Honeywell

Ethernet-to-Modbus Bridge for LeaderLine Products

Application Note

Industry: General

Application: Wonderware TCP/IP Modbus Server Connection to Honeywell LeaderLine Modbus Products

Background

The Ethernet TCP/IP connections are not multidrop-limited to 4000 feet and 32 devices, as with Modbus RS485 communications.

Solution

Honeywell LeaderLine products with Modbus communication can now be connected to an Ethernet network by using an inexpensive Ethernet-to-Modbus bridge.

These LeaderLine products include:

- UMC800 Universal Multi-loop Controller

- UDC700, UDC1000, UDC1500, UDC2300, UDC3300, UDC5300, and UDC6300 Controllers

- DPR100C/D, DPR180/250, VRX100/150/180 and VPR100, DR4300, DR4500A Recorders

Benefit Summary

Advantages of an Ethernet TCP/IP connection are:

- Ethernet TCP/IP connections are not limited to the 4000 feet Modbus distance limit. The Ethernet TCP/IP connection removes distance limitations between computer(s) and Honeywell Modbus devices.

- Ethernet TCP/IP connections allow multiple computers and/or multiple client applications to access data from Honeywell LeaderLine Controllers and Recorders with their *existing* Modbus communication hardware.

- With appropriate web server software Honeywell LeaderLine Modbus devices can be accessed via common web browsers such as Netscape or Explorer. This makes intranet and internet communication to these devices possible.

Implementation

Overview. This application note will demonstrate how to connect a Wonderware Ethernet server to three Honeywell LeaderLine devices: UDC2300, UDC3300, and UMC800 with Modbus communication. The example (Figure 1) will connect a process variable (PV) from each of these three devices to cells on a Microsoft Excel spreadsheet. Any previously listed LeaderLine devices could be added to the Modbus network.
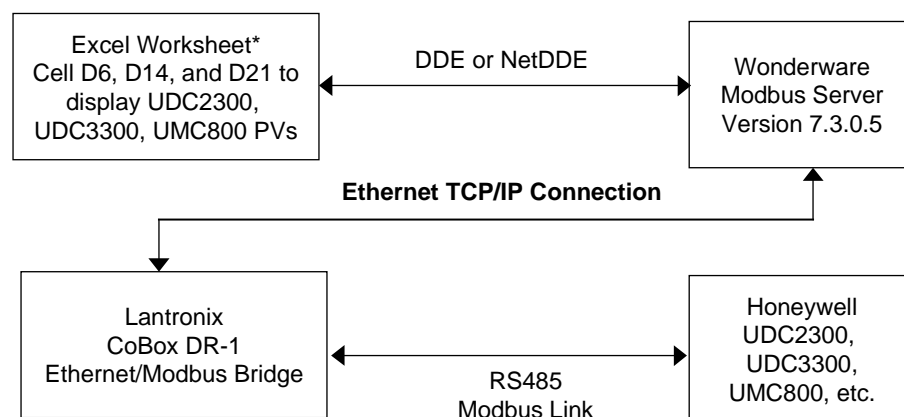

Figure 1 – Functional Overview

Ethernet-to-Modbus Bridge for LeaderLine Products

Application Note

This demonstration application uses the following four components:

1. Microsoft Excel as the client application*
Excel was chosen for a client application for this demonstration example. Other applications that support Microsoft's DDE could have been used in place of or in addition to the Excel client, such as:

- User-written Visual Basic client applications

- Wonderware Intouch DDE client applications

Excel is the client application that requests information from the Wonderware server, which in turn queries the Honeywell LeaderLine devices.

2. Wonderware I/O Modicon Modbus Ethernet Server Version 7.3.0.5 or later
The Wonderware server accepts requests from client application(s). The server will process these requests and transmit them to the Ethernet link. When the Honeywell device replies to these requests the server will pass the responses back to the requesting client(s).

3. Lantronix CoBox DR-1 Ethernet to Modbus Bridge
The Lantronix CoBox DR-1 (Figure 2) bridge provides two functions.

- It converts the TCP/IP protocol from the server to the Modbus protocol required for the Honeywell Modbus devices. When the Honeywell device responds, it converts Modbus back to TCP/IP for the server.

- It converts the electrical signal levels between Ethernet and RS485.

