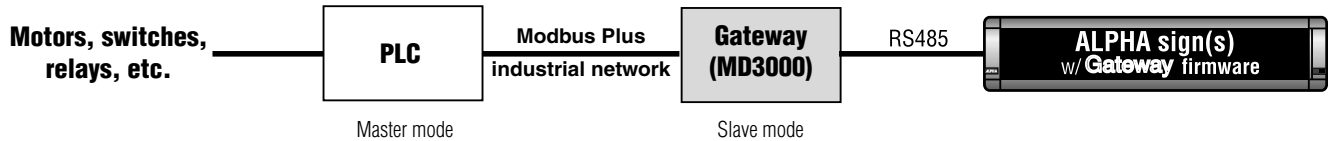


Introduction

This document explains how to set up the MD3000 to act as an interface between a Modbus Plus industrial network and an ALPHA sign network (as illustrated below):



INFORMATION FLOW



NOTE: In the event of a communication failure, caused by any means, messages may not be displayed on a sign.

Specifically, this document describes how to:

- connect the MD3000 to a Modbus Plus PLC
- connect the MD3000 to one or more ALPHA signs
- use the **MD3000 Configuration Editor** software to set up the MD3000 so that it interfaces between a Modbus Plus PLC and an ALPHA sign network.

Related documents

Document name	Part number	Description
Gateway Messaging Software User Manual	9703-7004A	Describes how to use Adaptive's Gateway Messaging Software to store messages in ALPHA signs.
Network Configurations	9708-8046A	Explains how to network ALPHA signs.

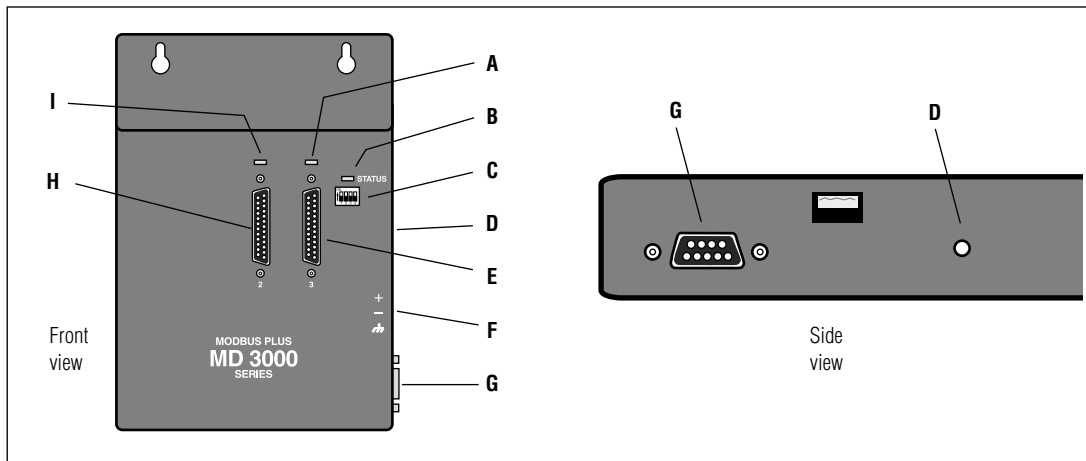
MD3000 description

The MD3000 is an intelligent Modbus Plus-to-serial communications interface unit. It allows data exchange between a Modbus Plus host and ALPHA signs equipped with the Gateway firmware option.

