

MODBUS® COMMUNICATION MODULE

MICROTECH® 4 REBEL APPLIED™ UNIT CONTROLLER



- MODEL DPSA
- 20 TO 52 TONS
- R-410A AND R-32 REFRIGERANT

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Introduction

This manual describes how to install or replace a Modbus® communication module on a MicroTech® 4 Rebel Applied® unit controller. It also explains how to set network parameters and establish communication between the unit controller and Modbus network.

Reference Documents

Company	Number	Title	Source
Daikin Applied	OM 1288	MicroTech 4 unit controller for Rebel Applied Rooftop Systems	www.DaikinApplied.com
	ED 19133	MicroTech 4 Rebel Applied Modbus Network Integration	
Modbus-IDA.ORG		Modbus Application Protocol Specification V1.1b	www.Modbus.org
Modbus-IDA.ORG		Modbus over Serial Line Specification and Implementation Guide V1.02	www.Modbus.org

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. Daikin disclaims any liability resulting from any interference or for the correction thereof.

Software Revision

This document supports BSP (Board Support Package) Modbus communication module firmware v11.18 and all subsequent versions until otherwise indicated.

Hazard Identification

 **DANGER**
 Danger indicates a hazardous situation, which will result in death or serious injury if not avoided.

 **WARNING**
 Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

 **CAUTION**
 Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

NOTICE
 Notice indicates practices not related to physical injury.

NOTE: Indicates important details or clarifying statements for information presented.

The Modbus communication module connects the MicroTech unit controller to a building automation system (BAS). This interface enables the exchange of Modbus objects between the unit controller and the network.

The Modbus communication module, together with the unit controller, support the Modbus RTU standard profile.

Features

- Integration into a building automation and control system via Modbus RTU
- Simple attachment to a MicroTech unit controller
- LEDs indicate communication status and network activity
- Modbus baud rate, parity, and other network parameters set directly from the unit controller
- Circuit board components enclosed in protective housing

Specifications

The following section provides a summary of technical data and conformance to agency listings.

General	
Dimensions	W x H x D: 1.77 x 4.33 x 2.95 in (45 x 110 x 75 mm)
Weight	3.5 oz (85 g)
Material	Base - plastic, pigeon-blue
	Housing - plastic, light-gray
Operating	
Temperature	-40 - 158°F (-40 - 70°C)
Humidity	<90% RH
Atmospheric pressure	Min. 10 psi (70kPa), corresponding to max. 9,842 ft (3,000 m) above sea level
Storage and Transportation	
Temperature	-40 - 158°F (-40 - 70°C)
Humidity	<95% RH
Atmospheric pressure	Min. 3.77 psi (26 kPa), corresponding to max. 32,808 ft (10,000 m) above sea level
Electrical	
Power	Supplied via unit controller DC 5 V (+5% / -5%), max. 140 mA
Network connection	RS-485 (EIA-485) - T1 and T2 3-wire twisted pair, shielded
Bus connection/ Transceiver	Galvanically isolated
	+, -, REF (3 wires)
	Isolated transceiver with fail-safe circuitry
Bus termination	1/2 Unit load
Bus termination	680 Ω / 120 Ω +1 nF / 680 Ω (switch by software)
Baud rate	4800, 9600, 19200, and 38400
Additional Components	
Board-to-board connector	10-pin plug between communication module and unit controller
Modbus network connector	RS-485 connection plug, 3-pin spring cage top entry
Agency Listings	
US	UL916, UL873
Canada	CSA C22.2M205
Europe	
EMC directive	2004/108/EC
Low-voltage directive	2006/95/EC Listings
RoHS directive	2002/95/EC

Dimensions

Figure 1 and Figure 2 provide key dimensional data.

