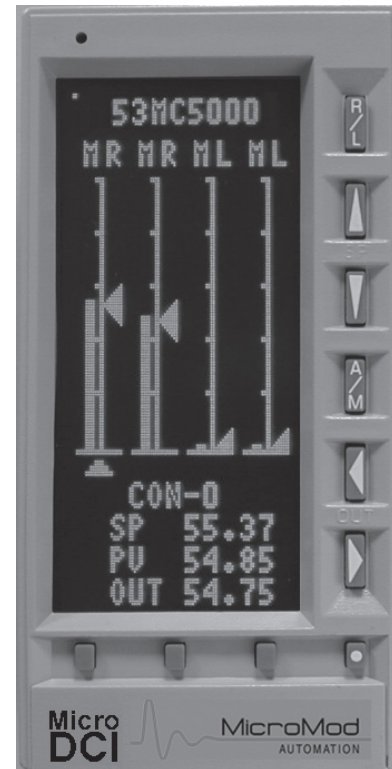


## MICRO-DCI™ Process Control Station Series 53MC5000

- **One, Two or Four loops of control with real-time clock, math, logic and sequence control**
- **High Visibility dot matrix operator display in standard or high resolution**
- **Library of standard, easily modified Controller Templates**
- **Standard and custom displays with trending and graphics**
- **Easy configuration with function blocks and configurable modules**
- **High-level programming option**
- **Easy-Tune™ PID self-tuning algorithm**
- **Standard RS-232/485 serial communication port and RS-232 configuration port**
- **Optional Dual high speed (2 Mb) highway with Peer-to-Peer communication**
- **Optional PLC and Printer communications interface**



The 53MC5000 is a multiloop, multifunction Process Control Station designed to perform any process application, from simple PID to the most complex control strategy. It combines DCS-style control algorithms with the discrete I/O handling and sequence control of a PLC in one compact package. The high-visibility dot matrix display is available in normal and high-resolution format and supports customized graphic screens and trending in addition to standard operating displays.

The 53MC5000 is available in One, Two, or Four-loop control versions, and provides

expansion capability in Functionality, Hardware, and Software allowing users to select only the functions required for a given application. Option boards provide additional discrete inputs & outputs, analog inputs & outputs, and communications. Software may be extended to permit the configuration method that best fits the application: the prewritten and configurable Flexible Control Strategy (FCS), configurable F-CIMs (Control Interconnection Modules), or F-TRAN, MicroMod Automation's high-level control language.

## FUNCTIONALITY

The 53MC5000 is available in one, two, or four-loop versions. The one-loop version provides basic functionality via preconfigured templates. The two- and four-loop versions can be expanded to provide extended functionality for more complex control applications.

### Standard

The basic functionality provides a library of 10 preconfigured control strategies which can be loaded using the controller keypad. One set of templates is available for each loop in the controller. The user need only enter process-specific data such as engineering unit ranges, tuning parameters and alarm limits to obtain a fully functioning controller. Each strategy can be modified from the front panel to allow additional control functions, and includes preconfigured operating displays. The basic templates include:

- o Single-Loop Controller
- o Analog Backup Controller (signal selection and automatic PID backup control with control element feedback)
- o Ratio PID controller
- o Auto/Manual Station
- o Ratio Auto/Manual Station
- o Two-loop controller (two- or four-loop version)
- o Single Station Cascade Controller (two- or four-loop versions only)
- o Two-loop Override Controller (two- or four-loop version only)
- o Four-loop Controller (four-loop version only)
- o Dual Cascade Controller (four-loop version)

The PID control loops provide proportional, integral and derivative control, local/remote setpoint with ratio and/or bias, setpoint & output tracking, setpoint & output limiting, setpoint & output rate-of-change limiting, feedforward, high/low alarms and process variable retransmission. Each controller also includes eight trend modules with user-selectable recording rates and sampling methods, and eight totalizer modules with user-configurable scale factor, rollover, dropout and reset values.

The basic templates can be modified using modules to include additional functions:

- o Math – polynomial equations, exponential, log, square root, comparator (greater, greater or equal, less, less or equal)
- o Extended Math – piecewise characterization, 3<sup>rd</sup> and 11<sup>th</sup> order polynomial characterization, linear and square-root compensated gas flow
- o Logic – and, or, not, and not, or not, xor, latch

### Extended Programmable

The Extended Programmable version of the controller provides a means of selecting and interconnecting function blocks for additional flexibility, and a high-level programming language for the more advanced math and logic requirements of batch and model-based control. Functions available with the Extended Programmable option include:

#### Numerical Operations

- Pre-written selectable equations
- Add, Subtract, Multiply, Divide
- Square Root
- Compare
- Absolute value
- Duplicate
- Get Pulse Input Data
- Log (base 2)
- 2x, X to the power Y, Yx, Swap (X $\leftrightarrow$ Y)
- Totalize

#### Logical Operations

- AND
- OR
- XOR
- Duplicate
- Invert

#### Control Modules

- PID algorithm
- Setpoint Generation
- Auto/Manual Switching
- PV Deviation

#### Easy-Tune

Easy-Tune is MicroMod's self-tuning algorithm included as standard in all versions of the controller. This algorithm estimates the process as first order and calculates the process gain, first order time constant, and deadtime. Self-tuning can be continuous or on-demand and calculated coefficients can be automatically entered or displayed for confirmation prior to entry into the control loop.

