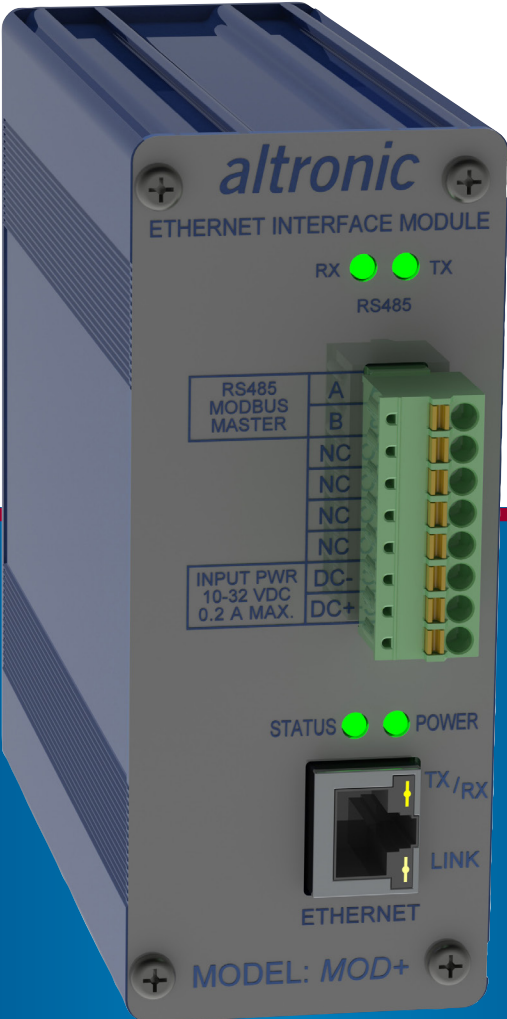


Installation & Operating Manual

MOD+ Ethernet Interface Module

Form MOD+ IOM 9-14



ODVA APPROVAL PENDING

1.0 PLC+ Function-Specific I/O Modules

- 1.1 The PLC+ product line was developed by Altronic to allow easy integration of engine/compressor/generator function specific I/O through Ethernet to industry standard PLCs. The PLC+ Modules are designed to seamlessly deliver efficient, hazardous area approved, cost effective I/O functions that are not normally available by off-the-shelf PLC hardware.
- 1.2 The PLC+ modules were designed with Rockwell Automation Control Logix and Compact Logix controllers in mind. EtherNet/IP implemented in the PLC+ Modules, along with Modbus/TCP allow seamless communication over Ethernet to Rockwell Automation PLCs as well as a wide range of other industrial PLCs.
- 1.3 The PLC+ Modules are based upon taking a time tested Altronic designed and tested specialty I/O function such as analog and digital I/O, vibration, detonation, speed, and others and marrying it to a communications board packaged in a rugged, cost effective shock and dust-resistant package.

2.0 MOD+ Description

- 2.1 The Altronic MOD+ Ethernet Interface Module is designed to connect to Modbus RTU enabled products. It acts as a Modbus Master and converts the Modbus RTU register data from the connected product into either Ethernet/IP or Modbus/TCP formats. Ethernet/IP is meant to talk to Allen Bradley ControlLogix and CompactLogix PLC's. Modbus/TCP is meant to communicate to PLC's and PC's. The MOD+ has one RS485 Modbus Master port to allow it to be connected to one Modbus RTU slave device. It has an integral Ethernet communications port.
- 2.2 In Ethernet/IP mode the MOD+ uses a personality profile configuration file to convert the data into the Ethernet/IP protocol. The personality profile consists of two files that get loaded into the MOD+ via the ethernet port, a CIP.lib file and an ESD file. The connected product data is then available via I/O data assemblies in the producer/consumer connection over Ethernet/IP. Currently configuration files are available for the Altronic MTB, CPU-95 Enhanced Display Module, GOV10, and others. When the configuration files are loaded into the MOD+ it is then married to that specific product. Only one configuration file can be loaded into the MOD+ at a time.
- 2.3 In Modbus/TCP mode the MOD+ acts as a converter to convert Modbus RTU data to Modbus/TCP/IP.
- 2.4 The MOD+ is housed in a 4.5" x 2.5" rugged anodized aluminum case. It mounts on a DIN rail using the DIN-rail-clip on the back of the unit. Pluggable Phoenix Contact-type connectors with push-in spring-cage connectors are used for power and Modbus connections to the Module. A standard RJ45 connector is used for Ethernet communications. The power requirement is 10 to 32Vdc, 0.20Amp max. Status LEDs show RS485 RX and TX communication activity, that the module is powered, its current protocol, Ethernet RX/TX and Link activity.
- 2.5 For proper operation, these instructions must be adhered to strictly.

3.0 Mounting

- 3.1 Mount the MOD+ inside a control panel or to a suitable flat surface. A DIN-rail-mounting-clip on the back of the unit is used to mount the unit on a standard 35mm DIN rail. When mounting the Module to the DIN rail, angle the top of the unit towards the rail and slide the top of the clip over the top of the rail. Firmly push the unit towards the rail until it snaps into place. To remove, grab the Module firmly on the top of the unit and apply downward pressure to compress the latch spring. Rock the bottom of the unit away from the rail.

WARNING: Deviation from this installation/operating manual may lead to improper operation of the monitored machine which could cause personal injury to operators or other nearby personnel.

CAUTION: The MOD+ Ethernet Interface Module is certified for use in Class I, Division 2, Groups C & D hazardous locations when installed in accordance with these instructions.

The communication leads connected to this device operate at a low voltage and power level and **MUST NOT CONTACT** any external voltage source. Damage to the system will result from connection between the comm leads and the ignition system or any AC or DC power source above 36 Vdc.

WARNING: This module is OPEN type equipment that must be used within a suitable enclosure.

4.0 Wiring (SEE WIRING DIAGRAMS)

4.1 GENERAL

Take care not to damage the insulation and take precautions against damage from vibration, abrasion or liquids in conduits. Never run low voltage power or communications wires in the same conduit as the ignition wiring or other high energy wiring such as AC line power, etc. Keep wires at least 12 inches away from all high voltage wiring.

Keep secondary wires to spark plugs and other high voltage wiring at least 12 inches (205mm) away from vibration sensors and their wiring.

4.2 POWER WIRING

Connect the power input wires to terminals (DC+) and (DC-); power requirement is 10 to 32Vdc, 0.20Amp max. Connect the minus terminal (DC-) to panel ground, which must be the same as the ground on the monitored device. This device must be powered from a Class 2 power supply. It is recommended that the current from the power supply to the Module be limited through a properly sized surge-tolerant fuse or electronic breaker.

DO NOT connect the minus terminal directly to AN IGNITION SYSTEM COMMON COIL GROUND ON THE ENGINE.