Figure 1: Modbus Communication Module Top View

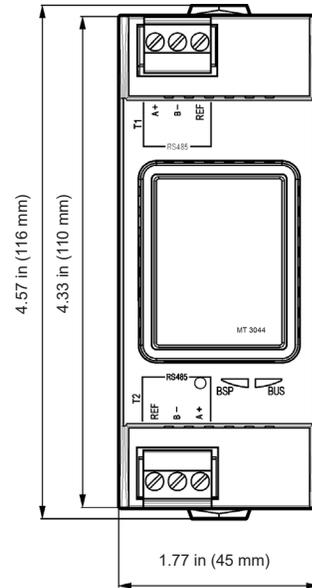
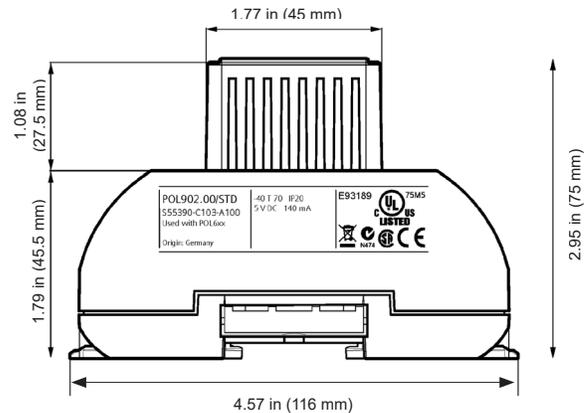


Figure 2: Modbus Communication Module Side View



Component Data

The Modbus communication module is a printed circuit board with a plastic enclosure. It connects directly to the left-hand side of the MicroTech unit controller as shown in [Figure 3](#). It may be possible that another module is also connected to

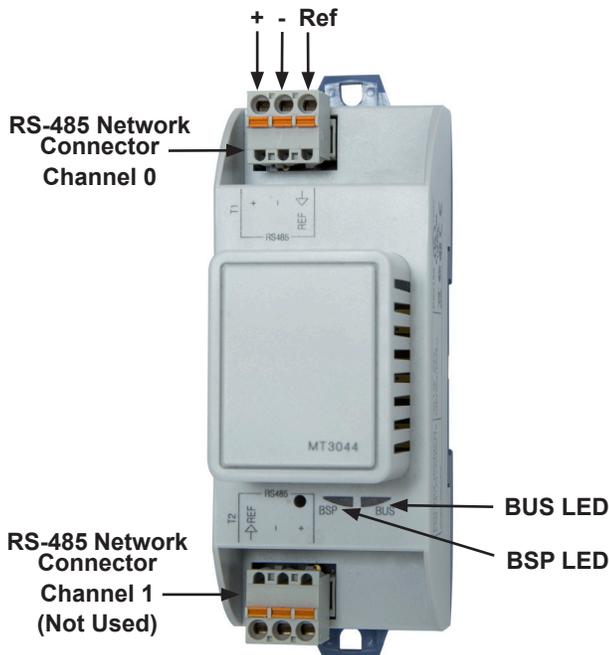
the unit controller. In this case, the Modbus communication module simply attaches directly to the left side of the existing module instead of the unit controller.

Figure 3: Modbus Communication Module Attached to Unit Controller



[Figure 4](#) shows the important features of the Modbus communication module, which are described in the following section.

Figure 4: Modbus Communication Module



Light Emitting Diodes (LEDs)

The Modbus communication module has a BSP LED and a BUS LED to indicate communication activity and status of the Modbus communication module. These indicators are visible when the module is connected to the MicroTech unit controller and power has been applied to the unit ([Figure 4](#)).

BSP LED

The BSP LED indicates the communication state between the Modbus communication module and the MicroTech unit controller. [Table 1](#) describes the status of the BSP LED.

Table 1: BSP LED Activity

LED Status	Description
Alternating red and green flashing at once per second	Board Support Package (BSP) firmware upgrade in progress.
Green	BSP is running. Communication is established between the unit controller and the communication module.
Yellow	The communication module is capable of communicating to the unit controller. However, communication is not established.
Red flashing at 2 Hz	BSP (software) error. ¹
Red	Hardware error. ¹

¹ In the event that this should occur, cycle power to the unit controller. Contact the Daikin Applied Controls Customer Support group at 866-462-7829 or Controls@daikinapplied.com for additional assistance, if necessary.

BUS LEDs

The BUS LED indicates the communication status between the Modbus communication module and the Modbus network. [Table 2](#) describes the status of the BUS LED.

Table 2: BUS LED Activity

LED Status	Description
Green ²	The unit controller is communicating to the network.
Yellow	Communication module is initializing.
Red ¹	Communication error or timeout has expired. The unit controller is not communicating to the network. Possible hardware error.

¹ If the Com LED Timeout parameter is set to 0, the timeout feature is disabled. See [Table 3](#) for additional information.

² If the timeout is set to 0 and therefore disabled, the LED remains green even in the event of a communication error.

