M340 Modbus Plus Proxy Module

User Guide

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Follow all local and national safety codes and standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

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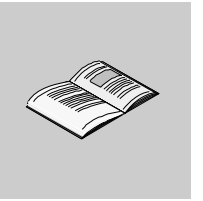

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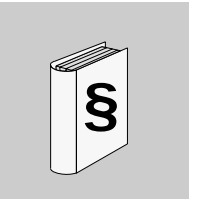
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

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

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION
CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

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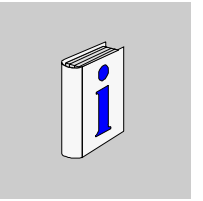
A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This manual describes the installation and configuration of the TCSEGDB23F24FA M340 Modbus Plus Proxy module (M340 EGD) allowing the integratation of an M340 PLC into a Modbus Plus network.

NOTE: The M340 EGD is also available with a conformal coat. The part number for this version is TCSEGDB23F24FK.

Validity Note

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Related Documents

Title of Documentation	Reference Number
Modicon M340 using Unity Pro: Processors, Racks and Power Supply Modules	35012676 (English), 35012677 (French), 35013351 (German), 35013352 (Italian), 35013353 (Spanish), 35013354 (Chinese)
Modicon M340 for Ethernet Communications Modules and Processors	31007131 (English), 31007132 (French), 31007133 (German), 31007134 (Spanish), 31007493 (Chinese), 31007494 (Italian)
Modicon Modbus Plus Planning and Installation Guide	31003525 (English), 704244 (French), 31006934 (German), 31006935 (Spanish)
Unity Pro Program Language and Structure Reference Manual	35006144 (English), 35006145 (French), 35006146 (German), 35006147 (Spanish), 35013361 (Italian), 35013362 (Chinese)

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User Comments

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Introduction

1

Introduction

The chapter begins with an introduction of the M340 EGD module and a discussion of its role as the Modbus Plus interface for the M340 PLC. It includes a description of the major characteristics of Modbus Plus.

What's in this Chapter?

This chapter contains the following topics:

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M340 EGD Overview	12
Integrating Modicon M340 on Modbus Plus	14
Physical Description	17
About Modbus Plus	19
M340 Offset Data Management	20

M340 EGD Overview

General Description

The M340 EGD is a network device that allows the Unity M340 PLC to communicate with legacy Modbus Plus devices. Existing Modbus Plus device applications do not have to be modified to communicate with M340. The M340 EGD accommodates PLC CPU platform addressing and communications function differences between M340 and other PLC platforms (including 984LL). The M340 EGD is a key component for Modbus Plus PLC users looking to introduce the M340 to their Modbus Plus network, or to incrementally migrate from other PLC models to M340 and Unity.

The M340 EGD operates by continuously exchanging data between the Ethernet interface of M340 and a Modbus Plus network, including Modbus Plus Peer Cop and Global Data. This allows the M340 to participate as a Peer Cop or Global Data node in a Modbus Plus network. The data is refreshed cyclically with the Modbus Plus token rotation *(see page 119)*.

The M340 EGD monitors the operational state of the M340 PLC. When M340 PLC operational state is in *Run mode* the M340 EGD will check the PLC operational state at a rate of 1/2 the *Peer Cop Health Timeout*. If the PLC operational state goes to *Stop mode* the M340 EGD will stop sending Peer Cop and Global Data. When M340 PLC operational state is in *Stop mode* the M340 EGD will check the PLC operational state at a rate of 10 ms. If PLC state goes to *Run mode* the M340 EGD will start sending Peer Cop and Global Data.

The M340 EGD uses 5 of the 8 available transactions processed per M340 CPU scan, allowing additional transactions for Unity programming and monitoring of M340. For peer to peer M340 communications over Ethernet, an M340 NOE is recommended to allow the M340 access to the M340 EGD.

Unity programming is also supported through the M340 EGD from a Modbus Plus equipped Unity station to the M340.

How the M340 EGD Manages Modbus Plus Nodes and the M340 Platform

The M340 EGD accommodates the register types and starting address differences between Modbus Plus nodes and the Unity M340 platform.

NOTE: Legacy Modbus Plus devices support four data types: 0x, 1x, 3x and 4x. The M340 on Unity supports two data types: %M (bits) and %MW (words).

The M340 EGD uses an offset value applied to 1x and 3x registers to separate them from 0x and 4x. The offset value used by the M340 EGD points to a location in M340 memory separate from 0x and 4x requests. This requires that the M340 application 0x requests for output bits are passed on to %M location in M340 by the M340 EGD, while requests for 1x input bits are redirected by the M340 EGD to a separate %M location.

The same applies for 3x and 4x. Requests for 4x are passed on natively to %MW memory locations while the requests for 3x are redirected to a separate location in %MW M340 memory.

There is also a feature in the M340 EGD to increment requests by 1 for applications that have been converted from Concept/ProWORX to accommodate the differences in starting register locations between platforms. The M340 CPU starts addressing at %M0 and %MW0. Concept/ProWORX application CPUs start at 000001, 100001, 300001 and 400001. Applications converted from Concept and ProWORX will have a starting register of %M1/%MW1. The *offset by 1* feature of the M340 EGD redirects communications by 1 to reflect the difference.

For more information about M340 offset register management and configuring offsets *(see page 70)*.

Configuring the M340 EGD

The M340 EGD is configured by means of an on-board web server *(see page 63)*. The web server can be accessed using Microsoft Internet Explorer 6.0 or higher and Java 1.5 or higher. For any configuration change to take effect, the change must be saved in the M340 EGD. The M340 EGD must then be rebooted, which can be done remotely via the web interface. In addition, M340 EGD configuration files can be backed up to your PC and restored from your PC to the M340 EGD using the M340 EGD Configuration Management Utility. You can also export and then print (in Microsoft Excel) concise reports of the current M340 EGD configuration with the same utility.

Connecting the M340 EGD

The M340 EGD Ethernet interface should be directly connected to the M340 CPU Ethernet port or an M340 NOE. Because the connection from the M340 EGD to the M340 CPU Ethernet interface is RJ45 Ethernet, cabinet location of the M340 EGD is flexible up to 100 meters.

NOTE: Install the M340 EGD close enough to the M340 to allow visual diagnostics.

Other Features of the M340 EGD

The M340 EGD uses LED diagnostic flash codes consistent with other Modicon Modbus Plus products and supports:

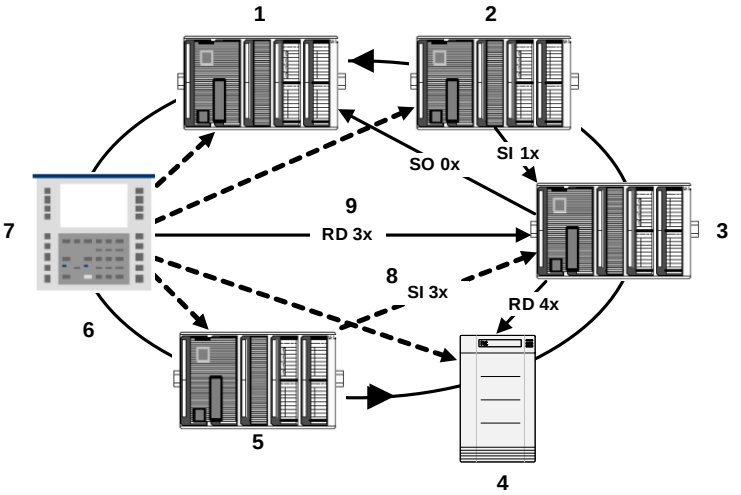
- redundant Modbus Plus cabling
- redundant 24 Vdc power connections, which can include the M340 24 Vdc sensor bus power supply output as a source

Integrating Modicon M340 on Modbus Plus

A Typical Compact Modbus Plus Network Example

The following illustration shows a typical Compact Modbus Plus installation with Modbus functions, Peer Cop, and global data communications. It consists of:

- Compact PLCs
- a SCADA device
- a drive or RTU

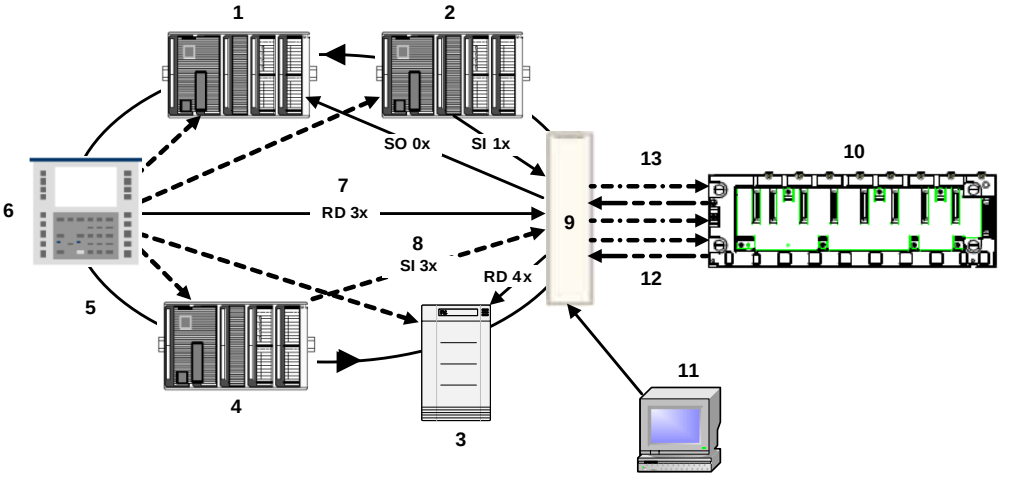


Label/Symbol	Meaning
1	Compact PLC 1
2	Compact PLC 2
3	Compact PLC 3
4	Drive or RTU
5	Compact PLC 4
6	Modbus Plus token rotation
7	SCADA
8	Modbus Function
9 	Peer Cop/Global Data
SI	Specific Input
SO	Specific Output

A Migrated Compact Modbus Plus Network to Modicon M340 Example

The following illustration shows what an integrated Compact Modbus Plus installation looks like when it is migrated to a Modicon M340 system would look like. It consists of:

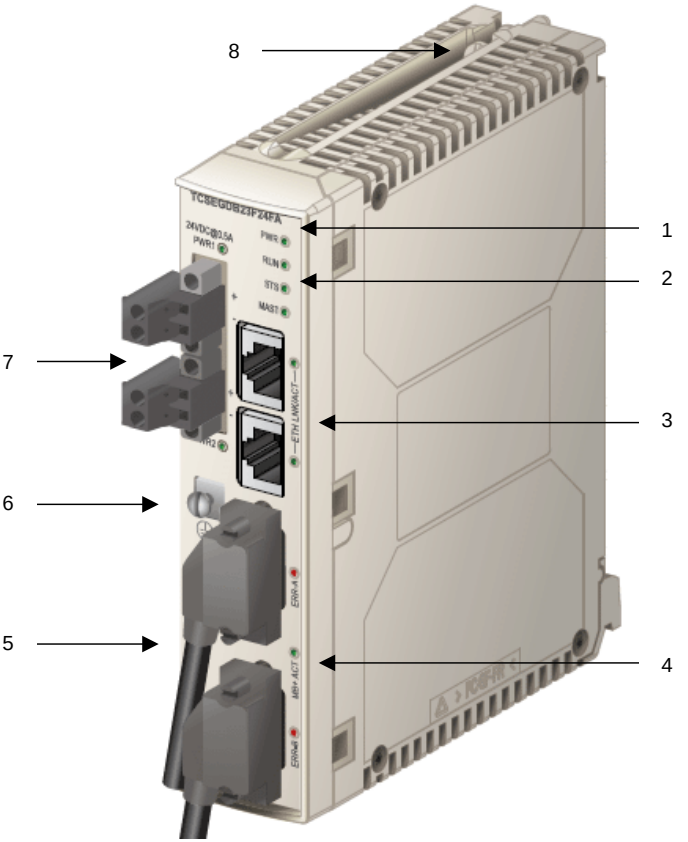
- a Compact Modbus Plus network
- a M340 EGD connected to:
  - a Unity PC
  - Modicon M340



Label/Symbol	Meaning
Compact Modbus Plus Network	
1	Compact PLC 1
2	Compact PLC 2
3	Drive or RTU
4	Compact PLC 3
5	Modbus Plus token rotation
5	SCADA
7	Modbus Function
8	Peer Cop/Global Data
SI	Specific Input
SO	Specific Output
Modicon M340 Network with M340 EGD	
9	Modicon M340
10	M340 EGD
11	PC with Internet Explorer and Unity
Ethernet (Offset Handling)	
12	Redirected
13	Not Redirected

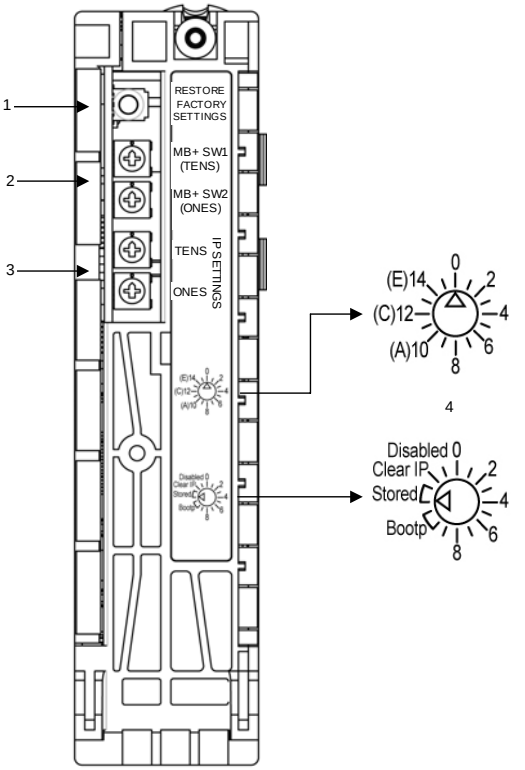
Physical Description

Front Panel View



1. Product number
2. Module status LED Display: Indicates the operating status of the module *(see page 56)*
3. Dual Port Ethernet connectors and activity LEDs
4. Redundant Modbus Plus connectors and Modbus Plus activity/status LEDs
5. MAC label: Indicates the module's global Ethernet MAC address assigned at the factory
6. PE (protective earth ground) screw terminal
7. Redundant power supply connectors and LEDs
8. Mounting plate screw

Rear Panel View



1. Restore Factory Settings switch *(see page 39)*
- Depressing the switch for 5 s sets the M340 EGD to its factory default settings. A power cycle is required for the settings to take effect.

NOTE: The user name and password are **not** reset to the factory default values.

2. Modbus Plus address rotary switches *(see page 37)*
- Upper rotary switch: MB+ SW1 (TENS)
- Lower rotary switch: MB+ SW2 (ONES)

3. IP rotary switches *(see page 38)*
- Upper rotary switch (TENS)
- Lower rotary switch (ONES)

4. IP rotary switch labeling
- Upper rotary switch (Tens)
  The switch is labeled with settings 0 to 15.
- Lower rotary switch (Ones)
  The switch is labeled with settings 0 to 15, including Bootp (settings 10 and 11), Stored (settings 12 and 13), Clear IP (setting 14), and Disabled (setting 15).

About Modbus Plus

Communication Method

The Modbus Plus protocol is based on a logical token bus (token rotation). Each node on the network needs to be assigned a unique address in the range 1 to 64, and a node can access the network once it receives the token. A Modbus Plus communication channel supports three primary functions:

- Point-to-point data exchanges between nodes using the MSTR function block. The MSTR function block can be used for transferring, reading and clearing statistics, and accessing the network's global database. The MSTR is a general function for transacting messages with any type of networked node. It is programmed into the user logic program of the legacy controller.

NOTE: Quantum PLC/Compact PLC use the MSTR function block;
Premium PLC/M340 PLC use Read_Var and Write_Var functions instead. Refer to the appendix for an example of using the Read_Var function block *(see page 123)*.

- Cyclic broadcast exchanges of global data between participating nodes.
  When a node rotates the token, it can broadcast up to 32 words (16 bits each) of global information to all other nodes on the network. The information is contained in the token frame. The process of sending global data when transmitting the token is controlled independently by the application program in each node.
- Multi-point exchange of specific data via Peer Cop.
  Specific inputs and outputs act as a point-to-point-service. Every message contains one or more receive addresses for transferring the data. This function enables data to be forwarded to several stations without repetition.

Modbus Plus networks can be interconnected using Modbus Plus bridges. The M340 EGD supports full 5 byte routing across up to 4 Modbus Plus networks to a node destination.

For more information, refer to the *Modbus Plus Network Planning and Installation Guide* (890 USE 100).

M340 Offset Data Management

Understanding why M340 Data is Offset

The starting location for bits in an M340 PLC is %M0. Because legacy Modbus Plus input (1x) and output (0x) bits are both referenced by %M, inputs must be stored separately from outputs in a separate M340 PLC memory location. Outputs in the M340 PLC read from Modbus Plus nodes are directed as programmed, but the M340 must place input bits in an available memory location apart from the output bits.

The M340 application must be modified to separate the 1x %Ms from 0x %Ms, as well as 3x from 4x. The programmer needs to identify the input bits and registers and locate them elsewhere in M340 memory. Where they are relocated determines the offset for Modbus Plus functions such as HMI, SCADA, and MSTR. Note that the 1x/3x offset values do not apply to Peer Cop and global data source or destination. You must insert the exact location from which to retrieve or to send global data and Peer Cop data.

Data Type Offsets

An offset is a method of separating data in a device. This feature is used in the M340 EGD because the memory structures of the M340 PLC and Compact PLCs are different. The Compact PLCs support four memory address types, while the M340 PLC supports just two memory types.

To allow these different PLC types to communicate, the M340 PLC register types must be further divided into four types to inter-operate with Compact PLCs. The method for doing this is offsets.

Compact PLC	M340 PLC	M340 PLC using the M340 EGD
0x output bits	%M IO bits	%M output bit memory space
1x input bit		%M input bit memory space (offset)
3x input registers		%MW input register memory space (offset)
4x holding registers	%MW registers	%MW holding register memory space

To manage the offsets, the M340 PLC application must provide range in memory to separate the two different bit types and the two different register types. The M340 PLC application allocates a memory range for:

- %M I/O bits
- %MW register words

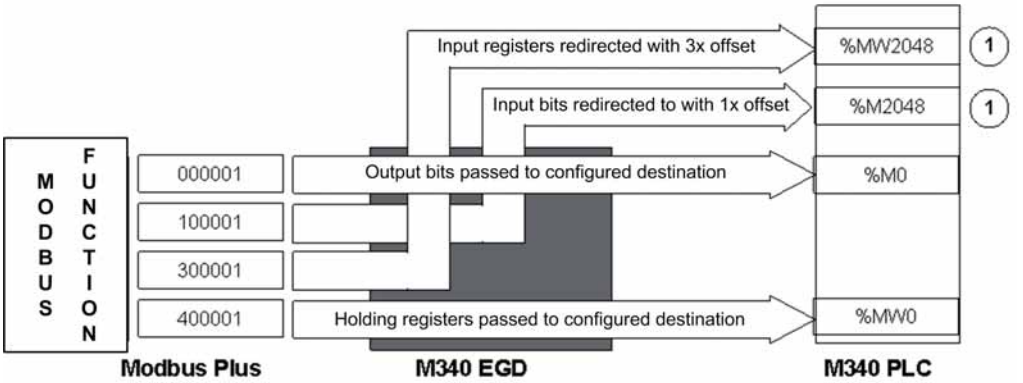
Without this separation by allocating memory, communication requests from a Compact PLC and M340 PLC would be reading and writing to the same memory range. For example a Compact request for 00001 and 100001 would both be passed to %M0.

To manage this conflict, the M340 PLC programmer identifies two additional memory ranges for input bits and input registers. When developing the M340 PLC application, choose a free range in memory for %M input bits and %MW input registers large enough to accommodate the application. The difference between the starting location %M0 for example, and the starting location for input bits is called the *offset*.

The default offset range for input bits (1x data type) and input registers (3x data type) is 2048. This is an upper memory area that is out of reach for default Compact PLC applications but easily addressable using the increased memory capacity of M340. Using default offset ranges, communications from a Compact PLC are forwarded directly or redirected to the offset range depending on the data type. Only the 1x and 3x Modbus functions are redirected.

NOTE: The automatic application of the offset redirection only applies to Modbus functions such as MSTR blocks on Compact PLC's, HMI and SCADA type requests. Peer Cop and global data functions are not automatically redirected to the offset range space.

An example of a SCADA system on Modbus Plus making four Modbus function requests for different data types would be as follows using the default 2048 offset for 1x and 2048 for 3x.

