



## Profibus Distributed I/O



## Discrete I/O Modules



## Analog I/O Modules



## BusWorks® 900PB Series Profibus-DP I/O

### Introduction

Series overview .....Page 38

### Discrete I/O Modules

981PB discrete input .....Page 46  
982PB discrete output .....46  
983PB discrete I/O .....46

### Analog I/O Modules

961PB DC current input, differential ..... Page 41  
962PB DC voltage input, differential .....41  
963PB DC current input, single-ended .....42  
964PB DC voltage input, single-ended .....42  
965PB Thermocouple/millivolt input .....43  
966PB RTD/Resistance input .....44  
972PB DC current output .....45  
973PB DC voltage output .....45

### Technical Documentation

Operation and performance specifications . .Page 47  
Accessories .....48

	961/962	963/964	965	966	972/973	981/82/83
<b>DISCRETE INPUTS</b>						
Active low input						X
<b>ANALOG INPUTS</b>						
DC current input	X	X				
DC voltage input	X	X				
DC millivolt input			X			
Thermocouple input			X			
RTD/resistance input				X		
AC current input (requires external sensor)	X	X				
<b>DISCRETE OUTPUTS</b>						
Sinking output (low-side switch)						X
<b>ANALOG OUTPUTS</b>						
DC current output					X	
DC voltage output					X	
<b>POWER REQUIREMENT</b>						
DC-powered	X	X	X	X	X	X



Member of:





## ProfiBus-DP / RS485



PNO  
Certified



24HR  
5YR

## 900PB Series ProfiBus-DP I/O Modules

The 900PB series is a high-performance line of networked I/O modules. These units feature universal input/output ranges and an intelligent microcontroller to provide extreme flexibility and powerful monitoring and control capabilities. Select from a variety of analog and discrete I/O models to meet your application requirements.

Each module provides a direct network interface for your I/O signals. Unlike "block I/O" devices that combine a large and expensive processor block with snap-on I/O terminal blocks, 900PB modules handle the network interface and I/O processing in a single, compact multi-channel module. This space-saving approach is very cost-effective for systems that need to add some I/O channels at an existing control site or network new, remote sites.

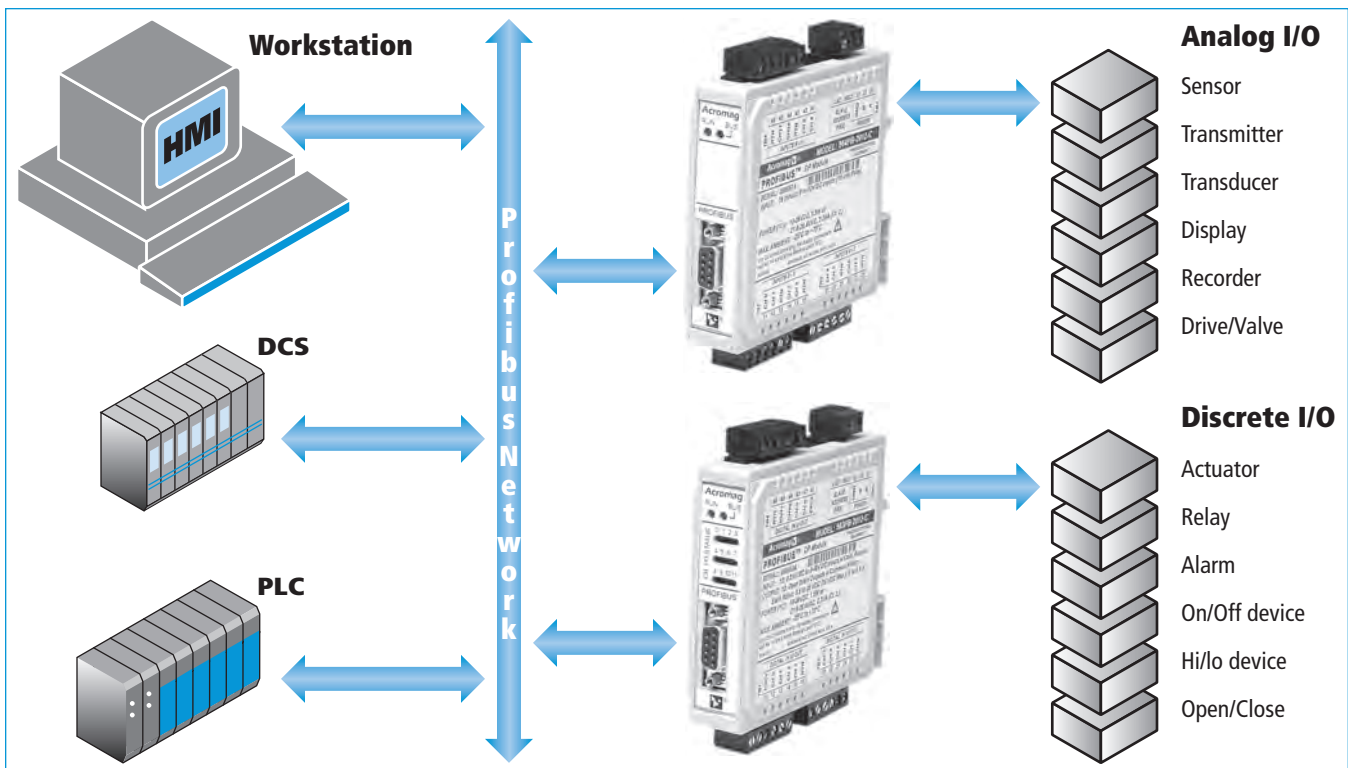
To ensure unsurpassed performance, these I/O modules employ advanced microcontroller technology. Isolated input, output, power, and network circuits increase noise/transient immunity and prevent ground loops. Status LEDs provide diagnostic feedback.

Self-diagnostics and sophisticated watchdog timers simplify maintenance and troubleshooting. The watchdog timer invokes a failsafe condition if host communication is lost. For further security, a second watchdog monitors the microcontroller for failed operations or a "lock-up" condition and automatically resets the unit.

**24HR 5YR** Ready to ship within 24-hours from stock. Backed by a 5-year warranty.

## Special Features

- **Direct Network Interface:**  
Each module has a built-in microcontroller for communication. No bus coupler required.
- **RS485/ProfiBus Network Communication:**  
Highly immune to noise and operates over long distances
- **Industry Standard ASIC:**  
Siemens SPC3 intelligent ASIC to talk ProfiBus
- **High-Speed Data Rates:**  
Half-duplex RS485 with rates up to 12M baud
- **Auto-Baud Rate Detection:**  
Baud rate is set automatically
- **Fully Isolated:**  
I/O, network, and power circuits isolated from each other for safety and noise immunity
- **Nonvolatile Reprogrammable Memory:**  
Allows the functionality of this device to be reliably reprogrammed thousands of times
- **Self-Diagnostics & Watchdog Timers:**  
Self-test simplifies maintenance. Profibus has defined failsafe mode for lost communication.