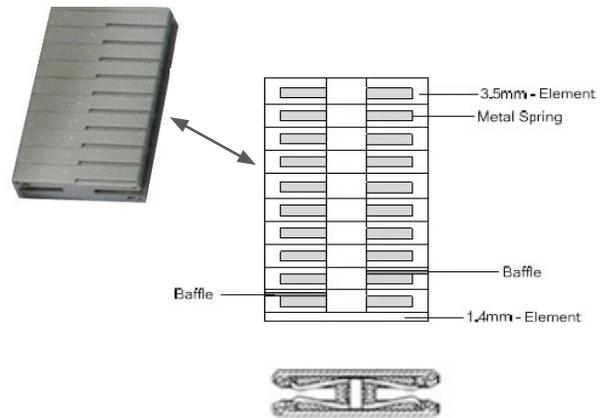
Modbus Network Connector

The connection to the Modbus is made via the connector T1 and T2 ports. An RS-485 connection port connects the Modbus communication module to the Modbus Network. It has three pins: +, -, and Ref. The module has two RS-485 ports, but only the top connector (Channel 0) is used ([Figure 4](#)).

Board-To-Board Connector

The 10-pin board-to-board connector connects the MicroTech unit controller to the Modbus communication module ([Figure 5](#) and [Figure 7](#)).

Figure 5: Board-to-Board Connector



Installation

The following section describes how to field install a new Modbus communication module or replace an existing module on the MicroTech unit controller.

⚠ WARNING

Electric shock hazard. The terminals on the unit controller are high voltage. Disconnect power to avoid electrical shock potential, which may result in personal injury, serious injury, death, or equipment damage.

This equipment must be properly grounded. Connections and service to the unit controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled..

Field Installation Kit

The Modbus communication module field-installed kit ships with the following items:

- The Modbus communication module with RS-485 network connector
- Board-to-board connector - [Figure 5](#)
- This manual (IM 1374)

Installing a new Communication Module

Follow these steps to install a Modbus communication module on the unit controller. The communication module can be connected directly to the unit controller itself or to an existing module, if one is attached.

NOTE: There is a limit of three devices that can be attached to the left side of the unit controller.

1. Set the “Control Mode = Off” from the HMI Main Menu on the unit controller display menu. This must be done prior to installing a new communication module.
2. Remove power from the unit controller.
3. Carefully remove the blue plastic knockout strip on the far left end of the unit controller itself (or additional module, if present). [Figure 6](#) shows the knockout strip after it has been removed from the unit controller.

To prevent damage to the unit controller, insert a small flathead screwdriver or similar tool into the tab on the bottom of the unit controller and pull the screwdriver away from the controller.

4. Carefully remove the blue plastic knockout strip on the right side of the Modbus communication module.
5. Insert the board-to-board connector into the Modbus communication module. Note that it only fits one way and that the baffles must line up with corresponding slots in the communication module and the unit controller ([Figure 6](#) and [Figure 7](#)).

Figure 6: Communication Module and Knockout

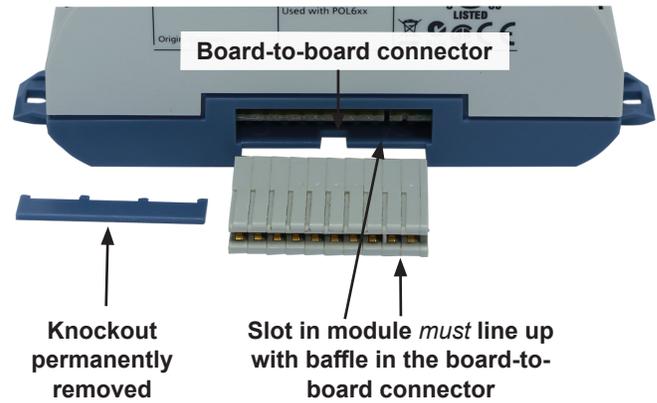


Figure 7: Communication Module with Board-to-Board Connector Inserted



6. Insert the other end of the board-to-board connector to the far-left side of the unit controller or other module, if attached.
7. Insert the network cable into the Modbus communication module’s top network connector, Channel 0 ([Figure 4](#)).
8. Apply power to the unit controller.

NOTE: The unit controller automatically resets itself approximately 30 seconds after power has been applied to it. This reset is necessary so that the Modbus communication module can synchronize with the unit controller.

