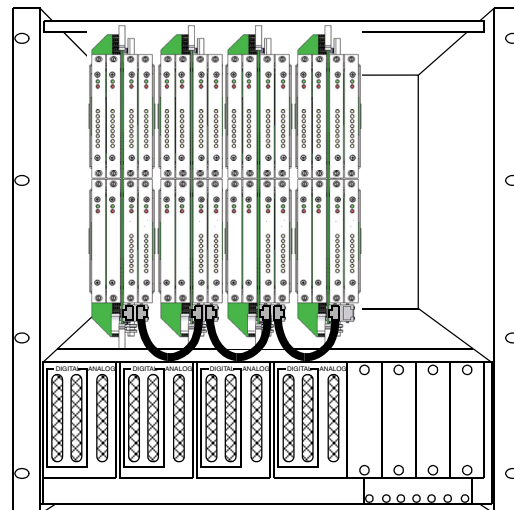


DCS Fieldbus Modules for ABB/Taylor MOD300 Direct I/O Automation Systems

FCP270 Control Processor
Modules Mounted on Baseplate



DCS Fieldbus Modules and Motherboards



The I/A Series® Field Control Processor 270 (FCP270) modules mounted on a baseplate and the distributed control system (DCS) Fieldbus Modules replace the MOD300 Direct I/O modules and connect existing field devices to the I/A Series system via a 2 Mbps HDLC Fieldbus and high-speed Ethernet network

FEATURES

- ▶ Migration from proprietary DCS to a state-of-the-art open I/A Series system
- ▶ Advanced I/A Series® control with a single point of configuration
- ▶ More direct control performance than any gateway device could offer
- ▶ Cost savings over total system replacement by preserving the existing process interface and wiring and minimizing process downtime
- ▶ Single vendor service and supply.

OVERVIEW

The I/A Series DCS Fieldbus Modules (FBMs) are for migration of ABB/Taylor MOD300 Direct I/O automation systems manufactured by ABB Automation products division. The FBMs plug directly into an existing electronic nest to replace process input and output modules. Migration products include the 6002N Model A and Model B Controller card files and the 6202N Controller card files.

The I/A Series DCS FBM family provides a migration path from MOD300 Direct I/O process I/O components to I/A Series display and supervisory functions.

No additional communication devices are required. No multi-vendor communication software licensing is required.

The I/A Series DCS FBM family replaces the MOD300 Direct I/O modules. Once integrated, the process is controlled entirely by the advanced I/A Series algorithm set.

The I/A Series DCS FBM product includes connectors to enable integration of original process signals to I/A Series systems while keeping the field interface and wiring. It provides access to all process signals connected to the MOD300 Direct I/O system by providing the connection between the Field Termination Assemblies (FTAs) and the I/A Series system. All process signals become fully integrated into the I/A Series system. Process data is used for operator display, history, alarming and control.

Operator functions and engineering configuration are accomplished by the I/A Series system at any I/A Series operator workstation. Because all process values become part of the I/A Series system, all configuration data is maintained by the system as native I/A Series configurations.

This migration path provides plant operations with all the power and flexibility of the I/A Series system. All process values can be used plant wide for control,

display, history, alarming and information management from a single vendor source.

FUNDAMENTAL PRINCIPLE

Invensys believes that it is only acceptable to interface with competing manufacturers' operating systems in two ways:

- ▶ Through high level public gateways
- ▶ At the lowest level directly to field devices without communicating with proprietary buses or components.

The Invensys migration product offerings adhere to this principle.

PRODUCT DESCRIPTIONS

The I/A Series migration strategy replaces the MOD300 Direct I/O process control system with a 2 Mbps Fieldbus connection to an I/A Series Field Control Processor 270 (FCP270), provides a motherboard-and-DCS Fieldbus modules replacement of the MOD300 controller and I/O, but leaves the original process interface wiring, termination assemblies and cabinets in place.