## PROCESS I/O

The 53MC5000 provides standard and expansion I/O.

### Standard I/O

All versions of 53MC5000 controller include:

- o Four analog (1-5V) inputs
- o Two analog (4-20mA) outputs
- o Two discrete inputs
- o Two discrete outputs

The standard controller provides local terminations on the rear of the chassis. A Cord Set option provides a remote termination board assembly that allows you to locate the terminations for standard I/O up to 5 feet from the controller.

### Optional Expansion I/O

Up to three Dual Relay boards can be added without the use of the Expansion Chassis. Each board provides two SPDT, 24V relay outputs with 10A, 240V contacts.

The Expansion-Ready Chassis option provides slots for the addition of one analog I/O option board, one discrete I/O option board, and two communication option boards.

Available I/O option boards are:

- o 6 DI/DO – six discrete contact inputs and four discrete SPST contact outputs
- o 16 DI/DO – any combination of 16 discrete signals (inputs or outputs). This board uses plug-in modules to select voltage for individual signals.
- o Single-Channel Analog Input – provides one additional analog input, used with an analog conversion module to select RTD, thermocouple, voltage, millivolt or current.
- o Multi-Channel Analog I/O – four analog inputs (0-20mA or Frequency), two analog outputs and one universal analog input (using analog conversion module)

## COMMUNICATIONS

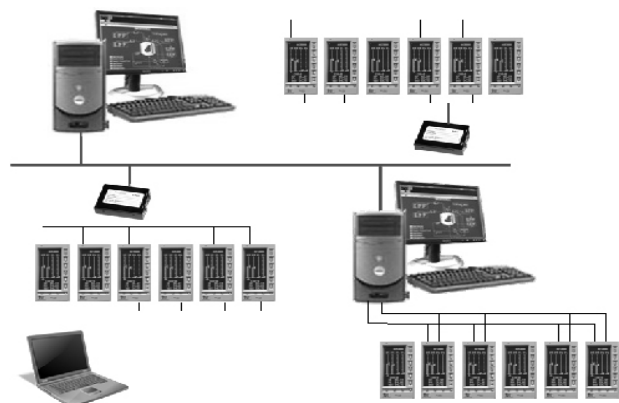
Every controller includes standard DataLink serial communication. DataLink allows monitoring and configuration over an RS-422/485 network. Up to two communication option boards can be added to the 53MC5000 in any combination.

Up to two high-speed, peer-to-peer Micro-Link networks can be added to a controller and used independently or as redundant highways between controllers.

The SCADA Adapter provides a way of connecting a network of controllers to a variety of communication devices such as modems and fiber-optic converters.

The PLC/Printer Interface allows connection of the 53MC5000 controller to a PLC for bidirectional data exchange. This option provides the capability to transfer logical bit indicators and floating point variables to or from devices via Modbus RTU, Allen-Bradley, Siemens S5, Koyo PLCs and OPTO 22 digital and analog I/O. In Modbus RTU mode the 53MC5000 can act as either a master or slave device. The interface is also capable of sending serial output data to a printer, in either the resident standard format or user-generated, free-format datalog programs.

The Micro-DCI Communication Services software provides seamless integration of 53MC5000 controllers with MicroMod's Micro-PWC operations and information software. In addition, an OPC server is included to allow integration with most popular HMI packages on the market. With MicroMod's E-Port gateway, the controllers can be connected to an Ethernet network creating a powerful system that combines the security and integrity of local control with the information and operations flexibility of a distributed system.



## OPERATOR DISPLAY

The bright, highly visible dot matrix display uses gas plasma technology to provide a high level of information for ease of operation. The combination of displays and front panel keys provides a broad range of operator functions far beyond the capabilities of the traditional panel-mounted controller.

The operator display is available in two versions: standard and high-resolution. The Standard display provides 48x96 pixel resolution. The High-Resolution display provides 96x192 resolution for better graphics and larger alphanumeric characters, and access to the improved front-face configuration menu system. In addition the high-resolution display can be removed and replaced without removing power from the instrument.