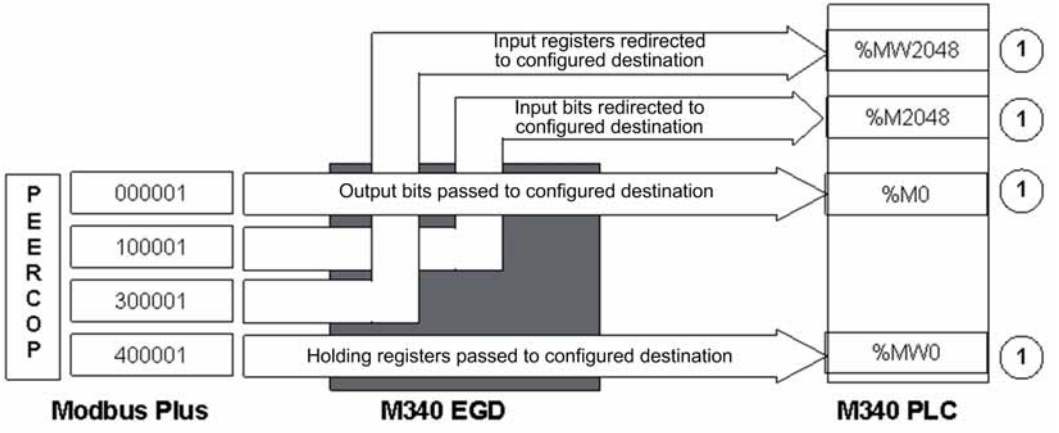


(1) Modbus function such as MSTR, HMI, and SCADA requests have the configured 1x/3x offset automatically applied only to 1x and 3x functions. 0x and 4x functions are passed through without offfset

Compact PLC	M340 EGD	M340 PLC
SCADA requests 000001	passes the request	request received at %M0
SCADA requests 100001	redirects the function with offset	request received at %MW2048
SCADA requests 300001	redirects the function with offset	request received at %M2048
SCADA requests 400001	passes the request	request received at %MW0

M340 Applications and Data Type Offsets

The offset values for the redirected data types, 1x and 3x are user-configurable. The M340 PLC application programmer must locate objects that represent input bits and input registers in the M340 PLC application. Objects representing input bit are located in the %M offset range space and objects representing input registers are located in the %MW offset range space.



(1) M340 PLC source or destination for Peer Cop / Global Data must be directly entered using the actual location in the Peer Cop or Global Data web pages. The **1x/3x offset is not applied to Global Data / Peer Cop.** The default starting values are shown.

Evaluate your M340 PLC application and find a range of free memory to locate the objects representing the two additional object data types for input bits and input registers. Assign the starting memory location of that range as your M340 EGD offset value for each of the two data types.

Legacy Compatibility Offset Option

The Legacy Compatibility option is used to accommodate applications that have been converted to Unity from legacy platforms such as Concept, ProWORX, or Modsoft. Because of the different memory structures of the M340 PLC and 984 type platforms, there is a difference in the starting register. The starting registers for 984 PLC systems are 000001, 100001, 300001 and 400001. The starting registers for the M340 PLC are %M0 and %MW0.

When an application is converted from 984 to Unity on the M340 PLC, the registers are located plus 1 from the starting address. For example, after conversion, 400001 ends up after conversion at %MW1 instead of the M340 PLC starting register of %MW0.

With the legacy compatibility offset option OFF, Modbus Plus requests to the M340 PLC for register 400001 would be forwarded to %MW0. To access the location where the converted value is, the legacy compatibility option ON offsets this request plus 1 to %MW1 where the register actually resides. See the following table for examples with and without the legacy compatibility option.

A converted application with the legacy compatibility option **off**:

Modbus Plus Request	M340 EGD	M340 PLC
000001	no offset	%M0
100001	redirect with offset	%M2048
300001	redirects with offset	%MW2048
400001	no offset	%MW0

A converted application with the legacy compatibility option **on**:

Modbus Plus Request	M340 EGD	M340 PLC
000001	no offset + 1	%M1
100001	redirect with offset	%M2049
300001	redirects with offset	%MW2049
400001	no offset + 1	%MW1

NOTE: The Legacy Compatibility Option applies to Modbus function requests (MSTR, SCADA, HMI) and Peer Cop global data requests.

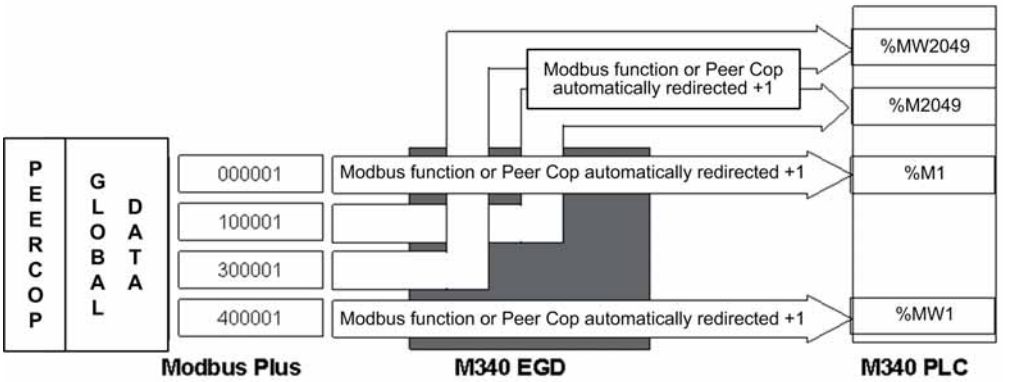
Though requests are redirected by the M340 EGD, responses are returned to the normal requested response location. The operation of this option is transparent to the requesting Modbus Plus nodes. This allows existing Modbus Plus nodes to communicate unmodified with the different memory structure of the M340 PLC.

NOTE: Enabling or disabling the Legacy Compatibility option will automatically update your configuration table for global data and Peer Cop.

Peer Cop, Global Data, and Offsets

Peer Cop and global data do not apply Data Type Offsets, but do apply the Legacy Compatibility Option offset. Recall that data type offsets only apply to Modbus function requests. When entering source and destination reference locations for Peer Cop and global data you must enter the actual location of the data object where it exists in the M340 PLC. If you select the Legacy Compatibility Option, all Peer Cop, Modbus functions, and global data requests are redirected with an offset +1.

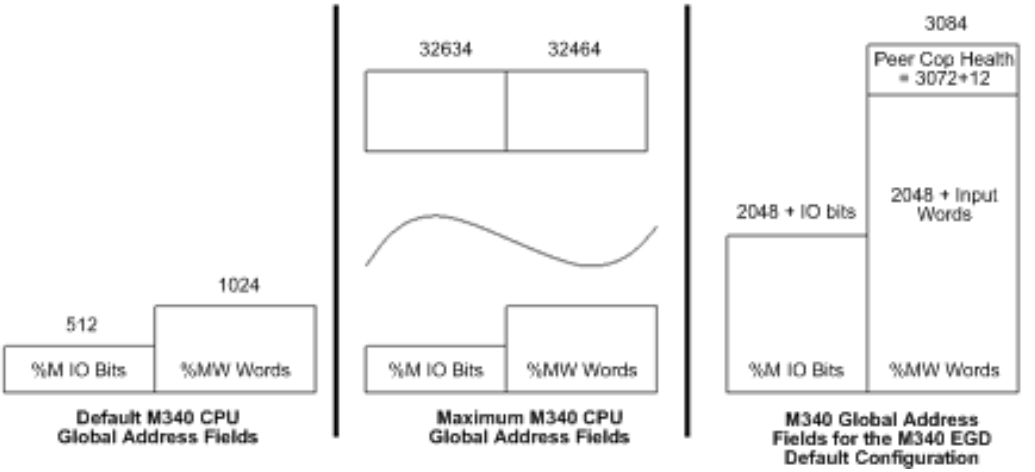
For example if you have relocated your M340 PLC input bits and input registers using the default setting of 2048, enter the following values for Peer Cop. This example represents the 4 different data type options for Specific Input to receive data from another Modbus Plus node for each of the data types starting register. Note that the location for input bits (1x) and input registers (3x) must be explicit and the data objects must exist in the M340 PLC application at the locations shown.



NOTE: Modbus function and Peer Cop messages are automatically redirected +1 to accomodate the difference in starting registers for a converted 984 programming application.

Setting the M340 Global Address Fields

Configure the M340 CPU PLC memory to accommodate 2048 %M IO bits plus the number of inputs required for your application and 3084 %MW words. For %MW words, there is 1024 words for the input registers between the default starting offset of 2048 and the starting default offset for Peer Cop Health 3072+12 words. You can adjust these values to your application as required.

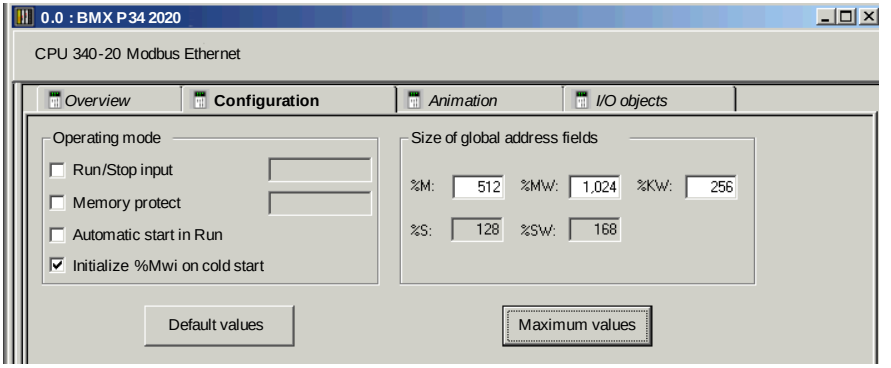
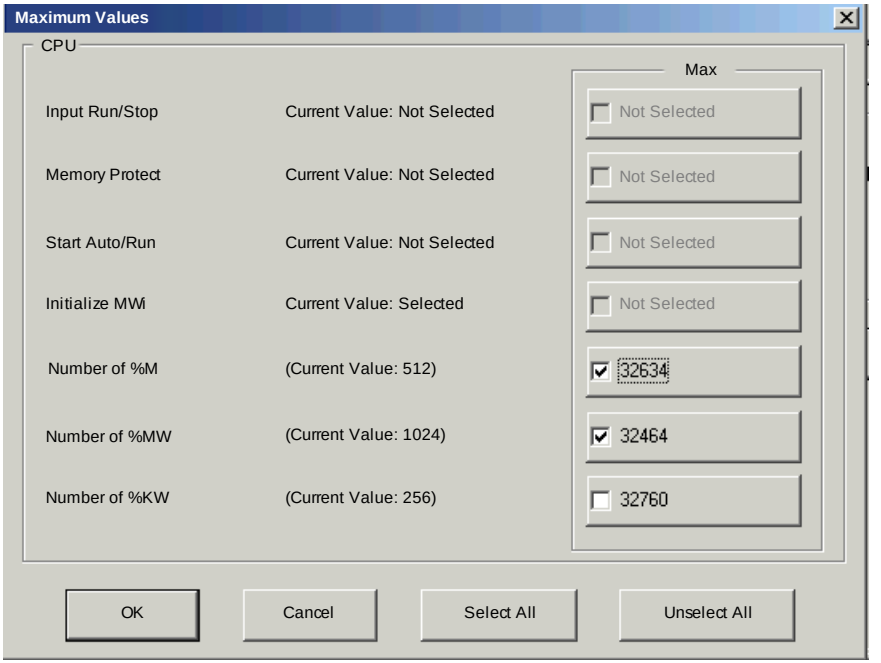


Peer Cop Health writes 12 words to the M340 CPU starting by default at %MW3072. To accommodate the Health block at this default location, configure the CPU for a minimum of %MW3084 words. If these 12 words are not configured in the CPU and reserved for the Health block, Peer Cop and Global Data services are disabled on Modbus Plus.

Using Comm Functions in the M340

When using Comm functions such as Read_Var or Write_Var in the M340 CPU, insert a nonzero value in the timeout register of the Management Parameter table of each function. A value of zero in the register imposes an infinite timeout, and you will not be able to recover the function after a connection has been interrupted.

To set the %MW and %M to maximum, perform the following procedure:

Step	Action
1	In Unity Pro, click the **Configuration** tab of the M340 CPU and the **Default values** or **Maximum values** button as required. **NOTE:** The values used are configurable. Any values for partitioning can be used as long as the M340 EGD is reading and writing to a valid M340 address location. 
2	In the Maximum Values screen, make sure Number of %M and Number %MW in the Max field have been checked off. 
3	Click **OK**.

Planning M340 Memory Partitions with the M340 EGD

The objective is to identify the starting location of free memory in which to locate input bits and input registers. This requires evaluating the highest memory address location of output bits and holding registers. You need to identify an area above those values to locate a starting range for input bits and registers.

For example, if your M340 PLC application maintains an address location for output bits of 000512 or %M512, you need to establish a 1x offset of 513 or above to prevent an overwrite conflict. If your application maintains an address location for holding registers of 401840, you need to establish 401841 or greater for input registers. In both cases, establish in the memory partitioning enough addressable space to accommodate the application.

	Existing Application Memory	**Input Bits or Registers**	**Offset**	**M340 Partition**
Output Bits	000512	512	513	1025+
Holding Registers	401840	1024	1841	2865+

You must make sure that the 1x/3x offset plus the addressable input bits and registers are a valid, partitioned memory location in the M340 PLC. Not allocating addressable memory will result in the M340 EGD recording Modbus Exception errors writing to that location. Refer to the M340 EGD RUN LED *(see page 56)* flash code status. The M340 EGD will flash the RUN LED 3x at 500ms intervals if the area of memory in the M340 PLC is not available and the M340 EGD configuration is attempting reads and writes to that address location.

M340 EGD Module Specifications

2

M340 EGD Module Specifications

General Specifications

General specifications for the M340 EGD module are described in the following table.

Communication Ports	• two auto-sensing 10/100Base-T shielded twisted pair (RJ-45 connector) ports • two Modbus Plus network DB-9 ports (9-pin connectors)
External Power Supply Voltage	19.2...31.2 Vdc
Current Required	300 mA max
Power Dissipation	6.2 W
External Fuse	None
Operating Conditions	
Temperature	0...+60° C
Humidity	0...95% Rh non-condensing @ 60°C
Altitude	2000 m (6561.68 ft)
Vibration	**Panel Mounting** • 5...11.9 Hz @ ±3.5 mm • 11.9...150 Hz @ 2 g
	DIN Rail Mounting • 5...8.4 Hz @ ±3.5 mm • 8.4...150 Hz @ 1 g
Storage Conditions	
Temperature	–40...+85°C
Humidity	0...95% Rh non-condensing @ 60°C
Free Fall	1 m unpackaged
Shock	+/– 15 g, 11 ms, half sine wave

System and Network Requirements

- Unity Pro XL programming software v3.x or higher
- Internet Explorer v6.0 or higher
- Java 1.5 or higher
- MS Windows XP or Vista
- M340 CPUs
  - BMX P34 2020 CPU (Modbus and Ethernet version)
  - BMX P34 2030 CPU (CANopen and Ethernet version)
- M340 Ethernet Communication Modules
  - M340 BMX NOE 0100
  - M340 BMX NOE 0110

Agency Approvals

- UL: UL 508
- CSA: CSA 22.2.142
- CE: EMI EN55011, EN61131-2
- C-TICK

M340 EGD Module Installation

3

Introduction

This chapter describes the M340 EGD installation, configuration, connections and cabling, power requirements, switch settings, and LED diagnostic indicators.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
3.1	Package Contents	32
3.2	Removing the M340 EGD Mounting Plate	33
3.3	M340 EGD Switches	36
3.4	External Cabling	40
3.5	Connecting the M340 EGD to PE (Protective Earth)	48
3.6	Configuring the IP Address	49
3.7	Mounting the M340 EGD on a Rack or DIN Rail	52
3.8	LED Diagnostic Indicators	54

3.1 Package Contents

Package Contents

Before you begin installing the M340 EGD, review the table below and make sure you have received the following items:

Item	Part Number
M340 EGD Module	TCSEGDB23F24FA **NOTE:** The part number for the M340 EGD with conformal coating is TCSEGDB23F24FK.
TSX57 Mounting Plate	35002713
Power Supply Connectors	Two 2-position front terminal connectors
M340 Modbus Plus Proxy Documentation and User Tools CD	BBV27734
Quick Start Guide	BBV28011
Potentiometer Screwdriver	W4 1402172011

NOTE: A medium-sized (#2) flat head screwdriver is also required for securing the M340 EGD to the mounting plate.

3.2 Removing the M340 EGD Mounting Plate

About this Section

This section provides a description of the M340 EGD mounting plate and instructions for removing the mounting plate.

NOTE: The M340 EGD mounting plate needs to be removed before installation of the M340 EGD and whenever access to the rear panel Modbus Plus rotary switches *(see page 37)*, IP address rotary swtiches *(see page 38)*, or reset button *(see page 39)* is required.

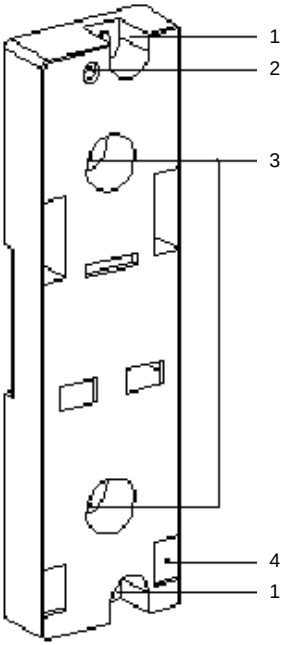
What's in this Section?

This section contains the following topics:

Topic	Page
The M340 EGD Mounting Plate	34
Removing the M340 EGD Mounting Plate	35

The M340 EGD Mounting Plate

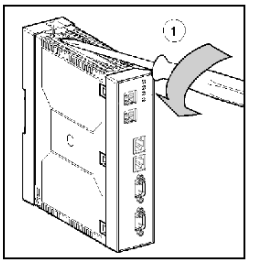
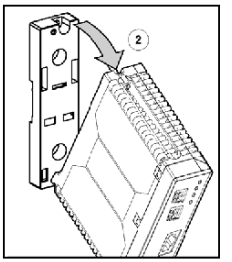
Each M340 EGD comes delivered mounted on a support plate (Part #: 35002712), which allows attachment to either a rack (Part # AM1-DE200 or AM1-DP200) and on a DIN rail (Part # AM1-PA).



1 Two 7/32 in (5.5 mm) holes for securing the plate to a panel or to an AM1-PA pre-slotted plate, with fixing centers of 5.51 in (140 mm, Micro fixing centers). The tightening torque is: 8.85 to 10.62 lb-in (1 to 1.2 n-m).
2 M4 fixing hole for securing the M340 EGD.
3 Two 0.255 in (6.5 mm) holes for securing the plate to a panel or to an AM1-PA pre-slotted plate, with fixing centers of 3.5 in (88.9 mm).
4 Slots to hold the support posts on the back of the M340 EGD.

Removing the M340 EGD Mounting Plate

To remove the M340 EGD from the mounting plate proceed as follows:

Step	Action	Illustration
1	Unscrew the screw at the top part of the module in order to remove it from its mounting plate.	
2	Swing the module forward and disengage the module's pins from the holes situated in the bottom part of the mounting plate.	
3	Make your switch settings *(see page 36)* as required.	

3.3 M340 EGD Switches

About this Section

This section provides the locations and use of the M340 EGD switches for Modbus Plus address settings, local IP address settings, and module reset.

What's in this Section?

This section contains the following topics:

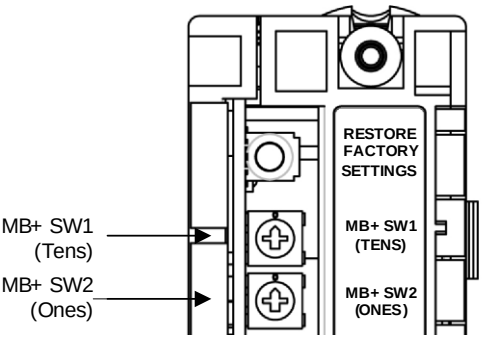
Topic	Page
Modbus Plus Rotary Switches	37
IP Address Switch Settings	38
Restore Factory Settings Button	39

Modbus Plus Rotary Switches

Switch Location

The two blue rotary switches indicated in the figure below are located on the rear panel of the M340 EGD. They are used together to set the Modbus Plus node and Modbus port address for the module. These settings are applied only on power-up.

Rotary SW1 (top switch) sets the upper digit (tens), and rotary SW2 (bottom switch) sets the lower digit (ones) of the Modbus Plus node address.



Address Settings

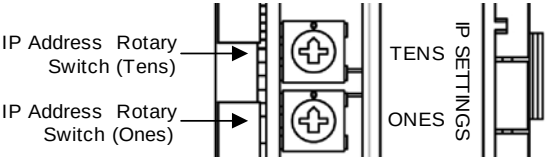
The following table shows the highest valid node address settings for the SW1 and SW2 switches. Any setting above 64 is invalid.