To replace the MOD300 controller and I/O modules, the MOD300 migration consists of new I/A Series DCS FBMs, FCP270 and baseplate. The baseplate supports either a single FCP270 module or a pair of fault-tolerant FCP270 modules. The FCP270 provides the control algorithms and interface between the FBMs and the 100 Mbps/1 Gbps Ethernet control network. This allows migration to I/A Series control, display and application products while retaining the original process termination and field I/O wiring. All original process I/O capability of the MOD300 module functions is replaced by FBMs and direct I/A Series control processor scanning and control. For more information on the FCP270, refer to PSS 21H-1B9 B3.

Using the I/A Series Z-Module Control Processor 270 (ZCP270) instead of the FCP270 requires a new I/A Series Z-module mounting structure that mounts in a 19 inch rack, Fieldbus Communications Module (FCM100E/FCM100Et), and baseplate. A single or redundant pair of FCM100E or FCM100Et modules mounts on the baseplate. The FCM100E/FCM100Et provides the interface between the FBMs, via a 2Mbps HDLC Fieldbus, and the ZCP270 controller, via a 100Mbps Ethernet Fieldbus.

For more information on the ZCP270, refer to PSS 21H-1B10 B3. For more information on the FCM100E, refer to PSS 21H-2Y11 B4.

For more information on the FCM100Et, refer to PSS 21H-2Y10 B4.

New I/A Series DCS FBMs plug into a motherboard which plugs directly into existing MOD300 racks in place of MOD300 Direct I/O modules.

The Fieldbus connects the DCS FBM subsystem to the FCP270 or ZCP270. I/O from the subsystem is connected to the control strategy using standard I/A Series I/O type blocks. The DCS FBMs pass process measurement and output signals and digital I/O signals to and from the control processor.

All process signals are fully integrated into the I/A Series system, allowing direct I/A Series system monitoring and control of the process.

The migration of the following MOD300 components to the I/A Series system can be accomplished using either an FCP270 or a ZCP270/FCM100 combination mounted on a baseplate:

- ▶ 6000 Series Direct I/O Non-Redundant Controller
- ▶ 6000 Series Direct I/O Redundant Controller
- ▶ 6200 Series Direct I/O Non-Redundant Controller
- ▶ 6200 Series Direct I/O Redundant Controller

MOD300 Subsystems

An FCP270 or FCM100E/FCM100Et baseplate is installed in the MOD300 enclosure or another location with single or redundant modules. The baseplate has a built-in Fieldbus termination assembly. The I/O module power supplies and MOD300 rack nests are retained in the cabinet.

The MOD300 racks, used to house I/O modules, are reused to house the I/A Series DCS FBMs. All termination assemblies remain intact with their termination cables and field wiring.

MOD300 Controllers and I/O modules are removed from the MOD300 rack and replaced by a corresponding motherboard containing I/A Series DCS FBMs that mate to the original power/signal connector and termination cable connector. These DCS FBMs provide original I/O functionality of the process inputs and outputs.

Migration with FCP270 and DCS FBMs

The Field Control Processor 270 (FCP270) is a distributed, field-mounted controller module that supports up to 32 DCS FBMs. The FCP270 connects to the control network via optionally redundant 100 Mbps Ethernet fiber optic cables and Ethernet fiber switches. The FCP270 is an optionally fault-tolerant controller that communicates with connected DCS FBMs to perform data acquisition and control using I/A Series control algorithms.

The FCP270 mounts in a 2-position baseplate that supports a single module or a fault-tolerant module pair. The baseplate accepts only FCP270 modules. The FCP270 connects to redundant 2 Mbps HDLC I/O Fieldbus for communications to the DCS FBMs and provides galvanic isolation between the 100 Mbps Ethernet Fieldbus and the 2 Mbps local Fieldbus.

The Fieldbus Expansion Module 100 (FEM100) allows the FCP270 to access up to four nests through up to four Expanded Fieldbuses. Each Expanded Fieldbus typically supports the same number of FBMs as a single Fieldbus. For more details and specifications on the FEM100, refer to PSS 21H-2Y14 B4.

