

**DCS Fieldbus Modules for Siemens APACS+™ Automation Systems**

DCS Fieldbus Modules



*Foxboro Evo™ system Field Control Processor 280 (FCP280) and Field Control Processor 270 (FCP270) modules mounted on a baseplate and distributed control system (DCS) Fieldbus Modules replace the APACS+ Control and I/O modules and connect existing field devices to the Foxboro Evo system via a 2 Mbps HDLC Fieldbus and high-speed Ethernet network.*

**OVERVIEW**

The Foxboro Evo system DCS 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 Evo system DCS FBM family provides a migration path from APACS+ process I/O components to Foxboro Evo 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 Evo algorithm set.

The Foxboro Evo DCS FBM product includes connectors to enable integration of original process signals to Foxboro Evo systems 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 the Foxboro Evo system. All process signals become fully integrated into the Foxboro Evo system through the use of process data for operator display, history, alarming and control.

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

This migration path provides plant operations with all the power and flexibility of the Foxboro Evo system.

## FEATURES

- ▶ Migration from proprietary DCS to a state-of-the-art open Foxboro Evo system
- ▶ Advanced Foxboro Evo 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 Evo migration strategy replaces the APACS+ process control system with a 2 Mbps Fieldbus connection to a Field Control Processor (FCP280 or FCP270), 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 Evo DCS FBMs, FCP280/FCP270 and baseplate. The baseplate supports either a single FCP280/FCP270 module or a pair of fault-tolerant FCP280/FCP270 modules. The FCP280/FCP270 provides the control algorithms and interface between the FBMs and the 100 Mbps/1 Gbps Ethernet control network. This allows migration to Foxboro Evo 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 Evo control processor scanning and control. For more information on the FCP270, refer to PSS 21H-1B9. For more information on the FCP280, refer to PSS 31H-FCP280.

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, FCP270 or ZCP270. I/O from the subsystem is connected to the control strategy using standard Foxboro Evo system 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 Foxboro Evo system, allowing direct Foxboro Evo system monitoring and control of the process.

Migration using the FCP280, FCP270 or FCM100Et/FCM100E and baseplate is accomplished using the DCS Fieldbus Module Migration Kit (P0922TL).

### **APACS+ Subsystems**

An FCP280, FCP270 or FCM100Et/FCM100E 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, FCP270 or ZCP270 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 Field Control Processor 280 (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 Evo 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 DCS Fieldbus Module 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 Evo 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 and the APACS+ modules they replace.

**Table 1. DCS Fieldbus Modules I/O Options**

DCS FBM	Inputs	Outputs	Replaces APACS+ Module
AEAM01	1-16 AI/DI/PI*	1-16 AO/DO*	EAM
ART203	16 AI RTD	None	RTM
ASAM01	1-32 AI/DI*	1-32 AO/DO*	SAM
AVI202	16 AI (multirange)	None	VIM
ASA211	32 AI	None	SAI
ASDM24	1-32 DI (24 V dc)*	1-32 DO (24 V dc)*	SDM (24 V dc)
ASDM48	1-32 DI (48 V dc)*	1-32 DO (48 V dc)*	SDM (48 V dc)
AID115	32 DI (115 V ac)	None	IDM115

Table 1. DCS Fieldbus Modules I/O Options (Continued)

DCS FBM	Inputs	Outputs	Replaces APACS+ Module
AID230	32 DI (230 V ac)	None	IDM230
AOD115	None	32 DO (115 V ac)	ODM
ADO125	None	16 DO (125 V dc)	IDO
AHF214	16 AI (HART)	None	HFM
AHF216	16 AI (HART)	None	HFM (redundant)
* Configurable point-by-point.			