Figure 2 – Lantronix CoBox DR-1

Figure 3 – Lantronix CoBox EM-1

NOTICE

Either of these two Lantronix Ethernet-to-Modbus bridges (Figures 2 and 3) can be used for this application. This example uses the CoBox DR-1 (Figure 2).

See the Lantronix site http://www.lantronix.com/products/ds/coboxdr1/#specs for full specifications for each of these products.

4. Honeywell UMC800, UDC3300, and UDC2300
These are the process instruments that the client application(s) will send commands to. Honeywell LeaderLine Modbus devices can be configured to respond with the register order required by the server. Floating point values can be both register swapped and byte swapped within the register, making these LeaderLine products compatible with all popular servers.

The following four steps are required to complete this application.

Step 1: Wire the hardware together. See Figure 4.

Step 2: Configure the CoBox Bridge.

Step 3: Configure the Wonderware Server.

Step 4: Configure or program the client application (in this example Excel).

Ethernet-to-Modbus Bridge for LeaderLine Products

Step 1
Wire the hardware together.

Wire the CoBox DR-1 to the Honeywell devices as shown in Figure 4. Up to 32 Honeywell devices may be connected to the RS485 link. The link should be terminated at both ends with 120-ohm resistors.
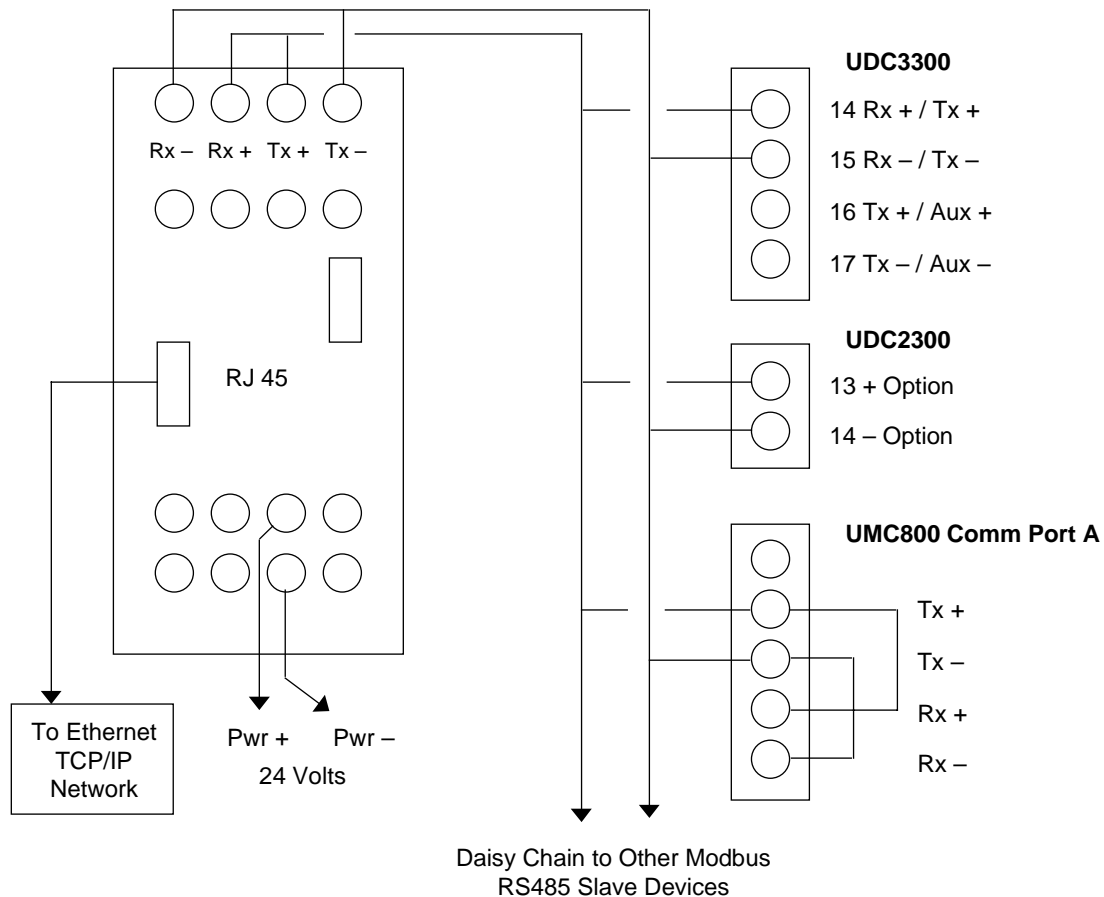

Figure 4 – Lantronix CoBox DR-1 Bridge to UDC 3300, UDC2300, UMC800 Wiring Diagram

Ethernet-to-Modbus Bridge for LeaderLine Products

Step 2
Configure the CoBox Bridge.