**WARNING**

Electric shock hazard. The terminals on the unit controller are high voltage. Disconnect power to avoid electrical shock potential, which may result in personal injury, serious injury, death, or equipment damage.

This equipment must be properly grounded. Connections and service to the unit controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled..

Replacing a Communication Module

Follow these steps to remove an existing Modbus communication module from the unit controller and replace it with a new module.

1. Set the "Control Mode = Off" from the HMI Main Menu on the unit controller display menu. This must be done prior to removing and replacing an existing communication module.
2. Remove power from the unit controller.
3. Locate the Modbus communication module on the left side of the unit controller.
4. Gently pull the network cable connector from the Modbus communication module (Figure 4).
5. Grasp the Modbus communication module and carefully pull it from the unit controller (or from an adjacent module, if it is attached to one).
6. Install the new Modbus communication module:

NOTE: To prevent damage to the unit controller, insert a small flathead screwdriver or similar tool into the tab on the bottom of the unit controller and pull the screwdriver away from the controller.

- a. Carefully remove the blue plastic knockout strip on the right side of the Modbus communication module.
- b. Insert the board-to-board connector into the Modbus communication module. Note that it only fits one way and that the baffles must line up with corresponding slots in Modbus communication module and the unit controller (Figure 6 and Figure 7).

7. Insert network cable into the Modbus communication module's top network connector, Channel 0 (Figure 4).
8. Apply power to the unit controller. The Modbus communication module is now ready to be configured for network integration.
9. Follow the steps described in the next section to set Modbus addressing parameters.

NOTE: The unit controller automatically resets itself approximately 30 seconds after power has been applied to it. This reset is necessary so that the Modbus communication module can synchronize with the unit controller.

Network Addressing

The following section describes how to configure the Modbus communication module for BAS network integration. Follow these instructions to set addressing parameters using the MicroTech unit controller.

Network Considerations

Standard Modbus network rules apply. The network is a daisy-chain of unit controllers including all servers and the client. The Modbus standard recommends that the network be terminated on each end with the characteristic impedance of the network of approximately 120 ohms. Follow the guidelines stated in the Modbus specifications (www.Modbus.org).

Modbus Configuration

The Modbus communication module is configured using the unit controller HMI keypad display. The Modbus network address (ident number) and transmission (baud) rate *must* be set using the unit controller HMI.

NOTE: Set the network address within the valid range of 1-247 and also verify the baud rate before the unit controller can properly communicate on the Modbus network. These parameters are only available when the communication module is correctly attached to the controller.

Table 3 describes the addressing parameters used to establish communication between the unit controller and the BAS. The items shown in boldface are required for minimum network configuration.

NOTE: The following procedure assumes a Modbus communication module is attached and the unit controller is powered up. If a communication module is available but not attached, see the [Installation](#) section. Otherwise, see [Service Information](#) for part number and ordering.

1. Remove power and then re-apply power to the unit controller.
2. Enter the password from the HMI Main Menu:
 - a. Turn the circular knob on the unit controller ([Figure 8](#)) until Enter Password is highlighted from the menu list ([Figure 9](#)).
 - b. Select Enter Password by pressing down on the circular knob.
 - c. Enter password 2526 and press Enter.

If you are not at the HMI Main Menu and need to enter a password, press the Back button until the HMI Main Menu appears.
3. Set the "Control Mode = Off" from the HMI Main Menu.
4. Proceed to Step 6 to set the network address.

Figure 8: Unit Controller HMI Features

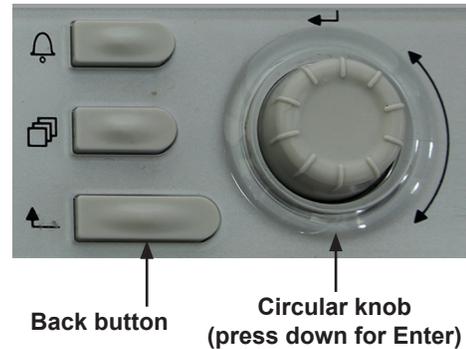


Figure 9: HMI Main Menu: Enter Password



Set the Network Address

5. Scroll down to the BMS Communications/Modbus Set-Up and press Enter.
6. Scroll down to Address and press Enter. Change parameter to the value specified by the BAS network administrator.
7. Press Enter again to confirm selection.
8. Proceed to Step 9 and set the baud rate.