4.3 RS485 MODBUS MASTER WIRING

The MOD+ has one RS485 port, it is a master port. Wire the RS485 port from the Phoenix type terminal block on the MOD+ module to the RTU-enabled device. Use a two-conductor shielded cable of fine gauge stranded wire and connect the wires to the terminals labeled A and B. Make the connection to the device A to A(-) and B to B(+). If required connect the shield to the slave device only.

4.4 RJ45 ETHERNET COMMUNICATIONS WIRING

The MOD+ communicates to other instruments, PC's, or PLCs via the Ethernet communications port. Use data grade Category 5E Shielded Twisted Pair (STP) or Unshielded Twisted-Pair (UTP) cable that has a 100Ω characteristic impedance that meets the EIA/TIA Category Five (CAT-5) wire specifications. Max wire length is 100 meters / 325 feet.

4.5 HAZARDOUS AREA OPERATION

The MOD+ is CSA certified for CLASS I, DIVISION 2, GROUPS C & D areas as a component only and is required to be installed in a suitable enclosure where the suitability of the combination is subject to the local inspection authority having jurisdiction. The power connections to the MOD+ must be in accordance with the National Electrical Code and in Canada, the Canadian Electrical Code. In addition, the following requirements must be met:

1. **Run the communication wires leaving the panel in a separate conduit from all other wiring and keep them separate throughout the installation.**
2. **Power, input, and output wiring must have a grade of insulation capable of withstanding an AC voltage of 500 volts RMS.**
3. **In general, run wires in separate conduits and junction boxes from high voltage wires such as ignition, fuel valve, and other high voltage wiring.**

NOTE: Altronic HIGHLY RECOMMENDS the use of resistor spark plugs and/or spark plug leads with all digital instrumentation as a means of reducing the impact of RFI (radio frequency interference) on operation.

NOTE: The use of Category 5E STP cable (Shielded Twisted Pair) with shielded RJ45 plug connectors is strongly recommended for installations in harsh industrial environments and/or in the presence of strong electrical fields.

WARNING: Do not disconnect equipment in Div. 2 environment unless power is switched off or the area is known to be non-hazardous.

5.0 Front Panel LED Indicators

- 5.1 **POWER** – When the unit is powered, the green “POWER” LED will be on.
- 5.2 **STATUS** – The status indicator is multi-purpose. It contains several “blink” patterns.
- EtherNet/IP communications mode – one long, one short blink at ¼-second rate
 - Modbus/TCP communications mode – short blinks at ¼ second rate
 - “wink” mode – steady short blinks at 1/8 second rate for the selected time
- 5.3 **ETHERNET** – The Ethernet port contains two LED’s that are built into the RJ45 connector. The green LINK LED will be on solid if the Ethernet port has successfully established a connection. The yellow RX/TX light signals network activity.
- 5.4 **RS 485 INDICATORS** – The RS485 port contains two LEDs, one for receive (RX) the other for transmit (TX). In normal operation the LEDs will blink indicating that data is being communicated over the RS485 Master port.

6.0 Protocols

- 6.1 The MOD+ Module supports EtherNet/IP (Ethernet Industrial Protocol) and Modbus/TCP (Modbus over TCP/IP).
- 6.2 EtherNet/IP – EtherNet/IP is a communication protocol developed and used by Rockwell Automation for use in their Allen Bradley brand PLCs. It is managed by Open DeviceNet Vendors Association (ODVA) (www.odva.org) and is designed for use in process control and other industrial automation applications. Some other vendors using EtherNet/IP are Omron, Schneider Electric, Harting, Phoenix Contact, Opto 22, Wago Corporation, and Yaskawa. EtherNet/IP uses objects to communicate to and from the PLC+ Modules and the PLC. An object model is a collection of related data values and common elements of the PLC+ Module. The object model is listed toward the end of this manual.
- 6.3 Modbus/TCP – Modbus/TCP is Modbus over Ethernet. It is very similar to Modbus RTU. The Modbus registers are the same. The memory map of the Modbus registers are listed in each Modbus-enabled product.

7.0 EDS File (Electronic Data Sheet)

- 7.1 The EDS file is used for Module configuration and to commission it on an EtherNet/IP network. It is an ASCII text file that describes the Module’s device type, product revision, and its configurable parameters on the EtherNet/IP network.
- 7.2 An EDS file for the MOD+ can be found enclosed on the media with this document and on the Altronic ftp site; it may also be downloaded from the onboard web page.

8.0 Embedded Web Server

- 8.1 Each PLC+ Monitor has a built-in web server that allows it to be set up. The embedded web server can be used to view and set the network settings, the protocol settings, and the port settings. For connection details see wiring diagram at the end of this manual.
- 8.2 The PLC+ Modules support Auto MDI/MDI-X crossover. A straight-through Ethernet cable may be used to connect the PC to the PLC+ Module. A straight-through connection through an Ethernet switch or hub on a network may also be used.
- 8.3 Once connected and powered, open your web browser and type the IP address assigned to the Module in the “Address” bar; <http://10.1.100.100> for example. The Module’s home page will be displayed.

NOTE: The default parameters are:
Static IP Address: 10.1.100.100
Subnet Mask: 255.255.255.0
Protocol Setting: EtherNet/IP

- 8.4 Home Page – The Home Page will show the current firmware version, Network Settings, Protocol Settings and allows execution of the “Wink” mode.



Default Settings are shown

Status:

- Up Time – The Up Time is the time between power cycles.
- Firmware Version – The Firmware Version is the revision level and the date it was compiled
- CIP Library – The CIP Library is the personality code of the product and rev level.

Ethernet:

- IP Address – The IP Address is a node identification number for the device on the network. The current IP address is shown.
- IP Mode – IP Mode shows the current Static, DHCP, BootP, or AutoIP IP address assignment type.
- MAC Address – The MAC Address is the unique Hardware identifier of the Module assigned by the factory.
- Protocol Setting – Shows the current protocol; either EtherNet/IP or Modbus/TCP.
- Wink Mode – The “wink” mode is used to identify a Module in the network. When the wink mode is commanded the “STATUS” LED on the Module with the displayed IP address will blink with short blinks at a rate of 1/8 second. This can be used by the integrator or technician to identify which unit is being talked to. The number of seconds the unit will “wink” for can be selected from 1 to 60 seconds.

9.0 Network Settings

- 9.1 Select the Network Settings page to change the network settings for this Module. Press the apply button to save the new settings. The following network settings can be selected.

The screenshot shows a web browser window with the URL 10.1.100.100/ip.shtml. The page title is 'MOD+/MTB' and the main heading is 'Network Settings'. The interface is divided into two columns: 'Current Settings:' and 'Change Settings to:'. The 'Current Settings:' column lists the following values: IP Address Mode: Static, Link Negotiation: Auto-Negotiate, MDI: AUTO, IP Address (TCP/IPv4): 10.1.100.100, Subnet Mask: 255.255.255.0, and Default Gateway: 0.0.0.0. The 'Change Settings to:' column provides dropdown menus for IP Address Mode (Static), Link Negotiation (Auto-Negotiate), and MDI (AUTO). For IP Address, Subnet Mask, and Default Gateway, there are four input fields each, representing the octets of the address. An 'apply' button is located at the bottom of the form. The footer of the page reads 'Copyright © 2013 Altronic LLC HOERBIGER Engine Solutions'.