## Discrete I/O

These modules monitor discrete levels of various devices and/or provide on/off control capabilities depending on the model selected. Each module has up to twelve channels to save space and minimize costs. Models are available with input- or output-only, or bidirectional I/O configurations.

### Inputs

- Active-low inputs, 0 to 35V DC

### Outputs

- Sinking outputs, 0 to 35V DC, up to 500mA

### Functions

- Monitor discrete state or level
- Control on/off, high/low, open/close switching
- Activate audible or visual alarms

## Analog Input

These units monitor a wide variety of industrial machinery and equipment. They accept direct sensor inputs or DC process control signals from transducers, transmitters, and other instruments.

### Inputs

- DC current
- DC voltage
- DC millivolts
- Thermocouple
- RTD/resistance
- AC current

### Functions

- Measure process variables
- Monitor machinery and industrial devices
- Acquire data from non-networked instruments

## Analog Output

Analog output modules are ideal for controlling a wide variety of industrial equipment. The host defines the output of voltage or current signals to control speed, flow, temperature, frequency, level, force, torque, intensity, and many other physical properties.

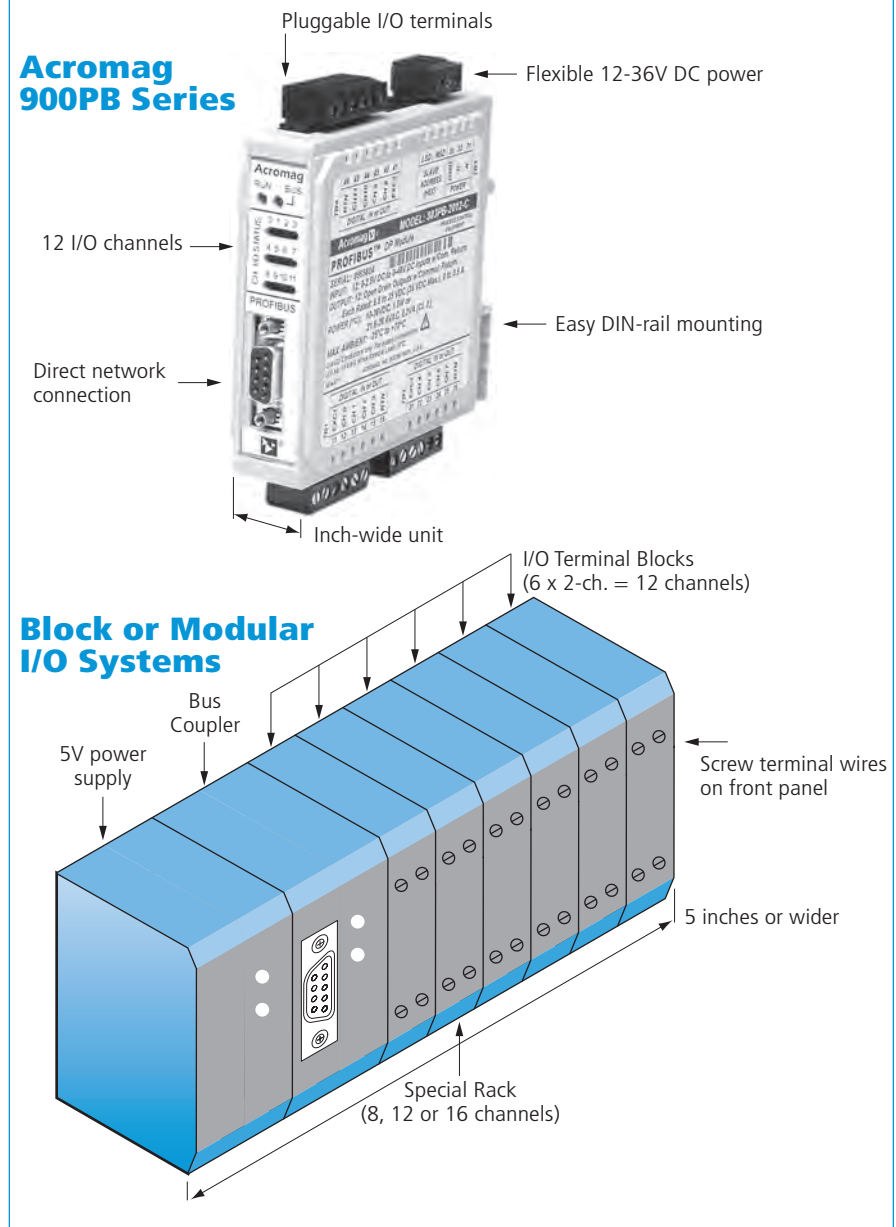
### Outputs

- DC voltage
- DC current

### Functions

- Write data to local displays or recorders
- Control drives, valves, and positioners

## Save 50% compared to "Block I/O"



BusWorks® Profibus I/O

Acromag 900PB Series I/O	Block and Modular I/O Systems
<i>Stand-alone I/O modules are very economical.</i>	<i>Block I/O systems have high start-up costs.</i>
<ul style="list-style-type: none"> <li>Direct connection to network</li> <li>Up to 12 channels on one module</li> <li>One inch wide for twelve channels</li> <li>Flexible 12-36V DC power requirement</li> <li>Pluggable terminal blocks on top and bottom</li> </ul>	<ul style="list-style-type: none"> <li>Expensive bus coupler required</li> <li>Plug-in I/O modules or terminal blocks required</li> <li>Five inches wide or more for twelve channels</li> <li>May require special 5V power supply</li> <li>Fixed wiring terminals on front of unit</li> </ul>



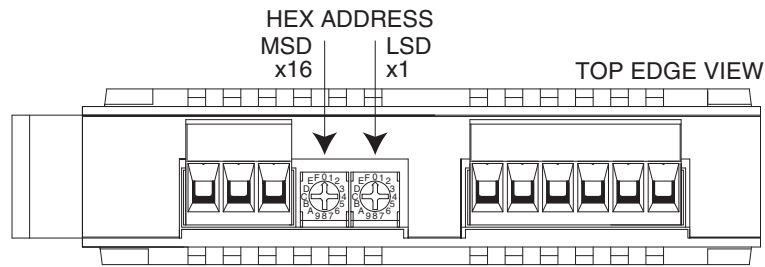
## Easy to Use

Profibus-DP networks offer several advantages. They are proven, fast (up to 12Mbps without fiber optic cable), deterministic, and ideal for transmitting analog or discrete data. I/O devices are also easy to install and maintain. More than 1000 organizations worldwide, plus the Profibus Trade Organization (PTO), help nurture a growing user base, introduce new products, and provide technical support for this network technology.

