

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

FOXBORO

ZCP270

FIELD CONTROL PROCESSOR

Used with the applicable Foxboro I/A Series DCS configuration.

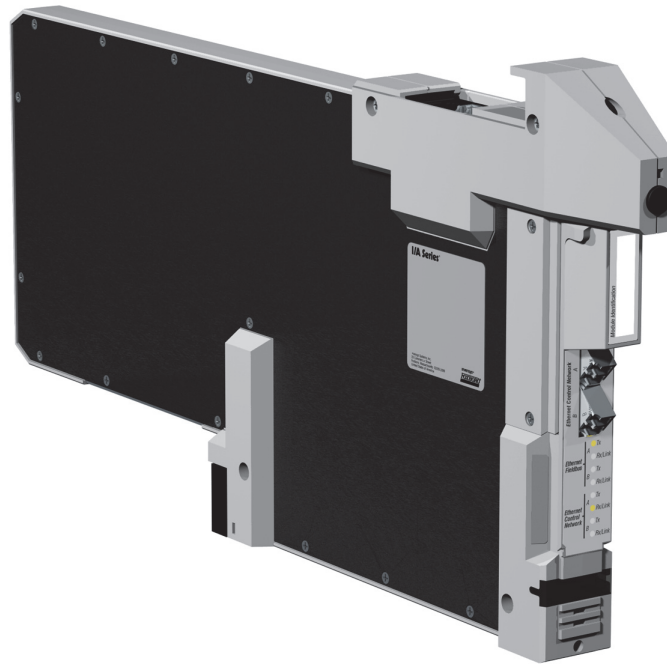
REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Schneider Electric / Foxboro official product specification

Z-Module Control Processor 270 (ZCP270)



The Z-Module Control Processor 270 is a distributed, optionally fault-tolerant controller that performs process control and alarming functions according to a user-defined control strategy.

OVERVIEW

The Z-Module Control Processor 270 (ZCP270) is an optionally fault-tolerant, Z-form factor controller. The ZCP270 performs regulatory, logic, timing, and sequential control together with connected Fieldbus Communications Modules (FCMs) and Fieldbus Modules. It also performs data acquisition and alarm detection and notification. The ZCP270 connects to the MESH control network and FCM100Et/FCM100Es via standard fiber optic 100 Mbps Ethernet. The FCM100Et interfaces the 2 Mbps Module Fieldbus used by the 200 Series FBMs and the FCM100E interfaces the 2 Mbps

Module Fieldbus used by the 200 Series FBMs or the 268 Kbps Fieldbus used by 100 Series FBMs. Depending on sizing considerations, the ZCP270 can be used with a mix of FCM100E and FCM100Et modules.

The fault-tolerant version of the ZCP270 consists of two single-width processor modules. These modules install in adjacent ZCP270 slots in a 1x8 or 2x8 mounting structure and connect to a fault-tolerant connector to allow for high-speed communication between the modules (see Figure 1).

FEATURES

- ▶ Performs regulatory, logic, timing, and sequential control together with connected Fieldbus Modules
- ▶ Supports up to 128 of the 200 Series Fieldbus Modules (FBMs - Compact or standard types) when using the FCM100Et Fieldbus Communications Module
- ▶ Supports up to 128 of the 200 Series FBMs (Compact or standard types), 100 Series FBMs, or a combination 100 Series and 200 Series FBMs when using the FCM100E Fieldbus Communications Module
- ▶ Performs data acquisition and alarm detection and notification
- ▶ Offers unique, patented, fault-tolerant operation using two control modules to greatly improve reliability relative to other process controllers
- ▶ Connects to the MESH control network via standard fiber optic 100 Mbps Ethernet
- ▶ Uses versatile control algorithms and a wide variety of FBMs to provide control capabilities for a broad range of process applications
- ▶ Supports time synchronization using optional external time from GPS satellites
- ▶ Offers on-line image update of a fault-tolerant ZCP270 without shutting down the process
- ▶ Uses soft letterbugs configurable via the I/A Series® system Letterbug Configurator
- ▶ Supports self-hosting mode with I/A Series software v8.4-v8.8 or Foxboro Evo™ Control Core Services v9.0 or later.

EQUIPMENT MOUNTING

The Foxboro Evo architecture requires workstations and commercial-off-the-shelf (COTS) Ethernet switches, a rack room for the ZCP270 and Ethernet switches, and a field enclosure for the FCM100Ets/FCM100Es, FBMs, and other I/O hardware. For more information on the MESH control network architecture, refer to PSS 21H-7C2 B3.