A set of standard display screens is provided with every controller to facilitate configuration. These include:

- o Single Loop
- o Single Loop with Process Variable Trending
- o Two Loop\*
- o Four Loop\*\*
- o Parameter – up to eight password protected displays for parameter entry (alarm limits, tuning constants etc.)
- o Alarm/Status Display
- o Totalizer
- o System Status

\*with two-loop or four-loop controller only

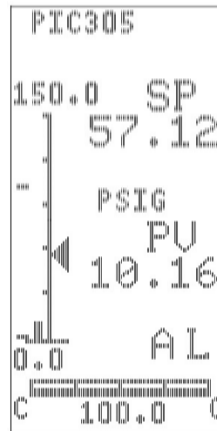
\*\* with four-loop controller only

Active alarm condition is indicated on the top line of the loop displays and as illuminated segments to the left of the process variable bargraph.

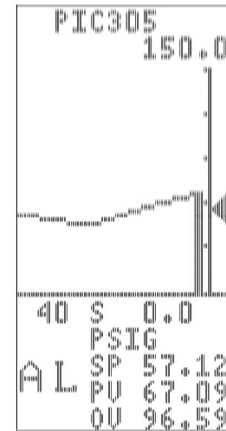
When in alarm condition, the bargraph will flash and a flashing text message on the alarm line indicates the type of alarm. The Alarm/Status display provides indication for up to eight alarm points and/or discrete parameters. Alarms are acknowledged using the MODE button on the front panel.

In addition to the standard displays, application-specific displays can be developed by the user, incorporating static and dynamic data as well as graphics for sequence and batch operation, discrete device handling, recipe selection or multiple variable indications.

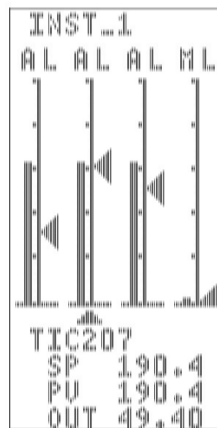
The illustrations below show sample screens from the high-resolution version of the 53MC5000 display.



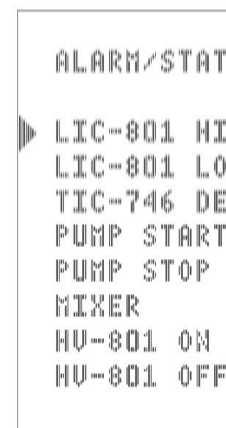
Single Loop



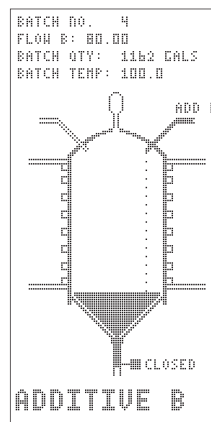
Single Loop with PV Trend



Four Loop



Alarm/Status



Custom Graphic



Parameter Display

## CONFIGURATION

Control strategies are implemented in the 53MC5000 using one of the following methods:

- o Selecting a Flexible Control Strategy (FCS) from the library of preconfigured templates
- o Selecting and connecting standard or custom F-CIM modules for more flexibility
- o Developing an F-TRAN program for complex applications and custom displays

### FCS (Flexible Control Strategy)

FCS is a library of control strategies that provide a preconfigured sequence of function blocks that can be modified to fit most process applications. Simply select a strategy and enter the specific process parameters. The preconfigured strategy can be enhanced by adding math, totalization, and logic modules.

### F-CIM (Control Interconnection Module)

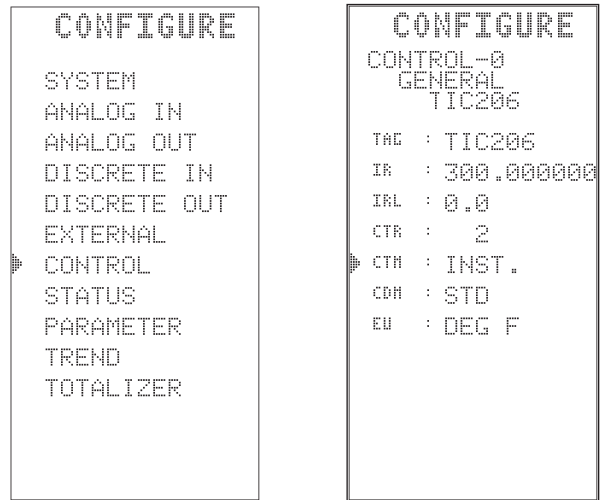
For more complex applications, F-CIM provides an easy-to-use configuration technique which connects control modules in any sequence desired. Most modules have no limit on the number of times they can be used. For special applications custom modules can be developed.

