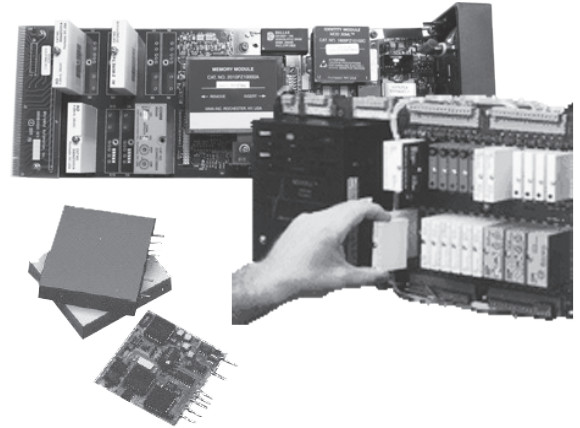


MOD Series Plug-In I/O and Communication Modules

- **For MOD 30ML, MODCELL, SteamPAK and RetroPAK 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 on the 1800R MOD 30ML Multiloop Controller, the MODCELL 2000 Multiloop Processor, the SteamPAK* boiler control packages and the RetroPAK* retrofit controllers. The series includes analog input modules, analog output modules, digital input modules, digital output modules, relay output modules and communication modules.

All analog and solid-state digital I/O modules are fully isolated channel-to-channel and channel-to-ground. This helps eliminate propagation of noise and spikes on signal and power lines 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 the RS-485 module also provides pull-up/pull-down bus resistor switches. The Instrument Communication Network (ICN) module provides address switches. The Ethernet Interface module is used with the Ethernet-style termination assembly on the MOD 30ML controller and provides Modbus TCP protocol.

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, digital 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

- Current input, with or without transmitter power supply
- 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
- Current output 0-20/4-20mA

Digital Modules

- Isolated digital 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) digital input 2.2V to 24V dc
- Isolated digital 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 digital output 25V, 50mA TTL
- Mechanical relay output

Communication Modules

- Instrument Communications Network (ICN)
- RS-232 Modbus RTU
- RS-485 Modbus RTU (4-wire)
- 2040N Ethernet Modbus TCP Interface

*SteamPAK and RetroPAK are based on the MOD 30ML controller

Analog Input / Output Modules

Voltage 2001AZ

Range	(0-100%) ±10V dc, ±100 mV dc
Low limit	-11V, -110mV
High limit	+11V, +110 mV
Input resistance	1 Megohm
Noise filter	3db a 5 Hz, 3 db a 3 Hz
Resolution	16 bits
Sensitivity	0.4mV, 4uV
Accuracy	(calibrated) 0.1%
Isolation	250V rms
Maximum survivable input	±300V dc / 250V ca (Differential)
Common mode rejection	100 db a 60 Hz minimum
Normal mode rejection	40 db a 60 Hz minimum

Current 2002AZ

Range	(0-100%) 4 a 20mA
Low limit	0 mA
High limit	24 MA
Input resistance	2.5 ohms
Noise filter	3db a 5 Hz
Resolution	13 bits
Sensitivity	1.6 uA
Accuracy	0.2%
Isolation	250V rms
Maximum survivable input	50 mA dc (Differential)

Current with 2-wire transmitter power 2012AZ

Range	4 a 20mA
Low limit	0 mA
High limit	27.5 mA
Input resistance	50 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 2013AZ¹

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

RTD 2009AZ

Range	0-4000 ohms (1000 ohms nominal)
2 wire	0-400 ohms (100 ohms nominal)
3 wire	100 ohms each wire
Input Resistance	3 db a 5 Hz
Noise Filter	2 wire: 0.08 ohms/count
Resolution	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

Low Limit	High Limit
0 ohms	4200 ohms
0 ohms	400 ohms

Current Output 2003A

Range	(0-100%) 4 a 20 mA
Low Limit	0 mA
High Limit	25 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%

! 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
 1520mA 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

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. The RTD module 2009AZ10240 may also be used for CJC.

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 µA dc
Response time	100 µs

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	± 9V with ± 5V supply
Receiver Input Levels	± 30V

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

BAUD Rate	300 to 38.4K BAUD
Addresses	1 - 247

Ethernet Interface 2040NZ

For use only with the MOD 30ML with Ethernet-style termination.

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

! 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
1520mA 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 - isolated			
Voltage (+/- 100mv, +/- 10V)	1	80mA	2001AZ10101B
Current (4-20mA)	1	80mA	2002AZ10101B
Current (4-20mA) with 2-wire transmitter power	(Note 1)	350mA	2012AZ10101B
RTD (2-wire, 1000 ohm nominal resistance)	1	80mA	2009AZ10220B
RTD (3-wire, 100 ohm nominal resistance)	2	80mA	2009AZ10130B
RTD for Cold Junction Compensation	1	80mA	2009AZ10240B
Thermocouple (supports type B,E,J,K,N,R,S,T and calibrated)	1	80mA	2013AZ10101B
Analog Output - isolated			
Current (4-20mA / 0-20mA)	(Note 1)	350mA	2003AZ10101A
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
Note 1: These active current modules use one position, however for heat dissipation is is recommended that one module space on each side be unused.			

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)		200m	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
For use with MOD 30ML Ethernet Termination only (see Note 2):			
Ethernet Interface Module	2	275 mA	2040NZ10000A
Note 2: The MOD 30ML with Ethernet termination is shipped with the 2040NZ factory-installed. The module is listed here as a spare/ replacement part only.			

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