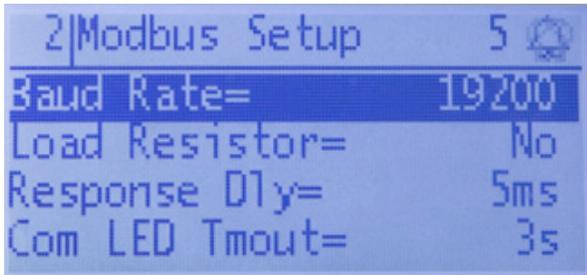
NOTE: If baud rate (or other parameters) do not require configuration, proceed to [Apply Changes and Cycle Power](#), Steps 17-19. All changes must be made before saving.

NOTE: The Modbus Set-Up menu only appears if the communication module is installed correctly (see [Installation](#) section.) If it is installed correctly and menu still does not appear, cycle power to the unit controller and repeat the configuration process.

Set the Baud Rate

9. Scroll down to the HMI Main Menu/BMS Communication/Modbus Set-Up and press Enter.
10. Scroll to Baud Rate and press Enter to select the desired baud rate. [Figure 10](#) shows view a baud rate that has been set to 19200 bps.

Figure 10: Modbus Set-Up Menu: Change Baud Rate



NOTE: The Modbus communication module has a default baud rate of 38400 bps. Additional options are shown in Table 3.

11. Press Enter again to confirm selection.
12. If network configuration is complete, continue to Step 13. Otherwise, skip to Steps 17-19. All changes must be made before saving.

Set Additional Network Parameters

Adjust any other network parameters as shown in Table 3 or change previously configured values as needed.

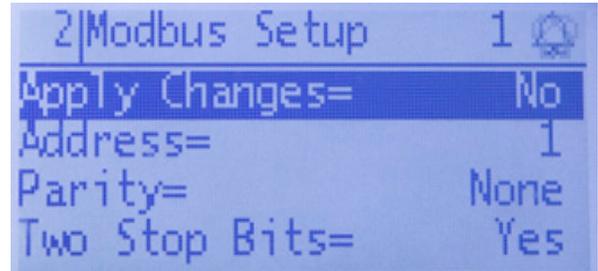
13. Scroll down to the BMS Communication/Modbus Set-Up and press Enter.
14. Scroll down to the desired parameter and press Enter.
15. Change value and press Enter again to confirm the selection.
16. Repeat steps 13-15 as needed.

NOTE: Make all changes before cycling power to the unit controller.

Apply Changes and Cycle Power

17. Scroll to Apply Changes and select Yes to save the changes.
18. Cycle power to the unit controller (Figure 11).

Figure 11: Modbus Set-Up Menu: Network Address



19. Navigate back to the BMS Communication/Modbus Set-Up menu to verify the parameter setting(s). This procedure may take a minute while the Modbus communication module powers up.

NOTE: Refer to the MicroTech 4 Rebel Applied Unit Controller Operation Manual, OM 1288 for additional information on using the controller HMI keypad display for other unit setpoints. Also refer to Network Protocol Document ED 19133 for descriptions of the available Modbus registers. www.DaikinApplied.com.

Configurable Parameters

Table 3 defines all Modbus addressing parameters supported by the communication module. They are accessed from the

unit controller HMI keypad display HMI Main Menu/BMS Communication/Modbus Set-Up page as described in the previous section.

Table 3: Network Parameters

Parameter	Range/Default	Description
Apply Changes	Yes or No Default: No	Setting this to Yes cycles power to the unit controller, thus allowing the network setup changes to take place.
Network Address ^{1,2}	1-247 Default: 1	The Modbus Address of the communication module. This must be unique throughout the entire network.
Baud Rate ^{1,2}	4800, 9600, 19200, 38400 Default: 38400	Data transfer speed (bps) of the Modbus network.
Parity ¹	Even = 0 Odd = 1 None = 2 Default: None	Defines the parity (i.e. the use of checksums for detecting transmission errors) that is specified for the bus. This must also be identical for all nodes on the bus.
Two Stop Bits ¹	Yes or No Default: Yes	This defines the number of stop bits. Yes = 2 stop bits, No = 1 stop bit. Two stop bits are used unless this parameter is set to No. This value must also be coordinated with the other bus nodes.
Load Resistor	Yes or No Default: No	Set this parameter to Yes if this unit is the first or last server on the segment. If an external terminating resistor is used, set this parameter to No.
Response Delay ¹	0 - 30000 milliseconds Default: 5 milliseconds	When a request is received, the response is delayed by this many milliseconds to avoid over-run of the client device. In most cases, it is not necessary to change this delay. However, Response Delay can be adjusted if the client is too slow.
Com LED Timeout	0 - 3600 seconds Default: 3 seconds	If the Com LED Timeout is set to 0, the BUS LED is always green and cannot be used to indicate communication to the client. If the client does not poll within this time, then the BUS LED turns red.
Modbus BSP	v11.18 or newer	Board Support Package - indicates the Modbus communication module firmware version. The Modbus BSP is read-only.
Unit Support	English or Metric Default: English	Controls the type of units that are passed through Modbus.

