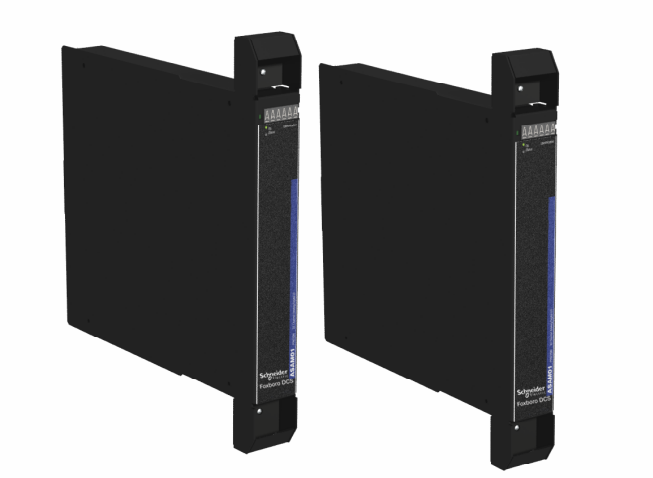
Foxboro™ DCS

Fieldbus Module for Siemens APACS+™ Automation Systems

PSS 41H-3MIGSIEM

Product Specification

January 2020



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Legal Information

Overview

EcoStruxure™ Foxboro™ DCS Field Control Processor 280 (FCP280) modules mounted on a baseplate and distributed control system (DCS) Foxboro DCS Fieldbus Modules (FBMs) replace the APACS+ Control and I/O modules and connect existing field devices to Foxboro DCS via a 2 Mbps HDLC Fieldbus and high-speed Ethernet network.

The Foxboro Fieldbus Modules (FBMs) are for migration of APACS+™ automation systems manufactured by Siemens® Energy & Automation, Inc. and Moore Products Co. The FBMs plug directly into an existing electronic nest to replace process input and output modules.

The Foxboro DCS FBM family provides a migration path from APACS+ process I/O components to Foxboro DCS display and supervisory functions. No additional communication devices are required. No multi-vendor communication software licensing is required.

The DCS FBM family replaces the APACS+ I/O modules. Once integrated, the process is controlled entirely by the advanced Foxboro DCS algorithm set.

The Foxboro DCS FBM product includes connectors to enable integration of original process signals to Foxboro DCSs while keeping the field interface and wiring. It provides access to all process signals connected to the APACS+ system by providing the connection between the Field Termination Assemblies (FTAs) and Foxboro DCS. All process signals become fully integrated into Foxboro DCS through the use of process data for operator display, history, alarming and control.

Operator functions and engineering configuration are accomplished by Foxboro DCS at any Foxboro DCS operator workstation. Because all process values become part of Foxboro DCS, all configuration data is maintained by the system as native Foxboro DCS configurations. This migration path provides plant operations with all the power and flexibility of Foxboro DCS.

Features

- Migration from proprietary DCS to a state-of-the-art open Foxboro DCS
- Advanced Foxboro DCS 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

Fundamental Principle

Foxboro 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 Foxboro migration product offerings adhere to this principle.

Product Descriptions

The Foxboro DCS migration strategy replaces the APACS+ process control system with a 2 Mbps Fieldbus connection to a Field Control Processor (Foxboro DCS FCP280), provides a module-for-module replacement of I/O modules, but leaves the original process interface wiring and cabinets in place.

To replace the APACS+ control and I/O modules mounted in MODULRAC, SIXRAC or UNIRAC assemblies, the APACS+ migration consists of new Foxboro DCS FBMs, FCP280, and baseplate. The baseplate supports either a single FCP280 module or a pair of fault-tolerant FCP280 modules. The FCP280 provides the control algorithms and interface between the FBMs and the 100 Mbps/1 Gbps Ethernet control network. This allows migration to Foxboro DCS control, display, and application products while retaining the original process termination and field I/O wiring. All original process I/O capability of the APACS+ module functions is replaced by FBMs and direct Foxboro DCS control processor scanning and control. For more information on the FCP280, refer to PSS 41H-1FCP280.

New DCS FBMs plug directly into existing MODULRACs, SIXRACS or UNIRACs in place of APACS+ I/O modules.

The Fieldbus connects the DCS FBM subsystem to the FCP280. I/O from the subsystem is connected to the control strategy using standard Foxboro DCS 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 Foxboro DCS, allowing direct Foxboro DCS monitoring and control of the process. Migration using the FCP280 and baseplate is accomplished using the DCS Fieldbus Module Migration Kit (P0922TL).