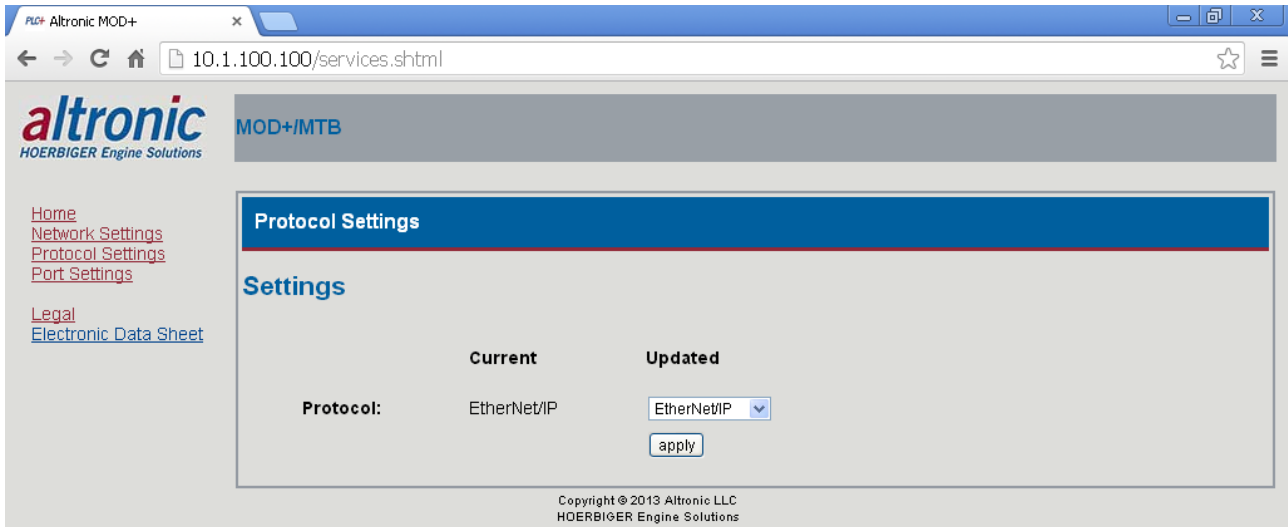
Default settings are shown

IP Address Mode:

- Static – A Static IP Address is a fixed IP Address for the Module.
- DHCP, AutoIP, BOOTP – Dynamic Host Configuration Protocol (DHCP), link-local address (AutoIP), Bootstrap Protocol (BOOTP) are network discovery protocols that allow the Module to be automatically discovered on the network and be assigned necessary information, e.g., an IP address, Subnet Mask, and Gateway, by a server connected to the network to allow communication on the network.
- Link Negotiation – Auto-Negotiate, 100 Full Duplex, 100 Half Duplex, 10 Full Duplex, 10 Half Duplex. Auto negotiation chooses the highest performance transmission mode that the network supports.
- MDI – A Medium Dependent Interface (MDI), Auto, MDI, MDI-X, is the physical and electrical selection. Auto detects if the connection would require a crossover connection and automatically selects for the correct connection.
- IP Address – The IP Address is an identification number assigned to a device. The PLC+ Modules are set to a default IP address of 10.1.100.100 when received. See section 12.2 on how to return the IP address to the default setting.
- Subnet Mask – A Subnet Mask is used to distinguish between the host portion of the IP address and the network.
- Default Gateway – The Default Gateway is the node on the network that facilitates communication with other networks. The default gateway setting is optional. For networks that do not have a gateway, this should be set to 0.0.0.0.

10.0 Protocol Settings

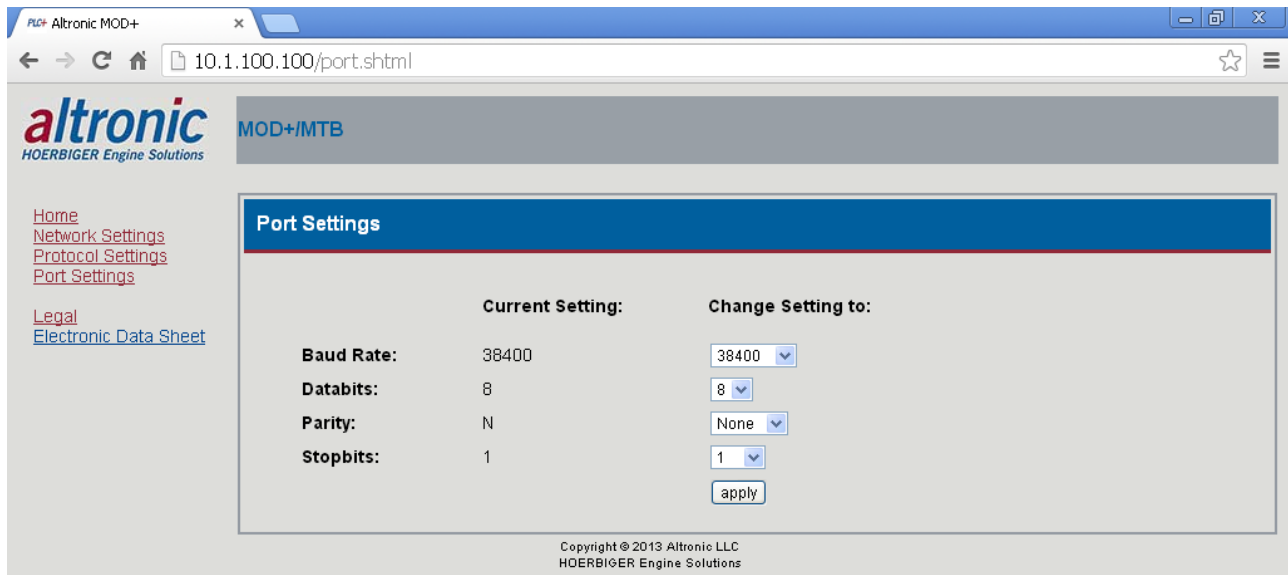
- 10.1 Select the Protocol Settings page to change the protocol for this Module. The selections are EtherNet/IP or Modbus/TCP. Press the apply button to save the new settings.



11.0 Port Settings

- 11.1 The Port Settings pertain to the Modbus Master port on the MOD+. The settings must match the port settings of the Mosbus slave device being connected to. Select the Port Settings page to verify and change the communication parameters.

WARNING: The MOD+ Ethernet Interface Module must be configured prior to use.



12.0 Default Network and Serial Port Settings

12.1 The MOD+ Module is shipped with default network and Serial Port settings to allow the integrator to start at known settings.

