

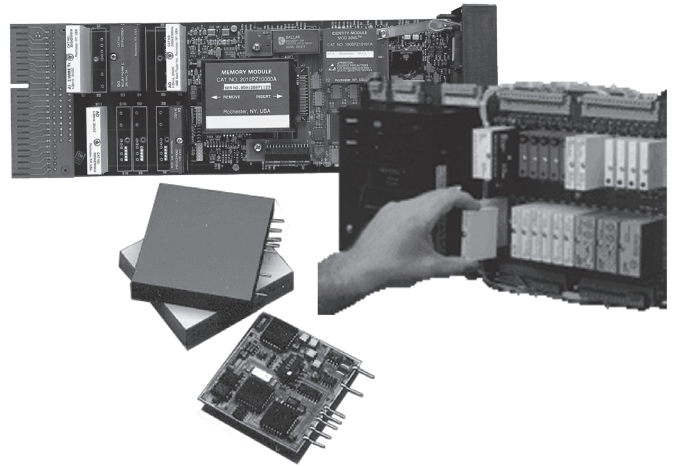
MOD Series Plug-In I/O and Communication Modules

- *For MOD 30ML, MODCELL, RetroPAK, and SteamPAK Series controllers*
- *Single-point input, output & communication modules*
- *Individual point isolation*
- *Short-circuit & cut wire detection*
- *Microprocessor-based analog modules hold failsafe settings & last good values*
- *Maintain signal value on main CPU failure*

The 2000 series plug-in modules are used with the MOD 30ML 1800, MODCELL 2000, SLC RetroPAK, 353 RetroPAK, MOD 30 RetroPAK, and the SteamPAK family of controllers. The series includes analog inputs, current output, discrete input and output, relay output, and communication modules.

All analog and solid-state digital I/O modules are fully isolated, both channel-to-channel and channel-to-ground. This helps eliminate propagation of noise and spikes on signal and power lines, and protects the main board and adjacent I/O, when the controller is properly installed. Each I/O module includes short-circuit and cut-wire detection with associated diagnostics, and a digital flag that can be used to initiate alternate control logic such as safe shutdown. Out-of-range and quality diagnostics are also associated with each module. The RS-232 and RS-485 Modbus modules provide address switches and pull-up/pull-down bus resistor switches. The Instrument Communication Network (ICN) module provides address switches. The Ethernet Interface modules provide Modbus TCP using standard RJ45 connectors.

MOD 30ML accepts up to 11 plug-in modules to complement its built-in I/O. MODCELL accepts up to 32 plug-in modules. Modules can be a mix of analog, discrete, and communication. The only restriction on placement is the communication modules, which must be installed in dedicated positions. If these positions are not used for communications they may be used for inputs or outputs.



Analog Modules

- Multifunction current module, switch-selectable for current input with or without transmitter power, or current output
- 3-wire, 100 ohm RTD or 2-wire, 1000 ohm RTD input with upscale burnout detection
- Thermocouple input with upscale burnout detection (Supports all standard thermocouple types; cold junction compensation provided)
- Volt/millivolt input

Discrete Modules

- Isolated discrete input (2.5-28Vdc, 4-16Vdc, 10-32Vdc, 12-32Vac, 35 to 60V ac/dc, 90 to 140V ac/dc, 180 to 280V ac/dc)
- Non isolated (contact sense) discrete input 2.2V to 24V dc
- Isolated discrete output (5 to 60V dc, 5 to 200V dc, 12 to 140V ac, SPST, NO, 24 to 280V ac, SPST, NO, 24 to 280V ac, SPST, NC)
- Non isolated discrete output 25V, 50mA TTL
- Dual Mechanical relay output

Communication Modules

- Instrument Communications Network (ICN)
- RS-232 Modbus RTU
- RS-485 Modbus RTU (4-wire)
- Ethernet Modbus TCP Interface

Analog Input / Output Modules

Voltage 2001AZ, Model C

Range	(0-100%) ±10V dc, ±100 mV dc
Low limit	-10V, -110mV
High limit	+10V, +110 mV
Input resistance	1 Megohm
Noise filter	3db at 15hz on 10 volt range 3db at 1.5hz on 100mv range
Resolution	16 bits
Sensitivity	0.4mv on 10 volt range 4µv on 100mv range
Accuracy	0.1% of range
Isolation	250V rms
Maximum survivable differential input	±300V dc / 250V ac
Common mode rejection	100 db a 60 Hz minimum
Normal mode rejection	40 db a 60 Hz minimum