APACS+ Subsystems

An FCP280 baseplate is installed in the MODULPAC enclosure with single or redundant modules. The baseplate has a built-in Fieldbus termination assembly. The I/O module power supplies and MODULRACs are retained in the cabinet.

The MODULRACS, used to house I/O modules, are reused to house the DCS FBMs. All termination assemblies in the local, adjacent, and remotely marshalled MODULPACs remain intact with their termination cables and field wiring.

APACS+ I/O modules are removed from the MODULRAC and replaced by a corresponding DCS FBM that mates to the original power/signal connector and termination cable connector on the back of the MODULRAC. This DCS FBM provides original I/O functionality of the process inputs and outputs.

Ladder Logic Implementation

Ladder logic for an APACS+ system is implemented in the ACM controllers, not in the I/O modules. Thus, any digital I/O point in the system can be used as an input or output to the ladder logic running in the ACM. A similar capability exists with the migrated APACS+ system through the use of sequence control logic in the FCP280 Control Processor.

Foxboro control block ladder logic is implemented by using a combination of logic which executes directly in the digital I/O modules and sequence control logic in the Control Processor. This same capability exists in the AID115, AID230, AOD115, and ADO125 APACS+ migration modules. The channel configurable ASAM01, AEAM01, ASDM24 and ASDM48 I/O modules implement ladder logic only by using sequence control logic in the Control Processor similar to the original APACS+ system.

Migration with FCP280 and DCS FBMs

The FCP280 is a distributed, field-mounted controller module that supports up to 128 DCS FBMs - 32 per HDLC fieldbus. The FCP280 connects to the control network via optionally redundant 100 Mbps Ethernet fiber optic cables and Ethernet fiber switches. The FCP280 is an optionally fault-tolerant controller that communicates with connected DCS FBMs to perform data acquisition and control using Foxboro DCS control algorithms.

The FCP280 mounts in a 2-position baseplate that supports a single module or a fault-tolerant module pair. The baseplate accepts only FCP280 modules. The FCP280 connects to an optionally 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.

FCP280 modules connect to a pair of copper or fiber optic network adapters that connect to Ethernet switches in a redundant control network. The network adapter pair mounts to the FCP280 baseplate.

To support redundancy, a pair of FCP280s must be used for each DCS FBM grouping. In non-redundant configurations, only a single FCP280 is required for each grouping.

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 APACS+ module form factor. Each DCS FBM plugs into the slot used by the replaced APACS+ module and provides two rear connectors, one of which mates to a connector on a local field termination strip on the backplane of the MODULRAC.

For marshalled termination assembly located in an adjacent MODULPAC enclosure, the FBM I/O connector mates to a field termination cable connector mounted on the back of the MODULRAC.

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

- Analog input module
- Analog multi-range input module
- Analog RTD input module
- Digital input module
- Digital output module
- HART® input module
- HART redundant input module
- Analog/digital/pulse input and analog/digital output module, configurable point-by-point
- Analog/digital input and analog/digital output module, configurable point-by-point
- Digital input/output, configurable point-by-point. Each module type is replaced with an equivalent Foxboro 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. This table lists the available FBMs and the APACS+ modules they replace.

Table 1. FBM I/O Options

APACS+ Module	Replacement FBM	Inputs	Outputs
EAM	AEAM01	1-16 AI/DI/PI*	1-16 AO/DO*
RTM	ART203	16 AI RTD	None
SAM	ASAM01	1-32 AI/DI*	1-32 AO/DO*
VIM	AVI202	16 AI (multirange)	None
SAI	ASA211	32 AI	None
SDM (24 V dc)	ASDM24	1-32 DI (24 V dc)*	1-32 DO (24 V dc)*
SDM (48 V dc)	ASDM48	1-32 DI (48 V dc)*	1-32 DO (48 V dc)*
IDM115	AID115	32 DI (115 V ac)	None
IDM230	AID230	32 DI (230 V ac)	None
ODM	AOD115	None	32 DO (115 V ac)
IDO	ADO125	None	16 DO (125 V dc)
HFM	AHF214	16 AI (HART)	None
HFM (redundant)	AHF216	16 AI (HART)	None
*Configurable point-by-point.			