### F-TRAN

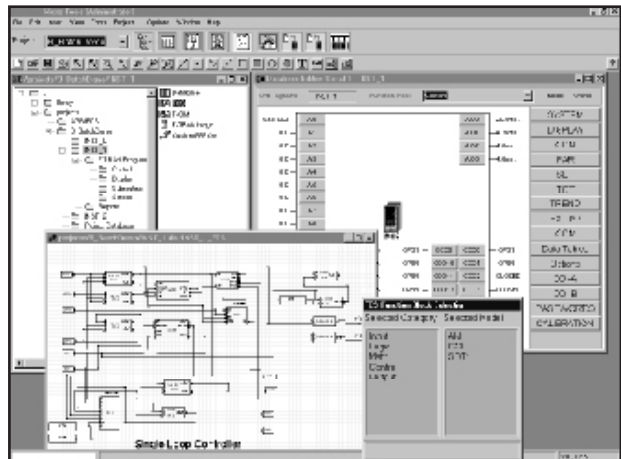
F-TRAN is a proprietary, high-level programming language used to develop custom control strategies such as batch control, deadtime compensation, and other mathematical model-based control functions. Forward and backward jumps and skips and indirect addressing provide nearly unlimited flexibility. Prewritten subroutines are included in a library and greatly simplify custom control program development. F-TRAN is included with the Extended Functionality and requires Micro-Tools software.

## Configuration Methods

FCS and F-CIM are included in the Standard Functionality option. Configurations can be implemented through the front panel of the controller using the display and keypad, or with MicroTools configuration software. The high-resolution display provides an easy-to-use, enhanced menu system which greatly facilitates configuration and eliminates the need to know database locations.



Micro-Tools is a graphical Windows-based tool for creating, editing, downloading, documenting and debugging 53MC5000 control strategies on a personal computer. It supports development of FCS, F-CIM and F-TRAN based configurations. It provides automatic documentation of the configuration, online context-sensitive help, and live debug and download.



**Model Number Designation** - See Notes on following page for explanation of functionality and options

	53MC5	01	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Process Control Station	53MC5																	
No. of Control Loops (see Note 1)																		
One Loop		1																
Two Loops		2																
Four Loops		4																
Power Requirements																		
AC (110/220, 220/240 Vac 50/60 Hz)				1														
DC (24 Vdc)				2														
Functional Requirements (see Note 2)																		
Standard					1													
Extended Programmable (Two- or Four-loop versions only)					2													
Design Level							B											
Display Type																		
Standard Resolution (48x96 pixels)								2										
High Resolution (96x192 pixels -see Note 3)								4										
Main Rear Terminal Requirement (see Note 4)																		
Standard Rear Terminal Board									1									
Cord Set Connector (for remote termination of standard I/O - includes backplane, ITB and 5 ft. cable. For special cable lengths see Accessories)									5									
Chassis																		
Standard (supports standard I/O only)										A								
Expansion Ready (required for any I/O or communication options )										B								
Safety Classification																		
General Purpose											A							
Factory Mutual Class 1, Division 2 Class A,B,C,D											B							
Discrete I/O Option - includes PCB, 5 ft cable and ITB																		
Not Implemented												X						
6 DI (26V max) and 4 DO (150mA, 50V max.) - no additional modules required												C						
16 DI/DO - requires plug-in modules, select from Accessories												F						
DDI-A Printer / PLC Interface (includes PCB, RS-232/485 converter ITB & 5 ft cable)												M						
Dual Relay Board (adds two SPDT, 24 Vdc powered relays with 10A, 240 Vac contacts)																		
Not Implemented													X					
One board													1					
Two boards													2					
Three boards													3					
Analog I/O Option (see Note 6)																		
Not Implemented														X				
Single Channel (requires Analog Conversion Module - see next line)														A				
Multi Channel Analog I/O (analog conversion module required if using universal input)														D				
Analog Conversion Modules (Required for Analog I/O option - select additional modules from P-DCI-Spares)																		
Not Implemented															X			
0-20mA															A			
0-5Vdc															B			
RTD 100 Ohm, -100 to 100 C															C			
Thermocouple Type J, 0 to 760 C															D			
Communication A Option																		
Not Implemented																	X	
Datalink cable and ITB (connect between controllers with Cord Set terminations for standard I/O)																	C	
MicroLink-A - high speed host & peer-to-peer communications (includes PCB, 2.5 Ft cable and ITB)																	F	
Communication B Option (Includes PCB, cable and ITB)																		
Not Implemented																		X
MicroLink-B Communications (provides redundant MicroLink when ordered with MicroLink A.)																		C
DDI-B Printer/PLC Interface (includes PCB, RS-232/485 converter ITB & 5 ft cable)																		J
Conformal Coating																		
Standard																		A

**ACCESSORIES****Configuration Software**

MicroTools for Windows - see specification sheet S-DCI-53MT600

**Communications**

SCADA Adaptor for radio modem connection (DataLink only) 686B615U01

**Mounting & Installation Hardware**

Channel for wall mounting remote termination boards (4 ft. length)	129A003U03
DIN Rail Adaptor Kit	614B958U01
DIN to 3x6 Panel Mounting Adaptor	614B762U02
Panel Filler Kit	612B403U01
Horizontal Multiple Mounting Trim Collar - see Spare & Expansion Parts P-DCI-Spare	
Rear-of-case Tag	388B708A11
Front Door Cover	325A095U01
250-ohm Input Resistor for 4-20mA signals	161M417U05