Network devices, including Acromag's 900PB I/O modules, are easily installed and configured using network management software typically provided by the supplier of the host or master controller. The startup process is shown below.

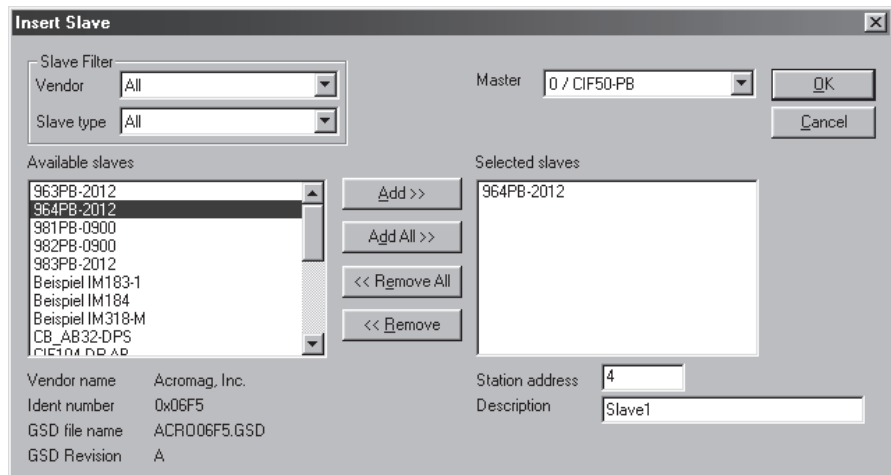
### Step 1: Set the slave address

Using two rotary switches, as shown, set the slave address between 0 and 125 (00 to 7D Hex). The factory default setting is 126 (7EH) which allows programming via the network. Once the address is set, the module may be physically connected to the network or master.



Set switches to a valid slave address from 0 to 125 (00H to 7DH)

Step 1: Rotate the switches on top of each 900PB module to set the desired network address.



Step 2: The network management software (SyCon from Lantronix shown above) lists Profibus devices available for configuration after their GSD files are copied to the software's directory using Windows Explorer.

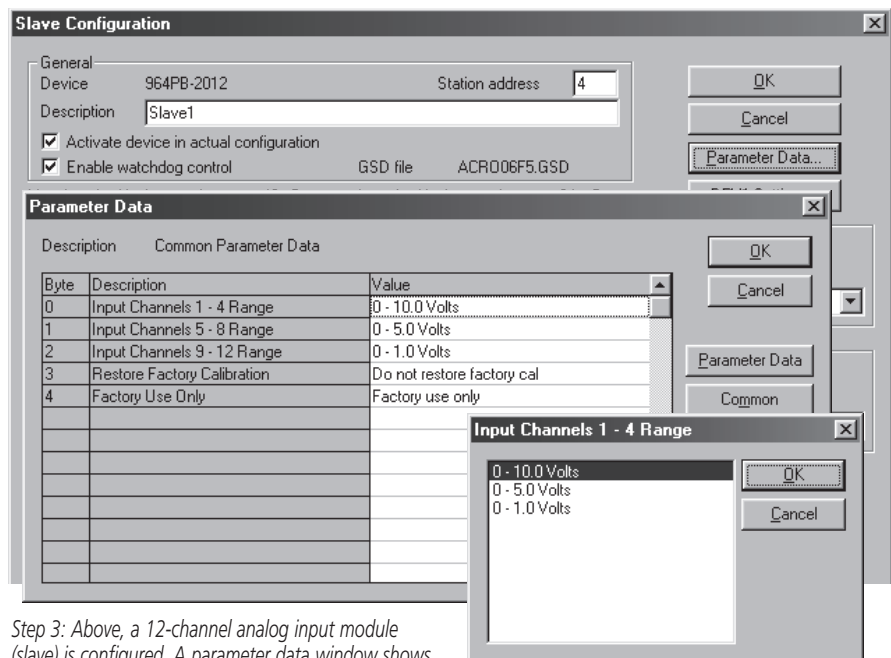
### Step 2: Add the I/O module to the network database

Each I/O module, like all slave devices, is defined by a unique software file (\*.gsd file). The GSD file for each module is installed (or imported) into a network database for identification by the network management software.

Acromag GSD files are supplied at no-charge with each module. They are also available for download on the Acromag website or from the PTO at [www.profibus.com](http://www.profibus.com).

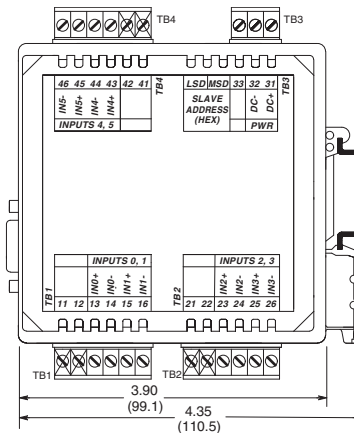
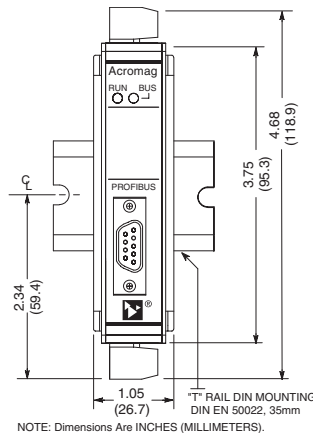
### Step 3: Configure the module

Using the network management software, you configure each device as desired (address, ranges, sensor break detection, failure modes, etc.). When finished, the software will download the configuration to the master controller for communication.



Step 3: Above, a 12-channel analog input module (slave) is configured. A parameter data window shows the user-selected voltage input ranges.

The menu above lists input range options individually selectable for each 4-channel group.



NOTE: Dimensions Are INCHES (MILLIMETERS).