1. The CoBox Bridge must be given an IP address. This can be done easily from the host computer using the Telnet application which is present on Win95, Win98, and NT operating systems. (See the CoBox manual for explicit details.)

2. Use the Telnet application to configure the Modbus port side of the CoBox Bridge.

   Select item 2 (see Figure 5) to configure the Modbus side to the CoBox Bridge. Follow the on screen prompts and set the following:

   - Attached Device (1 = Slave, 2 = Master) **Set to Slave.**

   - Protocol (1 = Modbus RTU, 2 = Modbus ASCII)
     Set to Modbus RTU.

   - Serial Interface (**19200,8,N,1,RS485)**
     This is a good default for Honeywell products.
     Where:
       19200 is the Baud rate of the Slave Device (UDC3300).
       8 is the number of bits per byte/character. *Must be set to 8.*
       Where **N** (none) is the parity. *Must be N.*
       1 is the number of stop bits. *Set to 1.*
       RS485 is the driver control. *Set to RS485.* This is the setting for a two-wire connection.

```
Telnet - 164.145.160.53                                    _ □ ✕
Connect  Edit  Terminal  Help
Schneider Automation, Inc. - Modbus Bridge (174 CEV 300 10)


Serial Number 202-029  Software Version V01.0 (990407)


Press Enter to go into Setup Mode, wait to close




Modbus Bridge Firmware Setup, Schneider Automation, Inc.
1) Network/IP Settings:
     IP Address ................. 164.145.160.053
     Default Gateway ............ 164.145.160.001
     Netmask .................... 255.255.255.000
2) Serial & Mode Settings:
     Protocol ................... Modbus/RTU,Slave(s) attached
     Serial Interface ........... 19200,8,N,1,RS485
3) Modem Control Settings:
     Modem control not available with RS422/RS485
4) Advanced Modbus Protocol settings:
     Slave Addr/Unit Id Source .. Modbus/TCP header
     Modbus Serial Broadcasts ... Disabled
     Character,Message Timeout .. 00050 ms,05000 ms


D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..4) to change: ▮
```
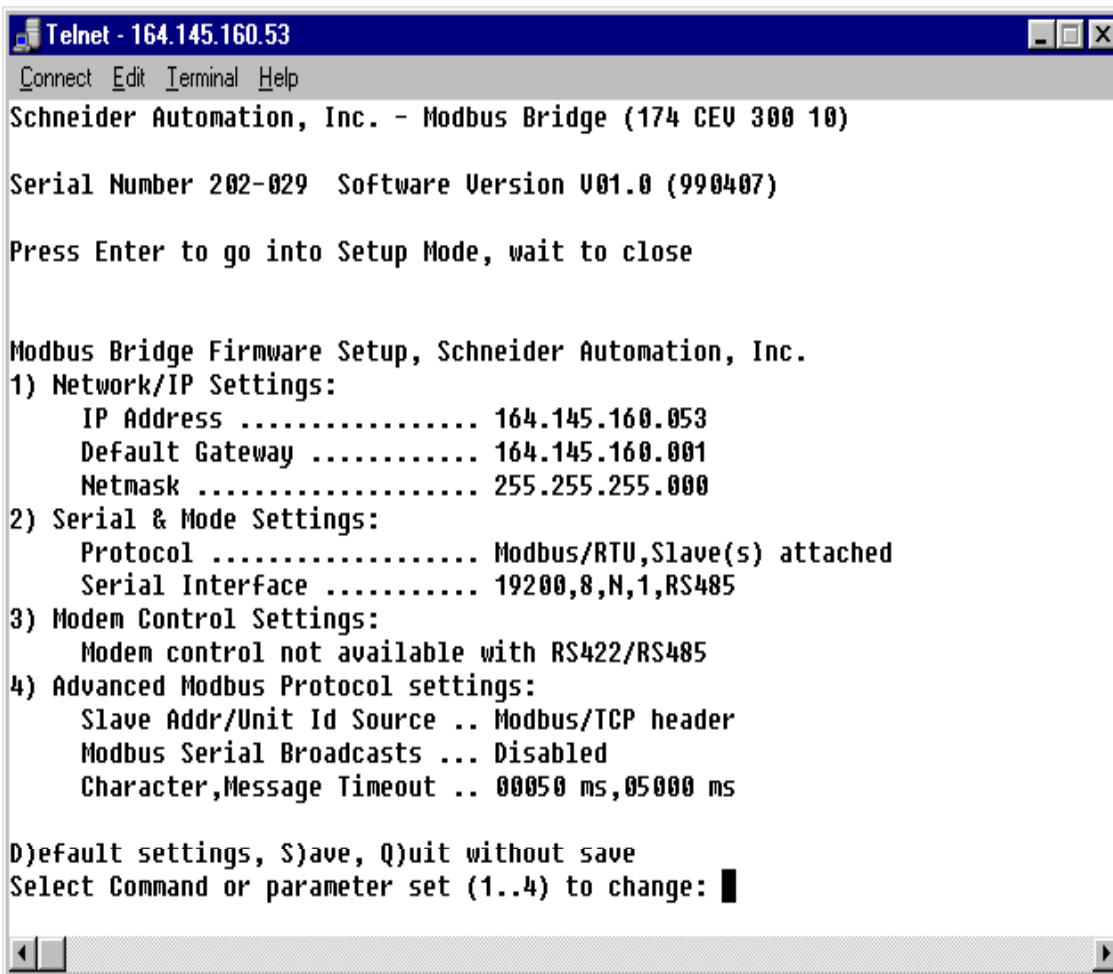
Figure 5 – Telnet Window for Configuring Both Sides of the CoBox Ethernet-to-Modbus Bridge

