Modbus Plus X-Link Driver User's Guide

Version 1.22

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This document applies to the Modbus Plus X-Link Driver (SA85.DRV).

SST strives to ensure accuracy in our documentation. However, due to rapidly evolving products, on occasion software or hardware changes may not have been reflected in the documentation. If you notice any inaccuracies, please contact SST.

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1 Introduction

1.1 What is the Modbus Plus Driver?

The Modicon Modbus Plus X-Link driver allows the X-Link to transfer data to or from devices on the Modicon Modbus Plus network.

1.2 Why Do I Need This Manual?

This manual describes the communication requirements and capabilities of the Modbus Plus driver, the configuration parameters for the driver and the mappings possible for the Modicon PLCs. It provides troubleshooting information and technical specifications that can be referenced when required.

For further information, refer to the *SA85 Interface Card User's Guide, Modicon IBM Host Based Devices User's Guide GM-HBDS-001 Rev. D.* As well, refer to the appropriate Modicon documents for information on Modicon hardware, programming and network protocols.

If you need information on the X-Link unit or the X-Link configuration software program, refer to the *X-Link User's Guide*.

1.3 How Do I Use This Manual?

The following conventions will help you better understand and use the material in this manual.

Text you type	appears in Courier font. For example, “Type `mkdir C:\XLINK` to make a new X-Link directory.”
Menu Names	are italicized. You *choose* menu options. For instance, “Choose the *X-Link/New...* command.”
Dialog Box Names	are italicized. For example, “The *File to Open* dialog box appears.”
Dialog Box Options	are *selected*. For example, “From the *Ports* list, select the COM port you are using.”
Text in Message Boxes	appears in quotation marks. For example: *The message “Already Downloaded - Reload?” appears.*
Keystrokes	Single keystrokes appear in square brackets. Press keys separated by “+” signs at the same time. For example, “Press ALT + O,” means you should press the [Alt] key and the [O] key at the same time.
Mouse or Keyboard?	You may use either a mouse or the keyboard to select options in the configuration program. There are typically three different ways to choose a command. This manual typically lists one or two command options. Refer to the *Shortcut Summary* in the *X-Link User’s Guide* for additional choices.

1.4 Where Can I Find More Help?

If you have a question or problem that the manuals or on-line help do not address, you can contact X-Link Technical Support by mail, fax or email, or by phone during regular business hours (EST).

X-Link Technical Support
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X-Link drivers and manuals are also available on the SST Web site, *www.sstech.on.ca*.

2 Communication

Once configured, the X-Link emulates a station on the Modbus Plus network. It can send messages to other stations and receive messages from other stations. This section outlines the requirements and compatibilities of this communication.

2.1 Requirements

To communicate to the Modbus Plus network, the X-Link requires a Modicon SA85 card. The X-Link Modbus Plus driver supports either the redundant or non-redundant version of the SA85.

Installation and cabling requirements are detailed in the SA85 user manual, *Modicon IBM Host Based Devices User's Guide GM-HBDS-001 Rev. D.*

2.2 Compatibilities

The Modbus Plus X-Link driver has been written to conform with the specification in the *Modicon IBM Host Based Devices User's Guide GM-HBDS-001 Rev. D.*

3 Configuration

When you download a driver to the X-Link, you must set configuration parameters to control the interface between the driver and the required hardware. This section details the configuration parameters for the Modbus Plus driver.

3.1 Configuration Parameters

The Modbus Plus driver is distributed in the file SA85.DRV. Once the SA85.DRV is loaded into the X-Link, the following parameters are required:

Card Segment	The memory address for the SA85 card. The card requires 2K of memory in the range of C000 to EF80. Default is D000, second choice is D800.
Convert Floats	With this option is on, the Modbus Plus Driver will convert the data types between the integer supported by the Modbus Plus, and floating points stored in the X-Link. Incoming integers will be expanded to floats; the floats written to the Modbus Plus will be truncated. When this option is off, the floating points will be read and written as two consecutive integers. Default option is Off.
Poll Rate	Because the driver does not use interrupt settings, it must access data from the card at a certain rate. The poll rate ranges from 2 ms to 255 ms with a default of 10 ms.

The memory address selected must match the switch settings on the SA85. The memory base address switches are located near the bus connector on the SA85 and are not accessible from the outside of the X-Link.

The Modbus Plus node address must also be set on the SA85. The switches to set the station address are accessible from the end of the X-Link.

4 Mappings

Once the X-Link has been loaded, you can create mappings to transfer data from one network to the other. This section outlines the mapping options supported by the Modbus Plus driver.

For information on what mappings are or how they work, please refer to the *X-Link User's Guide*.