Default Network Settings:

- IP Address Mode: Static
- Link Negotiation: Auto-Negotiate
- MDI: Auto
- IP Address: 10.1.100.100
- Subnet Mask: 255.255.255.0
- Default Gateway: 0.0.0.0

Default Serial Port Settings:

- Baud Rate: 38400
- Databits, Parity, Stopbits: 8, N, 1

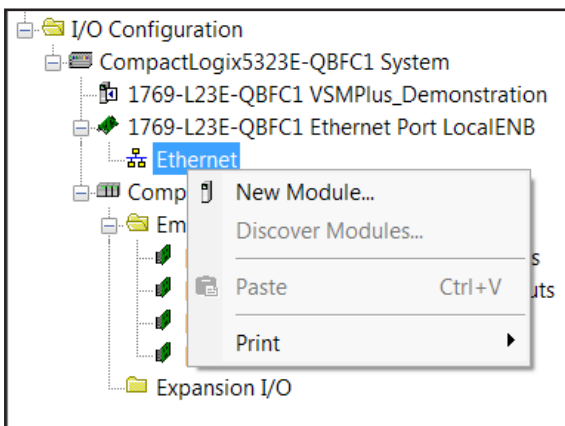
12.2 The Module can, at any time, be returned to the default network settings.

1. Power the Module
2. Locate the small hole on the bottom of the Module in line with the Ethernet connector.
3. Unwrap a paper clip. Insert the end into the hole to activate the reset switch. The switch has tactile feedback. Press and hold the switch on for 5 seconds.
4. Observe the Status LED indicator on the front panel; after a few seconds it will blink in rapid succession indicating the network settings have gone back to the default configuration.
5. Open your web browser and type the default IP address in the "Address" bar: <http://10.1.100.100>, the module home page will be displayed. The network settings on the PC may need to be reconfigured in order to communicate with the device.

13.0 Adding the MOD+ Module to an Alan Bradley Compact Logix/Control Logix PLC using RSLogix-5000

13.1 Before you begin, ensure that you have made a back-up of any and all programs. RSLogix 5000 shall be opened and Offline.

1. Add a new Module to the Ethernet backplane.

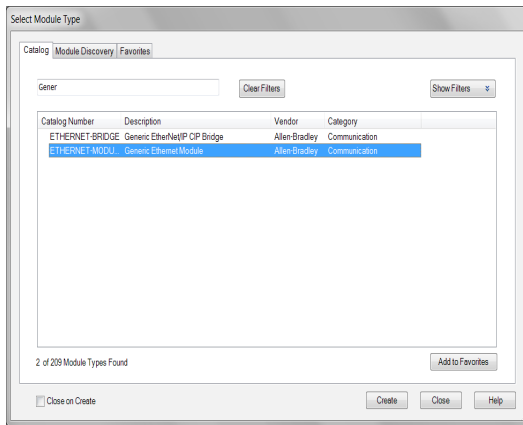


NOTE: These steps were performed using a Compact Logix 1769-L23E-QBFC1 running software v.20 and the Altronic LLC Vibration Sensor Monitor (VSM+). These steps may vary depending on the configuration and equipment used.

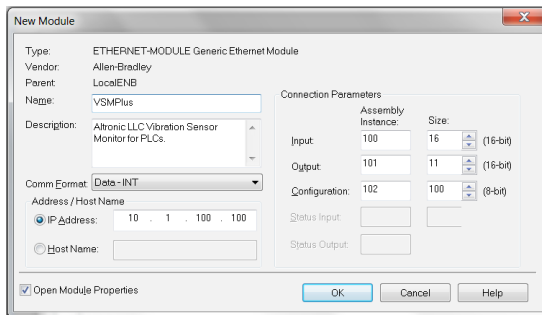
WARNING: This procedure will involve downloading to the PLC. This should only be done while the PLC is not in operation and actively controlling a system. Be sure to observe all warnings and cautions before proceeding.

NOTE: The reference functions are provided as a guide and tool to aid the user in integrating a PLC+ module to an Alan Bradley PLC. The use of these functions is not required for device functionality.

- a. The module type is “Generic Ethernet Module”

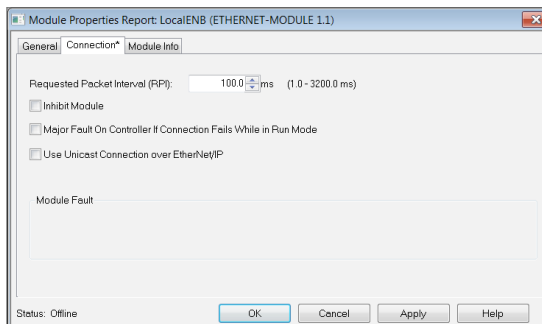


2. Create the module. Be sure to enter the correct IP address or host name of the module.



NOTE: The module name should match the module name, “VSMPlus” for example, in order that the imported routine can parse the data.

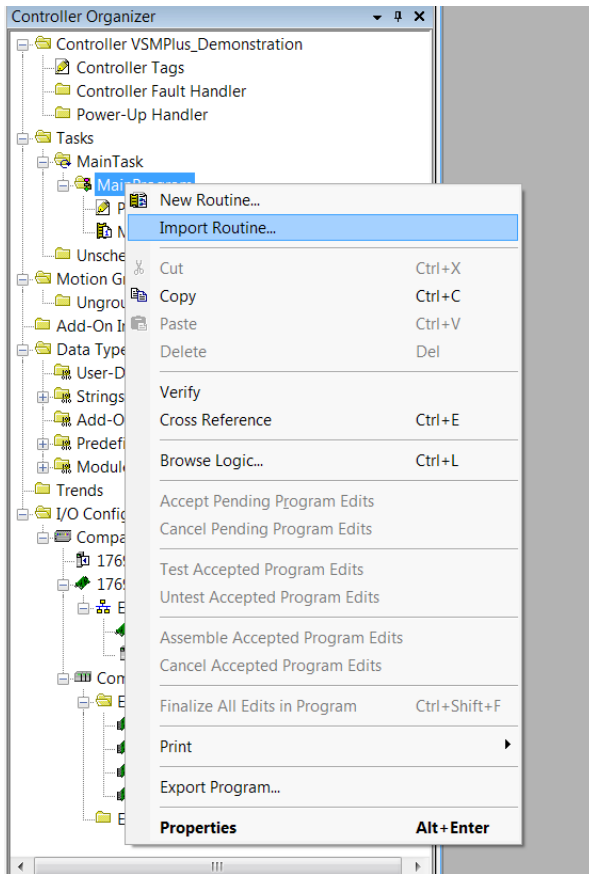
- a. The communications format shall be “Data – INT”.
- b. Refer to the Module Assembly Tables for the correct Assembly Instance numbers and sizes.
3. Enter the module properties as needed for the project.



