

PSS 21H-7G5 B3

I/A Series[®] Hardware Integrator for Modbus[®] Plus Devices



The I/A Series Integrator for Modbus Plus Devices (the Integrator) is a station in the I/A Series system. It allows the integration of data from third-party Modbus Plus-compatible devices into I/A Series databases so that the data can be accessed by standard I/A Series control blocks.

"Devices" with which the Integrator can successfully communicate are those with an AEG Schneider Automation, ModConnect[®] Certified Program implementation of a Modbus Plus communications interface. These devices must support the appropriate Modbus function codes from the list in Table 1, and operate in the Modicon Remote Terminal Unit (RTU) mode. The Integrator can communicate with any of AEG Schneider Automation's Programmable Controllers that have a Modbus Plus Port, such as the Modicon 984 Compact, 984 Slot-Mount Controllers, or Quantum Series CPUs.

Table 1. Modbus Function Codes

Code	Function	
0x01	Read Coil Status	
0x02	Read Input Status	
0x03	Read Holding Registers	
0x04	Read Input Registers	
0x05	Force Single Coil	
0x06	Preset Single Register	
0x0F	Force Multiple Coils	
0x10	Preset Multiple Registers	



Product Specifications

The Integrator interfaces to the Modbus Plus 1-Mbit token-passing, RS-485 LAN using proprietary Peer Processor technology. Figure 1 shows a typical configuration. The Peer Processor provides two ports, which can be connected to separate Modbus Plus busses for support of redundant communications media.

Features of the Integrator include:

- High performance interface to Modicon's Modbus
 Plus LAN
- Up to eight transactions in progress simultaneously to maximize throughput
- Utilization of modified standard I/A Series Control Processor 30 hardware
- ModConnect certification of the Modbus Plus implementation
- Message Pass Through (MPT) provides an interface for application programs to communicate with the Modbus Plus via standard I/A Series Inter-Process Communication (IPC) connected services. Any message that is understood by the target device can be sent using MPT. This includes reading and writing data, and downloading programs to the device or getting status information from the device. The Peer Processor provides CRC error checking at the Link Layer. All other error checking and handling must be done by the application program.

• Support for the following standard I/A Series control blocks:

AIN	CIN	MAIN	PATALM
ALMPRI	COUT	MCIN	REALM
AOUT	DEP	MCOUT	ТІМ
BLNALM	EXC	MON	VLV
CALC	GDEV	MOVLV	
CHARC	IND	MTR	

- A special block, MDSCAN, is used to define the device's I/O point specifications for a compound. Only one MDSCAN block can reside in a compound to access points from any one device. The actual number of points accessed is dependent on the block's scan rate, the configuration of the compound, and the communication limit of the device. A maximum of 200 bytes can be read.
- Support for standard I/A Series alarm functions
- Optional redundant modules for enhanced reliability
- Primary and alternate path routing for the Modbus Plus network.



Figure 1. Typical Modbus Plus Configuration

FUNCTIONAL SPECIFICATIONS

The Integrator communicates with devices over AEG Schneider Automation's proprietary Modbus Plus serial communication network. The network has the following characteristics:

- 1-Mbit data rate
- Token ring
- Modified HDLC protocol
- Standard Modbus commands in RTU mode
- Dual RS-485 channels

The Integrator hardware is an I/A Series Z-module form-factor processor containing a Modbus Plus Peer Processor and software for I/O communications that accesses digital and analog data in a Device.

The Integrator collects the required data from the devices, performs the necessary conversions, and then stores the converted data in its control database for incorporation into the I/A Series plant management functions and operator displays. Data can also be written out to the individual devices from the I/A Series network.

The maximum number of data bytes in a message (from any source to any target) is 200. Hence, large transmissions of data must be broken into multiple small transactions that stay within the 200-byte limit.

System Management Support

The System Health Displays for the Integrator appear in a format similar to that of the Control Processor, so that the displays present the Integrator as a Control Processor and the devices as Fieldbus Modules (FBMs). The system engineer/operator can use the System Health Displays to disconnect a failed device or to restore communications to one that had failed.

Alarm Functions

The Integrator fully supports I/A Series alarm functions. Standard I/A Series alarm processing is applied to data read from devices, and alarms are reported to the I/A Series operator via the alarm logging devices as configured in the compound/block database. All alarms are acknowledged from specific I/A Series displays. To allow for the dynamic suppression of selected alarms from the I/A Series workstation, the priorities and inhibit parameters of alarms are specified during block configuration.

PACKAGING AND ARCHITECTURE

The Integrator is packaged as a single-ported single width Z-module which, when installed in an I/A Series mounting structure, connects to the Mounting Structure Bus and accesses the Nodebus.

The RS-485 Transceiver (a small box) mounts on the DIN rail of an I/A Series enclosure and is connected to the Z-module (Integrator) via a cable plugged into the single port of the Integrator. This box provides two 9-pin RS-485 ports to Modbus Plus. Each port can connect to a distinct Modbus Plus bus providing support for redundant communication channels (and media). The ports are managed by the proprietary Modicon software in the Integrator's Peer Processor and cannot be selected, switched, enabled, or disabled by the I/A Series system. Hence, from an I/A Series system view, the Integrator appears to be a single-ported device.