Functional Specifications - Common to All FBMs

Communication	The FBMs communicate with the associated FCP280 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) • *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

ADO125 Discrete Output Functional Specifications

Output	16 individually isolated channels
Minimum Module Scan Time	10 ms
Power Requirements	• Power Consumption: 6 W maximum • Heat Dissipation: 8 W maximum (27 BTU/hr)
Output Applied Voltage	24 to 125 V dc (130 V dc maximum)
Output Load Current	2 A at 24 V dc or 0.5 A at 125 V dc maximum 50 mA minimum (100 mA for redundant) 20 A maximum per module < 10 A surge for 10 ms
On-State Voltage Drop	< 2.5 V dc at 2 A (includes drop in 3 m cable)
Off-State Leakage Current	< 4 m A
Fusing	1 fuse per point on marshalled terminal assembly (2 A 250 V dc slowblow cartridge type). 4 A thermal and 1 electronic (resetable) per point in module. The thermal fuses are protected from nuisance blowing by the electronic soft fuse which blows prior to 3 A.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground and 600 V ac between any channel and all other channels. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AEAM01 Analog/Discrete/Pulse I/O Functional Specifications

Input/Output	16 individually isolated channels, software configurable on a per channel basis, as listed below. • Analog Input ◦ Current input range: 0 to 20 mA or 4 to 20 mA ◦ Voltage input range: 0 to 5 V dc or 1 to 5 V dc ◦ Resolution: 15 bits ◦ Accuracy: ±0.03% of span • Analog Output ◦ Current output range: 0 to 20.4 mA ◦ Resolution: 13 bits ◦ Accuracy: ±0.05% of span • Frequency Input ◦ Range: 10 to 50000 Hz ◦ Resolution: 15 bits ◦ Accuracy: ±0.01% of reading ◦ Pulse count: no missing pulses ◦ Minimum pulse width: 6 µs ◦ Current input threshold: 10 mA ±1 mA ◦ Voltage regular threshold: 2.5 V dc ±0.125 V dc ◦ Voltage TTL threshold: 1.4 V dc ±0.125 V dc • Discrete Input Sourcing ◦ Input filter delay: 5.6 ms maximum ◦ Input wetting current: 20 mA • Discrete Input Sinking ◦ Input filter delay: 11 ms maximum • Discrete Output ◦ Maximum output current: 40 mA ◦ On-state voltage range: 14 to 24 V dc ◦ Off-state leakage current: < 0.05 mA
Minimum Module Scan Time	25 ms for inputs 10 ms for outputs

Power Requirements	• Power Consumption: 17W maximum • Heat Dissipation: 17W maximum (58 BTU/hr)
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground and 600 V ac between any channel and all other channels. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AHF214/216 HART Input Functional Specifications

Input	16 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 marshalled termination assembly) • Calibration range (span): 1 to 5 V dc • Input overvoltage: ±30 V dc (continuous) • Input accuracy: ±0.1% of span • Input resolution: 15 bits • Analog update rate: 100 ms
Power Requirements	(All transmitters powered from the migration module.) • Power Consumption: 10 W maximum • Heat Dissipation: 10 W maximum (34 BTU/hr)
Channel Isolation	The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AID115 Discrete Input Functional Specifications

Discrete Input	32 channels in 8 groups of 4 channels. Each group is isolated from the other groups and ground. Each group may be connected to a separate ac supply. • Input operating voltage range: 84 to 140 V ac, RMS • Frequency: 47 to 63 Hz • Input delay filter time: 22 ms typical • Minimum input (wetting) current: 3.1 mA RMS, 5.6 mA peak at 115 V ac • Logic “0” state input voltage: 0 to 71 V ac RMS, 50/60 Hz • Logic “0” state input current: 0.0 to 0.56 mA RMS • Logic “1” state input voltage: 84 to 140 V ac RMS, 50/60 Hz • Logic “1” state input current: 1.6 to 6.3 mA RMS
Power Requirements	• Power Consumption: 3 W maximum • Heat Dissipation: 16 W maximum (55 BTU/hr)
Channel Isolation	Each group of channels is galvanically isolated from all other groups and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any group of channels and ground and 600 V ac between any group and all other groups. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AID230 Discrete Input Functional Specifications

Discrete Input	32 channels in 8 groups of 4 channels. Each group is isolated from the other groups and ground. Each group may be connected to a separate ac supply. • Input operating voltage range: 182 to 250 V ac, RMS • Frequency: 47 to 63 Hz • Input delay filter time: 22 ms typical • Minimum input (wetting) current: 2.17 mA RMS, 3.84 mA peak at 230 V ac • Logic “0” state input voltage: 0 to 150 V ac RMS, 50/60 Hz • Logic “0” state input current: 0.0 to 0.56 mA RMS • Logic “1” state input voltage: 182 to 250 V ac RMS, 50/60 Hz • Logic “1” state input current: 1.44 to 3.38 mA RMS
Power Requirements	• Power Consumption: 3 W maximum • Heat Dissipation: 20 W maximum (68 BTU/hr)
Channel Isolation	Each group of channels is galvanically isolated from all other groups and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any group of channels and ground and 600 V ac between any group and all other groups. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AOD115 Discrete Output Functional Specifications