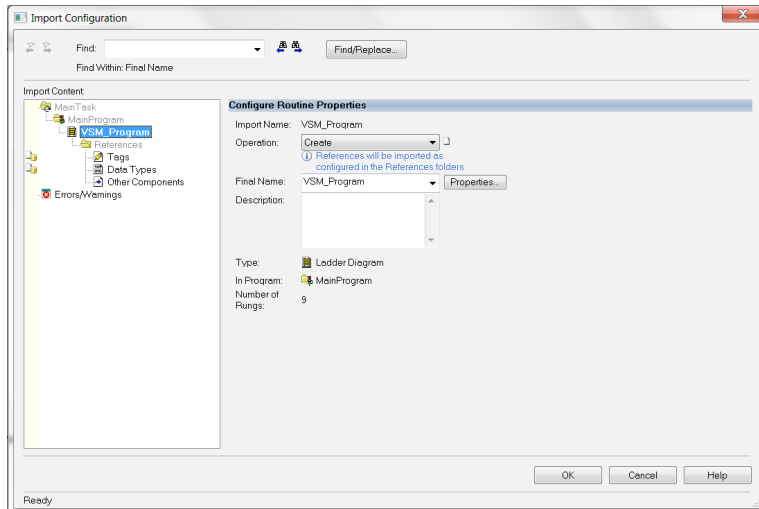
NOTE: Unless otherwise stated, all MOD+ modules support a minimum RPI of 100.0ms. Setting the RPI lower than this value may cause undesired operation.

NOTE: All MOD+ modules support both Unicast and Multicast EtherNet/IP connections. This setting may be changed according to project and network requirements.

4. Under controller organizer, expand the “Main Task” and “Main Program”. From the “Main Program,” Import a new routine.

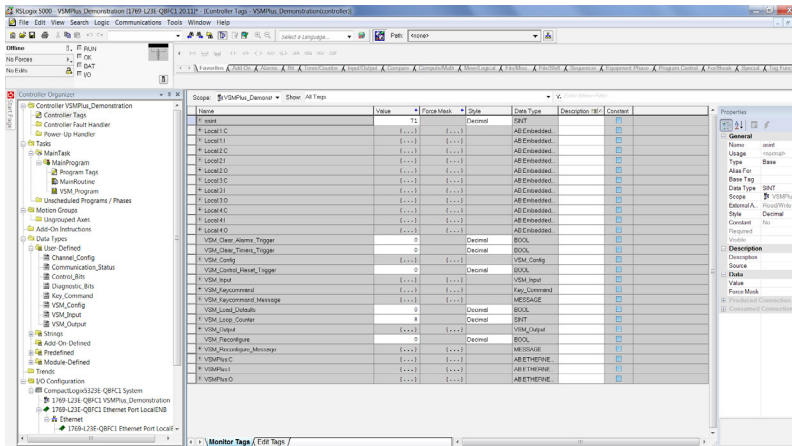


- a. Select the appropriate .L5X file for the module and configuration that you are adding.
- b. When prompted, create all necessary components (Tags, Data Types, etc).



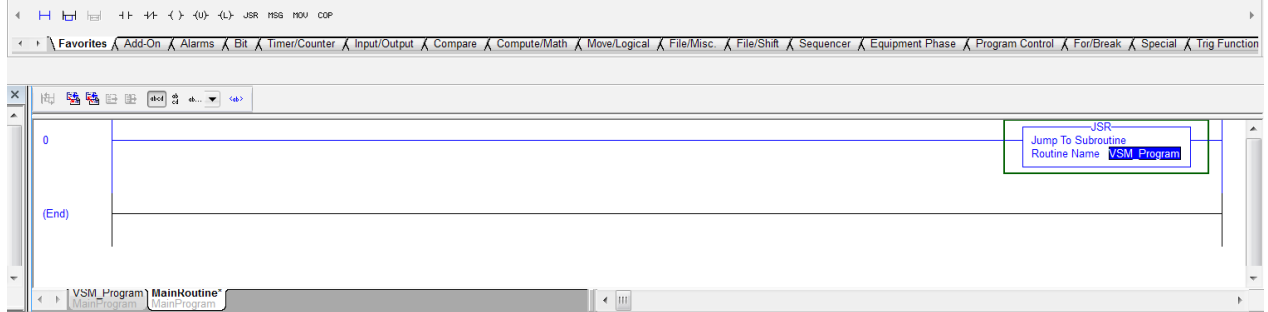
NOTE: Some data types and tags are common across MOD+ modules. Import conflicts can be safely ignored if they conflict with an existing MOD+ module import.

- RSLogix 5000 will now create the routine, Tags, and UDTs necessary for module operation.



NOTE: Be sure to verify the newly imported routine. Occasionally errors will occur during import. Ensure that rungs properly reference the correct fixed controller tags (EG Module:I.Data, Module:O.Data, etc). Also, ensure that any Message statement have the correct module listed in the Path under the "Communication" tab.

- At the beginning of the "Main Routine" add a single unconditional JSR to the newly created routine.



- Once everything has been verified and there are no errors, DOWNLOAD to the Controller.

Upon import, a series of controller tags "<Module>_Input", "<Module>_Output", and optionally "<Module>_Reconfigure" will have been created. These points are provided to allow easy connection to/from the module's Input, Output, and Configuration data respectively. If a configuration assembly is used, there will also be a "<Module>_Reconfigure" BOOL tag created that will allow the PLC to send the "Device Reconfigure" message to the device to allow run-time configuration changes. Some modules may also create other controller tags to access special functionality such as specific MESSAGE statements or device "Key Commands". Refer to the individual product documentation for these messages and their meaning. If necessary, use the "Cross Reference" functionality of RSLogix 5000 as an aid.

WARNING: Care must be taken when exercising the provided data points to ensure that written values do not exceed the limits of the corresponding data point. Failure to do so may result in equipment malfunction and/or a PLC IO Fault.

14.0 EtherNet/IP Object Models

14.1 The following Objects are used in the MOD+.

OBJECT (ID)	TYPE
Identity (01h)	Required
Message Router (02h)	Required
Assembly (04h)	Device-specific
Connection Manager (06h)	Required
TCP Object (F5h)	Required
Ethernet Link Object (F6h)	Required
QoS (48h)	Pre-defined
Parameter (0Fh)	Pre-defined
Parameter Group (10h)	Pre-defined
Group (12h)	Pre-defined
File (37h)	Pre-defined

14.2 Identity Object (01h – 1 instance)

The identity object provides identification of, and general information about the MOD+.