Fault-tolerant FCP270 modules connect to a pair of fiber optic splitter/combiners that connect to Ethernet switches in a redundant control network. The splitter/combiner pair mounts in an assembly that fastens to the baseplate.

To support redundancy, a pair of FCP270s must be used for each grouping of 32 DCS FBMs. In non-redundant configurations, only a single FCP270 is required for each grouping.

The maximum total cable length for the 2 Mbps Fieldbus is 60 m (198 ft) within a grouping.

Migration with FCM100E/FCM100Et and DCS FBMs

The FCM100E or FCM100Et is a fiber optic communications interface which allows the DCS FBMs to communicate with the ZCP270 via the optionally redundant 100 Mbps Ethernet fiber optic Fieldbus. The FCM100E/FCM100Et converts 100 Mbps Ethernet signals used by the ZCP270 to 2 Mbps signals used by the DCS FBMs, and vice versa. The FCM100E/FCM100Et also provides galvanic isolation between the 100 Mbps Ethernet Fieldbus and the 2 Mbps local Fieldbus.

The FCM100E/Ets are used in pairs for redundancy. An module (or pair of modules) can support up to 32 DCS FBMs. The ZCP270 supports up to 32 FCM100E/Et redundant pairs connected to the 100 Mbps Ethernet Fieldbus via optionally redundant Ethernet switches and fiber optic cabling. The ZCP270 supports up to 120 DCS FBMs connected to FCM100E/Ets.

The FCM100E/Et allows the DCS FBMs to communicate with the ZCP270 over extended distances using the 100Mbps Ethernet fiber optic Fieldbus. The FCM100E/Et provides expanded networking and greater Fieldbus cabling distances in a fiber optic network. This configuration is ideally suited for sites in which groups of DCS FBMs are to be spread apart over greater distances. Up to 32 groupings of baseplate-mounted FCM100E/Ets and DCS FBMs can be linked to each optionally redundant Ethernet switch, for a maximum of 120 DCS FBMs per ZCP270 (depending on selected scan periods).

To support redundancy, a pair of FCM100E/Ets must be used for each DCS FBM grouping. In non-redundant configurations, only a single FCM100Et is required for each grouping. Signal transmission distances up to 2 kilometers (1.24 miles) are possible between the FCM100Ets and Ethernet fiber switches, providing for wide distribution of the DCS FBM equipment groupings. The maximum total cable length for the 2 Mbps Fieldbus is 60 m (198 ft) within a grouping.

I/O Modules

The DCS FBMs provide advanced 200 Series FBM technology on an MOD300 module form factor. Each DCS FBM motherboard plugs into the slot used by the replaced MOD300 module and provides connectors to the I/O signals and the FCP270 or FCM100E communication bus.

The following I/O module types are used in the MOD300 system:

- ▶ Analog input module with HART capability
- ▶ Analog output module with HART capability
- ▶ Digital input/output, configurable point-by point.

Each module is replaced with an equivalent I/A Series DCS FBM module. All I/O wiring connected to the I/O module termination strips remain in place. Power is derived from the original rack power supply. Table 1 lists the available DCS Fieldbus Modules.

Redundant MOD300 controllers may be replaced with redundant motherboards and DCS Fieldbus modules.

Table 1. DCS Fieldbus Modules I/O Options Per Motherboard

Module	Inputs	Outputs	Redundant
2 DIO214	16 AI (8 channels per card)	-	No
1 DIO215	-	8 AO	No
1 DIOSDM	1-48 DI	1-48 DO	No
4 DIO216	16 AI (8 channels per card pair)	-	Yes
2 DIO218	-	8 AO	Yes
2 DIOSDM	1-48 DI	1-48 DO	Yes

FUNCTIONAL SPECIFICATIONS – COMMON TO ALL MODULES

Communication

The DCS Fieldbus Modules communicate with the associated FCP270 or FCM100E/FCM100Et via the local 2 Mbps Fieldbus.

Calibration Requirements

Calibration of the modules is not required.