Node Address	SW1	SW2
1 ... 9	0	1 ... 9
10 ... 19	1	0 ... 9
20 ... 29	2	0 ... 9
30 ... 39	3	0 ... 9
40 ... 49	4	0 ... 9
50 ... 59	5	0 ... 9
60 ... 64	6	0 ... 4

IP Address Switch Settings

Switch Locations

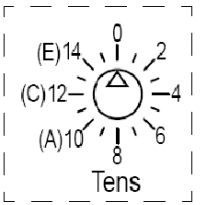
The M340 EGD must obtain a unique IP address, subnet mask, and gateway address to communicate over an Ethernet network. The settings of the two red rotary switches determine the source of these settings. These settings are applied only on power-up. As shown below, the TENS switch is located above the ONES switch.

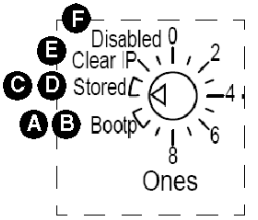


NOTE: If you are required to change the IP address settings, the M340 EGD must be rebooted for the changes to take effect.

Switch Settings

The settings of the rotary switches determine the source of the M340 EGD address parameters as follows:

Switch Location	Positions	Description	Switch Labels
Upper (Tens)	0 to 9	The *tens* value for the device name: (0, 10, 20, ... 90)	
	10(A) to 15(F)	The *hundreds* value for the device name: (100, 110, 120, ... 150	
Lower (Ones)	0 to 9	The *ones* value for the device name: (0, 1, 2, ... 9)	
	BOOTP	Set the switch to A or B to receive an IP address from a BOOTP server.	
	Stored	Set the switch to C or D to use the internally configured IP address. When shipped, the MAC based default address is stored.	
	Clear IP	Set the switch to E to use the default IP MAC based parameters.	
	Disabled	Set the switch to F to disable communications.	

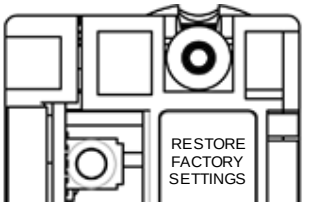


Restore Factory Settings Button

Button Location

A push-button is located at the middle top, facing the rear of the module and is labeled RESTORE FACTORY SETTINGS. The button must be held for 5 s to clear the M340 EGD configuration, including the IP address, and returns the module's default parameter settings. This does not clear the user defined password.

NOTE: A power cycle is required for the settings to take effect.



3.4 External Cabling

About this Section

This section provides information about the M340 EGD external cable connections.

What's in this Section?

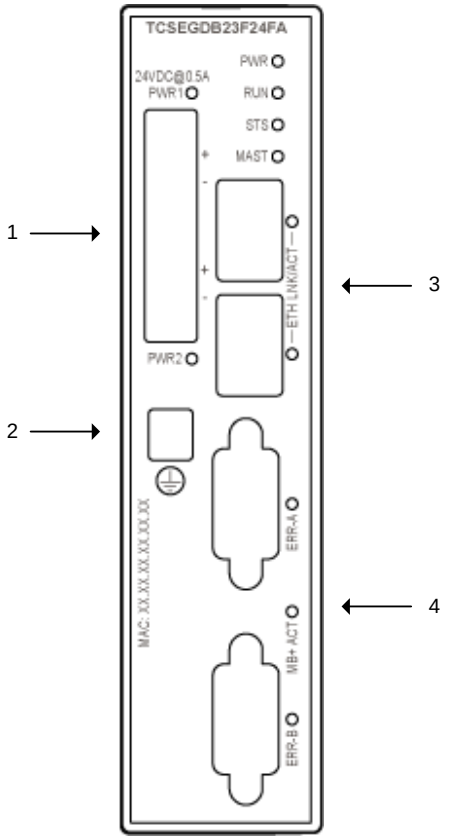
This section contains the following topics:

Topic	Page
Front Panel Connectors	41
Connecting the Power Supplies	42
Connecting to the Modbus Plus Network	43
Connections for Ethernet Communication	44
Connection Example	47

Front Panel Connectors

There are three sets of connectors and the PE (protective earth) screw terminal on the front panel of the M340 EGD:

1 Power supply connectors
2 PE screw terminal
3 Dual port Ethernet RJ45 connectors
4 Modbus Plus connectors



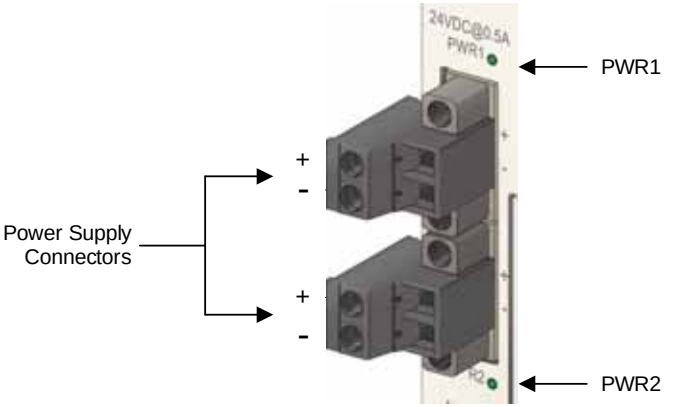
Connecting the Power Supplies

Power Supply Connectors

The M340 EGD comes equipped with two, 2-position front terminal power supply connectors for 24 Vdc primary and redundant external power. The M340 EGD uses only one of the power sources at a time. When ordering spare power supply connectors, contact your Schneider Electric distributor.

Primary power can be supplied to either connection. A redundant power supply is used so that in the event of the primary supply is unavailable, the redundant power supply is able to power the load for uninterrupted system operation.

Each connector has a dedicated LED (PWR1 and PWR2) indicating that the M340 EGD is powered up.



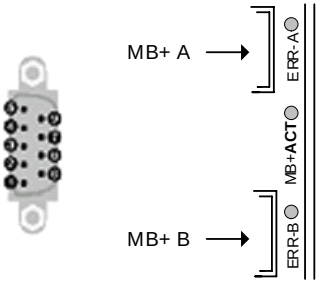
NOTE: Refer to the power supply LED diagnostic table *(see page 60)* for a list of power supply LED connector diagnostic codes.

Connecting to the Modbus Plus Network

Modbus Plus Connectors

The M340 EGD includes two female nine-receptacle SUB-D Modbus Plus network connectors (MB+A and MB+B) for primary and redundant Modbus Plus communication. The connectors are located at the right side bottom, facing the front of the module.

These ports operate as redundant Modbus Plus ports. If communication is lost on one cable path, the other path continues normally.



The connectors include one LED (MB+ACT) indicating network status and two LEDs (ERR-A and ERR-B) indicating communication status. For a list of Modbus Plus diagnostic codes, refer to the Modbus Plus LED diagnostic table *(see page 59)*.

Connections for Ethernet Communication

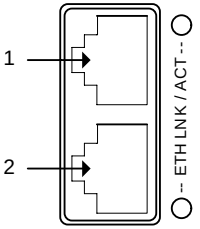
Overview

The M340 EGD module is a device with two embedded Ethernet ports that function as an Ethernet switch. The M340 EGD, Modicon M340, or PC can be connected to either Ethernet port using Cat5e shielded cable.

About the Connectors

The M340 EGD has standard RJ45, 10/100 BASE-T connectors as its Ethernet interface. Either Ethernet port can be used to connect the M340 EGD to the M340 PLC.

Each connector has a dedicated LED indicating Ethernet link status and activity. For a list of Ethernet LED connector codes, refer to the Ethernet LED diagnostic table *(see page 58)*.

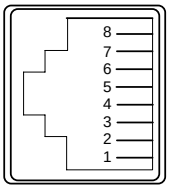


1 **Port 1** (top connector): to the M340 CPU
2 **Port 2** (bottom connector): to the Ethernet network

Pin Assignments

A straight pinned or crossover cable can be used to connect the M340 EGD to the M340 PLC.

NOTE: The M340 EGD supports MDI-MDI-X Autocrossing.



The RJ45 wiring layout for straight-through cables.

RJ-45 Pin
1 Tx+
2 Tx-
3 Rx+
6 Rx-

The RJ45 wiring layout for crossover cables.

RJ-45 Pin	RJ-45 Pin
1 Tx+	3 Rx+
2 Tx-	6 Rx-
3 Rx+	1 Tx+
6 Rx-	2 Tx-

Each RJ45 is an Auto-MDIX (media dependent interface crossover) connector.

The internal Auto-MDIX logic makes the automatic modification of the transmitting and receiving line of a port possible. The connectors automatically sense the:

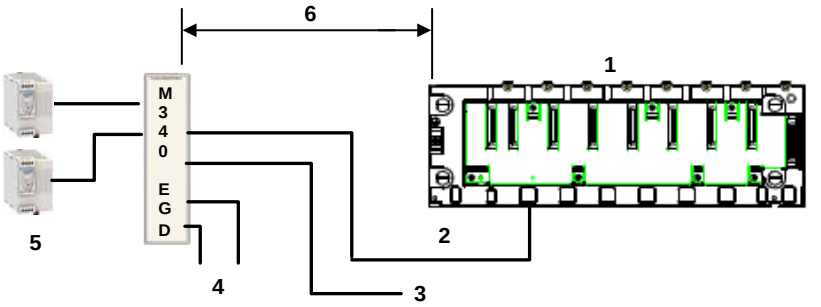
- Cat5e cable type (straight or crossed) plugged into the connector
- pin requirements of the device to which it is connected

Using this information, each connector assigns transmit and receive functions to pin combinations 1 & 2 and 3 & 6 as necessary to communicate with the device at the other end of the cable.

About Cat5e Cable

Cat5e is the current preferred industry standard for network wiring. Cat5e is a shielded twisted pair type cable exclusively designed for high signal integrity and has the following characteristics:

- impedance 100 Ω±15 Ω (from 1 to 16 MHz)
- maximum attenuation 11.5 dB/100 meters
- maximum length 100 meters



1 Modicon M340
2 Ethernet
3 2nd Ethernet port
4 Redundant Modbus Plus
5 Redundant Power Supply
6 Up to 328 ft (100 m)

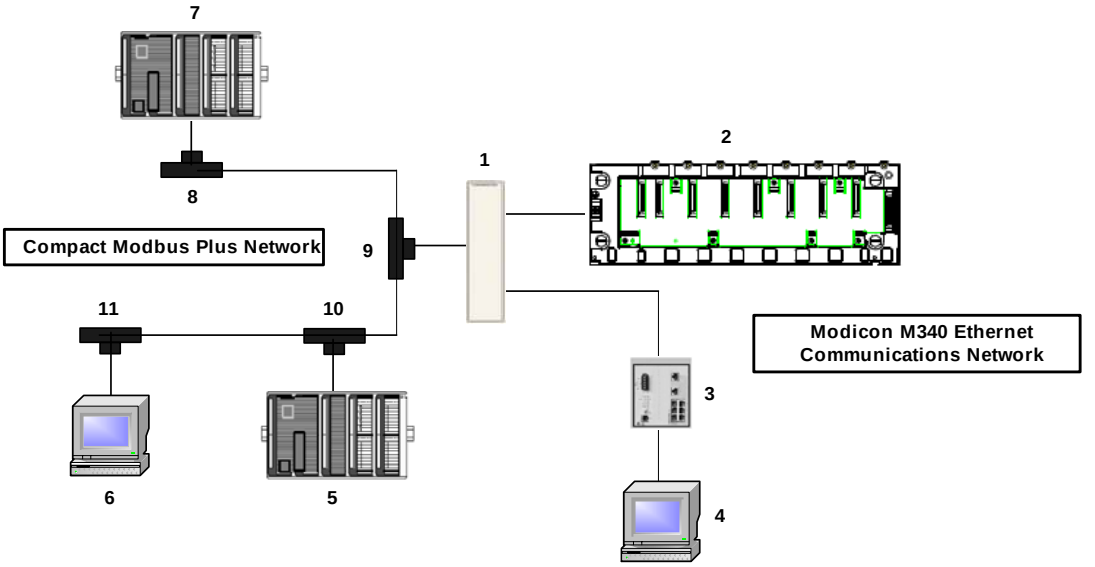
The following straight-through ConneXium cables fit these requirements for connecting terminal devices:

Description	Reference		Length, ft (m)
	EIA/TIA 568	UL/CSA CMG	
Straight-through Cat-5 shielded cable with RJ45 ends	490 NTW 000 02	490 NTW 000 02 U	6.6 (2)
	490 NTW 000 05	490 NTW 000 05 U	16.4 (5)
	490 NTW 000 12	490 NTW 000 12 U	39.4 (12)
	490 NTW 000 40	490 NTW 000 40 U	131.2 (40)
	490 NTW 000 80	490 NTW 000 80 U	262.5 (80)

NOTE: Install the M340 EGD where the M340 EGD diagnostic LEDs can be easily viewed.

Connection Example

The following example is representative of how a Compact Modbus Plus network and a Modicon M340 Ethernet communications network connects to the M340 EGD.



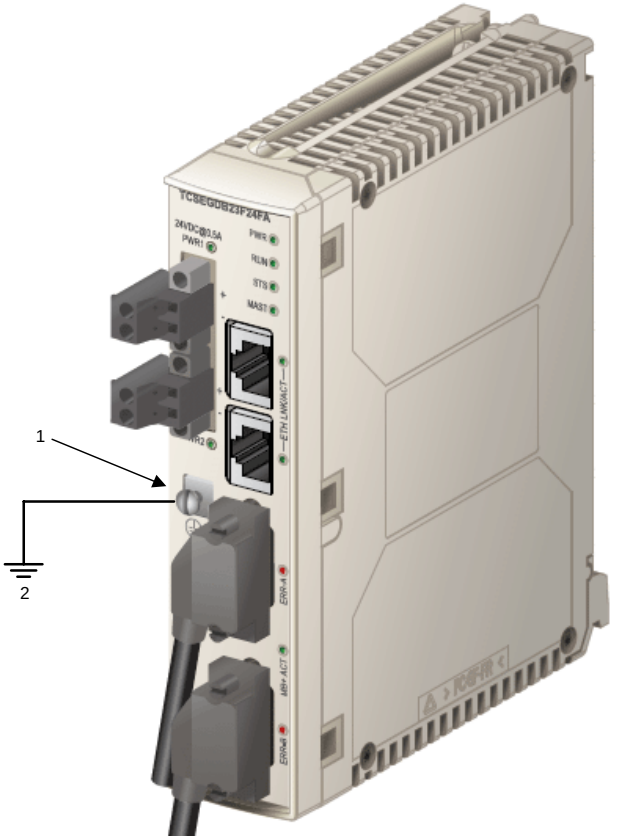
1 M340 EGD
2 Modicon M340
3 Ethernet switch
4 PC with Internet Explorer and Unity
5 Compact PLC 1
6 PC with Unity and Modbus Plus adapter
7 Compact PLC 2
8 ... 11 Modbus Plus taps

3.5 Connecting the M340 EGD to PE (Protective Earth)

M340 EGD PE Connection

How PE Contact is Made

PE is brought to the M340 EGD by a heavy-duty cross-sectional wire, usually a copper braided cable, 10 AWG (4.2 mm^2) or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the M340 EGD just below the redundant power supply connector and is secured by the PE captive screw.



1 captive screw for the PE connection
2 to the PE point on the system

Local electrical codes take precedence over our PE wiring recommendations.

3.6 Configuring the IP Address

The IP Address Configuration Process

Introduction

To use the M340 EGD module's embedded web pages to assign the desired IP address, you can either use the Bootp setting and a Bootp server to assign an IP address, or use the module's default IP address.

The following procedure shows how to access the module using the default IP address.

This process includes the following parts:

- determine the M340 EGD module's default IP address
- modify your PC's local area connection to connect to the M340 EGD default IP address
- configure the module's IP address
- save the IP address configuration and reboot the module to enable the newly configures IP address of the M340 EGD

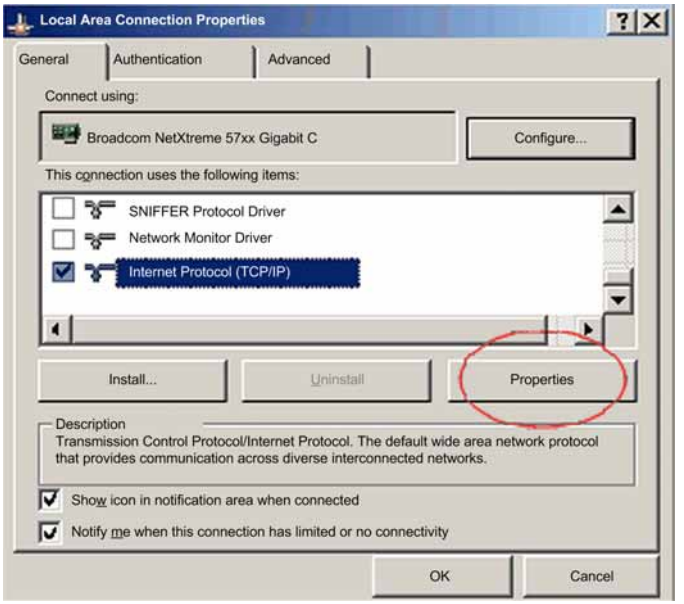
How to Determine the Default IP Address

When the module is first powered up (before it is initially configured) it uses a default IP address, which is based upon its MAC address. Before you can connect to the M340 EGD module, you must first determine its default IP address, as follows:

Step	Action
1	Obtain the MAC address from the front of the module.
2	Write down the last two bytes of the MAC address.
3	Convert the last two bytes from Hexadecimal to Decimal. For example, if the MAC address is 00:00:54:12:AB:CD, the last 2 bytes are AB:CD. **NOTE:** You can perform a hexadecimal to decimal conversion by using a Windows calculator in scientific mode. Access the Windows calculator at **Start** → **Programs** → **Accessories** → **Calculator**.
4	Create the 4 byte default IP address by concatenating the last two bytes of the MAC address (converted to Decimal) to the first two byes, which are always 85.16. In this example, because the last 2 bytes of the MAC address are AB:CD (hex) their decimal values are 171.205, and the default IP address is 85.16.171.205.

How to Configure Your PC Ethernet Adapter

Modify the IP address and subnet mask for your local area connection to communicate with the M340 EGD default IP address.

Step	Action
1	Select your Local Area Connection from the Windows Start menu by clicking **Settings and Network Connections**.
2	In the General tab, use the scroll bar to view and select **Internet Protocol (TCP/IP)**.
3	Click **Properties**, as displayed below: 
4	Select **Advanced** in the Properties dialog.
5	In the IP Settings tab, select **Add** from the IP address section.
6	Enter the IP address **85.16.0.1** and the subnet mask **255.0.0.0**.
7	Select **Add**, then **OK** in each dialog box to accept your changes.

How to Test the TCP/IP Configuration

Perform the steps below to test your TCP/IP configuration.

Step	Action
1	In Windows, select **Start** → **Run** and enter **cmd**. A black command prompt window will appear.

Step	Action
2	Enter the default IP address of the M340 EGD with the following command: **Ping** the <default IP address of the M340 EGD>
3	If a reply is received, your configuration has been verified and you can enter the stored IP address.

How to Enter the Stored IP address

Use your PC to access the M340 EGD module's embedded web pages, where you can enter the desired stored IP address settings.

Step	Action
1	Open Internet Explorer and enter the module's default IP address in the browser's Address line and click **Enter**. A dialog opens.
2	In the dialog, enter the default user name of **USER** and default password of **USER** and click **OK**. The Home page opens.
3	Click **Setup** on the menu bar. The Setup Home page opens.
4	In the Setup Home page, select **IP Setup**, on the left. The IP Setup page opens.
5	In the IP Setup page, complete the following fields to assign to the M340 EGD: ● Ethernet Frame Format: select Ethernet II ● IP Address: type in the desired IP address ● Subnet Mask: type in the subnet mask (required) ● Default Gateway: type in the IP address of the default gateway (optional)
6	Click **Apply** to save your changes to RAM memory, then click **Save to Flash** to save your changes to persistent flash memory. **NOTE:** Your new IP address settings are applies only after module is rebooted.

Finalize Your IP Address Settings

You must reboot the M340 EGD to apply your IP address changes.

Step	Action
1	Reboot the M340 EGD to apply the newly configured IP address. The STS LED is solid after the power cycle is complete,
2	**Ping** the <new IP address of the M340 EGD>. If a reply is received, communications are successful.
3	Connect the M340 EGD to an Internet Explorer to verify the new IP address.
4	A Login screen displays to indicate the module's acceptance of the IP address.