ATTR ID	NAME	DATA TYPE	DATA VALUE	Access RULE
Class Attributes				
1	Revision	UINT	1	GET
Instance Attributes				
1	Vendor Number	UINT	1250 _{DEC}	GET
2	Device Type, Generic	UINT	2b _{HEX}	GET
3	Product Code Number	UINT	(product specific)	GET
4	Product Major Revision Product Minor Revision	USINT USINT	02 30	GET
5	Status Word (see definition below)	WORD	See Below	GET
6	Product Serial Number (unit MAC address)	UDINT	Unique 32 Bit Val	GET
7	Product Name Structure of: Product Name Size Product Name String	USINT USINT[0-32]	(product specific)	GET
Status Word				
Bit	Bit = 0	Bit = 1		
0	No I/O Connection	I/O Connection Allocated		
1-15	Unused	Unused		
Common Services				
SVC CODE	IMPLEMENTED FOR		SERVICE NAME	
	CLASS LEVEL	INSTANCE LEVEL		
0E _{HEX}	Yes	Yes	Get_Attribute_Single	

Common Services (contd)				
05 _{HEX}	No	Yes	Reset	
Reset Service Code				
SVC CODE	CLASS	INSTANCE	DATA ¹	DESCRIPTION
05h	01h	01h	00h	Force software reset.
05h	01h	01h	01h	Reload factory settings and reset.

¹ This device requires that the attributes be left blank and that the value be entered in the data field.

14.3 Message Router Object (02h)

The message router object provides a messaging connection point through which a client may address a service to any object class or instance residing in the MOD+.

The MOD+ has no supported attributes.

14.4 Assembly Object (04h)

The Assembly Object binds attributes of multiple objects, which allows data to or from each object to be sent or received over a single connection. Assembly objects can be used to bind input data or output data. The terms "input" and "output" are defined from the network's point of view. An input will produce data on the network and an output will consume data from the network.

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
Class Attributes				
1	Revision	UINT	1	GET
2	Max Instance	UINT	255	GET
Instance 64H Attributes (Input Instance 1)				
3	Input Data (T->O)	(product specific)		GET
Instance 65H Attributes (Output Instance 1)				
3	Output Data (O->T)	(product specific)		SET
Instance FDH Attributes (Output Only Instance)				
<i>This instance allows clients to produce output data without monitoring the input data.</i>				
Instance FEH Attributes (Input only Instance)				
<i>This instance allows clients to control the input without providing output data.</i>				
Instance FFH Attributes (Heartbeat Instance – Listen Only)				
<i>This instance allows clients to monitor input data without providing output data.</i>				
Common Services				
<i>CHART CONTINUES...</i>				
SVC CODE	IMPLEMENTED FOR		SERVICE NAME	
	CLASS LEVEL	INSTANCE LEVEL		
0E _{HEX}	Yes	Yes	Get_Attribute_Single	
05 _{HEX}	No	Yes	Reset	

14.5 Connection Manager Object (06h)

This object is used for connection and connectionless communication, including establishing connections across multiple subnets.

14.6 TCP/IP Interface Object (F5h – 1 instance)

The TCP/IP Interface Object provides the mechanism to configure a device's TCP/IP network interface. Examples of configurable items include the device's IP Address, Network Mask, and Gateway Address.

ATTR ID	NAME	DATA TYPE	DATA VALUE	Access RULE
Class Attributes				
1	Revision	UINT	1	GET
Instance Attributes				
1	Status ¹	DWORD	1	GET
2	Configuration Capability ²	UINT	5	GET
3	Configuration Control ³		0	GET
4	Physical Link Object ⁴ -			GET
	A Structure of:			
	Path Size	UINT	2	
	Path	Array of WORD	20F6H.. 2401H	
Instance Attributes				
5	Interface Configuration ⁵			GET
	A Structure of:			
	IP Address	UDINT	0	
	Network Mask	UDINT	0	
	Gateway Address	UDINT	0	
	Name Server	UDINT	0	
	Name Server 2	UDINT	0	
	Domain Name Size	UINT	0	
	Domain Name	STRING	0	
6	Host Name ⁶			GET
	A Structure of:			
	Host Name Size	UINT	0	
	Host Name	STRING	0	

Common Services

SVC CODE	IMPLEMENTED FOR		SERVICE NAME
	CLASS LEVEL	INSTANCE LEVEL	
0E _{HEX}	Yes	Yes	Get_Attribute_Single
10 _{HEX}	No	Yes	Set_Attribute_Single

¹ See section 5-3.2.2.1 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

² See section 5-3.2.2.2 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

³ See section 5-3.2.2.3 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

⁴ See section 5-3.2.2.4 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

⁵ See section 5-3.2.2.5 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

⁶ See section 5-3.2.2.6 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

14.7 EtherNet Link Object (F6h – 1 instance)

The Ethernet Link Object maintains link-specific counters and status information for an IEEE 802.3 communications interface.

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
Class Attributes				
1	Revision	UINT	1	GET
Instance Attributes				
1	Interface Speed ¹	UDINT	100 (default)	GET
2	Interface Flags ²	DWORD	3 (default)	GET
3	Physical Address ³	USINT Array[6]	0 (default)	GET
Common Services				
SVC CODE	IMPLEMENTED FOR		SERVICE NAME	
	CLASS LEVEL	INSTANCE LEVEL		
0E _{HEX}	Yes	Yes	Get_Attribute_Single	

¹ See section 5-4.2.2.2 of “Volume 2: EtherNet/IP Adaptation of CIP™” from ODVA for more details on this attribute.

² See section 5-4.2.2.1 of “Volume 2: EtherNet/IP Adaptation of CIP™” from ODVA for more details on this attribute.

³ See section 5-4.2.2.3 of “Volume 2: EtherNet/IP Adaptation of CIP™” from ODVA for more details on this attribute.

14.8 QoS Object (48h – 1 instance)

The QoS Object provides a means to configure certain QoS-related behaviors in EtherNet/IP devices.

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
Class Attributes				
1	Revision	UINT	1	GET
Instance Attributes				
4	DSCP Urgent	USINT	1	GET/SET
5	DSCP Scheduled	USINT	1	GET/SET
6	DSCP High	USINT	1	GET/SET
7	DSCP Low	USINT	1	GET/SET
8	DSCP Explicit	USINT	1	GET/SET
<i>CHART CONTINUES...</i>				
Common Services				
SVC CODE	IMPLEMENTED FOR		SERVICE NAME	
	CLASS LEVEL	INSTANCE LEVEL		
0E _{HEX}	Yes	Yes	Get_Attribute_Single	
10 _{HEX}	No	Yes	Get_Attribute_Single	

¹ See section 5-6.4.2 of “Volume 2: EtherNet/IP Adaptation of CIP™” from ODVA for more details on these attributes.

14.9 Parameter Object (0Fh – 208 instances)

The parameter object along with the parameter group and group objects are standard objects that provide an alternate path to the MOD+ vendor specific objects.