**Digital Input/output Modules for 16 DI/DO Option:**

## Digital Input Modules

5Vdc external power	
12-32Vac / 10-32Vdc	2004AP10120A
2.5 - 28Vdc	2004AP10100A
90 - 140Vdc	2004AP10140A
180 - 280Vdc	2004AP10150A
24Vdc external power	
12-23Vac / 20-32Vdc	G4IDC24
90-140Vac/dc	G4IAC24

## Digital Output Modules

5Vdc external power	
5 - 60Vdc	2005AP21100A
5 - 200 Vdc	2005AP21110A
12 - 140 Vac	2005AP21120A
24Vdc external power	
12-140Vac	G4)AC24
24-280Vac	G4OAC24A
5-60Vdc	G4ODC24

Note: Additional digital I/O modules may be purchased directly from OPTO 22.

**Notes:**

## 1. Functionality

Standard Functionality provides FCS and F-CIM configuration (pre-configured, modifiable control strategies and function-block configuration).  
Extended Functionality provides F-TRAN high-level language programming.

## 2. Main Rear Terminals

Standard rear terminal board provides direct connection for standard I/O on the back of the controller.  
Cord Set Connector allows remote connection of standard I/O only.

## 3. Display

The Standard Resolution display provides 48x96 pixel resolution. The High Resolution display provides 96x192 pixels and is required for hot-swap capability and access to the enhanced front-face configuration menu system.

## 4. Digital and Dual Relay I/O Options

6 DI / 4 DO option does not require any plug-in modules.  
16 DI / DO option requires plug-in digital modules and external supply voltage (5Vdc or 24Vdc).  
Dual Relay option may also be used with 6 DI / 4 DO or Standard Digital I/O as interposing relays.

## 5. Analog I/O Options

Single Channel Analog option provides one additional universal input. Input type is determined by selection of Analog Conditioning Module.  
Multi-Channel Analog option provides four additional analog inputs, two additional analog outputs, and one universal input. Input type is determined by selection of Analog Conditioning Module. Additional Analog Conditioning Modules are available; see Price Sheet P-DCI-Spares

## 6. Special Cable Lengths

All I/O and communication options are supplied with the option board (PCB), standard cable and ITB (termination board). For non-standard cable length select "Not Implemented" (X) in model number and specify PCB, cable and ITB separately from Parts List P-DCI-Spares.

## Engineering Specifications

### **OPERATING CHARACTERISTICS**

Power Requirements:

21 to 28 VDC

120 VAC +/- 10%, 50/60 Hz

220/240 VAC +/- 10%, 50/60 Hz

Power Consumption:

AC Operation: 36 VA max

Internal Power Supply

Available Power Output for Transmitters:

24-26V dc, 80 mA, short circuit protected

Output Ripple: 200 mV p-p maximum

### **ENVIRONMENTAL CHARACTERISTICS**

Enclosed temperature controlled locations (class A and B per ISA S71.01 1985)

Ambient Temperature Limits: 4 to 52°C (+40 to 125°F)  
for single mount; 4 to 40°C (+40 to 103°F) for  
high density installations

Relative Humidity Limits: 10 to 90% maximum

Temp. Effect on Accuracy: +/-0.28% per 28° (50°F)  
from reference temp. of 25°C (77°F)

Enclosure Classification: NEMA type 1/IEC 529 Type IP20

### **PHYSICAL CHARACTERISTICS**

Materials of Construction

Case: Steel

Finish: RAL 9002, Light Gray

Circuit Boards: Glass epoxy

Bezel: ULTEM 1000 (Polyetherimide Resin)  
Flamability-UL94 5V

Dimensions: DIN case only

2 27/32"W x 5 21/32"H x 12 26/32"L  
(72 mm W x 144 mm H x 305 mm L)

Mounting: Flush panel (1/8" to 1" Thickness)

Panel Cutout: 2 11/16"W x 5 7/16"H (68 mm W x 138 mm H)

Weight: 5 lbs. (approximate)

Electrical Connections

Rear-of-case compression-type terminal strips

Front Panel

Display: 48 x 96 pixel or 96 x 192 pixel (dot addressable)

Push-buttons: 10 (membrane type switches)

### **MICROPROCESSOR SAMPLING & UPDATE**

Program scan rate: selectable from 0.05 to 1.5 second

Input Signal Sampling Rate

Analog: 0.05 s for all inputs

Contact: 0.05 s for all inputs

Display Update: Configurable, every 1-15 Program Scans

Output Signal Update: same as Program Scan Rate

### **CONTROL RANGES**

Proportional Band: 2 to 1000%, and "off"

Integral: 0.02 to 200 minimum, or Manual

Reset from 0 to 100%

Derivative: 0.01 to 8 minimum and "off"

### **STANDARD INPUT & OUTPUT SIGNALS**

#### **Analog Inputs**

(All analog inputs are referenced to signal common.)