Current 2014AZ

Range	(0-100%) 4 to 20mA
Low limit	0 mA
High limit	22 MA
Input resistance	100 ohms
Noise filter	3db a 5 Hz
Resolution	13 bits
Sensitivity	1.6µA
Accuracy	0.2%
Isolation	250V rms
Maximum survivable differential input	50 mA dc

Current with 2-wire transmitter power 2014AZ

Range	4 to 20mA
Low limit	0 mA
High limit	22 mA
Input resistance	100 ohms
Noise filter	3db a 5 Hz
Resolution	14 bits
Sensitivity	1µA
Accuracy	0.2%
Isolation	250V rms
Normal mode rejection	40 db a 60 Hz minimum

Thermocouple 2013AZ, Model C¹

Types	B,E,J,K,N,R,S,T
Range	±100 mVd dc
Low limit	-10V, -110mV
High limit	+10V, +110 mV
Input resistance	1 Megohm
Noise filter	3db at 1.5hz
Resolution	16 bits
Sensitivity	4µV
Accuracy	0.1% of range
Isolation	250V rms
Normal mode rejection	40 db a 60 Hz typical

RTD 2009AZ

	Range	Low Limit	High Limit
2 wire	0-4000 ohms (1000 ohms nominal)	0 ohms	4200 ohms
3 wire	0-400 ohms (100 ohms nominal)	0 ohms	400 ohms
Input Resistance	100 ohms each wire		
Noise Filter	3 db a 5 Hz		
Resolution	2 wire: 0.08 ohms/count 3-wire: 0.008 ohms/count		
Accuracy (absolute)	2 wire: ±2 ohms 3-wire: ±0.2 ohms		
Isolation	250 V rms		
Common Mode Rejection	100 db a 60 Hz minimum		
Normal Mode Rejection	40 db a 60 Hz minimum		

¹Note: if built-in analog input 1 on MOD 30ML is configured for thermocouple with cold junction compensation, the CJC value can be used for any other thermocouples on the instrument.

Current Output 2014AZ

Range	(0-100%) 4 to 20 mA
Low Limit	0 mA
High Limit	22 mA
Open Circuit Voltage	26 volts maximum
Isolation	250V rms
Resolution	12 bits
Sensitivity	5 uA
Accuracy	±0.2%
Load Limit	0 - 800 ohms
Fault Output	user defined between 0 and 100%, or last value

Digital Input / Output Modules**Isolated Digital Inputs 2004AP**

2004AP10...	...100A	...110A	...120A	...130A	...140A	...150A
Input Voltage Range	2.5-28V dc	4-16V dc	10-32V dc 12-32V ac	35-60V ac/dc	90-140V ac/dc	180-280V ac/dc
Low logic input	1V	1V	3V	9V	45V	80V
Maximum input current	30mA	45mA	25mA	6mA	11mA	6.5mA
Response time	1.5 ms	0.1 ms	5 ms	10 ms	20 ms	20 ms
Input resistance	900 ohms	300 ohms	1000 ohms dc 1500 ohms ac	10K ohms	14K ohms	43K ohms

Non-isolated Digital Inputs 2006AZ

Contact sense	5V/ 0.5 mA dc typical
Low logic input	0 a 0.65V dc to 50K ohms minimum
High logic input	2.2 a 24V dc to 50 ohms maximum
Maximum input current	2.5 mA dc
Response time	1 ms

Isolated Digital Output 2005AP

2005AP21...	...100A	...110A	...120A	...130A/140A
Output voltage range	5-60V dc	5-200V dc	12-140V ac	24-280V ac
Maximum output current	1A	0.55A	1A	1A
Response time	0.75 ms	0.75 ms	1/2 cycle	1/2 cycle

Non-isolated Digital Output 2007AZ

Output Voltage Range	+5 a +24V dc
Maximum output current	100 mA dc
Maximum leakage current	100 μ A dc
Response time	100 μ s

Mechanical Relay Output 2011AZ

Types	Two independent relays (NO/NO, NC/NC, NO/NC)
Contact load	3A a 250Vac or 30V dc per relay
Contact resistance	0.10 ohms maximum
Isolation	250V rms (contact to coil)
Response time	10ms

Communication Modules**ICN 2030NZ**

BAUD Rate	31.25K BAUD
Addresses	0 - 15

Modbus RTU RS-232 2033NZ

BAUD Rate	300 to 38.4K BAUD
Addresses	1 - 247
Output Swing	\pm 9V with \pm 5V supply
Receiver Input Levels	\pm 30V

Modbus RTU RS-485 (4-wire) 2034NZ

BAUD Rate	300 to 38.4K BAUD
Addresses	1 - 247

Ethernet Interface 2040NZ and 2041NZ*

Protocol	Serial MODBUS RTU Slave
Modbus Address	1
BAUD Rate	up to 38400 BAUD

*2040NZ is used with MOD 30ML with Ethernet-style termination.
2041NZ is used with MODCELL and has a built-in Ethernet port for an RJ45 cable connection.

