

## MODCELL™ 2000 Multiloop Processors

- Intelligent Process Controller for data acquisition, comprehensive regulatory control and flexible sequential control
- Supports up to 30 single point, individually isolated process I/O on a single card
- Expansion I/O up to 100 discrete points
- Redundant, removable NOVRAM backs up configuration and current process parameters
- Per-point power fail and failsafe settings for complete process security
- Flushmount Format FM Approved & CSA Certified for Class I, Division 2, Groups A, B, C, D Hazardous Locations
- Modbus RTU and peer-to-peer communications
- OPC servers for communication to operator workstations, plantwide systems and SCADA consoles



### **MODCELL™ 2000 Multiloop Processor & I/O Modules**

The MODCELL Multiloop Processor is a self-contained Intelligent Process Controller comprising I/O, terminations, signal conditioning, power supply and control logic on a single platform. Available in Logic Control and Advanced Control versions, it can function as a multiloop PID controller, a batch sequencing controller, or a high density, flexible I/O subsystem. Up to 32 single-point process I/O and communications modules can be installed on one controller and configured in flexible combination to meet specific data acquisition and control needs.

### Functionality

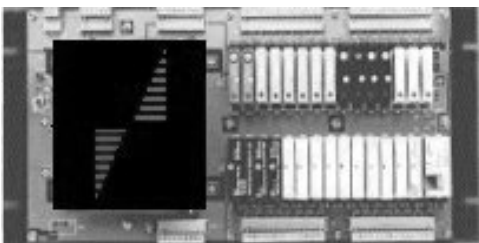
Software functionality is provided by the Identity Module containing the controller firmware. The Logic Control Identity Module provides logic control functions through use of arithmetic and relational operators, timer functions, and I/O functions, and is used for data acquisition and monitoring as well as sequential operations. Powerful, easy-to-use Sequence Blocks are based on drum programmer design with up to 100 inputs, 80 steps and 30 outputs per block; blocks can be cascaded for larger sequences. The Sequence Block allows forward and backward stepping, unlimited branching and outputs configurable for any data type supported by MODCELL (discrete, floating point, integer, time, date, ASCII or hex).

The Advanced Control Identity Module provides all the functions of the Logic Control Identity plus continuous control functions such as PID, feedforward, setpoint and output tracking, external feedback, setpoint and output limiting, as well as the logic and I/O functions of the Logic Control version. As many as eight separate PID control loops can be configured in a single MODCELL processor with a total loop processing time of 250 ms. Larger numbers of loops can be configured with slower processing times.

Processors can be upgraded easily to incorporate PID control simply by replacing the Identity Module.

### Base Platform

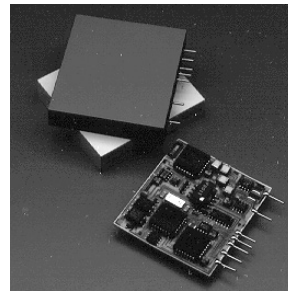
The 5U flushmount packaging design allows easy installation and commissioning. The base unit is supplied on a mounting plate which fits standard EIA racks or panels. Field terminations use groups of pluggable, screw-down termination blocks for easy signal wiring, and power supply connections are separated from field signal wiring.



The unit includes an on-board ac or dc power supply, a high-speed CPU, and associated firmware to support I/O, communications and control functions. Each MODCELL Multiloop Processor of non-volatile RAM which contains the user database and all current process and operating parameters. The optional Memory Module provides redundant, removable non-volatile RAM which backs up the configured database and, if left on the unit during operation, current process data.

### Process I/O

The individual process I/O and communications modules are purchased separately based on application need. These plug-in modules include various types of analog input, analog output, digital input, digital outputs, ICN and serial communications, and are purchased individually to suit the process requirements, as any mix of signal types may be installed on the MODCELL base platform. Signal conditioning is performed in the modules. Fail-safe and power fail/recovery parameters may be configured for each individual point.



### Analog I/O

Analog input modules provide high-resolution signal conditioning performed in the module. Process signals including RTD and thermocouple are connected directly to the MODCELL termination without requiring transmitters or transducers for signal conversion. A single module supports all thermocouple types with upscale burnout detection; there is also a current input module which supplies loop power for 2-wire transmitters. Cold junction compensation is provided by a single module for all thermocouple inputs. Other input types include volt, millivolt, 2- and 3-wire RTD with upscale burnout detection and current input without loop power. The analog output module supplies 4-20mA or 0-20mA. All analog I/O modules are individually, optically isolated to 250Vrms continuous.