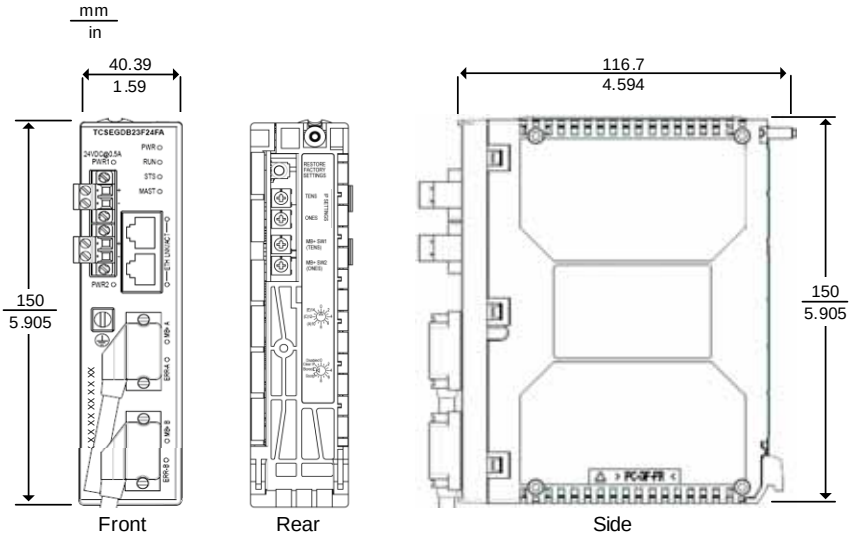
Install the Mounting Plate

Install the M340 EGD mounting plate onto the module using the reverse of the mounting plate removal procedure *(see page 35)*.

3.7 Mounting the M340 EGD on a Rack or DIN Rail

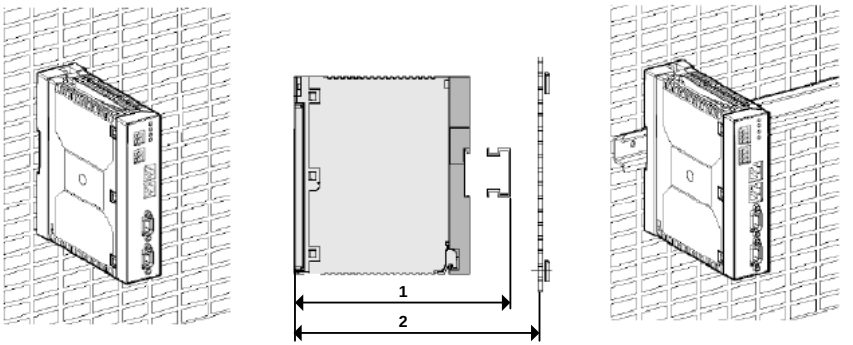
Dimensions and Mounting of the M340 EGD

M340 EGD Dimensions



Mounting the M340 EGD on a Rack or DIN Rail

The following Illustration shows an M340 EGD mounted on a rack (AM1-DE200, AM1-DP200) and on a DIN rail (AM1-PA):



1 5.65 in (143.7 mm) AM1-DE200
5.36 in (136.2 mm) AM1-DP200

2 5.42 in (132.7 mm) AM1-PA

NOTE: For installations where the expected vibration is over 1G, screw down the M340 EGD using the mounting plate to a panel, instead of DIN rail mount.

3.8 LED Diagnostic Indicators

About this Section

This section provides desciptions and locations of the M340 EGD diagnostic LED indicators.

What's in this Section?

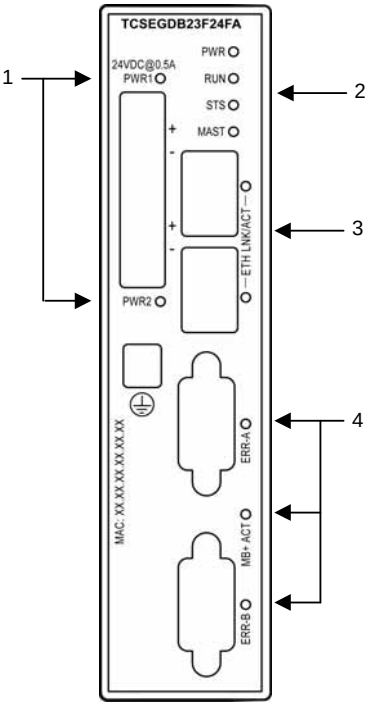
This section contains the following topics:

Topic	Page
Front Panel LEDs	55
Module Status LEDs	56
Ethernet Connector LEDs	58
Modbus Plus Diagnostic LEDs	59
Power Supply Diagnostic LEDs	60

Front Panel LEDs

There are four sets of LEDs on the front panel of the M340 EGD:

1 Power supply LEDs
2 Module status LEDs
3 Ethernet status LEDs
4 Modbus Plus status LEDs



Module Status LEDs

The LED Display

There are four module status LEDs located at the top front of the module. They indicate the operational status of the M340 EGD. The LEDs are labeled: PWR, RUN, STS, and MAST.

Indications

As you refer to these tables, keep in mind the following:

- Individual flashes are approximately 500 ms. There is a two-second interval between flash sequences. For example:
  - flashing - flashes steadily, alternating between 500 ms on and 500 ms off
  - flash 2 - flashes twice (500 ms), then 2 seconds off
  - flash *N* - flashes N (some number of) times, then 2 seconds off

PWR LED

The PWR LED indicates whether or not the M340 EGD is receiving adequate power. The following table summarizes the PWR LED states.

LED (green)	Pattern	Meaning
PWR	on (steady)	The M340 EGD has powered up successfully.
	off	Power does not meet operational requirements.

RUN and MAST LEDs

The following table describes the indicated condition(s) and the colors and blink patterns that the RUN and MAST LEDs use to show normal operations and error conditions for the M340 EGD.

Run (green)	Mast (green)	State	Meaning
on	on (steady)	Norm al	The M340 EGD is configured and running.
flashing	off	Safe	The M340 EGD is not configured correctly. **NOTE:** Safe mode is when the M340 Configuration is invalid.
flash 2	flashing	Inhibit	There is no connectivity (i.e., Ethernet cable connection) from the M340 EGD to the M340 PLC. There is no communications between the M340 PLC and Modbus Plus.
flash 3	on (steady)	Inhibit	There are 10 consecutive errors when the M340 EGD tries to read or write to the same address in the M340 PLC. This is due to a configuration in the M340 EGD attempting to read or write to an address location in the M340 PLC that is not configured. However, Modbus functions such as MSTR on Modbus Plus and Read_Var on the M340 PLC will be passed. It is only the Peer Cop Global Data Modbus Plus component that is shut down.
flash 4	on (steady)	N/A	The M340 EGD is at its default factory configuration.

STS LED

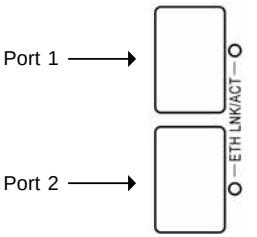
The table that follows describes the Ethernet status communicated by the STS LED, and the color and flash patterns used to indicate each condition.

LED (green)	Pattern	Meaning
STS	on (steady)	The M340 EGD is running normally.
	flash 2	There is not a MAC address.
	flash 3	Check the Ethernet cable between the M340 EGD and the M340 PLC.
	flash 4	A duplicate IP address has been detected.
	flash 5	The M340 EGD is waiting for the server IP configuration.
	flash 6	The M340 EGD is using the default IP configuration.
	flash 7	The M340 EGD firmware has not been validated.

Ethernet Connector LEDs

The LED Display

There are two Ethernet connector LEDs that are located on the front of the module near the Ethernet connectors. Each connector has a dedicated LED indicating Ethernet link status and activity.The LEDs are labeled ETH LNK/ACT.



Indications

Use the LEDs to diagnose the state of the module as follows:

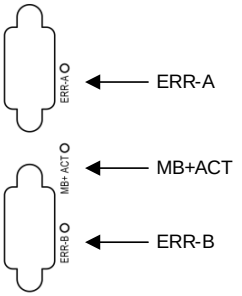
LED	Color	Description
ETH LNK/ACT	Green	• **On:** The Ethernet cable is connected and the module has an Ethernet link. • **Off:** An Ethernet link has not been established. • **Flashing:** Indicates transmission activity.

Modbus Plus Diagnostic LEDs

The LED Display

There are three Modbus Plus diagnostic LEDs located on the front of the module near the Modbus Plus connectors:

- The MB+ACT LED flashes a repetitive pattern to show its network communication status.
- The ERR-A and ERR-B LEDs identify communication status on the two Modbus Plus cable paths.



Indications

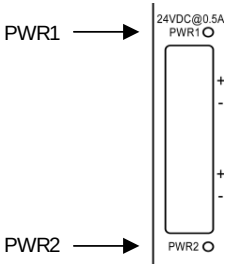
The following table describes the colors and flash patterns of the Modbus Plus connector LEDs. These LEDs indicate the communication status on the M340 EGD.

LED	Color	Pattern	Meaning
ERR-A ERR-B	Red	steady on	There is no Modbus Plus communication on the M340 EGD.
		steady off	A Modbus Plus link has been established. Check the flash codes of the MB+ACT LED.
		flashes on error	Attempting to read or write from a Modbus Plus node, which is not active.
MB+ACT	Green	steady on	The Modbus Plus address switches are set to an invalid Modbus Plus address.
		flash every 160 ms	Modbus Plus activity.
		flash every 1 s	Node is in MONITOR_OFFLINE state. In this state, the node can hear activity on the other nodes but cannot transmit data itself.
		2 flashes, off 2 s	The node can detect the network token being passed among other nodes, but it never receives it.
		3 flashes, off 1.7 s	The node does not detect any token passing on the network.
		4 flashes, off 1.4 s	The M340 EGD has detected a duplicate Modbus Plus address.

Power Supply Diagnostic LEDs

The LED Display

The power supply LEDs are located on the top front of the module. Each 24 Vdc power supply connector has one LED labeled PWR1 (upper connector) and PWR2 (lower connector).



Indications

Use the LEDs to diagnose the state of the module as follows:

LED	Color	Description
PWR1 PWR2	Green	• **On:** Indicates input power from this power supply. • **Off:** Indicates no input power from this power supply.
PWR *(see page 56)*	Green	• **On:** Indicates input power from this power supply. • **Off:** Indicates no input power from this power supply.

NOTE: In addition to the power supply LEDs, refer to the PWR LED *(see page 56)* on the front panel for the operating condition of the M340 EGD.

Embedded Web Pages

4

Introduction

This chapter presents the contents of the embedded Web pages contained in the M340 EGD. These Web pages enable you to access diagnostic information, view configuration information, and change the online configurations for the module.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
4.1	Embedded Web Server	62
4.2	Setup Page	66
4.3	Advanced Configuration	83
4.4	Diagnostic Page	89

4.1 Embedded Web Server

About this Section

This section provides instructions for how to get started with the embedded web server on the M340 EGD.

What's in this Section?

This section contains the following topics:

Topic	Page
Introduction to the Embedded Web Server	63
User Selections on the M340 EGD Home Page	65

Introduction to the Embedded Web Server

Web Server Capabilities

The M340 EGD includes an embedded Web server, which allows you to do the following:

- perform diagnostics
- configure for connectivity

All data is presented as standard web pages in HTML format. To access web pages, use Internet Explorer 6.0 or higher and Java 1.5 or higher.

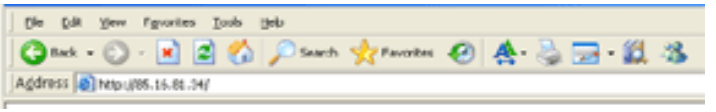
Embedded Web Server Functions

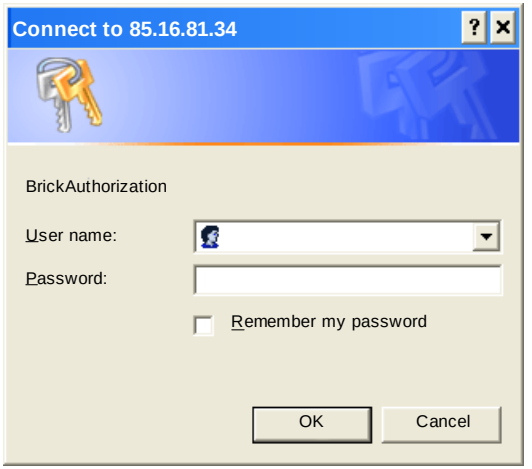
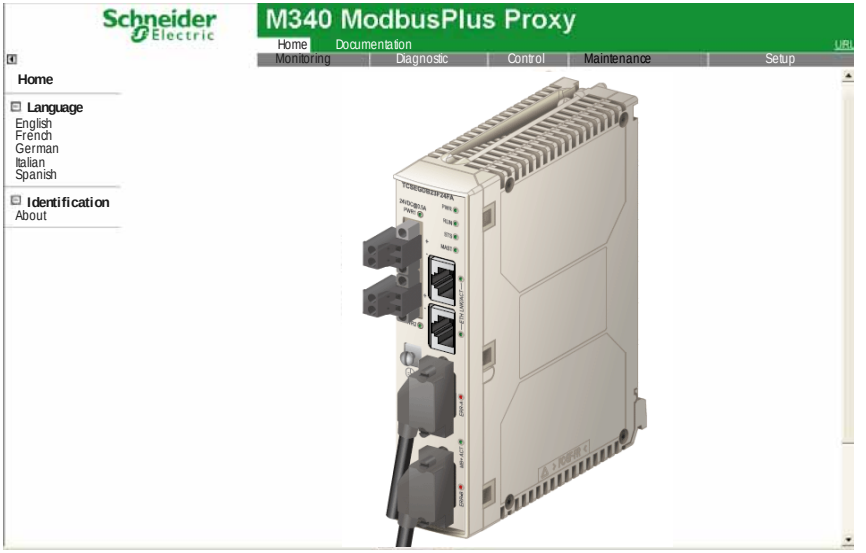
The functions available on an embedded server are as follows:

- Setup *(see page 66)*: These pages allow you to configure parameters for several module services, including security, IP, SNMP, global data, Peer Cop, and Ethernet ports.
- Diagnostics *(see page 89)*: These pages allow network diagnostics for the following module services: Ethernet statistics, TCP statistics, and SNMP statistics.

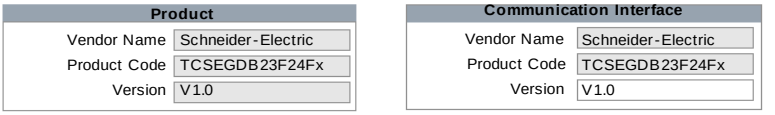
Accessing the Embedded Web Server

To access the M340 EGD's embedded web server, perform the following steps:

Step	Action
1	Open a browser.
2	Enter the IP address of the M340 EGD in the address or location box of the browser window. Use the following format: http://hostname (where hostname is the full IP address).  The Schneider Electric Web Utility home page appears.

Step	Action
3	Enter the current user name (the default is USER) and password (the default is USER) and click **OK**.  The home page for the M340 EGD appears. 

User Selections on the M340 EGD Home Page

Click on...	To...
Home	Return to the **Home** page.
Language	Display language selections for the web pages, including: ● English ● French ● German ● Italian ● Spanish
Identification	To display the **About** menu item. Select **About** to show Product and Communication interface information including vendor names, product codes, and version numbers (an example of which is displayed below:) 

Links

From the M340 EGD home page, you can access the following pages:

- Setup *(see page 66)*
- Diagnostics *(see page 90)*
- Control
- Documentation

4.2 Setup Page

About this Section

This section describes the Setup page associated with the embedded Web server.

What's in this Section?

This section contains the following topics:

Topic	Page
Setup Page	67
M340 IP Address Setup	69
M340 Register Offset Setup	70
Modbus Plus Peer Cop Global Output Setup	73
Modbus Plus Peer Cop Global Input Setup	75
Modbus Plus Peer Cop Specific Output Setup	77
Modbus Plus Peer Cop Specific Input Setup	79
Modbus Plus Routing Table Setup	81

Setup Page

Accessing the Setup Page

In the M340 EGD menu bar, click the **Setup** link to display the Setup page:

Links

To set the operational parameters for the services you require, click on the appropriate link, below, to open a page where you can configure that service:

- Security
  - Password Change *(see page 88)*
  - User Administration
- IP Setup *(see page 84)*
- SNMP Agent *(see page 86)*
- M340 Interface
  - IP Address *(see page 69)*
  - Register Offsets *(see page 70)*
  - Routing Table *(see page 81)*
- Modbus Plus Peer Cop
  - Health *(see page 91)*
  - Global Output *(see page 73)*
  - Global Input *(see page 75)*
  - Specific Output *(see page 77)*
  - Specific Input *(see page 79)*

Saving Your Work

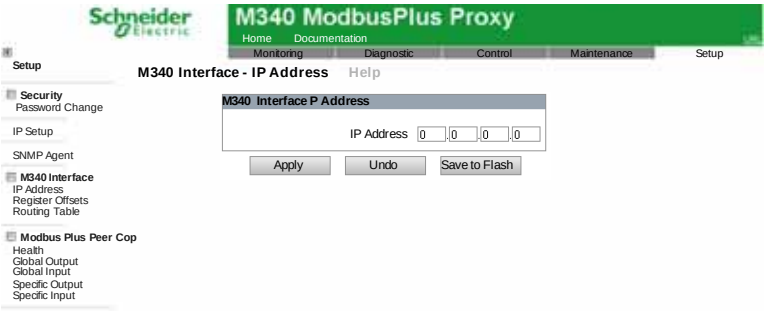
Each configurable page accessible from the **Setup** menu displays the following command buttons:

Command	Description
Apply	Saves your edits.
Undo	If you select **Undo** before clicking the **Apply** command, it clears your edits, and restores the present screen's prior settings. Once **Apply** is selected, the **Undo** feature is inactive.
Save to Flash	Effects a real-time change to the setup configuration, by saving the entire M340 EGD module configuration to flash memory.

M340 IP Address Setup

Entering M340 IP Parameters

Enter a new M340 IP address setup with these steps:

Step	Action
1	Open the IP Address page by navigating to **Setup** → **M340 Interface** → **IP Address**. The following window opens: 
2	In the **IP Address** field, enter an IP address of the master M340 PLC that will communicate with the M340 EGD. Also note that the M340 PLC should be configured on the same subnet as the M340 EGD. **NOTE:** The M340 EGD can communicate with only one master M340 PLC.
3	Save *(see page 68)* your edits.

M340 Register Offset Setup

Different Offset Types

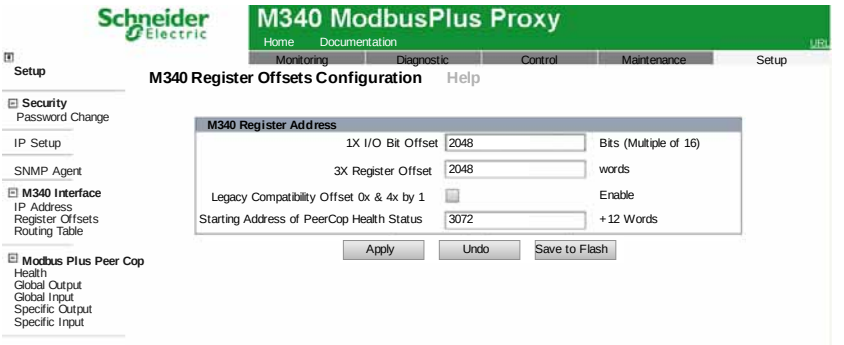
When designing or converting an application to M340 Unity, use offsets to define starting locations in M340 memory for different types of data:

- a bit offset to separate standard input bits from standard output bits and keep these inputs and outputs from overwriting each other
- a word offset to separate standards input words from standard output words and keep these inputs and outputs from overwriting each other
- a word offset to separate the Peer Cop health status block from standard input and output words and from actual Peer Cop/Global data words
- an optional legacy compatibility offset that will increment all %M and %MW values by 1 to maintain numbering consistency in the output bits and words between a converted legacy application (written using 0x and 4x references) and a Unity application (using %M and %MW references)

CAUTION
Overwritten Memory Locations Make sure that the offsets are configured such that all input and output data are segregated into different areas of M340 PLC memory. **Failure to follow these instructions can result in equipment damage.**

NOTE: Standard inputs and outputs are data transmitted to the M340 PLC from Modbus functions such as MSTR blocks, and HMI and SCADA requests. Peer Cop and Global Data functions are not automatically redirected by these offset settings; this data must be addressed manually by a programmer on the Global Output *(see page 73)*, Specific Output *(see page 77)*, Global Input *(see page 75)*, and/or Specific Input *(see page 79)* setup pages.

Access this page by navigating to **Setup** → **M340 Interface** → **Register Offsets**



1x Bit Offset

M340 register offsets The M340 EGD provides a default 1x (input bit) offset at %M2049 (if the legacy compatibility offset in enabled, %M2048 if it is disabled). You may change the default if it suits your application.