Discrete Output	32 channels in 4 groups of 8 channels. Each group is isolated from the other groups and ground. Each group may be connected to a separate ac supply. • Output operating voltage range: 93 to 132 V ac, RMS • AC supply current: 30 A maximum • Frequency: 47 to 63 Hz • Output current per channel: 1.0 A maximum, 0.033 A minimum • Total output current (all channels): 4 A per group maximum, 16 A per module maximum at 30 °C • Output (group) fuse rating: 5 A, 250 V ac • Output voltage drop: 1.82 V ac maximum • Surge current: 25 A maximum for 16.6 ms (1 cycle), 17 A maximum for 33 ms (2 cycles) • Off-state channel leakage current: 4 mA maximum
Power Requirements	• Power Consumption: 11 W maximum • Heat Dissipation: 24 W maximum (82 BTU/hr)
Channel Isolation	Each group of channels is galvanically isolated from all other groups and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any group of channels and ground and 600 V ac between any group and all other groups. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

ART203 RTD Input Functional Specifications

Input

16 software configurable, individually isolated RTD or slidewire channels.

- Input ranges: 0 to 320 Ω (100 Ω Pt or Ni), 0 to 640 Ω (200 Ω Pt) or 5 to 1005 Ω slidewire
  - 320 Ω equals 64000 counts. Minimum overrange value is 327.675 Ω at a count of 65535
  - 640 Ω equals 64000 counts. Minimum overrange value is 655.35 Ω at a count of 65535
  - 1280 Ω equals 64000 counts. Minimum overrange value is 1310.7 Ω at a count of 65535
- Lead resistance: 50 Ω maximum each lead

  Any imbalance in extension leads will decrease accuracy
- Accuracy: ±0.075% of span, temperature coefficient ±50 ppm/°C

Module Scan Time

Integration Period (ms)	Update Time (ms)	Settling Time* (ms)	Resolution (bits)
50	25	100	15
100	25	125	15
250	25	200	15
500	25	500	15
1000	25	1000	15

*Value settles within a 1% band of steady state for an input step change of 30 to 320 Ω.

Power Requirements

- Power Consumption:

  6 W maximum
- Heat Dissipation:

  6 W maximum (20 BTU/hr)

Channel Isolation

Each group of channels is galvanically isolated from all other groups and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any group of channels and ground and 600 V ac between any group and all other groups.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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.

Failure to follow these instructions will result in death or serious injury.

ASA211 Analog Input Functional Specifications

Input	32 group isolated analog channels. • Input range: 0.0 to 5.12 V dc (0.0 to 20.48 mA at marshalled termination assembly) • Calibration range (span): 1 to 5 V dc (4 to 20 mA at termination assembly) • Resolution: 15 bits • Accuracy: ±0.1% of span over 4 to 20 mA range • Temperature Effect: ±100 ppm/°C
Minimum Module Scan Time	50 ms
Power Requirements	• Power Consumption: 3 W maximum • Heat Dissipation: 3 W maximum (10 BTU/hr)
Channel Isolation	The channels are galvanically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

ASAM01 Analog/Discrete Input/Output Functional Specifications

Input/Output	32 group isolated channels, software configurable on a per channel basis, as listed here. • *Analog Input* ◦ Current input range: 0 to 20.48 mA ◦ Calibration range: 4 to 20 mA ◦ Resolution: 15 bits ◦ Accuracy: ±0.1% of span over 4 to 20 mA range • *Analog Output* ◦ Current output range: 0.1 to 20.48 mA ◦ Calibration range: 4 to 20 mA ◦ Resolution: 13 bits ◦ Accuracy: ±0.1% of span over 4 to 20 mA range ◦ Load capacity: 50 to 800 Ω • *Discrete Input (Contact Type)* ◦ Current supplied: 10 mA ◦ Minimum on-state percentage: 0 to 100% configurable, scale from 0 to 10 mA ◦ Minimum off-state percentage: 0 to 100% configurable, scale from 0 to 10 mA ◦ Default configuration: > 8 mA for input On ◦ Default configuration: < 2 mA for input Off • *Discrete Output* ◦ Output On (load < 856 Ω): 20.48 mA maximum ◦ Output On (load > 856 Ω): 20.2 V dc minimum ◦ Output Off: 0.1 mA maximum, 0.0 mA minimum
Minimum Module Scan Time	50 ms for inputs 10 ms for outputs