## 961PB, 962PB Analog Input:

### 6-Channel Differential Input: DC Current or DC Voltage Signals

#### Models

961PB: 6 DC current input channels  
962PB: 6 DC voltage input channels

#### Description

These modules provide an isolated Profibus-DP network interface for six analog input channels. Differential inputs eliminate ground loops and thus the need for isolators in many applications. Multi-range inputs accept signals from a variety of sensor and devices. High-resolution, low noise, A/D converters deliver high accuracy and reliability.

#### Input Ranges

DC Current (user-selectable ranges)

0 to 1mA, 0 to 11mA, 0 to 20mA, 4 to 20mA  
0 to 20 amps AC (with optional AC sensor)

DC Voltage (user-selectable ranges)

±78mV to ±10V DC (eight range options)

#### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

#### Power Requirement

12 to 36V DC supply required

#### Approvals

Profibus PNO certified.  
CE marked. UL, cUL listed.  
Class I; Division 2; Groups A, B, C, D.

#### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 6-input stand-alone module is very economical
- Differential inputs eliminate ground loops
- Universal inputs support a variety of sensors
- High-resolution 16-bit  $\Sigma$ - $\Delta$  A/D converters ensure precise, high accuracy measurements
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

#### Performance

##### General Specifications

See Page 47 for communication and other specs.

##### Input Configuration

Input ranges are selectable for a 3-channel group.

##### Accuracy

Better than  $\pm 0.05\%$  of span for nominal input ranges.

##### Analog to Digital Converter (A/D)

16-bit  $\Sigma$ - $\Delta$  converter.

##### Resolution

0.005% or 1 part in 20000.

##### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.  
Common Mode: Better than 140dB @ 60Hz.

##### Input Filter Bandwidth

-3dB at 3Hz, typical.

##### DC Current Input impedance

24.9 ohms.

DC Voltage Input impedance  
Greater than 110.5K ohms.

#### Environmental

##### Ambient Temperature

Operating: -25 to 70°C (-13 to 158°F).  
Storage: -40 to 85°C (-40 to 185°F).

##### Relative Humidity

5 to 95%, non-condensing.

##### Isolation

1500V AC for 60 seconds or 250V AC continuous.  
3-way isolation between I/O, network, and power.

#### Ordering Info

##### Models

961PB-2006

DC current input module, 6 differential channels

962PB-2006

DC voltage input module, 6 differential channels

NOTE: Modules include GSD files on CD-ROM.

#### Accessories (see Page 48)

5020-350

AC current sensor. Used with 961PB DC current input models. One sensor per channel is required.

See page 205.

P55R-D24

Power supply (24V DC, 2.1A).

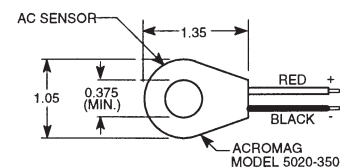
See Power Supplies on Page 199.

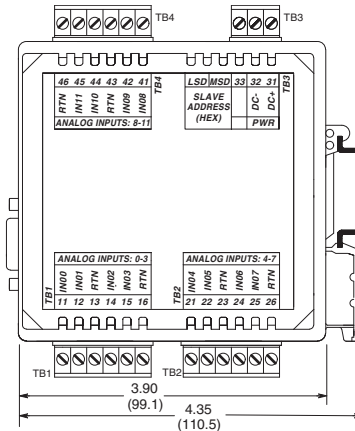
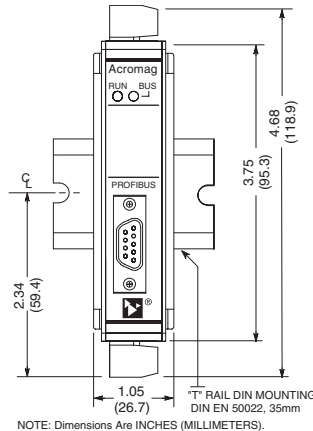
TBK-B03

Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S03

Optional terminal block kit, spring clamp style, 4 pcs.





NOTE: Dimensions Are INCHES (MILLIMETERS).

## 963/964PB Analog Input:

### 12-Channel Single-Ended Input: DC Current or DC Voltage Signals

#### Models

963PB: 12 DC current input channels  
964PB: 12 DC voltage input channels

#### Description

These modules provide an isolated Profibus-DP network interface for twelve analog input channels. Compact design saves space and lowers system costs. Multi-range inputs accept signals from a variety of sensors and devices. High-resolution, low noise, A/D converters deliver high accuracy and reliability.

#### Input Ranges

DC Current (user-selectable ranges)  
0 to 1mA, 0 to 11mA, 0 to 20mA, 4 to 20mA  
0 to 20 amps AC (with optional AC sensor)

DC Voltage (user-selectable ranges)  
±1V, ±5V, or ±10V DC

#### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

#### Power Requirement

12 to 36V DC supply required

#### Approvals

Profibus PNO certified.  
CE marked. UL, cUL listed.  
Class I; Division 2; Groups A, B, C, D.

#### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 12-input module has very low cost per channel
- Universal DC inputs support a wide variety of industrial sensors and signals
- High-resolution 16-bit  $\Sigma$ - $\Delta$  A/D converters ensure precise, high accuracy measurements
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

#### Performance

##### General Specifications

See Page 47 for communication and other specs.

##### Input

###### Configuration

Input ranges are selectable on each terminal block for a group of four input channels (4-channel basis).

###### Accuracy

Better than ±0.05% of span for nominal input ranges.

###### Analog to Digital Converter (A/D)

16-bit  $\Sigma$ - $\Delta$  converter.

###### Resolution

0.005% or 1 part in 20000, typical.

###### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.  
Common Mode: Better than 140dB @ 60Hz.

###### Input Filter Bandwidth

-3dB at 3Hz, typical.

###### DC Current Input impedance

49.9 ohms.

DC Voltage Input impedance  
Greater than 110.5K ohms.

#### Environmental

##### Ambient Temperature

Operating: -25 to 70°C (-13 to 158°F).  
Storage: -40 to 85°C (-40 to 185°F).

##### Relative Humidity

5 to 95%, non-condensing.

##### Isolation

1500V AC for 60 seconds or 250V AC continuous.  
3-way isolation between I/O, network, and power.  
Inputs share a common.

#### Ordering Info

##### Models

963PB-2012  
DC current input module, 12 single-ended channels

964PB-2012  
DC voltage input module, 12 single-ended channels

NOTE: Modules include GSD files on CD-ROM.

#### Accessories (see Page 48)

##### 5020-350

AC current sensor. Used with 963PB DC current input models. One sensor per channel is required. See page 205.