## Digital I/O

Digital I/O options include both isolated and non-isolated modules. Solid state relay versions offer high isolation voltage capability. Nonisolated modules provide interrogation voltage for TTL logic and the ability to interface between similar modules without the need for an external power supply. The Mechanical Relay output module supports Form A, Form B and Form C relays.

## Expanded Digital I/O

One MODCELL Multiloop Processor may be expanded to incorporate up to 100 digital I/O (total) using the CS-31 Remote I/O modules. The modules communicate to the Multiloop Processor over the CS-31 Remote I/O Network, an RS485 fieldbus which connects to the base unit via a plug-in module. Refer to Specification Sheet for CS-31 Remote I/O for details.

## Communications

Three serial communications channels on each MODCELL unit allow up to three independent networks to function simultaneously. The MODCELL Multiloop Processor communicates peer-to-peer to other MODCELLs, and MOD 30ML Instruments through connections to the Instrument Communications Network (ICN), allowing seamless integration into

both existing and new control strategies. A ICN Communication module provides this capability. Three serial communications modules provide RS-232 and RS-485 (2-wire or 4-wire) interface using standard Modbus RTU Master/Slave protocol. The 4-wire RS-485 module can provide pull-up/pull-down resistors for the Modbus network. Communications to MODCELL 2050 single loop controllers, various host systems and commercial terminal devices can be accomplished using standard Modbus RTU protocol. Both ICN communications and Modbus communications (Master and/or Slave) can be used on a single unit, simultaneously.

## Configuration & Operation

Control strategies are developed using the windows-based Visual Application Designer (ViZapp) software, a graphic configuration package that provides function-block strategy building, online debugging, tuning windows, and simple operator interface capabilities (see S-MOD-ViZapp).

Using MicroMod's OPC servers, MODCELL can communicate with Micro-PWC Operator Console from MicroMod, or any OPC Client software package.

Component	Features
Processor Base Unit	<ul style="list-style-type: none"> <li>• 5U x 19" flushmount carrier board</li> <li>• Powerful Motorola 68302 processor, including on-chip RISC communications processor</li> <li>• Universal ac power supply (85-250V ac/50-400 Hz VDC) or 24V dc power supply</li> <li>• 32 I/O sockets available for any mix of process I/O and communications modules</li> <li>• Non-volatile database RAM</li> <li>• Embedded real-time clock with 1ms resolution</li> </ul>
Portable Memory Module	<ul style="list-style-type: none"> <li>• Optional plug on module that provides redundant, removable non-volatile RAM for databased backup, portability and integrity</li> <li>• Updated every 50 ms</li> </ul>
Process I/O Modules	<ul style="list-style-type: none"> <li>• Single-point I/O modules for wide variety of process signals</li> <li>• Embedded microprocessor provides high-resolution signal conversion</li> <li>• Economic brick design for digital I/O expansion</li> <li>• Individually opto-isolated to 250Vms, continuous</li> <li>• Per-point, configurable fail-safe and power fall/restart settings</li> <li>• Provide loop power for 2-wire transmitters</li> </ul>
Communications Modules	<ul style="list-style-type: none"> <li>• Peer-to-peer Instrument Communication Network (ICN)</li> <li>• TD-232 and RS-485 (2-wire and 4-wire) serial communications using standard Modbus RTU protocol</li> </ul>
Identify Module <ul style="list-style-type: none"> <li>• Logic Control</li> <li>• Advanced Control</li> </ul>	<ul style="list-style-type: none"> <li>• Configurable function blocks for: <ul style="list-style-type: none"> <li>• Analog I/O and digital I/O</li> <li>• Linearization and piecewise (lookup) tables – 4096 of each block</li> <li>• Process and diagnostic alarms</li> <li>• Incrementing or decrementing timers and counters – 4096 of each block</li> <li>• Arithmetic and relational control and event logic – 4096 blocks</li> <li>• Comprehensive PD control (including feedforward, external feedback, setpoint/output tracking, setpoint/output limiting, deadtime compensation) – 4906 blocks</li> <li>• Sequence control – 4096 blocks</li> </ul> </li> </ul>