Operating modes

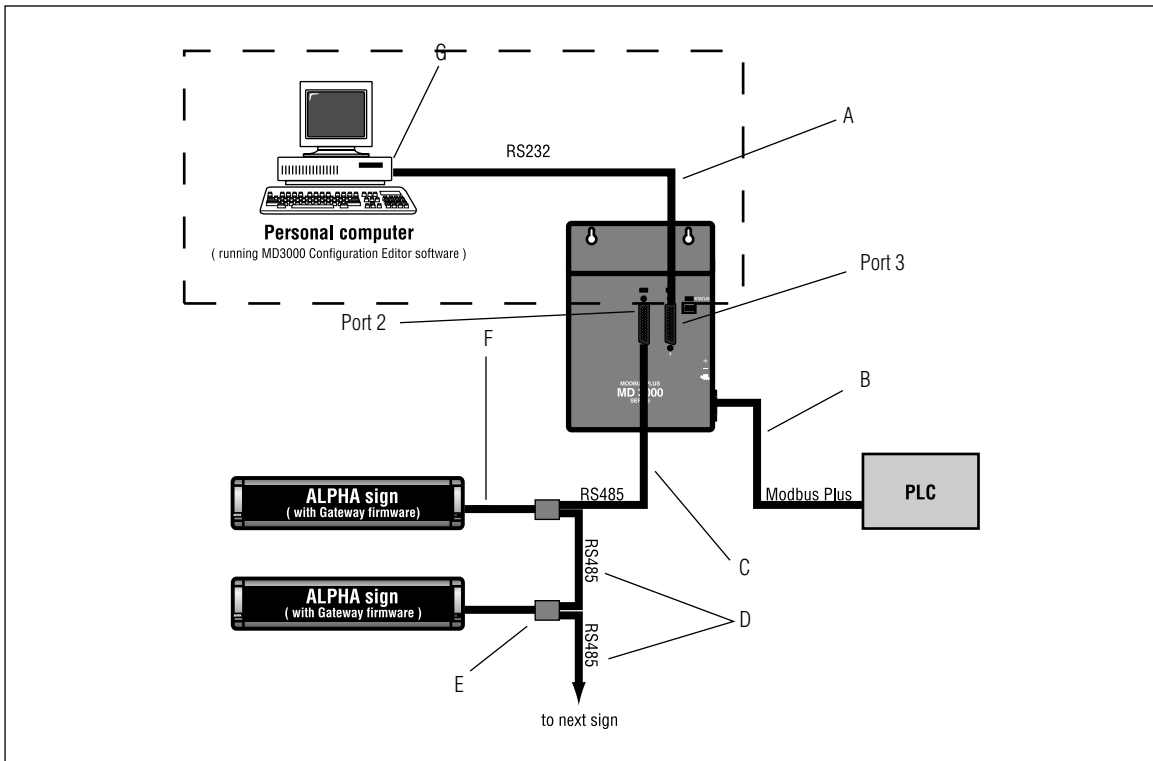
Using the MD3000's DIP switches, the unit can be set to either one of two types of operation: Normal Operation Mode or Configuration Mode:

- *Normal Operation Mode (DIP switch settings: 1, 2, 3, 4 = OFF)* — In this mode, Ports 1, 2, and 3 are all active. The MD3000 will first wait for configuration from the Modbus Plus host before initiating with the ALPHA sign(s).
- *Configuration Mode (DIP switch settings: 1, 2, 4 = OFF; 3 = ON)* — In this mode, only Port 3 is active. Ports 1 and 2 are *not* active. This mode is used to set up the various MD3000 parameters (e.g., baud rate, PLC address, etc.) with the **MD3000 Configuration Editor** software.



Item	Name	Description
A	Port 3 LED	Green = transmitting data Red = receiving data
B	STATUS LED	Flashing green = unit initialized OK and is in Configuration Mode. Flashing red = Modbus Plus error
C	DIP switches	Use these switches to set the operating mode of the unit: Normal Operation Mode (used to relay PLC data to ALPHA signs): 1, 2, 3, 4 = OFF. Configuration Mode (used to program the MD3000): 1, 2, 4 = OFF; 3 = ON
D	Port 1 LED	Continuous Flash = Modbus Plus Communications OK. 3 Flashes then Pause = No other Nodes on Network. 4 Flashes then Pause = Duplicate Node Numbers on Network.
E	Port 3 ("passthrough port")	Connect to a personal computer that is running the MD3000 Configuration Editor software and the Gateway Messaging Software .
F	Power connector	Connect to a DC power supply of 7 to 28 volts rated at 9 watts.
G	Port 1	Data input from a Modbus Plus host.
H	Port 2	Data output to one or more ALPHA signs.
I	Port 2 LED	Green = transmitting data Red = receiving data