##### PS5R-D24

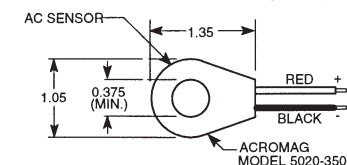
Power supply (24V DC, 2.1A).  
See Power Supplies on Page 199.

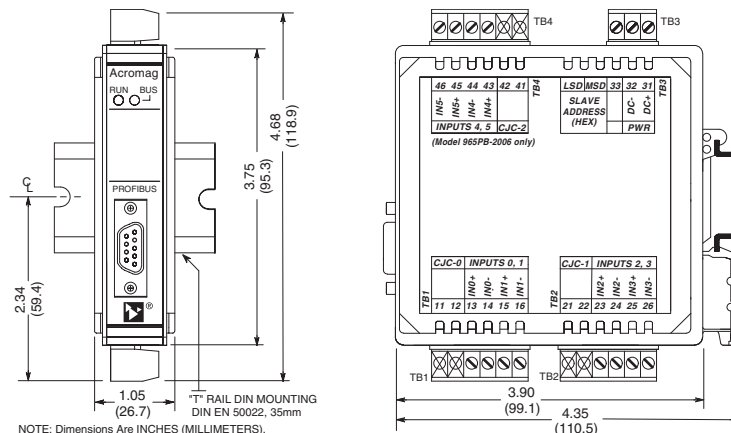
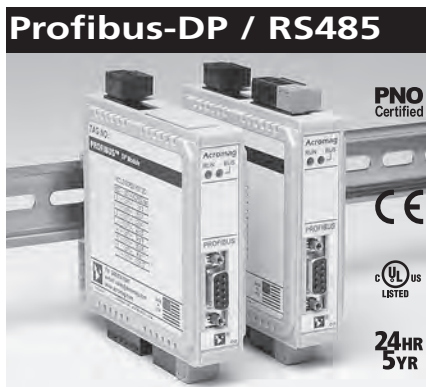
##### TBK-B03

Optional terminal block kit, barrier strip style, 4 pcs.

##### TBK-S03

Optional terminal block kit, spring clamp style, 4 pcs.





## 965PB Analog Input:

### 4 or 6-Channel Input: Thermocouple or Millivolt Signals

#### Description

These modules provide an isolated Profibus-DP network interface for up to six input channels. Differential inputs eliminate ground noise and each terminal block includes a cold junction compensation (CJC) sensor for more precise temperature measurements. Multi-range inputs accept signals from a variety of sensors and devices. High-resolution, low noise, A/D converters deliver high accuracy and reliability.

#### Input Ranges

Thermocouple (user-selectable type)

Type J, K, T, R, S, E, B, or N

DC Millivolts (user-selectable range)

±100mV or ±1V DC

#### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

#### Power Requirement

12 to 36V DC supply required

#### Approvals

Profibus PNO certified.

CE marked. UL, cUL listed.

Class I; Division 2; Groups A, B, C, D.

#### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 6-input stand-alone module is very economical
- Universal inputs support a variety of sensors
- Built-in CJC sensor on each terminal block produces more precise temperature measurements
- Thermocouple break detection (upscale or downscale) identifies sensor wiring failures
- High-resolution 16-bit  $\Sigma$ - $\Delta$  A/D converters ensure precise, high accuracy measurements
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

#### Performance

##### General Specifications

See Page 47 for communication and other specs.

##### Input

##### Configuration

Input ranges are selectable for a 3-channel group.

##### Accuracy

Input	Input Range	Accuracy (typical)
Type J	-210 to 760°C	±0.5°C
Type K	-200 to 1372°C	±0.5°C
Type T	-260 to 400°C	±0.5°C
Type R	-50 to 1768°C	±1.0°C
Type S	-50 to 1768°C	±1.0°C
Type E	-200 to 1000°C	±0.5°C
Type B	260 to 1820°C	±1.0°C
Type N	-230 to -170°C	±1.0°C
Type N	-170 to 1300°C	±0.5°C
Voltage	±100mV or ±1V DC	±0.1% of span

Cold Junction Compensation (CJC) Accuracy ±0.5°C.

##### Thermocouple Break Detection

Upscale or downscale selection applies to all channels.

##### Analog to Digital Converter (A/D)

16-bit  $\Sigma$ - $\Delta$  converter.

##### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.

Common Mode: Better than 140dB @ 60Hz.

##### Input Filter Bandwidth

-3dB at 3Hz, typical.

#### Environmental

##### Ambient Temperature

Operating: -25 to 70°C (-13 to 158°F).

Storage: -40 to 85°C (-40 to 185°F).

##### Relative Humidity

5 to 95%, non-condensing.

##### Isolation

1500V AC for 60 seconds or 250V AC continuous.

3-way isolation between I/O, network, and power.

#### Ordering Info

##### Models

965PB-2004

4-channel thermocouple/millivolt input module

965PB-2006

6-channel thermocouple/millivolt input module

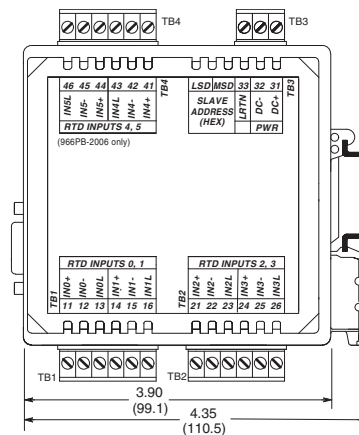
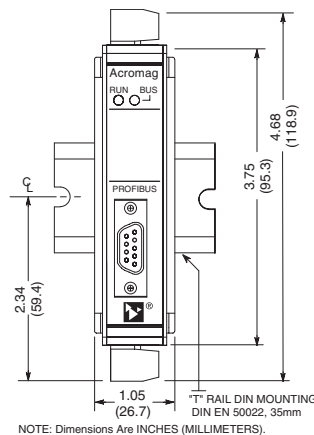
NOTE: Modules include GSD files on CD-ROM.

##### Accessories (see Page 48)

P55R-D24

Power supply (24V DC, 2.1A).

See Power Supplies on Page 199.



## 966PB Analog Input:

### 4 or 6-Channel Input: RTD or Resistance Signals

#### Description

These modules provide an isolated Profibus-DP network interface for up to six input channels. Multi-range inputs accept signals from a variety of sensors and devices. High-resolution, low noise, A/D converters deliver high accuracy and reliability. 3-way isolation further improves the system performance.

#### Input Ranges

RTD (user-selectable type)

2-wire and 3-wire RTDs are supported.

