ControlWave® PAC
Analog Input / Output Modules

The Analog Input (AI), Analog Output (AO), and Analog Output (AO) with Read-Back modules provide the ControlWave® PAC with the ability to monitor and control various analog field signals. The following AI and AO modules are available.

- 8 or 16 Analog Inputs module
- 8 Analog Outputs module
- 8 Analog Outputs module with Read Back

All I/O modules have surge protection that meets IEEE C37.90-1978 and IEC 801-5 specifications.

8 or 16 Analog Inputs Module

The 8 or 16 Isolated Analog Inputs module provides eight or sixteen analog inputs either 4 to 20 mA internally sourced input or 1 to 5 Vdc isolated input operation. Surge suppression MOV isolated common to chassis is 500 Vdc and across input signals and negative input to chassis is 31 Vdc transorb.

8 Analog Outputs Module

The 8 Analog Outputs module provides four or eight analog output channels. Analog output supports 4 to 20 mA output with a maximum external load of 650 ohms. Surge suppression MOV isolated common to chassis is 500 Vdc and across input signals and negative input to chassis is 31 Vdc transorb. The 8 Analog Outputs module is available with local or remote terminations.

8 Analog Outputs Module with Read Back

The 8 Analog Outputs module with Read-Back provides eight analog outputs. Analog outputs are used for redundant I/O systems only with output configurations of 4 to 20 mA (650 max. drive). Surge suppression MOV isolated common to chassis is 500 Vdc and across input signals and negative input to chassis is 31Vdc transorb. The 8 Analog Outputs with Read-Back module is available with local or remote terminations.

Local or Remote Terminations

I/O modules available are factory configured for either local terminations that consist of one 40-point terminal block assemblies or remote terminations that consist of 4 DIN-rail mountable terminal block mass termination headers. Terminations are pluggable and accept a maximum wire size of 14 AWG (American Wire Gauge).

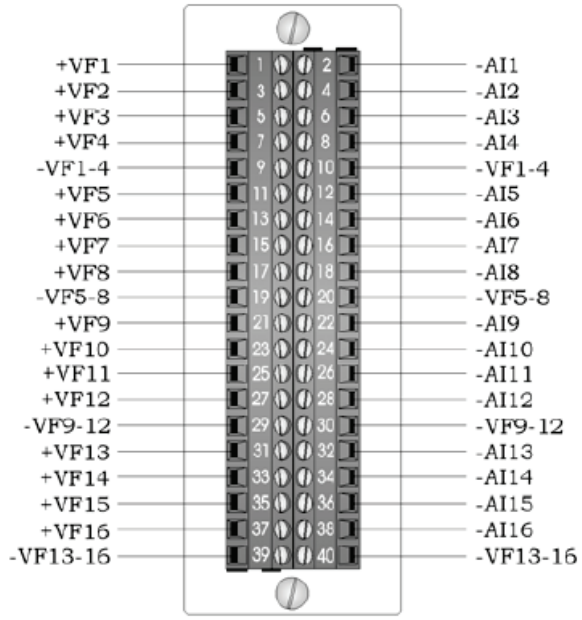
I/O modules are designed to maximize usability while minimizing installation, maintenance, and system downtime costs. A pull down door provides front panel wiring terminal access for technicians. The bezel and the terminations can be easily removed from the I/O module to make wiring even easier.

Remote terminations provide a convenient alternative to the standard direct connect termination. Remote terminations allow a concentration of electrical connections from one or more controllers to be located in a single area. For more information on remote terminations or terminal blocks, refer to *Product Data Sheet CWPAC*.

