

DCS Fieldbus Modules for APACS+™ Automation Systems

FCP270 Control Processor
Modules Mounted on Baseplate



DCS Fieldbus Modules



I/A Series® system 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 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 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 I/A Series system DCS FBM family provides a migration path from APACS+ 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 system DCS FBM family replaces the APACS+ I/O modules. Once integrated, the process is controlled entirely by the advanced I/A Series algorithm set.

The I/A Series system 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 APACS+ 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 through the use of process data 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.

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 APACS+ process control system with a 2 Mbps Fieldbus connection to an I/A Series system Field Control Processor 270 (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 I/A Series system 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 APACS+ 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 system Z-Module Control Processor 270 (ZCP270) instead of the FCP270 requires a new I/A Series system Z-module mounting structure that mounts in a 19 inch rack, Fieldbus Communications Module (FCM100Et and FCM100E), and baseplate. A single or redundant pair of FCM100Et/FCM100E modules mounts on the baseplate.

The FCM100Et/FCM100E 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 FCM100Et, refer to PSS 21H-2Y10 B4. For more information on the FCM100E, refer to PSS 21H-2Y11 B4.

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

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

APACS+ Subsystems

An 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 I/A Series system 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

I/A Series system 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 FCP270 or ZCP270 Control Processor.

Invensys 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 FCP270 and DCS FBMs

The Field Control Processor 270 (FCP270) is a distributed, field-mounted controller module that supports up to 39 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 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.

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 DCS FBM grouping. 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 FCM100Et/FCM100E and DCS FBMs

The FCM100Et and FCM100E are fiber optic communications interfaces which allow the DCS FBMs to communicate with the ZCP270 via the optionally redundant 100 Mbps Ethernet fiber optic Fieldbus. The FCM100Et and FCM100E convert 100 Mbps Ethernet signals used by the ZCP270 to 2 Mbps signals used by the DCS FBMs, and vice versa. The FCM100Et and FCM100E also provide galvanic isolation between the 100 Mbps Ethernet Fieldbus and the 2 Mbps local Fieldbus.

The FCM100Et/FCM100Es are used in pairs for redundancy. A single or pair of FCM100Et/FCM100Es can support up to 39 DCS FBMs. The ZCP270 supports up to 32 FCM100Et/FCM100E 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 FCM100Et/FCM100Es.

The FCM100Et and FCM100E allow the DCS FBMs to communicate with the ZCP270 over extended distances using the 100Mbps Ethernet fiber optic

Fieldbus. The FCM100Et and FCM100E provide 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 FCM100Et/FCM100Es 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 FCM100Et/FCM100Es must be used for each DCS FBM grouping. In non-redundant configurations, only a single FCM100Et or FCM100E is required for each grouping. Signal transmission distances up to 2 kilometers (1.24 miles) are possible between the FCM100Et/FCM100Es 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 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 I/A Series system 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
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 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

AD0125 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 (resettable) 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 μ s

FREQUENCY INPUT (CONTINUED)

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

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: ± 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^a: 0 to 320 Ω (100 Ω Pt or Ni),

0 to 640 Ω (200 Ω Pt) or 5 to 1005 Ω slidewire

Lead resistance: 50 Ω maximum each lead^b

Accuracy: $\pm 0.03\%$ of span, temperature coefficient
 ± 50 ppm/°C

^a320 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.

^bAny 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 Ω .

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: ± 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 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 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 (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)

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 (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)

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: $\pm 0.1\%$ of span

THERMOCOUPLE INPUTS

Isothermal sense accuracy: $\pm 0.5^{\circ}\text{C}$
Linearity: Included in Accuracy
Accuracy: ± 27 μV at 25°C
Accuracy temperature coefficient: ± 50 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.