Platinum 100 ohm (alpha = 1.3850 or 1.3911)

Nickel 120 ohm

Copper 10 ohm

Resistance

0 to 500 ohms

#### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

#### Power Requirement

12 to 36V DC supply required

#### Approvals

Profibus PNO certified.

CE marked. UL, cUL listed.

Class I; Division 2; Groups A, B, C, D.

#### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 6-input stand-alone module has much lower start-up cost than multi-piece block I/O systems
- Versatile RTD or ohmic inputs support a wide variety of industrial sensors and devices
- RTD break detection (upscale or downscale) identifies sensor wiring failures
- High-resolution 16-bit  $\Sigma$ - $\Delta$  A/D converters ensure precise, high accuracy measurements
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

#### Performance

##### General Specifications

See Page 47 for communication and other specs.

##### Input

###### Configuration

Input ranges are selectable for a 3-channel group.

###### Accuracy

Input Type	Input Range	Accuracy (typical)
Pt 100 ohm	-200 to 850°C	±0.25°C
Ni 120 ohm	-80 to 320°C	±0.25°C
Cu 10 ohm	-200 to 260°C	±1.25°C
Resistance	0 to 500 ohms	±0.05 ohms

##### RTD Break Detection

Upscale or downscale selection applies to all channels.

##### Analog to Digital Converter (A/D)

16-bit  $\Sigma$ - $\Delta$  converter.

#### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.

Common Mode: Better than 130dB @ 60Hz.

#### Input Filter Bandwidth

-3dB at 3Hz, typical.

#### Excitation Current

1mA DC typical, all RTD types.

#### Environmental

##### Ambient Temperature

Operating: -25 to 70°C (-13 to 158°F).

Storage: -40 to 85°C (-40 to 185°F).

##### Relative Humidity

5 to 95%, non-condensing.

##### Isolation

1500V AC for 60 seconds or 250V AC continuous.

3-way isolation between I/O, network, and power.

Inputs share a common.

#### Ordering Info

##### Models

966PB-2004

4-channel RTD/resistance input module

966PB-2006

6-channel RTD/resistance input module

NOTE: Modules include GSD files on CD-ROM.

#### Accessories (see Page 48)

P55R-D24

Power supply (24V DC, 2.1A).

See Power Supplies on Page 199.

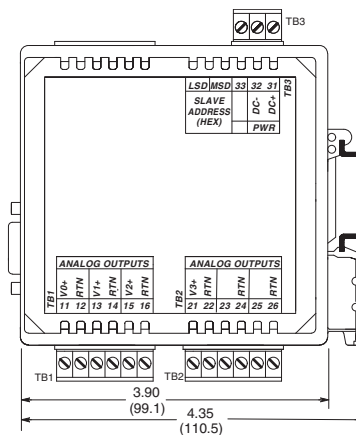
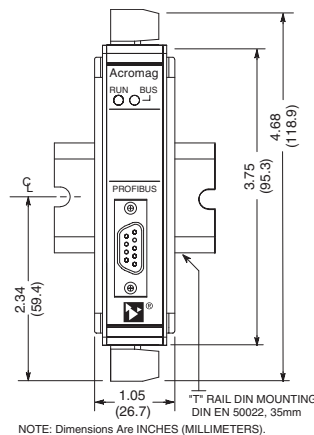
TBK-B03

Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S03

Optional terminal block kit, spring clamp style, 4 pcs.





NOTE: Dimensions Are INCHES (MILLIMETERS).

## 972/973PB Analog Output:

**4 or 6-Channel Output:  
DC Current or  
DC Voltage Signals**

### Models

972PB: DC current output channels  
973PB: DC voltage output channels

### Description

These modules provide up to six channels of analog output. Multi-range outputs support a wide variety of industrial devices. They can drive displays and recorders, control drives, or send analog signals to other systems. High-resolution, low noise, D/A converters deliver high accuracy and reliability. 3-way isolation further improves system performance.

### Output Ranges

DC Current (user-selectable ranges)  
0 to 1mA, 0 to 20mA, or 4 to 20mA

DC Voltage (user-selectable ranges)  
0 to 1V, 0 to 5V, or 0 to 10V DC

### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

### Power Requirement

16 to 36V DC supply required

### Approvals

Profibus PNO certified.  
CE marked. UL, cUL listed.  
Class I; Division 2; Groups A, B, C, D.

### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 6-input stand-alone module has much lower start-up cost than multi-piece block I/O systems
- Universal DC outputs support a wide variety of signals and industrial devices
- Three selectable failsafe modes (0%, last-state, or pre-defined) help prevent unsafe conditions
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

### Performance

#### General Specifications

See Page 47 for communication and other specs.

#### Configuration

Output ranges are selectable on a channel to channel basis.

#### Output

**Accuracy**  
Better than  $\pm 0.1\%$  of span, typical.  
1.6% for 0 to 1mA range. 0.8% for 0 to 1V range.

**Digital to Analog Converter (D/A)**  
12-bit converter.

**Current Output Compliance**  
12V minimum, 13V typical.

**Current Output Load Resistance Range**  
0 to 625 ohms, typical.

**Voltage Output Source Current**  
0 to 10mA DC, maximum.

### Environmental

#### Ambient Temperature

Operating:  
972PB-200x models: -25 to 60°C (-13 to 158°F).  
973PB-200x models: -25 to 70°C (-13 to 140°F).  
Storage: -40 to 85°C (-40 to 185°F).

#### Relative Humidity

5 to 95%, non-condensing.

#### Isolation

1500V AC for 60 seconds or 250V AC continuous.  
3-way isolation between I/O, network, and power.  
Outputs share a common.

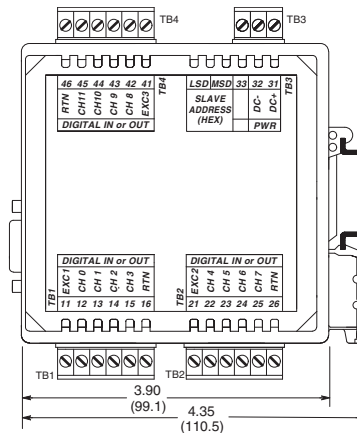
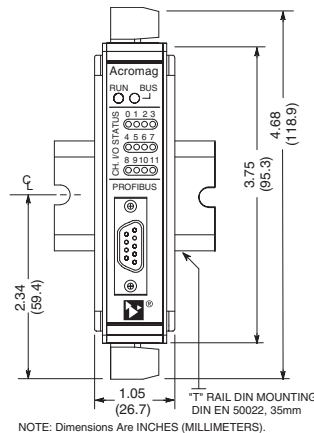
### Ordering Info

#### Models

972PB-2004  
DC current output module, 4 channels  
972PB-2006  
DC current output module, 6 channels  
973PB-2004  
DC voltage output module, 4 channels  
973PB-2006  
DC voltage output module, 6 channels  
NOTE: Modules include GSD files on CD-ROM.

