured together at the factory. After you set up the network, the unit is ready to operate with the default

values of the parameters set at the factory. Default values may be changed via the network or with the keypad/display. The appropriate Operation Manual provides default values and keypad operation. The MicroTech II Chiller Modbus Protocol Information Document (ED 15063) provides descriptions of the network variables. See Reference Documents section for details.

# Service Information

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## Test Procedures

If you can control the unit from its keypad, but you are unable to communicate with it via the network:

- Check the network wiring
- Check that the Control Source setpoint is set to Local (see Unit Setup for Modbus Network Control section.)
- Check that the Protocol Unit Setpoint is set to Modbus (see Addressing and Establishing Communications section.)
- Check that the ID number Unit Setpoint is set to communications module network address (see Addressing and Establishing Communications section.)
- If the Modbus Communication Module still does not respond, contact the McQuay Controls Customer Support group at 866-4MCQUAY (866-462-7829).

## Replacement Parts

| Description   | Part Number |
|---|-------------|
| MicroTech II Modbus Communication Module kit (kit includes the Modbus Communication Module (RS-485 serial network board) and IM 743). | 350147402   |
| Network Connector-Wago  | 330803003   |

This document contains the most current product information as of this printing. For the most current product information, please go to [www.mcquay.com](http://www.mcquay.com). All McQuay equipment is sold pursuant to McQuay's Standard Terms and Conditions of Sale and Limited Product Warranty.