Quantity: 4 Standard (Additional optional - See  
Single Channel or Multi-Channel Analog  
Option Board)

Resolution: 12 bit

Signal Range:

Analog inputs 0 and 1: 0-20mA or 4-20mA

Analog inputs 2 and 3: 0-5vdc or 1-5 vdc

Input Impedance: 1 megohm minimum for voltage  
inputs; value of ranging resistor for current  
signals.

Measurement Accuracy: +/-0.1% of span

Note: the standard rear terminal board has the appropriate  
resistors on ANIO and ANI1. If the input signal is voltage,  
the resistors should be removed.

#### **Contact Inputs**

Quantity: 2 (Additional optional - See 6DI/4DO Option  
Board or 16 DI/DO)

Type: Discrete inputs internally powered with  
4 volts @ 2 mA dc maximum (contact inputs  
are referenced to power common.)

Permissible Contact Resistance: 100 ohm maximum

Open/Close Contact Duration:

for open recognition: 0.05 s minimum

for close recognition: 0.05 s minimum

(Voltage inputs and CCI are sampled  
every 0.05 seconds)

Contact Recognition Level

Closed: 1 V dc max or less than 100 ohms

Open: 4 V dc to 15 v dc or 10 mA max

#### **Analog Outputs**

(All analog output signals are referenced to  
power common.)

Quantity: 2 Standard (Additional optional - See Multi-  
Channel Analog Option Board)

Signal Range: 0 - 21.84 mA dc (4 - 20 mA dc typically)

Load Resistance: 0-750 ohms

Accuracy: +/- 0.2% of span

(Current output is refreshed every 0.05

seconds. Output is updated every 0.15

seconds in a standard control strategy or at  
selected 0.05 second intervals in user  
specified control strategies.)

#### **Discrete Outputs**

Quantity: 2 (Additional optional - See 6DI/4DO Option Board  
or 16 DI/DO)

Type: Unpowered discrete solid state output.

Configuration: Single pole single throw, N.O., or N.C.  
referenced to power common.

Voltage: 30 V dc max.

Current: 50 mA dc max.



**I/O OPTIONS****SINGLE CHANNEL ANALOG OPTION BOARD**

## Analog Inputs

Quantity: 1; Isolated  
 Resolution: 12 bits  
 Signal Range: Universal input; high-level, RTD  
 or thermocouple signal (See Table 1).  
 Measurement Accuracy: +/-0.1% Full Scale

Note: The optional rear terminal board provides terminal connections (TB3) for the Single Channel Analog Option universal input (ANI 8).

**MULTI-CHANNEL ANALOG OPTION BOARD****Analog Inputs**

Non-Isolated  
 Quantity: 4  
 Resolution: 12 bits  
 Signal Type:  
 Current  
 Signal Range: 0 - 21.84 mA  
 Measurement Accuracy  $\pm 0.2\%$  of span  
 Frequency  
 Signal Range: 9 - 25,000 Hz  
 Input Impedance: 47K ohm in series with  
 0.22 MFD capacitor  
 Measurement Accuracy:  $\pm 0.2\%$  of span  
 Signal Amplitude: 4 - 25 V p-p  
 Pulse Width: 20 microseconds min

Isolated (Optional)  
 Quantity: 1  
 Resolution: 12 bits  
 Signal Range: Universal input (optional); high-level,  
 RTD or thermocouple signal (See Table 1)  
 Measurement Accuracy: +/-0.1% Full Scale  
 Input Impedance: 1 megohm minimum for voltage  
 inputs; value of ranging resistor for current  
 signals.  
 Measurement Accuracy: +/-0.1% Full Scale

Note : The standard rear terminal board has the appropriate resistors on ANIO and ANI1. If the input signal is voltage, the resistors should be removed.

**Analog Outputs**

(All analog output signals are referenced to power common.)