#### Accessories (see Page 48)

PS5R-D24  
Power supply (24V DC, 2.1A).  
See Power Supplies on Page 199.  
TBK-B03  
Optional terminal block kit, barrier strip style, 4 pcs.  
TBK-S03  
Optional terminal block kit, spring clamp style, 4 pcs.



## 981/982/983PB Discrete I/O:

### 12-Channel I/O: Active-Low Inputs, Sinking Outputs (Low-Side Switching)

#### Models

- 981PB: 12 input channels
- 982PB: 12 output channels
- 983PB: 12 input/output channels

#### Description

These modules provide an isolated Profibus-DP network interface for twelve discrete input and/or output channels. The outputs provide direct on/off, high/low, or open/close control of industrial devices. The inputs sense the status of motors, pumps, valves and other equipment. The 983PB model with tandem I/O provides output level control and status verification in one unit.

#### Input Range

0 to 35V DC

#### Output Range

0 to 35V DC

#### Network Communication

Profibus-DP, RS-485 network up to 12Mbaud

#### Power Requirement

12 to 36V DC supply required

#### Approvals

Profibus PNO certified.  
CE marked. UL, cUL listed.  
Class I; Division 2; Groups A, B, C, D.

#### Special Features

- Standard Profibus-DP network communication with industry-standard ASIC (Siemens SPC3)
- 12-channel stand-alone module has far lower start-up cost than multi-piece block I/O systems
- 0-35V DC solid-state logic interface can monitor or control a wide variety of devices
- Bidirectional I/O models facilitate loopback monitoring of the output state
- Socketed SIP resistors provide input and output 5.6K ohm pull-ups to the excitation supply
- Three selectable failsafe modes (off, last-state, or pre-defined) help prevent unsafe conditions
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

#### Performance

##### General Specifications

See Page 47 for communication and other specs.

##### Input (981 & 983 models)

###### Input Type

Twelve active-low, buffered inputs, with a common connection. Built-in 5.6K ohm pullups to excitation terminal socketed for 4-channel groups.

###### Input Signal Voltage Range

0 to 35V DC, maximum.

###### Input Impedance

100K ohms, typical.

###### Input Signal Threshold

TTL compatible with 100mV of hysteresis, typical.

##### Output (982 & 983 models)

###### Output Type

12 independent, open-drain, DMOS MOSFET switches.

###### Output Voltage Range

0 to 35V DC max. (0 to 500mA/channel continuous).

###### Output ON Resistance

0.28 ohms maximum.

##### Environmental

###### Ambient Temperature

Operating: -25 to 70°C (-13 to 158F).  
Storage: -40 to 85°C (-40 to 185°F).

###### Relative Humidity

5 to 95%, non-condensing.

###### Isolation

1500V AC for 60 seconds or 250V AC continuous.  
3-way isolation between I/O, network, and power.

#### Ordering Information

##### Models

- 981PB-2012  
Discrete input module, 12 channels
  - 982PB-2012  
Discrete output module, 12 channels
  - 983PB-2012  
Discrete input/output module, 12 channels
- NOTE: Modules include GSD files on CD-ROM.

##### Accessories (see Page 48)

- P55R-D24  
Power supply (24V DC, 2.1A).  
See Power Supplies on Page 199.
- TBK-B03  
Optional terminal block kit, barrier strip style, 4 pcs.
- TBK-S03  
Optional terminal block kit, spring clamp style, 4 pcs.



## General Operation and Performance Specifications

The following specifications are common to all 900PB Series I/O modules.

### ■ Communication

#### Interface Standard

Isolated, 3-wire RS-485 multi-drop, half-duplex, asynchronous.

#### Command/Response Protocol

Standard ProfiBus DP (Master/Slave) protocol per European Norm EN50170.

#### Baud Rate

Supports rates of 9600, 19.2K, 44.45K, 93.75K, 187.5K, 500K, 1.5M, and 12M bits per second, auto-detected.

#### Communication Distance

Up to 1200 meters without a repeater using Type A wire (<math>\leq 30\text{pF/m}</math>).

1200m @ 115Kbps or less

1000m @ 187.5Kbps

400m @ 500Kbps

200m @ 1.5Mbps

100m @ 12Mbps

#### Address

Set via two rotary hexadecimal switches or via the Set Slave Address command. Valid setting is 0-125.

Address 126 (7EH) is factory default address.

#### Maximum Message Size

Up to 32 bytes recommended, extendable up to 244 bytes of data/node/message, plus 11 bytes of overhead (data frame).

#### Network Capacity

Multi-drop up to 31 modules, plus a host, without a repeater. Up to 125 modules plus a host if four repeaters are used (one for every 31 nodes).

### ■ Environmental

#### Isolation

I/O channel, power, and network circuits are isolated from each other for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC dielectric strength test for one minute without breakdown). Complies with test requirements of ANSI/ISA-82.01-1988 for voltage rating specified.

### ■ Electromagnetic Compatibility (EMC)

Immunity per European Norm EN50082-1.

Emissions per European Norm EN50081-1.

#### Electrostatic Discharge (ESD) Immunity

Per EN61000-4-2.

#### Radiated Field Immunity (RFI)

Per EN61000-4-3 and EN550204.

#### Electrical Fast Transient Immunity (EFT)

Per EN61000-4-4.

