Foxboro Evo™ Process Automation System

Product Specifications

PSS 31H-1B11 B3

Field Control Processor 280 (FCP280)

The Field Control Processor 280 is a distributed, optionally fault-tolerant, field-mounted controller that performs process control and alarming functions according to a user-defined control strategy.

FEATURES

- Performs regulatory, logic, timing, and sequential control together with connected Fieldbus Modules (FBMs)
- Performs data acquisition and alarm detection and notification
- Supports up to 128 Compact or standard 200 Series FBMs, or up to 128 of a combination of 100 Series FBMs and 200 Series FBMs (with no more than 64 100 Series FBMs in this configuration)
  No Fieldbus Communication Module is required.
- No Fieldbus Expansion Module is required for Expanded fieldbus support.
- Supports self-hosting mode, which allows the FCP280 to boot itself with a valid control database even without its host workstation
- Offers unique, patented, fault-tolerant operation using two control modules to greatly improve reliability relative to other process controllers
- Offers on-line image upgrade (OLUG) of a fault-tolerant FCP280 without shutting down the process
- Liquid Crystal Display (LCD) displays letterbug and real-time roles and statuses
- Connects to The Mesh control network via standard fiber optic or copper 100 Mbps Ethernet cables

- Uses a rugged, die cast aluminum housing for mounting in a non-vented field enclosure
- Can operate in Class G3 harsh environments
- CE certified for field mounting in enclosures
- Each Fieldbus port on FCP280 baseplates supports either a 2 Mbps or 268 Kbps HDLC fieldbus exclusively
- 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
- Uses soft letterbugs configurable via the keys on the FCP280 faceplate.

OVERVIEW

The Field Control Processor 280 (FCP280) is a distributed, optionally fault-tolerant, field-mounted controller module. The FCP280 performs regulatory, logic, timing, and sequential control together with connected Fieldbus Modules. It also performs data acquisition and alarm detection and notification. The FCP280 connects to The Mesh control network via standard fiber optic or copper 100 Mbps Ethernet cables from network adapters installed on its baseplate (shown in Figure 1).

The FCP280 requires Foxboro Evo Control Core Services v9.0 or later. A system with the FCP280 and this software is called a Foxboro Evo Process Automation System.

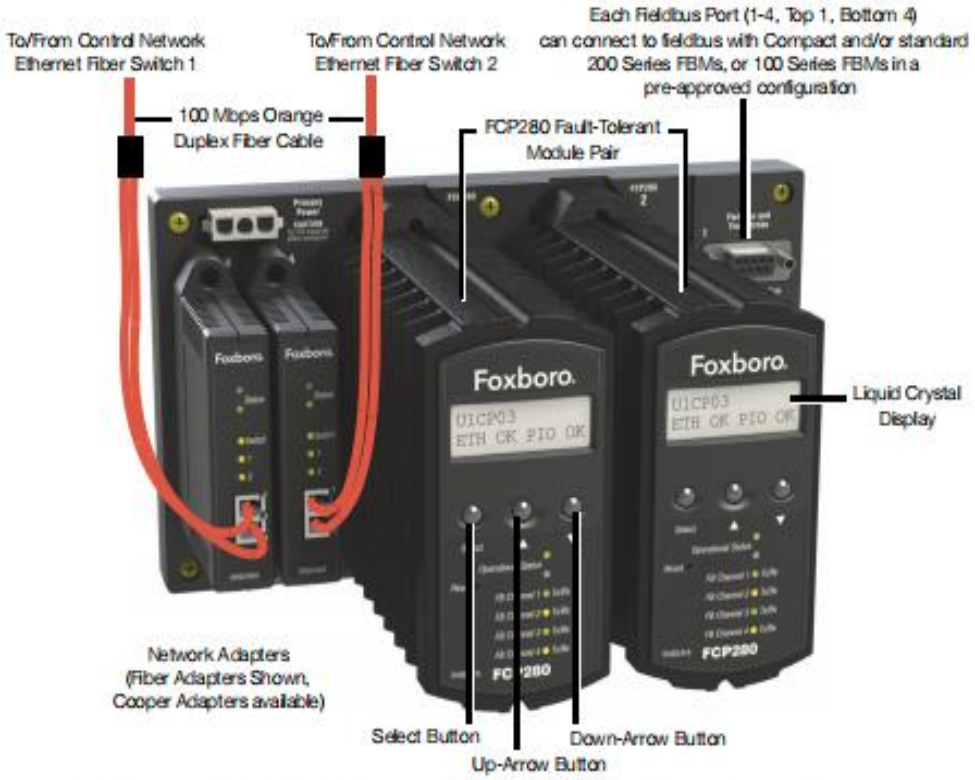


Figure 1. Fault-Tolerant FCP280 Module Pair Mounted on Vertical Mounted 2-Position FCP280 Baseplate

The fault-tolerant version of the FCP280 consists of two processor modules. These modules are installed in adjacent FCP280 slots in a baseplate for high speed communication between the modules.