MD3000 interconnection diagram



Item	Part #	Description
A	1188-0005	DB9-to-DB25 Configuration Cable to Port 3 Computer DB9 Female (RS485) TXD03 RXD 02 GND 05 RTS 07 CTS 08 DCD 01 DTR 04 DSR 06 MD3000 DB25 Male (RS485) 03 RXD 02 TXD 07 GND
B	—	Modbus Plus cable to Port 1 MD3000 DB9 Male 03 V- 02 CAN_L 05 Shield 07 CAN_H 09 V+

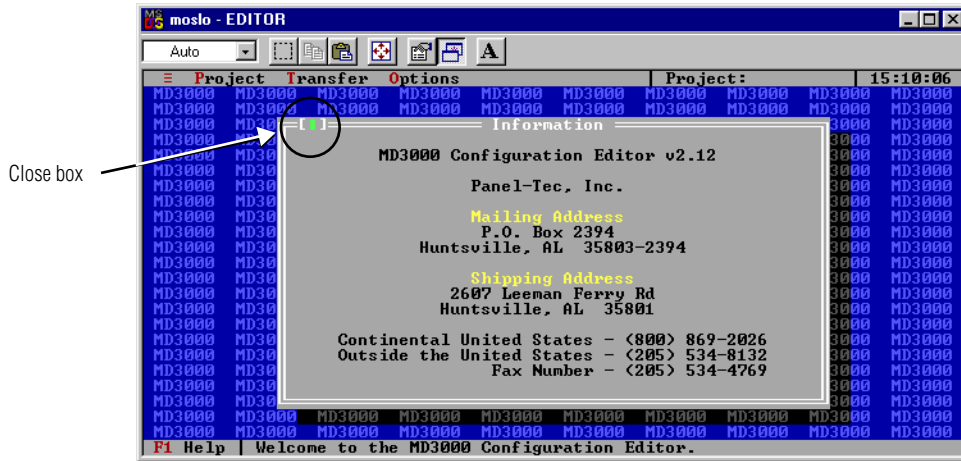
C	1188-9101	<p>DB25-to-3-wire cable to Port 2: to sign</p> <p>to sign</p> <p>to Modular Network Adapter Stripped wires (RS485)</p> <p>Modular Network Adapter</p> <p>MD3000 DB25 Male (RS485)</p> <ul style="list-style-type: none"> 23 Tx+ 24 Rx+ 21 Tx- 22 Rx- 01 SHIELD 04 RTS 05 CTS 09 10 11 12 <p>For MD3000 units with revision F or earlier, terminating resistors are provided within the unit. Other terminating resistors in the system must be removed.</p> <p>For MD3000 units with revision G or later, jumpers 9-10 and/or 11-12 must be clipped if terminating resistors are elsewhere in the system.</p>
D	1088-8000	RS485 cable
E	4331-0602	Modular Network Adapter (NOTE: On some ALPHA signs, this adapter is inside the sign.)
F	1088-8636	1 foot, 4-conductor RS485 cable (NOTE: If the Modular Network Adapter is inside the ALPHA sign, this cable is not necessary.)
G	1088-9105A	DB25-to-DB9 adapter (for DB25 computer COM port)