The RS-485 Transceiver has three LEDs - two red and one green. There is one red LED per port, indicating (when illuminated) that the port or bus is unavailable or failed (as determined by the Integrator's Peer Processor). The green LED flashes at several distinct frequencies to indicate the state of the bus as determined by the Peer Processor.

Enhanced Reliability

The Integrator for Modbus Plus offers optional redundant modules. The redundant configuration consists of two Integrator modules each with an RS-485 Transceiver Unit with two separate connections to the Nodebus and two connections each to the Modbus Plus network. A redundant Integrator provides the maximum hardware security, with an automatic switchover to the tracking Integrator if the control Integrator fails. Either Integrator can be the control or tracking Integrator.

Primary and alternate path routing for the Modbus Plus network allows you to specify an alternate route for data transmission to the controlling device on the Modbus Plus network.

DIAGNOSTICS

The Integrator uses three types of diagnostic tests to detect and/or isolate faults:

- Power-up self-checks
- Run-time and watchdog timer checks
- · Off-line diagnostics

Power-up self-checks are initiated when power is applied to the Integrator. These checks perform sequential tests on various Integrator functional elements. Red and green indicators at the front of the Integrator module reflect the successful (or unsuccessful) completion of the various phases of the start-up sequence. The run-time and watchdog timer checks provide continuous monitoring of Integrator functions during normal system operations. The operator is informed of a malfunction by a printed or displayed system message.

Off-line diagnostics are run for the purpose of performing comprehensive tests and checks on various station components. By using the off-line diagnostics, a suspected fault in the Integrator can be isolated and/or confirmed.

The Integrator's Peer Processor is constantly reporting (through the green LED on the transceiver unit) the state of the LAN. The states of the LAN are detected and reported via the frequency of the flash of the green LED. The current state is also reported to the system manager for display.

FUNCTIONAL SPECIFICATIONS

Processor Type

Microprocessor-based Intel 386 with stored programs, using high-speed communication capability. Modicon-designed Peer Processor (80C152) for I/O communication.

Memory

SIZE

4 MByte storage

ERROR DETECTION

Parity provides single-bit error detection for each byte

Number of Configurable MDSCAN blocks

Up to 100 MDSCAN blocks (one per compound) with up to 200 bytes of data per block

Basic Processing Cycle (BPC)

0.1, 0.5, 1, 2, 4, 8, 16, 32, 64, 256, 512, or 1024 seconds selectable at system configuration time

I/O Communications

TYPE EIA RS-485 dual channels, token ring TRANSMISSION RATE 1-Mbit data rate PROTOCOL Modified HDLC protocol Standard Modbus commands in RTU mode

I/O Capacity

Up to 64 devices, maximum (number of actual devices is device-performance dependent)

Power Requirements

INPUT/VOLTAGE 39 V dc Typical CONSUMPTION 15 W, maximum

Indicators

INTEGRATOR MODULE

Red and green light-emitting diodes (LEDs) indicate operational status

RS-485 TRANSCEIVER

Two red and one green LEDs. One red LED per port indicates (when illuminated) that the port or bus is unavailable or failed (as determined by the Peer Processor). The green LED flashes at several distinct frequencies to indicate the state of the bus as determined by the Peer Processor.

Internal Diagnostics

Self-checking module diagnostics performed at power-up. Run-time checks and watchdog timer function performed during operation

Redundant Integrator

The time to switch, caused by a failure of the controlling Integrator or a manual request to switch including the time for the tracking Integrator to take control, is approximately three basic processing cycle periods.

ENVIRONMENTAL SPECIFICATIONS*

Operating

TEMPERATURE 0 to 60°C (32 to 140°F) RELATIVE HUMIDITY 5 to 95% (Noncondensing) ALTITUDE -300 to +3,000 m (-1,000 to +10,000 ft)

Storage

TEMPERATURE -40 to +70°C (-40 to +158°F) RELATIVE HUMIDITY 5 to 95% (Noncondensing) ALTITUDE -300 to +12,000 m (-1,000 to +40,000 ft)

Environmental Contamination Level

Class G3 (Harsh) as defined in ISA Standard S71.04

* The environmental ranges can be extended by the type of enclosure containing the module. (Refer to the Product Specification Sheet (PSS) which describes the specific enclosure that is to be used.)

PHYSICAL SPECIFICATIONS

Configuration

INTEGRATOR MODULE

Single-width Integrator Z-module. Single cable to RS-485 Transceiver.

RS-485 TRANSCEIVER

Two 9-pin female connectors for Port 1 and Port 2 connections. Each port connects to a separate Modbus Plus trunk/LAN. Single cable to Integrator module.

Mounting

INTEGRATOR MODULE Can be placed in any of the following mounting structure slots:

- 1x8, 2x8, 2x Modular Mounting Structures
- Industrial Enclosures
 RS-485 TRANSCEIVER

On DIN rail, up to 132 cm (52 inches) from Integrator module

Mass (Maximum)

INTEGRATOR MODULE 1.2 kg (2.7 lb) RS-485 TRANSCEIVER 0.1 kg (0.2 lb) **PSS 21H-7G5 B3** Page 6

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