**PERFORMANCE SPECIFICATIONS - BASE UNIT**

**AC INPUT**

**Operating Range**

AC option: 85-250V rms, 50-400Hz

DC option: 20-50V dc

**Fuse**

2.5 Amps (ac), 4.0 Amps (dc)

**Power Consumption**

85 to 250V rms: 80 VA, 50W

20 to 50V dc: 40 VA

**Peak Inrush Current**

60 Amps (ac), 40 Amps (dc)

**Holdup Time**

32 msec at 120V ac, 5 msec at 24V dc typical

**PERFORMANCE SPECIFICATIONS - MODULES**

VOLTAGE INPUT 2001A	
Range	(0-100%) ±10V dc, ±100 mV dc
Low limit	-11V, -110mV
Upper limit	+11V, +110 mV
Input Resistance	1 megohm
Noise filter	3db at 5 Hz, 3 db at 3 Hz
Resolution	16 bits
Sensitivity	0.4mV, 4uV
Accuracy	(calibrated) 0.1%
Isolation	250V rms
Max. Survivable Input	±300V dc or 250V ac (Differential)
Common mode rejection	100 db at 60 Hz minimum
Normal mode rejection	40 db at 60 Hz minimum

CURRENT INPUT WITH 2-WIRE TRANSMITTER POWER 2012A	
Range	(0-100%) 4 to 20mA
Low limit	0 mA
Upper limit	27.5 mA
Input Resistance	50 ohms
Noise filter	3db at 5 Hz
Resolution	14 bits
Sensitivity	1µA
Accuracy	(calibrated) 0.2%
Isolation	250V rms
Two Wire Excitation Supply	Open circuit voltage: 24 V ±5% Short circuit current: maximum at 38 mA
Max. Survivable Input	±300V dc or 250V ac (Differential)
Common mode rejection	100 db at 60 Hz minimum
Normal mode rejection	40 db at 60 Hz minimum

CURRENT INPUT 2002A	
Range	(0-100%) 4 to 20mA
Low limit	0 mA
Upper limit	24 MA
Input Resistance	2.5 ohm
Noise filter	3db at 5 Hz
Resolution	13 bits
Sensitivity	1.6 uA
Accuracy	(calibrated) 0.2%
Isolation	250V rms
Max. Survivable Input	50 mA dc (Differential)
Common mode rejection	100 db at 60 Hz minimum
Normal mode rejection	40 db at 60 Hz minimum

RTD INPUT 2009A	
Range	2-wire: 0-4000 ohms (1000 ohms nominal) 3-wire: 0-400 ohms (100 ohms nominal)
Low Limit	2-wire: 0 ohms 3-wire: 0 ohms
Upper Limit	2-wire: 4200 ohms 3-wire: 400 ohms
Input Resistance	100 ohms each lead
Noise Filter	3 db at 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 at 60 Hz minimum
Normal Mode Rejection	40 db at 60 Hz minimum
Reference Conditions	Supply Voltage: 5V Temperature: 25°C

THERMOCOUPLE INPUT 2013A	
Types	B,E,J,K,N,R,S,T & calibrated
Range	±100 mV dc
Low limit	-110 mV
Upper limit	+110 mV
Input Resistance	10 Megohms
Noise filter	3 db at 3 Hz
Resolution	16 bits
Sensitivity	4 uV
Accuracy (calibrated)	0.1%
Isolation	250V rms
Max Survivable Input	±300V dc or 250V ac (Differential)
Common mode rejection	100 db at 60 Hz typical
Normal mode rejection	40 db at 60 Hz typical

CURRENT OUTPUT 2003A	
Range	(0-100%) 4 to 20 mA
Low limit	0 mA
Upper 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

DIGITAL INPUTS (ISOLATED) -			
2004AP10..	.. 100A	..110A	..120A
Input voltage ranges	2.5-28V dc	4-16V dc	10-32V dc 12-32V ac
Max Logic Low Input	1V	1V	3V
Max Input current	30mA	45mA	25mA
Response time	1.5 msec	0.1 msec	5 msec
Input resistance	900 ohms	300 ohms	1000 ohms dc 1500 ohms ac
2004AP10..	.. 130A	.. 140A	.. 150A
Input voltage ranges	35-60V ac/dc	90-140V ac/dc	180-280V ac/dc
Max Logic Low Input	9V	45V	80V
Max Input current	6mA	11mA	6.5mA
Response time	10 msec	20 msec	20 msec
Input resistance	10K ohms	14K ohms	43K ohms

DIGITAL INPUTS (NONISOLATED) 2006A	
Contact sense	5V/ 0.5 mA dc typical
Logic Low Input	0 to 0.65V dc or 50K ohms minimum
Logic High Input	2.2 to 24V dc or 50 ohms maximum
Max Input current	2.5 mA dc
Response time	1 msec

DC DIGITAL OUTPUTS (ISOLATED) 2005A..		
	..100A	..110A
Output voltage ranges	5-60V dc	5-200V dc
Max Output current	1A	0.55A
Response time	0.75 msec	0.75 msec

AC DIGITAL OUTPUTS (ISOLATED) 2005A..		
	..120A	..130A/140A
Output voltage range	12-140V ac	24-280V ac
Max Output current	1A	1A
Response time	1/2 cycle	1/2 cycle

DIGITAL OUTPUTS (NONISOLATED) 2007A	
Output voltage range	+5 to +24V dc
Max Output current	100 mA dc
Max Leakage Current	100 µA dc
Response time	100 µsec

MECHANICAL RELAY OUTPUTS 2011A	
Configuration	Dual independent relays (NO/NO, NC/NC, NO/NC)
Contact rating	2011AZ10... 3A at 250V ac or 30V dc per relay 2011AZ12... 3A at 60V ac or 30V dc per relay
Contact resistance	0.10 ohms maximum
Isolation	250V rms (contacts to coil)
Response time	10msec

**GENERAL SPECIFICATIONS**

**Operating temperature**  
0 to +50°C

**Storage Temperature**  
-40 to +75°C

**Humidity**  
5 to 95% RH, noncondensing

**Data Retention (Non volatile RAM memory and Portable Memory Module)**  
Typically 10 years with unit unpowered

**ICN Baud rate**  
31.25K Baud

**Modbus Baud rate**  
... to 38.4K Baud

**PHYSICAL SPECIFICATIONS - EUROCARD FORMAT**

**Height**  
Base card: 9.18" (233 mm)  
With front termination: 10.3" (262 mm)

**Width**  
Base card: 2.355" (60 mm)

**Depth**  
Base card: 8.7" (220 mm)  
With front termination: 11.2" (285 mm)

**Weight**  
Base Unit with identity module: 2.62 lbs.

**Mounting**  
Unit mounts in 19-inch rack housing, catalog number 2001F.

**PHYSICAL SPECIFICATIONS - FLUSHMOUNT FORMAT**

**Height**  
Including mounting assembly: 8.72" (221.49 mm)

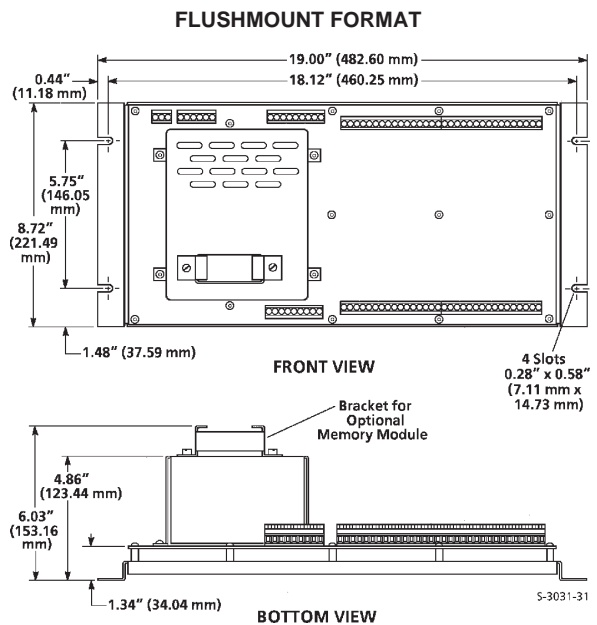
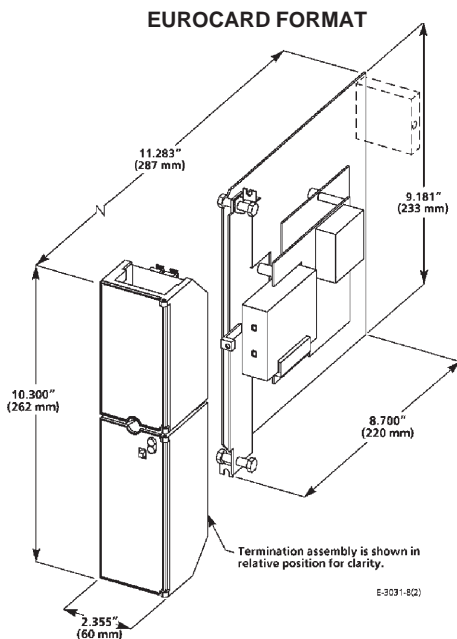
**Width**  
19.00" (482.60 mm)

**Depth**  
6.03" (153.16 mm)

**Weight**  
Base Unit with identity module: 3 lbs, 2 oz.

**Mounting**  
Unit mounts in a standard EIA rack or panel.

**DIMENSIONS**



**Model Number and Ordering Information**

	2002NZ	___	___	0	1	C
<b>Base Controller - Flushmount</b>	2002NZ					
<b>Approvals</b>						
General Purpose		10				
CE (European Community destinations only)		12				
FM/CSA Class 1 Division 2 A,B,C,D, T3C in 55°C Ambient		21				
<b>Power Supply</b>						
24V dc (not available with CE approvals)			4			
85 to 265V ac			8			
<b>Not Used</b>				0		
<b>Hardware Version</b>					1	
<b>Design Model</b>						C

**Identity Module - 1 per base unit (required)**

Logic Module - includes math, logic, sequence and I/O functions (see specification S-MOD-2002N)	2001PZ10106C
Control Module - includes Logic Module functions plus PID, Ramp/Soak	2004PZ10103C

**Plug-In I/O Modules - Maximum 30. Number of modules depends on slots occupied and power consumption. Do not exceed 4.5 amps on AC supply / 3 amps on DC supply units.**

**I/O MODULES**

	Positions	Power	
<b>Analog Input - isolated</b>			
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 per base instrument). Required if built-in input 1 is not used as tc+cjc and thermocouple inputs are used.	1	80mA	2009AZ10240B
Thermocouple (supports type B,E,J,K,N,R,S,T and calibrated)	1	80mA	2013AZ10101B
<b>Analog Output - isolated</b>			
Current (4-20mA / 0-20mA)	(Note 1)	350mA	2003AZ10101A
<b>Digital Input - Isolated</b>			
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
<b>Digital Output - Isolated</b>			
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
<b>Digital Input - Nonisolated</b>			
2.2V to 24V dc (contains internal 5V supply for direct hardwire connection)	1	10mA	2006AZ10100A
<b>Digital Output - Nonisolated</b>			
25V, 50mA TTL (open collector switch supports 5V TTL)	1	20mA	2007AZ10100A
<b>Mechanical Relay Output - isolated</b>			
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
<i>Note: 2011AZ10200 Form C module is no longer available.</i>			
<b>Extended I/O Interface (Limited Availability) - see P-MOD-EXT_IO for remote I/O modules</b>			
Extended I/O Interface Module (one per Remote I/O Network; 2 max)	2	400mA	2020NZ10000B

*Note 1:* These active current modules use one position, however they require that one module space on each side be unused.

**Communication Modules and Accessories on following page**

**COMMUNICATION MODULES (required) - 1 per instrument minimum; 3 maximum**

Instrument Communications Network (ICN)*	2	300mA†	2030NZ10000B
Serial Communications for Modbus RTU:			
RS-232**	2	180mA	2033NZ10000A
RS-485, 4-wire**	2	180mA	2034NZ10000A

**ACCESSORIES**

ICN Termination Assembly (1per ICN network)			2030FZ00002A
Portable Memory Module (optional)			2010PZ10000A
MODCELL Multiloop User's Guide - complete printed documentation *			98280-417
MODCELL Multiloop and MOD30ML User's Guide - complete printed documentation *			98280-419
Output Holder / Manual Loader (see S-MOD-1750N)			1750NZ10001A

**Configuration Software Visual Application Designer (required) - Refer to S-MOD-VIZAPP**

- \* One ICN module is required in the MOD 30 Replacement instrument if the built-in communications port is used for RS-232 through the front panel.
- \*\* Provides pull-up/pull-down resistors for Modbus network, and address switch. Required when using MOD 30ML as master.
- † 2030F terminator assembly adds 200mA for total ICN module load of 500mA to controller unit on which it is installed. One terminator assembly required per ICN network.

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