Power Requirements	• Power Consumption: 24 W maximum • Heat Dissipation: 24 W maximum (41 BTU/hr)
Channel Isolation	The channels are galvanically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

ASDM24 Discrete Input/Output Functional Specifications

Input/Output	32 group isolated channels, configurable on a per channel basis as discrete input, discrete output, or pulse output. • *Discrete Input (Contact Type)* ◦ Current supplied: 9.9 mA at 24 V dc typical ◦ On-state voltage range: 19.0 to 30.0 V dc ◦ Maximum off-state current: 6 mA ◦ Off-state voltage range: -0.5 to 15 V dc • *Discrete Output* ◦ Output current per channel: 600 mA maximum ◦ Output surge current: 2.0 A maximum for 10 ms ◦ Output fuse rating: 2.0 A (not field-replaceable) ◦ Output current total: See *Table 2. Output Current, page 20*. ◦ Off-state leakage current: 1.6 mA maximum
Minimum Module Scan Time	10 ms
Power Requirements	• Power Consumption: 5 W maximum • Heat Dissipation: 12 W maximum (41 BTU/hr)
Fusing	2 A thermal and 1 electronic (can be reset) per point in module. The thermal fuses are protected from nuisance blowing by the electronic soft fuse which blows prior to 1 A.
Channel Isolation	The channels are galvanically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

Table 2. Output Current

Ambient Temperature	Number of Channels at Specified Current					
	0.6 A	**0.5 A**	**0.4 A**	**0.3 A**	**0.2 A**	**0.1 A**
30°C (86°F)	19 (11.4 A total)	24 (12.0 A total)	32 (12.8 A total)	32 (9.6 A total)	32 (6.4 A total)	32 (3.2 A total)
35°C (95°F)	15 (9.0 A total)	19 (9.5 A total)	27 (10.8 A total)	32 (9.6 A total)	32 (6.4 A total)	32 (3.2 A total)
45°C (113°F)	10 (6.0 A total)	13 (6.5 A total)	18 (7.2 A total)	27 (8.1 A total)	32 (6.4 A total)	32 (3.2 A total)
60°C (140°F)	4 (2.4 A total)	5 (2.5 A total)	8 (3.2 A total)	12 (3.6 A total)	21 (4.2 A total)	32 (3.2 A total)

ASDM48 Discrete Input/Output Functional Specifications

Input/Output	32 group isolated channels, configurable on a per channel basis as discrete input, discrete output, or pulse output. • *Discrete Input (Contact Type)* ◦ Current supplied: 9.9 mA at 48 V dc typical ◦ On-state voltage range: 19.0 to 30.0 V dc ◦ Maximum off-state current: 6 mA ◦ Off-state voltage range: 0 to 15 V dc • *Discrete Output* ◦ Output current per channel: 600 mA maximum ◦ Output surge current: 2.0 A maximum for 10 ms ◦ Output fuse rating: 2.0 A (not field-replaceable) ◦ Output current total: See *Table 2. Output Current, page 20*. ◦ Off-state leakage current: 1.6 mA maximum
Minimum Module Scan Time	10 ms
Power Requirements	• Power Consumption: 4 W maximum • Heat Dissipation: 15 W maximum (51 BTU/hr)
Fusing	2 A thermal and 1 electronic (can be reset) per point in module. The thermal fuses are protected from nuisance blowing by the electronic soft fuse which blows prior to 1 A.
Channel Isolation	The channels are galvanically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

AVI202 Analog Or Thermocouple Input Functional Specifications

Input	16 individually isolated channels software configurable, on a per channel basis, for thermocouple or voltage input. • *Voltage Inputs* ◦ Ranges (V dc): -10 to +10, -5 to +5, -1 to +1, -100 to +100 mV, 0 to +5, and +1 to +5 ◦ Input overvoltage protection: ±30 V dc ◦ Accuracy: ±0.1% of span • *Thermocouple Inputs* ◦ Isothermal sense accuracy: ±0.5°C ◦ Linearity: Included in Accuracy ◦ Accuracy: ±27 µV at 25°C ◦ Accuracy temperature coefficient: ±50 PPM/°C ◦ Conformity: ±0.25°C ◦ Thermocouple junction type: grounded or ungrounded
Power Requirements	• Power Consumption: 6 W maximum • Heat Dissipation: 6 W maximum (20 BTU/hr)
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground and 600 V ac between any channel and all other channels. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** 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. **Failure to follow these instructions will result in death or serious injury.**

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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