1. Parameter must be configured from the HMI keypad display.
2. Boldface indicates that the parameter is required for minimum network configuration.

NOTE: If the unit controller application software requires a field upgrade, the network configuration parameters revert to their default values. Contact the Daikin Applied Controls Customer Support group at 866-462-7829 or Controls@daikinapplied.com for additional assistance, if necessary.

Service Information

Troubleshooting

Follow these procedures if you are not able to communicate with the unit via the network:

General

- Review the [Installation](#) section of this document to confirm that all procedures were followed correctly.
- Review the [Network Addressing](#) section of this document to confirm that all procedures were followed correctly.
- If the Modbus communication module is installed but LEDs are not active when the unit controller is powered up, remove the module and then follow the steps provided in the [Installing a new Communication Module](#) section. If the issue persists, replace the module.
- Verify Modbus wiring is connected to channel 0 (top port) of the communication module.
- Verify that the Modbus Set-Up menu appears in the unit controller HMI keypad display. If it does not, follow this procedure:
 1. Set the "Control Mode = Off" from the HMI Main Menu on the unit controller display menu.
 2. Remove power from the unit controller, wait 10 seconds, then re-power the unit controller. Within 45 seconds, the unit controller should recognize the attached Modbus communication module, and will cycle power.
 3. Verify that the Modbus Set-Up menu now appears in the unit controller display menu.

Network Parameters

- Verify that the network address of the Modbus communication module (server) is unique in the network. In contrast, the baud rate, stop bit, and parity settings of the communication module must match the other server devices on the network.
- Make sure there are no duplicate devices on the network and that network parameters are set correctly as shown in [Table 3](#).
- View the Modbus communication module BUS and BSP LEDs. Refer to [Table 1](#) and [Table 2](#) for explanations of the communication status among the unit controller, communication module, and the network based on the LED activity.

Network wiring

If performance is unsatisfactory or network is experiencing issues such as noise or slow transmission:

- Confirm that the shield is landed at only one point in the trunk.
- Be aware that the recommended network topology is daisy-chain (no T-Taps or ring layout).
- Verify that network wiring does not exceed 4000 ft total distance limit (without repeaters) at 38400 bps baud.
- Verify that polarity is maintained.
- Check that there are end-of-line termination resistors (120 Ω) at the first and last device on the trunk. This is required by the EIA-485 specification.
- Verify that the network trunk avoids strong sources of electromagnetic interference (EMI).
- Note that the two-wire bus is *not* interchangeable and must be connected correctly.
- Verify that the network trunk is not located near a DC load switch (relay).

Network Performance

- If network traffic is slow, communication is intermittent, or the trunk is experiencing "noise," it may be necessary to use a network protocol analyzer or oscilloscope to determine the source of poor performance.
- Confirm power is applied to the unit controller.

Parts

Table 4: Replacement Parts List

Description	Part Number
MicroTech Modbus communication module kit Kit includes: Modbus communication module, board-to-board connector and network connector.	350147413
Network connector (3-pin)	193410303
Board-to-board connector (10-pin)	300047027

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787).

Technical Support

Contact the Daikin Applied Controls Customer Support group at 866-462-7829 or Controls@daikinapplied.com for additional assistance.

Refer to the MicroTech 4 Rebel Applied Unit Controller Operation Manual, OM 1288 for additional information on using keypad/display to set unit parameters and defaults for unit setpoints. Also refer to Network Protocol Document ED 19133 for descriptions of the available Modbus registers (www.daikinapplied.com).

Revision History

Revision	Date	Description of Changes
IM 1374	April 2024	Initial release

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