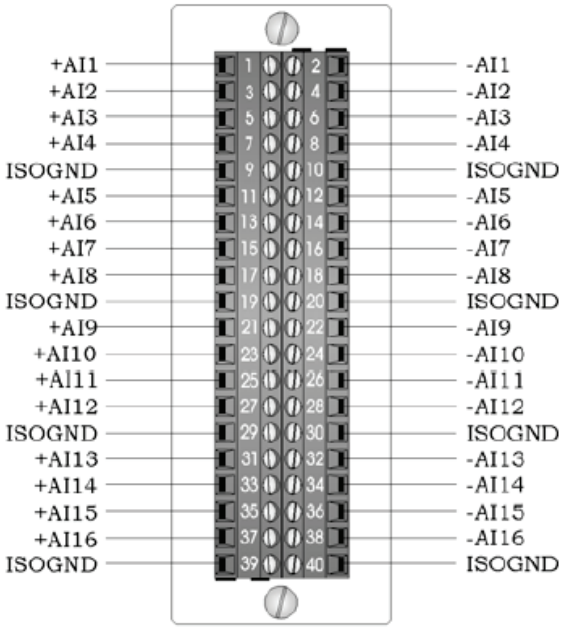
Analog Input Module

ControlWave PAC 8 or 16 Analog Inputs Module

Field Wiring Terminals



Terminal Block Assembly Assignments for 4-20 mA Internally Sources AI Operation



Terminal Block Assembly Assignments for 1 – 5 V Isolated Voltage Source AI Operation

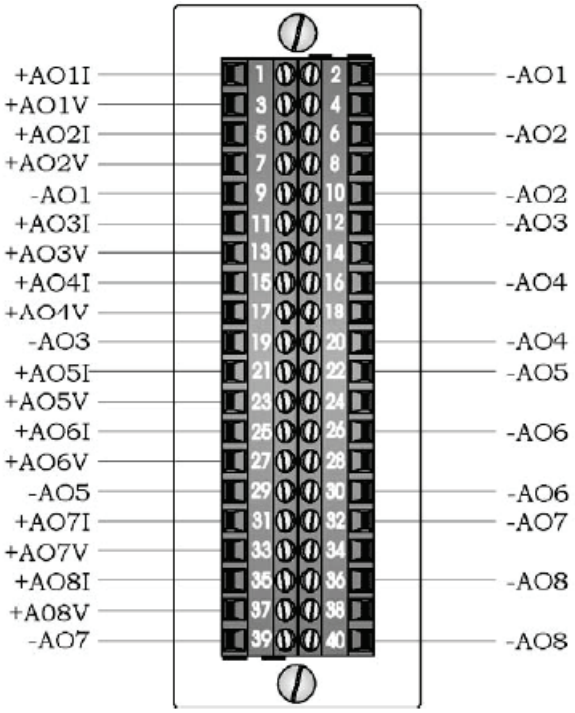
Inputs

Quantity	8 or 16 channels	
Type	Internally or externally sourced, single-ended, 4–20 mA inputs	
Connector	Terminal block or remote termination	
Resolution	14-bit	
Isolated Voltage Input	Internally Sourced	500 Vdc per module to chassis
	Externally Sourced	31 Vdc per channel
Voltage Input	Isolated differential inputs 1–5 Vdc	
Current Input	Externally sourced current loop with 1–5 V input module and 250 ohm resistor across the input terminals or 4–20 mA input module. On-board isolated loop power supply for internally powered AI.	
Input Impedance	> 1 MΩ for 1–5 Vdc, 250 Ω for 4 to 20 mA	
Common Mode Rejection	70 dB	
Normal Mode Rejection	26 dB	
Input Filtering	300 ms to 99.9% of input signal	
Channel Settling Time	680 µs	
Conversion Time	25 µs	

Accuracy	0.1% of span @ 25˚C 0.2% of span @ –20˚C to 70˚C 0.3% of span @ –40˚C to 70˚C
Isolated Voltage Common Mode Range	31 Vdc to isolated common
Status Indicator	Normal, Over-range/Under-range, FAIL and OK module status LEDs
Surge Supression	500 Vdc MOV isolated common to chassis. 31 Vdc transorb across input signals and negative input to chassis Meets IEEE C37.90-1978 and IEC 801-5.
Power	
Input Voltage Range	Powered from backplane
Physical	
Dimensions	177.8 mm H x 46.2 mm W x 165.1 mm D (7 in. H x 1.82 in. W x 6.5 in. D)
Weight	0.54 kg (1.2 lbs.)
Wiring	14 AWG for Local termination and remote termination
Environmental	
Same as the ControlWave PAC in which it is installed	
Approvals	
Same as the ControlWave PAC in which it is installed	