Ethernet-to-Modbus Bridge for LeaderLine Products (Example)

Step 3
Configure the Wonderware Server.

Start the Wonderware Modicon Modbus Ethernet (MBENET) I/O server by double clicking on its icon. The window shown in Figure 6 will appear.

Figure 6 – Wonderware MBENET Window

Only two menu items under the "Configure" menu need to be configured—Topic Definition and Server Settings.

Select Topic Definition. In Figure 7 three Honeywell devices have been added. The topic name is arbitrary. The names could be process meaningful names such as TIC535. We chose the names UDC3300, UDC2300, UMC800 to represent the three devices connected to a Modbus RS485 link.
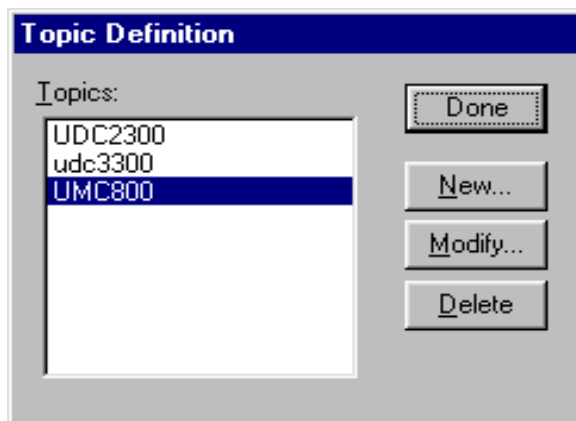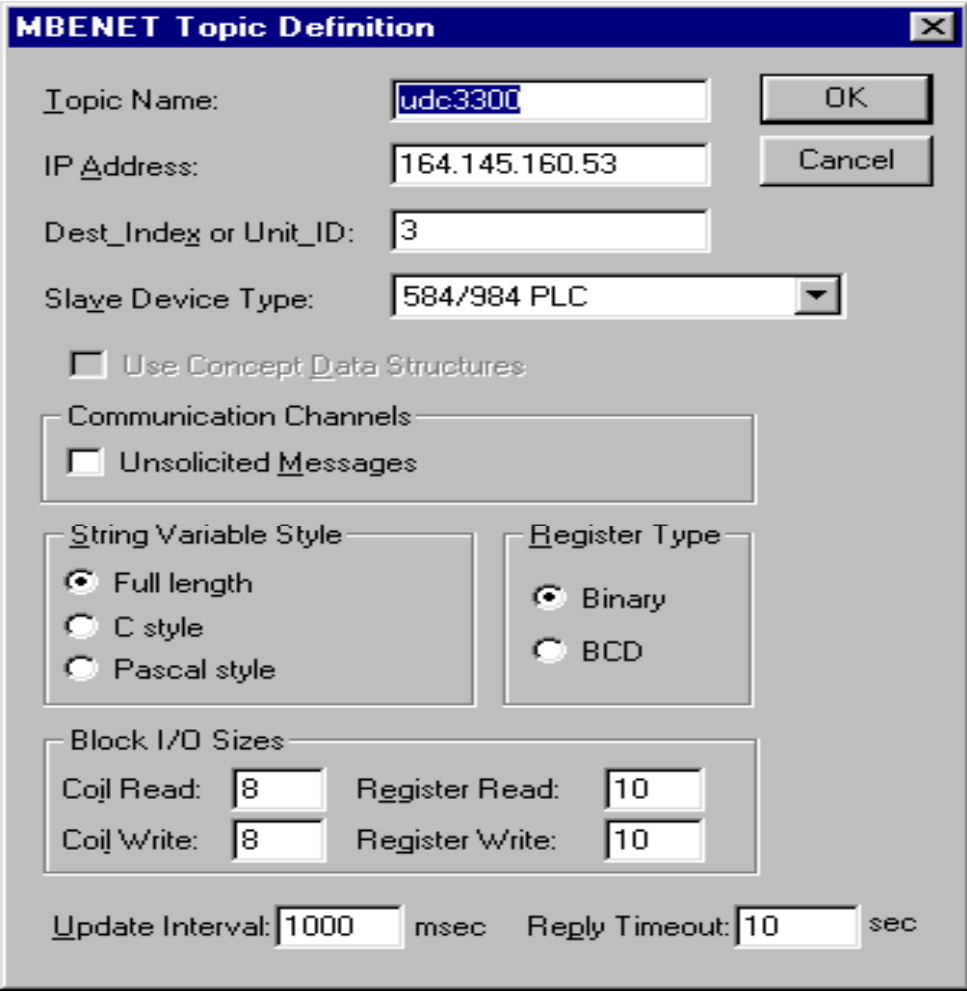
Figure 7 – Topic Definition Window

