Foxboro Evo™ Process Automation System

Product Specifications

Foxboro®

by Schneider Electric

Foxboro Evo™ RTU50 SVX CPU Module

OVERVIEW

The Foxboro Evo™ RTU50 SVX module is used with the RTU50 Card File and inherits the functionality of the compact Foxboro Evo SCD5200 COE module. When this module is used in an IEC 61850 Gateway, it provides more dynamic RAM for a higher concentration of IEC 61850 IEDs. The RTU50 SVX processor uses SFP receptacles to provide a simpler way to connect to local area networks.

INTRODUCTION

Modularity is the key feature of the RTU50 SVX. The CPU module consists of a high-speed board and a Carrier board, which are integrated into a compact main processor board. In a distributed station computing device network, the RTU50 SVX CPU module is the heart of each node, and each RTU50 SVX CPU node manages its associated database, communications, and local applications.

When utilized as a Data Control and Interchange Unit (DCIU), the RTU50 SVX CPU module provides:

- Data concentration capability
- SCADA communications
- Communications to Intelligent Electronic Devices (IEDs) over RS-232/RS-485
- Two SFP receptacles allow to plug in Either a Fiber SFP with a support of 100Base FX or a Copper SFP with a support of 10/100 Base-T and one 10/100Base-T on RJ-45 Ethernet links

With its on-board OptoNet fiber optic network connectivity, the RTU50 SVX CPU module supports high performance and reliable peer-to-peer

communications between the nodes. RTU50 configurations using the RTU50 SVX modules require a separate power supply for each card file.

FEATURES

CPU
- Dual ARM Cortex A9 SoC
- 256 MB DDR3 SDRAM
- 256 KB non-volatile RAM parameter memory
- 16 MB protected mode BIOS
- 64 MB Internal Flash Storage
- Dedicated RJ-45 Diagnostic Ethernet port
- Watchdog timer
- RS-232/RS-485 programmable serial port
- Two SFP receptacles allow to plug in Either a Fiber SFP with a support of 100Base FX or a Copper SFP with a support of 10/100 Base-T
- Real-time calendar clock
- 7-year battery backup

OptoNet
- Deterministic, token-passing network protocol
- Dual ring network, with up to 63 nodes per network
- Total network length up to 5.8 km, maximum of 500 m between nodes
- Optical fiber (multi-mode glass) cables
- Fault tolerant to a single point of failure
- High-speed data transfer
- Enables distributed data
- I/O data available to all nodes
- Convenient low cost ST Tx and Rx connector

Ethernet
- Half/Full duplex communications
- Two SFP ports provide link and activity indications for each channel and support either 100Base-FX or 10/100Base-T modules
- One port that supports 10/100Base-T Ethernet interface on RJ-45 is dedicated to Foxboro Evo Remote Terminal Viewer (RTV) connectivity

FUNCTIONAL DESCRIPTION

CPU

The RTU50 SVX CPU module is a combination of a high-speed CPU board and a Carrier board. The high-speed CPU board has a SPEAr1380 Processor with 2 X ARM cortex A9 cores, supporting a frequency of 600MHz.

The Carrier board has three Ethernet ports. Two of the ports are SFP ports that support pluggable 100Base-FX or 10/100Base-T interface modules. The third port supports a 10/100Base-T Ethernet interface on an RJ-45 connector.

A serial port, which can be linked to RS-232 or RS-485, is available for interfacing with IEDs or for communicating with a SCADA Master Station. This port supports industrial standard DNP3 Slave, DNP3 Master, Modbus Slave, and Modbus Master Protocols. It allows the implementation of proprietary protocols through the State And Logic Language High Level Serial Interface (SALL HLSI). Refer to PSS 31S-2M15 for more information on SALL. The serial port supports logging of Sequence Of Events (SOE) to a printer or a terminal.