ENHANCED RELIABILITY (FAULT-TOLERANCE)

The unique and patented fault-tolerant operation of the ZCP270 greatly improves reliability relative to other process controllers. The fault-tolerant version of the ZCP270 consists of two modules operating in parallel, with two sets of Ethernet connections to the MESH network, two for the control network and two for the fieldbus network. The two ZCP270 modules, married together as a fault-tolerant pair, provide continuous operation of the controller in the event of virtually any hardware failure occurring within one module of the pair.

Both modules receive and process information simultaneously, and faults are detected by the modules themselves. One of the significant methods of fault detection is comparison of communication messages at the module external interfaces.

Messages only leave the controller when both controllers agree on the message being sent (bit for bit match). Upon detection of a fault, self-diagnostics are run by both modules to determine which module is defective. The non-defective module then assumes control without affecting normal system operations.

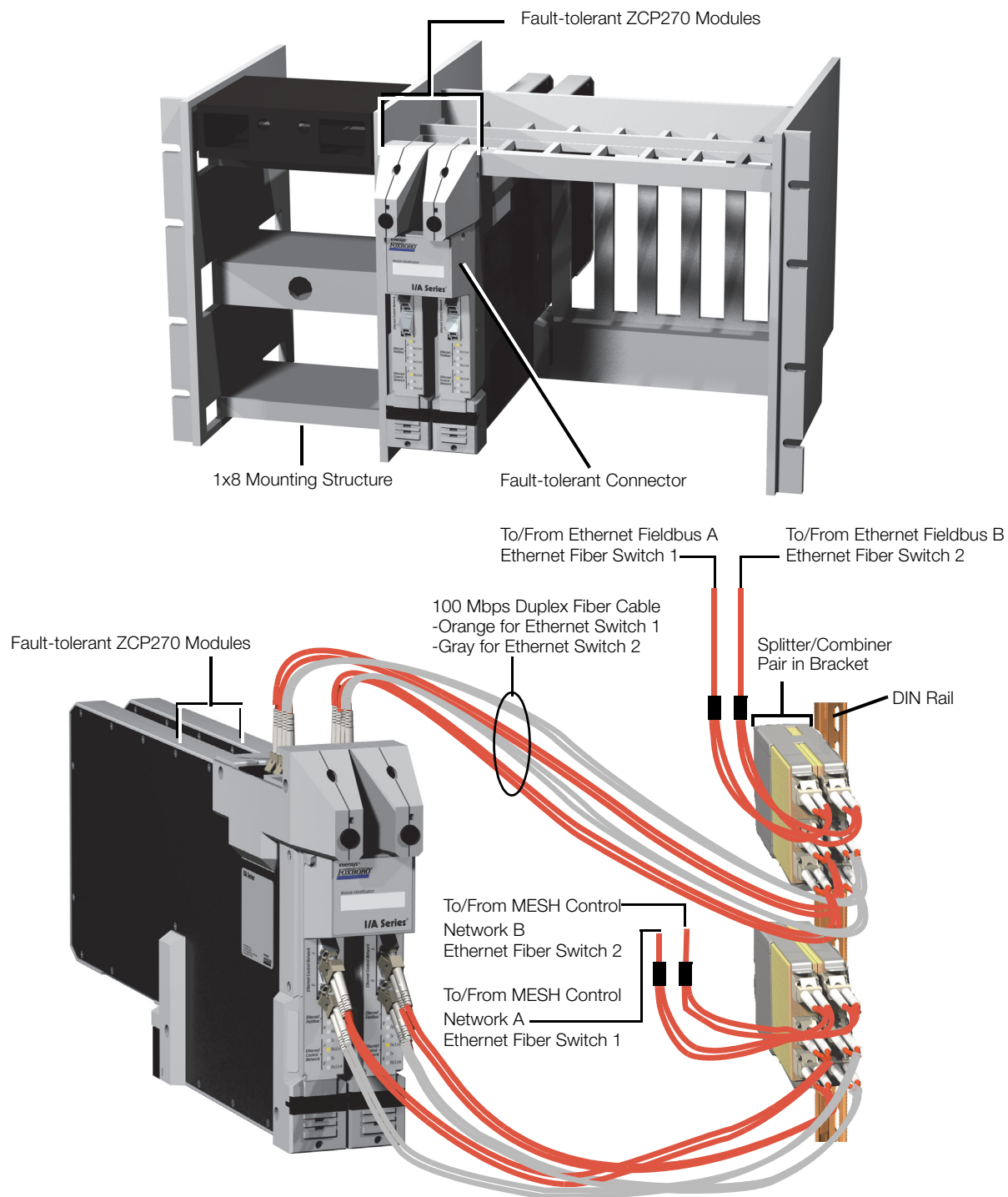


Figure 1. Fault-Tolerant ZCP270 Module Pair Mounted in 1x8 Mounting Structure

SPLITTER/COMBINER

Fault-tolerant ZCP270 modules connect to two pairs of fiber optic splitter/combiners (see Figure 1). One splitter/combiner pair connects redundant Ethernet ports on the front of each module to redundant Ethernet switches in the control network. The other splitter/combiner pair connects redundant Ethernet fieldbus ports on the top of each module to redundant Ethernet switches in the control network.