Quantity: 2  
 Signal Range: 0 - 21.84 mA dc  
 Load Resistance: 0-640 ohms  
 Accuracy: +/- 0.2% of span

**6 DI/4 DO OPTION BOARD****Contact Input Specifications**

Quantity: 6  
 Operational Type: Optically coupled Phototransistors  
 Input Connections  
 Voltage Input mode: 2 term. (+ and -) each input  
 Contact Input mode: 2 terminals each input (1  
 common)  
 Recognition level  
 Voltage Input mode: Energized - 12 to 26 Vdc range,  
 50 ohm max. resistance, non energized 1Vdc max.  
 Contact Input mode: Energized - 22 to 26 Vdc range, 500  
 ohms max., non-energized - 60k ohms min, 26 Vdc max.  
 Recognition time: 50 milliseconds  
 Maximum Input Voltage: 26 Vdc  
 Common Mode Limit: 50 V with respect to chassis ground  
 Transient Rejection: Meets IEEE Std. 472-1974  
 for Surge Withstand Capability

**Contact Output Specifications**

Quantity: 4  
 Operational Type: Form A, SPST, normally open, optically  
 isolated MOSFET switch  
 ON Resistance: 15 ohms maximum  
 Load Voltage Limit: 50 Vdc or peak AC  
 Load Current: 150 mA  
 Off State Leakage Current: 1 mA maximum  
 Common Mode Limit: 50 V with respect to chassis ground  
 Contact Protection: 250 mA Fuse  
 Transient Rejection (ITB): Meets IEEE Std. 472-1974  
 for Surge Withstand Capability

**CCO Relay ITB Specifications**

Number of Outputs: 2  
 Operational Type: SPDT  
 External Power Requirement: +24 Vdc, 200mA  
 Contact Rating: 10 Amp Resistive, 1 Amp Inductive, 250 Vac  
 Maximum

**16 DI/ DO OPTION BOARD****Contact Input/Output Specifications**

Quantity: 16  
 Operational Type: Opto 22 modules  
 External Power Requirements: +5 Vdc, 224 mA or +24 Vdc,  
 420 mA

**16 DI/DO ITB Specifications**

See Table 2 for a listing of applicable module types.

**Table 1: Analog Conditioning Modules Specifications**

Signal Type	mV	Voltage	Current	RTD	Thermocouple
Accuracy	± 0.05% span	± 0.05% span	± 0.05% span	± 0.05% span	-----
Nonlinearity	± 0.02% span	± 0.02% span	± 0.02% span	± 0.05% span	- 25 nA
Stability vs Ambient Temperature					
Input Offset	± 1 µV/°C	± 20 µV/°C	-----	± 0.02°C/°C	± 1 µV/°C
Gain ± 25 ppm /°C	± 50 ppm /°C	-----	± 50 ppm /°C	± 25 ppm /°C	
Input Bias Current	± 3 nA	± 0.2 n	-----	± 3 nA	- 25 nA
Input Resistance					
Normal	5 M ohms	650 k ohms	-----	5 M ohms	5 M ohms
Power Off	40 k ohms	650 k ohms	-----	40 k ohms	40 k ohms
Input Protection					
Continuous	240 V rms max	240 V rms max	240 V rms max	240 V rms max	240 V rms max
Transient	IEEE-STD 472	IEEE-STD 472	IEEE-STD 472	-----	-----

**Table 2: Digital I/O Module Specifications**

**Digital Input Modules**

**5 V External Power**

2004AP10...	...100A	...110A	...120A	...130A	...140A	...150A
Input Voltage Range	2.5-28 Vdc	4-16 Vdc	10-32 Vdc 12-32 Vac	35-60 Vac/dc	90-140 Vac/dc	180-280 Vac/dc
Low logic input	1 V	1 V	3 V	9 V	45 V	80 V
Maximum input current	30 mA	45 mA	25 mA	6 mA	11 mA	6.5 mA
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

**24 V External Power**

	G4IDC24	G4IAC24
Input Voltage Range	2.5-28 Vdc	4-16 Vdc
Low logic input	3 V	45 V
Maximum input current	12-32 Vac 10-32 Vdc	90-140 Vac/dc
Response time	5 ms	0.1 ms
Input resistance	1.5K ohms	

**Digital Output Modules**

**5 V External Power**

2005AP21...	...100A	...110A	...120A	...130A	...140A (NC)
Output voltage range	5-60 Vdc	5-200 Vdc	12-140 Vac	24-280 Vac	24-280 Vac
Maximum output current	1 mA	0.55 A	1 mA	1 mA	1 mA
Response time	0.75 ms	0.75 ms	1/2 cycle	1/2 cycle	1/2 cycle
Max. off-state leakage @ nominal voltage	1 mA ac	2 mA ac	5 mA ac	2.4 mA ac	2.5 mA ac

**24 V External Power**

	G4ODC24	G4OAC24	G4OAC24A
Input Voltage Range	5-60 Vdc	12 - 140 Vac	24-180 Vac
Maximum input current	12-32 Vac 10-32 dc	90 - 140 Vac/dc	5-60 Vdc
Response time		0.75 ms	1/2 cycle
Max. off-state leakage @ maximum voltage	1 mA	5 mA	2.5 mA

## COMMUNICATIONS

### Standard Micro-DCI Data link

Type: RS-485/422, four wire, asynchronous

Speed: Selectable - all standard baud rates between 300 and 9600; plus 14,400 and 28,800

Mode: Binary

### Optional Micro-Link Communication

Type: RS-485/422, four wire, CSMA/CD, peer-to-peer

Speed: Selectable - up to 2 Megabit/sec.