OptoNet

OptoNet on the RTU50 SVX CPU module is essentially a 3 port hub, with all three ports controlled from a single ARCNET network controller chip. The two external ports are logically and physically identical. Port A and Port B can be connected to neighboring RTUs. These ports are half duplex ports that can transmit and receive individually. Therefore, they create two effective "rings".

The third port is also a half-duplex port that is logically identical to the other two. It is an internal port that backs onto the ARCNET controller.

The network is automatically configured at start-up by the RTU host processors that assign themselves network addresses according to their OptoNet node number.

The ARCNET controller chips are the only local intelligence on the OptoNet node modules and the RTU host processors direct the network activity. The ARCNET controller chips handle all the housekeeping tasks such as passing tokens, acknowledging messages, and checking for errors.

Ethernet

The RTU50 SVX CPU module supports both half duplex and full duplex operations on Ethernet.

The RTU50 SVX CPU module features three Ethernet ports:

▸ Two SFP ports to support either 100Base-FX or 10/100Base-T interface modules

▸ One 10/100Base-T Ethernet port on RJ-45

The SFP Ethernet ports provide a cost-effective and versatile fiber optic and copper Ethernet interface for the RTU50 SVX CPU. The optical interface maintains high electrical isolation. Diagnostic LEDs provide link and activity indications for each SFP Ethernet channel.

The Ethernet port on RJ-45 is dedicated to RTV connectivity. Diagnostic LEDs provide activity and link indications for this Ethernet port.

The Ethernet ports support communication with the Master station(s) or TCP/IP enabled IEDs. Through TCP/IP, the Ethernet ports can also connect RTV. Refer to PSS 31S-2M13 for more details on RTV. The Ethernet ports can simultaneously support a maximum of 200 TCP/IP connections.

FUNCTIONAL SPECIFICATIONS FOR CPU

Processor
SPEAr1380 (Dual Core ARM Cortex-A9 at 600 MHz)

Operating System
VxWorks®

BIOS
Foxboro® protected mode

Memory System
256 MB DDR3 SDRAM
16 MB Flash BIOS
64 MB Flash file storage
256 KB Non-volatile RAM

Peripheral Controllers
16550 type UARTs integrated with CPU
DP83620/DP83640 Ethernet controllers
COM20022 ARCNET controller

Bus Specifications
Foxboro Electrobus

Watchdog Timer
1 second timeout to reset the CPU

Front Panel
Control Selector Switch
SEN/RST switch
RUN and FAIL LED
Two SFP ports
One RJ45 Ethernet port
Two OptoNet channel ports
One RS-232/RS-485 Serial port

Serial Ports
DB9 male sockets wired per TIA/EIA-574 (DTE)
    RS-232/RS-485 (2- OR 4-WIRE) LINK SELECTABLE
Provides general purpose user configurable communications port
    SUPPORTED PROTOCOLS
    DNP3(Master & Slave)
    IEC 101 (Master)
    Modbus (ASCII & RTU, Master & Slave)
    HLSI (Generic configurable protocol interface)
    GPS Clock (NEMA, Tekron, TrueTime, etc)

Real-Time Clock
IBM PC/AT compatible, with 7.5 ppm accuracy, also provides Electrobus synchronizing and SOE clocks.

Backup Time
Real-time clock and non-volatile RAM are maintained during power outage via a replaceable lithium battery. The battery lasts 1 year in storage and 7 years in use. A software battery low alarm is provided.

FUNCTIONAL SPECIFICATIONS FOR OPTONET

Configuration
Dual, counter-rotating ARCNET optical ring arrangement

Interface
TRANSMIT POWER
-12 dBm
RECEIVE LEVEL
-27 dBm at bit error rate of 10^{-9}

Ports
Two optical ports each containing a transmit channel and a receive channel support a dual ring ARCNET configuration.