Power Requirements

INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5% to -10%

Power Monitoring

Primary and backup rack power sources are monitored and alarmed at the system level if either voltage drops below acceptable levels.

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)

European EMC Directive 89/336/EEC

Meets: EN 50081-2 Emission standard
EN 50082-2 Immunity standard
EN 61326 Annex A (Industrial Levels)

ELECTROMAGNETIC COMPATIBILITY (CONT.)

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 8 kV, air 15 kV

IEC 61000-4-3 Radiated Field Immunity

10 V/m at 80 to 1000 MHz

IEC 61000-4-4 Electrical Fast

Transient/Burst Immunity

2 kV on I/O and communication lines

IEC 61000-4-5 Surge Immunity

2kV on ac and dc power lines; 1kV 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 and communication lines

IEC 61000-4-8 Power Frequency Magnetic Field Immunity

30 A/m at 50 and 60 Hz

DIO214/DIO216 HART INPUT FUNCTIONAL SPECIFICATIONS

Input

8 group isolated channels with 1 to 5 V dc and HART Protocol communications Single Drop capability only.

- ▶ Point-to-point, master slave asynchronous, half duplex at 1200 baud
- ▶ Error checking – parity on each byte and one CRC byte
- ▶ Speed – 2 messages per second

Input range: 0 to 5.12 V dc (0.0 to 20.48 mA at termination assembly)

Calibration range (span): 1 to 5 V dc

Input overvoltage: ± 30 V dc (continuous)

Input accuracy: $\pm 0.1\%$ of span (0.2% including termination assembly sense resistor)

Input resolution: 15 bits

Analog update rate: 100 ms

Power Requirements

(All transmitters powered from the migration module.)

POWER CONSUMPTION

3 W maximum

HEAT DISSIPATION

3 W maximum

Channel Isolation

The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground.

CAUTION

The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock.

DIO215/DIO218 HART OUTPUT FUNCTIONAL SPECIFICATIONS

Output

8 isolated channels with 0 to 20 mA outputs and HART Protocol communications Single Drop capability only.

- ▶ Point-to-point, master slave asynchronous, half duplex at 1200 baud
- ▶ Error checking – parity on each byte and one CRC byte
- ▶ Speed – 2 messages per second

Output range: 0.0 to 20.48 mA

Calibration range (span): 4 to 20 mA

Accuracy: 0.1% of span

Output Resolution: 13 bits

Update rate: 10 ms

Power Requirements

(All transmitters powered from the migration module.)

POWER CONSUMPTION

10 W maximum

HEAT DISSIPATION

10 W maximum

Channel Isolation

The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground or channel-to-channel.

CAUTION

The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock.

DIOSDM DISCRETE INPUT/OUTPUT FUNCTIONAL SPECIFICATIONS

Input/Output

48 group isolated channels, configurable on a per channel basis as discrete input, discrete output, or pulse output.

DISCRETE INPUT (CONTACT TYPE)

Input specification depends upon the OPTO-22 devices installed in the termination assemblies.

DISCRETE OUTPUT

Output specification depends upon the OPTO-22 devices installed in the termination assemblies.

Module Scan Time

10 ms

Power Requirements

POWER CONSUMPTION

5 W maximum

HEAT DISSIPATION

5 W maximum

Channel Isolation

The channels of the I/O card are galvanically isolated from earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. Each channel is isolated from other channels by the attached OPTO-22 devices installed in the termination assembly.

CAUTION

The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock.



IPS Corporate Headquarters
5601 Granite Parkway Suite 1000
Plano, TX 75024
United States of America
www.ips.invensys.com

Foxboro Global Client Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or
contact your local Foxboro
representative.
Facsimile: 1-508-549-4999

Invensys, Foxboro and II/A Series are trademarks of
Invensys plc, its subsidiaries, and affiliates.
All other brand names may be trademarks of their
respective owners.

Copyright 2008-2009 Invensys Systems, Inc.
All rights reserved

MB 21A

Printed in U.S.A.

0409