If you change the offset, the value must be on a 16-bit boundary:

- %M0, %M15, %M31, ... %M32607 if the legacy compatibility offset is disabled
- %M1, %M16, %M32, ... %M32608 if the legacy compatibility offset is enabled

Be sure to set the offset to a value that is greater than the number of standard output bits in your application.

3x Register Offset

M340 register offsets The M340 EGD provides a default 3x (input word) offset at %MW2049 (if the legacy compatibility offset in enabled, %MW2048 if it is disabled). You may change the default if it suits your application.

If you change the offset, the value may be an integer in range:

- 0 ... 32463 if the legacy compatibility offset is disabled
- 1 ... 32464 if the legacy compatibility offset is enabled

Be sure to set the offset to a value that is greater than the number of standard output words in your application.

Legacy Compatibility Offset 0x & 4x by 1

Check the **Legacy Compatibility Offset 0x & 4x by 1** checkbox if you want to enable this feature. When this offset is enabled, the default %M and %MW values in M340 memory are all incremented by 1. The first bit value becomes %M1, and the first word value becomes %MW1. 0x, 1x, 3x, and 4x values on the Modbus Plus side of the application remain the same, i.e., the option is transparent to the requesting Modbus Plus nodes. This operation allows existing Modbus Plus nodes to communicate unmodified with the different memory structure of the M340 PLC.

When this option is enabled, it increments Peer Cop/Global Data reference values in M340 PLC memory as well as standard I/O reference values. When you enable or disable this checkbox, you can see the values that have been entered on the Global Output *(see page 73)*, Specific Output *(see page 77)*, Global Input *(see page 75)*, and Specific Input *(see page 79)* setup pages increment or decrement accordingly.

Starting Address of Peer Cop Health Status

The value in this field indicates the starting location of the 12-word Peer Cop and Global Data Health block *(see page 92)*. By default, the value is 3073 (if legacy compatibility offset is enabled, 3072 if it is disabled).

This block lets you monitor the health of the M340 EGD Modbus Plus Peer Cop and Global Data from the M340 application. Each bit represents the health of the received or transferred data for each node, where 0 = unhealthy and 1 = healthy.

If the starting address is %MW3072, the 12 words would be arranged in the block as follows:

- %MW3072 ... %MW3075 indicate global input health
- %MW3076 ... %MW3079 indicate Peer Cop-specific output
- %MW3080 ... %MW3083 indicate Peer Cop-specific input

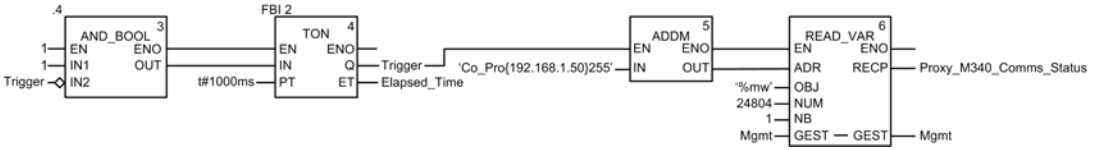
M340 PLC Application Monitoring and Peer Cop Health Status

The M340 EGD writes Peer Cop health information to a default M340 PLC address %MW3072 every 20 ms. However, if the communications between the M340 PLC and M340 EGD are disrupted due to a lost Ethernet link, the M340 PLC will retain the last value state for Peer Cop health.

It is recommended that you monitor connectivity between the M340 PLC and the M340 EGD using application logic. For example:

1. Program a Read_Var to read the M340 EGD address 24804 for a length of 1 register. This will return the number of active connections the M340 EGD has to the M340 PLC. A response integer value of 5 indicates a healthy connection status between the M340 EGD and M340 PLC. Trigger the Read_Var 1/4-1/2 of the Health Timeout value.
2. Use supporting logic timers to monitor response times for the Read_Var, 1/4-1/2 of the Health Timeout value.
3. Should the response timer expire, reset Peer Cop health bits to 0.
4. The Read_Var exception should only clear Peer Cop health bits on exception response. A successful response maintains the Peer Cop health values written by the M340 EGD to the M340 PLC.
5. Once communications between the M340 EGD and M340 PLC are restored, the M340 EGD will once again start writing the Peer Cop health block.

Sample Logic



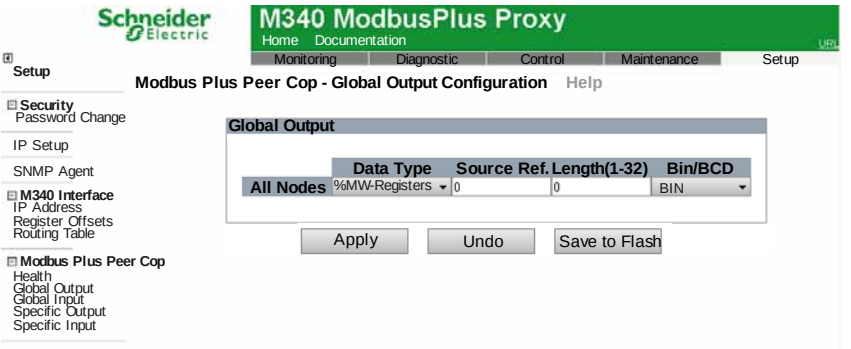
Modbus Plus Peer Cop Global Output Setup

Global Output Configuration

Each node can send a block of contiguous Global Output words to all other nodes on the local Modbus Plus network. The Global Input configuration on the other nodes will accept all or portions of all M340 output data. The M340 supports Modbus Plus Global Output data of up to 32 words. Only one Global Output source can be configured.

NOTE: M340 also supports global data over Ethernet which is configured directly on the M340. To support Modbus Plus Global Data on M340, you must configure the M340 EGD to support Modbus Plus Global Data.

Access this page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Global Output**



Configuring the Global Output Parameters

Configure the block of data that the M340 sends to all other nodes on the local Modbus Plus network as follows:.

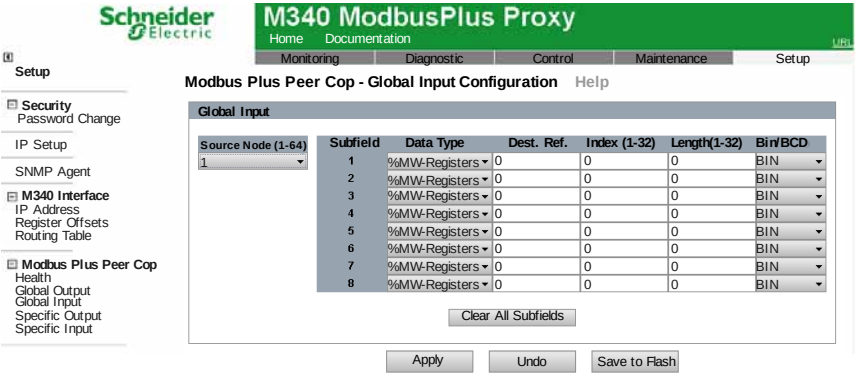
Step	Action	
1	Open the Global Output Configuration page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Global Output**.	
2	Enter configuration data in to the following fields:	
	Data Type	Indicate if the data to be sent is bits (%M) or words (%MW).
	Source Reference	Specify the starting address of M340 data to be sent to other nodes using Global Data. **NOTE:** The acceptable range of values depends upon the settings of the following fields: ● the **Data Type** setting, above, and ● the **Legacy Compatibility Offset 0x & 4x by 1** setting entered in the M340 Register Offsets Setup *(see page 70)* page. For data type %M with the legacy compatibility offset: ● enabled, the range is 1...32609, in increments of 16 ● disabled, the range is 0...32608, in increments of 16 For data type %MW with the legacy compatibility offset: ● enabled, the range is 1...32463, in increments of 1 ● disabled, the range is 0...32463, in increments of 1
	Length	Specify the source reference starting address and the number of words of data (up to 32 words output) to be sent to all other local nodes. **NOTE:** Setting the length to 0 disables Global Output to the Modbus Plus network.
	BIN/BCD	Determine the output format (BCD or binary) when entering a %MW reference destination. This format is used for data conversion before the data is delivered to its destination. %M references are only supplied as binary data.
3	Save *(see page 68)* your changes.	

Modbus Plus Peer Cop Global Input Setup

Global Input Configuration

Global Input allows the M340 EGD to receive up to 32 words per node—up to a maximum of 500 words total—on the local Modbus Plus network. The M340 EGD Global Input configuration determines which data to accept from each node. The subfields allow the M340 EGD to select up to 8 subfield references from each node indexed with length. This allows the M340 to receive multiple portions of data from the global output block of other nodes.

Access this page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Global Input**



Configuring the Global Input Parameters

Configure the Global Input parameters as follows:

Step	Action	
1	Open the Global Input Configuration page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Global Input**.	
2	In the **Source Node** list, select a node from which data is to be received. Available nodes are: 1...64.	
3	Configure the first subfield—**Subfield 1**—by entering settings for the following parameters. **NOTE:** The M340 EGD can receive up to 32 words from each node; up to 8 subfields can be defined per node.	
	Data Type	Select the type of data to be received: ● **%M-I/O Bits** ● **%MW-Registers**
	Destination Reference	Type in the starting reference (%M or %MW) of the destination in the M340 for Global Input data received. A %M reference must begin on a 16 bit boundary. **NOTE:** The acceptable range of values depends upon the settings of the following fields: ● the **Data Type** setting, above, and ● the **Legacy Compatibility Offset 0x & 4x by 1** setting entered in the M340 Register Offsets Setup *(see page 70)* page. For data type %M with the legacy compatibility offset: ● enabled, the range is 1...32609, in increments of 16 ● disabled, the range is 0...32608, in increments of 16 For data type %MW with the legacy compatibility offset: ● enabled, the range is 1...32463, in increments of 1 ● disabled, the range is 0...32463, in increments of 1
	Index (1-32)	Type in the starting location of the Global Output data to be read. This field, together with the **Length** field, lets the M340 EGD Global Input configuration to read all or a portion of the Global Output data from another PLC. For example, if 32 words of Global Output data were sent by another PLC, but only the last 4 words were needed by M340, the **Index** value would be 28 and the **Length** would be 4. This allows the M340 to conserve RAM by accepting only the data it requires.
	Length	Type in the number of words to be read field length for each subfield, an integer value from 1...32. Each word contains 16 discrete references. **NOTE:** Setting the length to 0 disables the Global Input subfield from this node.
	Bin/BCD	Select the data format: ● **BCD** (binary coded decimal) ● **BIN** (binary) **NOTE:** This format is used for data conversion before the data is delivered to its destination. %M references are supplied only as binary data.
	Use the **Clear All Subfields** command to return all numeric parameters to 0 for all subfield entries.	
4	Repeat step 3 for each additional subfield to be configured for the selected node.	
5	Save *(see page 68)* your edits.	

Modbus Plus Peer Cop Specific Output Setup

Specific Output Configuration

Specific output is a type of data output sent by a node using peer cop data transfers. Nodes using peer cop can be configured to send up to 32 words or bits of specific output data to each of up to 64 destination nodes, up to a maximum total of 500 words.

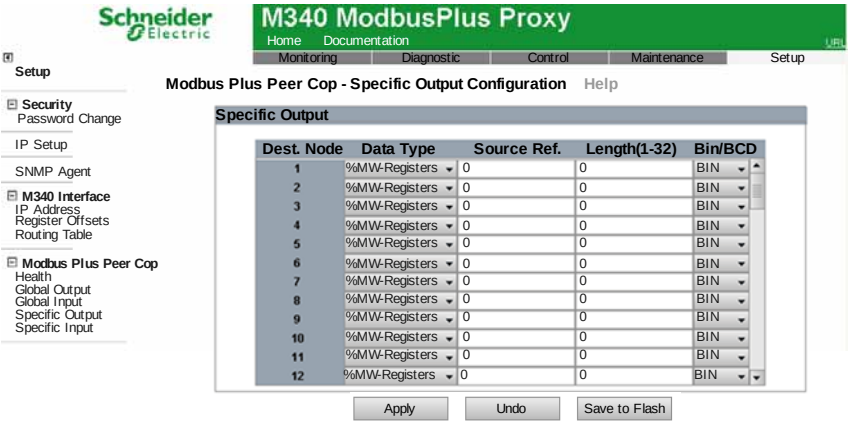
When configuring specific output data transfers, you need to specify the following information to be sent to each destination node:

- the starting address, in the table of internal words (%MW) or bits (%M), of the data to be transferred, and
- the number of words to be transferred

See the configuration steps *(see page 78)*, below, for specific configuration procedures.

NOTE: The address area for output words must not overlap.

Access this page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Specific Output**



Configuring the Specific Output Parameters

Configure the Specific Output parameters as follows:

Step	Action	
1	Open the Specific Output page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Specific Output**.	
2	Configure specific output data for the first destination node—**Destination Node 1**—by entering configuration data for the following fields. **NOTE:** You can configure up to 64 Modbus Plus destination nodes (1-64) on the local Modbus Plus network to which the M340 can send specific output data.	
	Data Type	Select the type of data to be sent: ● **%M-I/O Bits** ● **%MW-Registers**
	Source Reference	Type in the starting address of M340 data (%M, %MW) sent to specified nodes. %M references must begin on a 16 bit boundary. **NOTE:** The acceptable range of values depends upon the settings of the following fields: ● the **Data Type** setting, above, and ● the **Legacy Compatibility Offset 0x & 4x by 1** setting entered in the M340_Register Offsets Setup *(see page 70)* page. For data type %M with the legacy compatibility offset: ● enabled, the range is 1...32609, in increments of 16 ● disabled, the range is 0...32608, in increments of 16 For data type %MW with the legacy compatibility offset: ● enabled, the range is 1...32463, in increments of 1 ● disabled, the range is 0...32463, in increments of 1
	Length	Type in the number of words to be sent to each destination node: an integer value from 1...32. Each word contains 16 discrete references. **NOTE:** Setting the length to 0 disables Specific Output to this node.
	Bin/BCD	Select the data format: ● **BCD** (binary coded decimal) ● **BIN** (binary) **NOTE:** This format is used for data conversion before the data is delivered to its destination. %M references are supplied only as binary data.
3	Repeat step 2 for each additional destination node to be configured.	
4	Save *(see page 68)* your edits.	

Modbus Plus Peer Cop Specific Input Setup

Specific Input Configuration

Specific input is a type of data input received by a node using peer cop data transfers. Nodes using peer cop can be configured to receive up to 32 words of specific input data from each of up to 64 source nodes, up to a maximum total of 500 words. Nodes can be configured to accept or ignore incoming data from specific source nodes.

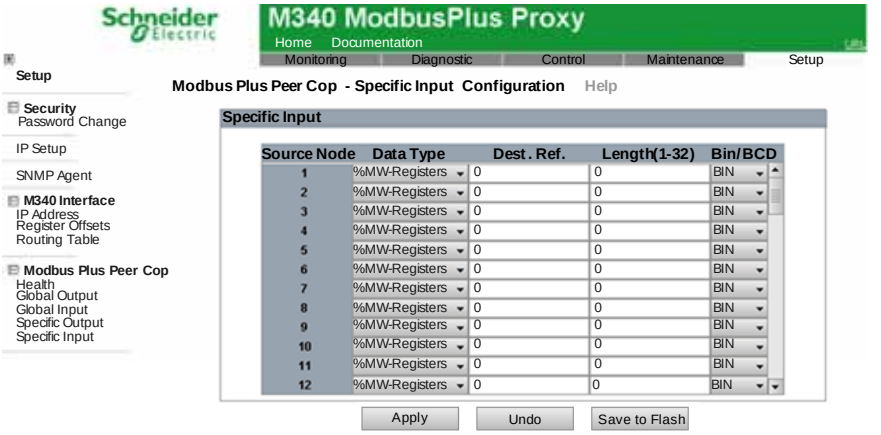
When configuring specific input data transfers, you need to specify the following information to be received from each source node:

- the starting address, in the table of internal words (%MW), of the data to be received
- the number of words—from 1 to 32—to be received from the source node

See the configuration steps *(see page 80)*, below, for specific configuration procedures.

NOTE: The address area for input and output words must not overlap.

Access this page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Specific Input**



Configuring the Specific Input Parameters

Configure the specific input parameter with these steps:

Step	Action	
1	Open the Specific Input Configuration page by navigating to **Setup** → **Modbus Plus Peer Cop** → **Specific Input**.	
2	Configure specific Input data for the first source node—**Source Node 1**—by entering configuration data for the following fields: ● Where to locate data received in M340 memory from each node that is transmitting Specific Output data to the M340 EGD/M340. %M references must begin on a 16 bit boundary. ● Length Define the data field length for each destination in your program. The length is indicated in words (16 discrete references per word) and can have a range of words between 1 and 32 for each node. ● BIN/BCD BCD or binary format for a %M reference destination. This format is used for data conversion before the data is delivered to its destination. %M references are supplied only as binary data and must begin on a 16 bit boundary.	
	Data Type	Select the type of data to be sent: ● **%M-I/O Bits** ● **%MW-Registers**
	Destination Reference	Type in the starting address in M340 memory (%M, %MW) where the received data will be located. %M references must begin on a 16 bit boundary. **NOTE:** The acceptable range of values depends upon the settings of the following fields: ● the **Data Type** setting, above, and ● the **Legacy Compatibility Offset 0x & 4x by 1** setting entered in the M340 Register Offsets Setup *(see page 70)* page. For data type %M with the legacy compatibility offset: ● enabled, the range is 1...32609, in increments of 16 ● disabled, the range is 0...32608, in increments of 16 For data type %MW with the legacy compatibility offset: ● enabled, the range is 1...32463, in increments of 1 ● disabled, the range is 0...32463, in increments of 1
	Length	Type in the number of words to be received from each source node: an integer value from 1...32. Each word contains 16 discrete references. **NOTE:** Setting the length to 0 disables Specific Input from this node.
	Bin/BCD	Select the data format: ● **BCD** (binary coded decimal) ● **BIN** (binary)
3	Repeat step 2 for each additional source node to be configured.	
4	Save *(see page 68)* your edits.	

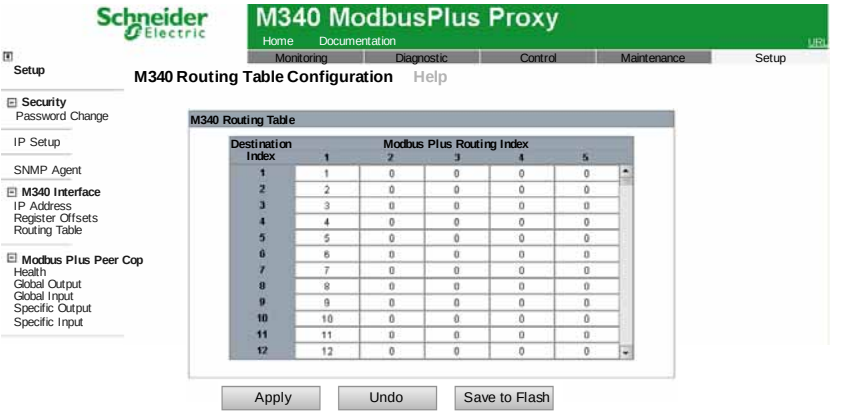
Modbus Plus Routing Table Setup

Modbus Plus Routing Table

The Modbus Plus routing table allows M340 communications function blocks, such as Read_Var and Write_Var, to send requests on to nodes on local and remote Modbus Plus networks. Use a 5-byte Modbus Plus routing scheme, where 1.2.3.4.5 routes an M340 communication function to node 5 across 4 bridges.

This feature extends M340 capability by redirection. For example, pointing a Read_Var to destination index 10 can redirect that request to devices crossing Modbus Plus bridges depending upon how row 10 is configured (in the routing table) for Modbus routing index 1-5. The final routing destination will be to the last non zero value starting at the first byte.

Access this page by navigating to **Setup** → **M340 Interface** → **Routing Table**



Configuring the Routing Table

Use the Routing Table to define network paths to nodes on the Modbus Plus network, as follows:

Step	Action	
1	Open the M340 Routing Table Configuration page by navigating to **Setup** → **M340 Interface** → **Routing Table**.	
2	Enter the first Modbus Plus path into the routing table at **Destination Index 1**, by completing one or more of the Modbus Plus Routing Index values. **NOTE:** ● By default the index will point an M340 communication request to a logical Modbus Plus node. For example requests for index number 10 will be directed to Modbus Plus node 10.0.0.0.0. The index however can redirect M340 request to nodes on remote Modbus Plus networks. For example, to send an M340 request to node 20 across a Modbus Plus bridge at address 15 using index value 10 would be entered as 15.20.0.0.0. ● The index for routing is 1-n by default. Index 1 points to Modbus Plus node 1. However, node 1 or node 10 can be pointed in a completely different direction. Pointing a Read_Var to node 10 could route the request off of the local Modbus Plus network to a remote destination. M340 function blocks only support a single index value.	
	Modbus Plus Routing Index (1 to 5)	Enter integer values in up to five cells for a Modbus Plus routing index item (row). the 5 cells in a row provide the path information that steers messages along the proper route to reach its related node destination. The value range of cell position 1 is 0 to 64; the value range of cells 2 through 5 is 0 to 254. A route of 0.0.0.0.0 disables the route for an Index. Any request directed to an Index whose Modbus Plus Routing Index is 0.0.0.0.0, will result in following exception response: *Target Device Unavailable*.
3	Add additional Modbus Plus path destination indexes, by repeating step 2 as many times as necessary. You can enter up to 254 Modbus Plus routing indexes.	
4	Save *(see page 68)* your edits.	