Maximum Length Between Nodes
500 meters

Maximum Size of OptoNet Network Ring
UP TO 12 NODES
5800 meters
FOR 12 TO 63 NODES
6280 - [40 x Number of nodes] meters

Optical Cable
Glass fiber, multi-mode, 820 nm wavelength, dual 50/125 or 62.5/125 µm, ST connectors

Indicators
2 LEDs per port indicating link and activity

FUNCTIONAL SPECIFICATIONS FOR ETHERNET

SFP Fiber Interface[1]
TRANSMIT POWER
-15.7 dBm
RECEIVE LEVEL
- 31 dBm at bit error rate of 10^{-10}
RANGE
- 2000 m

Ports
▸ Two SFP ports to support either 100Base-FX or 10/100Base-T

▸ One RJ-45 port to support 10/100Base-T

SUPPORTED PROTOCOLS
DNP3 (Master & Slave)
IEC 61850 (Client and Server)
IEC 60870-5-104 (Slave)
Modbus/TCP (Master)
Diagnostic interface
IED pass-through

Optical Cable
Glass fiber, multi-mode, 1310 nm wavelength, dual 50/125 or 62.5/125 µm, LC connector

Indicators
2 LEDs per port indicating link and activity

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(1) Copper and Fiber SFP modules must be ordered separately. See "SFP ModuleS" on page 6

PHYSICAL SPECIFICATIONS

Physical Size

The RT50 SVX CPU module requires frame space of 55mm and plugs into a backplane (Electrobus) through a DIN 41612 connector. The modules are the size of a double Euro card (233.4 x 106 mm board, 261.8 x 185 mm module). The dimensions of the RT50 SVX carrier board are: 160mm X 145.48mm ±0.2mm.

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)

European EMC Directive 2004/108/EC
Meets: EN 61326-1 Immunity requirements for industrial locations

CISPR 11, Industrial Scientific and Medical (ISM) Radio-frequency Equipment - Electromagnetic Disturbance Characteristics Limits and Methods of Measurement
Meets Class A Limits

IEC 61000-4-2 ESD Immunity
Contact 6 kV, air 8 kV

IEC 61000-4-3 Radiated Field Immunity
10 V/m at 80 to 1000 MHz

3V/m at 1.4GHz to 2.7GHz

IEC 61000-4-4 Electrical Fast Transient/Burst Immunity
2 kV on I/O and communication lines

IEC 61000-4-5 Surge Immunity
1 kV on I/O and communications lines

IEC 61000-4-6 Immunity to Conducted Disturbances Induced by Radio-frequency Fields
10 V (rms) at 150 kHz to 80 MHz on I/O and communication lines

IEC 61000-4-16 conducted, common mode disturbances Immunity
0 Hz to 150 kHz 30V for 3 Seconds on I/O, communication lines

Product Safety

This product complies with the U.S. Standard for Safety UL 61010-1 - Safety requirements for Electrical equipment for measurement, control, and laboratory use - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2008/10/28 and CSA C22.2 NO. 61010-1 - Safety requirements for Electrical equipment for measurement, control, and laboratory use.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature
-20 to 70°C (-4 to +158°F)

Relative Humidity
5 to 95% (Noncondensing)

Altitude
-300 to +2,000 m (-1,000 to +6,500 ft)

Vibration
1 g (10 to 150 Hz)

Shock
5 g (18 Pulses for 11ms each)

Bump
10 g (6000 Pulses for 16ms each)

Storage Temperature
-40 to +70°C (-40 to +158°F)

NOTE
AT-FS201 from Allied Telesis is the preferred media converter.

ORDERING INFORMATION

RTU50 MASTER PROCESSOR MODULE

Part Number	Description
SY-60399003R-AS	RTU50 SVX Master Processor Module

OPTICAL PATCH CORDS

Part Number	Description
SY-6051034 [a]	Optical Cable Assembly Multimode two ST to two ST 5 meters
P0972ZR [a]	Optical Cable Assembly Multimode two ST to LC 3 meters

(a) Request the factory for longer cables

SFP MODULES

Part Number	Description
SY-6034085	10/100Base-T SFP Module
SY-6038038	100Base-FX SFP Module