The FCP280 accepts four PIO channels (that is, four separate HDLC fieldbuses) via the four Fieldbus ports on its baseplate. These four Fieldbuses are referred to collectively as the "Expanded fieldbus." For a description of the FCP280 baseplates, refer to *DIN Rail Mounted Modular Baseplates* (PSS 21H-2W6 B4).

The number of FBMs which an FCP280 can support varies depending on the types of FBMs used:

- 200 Series FBMs exclusively used with FCP280 - Each Fieldbus port on the FCP280 baseplate can connect to a baseplate chain with up to 32 Compact or standard 200 Series FBMs per chain via the 2 Mbps HDLC fieldbus (up to 128 modules).
- 200 Series and 100 Series FBMs (dual baud configurations) used with FCP280 - The FCP280 can support a total of 64 100 Series FBMs (Y-module) or competitive devices (such as Foxboro Evo System migration FBMs) in one or more baseplate chains, with the remainder of the FCP280's 128 module limit being 200 Series FBMs, depending on the Fieldbus loading of the FCP280. For example, an FCP280 could support 64 100 Series FBMs and 64 200 Series FBMs (as 128 - 64 = 64). See Figure 2 and Figure 3 below.

NOTE

Certain competitive migration or supported third-party modules such as DCS Migration fieldbus Modules and Pepperl+Fuchs™ I/O modules may increase this 128 module maximum per FCP280. For the maximum numbers of each of these migration/third-party modules supported by the FCP280, refer to the supported migration products books in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).

When supporting 200 Series and 100 Series FBMs, each Fieldbus port (PIO channel) is dedicated to supporting either a 268 Kbps HDLC fieldbus (for 100 Series FBMs) or a 2 Mbps HDLC fieldbus (for 200 Series FBMs) - not both.

For connections to 100 Series FBMs over 60 m (198 ft), an FBI200 pair is required to extend communications up to 1830 m (6000 ft). See Figure 2 below.

To connect a Fieldbus port to a 268 Kbps HDLC fieldbus directly, the Fieldbus splitter (RH928CV) provides a connector for any Fieldbus port on the FCP280 baseplate, and two Termination Cable Assembly (TCA) termination blocks for the twinaxial cabling from the 100 Series FBMs.

The FCP280 can also communicate with serial and Ethernet devices, such as PLCs, via Field Device System Integrators. This allows you to connect to new device interfaces without any changes to the controller software.

To estimate the FCP280's processor load, refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY).

FUNCTIONAL SPECIFICATIONS

Processor Type

CONTROL PROCESSOR
ARM® System on a Chip (SOC) with stored programs, using high-speed communication capability.

SIZE
128 MB SDRAM
128 MB flash memory

ERROR DETECTION
ECC providing single-bit error detection and correction as well as multiple-bit error detection.

Process I/O Communications (with FBMs)

MODULE FIELDBUS

Type
HDLC

Transmission Rate
2 Mbps for 200 Series FBMs or
268 Kbps for 100 Series FBMs

Process I/O Capacity

200 SERIES FBMS
Up to 32 per Expanded fieldbus - up to 128 FBMs over all four Expanded fieldbuses when used exclusively with 200 Series FBMs. When used with a mix of 100 Series and 200 Series FBMs, up to 64 100 Series FBMs (Y-module) or competitive devices (such as Foxboro Evo System migration FBMs) with the remainder of this 128 module limit being 200 Series FBMs, depending on the Fieldbus loading of the FCP280.
For example, an FCP280 may support 64 100 Series FBMs and 64 200 Series FBMs (as 128 - 64 = 64) over separate Expanded fieldbuses.
Refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY) for sizing constraints.
Competitive Migration Modules
Refer to the device specific Product Specification Sheets.

Process I/O Capacity (Cont.)

100 SERIES FBMS
64 maximum (over one or more Fieldbus ports on the baseplate) depending on control processor sizing constraints (refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY)).
Competitive Migration Modules
Refer to the device specific Product Specification Sheets.

Memory Allocation for Blocks

15.75 MB

Maximum Number of Blocks Configured

The maximum number of control blocks that can be configured for the FCP280 (or fault-tolerant FCP280 pair) is 8000(1).

Block Executions Per Second

16,000 blocks/second, maximum

Maximum Number of Blocks Processed

The number of blocks that can be processed per block processing cycle (BPC) time interval depends on scan periods and block type selection. These blocks include all types (control blocks, ECBs, compounds, data blocks, and so forth). For sizing guidelines, refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY).