4.3 Advanced Configuration

About this Section

This section describes advanced configuration features.

What's in this Section?

This section contains the following topics:

Topic	Page
IP Setup	84
Configuring the SNMP Agent	86
Password Change	88

IP Setup

Configuring or Changing an IP Address

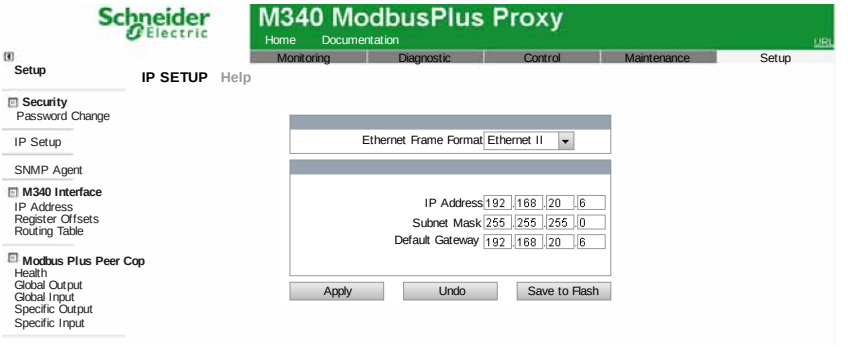
Use the **IP Setup** page to:

- select an Ethernet frame type, and
- input stored IP address settings

The stored IP addressing parameters set in this page are applied during power-up when:

- the ONES IP address rotary switch is set to **STORED**, or
- the module is configured to obtain its IP parameters from either a DHCP or a BootP server, but no valid parameters are received

Access this page by navigating to **Setup IP** → **Setup**



Selecting a Frame Type

To specify an Ethernet frame type, select one of the following values in the **Ethernet Frame Format** list:

- **Ethernet II**
- **IEEE 802.3**
- **Auto** (the device applies the appropriate format)

NOTE: A change made to the **Ethernet Frame Format** setting takes effect only after you reboot the M340. Navigate to the reboot command at **Control** → **Reboot**.

Assigning a Stored IP Address

Follow these steps to input a stored IP address for the M340 EGD:

Step	Action	
1	Open the IP Setup page by navigating to **Setup** → **IP Setup**.	
2	Input values for the following fields:	
	IP Address	Type in 4 octet values—from 0...255—as a unique IP address.
	Subnet Mask	Type in 4 octet values—from 0...255.
	Default Gateway	(Optional) Type in 4 octet values. This value must reside on the same subnet as the IP address.
3	Save *(see page 68)* your edits.	

NOTE:

- Changes made to the stored IP configuration take effect only after you reboot the M340 EGD. in the Reboot page. Navigate to the reboot command at **Control** → **Reboot**.
- Changes to rotary switch settings take effect only after a power cycle of the M340 EGD.

Configuring the SNMP Agent

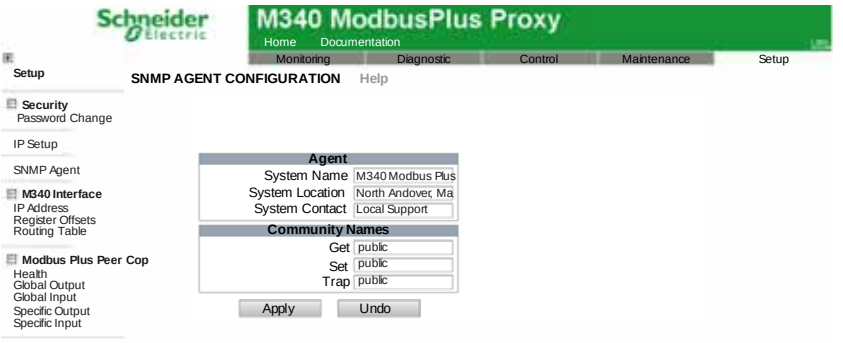
SNMP Basics

An SNMP (simple network management protocol) is a software component that reports management data about the module to a system diagnostic tool such as ConneXview.

The SNMP service includes:

- automatic discovery and identification of the M340 EGD by a diagnostic tool
- authentication checking by the M340 EGD of any SNMP system that sends requests to it

Access this page by navigating to **Setup** → **SNMP Agent**



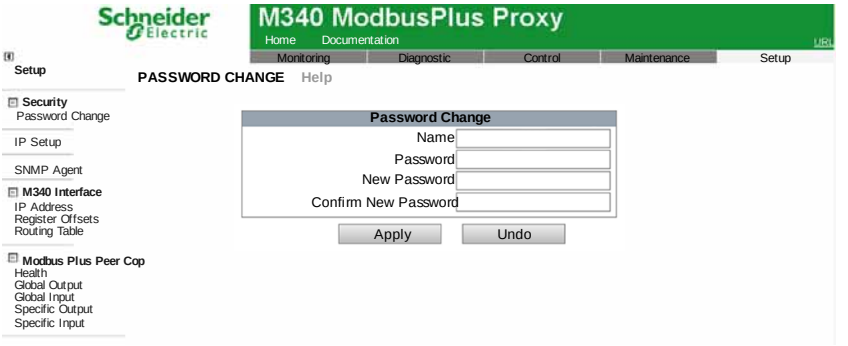
Viewing and Configuring SNMP Properties

Follow these steps to configure the SNMP agent settings:

Step	Action	
1	In the **Agent** section, type in values for the following fields can be edited:	
	System Name	User -defined, case-sensitive ASCII string describing the device—up to 32 characters.
	System Location	Case-sensitive ASCII string describing the location of the device—up to 32 characters.
	System Contact	Case-sensitive ASCII string identifying the contact person for the device—up to 32 characters.
2	In the **Community Names** section, type in values for the following passwords:	
	Get	Up to 16 printable ASCII characters; can be blank.
	Set	Up to 16 printable ASCII characters; can be blank.
	Trap	Up to 16 printable ASCII characters; can be blank.
	NOTE: The default setting for each community name is `public`.	
3	Save *(see page 68)* your edits. Power cycle the module so that your changes will take effect.	

Password Change

Use this web page to edit the password that must be entered (along with a user name) when accessing the setup web pages.



NOTE: The embedded web pages support the use of a single, non-editable user name: **USER**. Both this user name and the password are case sensitive.

Setting the Configuration Password

To change the password for access to the M340 EGD web pages:

Step	Action
1	Open the Password Change page by navigating to **Setup** → **Security** → **Password Change**.
2	In the **Password Change** page, type in values for the following fields: ● **Name**: user name (always **USER**) ● **Password**: existing password (default = **USER**) ● **New Password**: new password ● **Confirm New Password**: new password (again) **NOTE:** The password is case-sensitive.
3	Save *(see page 68)* your edits.

4.4 Diagnostic Page

About this Section

This section describes the Diagnostic page associated with the embedded Web server.

What's in this Section?

This section contains the following topics:

Topic	Page
Diagnostic Page	90
Modbus Plus Peer Cop Health Setup	91
Ethernet TCP/IP Statistics Page	93
Ethernet Port Statistics	94
Modbus TCP Port Statistics	95
Modbus TCP Port Connections Statistics	96
Modbus Plus Network Statistics	97
M340 Communication Statistics	99
SNMP Statistics	100

Diagnostic Page

Accessing the Diagnostic Page

From any web page, click the **Diagnostic** menu item to display the Diagnostic page.

Links

To access the service you require, click on a link:

- Ethernet Statistics
  - Global *(see page 93)*
  - Port *(see page 94)*
- Modbus Statistics
  - TCP Port *(see page 95)*
  - TCP Port Connections *(see page 96)*
- Modbus Plus Statistics
  - Network Statistics
  - M340 Communication *(see page 99)*
- SNMP Statistics *(see page 100)*
- Modbus Plus Peer Cop Health *(see page 91)*
  Note: this link is located at:
  Setup → Modbus Plus Peer Cop → Health

Modbus Plus Peer Cop Health Setup

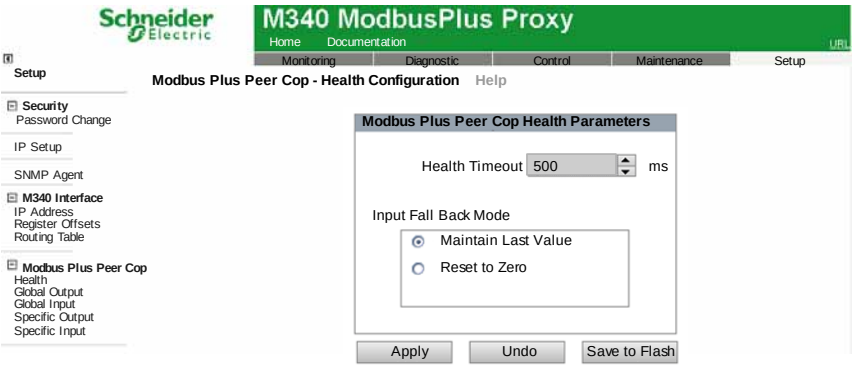
Overview

Use the Modbus Plus Peer Cop Health Setup page to configure:

- the timeout period the M340 EGD waits—after losing Global Input, Specific Input, and Specific Output data communications—before setting inputs to their fall back state, and
- the fall back behavior of inputs after the expiration of the timeout period

NOTE:

- The default memory location that the M340 EGD will write the 12 word Peer Cop Health block to in the M340 PLC starts at %MW3072. Adjust the M340 PLC Unity CPU memory configuration to accommodate this parameter.
- Modbus Plus Peer Cop health can be monitored in the M340 using the block array.
- This page is accessed by navigating to **Setup** → **Modbus Plus Peer Cop** → **Health**.



Configuring the Health Parameter

Configure the health parameter with these steps:

Step	Action	
1	Configure the following two fields:	
	Health Timeout	Use the spin control to set the timeout period the M340 EGD waits before setting inputs to their fall back state. Enter a value from 20 to 2000 ms in increments of 20 ms (Default = 500 ms). The timer is reset each time data is either successfully received or transmitted.

Step	Action	
	Fallback Mode	Select the condition to which Global and Specific Inputs bits and registers will be set if the health timeout expires before receiving new data: ● **Maintain Last Value**: retains the previous data ● **Reset to Zero**: sets the associated bit or register to zero
2	Save *(see page 68)* your edits.	

Bit-to-Network Node Relationship

The bits in words 1... 4 represent the health of the global input communication expected from nodes 1... 64. The bits in words 5... 8 represent the health of the output from a specific node. The bits in words 9... 12 represent the health of the input to a specific node:

Type of Status	Word Index	Bit-to-network Node Relationship															
Global Input	1	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	2	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
	3	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
	4	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
Specific Output	5	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	6	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
	7	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
	8	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
Specific Input	9	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	10	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
	11	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
	12	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

The default starting register for the 12 word Peer Cop health block in the M340 is %MW3072. Make sure that the M340 CPU memory is configured to accommodate this address range.

NOTE: These 12 words that are transferred to the M340 are monitored by logic. Also, a Peer Cop health memory location must be configured for a writing status block to the M340.

Ethernet TCP/IP Statistics Page

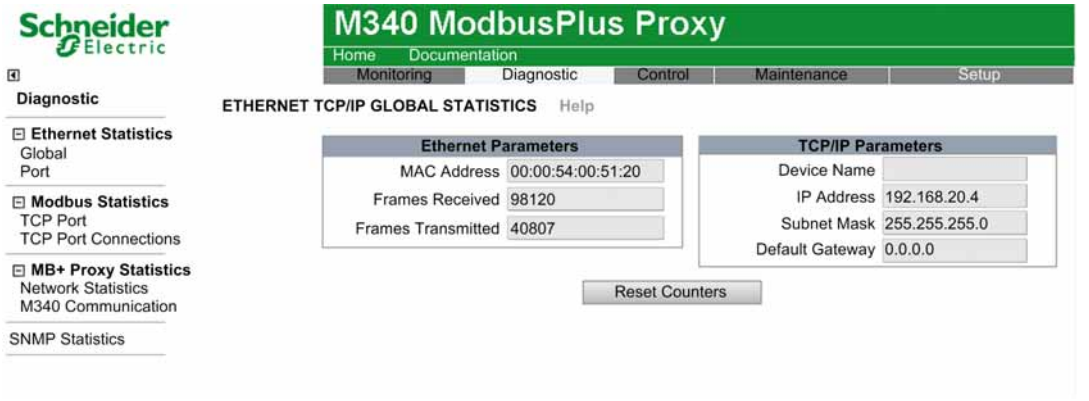
Using the Ethernet TCP/IP Statistics Page

Use the **Ethernet TCP/IP Statistics** page to:

- Display the following information about the M340 EGD module:
  - device name
  - MAC address
  - IP addressing parameters:
    - IP Address
    - Subnet Mask
    - Default Gateway
  - the number of Ethernet frames received and processed by the M340 EGD
  - the number of Ethernet frames processed and transmitted by the M340 EGD
- Click on the **Reset Counters** button to re-set the **Frames Received** and **Frames Transmitted** counting statistics to 0.

NOTE: The counting statistics on this page are automatically refreshed.

Access this page by navigating to **Diagnostic** → **Ethernet Statistics** → **Global**



Ethernet Port Statistics

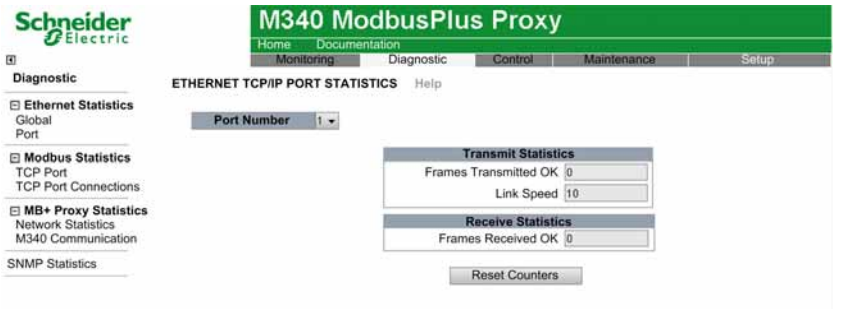
Using the Ethernet Port Statistics Page

Use the **Ethernet Port Statistics** page to:

- Display statistical information related to:
  - transmitted frames
  - received frames
- Reset all counting statistics by clicking the **Reset Counters** button.

NOTE: The counting statistics on this page are automatically refreshed.

Access this page by navigating to **Diagnostic** → **Ethernet Statistics** → **Port**



The Ethernet Port Statistics page displays these data fields.

Field Name	Description
Port Number	Select a port number to display its statistics: 1 or 2.
TCP/IP Statistics	
Frames Transmitted OK	A count of frames successfully transmitted.
Link Speed	Displays the current link speed in Mbps (10 or 100).
Receive Statistics	
Frames Received OK	A count of error free frames received.

Modbus TCP Port Statistics

Using the Modbus TCP Port Statistics Page

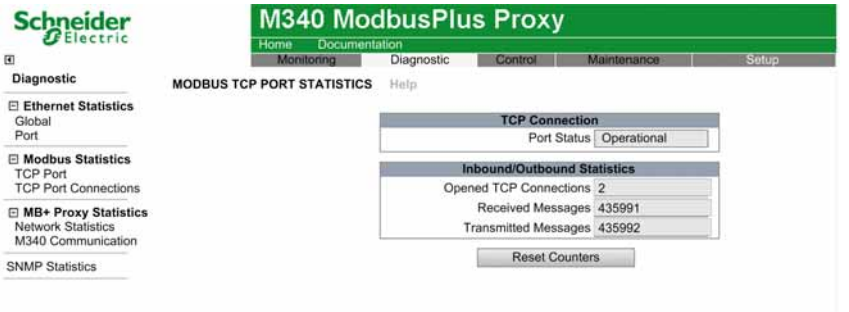
The **ModbusTCP Port Statistics** page displays data describing the usage of the M340 EGD module's embedded Modbus TCP port—port 502.

Use the **TCP Port Statistics** page to:

- display these data:
  - **Port Status** (operational or idle)
  - a count of each of the following statistics since these counters were last reset (by either a power cycle or the **Reset Counters** button):
    - **Opened TCP Connections**
    - **Received Messages**
    - **Transmitted Messages**
- access the **Reset Counters** button, which resets the counting statistics to zero

NOTE: The statistics on this page are automatically updated.

Access this page by navigating to **Diagnostic** → **Modbus Statistics** → **TCP Port**



Modbus TCP Port Connections Statistics

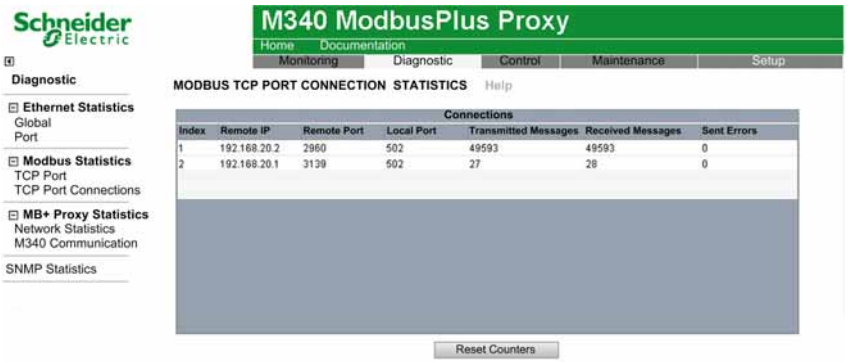
Using the Modbus TCP Port Connections Statistics Page

Use the **TCP Messaging Statistics** page to:

- display a list of open TCP connections for M340 EGD, and
- access the **Reset Counters** button, which you can click to clear the counting statistics

The data on this page is automatically updated. The counting statistics are automatically cleared when the module is powered-up or reset.

Access this page by navigating to **Diagnostic** → **Modbus Statistics** → **TCP Port Connections**



The statistics on this page include the following data for each active connection:

Field	Description
Index	The connection sequence number.
Remote IP	The IP address of the connected remote device.
Remote Port	The port number of the connected remote device used to make the connection.
Local Port	The port number of theM340 EGD used to make the connection.
Transmitted Messages	A count of the number of Modbus messages sent over this connection.
Received Messages	A count of the number of Modbus messages received on this connection.
Sent Errors	A count of the number of Modbus TCP sent errors detected over this connection.

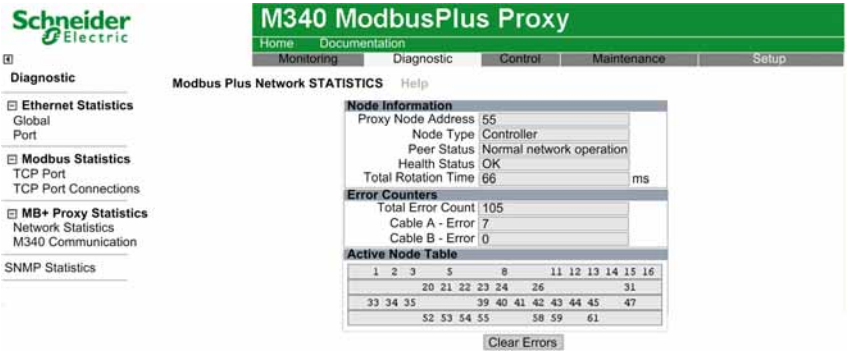
Modbus Plus Network Statistics

Using the Modbus Plus Network Statistics Page

Use the Modbus Plus network statistics page to:

- display these data:
  - address and status information for the M340 EGD in its role as a node on the Modbus Plus network
  - a count of detected Modbus Plus errors
  - a list of active nodes on the Modbus Plus network
- access the **Clear Errors** button, which resets the counting statistics to zero

Access this page by navigating to **Diagnostic** → **MB+ Proxy Statistics** → **Network Statistics**



The following table contains details related to the statistic fields on this page.

Statistic	Description
Node Information	
Node Address	The Modbus Plus address of the M340 EGD.
Node Type	The node types include: ● Unknown ● Controller
Peer Status	Indicates peer communication of the M340 EGD in reference to the network. The types of communication displayed are: ● Normal operation ● Never getting token ● Sole station ● Duplicate station
Health Status	The health status entries include: ● OK ● NOT OK
Token Rotation Time	The token rotation time is displayed in ms.
Error Counter	
Total Error Count	The total number of detected Modbus Plus errors.
Cable A - Error	The amount of detected errors on Cable A.
Cable B - Error	The amount of detected errors on Cable B.
Active Node Table	A list of the nodes present in the Modbus Plus network.