ControlWave PAC 8 Analog Outputs Module

Field Wiring Terminals



Outputs	
Quantity	8
Output Configurations	4–20 mA (650 max. drive)
Connector	Terminal block or remote termination
Resolution	12-bit
Accuracy	0.1% of span @ 25˚C for current output 0.2% of span @ –20 to 70˚C for current output 0.3% of span @ –40 to 70˚C for current output
Settling Time	1 ms
Status Indicator	FAIL and OK module status LED
Surge Suppression	500 Vdc MOV isolated common to chassis 31 Vdc transorb across output signals and negative output to common
Fail Safe	Configurable Output Fail State (hold last value, zero (–5%), to specified value)

Power	
Input Voltage Range	Powered from backplane

Physical	
Dimensions	177.8 mm H x 46.2 mm W x 165.1 mm D (7 in. H x 1.82 in. W x 6.5 in. D)
Weight	0.54 kg (1.2 lbs.)
Wiring	14 AWG for Local termination and remote termination
Environmental	
Same as the ControlWave PAC in which it is installed	
Approvals	
Same as the ControlWave PAC in which it is installed	

ControlWave PAC 8 Analog Outputs Module with Read Back (for redundant I/O systems only)

Outputs	
Quantity	8
Output Configurations	4–20 mA (650 max. drive)
Connector	Remote termination
Resolution	12-bit
Output Accuracy	0.2% of span at 25˚C for current output 0.35% of span at –20 to 70˚C for current output 0.5% of span at –40 to 70˚C for current output
Settling Time	1 ms
Status Indicator	FAIL and OK module status LEDs
Surge Suppression	500 Vdc MOV isolated common to chassis 31 Vdc transorb across output signals and negative output to common
Power	
Input Voltage Range	Powered from backplane
Physical	
Dimensions	177.8 mm H x 46.2 mm W x 165.1 mm D (7 in. H x 1.82 in. W x 6.5 in. D)
Weight	0.54 kg (1.2 lbs.)
Wiring	Remote termination
Environmental	
Same as the ControlWave PAC in which it is installed	
Approvals	
Same as the ControlWave PAC in which it is installed	

Headquarters:
Emerson Process Management
Remote Automation Solutions
6005 Rogerdale Road
Houston, TX 77072 U.S.A.
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Europe:
Emerson Process Management
Remote Automation Solutions
Emerson House
Kirkhill Drive Kirkhill Industrial Estate
Aberdeen UK AB21 OEU
T +44 1224 215700 | F +44 1224 215799
www.EmersonProcess.com/Remote

North American/Latin America:
Emerson Process Management
Remote Automation Solutions
6005 Rogerdale Road
Houston TX USA 77072
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Middle East/Africa:
Emerson Process Management
Remote Automation Solutions
Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone – South 2
Dubai U.A.E.
T +971 4 8118100 | F +971 4 8865465
www.EmersonProcess.com/Remote

Asia-Pacific:
Emerson Process Management
Remote Automation Solutions
1 Pandan Crescent
Singapore 128461
T +65 6777 8211 | F +65 6777 0947
www.EmersonProcess.com/Remote

© 2007-2012 Remote Automation Solutions, a business unit of Emerson Process Management. All rights reserved.

Bristol, Inc., Bristol Canada, BBI SA de CV and Emerson Process Management Ltd, Remote Automation Solutions division (UK), are wholly owned subsidiaries of Emerson Electric Co. doing business as Remote Automation Solutions, a business unit of Emerson Process Management. FloBoss, ROCLINK, Bristol, Bristol Babcock, ControlWave, TeleFlow, Helicoid, OpenEnterprise, and METCO are trademarks of Remote Automation Solutions. AMS, PlantWeb and the PlantWeb logo are marks of Emerson Electric Co. The Emerson logo is a trademark and service mark of the Emerson Electric Co. All other marks are property of their respective owners.

The contents of this publication are presented for informational purposes only. While every effort has been made to ensure informational accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. Remote Automation Solutions reserves the right to modify or improve the designs or specifications of such products at any time without notice. All sales are governed by Remote Automation Solutions' terms and conditions which are available upon request. Remote Automation Solutions does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Remote Automation Solutions product remains solely with the purchaser and end-user.

EMERSON™
Process Management