#### Conducted RF Immunity (CRFI)

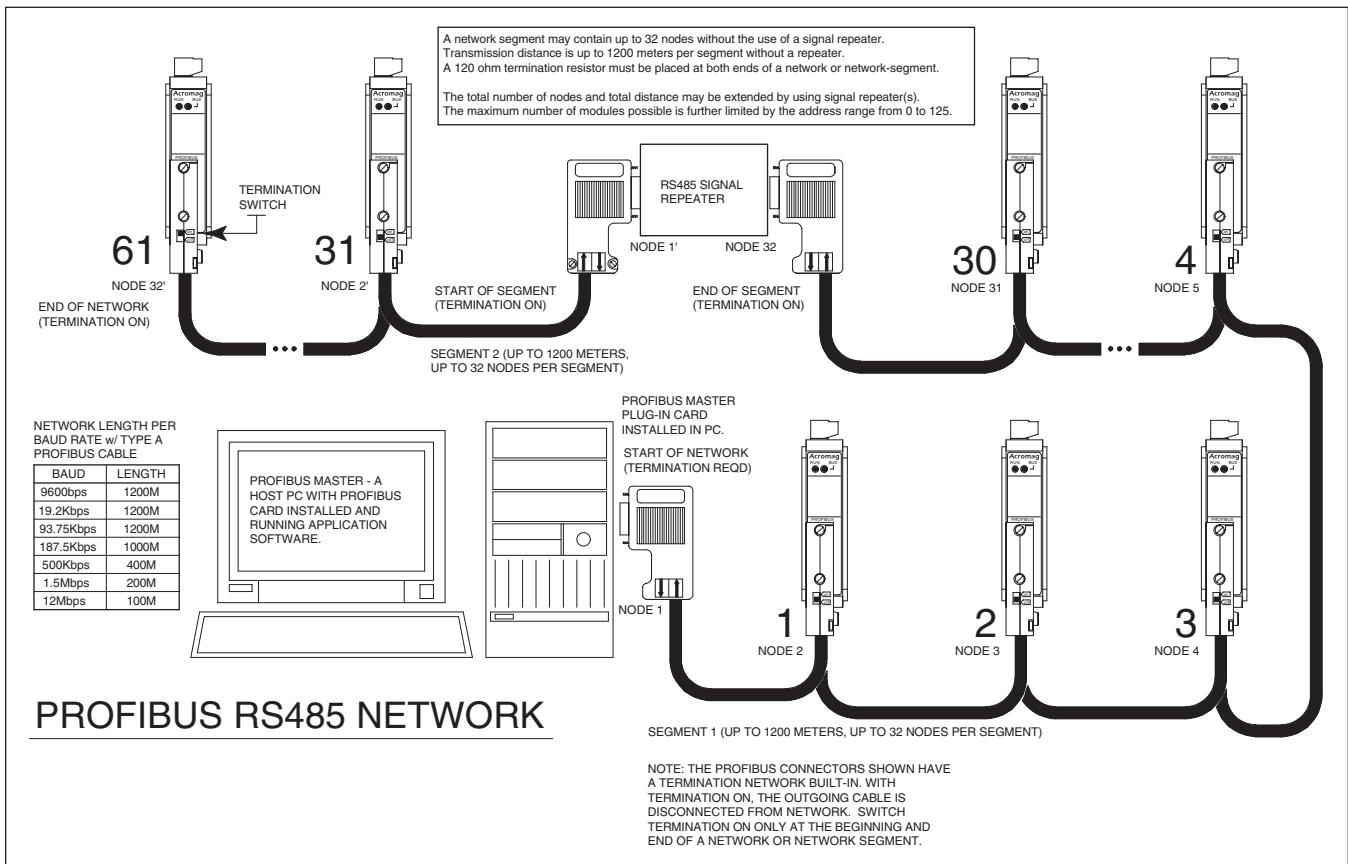
Per EN61000-4-6.

#### Surge Immunity

Per EN61000-4-5.

#### Radiated Frequency Emissions

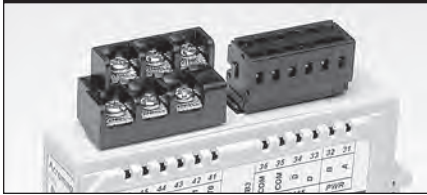
Per EN55022 Class B.





## Accessories

### Terminal Blocks

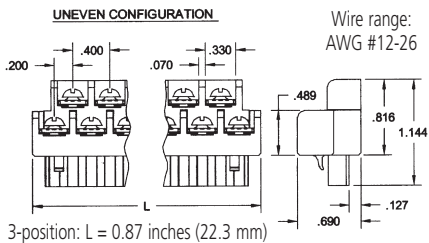
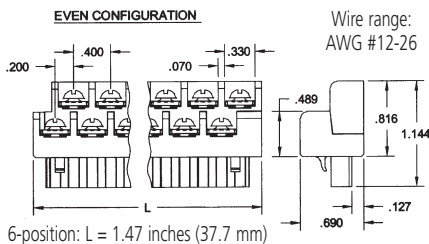


Barrier strip (left) and spring clamp (right).

#### Ordering Information

See individual I/O modules for compatibility.

#### Barrier Strip Terminal Blocks

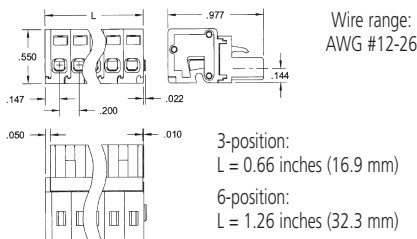


**TBK-B01**  
Terminal block kit,  
two 6-position pieces

**TBK-B03**  
Terminal block kit,  
one 3-position and  
three 6-position pieces

**TBK-B02**  
Terminal block kit,  
four 6-position pieces

#### Spring Clamp Terminal Blocks



**TBK-S01**  
Terminal block kit,  
two 6-position pieces

**TBK-S03**  
Terminal block kit,  
one 3-position and  
three 6-position pieces

**TBK-S02**  
Terminal block kit,  
four 6-position pieces

### Mounting Hardware



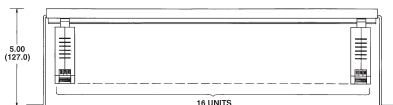
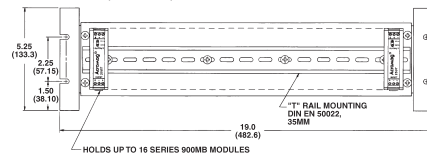
#### DIN-Rail Mounting

For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.

#### Ordering Information

**20RM-16-DIN**  
19" rack-mount kit with DIN rail.

**DIN RAIL 3.0**  
**DIN RAIL 16.7**  
DIN rail strip, Type T, 3 inches (75mm) or  
16.7 inches (425mm)



### Power Supplies



#### 50W Supply

**Input Power Requirement**  
85 to 264V AC or 105 to 370V DC

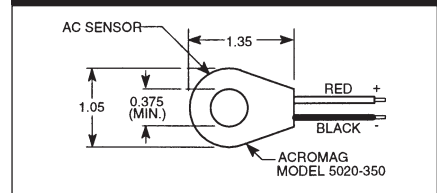
**Output**  
24V DC, 2.1A (50W)

#### Ordering Information

**P55R-D24**  
Universal 50W power supply

See Power Supplies on Page 199 for other models and more information.

### AC Current Sensor



#### Ordering Information

**5020-350**  
AC current sensor (See page 205)