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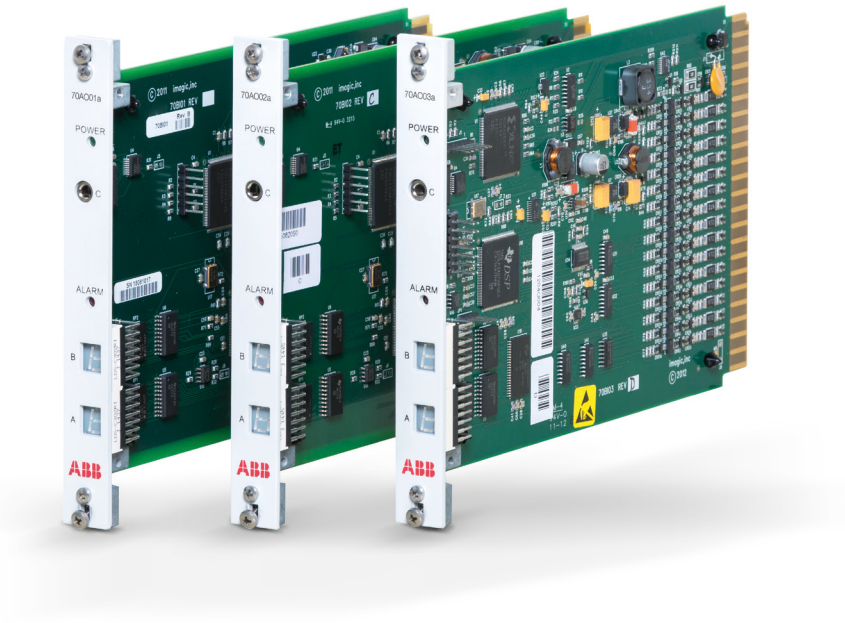
TECHNICAL DATA SHEET

Procontrol P13 I/O Modules

Input Modules for Analog Values
70AI01a, 70AI02a, 70AI03a, 70AI04a and 70AI05a



The Procontrol P13 system features a comprehensive range of I/O modules for analog, digital and pulse based input and output signals. The new family of analog input modules comprises modules for acquisition of voltage or current input signals in the typical ranges for process control as well as resistance temperature detection (RTD) and thermocouple/millivolt acquisition. All existing analog input modules of the classic Procontrol P13 portfolio can be mostly seamlessly replaced by the new module family.

The core of the P13 analog output modules is the custom local bus UART and digital signal processing engine. The core interfaces the analog to digital front end circuits, which are implemented in two different variants:

- 70AI01a, 70AI02a: Single multiplexed 16 bit successive approximation converter and precision front end circuitry to gather the current or voltage signals. Utilizing this acquisition unit, signals are gathered by an advanced signal processing engine.
- 70AI03a, 70AI04a, 70AI05a: Individual 20bit Sigma delta converters and precision front end circuitry to gather the input signals. These individual acquisition units are galvanically linked to an advanced signal processing engine capable of performing the floating point mathematics required to perform the proper linearizations and compensations for each different sensor type and connection.

Using the front panel configuration port and the P13 Configurator software, the modules can be monitored and configured for different applications.

A major step forward compared to the classic P13 output modules is the possibility to use the full local bus address range with every module and to configure an individual, non-consecutive address for each channel separately (except 70AI01a). In addition, each channel can be simulated/forced directly from the P13 Configurator (except 70AI01a and 70AI05a) for easy application verification after modifications or upgrades.

Procontrol P13 I/O Modules

Feature Highlights

- Comprehensive family of analog input modules for all power generation applications
- Flexible configuration possibilities for one-to-one replacements, retrofits and extensions
- Complete parametrization and configuration in software with the P13 Configurator tool; no need to set code switches and jumpers manually
- Support of non-consecutive addressing of input channels (except 70AI01a)
- Support for forcing/simulating individual input channels (except 70AI01a and 70AI05a)
- Support for disabling of individual input channels and less waste of valuable local bus addresses
- All modules can use the complete local bus address (normal and special) in arbitrary combinations on a single module
- State-of-the-art technology (DSP/FPGA-based) for low maintenance and outmost durability
- New high-density 16 channel input module for challenging retrofits with tight rack space constraints
- Support for individual forcing of input values and/or channel disturbance on card level with the P13 Configurator tool (except 70AI01a)
- Configuration cables are available with serial (DB9) or USB plug