To add a topic (Honeywell device), select New from the Topic Definition shown in Figure 7. The MBENET Topic Definition window (Figure 8) will appear. Fill in the blank fields to complete the topic definition.

Topic Definition. Each Honeywell device must be given a unique topic name. In the example in Figure 7 the topic name is UDC3300.

The following information must be provided for each topic (Honeywell device).

- Topic Name: UDC3300

- IP Address: 164.145.160.53
  This is the address of the CoBox Bridge.

- Des_index or Unit_ID: This is the Honeywell device's Modbus Slave address.

- Slave Device Type: Choose 584/984 PLC.

- String Variable Style: Choose Full length.

- Register Type: Choose Binary.

- Block I/O Sizes: This is device-dependent. Check the device's communication manual. The sizes used in Figure 8 are for a UDC3300.

- Update Interval: This is the polling rate to the device.

- Reply Time: This is the Retry interval before a communication error message is generated.

Ethernet-to-Modbus Bridge for LeaderLine Products (Example)

Figure 8 – MBENET Top Definition Window

Step 4
Configure or program the client application.

A client application must access the server. In this example Excel was chosen.

DDE Communication is established between Excel and the UDC3300 device by supplying the following three parameters. See cell D6 in Figure 9.

1. **APPLICATION:** This is the name of the Wonderware Server (MBENET).

2. **TOPIC:** This is the Modbus Slave device (in this case UDC3300).

3. **ITEM:** This is the variable to be read from the slave device ('40065 F').
   The "40065" is the register address of the UDC3300 process variable.

The complete string to read the UDC3300's PV in the sample Excel worksheet (Figure 9) at cell D6 is **=MBENET|udc3000!'40065 F'**.

The syntax for the ITEM parameter is a 5-digit register address that references a variable in the named device (UDC3300). In the example, 40065 is the register address for a UDC3300's process variable (PV).

The "F" in the item string ('40065 F') indicates the variable to be accessed (the PV) is a floating point number. See the Wonderware documentation for a complete list of data types supported by their server.