For each module, the splitter/combiners provide separate transmit/receive fiber connections for each Ethernet control network and Ethernet fieldbus port. Fiber cables are connected so that splitter/combiners pass inbound traffic from a switch to both modules, and pass outbound traffic from the primary module to a switch.

Each splitter/combiner pair mounts in an assembly that either mounts in a chassis assembly for 19-inch racks or fastens to the DIN rail in the enclosure. The splitter/combiner is a passive device that does not require electrical power.

ENHANCED COMMUNICATIONS

The Foxboro Evo architecture uses an Ethernet control network with 100 Mbps data communications between the ZCP270s and the Ethernet switches (see Figure 2).

The ZCP270 can also communicate with serial and Ethernet devices, such as PLCs, via Field Device System Integrators and FCM100Et/FCM100Es. This allows connection to new device interfaces without any changes to the controller software.

ON-LINE IMAGE UPDATE

For fault-tolerant ZCP270 modules, on-line image update replaces the executable image (operating system) of a running ZCP270 with a newer image without having to shut down the equipment being controlled by the ZCP270. New product enhancements can be brought on-line in 1.5 seconds for heavily loaded controllers; less for lightly loaded controllers.

Because the ZCP270 contains its executable image in internal flash memory, and has sufficient RAM to hold a new executable image at the same time, on-line image updates are now much easier to perform.

TIME SYNCHRONIZATION, SOE, TDRA

The Foxboro Evo system supports time synchronization using either an externally maintained optional source of Universal Coordinated Time (UTC) from GPS satellites or an internal source using proprietary software. ZCP270s and their FCM100EtS receiving time updates via the external time source synchronize their FBMs to 1 ms. For more information, refer to PSS 21S-1C2 B3.

Time stamping is used for alarm messages, values sent to the historian, and the new Sequence Of Events (SOE) and Transient Data Recorder and Analyzer (TDRA) features.

SOE data are discrete points that are time stamped at the FBM, optionally to 1 ms, and sent to the workstation on a change basis. TDRA data are analog points that are time stamped at the FBM and sent to the workstation every 10 ms. These new features are supported by client software in the workstation. To support SOE and TDRA, the FCM100Et must be installed on the same network as the workstation collecting the data. For information on this software, refer to PSS 21S-2B9 B4 and PSS 21S-2B10 B4.

SOFTWARE FEATURES

The ZCP270 performs regulatory, logic, timing, and sequential control, as well as data acquisition, alarm detection, and alarm notification. Process variables are controlled using time-proven algorithms (mathematical computations performing specific functions). The algorithms are contained in functional control blocks, which are configured by on-site process engineers to implement the desired control strategies. The versatility of the algorithms, coupled with the variety of FBMs available, provides control capabilities suited to a broad range of process applications. Control strategies ranging from simple feedback and cascade loops to highly sophisticated feedforward, nonlinear, and complex characterization control schemes are readily implemented.

The ZCP270 also provides the following features:

- ▶ Infrared communications with the controller enables you to set and read the controller letterbug via the Letterbug Configurator.
- ▶ Alarm enhancements to the function blocks: re-alarmed on changes to alarm priority, re-alarmed based upon a configurable time delay deadband, and alarm suppression based upon time.

- ▶ Optional UTC external time synchronization.
- ▶ Improved controller performance.
- ▶ Optional self-hosting mode (I/A Series software v8.4-v8.8 or Control Core Services v9.0 or later) allows the ZCP270 to start up and run, executing its configured control scheme using the checkpoint file stored in flash memory. This allows the ZCP270 to boot itself with a valid control database even if its host workstation is not present.

Self-Hosting Feature, Available with 200 Series FBMs Only

The self-hosting feature is recommended only for use in ZCP270s which are used with 200 Series FBMs. All of the information necessary to reboot 200 Series FBMs is included in non-volatile flash memory on the ZCP270. However, the flash memory on the 100 Series FBMs and related products on the 268k fieldbus does not include this information, and they require the workstation host to be present to reboot. More details on the self-hosting feature are available in *DIN Rail Mounted FBM Subsystem User's Guide* (B0400FA).