Technical Data

	70AI01a	70AI02a	70AI03a	70AI04a	70AI05a
Description	Analog input module, voltage/ current	Analog input module, voltage/ current	Analog input module, RTD	Analog input module, isolated thermocouple/ voltage	Analog input module, isolated voltage/current
Predecessor Module(s)	70EA01, 70EA02, 70EA06	(70EA01, 70EA02, 70EA06)	70EA03	70EA04, 70EA05	(70EA01, 70EA02, 70EA06)
I/O Interface					
No. of Channels	4 (four)	16 (sixteen)	4 (four)	8 (eight)	6 (six)
Input Types	+/-10VDC, +/-20mA, 4..20mA		RTD (Pt100)	Thermocouple (E, J, K, N, S and T), +/- 50mV, +/- 100mV	+/-10VDC, +/-20mA, 4..20mA
Input Characteristics			Platinum 100 385 (-200 to +650°C)	E (-270 to 1000°C) J (-210 to 760°C) K (-270 to 1372°C) N (-270 to 1300°C) S (-50 to 1768.1°C) T (-270 to 1000°C)	
Connection Types	Single Ended, Differential		2, 3, 4-wire		Single Ended, Differential
Resolution	16 bits internal, 15 bits local bus		20 bits internal, 15 bits local bus		
Conversion Type	Single multiplexed 16bit successive approximation		Individual 20bit sigma delta		
Conversion Time/ Acquisition Rate	2500Hz	2500Hz	35ms, 68ms, 135ms, 268ms, 534ms (configurable)	Fast: 60Hz Slow: 15Hz (configurable)	8ms, 17ms, 33ms, 67ms, 133ms (configurable)
Accuracy	0.1% typical		+/- 0.1°C typical	Converter voltage: 0.0015% typical Temperature: < 0.5°C typical	0.0015% typical at slowest conversion time
Common Mode Rejection	Typ. = 90db 1k source imbalance dc – 60Hz		120db @50/60Hz and @DC		

Technical Data

		70AI01a	70AI02a	70AI03a	70AI04a	70AI05a
Local Bus Interface						
Channel Addressing (on local bus)		4 addresses, normal/special range, consecutive	16 addresses, normal/ special range, non-consecutive	4 addresses, normal/ special range, non-consecutive	8 addresses, normal/ special range, non-consecutive	6 addresses, normal/ special range, non-consecutive
Channel Usage		Individual enabling/disabling per channel				
Output Format		+/- 200%		+/- 2000°C		+/- 200%
Update Rate for all Channels (on local bus)		5ms	5ms	40ms (depending on conversion time)	20ms	10ms (depending on conversion time)
Configuration and Maintenance						
Configuration Interface		Front panel RS232 (custom phone jack)				
Configuration Memory		EEPROM (onboard)				
Simulation Functions			Individual forcing of channels			
Fault Detection, Annunciation and Behavior						
Fault Inputs (Optional)		Four individual digital fault inputs (+24Vdc) (one per channel)				
Fault Conditions		A/D converter failure conditions, loop power supply errors and communications errors		A/D converter failure conditions, communications errors, temperature range errors, CJC range errors	Thermocouple break, A/D converter failure conditions, communications errors, temperature range errors, CJC range errors	A/D converter failure conditions, loop power supply errors and communications errors
Fault Annunciation						
	Visual	Master module ALARM LED, Individual channel ALARM LEDs				
	I/O	SME1 Digital alarm output (+24Vdc)				
	Local Bus	Disturbance bit on local bus address words				
Fault Behavior		Input set to “0”				Input set to “0” or “Last known good value” (configurable per channel)
Electrical Characteristics						
Power Supply		via P13 rack				
Min Operating Voltage		+19.5Vdc				
Max Operating Voltage		+30Vdc				
Power Consumption		2.1W typical 5.3W max				
Surge voltage resistance		1500V				
	Channel to Channel			1000Vrms		
	Channel to Ground			1000Vrms		
	Channel to Logic			1000Vrms		
		150Vdc in Voltage Mode		15Vdc		240Vdc/Vac in Voltage Mode
Max. Input in Current Mode		45mA		40mA		50mA

Technical Data

	70AI01a	70AI02a	70AI03a	70AI04a	70AI05a
Other Module Specific Data					
	Remark: Minor changes in edge connector layout compared to 70EA01.		RTD Excitation Voltage: 2.5Vdc RTD Excitation Current: 0.3mA @100Ω Maximum Lead Length: @250°C, using 0.5mm2 wire: 1220m	CJC Operating Temp: -20 to 60°C Thermocouple Break: Upscale	Digital Filters: 0ms, 250ms, 500ms, 1s, 2s, 3s
Ambient Conditions and General Properties					
Operating Temperature	0 – 60°C				
Relative Humidity	0 – 95%				
Certifications	CE, IEC 61508:2010 & IEC 61511:2004 (up to SIL3)	CE			
Dimensions	P13 Standard module (3.5E, 1T)				

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