MD3000 Setup Instructions for the Gateway in the Slave Mode

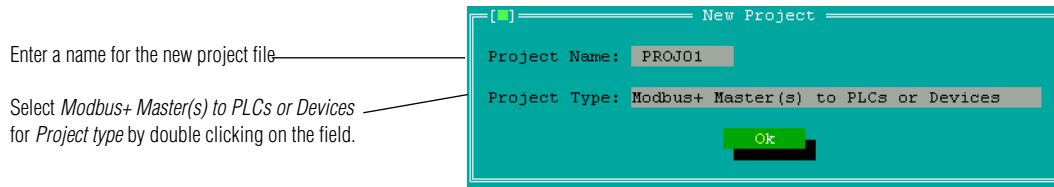
1. Attach a personal computer to the MD3000. (See “MD3000 interconnection diagram” on page 3.)
2. Put the MD3000 into Configuration Mode by setting DIP switch 3 to the ON position.
3. If not already installed, install the **MD3000 Configuration Editor** DOS software on the personal computer that will be used to program the MD3000.

Project file creation

4. Start the **MD3000 Configuration Editor** software. A screen similar to the following will appear.



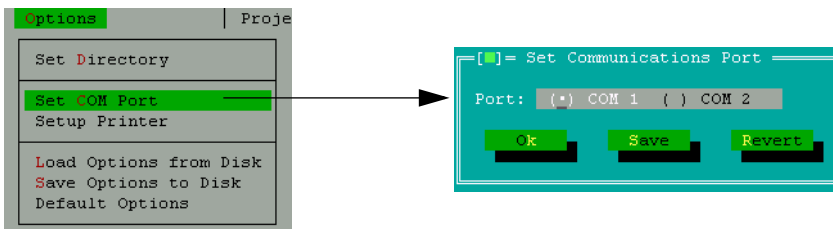
5. Create a new file by selecting *Project > New*.



6. Click *Ok* and then save the project by selecting *Project > Save*.

COM port setup

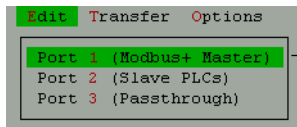
7. Select *Options > Set COM Port* and choose the PC COM Port you will use to communicate with the MD3000. (The default is COM 1.)



8. Select *Save*. You will be notified that the information was saved. Click *Ok* to exit this screen.
9. (Optional) Once a COM Port is selected, you may wish to save this setting by selecting *Options > Default Options*. If you do not do this, the COM port setting may revert to a former setting. The COM port setting is not part of the project, so saving the project will not save the COM port setting.

PLC communication (Port 1) setup

10. Select *Edit > Port 1 (Modbus+ Master)* to set up Port 1 on the MD3000.



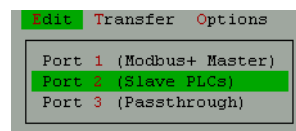
See your industrial network administrator for the *Modbus Plus Address of MD3000*.

11. Select the *Modbus Plus Node Address of MD3000*. (See your network administrator for the correct address.)

12. Select *Save*. You will be notified that the information was saved. Click *Ok* to exit this screen.

ALPHA sign communication (Port 2) setup

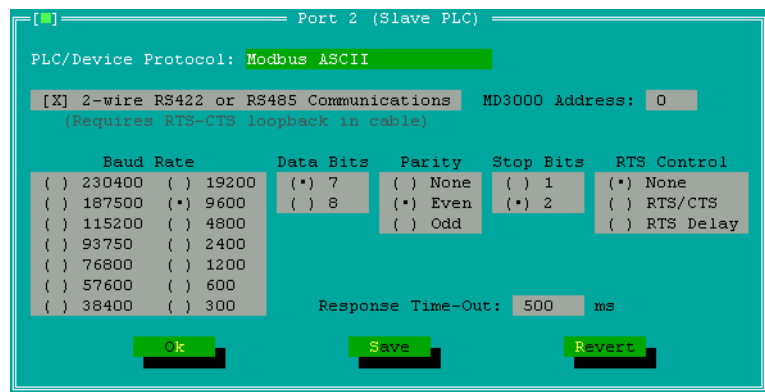
13. Select *Edit > Port 2 (Slave PLCs)* to set up the MD3000 so that it can communicate with ALPHA signs equipped with the Gateway firmware option.