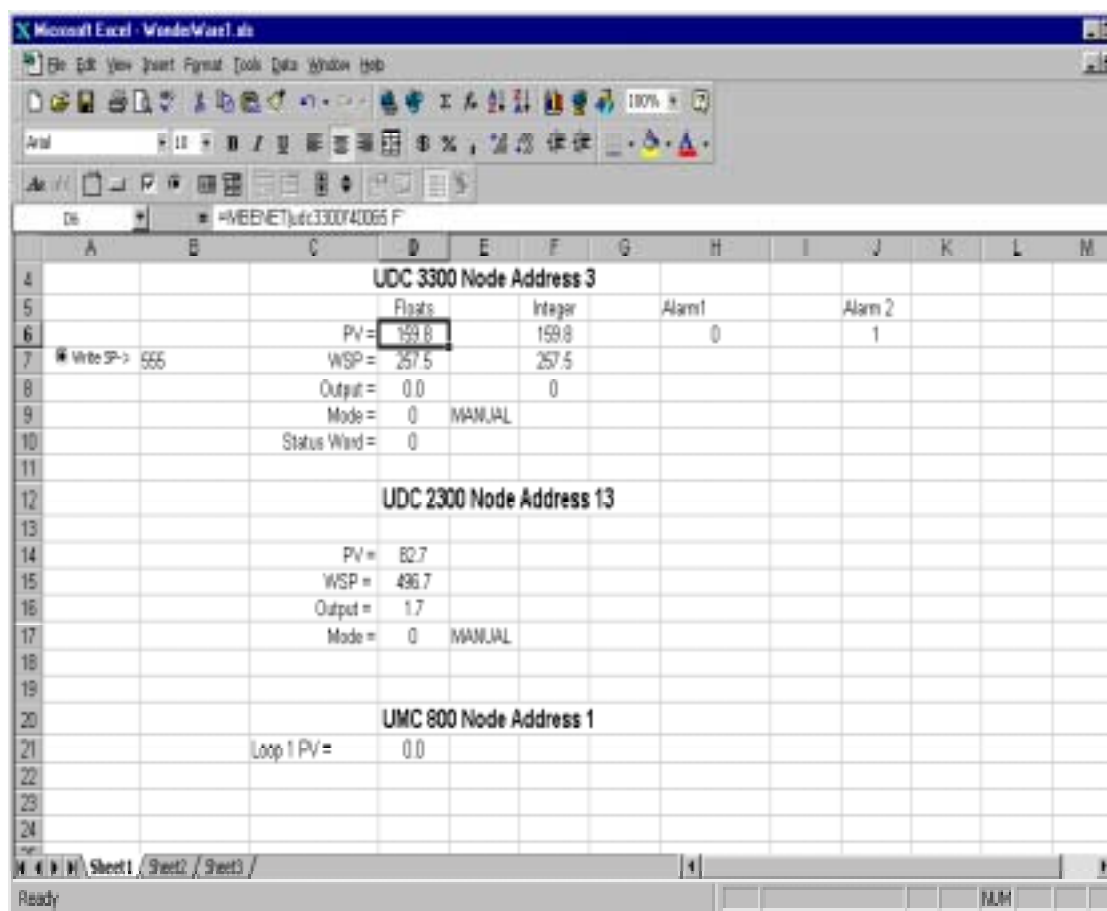# Ethernet-to-Modbus Bridge for LeaderLine Products (Example)

Figure 9 – Client Application

Technical Support and Sales Information

Technical support will be supplied by the product's vendor.

Lantronix Technical Support can be reached at this site: http://www.lantronix.com/support/

The manual for the Lantronix CoBox DR-1 or CoBox EM-1 can be downloaded from this site: http://www.lantronix.com/support/docs/

For Lantronix purchasing information, call 1-800-422-7055.

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Honeywell Technical Support

Honeywell Support for UDC3300 and other Honeywell LeaderLline Modbus products can be reached on 1-800-423-9883.

Ethernet-to-Modbus Bridge for LeaderLine Products

REFERENCES

Honeywell Modbus RTU Serial Communication Manual 51-52-25-66

Honeywell UMC800 Controller Modbus RTU Communications Manual 51-52-25-87

Honeywell UDC2300 Product Manual 51-52-25-73

Honeywell UDC3300 Product Manual 51-52-55-35

Honeywell UMC800 Controller Installation and User Guide 51-52-25-61

Lantronix CoBox DinRail Universal Thin Server Installation Guide

Wonderware Modicon Modbus I/O Server User's Guide Rev D

WARRANTY/REMEDY

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, check the Honeywell web site or call:

1-800-343-0228 (USA)

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www.honeywell.com/sensing

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