Minimum Block Processing Cycle (BPC)

50 ms

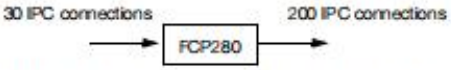
Sequence Block Size

32 KB maximum for each block

(1) Seven of these 8000 blocks are pre-defined, leaving a total of 7993 blocks that you can configure for the FCP280. Compounds and ECBs all count as blocks as well.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

Maximum Number of IPC Connections
231; 200 connections for source points; 30 connections for sink points; 1 connection for internal use only.



An IPC connection provides the means to exchange continuous process control information. A Source point is defined as a connection to a destination device that can have data sourced by a given CP. Thus an FCP280 can provide data to up to 200 destination stations.
A Sink point is defined as an external point to which the FCP280 can connect to acquire process control data. The FCP280 can receive continuous updates from up to 30 other data sources.

Maximum Number of OM Sink Lists
75
A Sink list is a list of items to be delivered to particular destination. These lists provide an efficient way to group updates to a given destination.

Maximum OM Scanner Database
18,000 points for BPC ≥ 200 ms
7,500 points for BPC ≤ 100 ms
The Object Manager (OM) scanner database is the total of all points in the control scheme for which the CP is scanning and providing updates.

Maximum Number of OM Sink Points
11,500
The OM sink point limitations refer to the number of points that can be received from outside sources.

Configurable Block Periods
0.05, 0.1, 0.2, 0.5, 0.6, 1, 2, 5, 6, 10, 30 seconds
1, 10, 60 minutes

Block Processing Cycle
0.05, 0.1, 0.2, 0.5 and 1.0 seconds, selectable at system configuration time

Time to Marry Fault-Tolerant Modules
Less than 0.5 seconds

Alarm Queue Entry Size
20,000 entries (640,000 bytes)
Alarms have text strings associated with each event. This is the maximum number of alarms that can be configured and the maximum number of characters that can be accommodated in the alarm text.

Internal Diagnostics
Self-checking performed at power-up. Run-time checks and the watchdog timer function performed during operation.
When FCP280s are configured as an fault-tolerant pair, constant synchronization checking and message compare operations are also used to detect hardware faults.

Power Requirements
INPUT VOLTAGE (REDUNDANT VOLTAGE)
24 V dc typical
CONSUMPTION (PER NON-FAULT-TOLERANT MODULE)
8.5 W, maximum

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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 4 kV, air 8 kV

IEC 61000-4-3 Radiated Field Immunity
10 V/m at 80 to 1000 MHz, 3 V/m at 1.4 to 2.0 GHz, 1 V/m at 2.0 to 2.7 GHz

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

IEC 61000-4-5 Surge Immunity
2 kV on ac and dc power lines; 1 kV on I/O and communications lines

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

IEC 61000-4-8 Power Frequency Magnetic Field Immunity
30 A/m at 50 and 60 Hz

PRODUCT SAFETY

Underwriters Laboratories (UL) for U.S. and Canada
Underwriters Laboratories (UL) for U.S. and Canada UL/UL-C listed as suitable for use in Class I, Groups A-D; Division 2; enclosure based systems when connected to specified DIN rail mounted Fieldbus Modules as described in the *DIN Rail Mounted Subsystem User's Guide* (B0400FA) Communications circuits also meet the requirements for Class 2 as defined in Article 725 of the National Electrical Code (NFPA No.70) and Section 16 of the Canadian Electrical Code (CSA C22.1). Conditions for use are as specified in the *DIN Rail Mounted Subsystem User's Guide* (B0400FA).

EUROPEAN LOW VOLTAGE DIRECTIVE 2006/95/EC AND EXPLOSIVE ATMOSPHERES (ATEX) DIRECTIVE 94/9/EC

ATEX (DEMKO) Ex nA IIC T4 Gc certified when connected as described in the *DIN Rail Mounted Subsystem User's Guide* (B0400FA). For use in an enclosure suited for an ATEX Zone 2 classified area.

SECURITY

Wurldtech Achilles Certification™ Level 1

ENVIRONMENTAL SPECIFICATIONS(2)

Operating

TEMPERATURE
0 to 60°C (32 to 140°F)

NOTE
Invensys recommends the use of the FCP280 vertical-mounted baseplate (RH924YF) on vertical DIN rails for more efficient cooling of the FCP280.

RELATIVE HUMIDITY
5 to 95% (Noncondensing)

ALTITUDE
-300 to +3,000 m (-1,000 to +10,000 ft)

CONTAMINATION
Class G3 (Harsh) as defined in ISA Standard, S71.04. No effect on functionality after simulated 10-year exposure to mixed gas testing per EIA Standard 364-65A, Class III.
The FCP280 has Conformal Coating.

VIBRATION
0.5 g (5 to 500 Hz)

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)

(2) The environmental limits of this module may be enhanced by the type of enclosure containing the module. (Refer to the applicable Product Specification Sheet (PSS) which describes the specific type of enclosure that is to be used.)