14. Click once in the field for *PLC/Device Protocol*, use the scroll bar and select *Modbus ASCII* by double clicking on it. Also select *2-wire RS422 or RS 485 Communications* by clicking in the box.

Use these settings for Port 2:

- *PLC/Device Protocol* = **Modbus ASCII**
- *Communications*: **2-wire RS422 or RS485**
- *MD3000 Address*: **0**
- *Baud Rate*: **9600**
- *Data Bits*: **7**
- *Parity*: **Even**
- *Stop Bits*: **2**
- *RTS Control*: **None**
- *Response Time-Out*: **500 ms** (recommended)



15. Save the settings for Port 2. You will be notified that the information was saved. Click *Ok* to exit this screen.

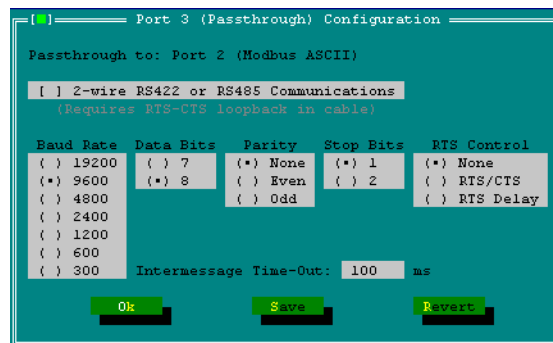
“Passthrough” (port 3) setup

16. Select *Edit > Port 3 (Passthrough)* to set up Port 3.

These are the default settings.

Use these settings for Port 3.

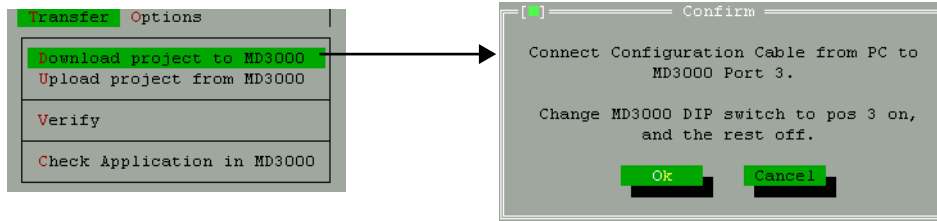
- *Communications*: Leave unchecked for **RS232**
- *Baud Rate*: **9600**
- *Data Bits*: **8**
- *Parity*: **None**
- *Stop Bits*: **1**
- *RTS Control*: **None**
- *Intermessage Time-Out*: **100 ms**



17. Save the settings for Port 3. You will be notified that the information was saved. Click *Ok* to exit this screen.

Downloading the project settings to the MD3000

18. If you haven't already done so, put the MD3000 into Normal Operating Mode by setting all DIP switches to the OFF position.
19. After you have completed making changes to the setup parameters, download the project settings to the MD3000 by selecting *Transfer > Download project to MD3000* and follow the prompts, such as shown here.



Safety and troubleshooting

When successfully connected to a Modbus Plus industrial network, there should **always** be some type of message on each ALPHA sign connected to this network:

PROBLEM:	No message appears on ALPHA sign	“No Network Activity” message appears on ALPHA sign	“NO BACKGROUND MESSAGE” ¹ appears on ALPHA sign
Possible Cause:	<ul style="list-style-type: none"> • Network wiring fault • PLC fault • MD3000 fault • ALPHA sign fault possible sign hardware failure or a PLC is trying to display a message that was not programmed into the sign). • Message(s) too long for the preset file size • Sign not plugged in 	<ul style="list-style-type: none"> • Network wiring fault • PLC fault • MD3000 fault • ALPHA sign fault • ALPHA sign timeout because there was no network activity for at least 3 seconds 	<ul style="list-style-type: none"> • Sign address not correct. • The sign has not received any message to display. (This is not an error condition). • Sign is receiving information, but the information is not for this sign.