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
Instance Attributes				
1	Parameter Value	[data type]	See Tables below	GET/SET
2	Link Path Size	USINT		GET
3	Link Path	Packed EPATH		GET
4	Descriptor	WORD	1	GET
5	Data Type	USINT	Refer to referenced data	GET
6	Data Size	USINT		GET
7	Parameter Name String	SHORT_STRING	<i>Same as "Tag" for referenced item</i>	GET
8	Units String	SHORT_STRING	<i>Same as "Tag" for referenced item</i>	GET
9	Help String	SHORT_STRING	<i>Same as Get_Label service for referenced item</i>	GET
10	Minimum Value	[data type]	Refer to referenced data	GET
11	Maximum Value	[data type]		GET
12	Default Value	[data type]		GET
13	Scaling Multiplier	UINT	1	GET
14	Scaling Divisor	UINT	1	GET
15	Scaling Base	UINT	1	GET
16	Scaling Offset	INT	0	GET
17	Multiplier Link	UINT	0	GET
Instance Attributes				
18	Divisor Link	UINT	0	GET
19	Base Link	UINT	0	GET
20	Offset Link	UINT	0	GET
21	Decimal Precision	USINT	0	GET
Common Services				
SVC CODE	IMPLEMENTED FOR		SERVICE NAME	
	CLASS LEVEL	INSTANCE LEVEL		
0E _{HEX}	Yes	Yes	Get_Attribute_Single	
10 _{HEX}	No	Yes	Get_Attribute_Single	
01 _{HEX}	No	Yes	Get_Attribute_All	

14.10 File Object (37h – 2 instances)

The file object allows easy access to the device EDS and icon files from within a PLC control environment.

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
Class Attributes				
1	Revision	UINT	1	GET
2	Max Instance ID	UINT	201	GET
3	Number of Instances	UINT	2	GET
4	Attribute List	UINT,UINT[]	1,[11]	GET
5	Service List	UINT,UINT[]	1,[77]	GET
6	Max Object Attribute ID	UINT	32	GET
7	Max Instance Attribute ID	UINT	11	GET
32	Directory	Array of: UINT: Instance Number STRINGI: Instance_Name STRINGI: File_Name	[[200, (ENG)"EDS and Icon Files", (ENG)"EDS.txt"], {201, (ENG)"Related EDS and Icon Files", (ENG)"EDSCollection.gz"}]	GET
Instance C8H Attributes (EDS file)				
1	State ²	USINT	2 (Default – Loaded)	GET
2	Instance Name	STRINGI	(ENG)"EDS and Icon Files"	GET
3	Instance Format Version	UINT	1	GET
4	File Name	STRINGI	(ENG)"EDS.txt"	GET
5	File Revision	USINT: Major_Revision USINT: Minor_Revision	0 ¹ 3	GET
6	File Size	UDINT	8292 ¹	GET
7	File Checksum	INT	-20137 ¹	GET
8	Invocation Method	USINT	255	GET
9	File Save Parameters	BYTE	00000000b	GET
10	File Type ³	USINT	1	GET
11	File Encoding Format ⁴	USINT	0	GET
Instance C9H Attributes (Icon file)				
1	State ²	USINT	2 (Default – Loaded)	GET
2	Instance Name	STRINGI	(ENG)"Related EDS and Icon Files"	GET
3	Instance Format Version	UINT	1	GET
4	File Name	STRINGI	(ENG)"EDSCollection.gz"	GET
5	File Revision	USINT: Major_Revision USINT: Minor_Revision	0 ¹ 8	GET
6	File Size	UDINT	433 ¹	GET
7	File Checksum	INT	10478 ¹	GET
8	Invocation Method	USINT	255	GET
9	File Save Parameters	BYTE	00000000b	GET
10	File Type ³	USINT	1	GET
11	File Encoding Format ⁴	USINT	1 (compressed)	GET

CHART CONTINUES...

ATTR ID	NAME	DATA TYPE	DATA VALUE	ACCESS RULE
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Common Services

SVC CODE	IMPLEMENTED FOR		SERVICE NAME
	CLASS LEVEL	INSTANCE LEVEL	
0E _{HEX}	Yes	Yes	Get_Attribute_Single
01 _{HEX}	No	Yes	Get_Attribute_All
4B _{HEX}	No	Yes	Init_Upload
4D _{HEX}	No	Yes	Init_Partial_Read
4F _{HEX}	No	Yes	Upload

¹ These values are subject to change without notice.

² See section 5-42.2 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

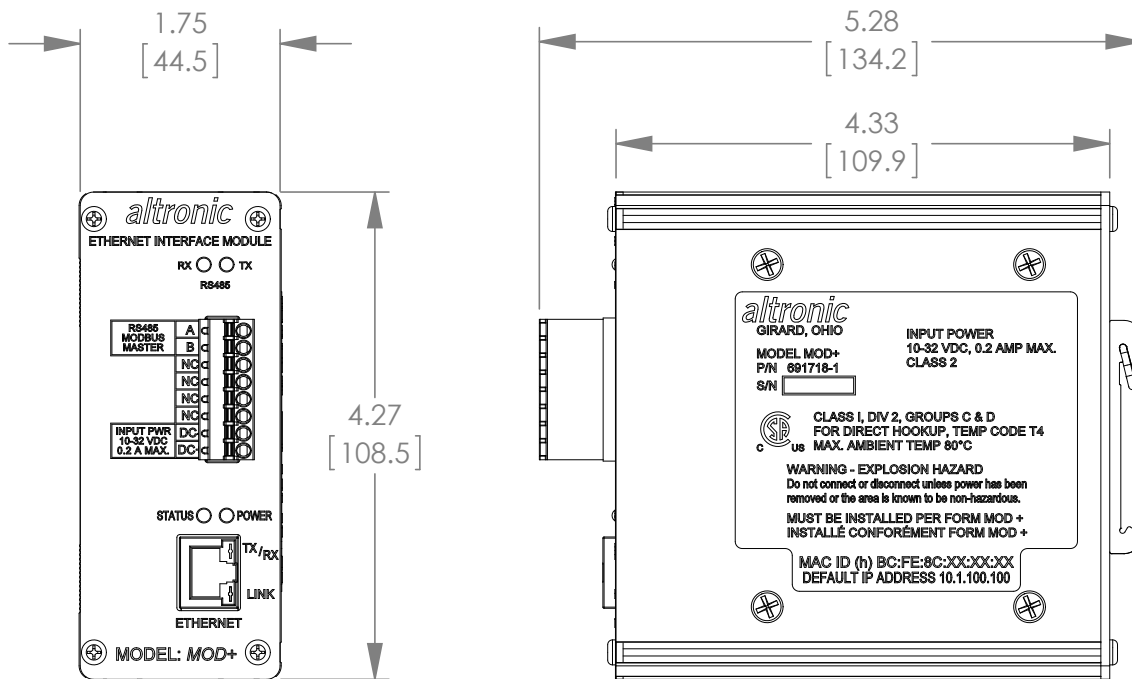
³ See section 5-42.2 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

⁴ See section 5-42.8 of "Volume 2: EtherNet/IP Adaptation of CIP™" from ODVA for more details on this attribute.

15.0 Modbus/TCP

Modbus/TCP is Modbus over Ethernet. The MOD+ Module converts the Modbus RTU register values to Modbus TCP. The Modbus RTU values are transmitted via RS485 to and from the MOD+ module and the connected device. The values are then transmitted out of the ethernet port as Modbus TCP. Refer to the specific product being converted for its register definitions.