4.1 Data Types and Lengths

The Modbus Plus Driver supports three X-Link data formats; Bits and Integers, as well as Floats.

The Modbus Plus protocol does not support floating point. The driver will truncate any floating point numbers before transmission, and expand the integer numbers to floating point after retrieval when floating points are requested.

The type of Modbus Plus command that the driver generates depends on the address type specified.

The length of the data portion in a command is constrained by the Modbus Plus protocol. Mappings that are configured with the X-Link reading or writing the data on the Modbus Plus network should be restricted to a maximum size of:

Data Type	X-Link Access	Maximum Size (bytes)
COIL	Read	250
COIL	Write	100
Registers	Read	250
Registers	Write	200
Global Data	Read/Write	64

4.2 Source Accesses

The Modbus Plus driver supports four possible source accesses.

The first source defines a local address which allows any device on the Modbus Plus network to write the data to the X-Link. This type of source is ideal for data that changes infrequently, but must be forwarded immediately, such as errors or exceptions. Programming must be provided on the remote device to update the data when necessary.

The second type of source supported by the Modbus Plus driver is an X-Link initiated read. This source defines an external address which the X-Link uses to read the data from a remote node on the network. This access also requires you to specify when to read the data. This type of data source does not require any programming in the remote node, but generates extra network bandwidth to poll the data.

The next source is Modbus Plus global data. As each station passes data on the network, it has the opportunity to transmit up to 32 integers to all the other stations on the network. This global data can be accessed as a source for an X-Link mapping. To access global data, you provide a station address (1 to 64) and an offset into that station's global data table.

The last source is Modbus Plus network statistic counters. To access the counters stored on the SA85 card, provide an offset specifying the number of words to skip from the beginning of the diagnostic counters.

4.3 Destination Accesses

The Modbus Plus driver supports three possible destination accesses.

The first destination defines a local address which allows any device on the Modbus Plus network to read the data from the X-Link. This type of destination can be used to allow a PLC to read back the data it has written. Programming must be provided on the remote device to initiate the read.

The second type of destination access supported by the Modbus Plus driver is an X-Link initiated write. This destination defines an external address which the X-Link uses to write the data to a remote node on the network. This access also requires the user to specify when to write the data. This type of data destination does not require any programming in the remote node and can avoid wasting network bandwidth that would be consumed by having the PLC poll the data.

The last type of destination access supported is global data. The X-Link writes the values into the global data table for the Modbus Plus station that is X-Link.

4.4 Local Addresses

When a mapping is created which allows a PLC to access data within the X-Link, a local address dialog box must be completed. The information required to complete a local address definition is the class of data to access (Coils, Input Status, Input Registers or Holding Registers) and the offset into the data table. If the access is specifying write, Input Status and Input Registers are not available as options.

The data type maps to register numbers as:

Data Type	Register Numbers
COILS	0xxxxx
INPUT STATUS	1xxxxx
INPUT REGISTERS	3xxxxx
HOLDING REGISTERS	4xxxxx

where 'xxxxx' represents a decimal number from 1 to 65535.

4.5 External Addresses

Mappings, which require the X-Link to originate commands, require the user to complete an external address dialog box. The external address requires the specification of a route to a remote node as well as a data type and offset.

To route directly to another PLC on the Modbus Plus, simply specify the node number in decimal. If you are routing to a node through any routes, the route is specified as up to five node numbers with periods between them.

To route to an X-Link or SA85 card, the route is specified as node followed by data channel. Data channels are from 1 to 8.

4.6 Status Counters

The status counters are maintained within the Modbus Plus driver for logging events and errors. The *Status* menu allows you to monitor some of these counters. As well, the status counters can be accessed as a data source for mappings.

The Modbus Plus driver status counters include counters for each Modbus command type.

Refer to the *Modicon IBM Host Based Devices User's Guide* for more information on the Status Counters.

5 Troubleshooting

If you cannot communicate with your X-Link, refer to the troubleshooting section in the X-Link User's Guide. If you can communicate with your X-Link, but cannot monitor the status of your Modbus Plus driver, you most likely have the memory address set incorrectly. Refer to your *SA85 User Manual* to confirm your settings.

The configuration software can be used to monitor a set of status counters maintained by the SA85 card. The status counters are standard network statistics for the Modbus Plus. They are detailed in the *SA85 User Manual* under Modbus Command Function 08.

6 Specification

6.1 Driver CMOS Storage Requirements

Driver Code and Parameters	16 Kbytes
Each Global Data Read Address	4 bytes
Each Global Data Write Address	3 bytes
Each Internal Address	5 bytes
Each External Address	10 bytes
Each Status Counter Address	2 bytes