! IMPORTANT NOTE:

Care must be taken not to exceed maximum power consumption when adding I/O and communication modules. See Ordering Information for individual module power consumption.

MOD 30ML

5 amps maximum
1220mA used for base instrument

Built-in outputs:

20mA output: 140mA
50mA output: 410mA
Transmitter power: 150mA

MODCELL

AC Power 4.5 amps
DC Power 3.0 amps

ORDERING INFORMATION

Some modules require two positions on the MODCELL or MOD 30ML.

Maximum available positions:

MOD 30ML - 11

MODCELL - 32 (at least 2 positions must be used for a communication network for downloading and monitoring)

	Positions	Power	Model No.
Analog Input & Output - isolated			
Voltage Input (+/- 100mv, +/- 10V) ¹	1	80mA	2001AZ10101C
RTD Input (2-wire, 1000 ohm nominal resistance)	1	80mA	2009AZ10220B
RTD Input (3-wire, 100 ohm nominal resistance) <i>Limited availability</i>	2	80mA	2009AZ10130B
Thermocouple Input (supports type B,E,J,K,N,R,S,T and calibrated) ¹	1	80mA	2013AZ10101C
Current Input/Output - switch selectable (4-20mA / 0-20mA) ¹	1		2014AZ10101A
Selected as current input non-2 wire		75mA	
Selected as current input 2-wire transmitter OR current output		250mA	
Digital Input - Isolated			
2.5 to 28V dc	1	12mA	2004AP10100A
4 to 16V dc	1	12mA	2004AP10110A
10 to 32V dc, 12 to 32V ac	1	12mA	2004AP10120A
35 to 60V ac/dc	1	12mA	2004AP10130A
90 to 140V ac/dc	1	12mA	2004AP10140A
180 to 280V ac/dc	1	12mA	2004AP10150A
Digital Output - Isolated			
5 to 60V dc	1	12mA	2005AP21100A
5 to 200V dc	1	12mA	2005AP21110A
12 to 140V ac, SPST, NO	1	12mA	2005AP21120A
24 to 280V ac, SPST, NO	1	12mA	2005AP21130A
24 to 280V ac, SPST, NC	1	12mA	2005AP21140A
Digital Input - Nonisolated			
2.2V to 24V dc (contains internal 5V supply for direct hardwire connection)	1	10mA	2006AZ10100A
Digital Output - Nonisolated			
25V, 50mA TTL (open collector switch supports 5V TTL)	1	20mA	2007AZ10100A
Mechanical Relay Output - isolated			
Dual SPST, NO/NO (2 outputs)	2	140mA	2011AZ10100A
Dual SPST, NC/NC (2 outputs)	2	140mA	2011AZ10110A
Dual SPST, NO/NC (2 outputs)	2	140mA	2011AZ10120A

COMMUNICATION MODULES

One maximum per MOD 30ML; up to 3 per MODCELL			
Instrument Communications Network (ICN)	2	300mA	2030NZ10000B
ICN Termination Assembly for Flushmount MODCELL (1 per ICN network)		200mA	2030FZ00002A
ICN Termination Assembly for MOD 30ML (1 per ICN network)		200mA	2030FZ00001A
Serial Communications for Modbus RTU:			
RS-232	2	180mA	2033NZ10000A
RS-485, 4-wire	2	180mA	2034NZ10000A
Ethernet Interface Module for MOD 30ML**	2	275mA	2040NZ10000A
Ethernet Interface Module for MODCELL	2	275mA	2041NZ10000A

**The MOD 30ML with Ethernet termination is shipped with the 2040NZ factory-installed. The module is listed here as a spare/ replacement part only.

Note 1: 2001AZ10101C is a direct replacement for 2001AZ10101B.
 2013AZ10101C is a direct replacement for 2013AZ10101B.
 2014AZ10101A is a direct replacement for 2002AZ10101B, 2012AZ10101B, and 2003AZ10101A.

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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