M340 Communication Statistics

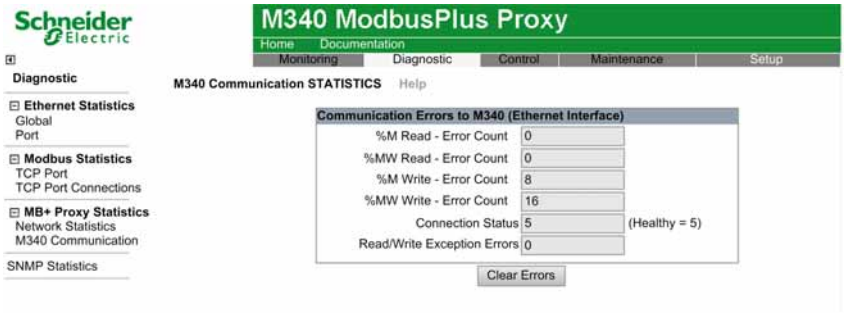
Using the M340 Communication Statistics Page

Use the **M340 Communication Statistics** page to display:

- counts of unsuccessful read and write requests to both global and specific inputs and outputs from the M340 EGD to the PLC
- status of the connection M340 EGD to the PLC
- a count of read and write exceptions

You can also access the **Clear Errors** button, which resets the counting statistics to zero.

Access this page by navigating to **Diagnostic** → **MB+ Proxy Statistics** → **M340 Communication**



The following table contains details related to the statistic fields on this page.

Statistic	Description
Communication Errors to M340 (Ethernet Interface	
%M Read – Error Count	The number of unsuccessful read requests of configured I/O bits on the M340 PLC.
%MW Read – Error Count	The number of unsuccessful read requests of configured registers on the M340 PLC.
%M Write – Error Count	The number of unsuccessful write requests of configured I/O bits on the M340 PLC.
%MW Write – Error Count	The number of unsuccessful write requests of configured registers on the M340 PLC.
Connection Status	The number of healthy TCP sockets the M340 EGD has open to the M340. Up to 5 sockets are supported simultaneously. A value of: ● 5, indicates a healthy connection ● less than 5, indicates a degraded connection. The smaller the value, the more degraded the connection.
Read/Write Exception Errors	A count of read and write exception messages received by the M340 EGD from the M340 since the last power-up or clear.

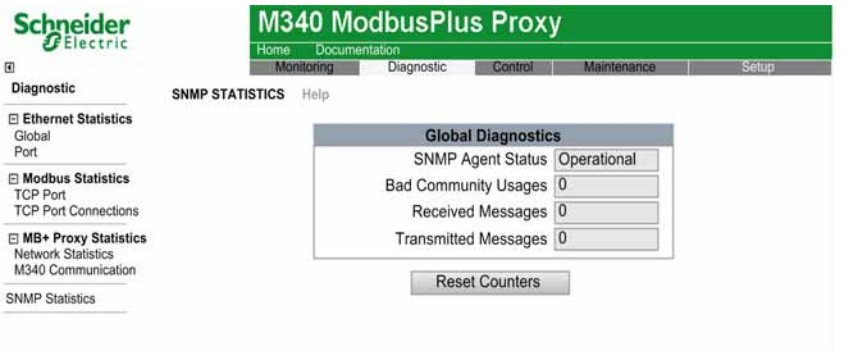
SNMP Statistics

Using the SNMP Statistics Page

Use the **SNMP Statistics** page to:

- display the following data describing the M340 EGD embedded SNMP agent:
  - **SNMP Agent Status:** operational or idle
  - **Bad Community Usages:** a count of requests sent to the M340 EGD containing an invalid community name, indicating the requesting device may be unauthorized to make such a request
  - **Received Messages:** a count of the number of SNMP requests received by the M340 EGD
  - **Transmitted Messages:** a count of the number of SNMP responses sent by the M340 EGD
- reset the three counting statistics, above, by clicking the **Reset Counters** button.

To access this page navigate to **Diagnostic** → **SNMP Statistics**



Function Codes and Modbus Exception Codes

5

Introduction

This chapter includes a table of function codes and a table of Modbus exception codes used by the M340 EGD.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Function Code Table	102
Modbus Exception Code Table	103

Function Code Table

This section provides the function codes used by the M340 EGD for communication requests from the M340's Read_Var *(see page 123)*, Write_VAR, and the Data_Exch functions. These function codes are also used by the M340 EGD to transfer data to and from the M340 as needed for Modbus Plus Peer Cop Data, Global Data, as well as requests from other Modbus Plus network devices.

Function Code	Meaning	M340 Memory Address
1	read output bits	%M
2	read input bits	%M
3	read consecutive holding register integer values	%MW
4	read consecutive input integer values	%MW
5	write single output bit	%M
6	write single integer value	%MW
15	write n output bits	%M
16	write consecutive holding register integer values	%MW
23	read/write consecutive holding register integer values	%MW

Modbus Exception Code Table

The following table lists the codes that may be returned in a Modbus exception response.

Name	Name	Meaning
01	illegal function	The function code received in the query is not an allowable action for the server. This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the server is in the wrong state to process a request of this type, for example because it is unconfigured and is being asked to return register values.
02	illegal data address	The data address received in the query is not an allowable address for the server. More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, the PDU (protocol data unit) addresses the first register as 0, and the last one as 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 4, then this request will successfully operate (address-wise at least) on registers 96, 97, 98, and 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 5, then this request will not succeed with Exception Code 0x02 *Illegal Data Address* since it attempts to operate on registers 96, 97, 98, 99 and 100, and there is no register with address 100.
03	illegal data value	A value contained in the query data field is not an allowable value for the server. This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does **not** mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the Modbus protocol is unaware of the significance of any particular value of any particular register.
04	slave device failure	An unrecoverable error occurred while the server was attempting to perform the requested action.
05	acknowledge	The server has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout from occurring in the client. The client can next issue a *Poll Program Complete* message to determine if processing is completed.
06	slave device busy	The server is engaged in processing a long–duration program command. The client should retransmit the message later when the server is free.
07	negative acknowledge	The server cannot perform the program function received in the query. This code is returned for an unsuccessful programming request using function code 13 or 14. The client should request diagnostic information from the server.
08	memory parity error	Specialized use in conjunction with function codes 20 and 21 and reference type 6, to indicate that the extended file area did not pass a consistency check.
0A	gateway path unavailable	Specialized use in conjunction with gateways, indicates that the gateway was unable to allocate an internal communication path from the input port to the output port for processing the request. Usually means that the gateway is misconfigured or overloaded.
0B	gateway target device failed to respond	No response received from the target device (the gateway generated this exception).

Utilities

6

Introduction

This chapter describes the various utilities used by the M340 EGD.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Updating Firmware	106
The M340 EGD Configuration Utility	113

Updating Firmware

Description

The M340 EGD firmware can be updated using the Unity Loader tool. You must do the following before updating the firmware.

- Disconnect the M340 EGD from the Modbus Plus network.
- Disconnect the M340 EGD from the M340 PLC.
- Connect the M340 EGD to the PC and make sure they are configured on the same IP subnet address.

⚠ CAUTION

COMMUNICATION LOSS

During the firmware download:

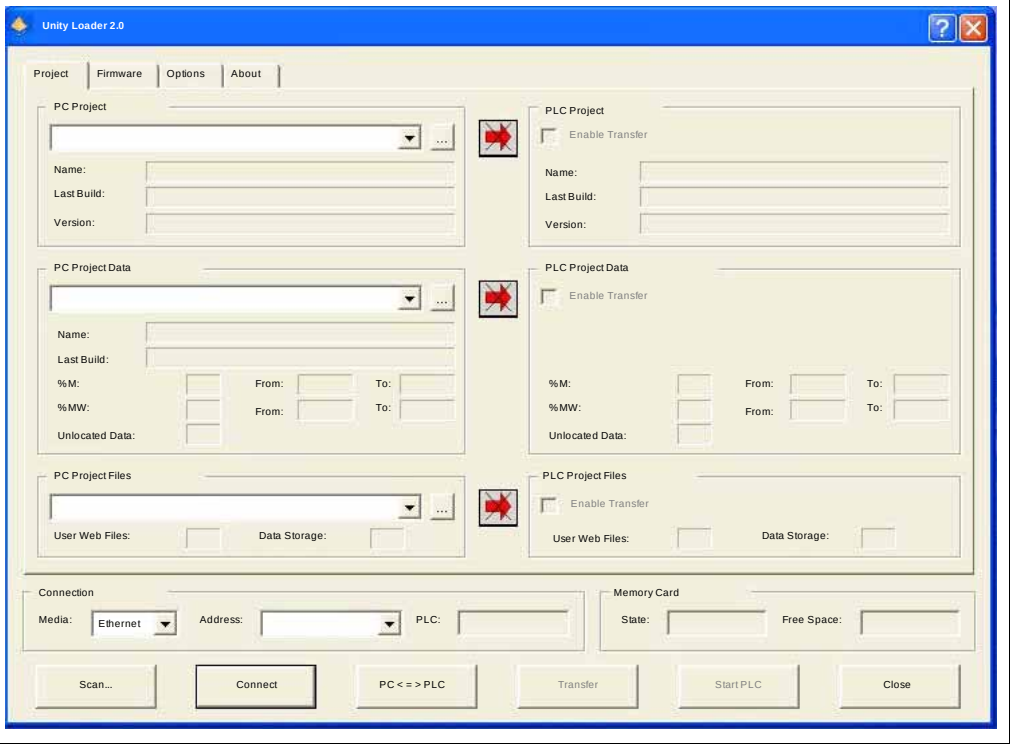
- Do not power OFF the PC.
- Do not shut down Unity Loader.

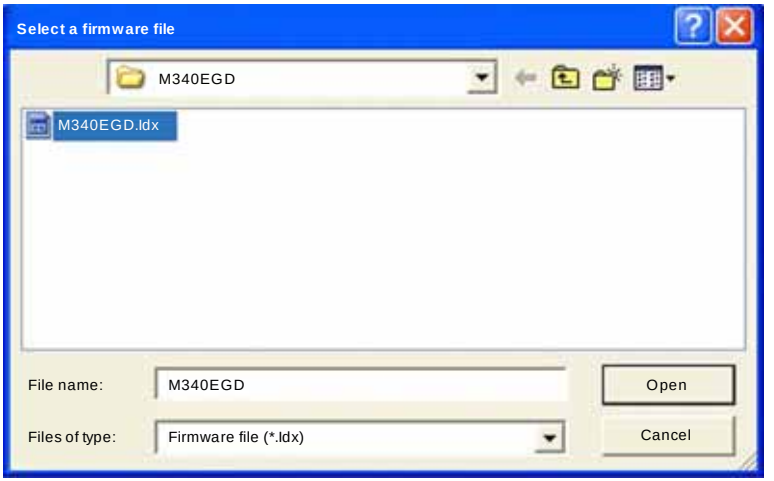
Failure to follow these instructions can result in injury or equipment damage.

You must have Unity Loader installed on your computer before you can update the module's firmware. Follow the below steps if you do not have Unity Loader on your computer.

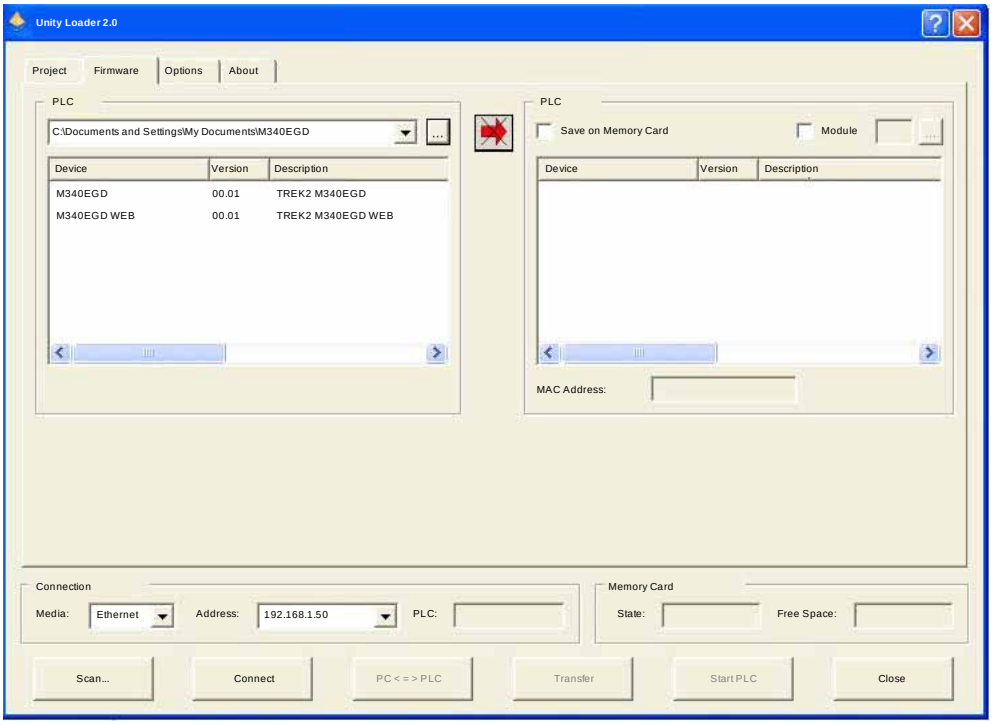
Step	Action
1	The Unity Loader tool can be found on www.schneider-electric.com.
2	In the search form input field, enter **Unity Loader**.
3	Select the appropriate entry for Unity Loader Software.
4	Follow the instructions provided to save the file to your local computer.
5	Run the program's setup and follow the onscreen instructions to install Unity Loader.

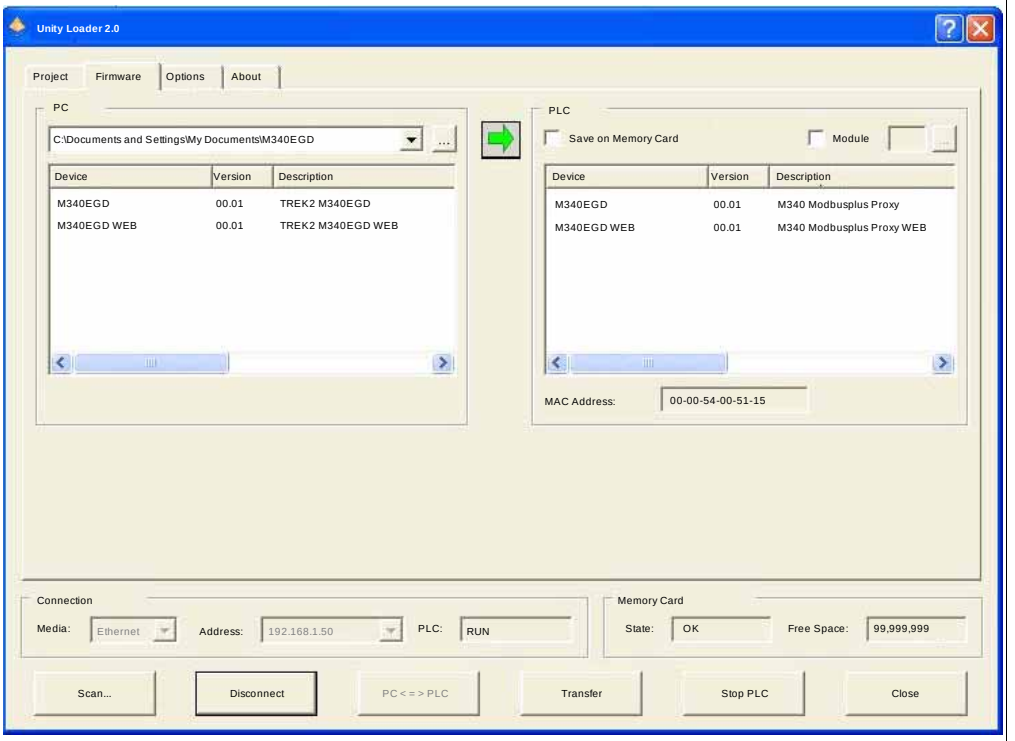
Open Unity Loader on your PC and follow the steps below to update the firmware for the M340 EGD.

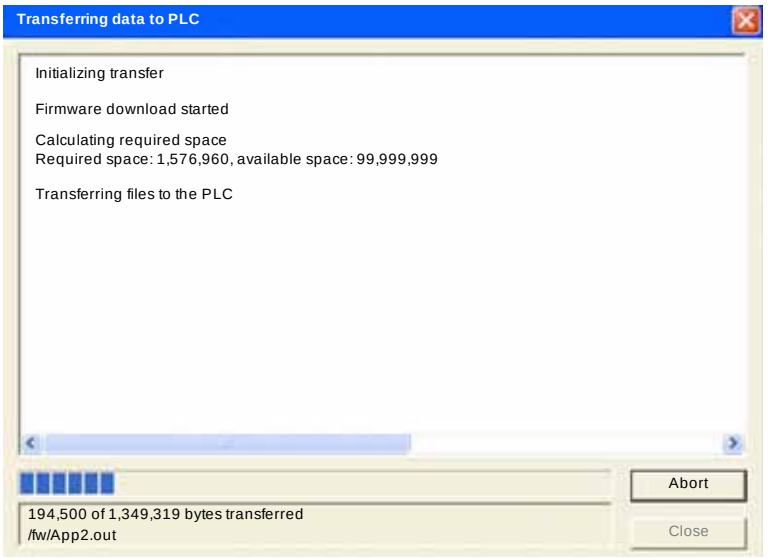
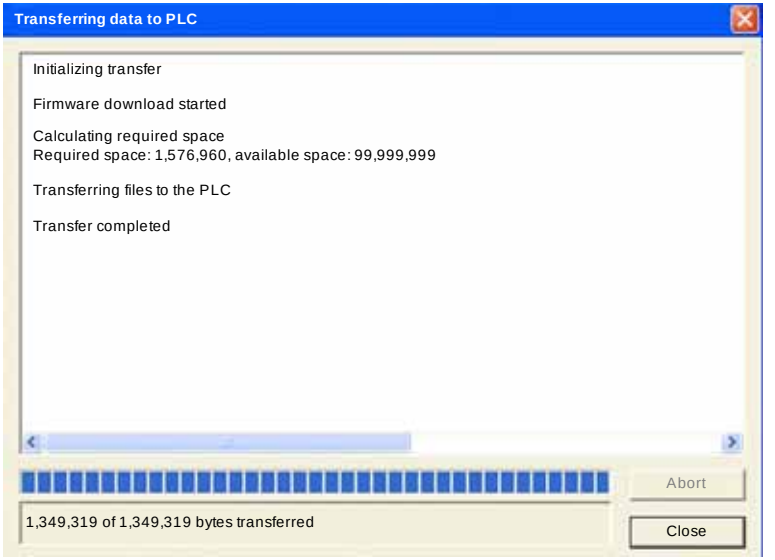
Step	Action
1	In the **Project** tab, select **Ethernet** from the **Media** drop-down menu and enter the IP address of the M340 EGD in the **Address** field. 

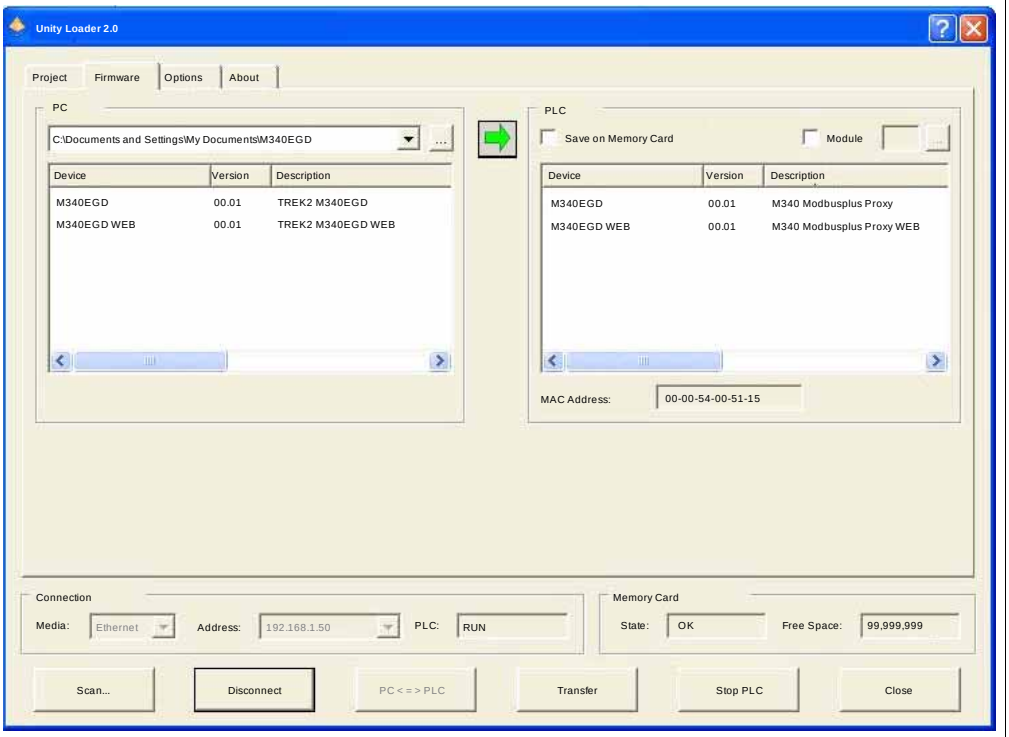
Step	Action
2	Open the **Firmware** tab and click the **...** button to browse to the location of the M340 EGD firmware. Select the firmware file. 