**FUNCTIONAL SPECIFICATIONS – COMMON TO ALL MODULES**

**Communication**

The DCS Fieldbus Modules communicate with the associated FCP280, FCP270 or FCM100Et/FCM100E 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

**ELECTROMAGNETIC COMPATIBILITY (CONT.)**

*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 mA

### 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 earth (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.

### 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.

## 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:  $\pm 0.03\%$  of span

#### ANALOG OUTPUT

Current output range: 0 to 20.4 mA

Resolution: 13 bits

Accuracy:  $\pm 0.05\%$  of span

#### FREQUENCY INPUT

Range: 10 to 50000 Hz

Resolution: 15 bits

Accuracy:  $\pm 0.01\%$  of reading

Pulse count: no missing pulses

Minimum pulse width: 6  $\mu$ s

#### FREQUENCY INPUT (CONTINUED)

Current input threshold: 10 mA  $\pm 1$  mA

Voltage regular threshold: 2.5 V dc  $\pm 0.125$  V dc

Voltage TTL threshold: 1.4 V dc  $\pm 0.125$  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

## AEAM01 ANALOG/DISCRETE/PULSE I/O FUNCTIONAL SPECIFICATIONS (CONT.)

### Power Requirements

#### POWER CONSUMPTION

17 W maximum

#### HEAT DISSIPATION

17 W maximum (58 BTU/hr)

### Channel Isolation

Each channel is galvanically isolated from all other channels and earth (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.

### 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.

## 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:  $\pm 30$  V dc (continuous)

Input accuracy:  $\pm 0.1\%$  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.

### 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.

## 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 earth (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.

#### 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.

## 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 earth (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.

#### 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.



## 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 earth (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.

#### 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.

## ART203 RTD INPUT FUNCTIONAL SPECIFICATIONS

### Input

16 software configurable, individually isolated RTD or slidewire channels

Input ranges<sup>a</sup>: 0 to 320  $\Omega$  (100  $\Omega$  Pt or Ni),  
0 to 640  $\Omega$  (200  $\Omega$  Pt) or 5 to 1005  $\Omega$  slidewire

Lead resistance: 50  $\Omega$  maximum each lead<sup>b</sup>

Accuracy:  $\pm 0.075\%$  of span, temperature coefficient  
 $\pm 50$  ppm/ $^{\circ}\text{C}$

<sup>a</sup>320  $\Omega$  equals 64000 counts. Minimum overrange  
value is 327.675  $\Omega$  at a count of 65535.

640  $\Omega$  equals 64000 counts. Minimum overrange  
value is 655.35  $\Omega$  at a count of 65535.

1280  $\Omega$  equals 64000 counts. Minimum overrange  
value is 1310.7  $\Omega$  at a count of 65535.

<sup>b</sup>Any imbalance in extension leads will decrease  
accuracy.

### 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  $\Omega$ .

## ART203 RTD INPUT FUNCTIONAL SPECIFICATIONS (CONT.)

### 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 earth (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.

### 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.

## 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:  $\pm 0.1\%$  of span over 4 to 20 mA range

Temperature Effect:  $\pm 100$  ppm/ $^{\circ}\text{C}$

### 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 earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels 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.

## ASAM01 ANALOG/DISCRETE INPUT/OUTPUT FUNCTIONAL SPECIFICATIONS

### Input/Output

32 group isolated channels, software configurable on a per channel basis, as listed below.

#### ANALOG INPUT

Current input range: 0 to 20.48 mA

Calibration range: 4 to 20 mA

Resolution: 15 bits

Accuracy:  $\pm 0.1\%$  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:  $\pm 0.1\%$  of span over 4 to 20 mA range

Load capacity: 50 to 800  $\Omega$

#### 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  $\Omega$ ): 20.48 mA maximum

Output On (load > 856  $\Omega$ ): 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 earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels 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.

**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 following table  
 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 (resetable) 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 earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels 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.

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.

Off-state leakage current: 1.6 mA maximum

#### 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 following table

Off-state leakage current: 1.6 mA maximum

### Minimum Module Scan Time

10 ms

### Power Requirements

#### POWER CONSUMPTION

4 W

#### HEAT DISSIPATION

15 W maximum (51 BTU/hr)

### Fusing

2 A thermal and 1 electronic (resettable) 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 earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between all channels 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.

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)

## 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:  $\pm 30$  V dc

Accuracy:  $\pm 0.1\%$  of span

#### THERMOCOUPLE INPUTS

Isothermal sense accuracy:  $\pm 0.5^\circ\text{C}$

Linearity: Included in Accuracy

Accuracy:  $\pm 27 \mu\text{V}$  at  $25^\circ\text{C}$

Accuracy temperature coefficient:  $\pm 50 \text{ PPM}/^\circ\text{C}$

Conformity:  $\pm 0.25^\circ\text{C}$

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 earth (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.

#### 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.





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