Mode: Binary

### Optional PLC/Printer Communication

Type: Converts RS-485/422, four wire, to RS232

Communication Baud Rate: 600, 1200, 2400, 4800, 9600, 19.2k, 28.8k, 38.4k

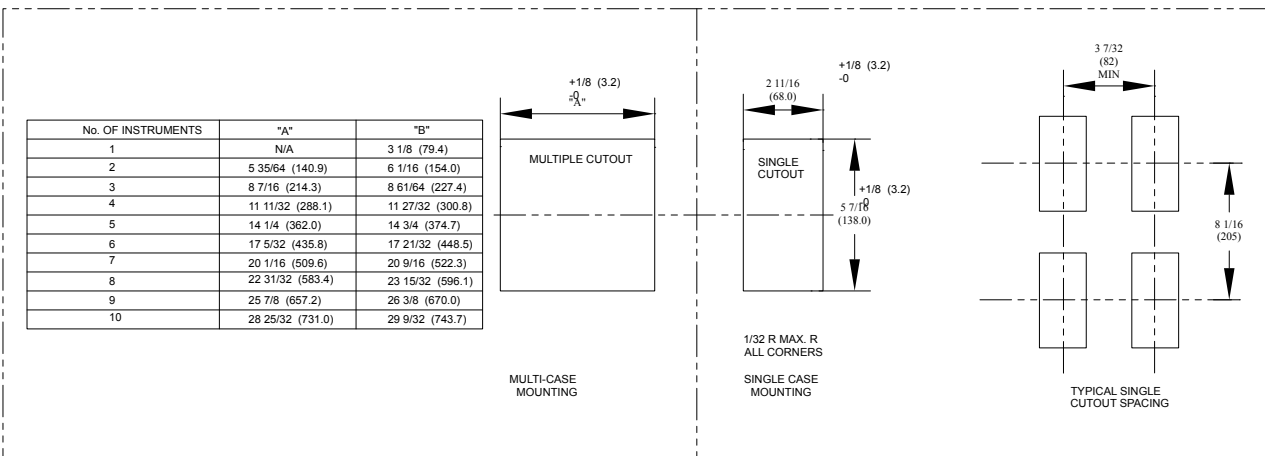
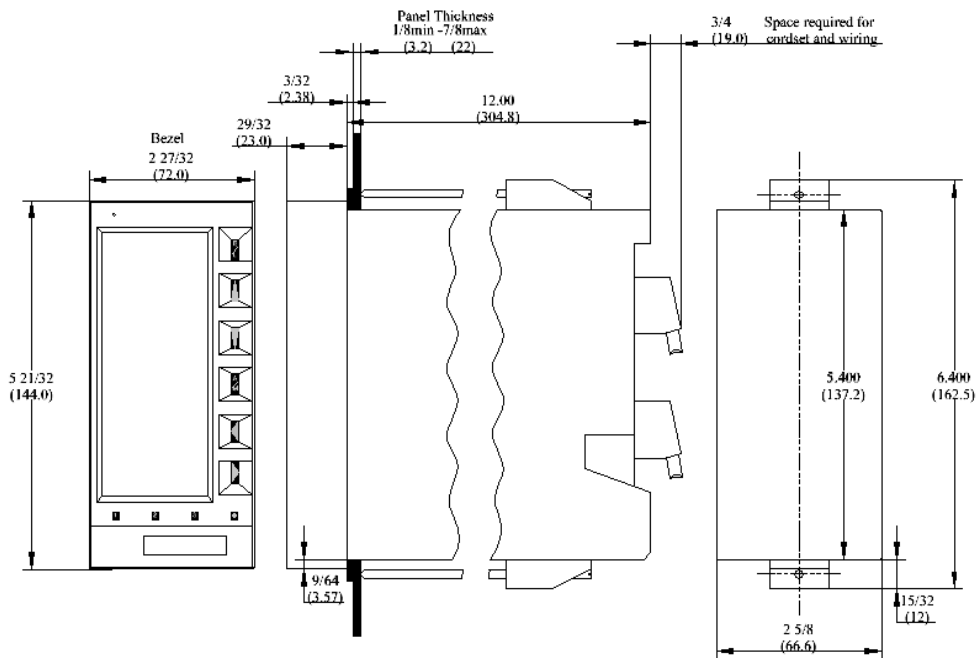
Communication Parity: Even, Odd or None

Set-Up: 8 bits, 1 stop

PLC Protocols: Allen-Bradley™ DF-1, OPTO 22 Serial I/O communications, Modbus RTU, Siemens 3964

Printer Protocol: RS-485/422 serial data, to RS-232

## MOUNTING DIMENSIONS



**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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