FIGURE 1. MOUNTING DIMENSIONS AND SPECIFICATIONS



SPECIFICATIONS:

POWER REQUIRED: DC POWER 10-32 VDC, 0.20 AMP. MAX.

AMBIENT TEMPERATURE RANGE: -40°C TO 80°C (-40°F TO 176°F)

MOUNTING: MOUNTS TO 35MM DIN RAILS

ENCLOSURE: EXTRUDED ALUMINUM, NEMA TYPE 1

MODBUS MASTER PORT FOR COMMUNICATIONS TO MODBUS RTU-ENABLED PRODUCT

INTEGRAL ETHERNET PORT FOR COMMUNICATIONS TO A PLC/PC OR OTHER COMMUNICATION DEVICE

LED INDICATORS: MOSBUS MASTER RX/TX, NETWORK STATUS LINK AND RX/TX, STATUS MODE, AND POWER

INTERNAL TFTP SERVER TO UPLOAD/DOWNLOAD THE CONFIGURATION DATA

CONNECTOR, ETHERNET PORT: SHIELDED RJ45 SOCKET

NETWORK WIRING INTERFACE: AUTO MDI/MDIX

COMMUNICATION PROTOCOLS: Modbus/TCP, ETHERNET/IP

CONNECTIONS: UP TO 5 CONNECTIONS

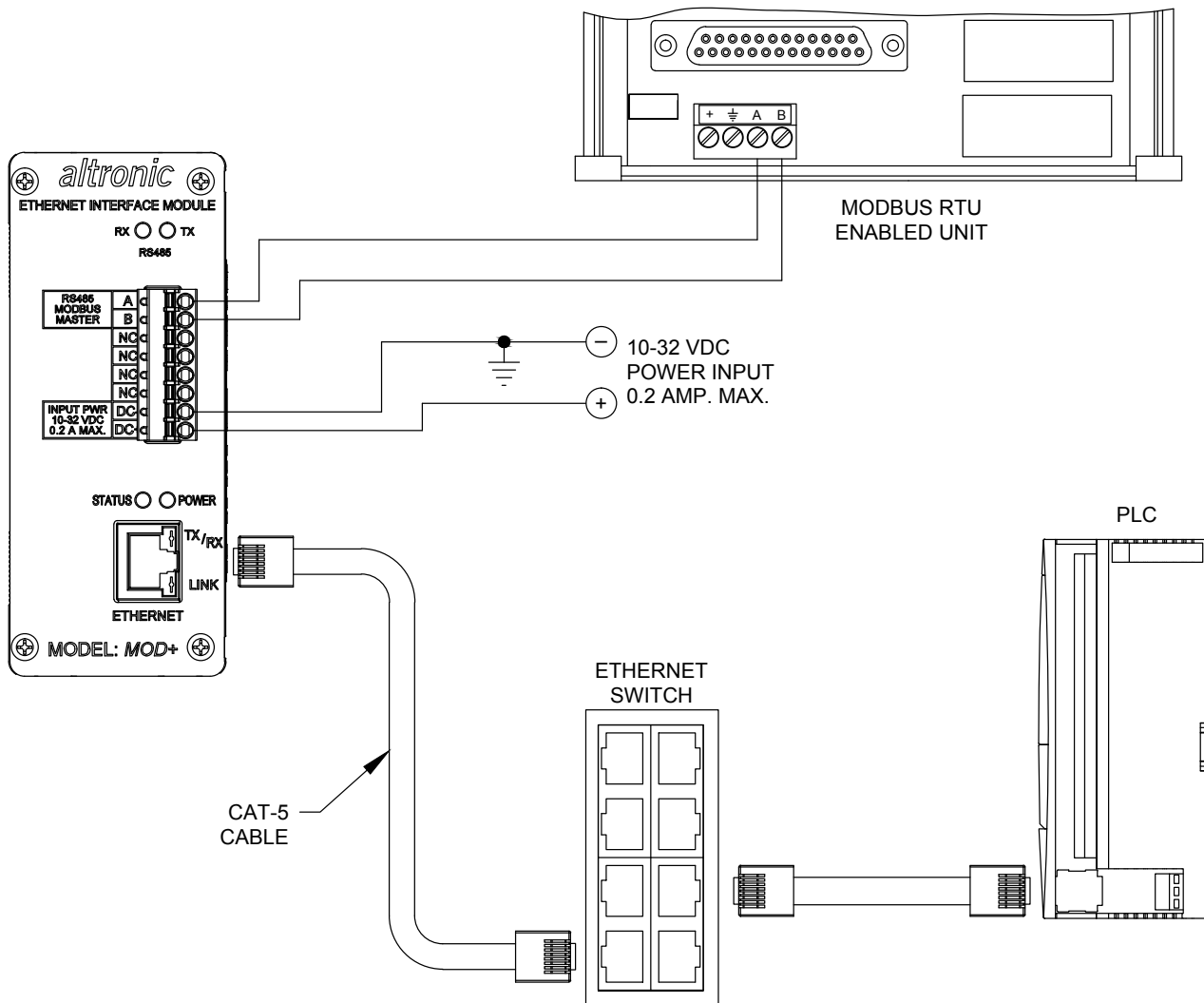
DATA RATE: AUTO SENSED 10/100 Mbps

ADDRESS: AUTO IP, BOOT P, STATIC

IP ADDRESS: DEFAULT STATIC IP ADDRESS IS 10.1.100.100

HAZARDOUS AREA CLASSIFICATION: CLASS I, DIV. 2, GROUPS C & D FOR DIRECT HOOKUP, TEMP CODE T4, MAX. AMBIENT TEMP. 80°C.

FIGURE 2. WIRING DIAGRAM – POWER AND COMMUNICATIONS



NOTES:

1. POWER WIRING,
MUST BE POWERED FROM A CLASS 2 POWER SUPPLY. IT IS RECOMMENDED THAT THE CURRENT FROM THE POWER SUPPLY TO THE MODULE BE LIMITED THROUGH A PROPERLY SIZED SURGE TOLERANT FUSE OR ELECTRONIC BREAKER.
2. RS485 MODBUS MASTER WIRING,
USE A TWO-CONDUCTOR SHIELDED CABLE OR FINE GAUGE STRANDED WIRE AND CONNECT THE WIRES TO THE TERMINALS LABELED A AND B. MAKE THE CONNECTION TO THE DEVICE A TO A(-) AND B TO B(+). IF REQUIRED CONNECT THE SHIELD TO THE SLAVE DEVICE ONLY.
3. RJ45 ETHERNET COMMUNICATIONS WIRING,
USE DATA GRADE CATEGORY 5E SHIELDED TWISTED-PAIR (STP) OR UNSHIELDED TWISTED-PAIR (UTP) CABLE THAT HAS A 100Ω CHARACTERISTIC IMPEDANCE THAT MEETS THE EIA/TIA CATEGORY FIVE (CAT-5) WIRE SPECIFICATIONS. MAX WIRE LENGTH IS 100 METERS / 325 FEET.