¹ This is called the “background message”. The Gateway Messaging Software can be used to change the wording of this message.

Messaging example

To help you understand how to program the MD3000 and how it works with a PLC and ALPHA signs, a complete messaging example follows.

The big picture

How to get PLCs to communicate with ALPHA signs

	What	How
1.	Program Gateway device (Map messages and variables to one or more ALPHA signs)	Gateway device (e.g., Modbus Plus) software (different for each manufacturer)
2.	Create messages and variables and store them in ALPHA sign(s)	Gateway Messaging Software (created by Adaptive)
3.	Program the PLC (associate machine “actions” with the messages and variables created in Step 1 above)	PLC software (different for each manufacturer)

The example

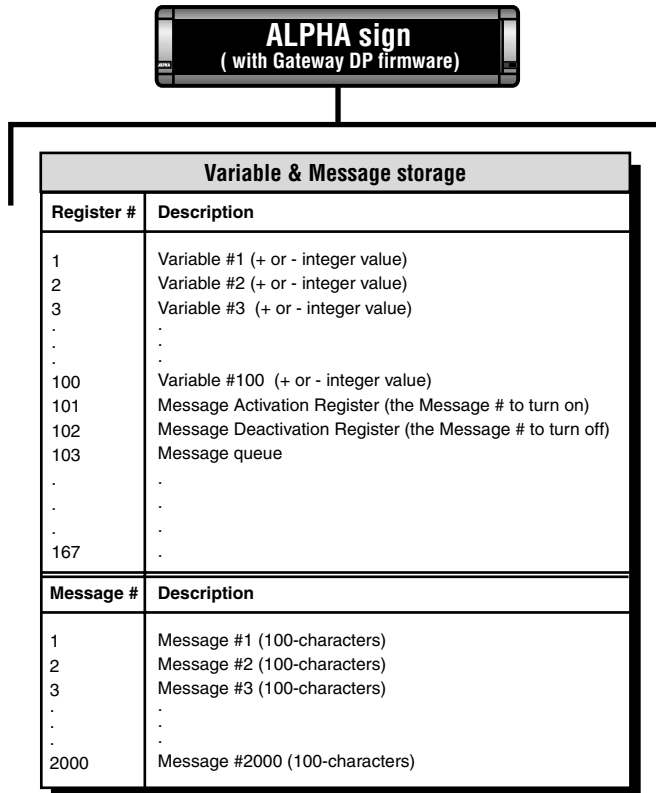
Here’s the situation:

- In this example factory, there’s a conveyor belt and an automated lathe connected to a Modbus Plus PLC (whose address = 5). This PLC is connected to a MD3000 (whose address = 3) and to two ALPHA signs (whose addresses are 7 and 8).
NOTE: Sample PLC register addresses are used below.
- On the ALPHA sign with address = 7, you want to display messages about the conveyor belt: *Conveyor Belt Speed = [a number representing the belt speed]*, *Conveyor Belt Off*, and *Motor Overload*.
- On the ALPHA sign with address = 8, you want to display messages about the automated lathe: *Lathe On* and *Lathe Off*.

These are the steps to follow for this example:

1. Using the **Gateway Messaging Software**, program the messages — and the one variable — into each of the two ALPHA signs. The illustration below represents the type of information stored in each sign:

How messages and variables are stored inside ALPHA signs



For the ALPHA sign with address = 7:

- Message #1 = *Conveyor Belt On: Speed* = [the speed is contained in Variable #1]
- Message #4 = *Conveyor Belt Off*
- Variable #1 = conveyor belt speed
- Message #5 = *Motor Overload*

For the ALPHA sign with address = 8:

- Message #2 = *Lathe On*
- Message #3 = *Lathe Off*

2. Using the software that came with it, program the Modbus Plus PLC that will be sending information to the MD3000.
3. Using the **MD3000 Configuration Editor** software, program the MD3000.

4. The complete setup for the PLC, MD3000, and ALPHA signs looks like this:

