



### MODCELL™ 2050R Single Loop Controllers

- Isolated universal process and remote set-point input
- Four internal set-points
- No jumpers required to define instrument parameters
- Ratio/bias on process and remote set-point
- Totalizer
- Ramp/soak profile
- Manual/Auto Station
- RS-485 MODBUS
- On-demand auto-tuning
- Retransmission of process or set-point
- Less than 8" (203.2 mm) behind the panel depth
- Two-year warranty
- FM & CSA Certified Class 1, Division 2, Groups A,B,C,D



**MODCELL™ 2050R  
Single Loop Controller**

The MODCELL 2050R™ indicating controller is a microprocessor based 3x6 (72 x 144) instrument that can display and control temperature, pressure, level, or flow. Instrument set-up is accomplished via easy-to-read English prompts and operator push buttons located on the front display. The process input is user selectable for direct connection of either Thermocouple, RTD, mV dc, V dc, mA dc or slidewire input. Ranging of the RTD and Thermocouple is automatic. Process input is isolated from the rest of the instrument. A 24V dc transmitter power supply is provided for use with a two-wire mA dc input on both process and remote set-point inputs.

**PERFORMANCE SPECIFICATIONS**

**GENERAL**

**Instrument Power Supply**

85-250V rms, 50-400 Hz; switcher power supply  
 20-50 V dc  
 20-35V rms, 50-400 Hz

**Power Consumption (120V rms, 60 Hz)**

30W max

**Display Resolution**

Process value rounded to the least significant digit

**Operating Conditions**

Temperature 32-131°F (0-55°C)  
 Humidity 25-95% RH (noncondensing)

**Environment**

Front face NEMA 4X (MODCELL 2050R)  
 NEMA 1 (MODCELL 2051R)

**Purge**

Will withstand 5" H<sub>2</sub>O pressure air volume exchange for 10 minutes, 2" H<sub>2</sub>O pressure indefinite time purge.

**Temperature Stability**

±0.01% per °C typical

**Supply Voltage Influence**

±0.1% for ±15% variations typical

**Sample Time**

0.25 second for V dc, mV, mA and digital inputs  
 0.5 second for thermocouple and RTD

**Retransmission**

Retransmission of process variable, second analog input or active set-point variable. ±0.3% span

**Set-point Resolution**

Local ±1 digit  
 Remote ±0.016% of span

**Data Retention**

Minimum 10 years without power (nonvolatile RAM memory)

**Electrical Codes**

General purpose EU EMC Compliant  
 CSA, Class 1, Division 2, Groups ABCD  
 FM, Class 1, Division 2, Groups ABCD

**Communications**

RS-485, 2-wire or 4-wire  
 MODBUS Slave Protocol

**Open Input Fault Detection**

Controller recover option is user configurable for all input types

**Fault Output**

User selectable, 0-100%

**Common Mode Rejection**

120 dB @ 50/60 Hz

**Input Common Mode Rating**

45V dc

**Maximum Normal Mode Voltage**

30V dc (except current input)

**Line Interruption**

No effect from 2 cycle dropout at normal AC line voltage

No effect from 30 ms dropout at normal DC voltage

**Line Interference**

Tested to and passes IEC 801-4 and 801-5, Level 3

**Security Access**

Two user-configurable, 4-digit number, for "Configuration" and "Tune".

**Inputs**

Type	Min.	Max.	Min.	Span
mV dc	-10	120	10	
V dc	0	6	0.1	
mA dc	0	50	1	

**Input Impedance**

Millivolt	10M ohms minimum
Volt	10M ohms minimum
Current	50 ohms nominal

**Linearization**

Input types other than TC and RTD are configurable for square law. Applicable to both process input and remote set-point.

**Thermocouple**

Per NBS125 and IEC584 standards

**RTD**

Per IEC751 and DIN43760 standards

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Per NBS125 and IEC584 standards

**RTD**

Per IEC751 and DIN43760 standards

**MEASURING RANGE LIMITS**

Thermocouple or RTD	°F		°C	
	Lower	Upper	Lower	Upper
Type B	752	3002	400	1650
Type E	-328	1832	-200	1000
Type J	-328	2192	-200	1200
Type K	-328	2498	-200	1370
Type N	32	2372	0	1300
Types R & S	32	3002	0	1650
Type T	-328	752	-200	400
RTD	-328	1562	-200	850

Performance accuracy is not guaranteed below 752°F (400°C) for Type B thermocouple. RTD, 3-wire platinum, 100 ohm per DIN standard 43760 (IEC751), with range of 0-400 ohms.

**Process Input Isolation**

Full galvanic isolation using transformers and opto couplers

**Transmitter Power Supply**

Isolated 24V dc supply for a maximum 22 mA loop, available on both process and remote set-point inputs

**Remote Set-point**

Isolated universal input for mV dc, V dc, mA dc (2-wire & non 2-wire), RTD, thermocouple and slidewire (option board required)

**Digital Inputs**

Two dry contact or dc voltage inputs  
 Open 50K ohms minimum or 4-24V dc  
 Closed 50 ohms maximum or <1.5V dc

**Position Feedback**

Slidewire resistance  
 500 ohms minimum with no added parts  
 20 ohm minimum with added 3.9K resistor

**INPUT ERROR LIMITS**

**Voltage (V dc)**

±0.05% of actual input value (±least significant digit for display)

**Millivolts**

±0.08% of actual input value or 20 microvolts whichever is greater (±least significant digit for display)

**Current**

±0.1% of actual input value (±least significant digit for display)

**RTD**

±1.8°F (1.0°C) of actual input value (±least significant digit for display)

**Thermocouple**

**Type J, K, E, T, N**

±2.7°F (1.5°C) of actual input value (±least significant digit for display)

**Type R, S, B**

±3.6°F (2.0°C) of actual input value (±least significant digit for display)

**Temperature Calibration**

A user-configurable, single-point calibration facility is provided to reduce RTD and Thermocouple measurement error to 0.0° or any user-desired offset; calibration adjustment is ±15°.

**OUTPUTS**

**Standard Control Output**

- 0-54 mA non-isolated operator settable span; 20 mA into a 1000 ohm load, 54 mA into a 400 ohm load; 1 mA minimum span
- Single pole double throw (SPDT) form "C" dry contact; contact rating: 2.5A at 240V ac, 5A at 120V ac (may be used for control or alarm) (EU EMC compliance is 150V ac maximum).

**Relays**

Number of relays per instrument is 3. Relays are single pole double throw (SPDT), contact ratings are 2.5 amps at 240V ac resistive, 5 amps at 120V ac resistive (EU EMC compliance is 150V ac maximum). Normally open, normally closed, and common (NO, NC, C) contacts are simultaneously available at the termination block. Up to two relays can be used for control.

**Output Error Limits**

±0.3% of setting plus 14µA

**Linearizer Error**  
 ±0.2°F (0.1°C) typical

**OPTIONS**

**Option Card**

Provides: one isolated universal analog input, operator settable; same as standard analog control input. One non-isolated 0-54 mA output, operator settable. RS-485 Modbus communications hardware.

**DISPLAY**

**Display Type**

Vacuum fluorescent (green)

**Analog Displays**

3 vertical bargraphs; 50 segments per bar

**Digital Displays**

3 engineering displays; 8 alphanumeric characters per display  
 3 status displays; 3 alphanumeric characters per display

**Indicator**

Alarm condition L.E.D. plus audible

**Brightness**

50 ft-lm minimum

**Totalizer Display**

Utilizes second 8 digit engineering display (8 positive characters or 7 negative characters plus sign)

**CONTROL**

On/off, Heat/cool, current or time proportioning, Ramp/soak profile, position feedback control, P, PI, PD, or full PID control responses. A second set of P and I tuning constants is provided when Dual Output control (heat/cool) is selected.

**Ramp/Soak Profile**

1 profile, 10 segments. User assigned event markers. Profiles can be downloaded via RS-485 communications.

**Auto-tuning**

On-demand automatically determines appropriate PID values for optimum process control. Not applicable to Heat/cool PID implementations.

**Gain**

0.1 to 125

**Integral (Rate)**

0.01 to 120.0 repeats per minute

**Derivative**

0.1 to 999.9 seconds in increments of 0.1 second; 0=off

**Manual Reset**

0.0% to 100% in 0.1% steps

**Cycle Time**

1.0 to 300 seconds in 0.1 steps

**Selectable Start Value**

Selectable Mode	Auto, Manual, Last
Selectable Output	Last, Fixed
Selectable Set-point	Last, Fixed

**Ratio (Remote Set-Point)**

0.1 to 99.9 in 0.01 steps

**Bias (Remote Set-Point)**

-999 to 9999 engineering units

**Dead Band (Valve Control)**

2.0% to 50% in 0.1% steps

**Differential Gap (On/Off Control)**

0 to span value

**Four Set-Points**

Four user-configurable set-points are available. Selecting set-points is done via the front face or digital inputs one and/or two.

**Auto/Manual Ratio/Bias Control Station**

User settable Ratio/Bias values (locally or remotely) are applied to the process variable to directly affect output without using PID.  
 Bias Range -999 to +9999 Engineering Units  
 Ratio Range 0.01 to 99.99 in 0.01 steps

**Anti-Reset Windup**

Reduces overshoot by inhibiting integral action. Standard on all control forms except On/Off and Auto/Manual Ratio/Bias.

**Reverse Output**

The dc current control output can be set to be "Reverse" so that an "Up is always open" strategy can be used with reverse-acting final control elements. Example; reverse output will provide a 20 mA at 0% to 4 mA at 100% control output.

**Output Limiting**

High Limit Low limit to 108% in 0.1% steps  
Low Limit 0 to high limit in 0.1% steps

**Auto/Manual**

Procedureless, bumpless transfer if selected

**Manual Output**

0 to 108%

**Set-Point Limiting**

Minimum and maximum limits can be set

**Control Action**

Direct or reverse

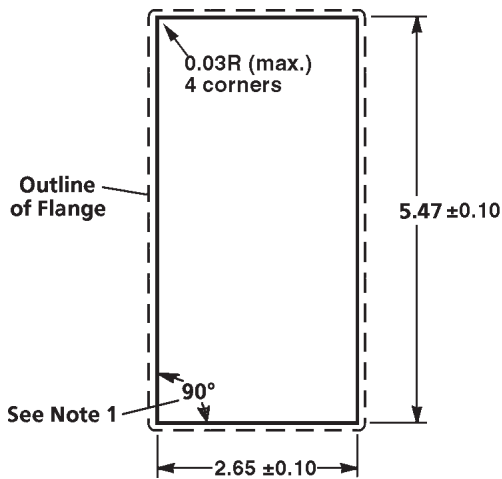
**OPERATOR KEYS****Key Type**

Seven tactile feedback keys; used for operator interface and instrument set-up.

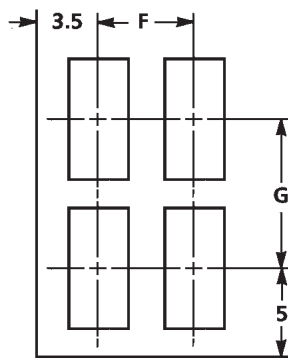
**INSTRUMENT LANGUAGE****Type**

English

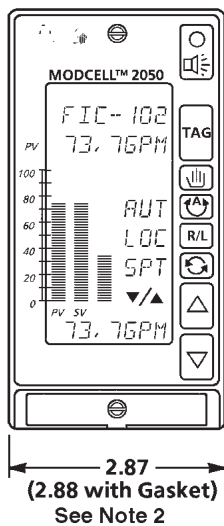
**DIMENSIONS**



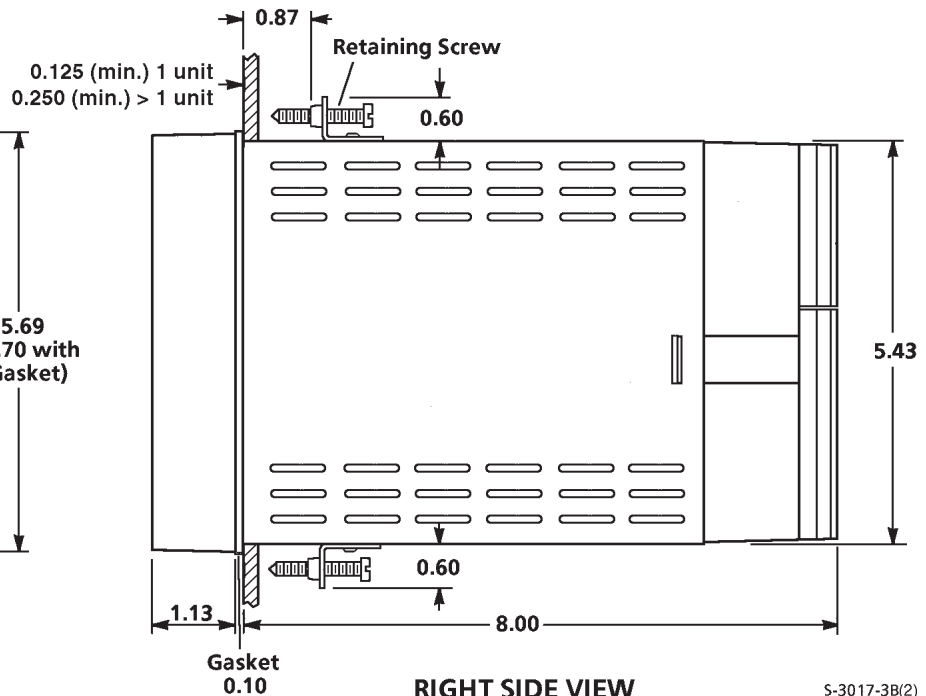
**PANEL CUTOUT**



Center-to-Center Distance	F	G
Recommended	4	8
Minimum	3.5	6.5



**FRONT VIEW**



**RIGHT SIDE VIEW**

S-3017-3B(2)

Inches	mm
0.10	2.5
0.60	15.2
0.87	22.1
1.13	28.7
2.65	67.3
2.87	72.9
2.88	73.2
3.5	88.9

Inches	mm
4.00	101.6
5	127.0
5.43	137.9
5.47	138.9
5.69	144.5
5.70	144.8
6.50	165.1
8.00	203.2

**Note:** 1. When mounting housing in panel cutout or rack and panel mounted bezel, turn retaining screws until point of screw touches rear of panel or bezel. Overtightening of retaining screws will distort housing. Housing must be square after retaining screws are tightened.  
 2. MODCELL 2051R does not use the gasket and has a bezel width of 2.735" (69.47mm). The panel cutout may be the same as for the 2050R.

### Model Number Designation

<b>CONTROLLER</b>	<b>205</b> 01 - 03	04	<b>R</b> 05	06	07	08	09	10	11	12
<b>Base Number</b> MODCELL 2050R Single Loop Controller MODCELL 2051R Single Loop Controller for replacement of Foxboro 62H and SPEC 200 (see accessories below)		0								
<b>Instrument Power</b> 85-250 V rms, 50-400 Hz 20-50 V dc or 20-35 V rms, 50-400 Hz (NOT available with Electrical Code 12)				Z						
<b>Electrical Code</b> EU EMC Compliant CSA / FM Certified Class 1, Division 2, Groups A,B,C,D (see Note 1)				A		1 2				
<b>Option Board</b> None 2nd isolated universal analog input, 2nd non-isolated analog output, RS-485 Communications Hardware							0			
<b>Firmware Version</b> Version 2								1		
<b>Model</b> 1st design level								0 2		B

Note 1: the 2050R and 2051R controllers are no longer available with UL listing

### ACCESSORIES

Option card (RS-485 communications, 2nd universal analog input, 2nd analog output)	2050NZ10100A
QuickScan QS-1300 Conversion Accessory without cable	2050FZ00000A
QuickScan QS-1300 Conversion Accessory with Direct Connect Cable	2050FZ00001A
Foxboro Spec 200 Conversion Accessory without cable	2051FZ10000A
Foxboro Spec 200 Conversion Accessory with Direct Connect Cable (see note 2)	2051FZ10001A
Foxboro 62H, 100S Conversion Accessory (no cable)	2051FZ20000A

Note 2: If you are maintaining the 0 to 10V dc I/O signals of the SPEC 200 architecture, this direct connect cable option must be used. The cable is not required when making field connections directly to the basic terminations of the 2051R.

[www.micromodautomation.com](http://www.micromodautomation.com)

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Printed in USA (05.5.04)

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