Step	Action
3	Click the **Connect** button.



Step	Action
4	Make sure the arrow in the middle of the screen is green, and then click **Transfer**. **NOTE:** Only click **Transfer** if the arrow is green. A yellow arrow indicates that the firmware on your computer is newer than the file selected for transfer, and a red arrow indicates that the computer's firmware is not compatible with the M340 EGD.  **NOTE:** Do not use the **Stop PLC**/**Start PLC** button when updating firmware for the M340 EGD.

Step	Action
5	Click **yes** on the two pop-up windows that appear. A third window then appears, which indicates the transfer status with the blue bars at the bottom of the screen. 
6	Once the transfer is complete, click **Close**. 

Step	Action
7	Click **Disconnect**, and then close the window. 
8	Reboot your PC to finalize the firmware update. **NOTE:** The module's configuration and IP settings do not change after the reboot. The password will be reset to the factory default setting (the default is USER.)

The M340 EGD Configuration Utility

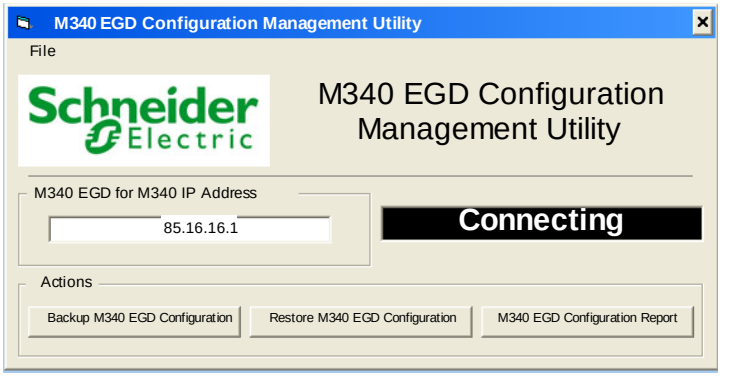
Using the M340 EGD Configuration Utility

The M340 EGD configuration utility is used to:

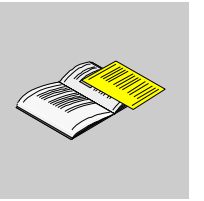
- backup or restore your M340 EGD configuration
- create an M340 EGD configuration report

Perform the steps in the following table to run the M340 EGD utility:

Step	Action
1	The Unity Loader tool can be found on the M340 Modbus Plus Proxy Documentation and User Tools CD shipped with the M340 EGD.
2	Select the **User Tools** folder on the CD.
3	Select the **M340 EGD Configuration Utility** folder.
4	Select and open the M340 EGD configuration utility. 

Step	Action
5	Enter a valid IP address in the M340 EGD for M340 IP Address field. 
6	Select the action you require: ● **Backup M340 EGD Configuration** This action creates a copy of the configuration on your hard disk. ● **Restore M340 EGD Configuration** This action opens a configuration from your hard disk. ● **M340 EGD Configuration Report** This action converts data into a readable format that can be imported into a Microsoft Excel file.

Appendices



Introduction

These technical appendices supplement the information in this guide.

What's in this Appendix?

The appendix contains the following chapters:

Chapter	Chapter Name	Page
A	M340 EGD Performance and Communication Planning	117
B	Replacing a Compact PLC Rack with a Modicon M340 Rack and M340 EGD	121
C	M340 EGD Application Note	123

M340 EGD Performance and Communication Planning

A

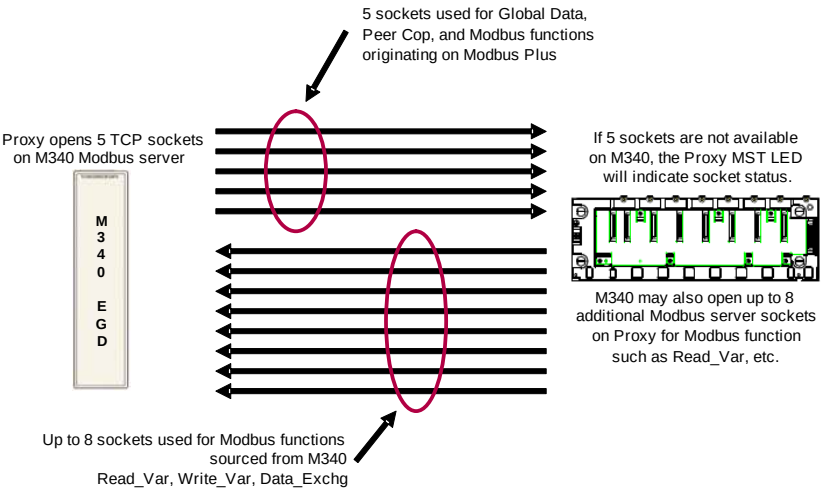
Overview

Introduction

As the M340 EGD exchanges data on Ethernet with the M340 CPU Ethernet interface, and with Modbus Plus nodes using the embedded Modbus Plus interface, there are variables which affect overall communications performance.

M340 EGD and the M340 Modbus Server

The key performance variables for M340 Ethernet communications are TCP socket availability and M340 CPU scan time. The M340 EGD opens 5 sockets for transaction processing per M340 CPU scan of the 8 transactions available per CPU scan on the M340 (refer to the figure below).



NOTE: The M340 supports more than 8 Modbus server sockets, but processes only 8 transactions per CPU scan.

The M340 EGD uses the M340 Ethernet Modbus server to exchange all data including:

- Peer Cop
- Global data
- Peer Cop health block
- Modbus functions originating from Modbus Plus

The M340 EGD polls the M340 to read/write peer cop and global data every 50 ms. Event communications such as MSTR or SCADA requests originating from Modbus Plus are passed immediately

These transactions from the M340 EGD are queued in memory by the M340 until the end of the M340 CPU scan. At the end of scan, the M340 CPU services the Ethernet communications interface and exchanges data to receive incoming requests from the M340 EGD, and send outgoing responses that have been solved in the M340 logic application. Note that on Modbus Plus, interfaces are also serviced at the end of CPU scan. This is the case of Modbus Plus CPU interfaces and option cards such as the Quantum NOM module.

Therefore, the combination of the M340 EGD poll rate and the M340 CPU scan time for your application are some of the key components in calculating system performance. For the calculations in this section, CPU represents the M340 CPU scan and EPR represents the Ethernet interface poll rate by the M340 EGD to the M340.

M340 EGD and the M340 Modbus Client

The M340 EGD also accommodates up to 8 Modbus client requests on the M340 EGD Modbus server. The client requests are for the recommended processing by the M340 CPU Ethernet interface or M340 NOE. Examples of client requests include Read_Var, Write_Var and Data_Exch M340 functions. The IO Scanner function using the M340 NOE is supported. Note, however, the risk of potential congestion depending on the communications architecture. IO scanner client requests from the M340 to Modbus Plus nodes via theM340 EGD could overload the M340 EGD interface which would slow communications from the M340 EGD to the M340. It is recommended that if the M340 NOE IO scanner is employed in place of function blocks that are no more than 6 IO scanner entries to Modbus Plus nodes be utilized to prevent overload. IO scanner repetition rates should also be 50 ms or greater. Lower IO scanner repetition rates may introduce duplicate re-transmission packets and lower overall throughput.

Modbus Plus Token Rotation

The M340 EGD will service the Modbus Plus token at each rotation. In the case of Peer Cop and global data, only data that has changed will be forwarded to the M340 EGD. Both input and output data is serviced. The token rotation time is a key factor in overall message delivery and application response time. Token rotation varies with node density. Each additional node adds to the Modbus Plus token rotation time. Note that communication requests that cross bridges will be subject to varying token rotation times on each logical Modbus Plus network and Modbus Plus bridge forwarding delays.

Modbus Plus PLC CPU Scans

The CPU scan of the source or destination Modbus Plus node is also a key factor. Similar to the M340 CPU scan, communications are serviced at the end of the scan. Therefore even a short token rotation time such as 5 ms will not produce fresh data to be sent or received every rotation if the CPU scan of the Modbus Plus node is 25 ms. Only when the CPU scan ends and the Modbus Plus interface is serviced will fresh data be sent or received by the Modbus Plus node.

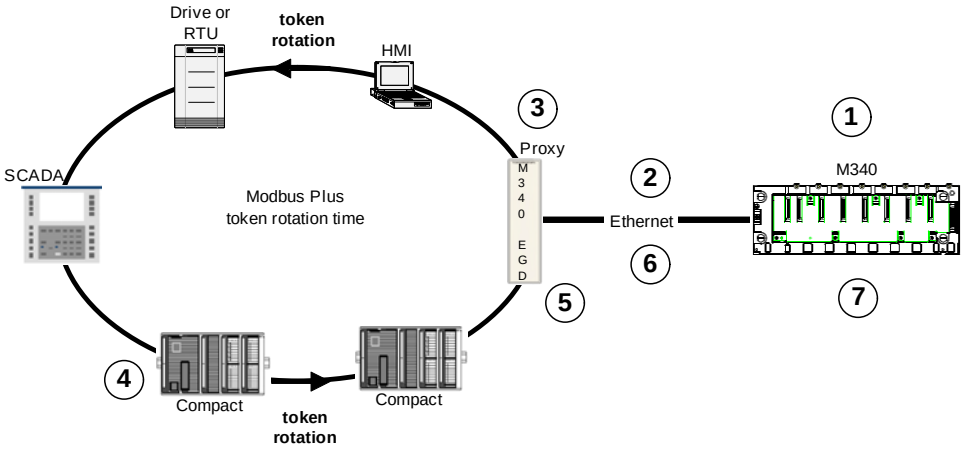
Calculating Message Delivery Time

Message delivery time is calculated as the time it takes a sending node to calculate a value to transmit a message to a receiving node, and for that message to be recognized in receiving node CPU logic (refer to the figure below).

- **Variables:**
  M340 CPU Scan = **M1**
  Modbus Plus Token Rotation = **TR**
  Modbus Plus node CPU Scan or slave Response = **M2**
- **Relative Constants:**
  M340 EGD forwarding delay (average) **EGD** = 10 ms
  Ethernet queuing and propagation delay **ENT** = 1 ms

The Message Request / Response cycle is as follows:

2 x **M1** + 2 x **ENT** + 2 x **EGD** + 2 x **TR** + **M2**



1 M340 solves logic and prepares requests (CPU scan).
2 Message is sent on Ethernet.
3 M340 EGD processes the message and sends it at the next token.
4 The token rotates to the target node and is received. The target node reads the request and solves logic and send a response (CPU scan). The response is sent at the next token rotation.
5 The token rotates to the M340 EGD and the message is received.
6 The M340 EGD processes the message and send it on Ethernet.
7 M340 solves logic and receives a response for processing.

Rotation Time Example

1 M340 CPU scan = 10 ms

2 MBP Token Rotation = 12 ms

3 Compact CPU scan = 15 ms

Equation

2 x 10 ms + 2 x 1 ms + 2 x 10 ms + 2 x 12 ms + 15 ms = 81 ms

NOTE: The example above is a single request and response cycle for a Modbus function such as Read_Var or MSTR.

For Peer Cop and Global Data message delivery, replace the 10 ms M340 EGD forwarding delay with a 20 ms poll rate between the M340 EGD and the M340.

To calculate an application response such as to read an input from Modbus Plus, solve it in logic and write the output, adjust accordingly by multiplying the sequence X 2. Read input, solve logic and write output requires approximately 2 message response cycles. Note that the only difference in using the M340 from a native Modbus Plus device is the 10 ms processing time required each time through the M340 EGD.

NOTE: For more network planning information about Modbus Plus, see *Modicon Modbus Plus Network and Planning Installation Guide* (31003525).

Replacing a Compact PLC Rack with a Modicon M340 Rack and M340 EGD

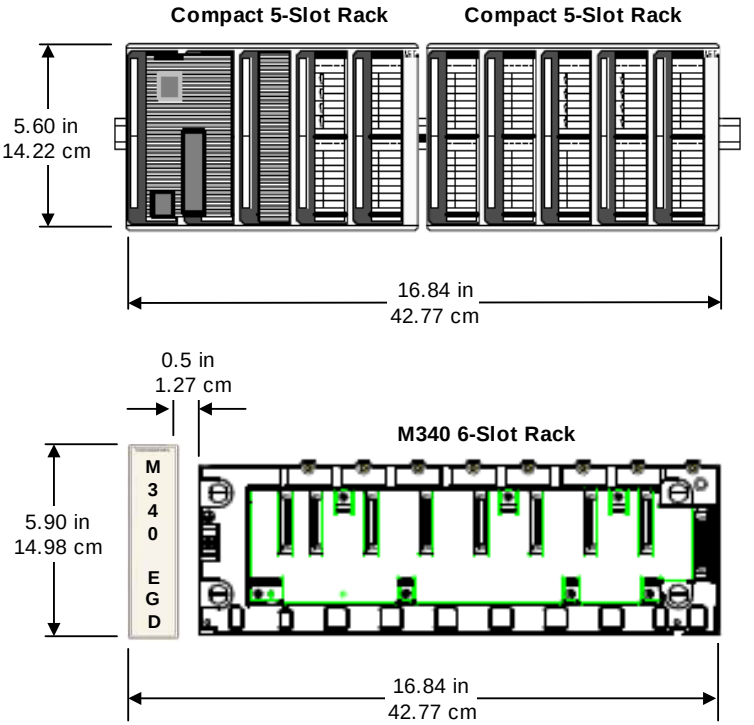
B

Installing a Modicon M340 Rack

Overview

The following example shows the dimensions and requirements when replacing two 5-slot Compact PLC racks with one 6-slot Modicon M340 rack and the M340 EGD.

NOTE: The M340 EGD is 0.30 in/0.76 cm taller than the Compact racks.



Installing the Modicon M340 Rack and M340 EGD in a Cabinet

If the racks are installed in a cabinet, comply with the following measures:

- Leave a minimum space of 80 mm (3.15 in) above and below the modules to facilitate air circulation.
- Leave a minimum space of 60 mm (2.36 in) between the modules, cable connections, and the wiring ducts to facilitate air circulation.

The minimum depth of the cabinet should be 150mm (5.91inch) if the rack is fastened to a plate or 160 mm (6.30 in) if the rack is mounted on a 15 mm (0.59 in) deep DIN rail.

NOTE: For more Modicon M340 system and installation specifications, see *Modicon M340 using Unity Pro: Processors, Racks and Power Supply Modules* (35012672).

M340 EGD Application Note

C

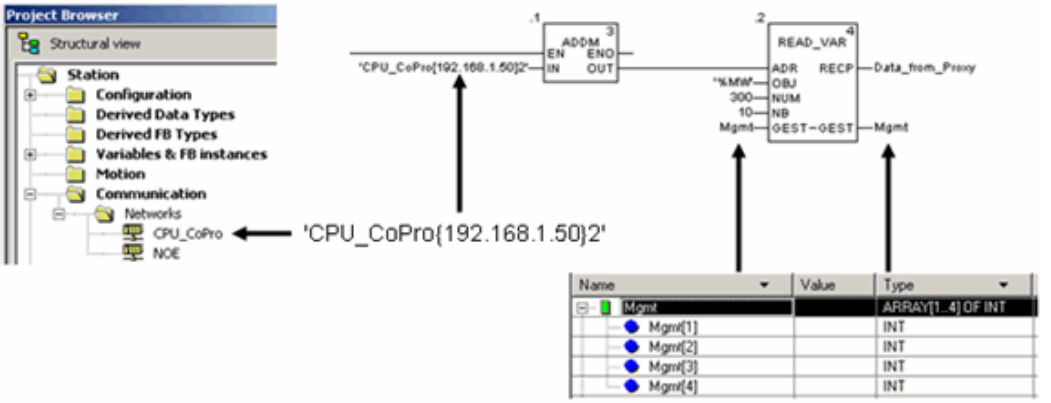
Using the Read_Var Function Block

Introduction

The M340 can be programmed to direct a Read or Write_Var request through the M340 EGD to read and write data to Modbus Plus nodes. This application example details how this is done.

Read_Var Example

This example directs a Read_Var to read 10 words at starting register 400300 from Modbus Plus node address 2. The M340 EGD Ethernet interface address is 192.168.1.50.



ADDM Block

The ADDM block is used for convenient addressing. The block converts a string address into a 5 byte array which can be tied to the input of the Read_Var. The Read_Var is the block that actually executes the read function. There are other variations of the ADDM block, this is just one example. For additional information, refer to the Help available in Unity regarding this block.

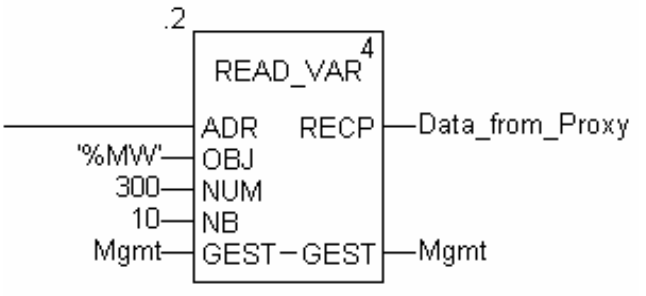
The format shown is:

'CPU_CoPro{192.168.1.50}2'

Note the use of apostrophes and braces in the address syntax.

- '**CPU_CoPro**{192.168.1.50}2'
  CPU_CoPro represents the network name assigned in the Unity communications network. This directs the block to reference which PLC interface will be used for the read.
- 'CPU_CoPro{**192.168.1.50**}2'
  In the braces is the IP address of the Ethernet device or the M340 EGD if you are directing the Read_Var to read from Modbus Plus devices. In this case the IP address of the M340 EGD is 192.168.1.50
- 'CPU_CoPro{192.168.1.50}**2**'
  The 2 outside the braces represents the Modbus Plus address of the device you wish to communicate. In this case the address is Modbus Plus node 2.

Read_Var Block



Inputs

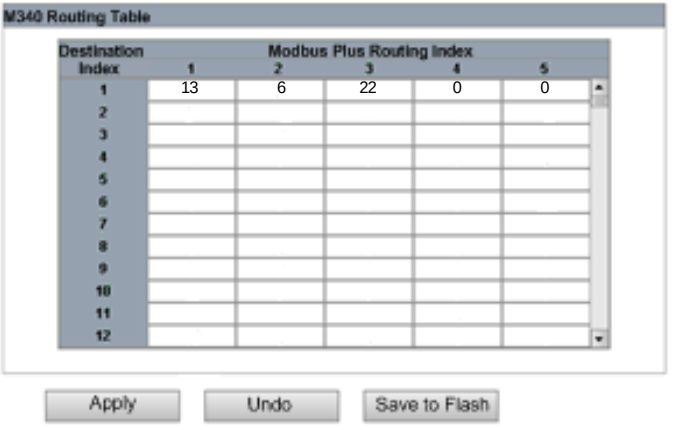
- ADR
  ADR receives in input string with the addressing parameters from the ADDM block described above.
- OBJ
  The data type you want to read:
  - %MW for word
  - %M for bits

- NUM
  The starting memory address to read on the slave/remote device. In this example, the read requests 10 words from the slave are starting register address 300.
- NB
  The number of registers to read.
- GEST
  A 4 byte register array of management parameters that describe the current communication and operation status. See Unity Help for details on how the status is decoded.

Routing from Ethernet to Modbus Plus with Read_Var or Write_Var

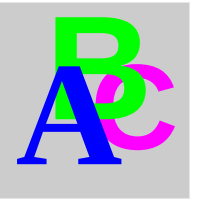
The M340 EGD routing table can also be used to route read and write requests across Modbus Plus network bridges. Simply use the Modbus Plus address value in the ADDM address block and edit the destination data in the routing table. The routing table will serve as an index.

Example: 'CPU_CoPro{192.168.1.50}**2**'



The routing table will take the read to node 2 and redirect it using the routing table values. A Read_Var sent to Modbus Plus node 2 in this example is routed to a Modbus Plus bridge at node 13, onto another Modbus Plus network. Then it is routed to another Modbus Plus bridge at destination node 6.

Index



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