MiniOCS and MiniRCS

User Manual for
MiniOCS and MiniRCS Models

Mini Hardware

5 September 2001 **GFK-1687B**

Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Fanuc Automation assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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REVISIONS TO THIS MANUAL

This version (GFK-1687B) of the *Mini Hardware Manual* contains the following revisions, additions, and deletions:

1. Added the following MiniOCS modules.

IC300OCS038 / IC300OCS068	IC300OCS055 / IC300OCS085
IC300OCS049 / IC300OCS079	IC300OCS057/ IC300OCS087

2. Added a **Safety Warning** in the *Installation/Safety* section of the data sheets to the modules that are listed after the warning.

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

Module	Revision (or higher)
IC300OCS035 / IC300OCS065	E
IC300OCS036 / IC300OCS066	E
IC300OCS037 / IC300OCS067	E
IC300OCS045 / IC300OCS075	E
IC300OCS047 / IC300OCS077	E

3. Added a **Safety Warning** in the *Wiring* section of the data sheets to the modules that are listed after the warning. **Be sure to check each data sheet for the actual fuse size required**.

Warning: To protect the module and associated wiring from load faults, use external fuse ( ) as shown.

Module	Revision (or higher)
IC300OCS035 / IC300OCS065	E
IC300OCS036 / IC300OCS066	E
IC300OCS037 / IC300OCS067	E
IC300OCS045 / IC300OCS075	E
IC300OCS047 / IC300OCS077	E

4. Added a **Safety Warning** in the *Wiring* section of the data sheets to the modules that are listed after the warning. **Be sure to check each data sheet for the actual fuse size required**.

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS045 / IC300OCS075
IC300OCS047 / IC300OCS077
IC300OCS049 / IC300OCS079

5. Added a **Safety Warning** in the *Wiring* section of the data sheets to the modules that are listed after the warning. Output pins are specified for each module.

Warning: Wiring the line side of the AC source to loads connected to outputs ( ) through ( ) and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS045 / IC300OCS075
IC300OCS047 / IC300OCS077
IC300OCS049 / IC300OCS079

6. Added a **Safety Warning** in the *Wiring* section of the data sheets to the modules that are listed after the warning. Output pins are specified for each module.

Warning: Wiring the positive side of the DC source to loads connected to outputs ( ) through ( ) and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

IC300OCS032 / IC300OCS062
IC300OCS034 / IC300OCS064

7. Added electro-mechanical relay compliance information in the *Internal Schematic Circuit* section of the data sheets to the following modules:

IC300OCS035 / IC300OCS065
IC300OCS037 / IC300OCS067
IC300OCS045 / IC300OCS075
IC300OCS047 / IC300OCS077
IC300OCS049 / IC300OCS079

8. Added a statement in the *Internal Circuit Schematic* section of data sheets for modules containing transient voltage suppressors (transorbs) used on output circuitry.

IC300OCS031 / IC300OCS061
IC300OCS032 / IC300OCS062
IC300OCS034 / IC300OCS064
IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS042 / IC300OCS072
IC300OCS045 / IC300OCS 075
IC300OCS047 / IC300OCS077
IC300OCS049 / IC300OCS079
IC300OCS052 / IC300OCS082
IC300OCS053 / IC300OCS083
IC300OCS055 / IC300OCS085
IC300OCS057 / IC300OCS087

9. Added **Digital Input Chart** to the following SmartStack modules.

IC300OCS032 / IC300OCS062
IC300OCS033 / IC300OCS063
IC300OCS034 / IC300OCS064
IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS041 / IC300OCS071
IC300OCS042 / IC300OCS072
IC300OCS045 / IC300OCS 075
IC300OCS047 / IC300OCS077
IC300OCS052 / IC300OCS082
IC300OCS053 / IC300OCS083
IC300OCS055 / IC300OCS085
IC300OCS031 / IC300OCS061

10. Added A **Derating Output Chart** to the following SmartStack modules.

IC300OCS031 / IC300OCS061
IC300OCS032 / IC300OCS062
IC300OCS033 / IC300OCS063
IC300OCS034 / IC300OCS064
IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS042 / IC300OCS072
IC300OCS045 / IC300OCS 075
IC300OCS047 / IC300OCS 077
IC300OCS049 / IC300OCS079
IC300OCS052 / IC300OCS082
IC300OCS053 / IC300OCS083
IC300OCS055 / IC300OCS085
IC300OCS057 / IC300OCS087

11. Added an **Output Operating Area Chart** to the following SmartStack modules.

IC300OCS049 / IC300OCS079
IC300OCS053 / IC300OCS083
IC300OCS055 / IC300OCS085
IC300OCS057 / IC300OCS087

12. Added a statement in the *Configuration* section of all data sheets that the status of the I/O can be monitored in Cscape Software.

13. Added safety symbols in the *Installation/Safety* section to the following data sheets.

IC300OCS035 / IC300OCS065
IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS049 / IC300OCS079

14. Added information pertaining to applications in which two-wire proximity switches are used as sensors for discrete AC inputs.

IC300OCS036 / IC300OCS066
IC300OCS037 / IC300OCS067
IC300OCS038 / IC300OCS068
IC300OCS047 / IC300OCS077

15. Added the following MiniRCS Models.

IC300RCS061
IC300RCS062
IC300RCS065
IC300RCS066
IC300RCS067
IC300RCS075
IC300RCS077
IC300RCS071
IC300RCS072
IC300RCS079
IC300RCS082
IC300RCS083
IC300RCS085
IC300RCS087
IC300RCS063
IC300RCS064

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* Not available as a MiniRCS model.

CHAPTER 1: INTRODUCTION

1.1 Scope

The *MiniOCS and MiniRCS Hardware User Manual* provides specifications, installation, and configuration procedures for the MiniOCS/MiniRCS product line. **Individual data sheets containing information specific to each MiniOCS / MiniRCS model are also contained in the manual and are located in Appendix A.**

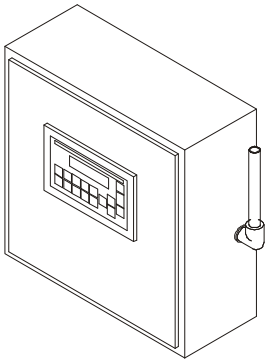


Figure 1.1 - Front View of MiniOCS (Shown on Door in Panel Box)

1.2 MiniOCS and MiniRCS Product Description

1.2.1 Functions and Features

The MiniOCS provides controller, I/O, operator interface, and optional networking capabilities in one unit. The MiniRCS has the same functionality as the MiniOCS except that it does not have local operator interface capabilities. Both the MiniRCS and the MiniOCS support a remote operator interface through a PC connected to the Mini unit's built-in network or serial port. The remote operator interface (Remote Text Terminal) is particularly useful when using the MiniRCS, which does not have a physical front panel screen or keypad.

The MiniOCS is mounted in a panel door; the MiniRCS is designed for backplate mounting. Both the MiniOCS and the MiniRCS can be used in CsCAN or DeviceNet networks. To use the MiniRCS in a DeviceNet network, a DeviceNet file can be downloaded from Cscape's Firmware Update Wizard.

A variety of MiniOCS / MiniRCS models are available. Each model comes equipped with one factory installed I/O board. Models of the MiniOCS / MiniRCS, which vary according to the type of I/O board installed, are available in non-network and network versions. Network versions contain an additional connector allowing connectivity to networks.

MiniOCS / MiniRCS devices have Serial and CAN (Controller Area Network) communication abilities. The units contain a standard 9-pin RS-232 port for programming/debugging, monitoring and network administration from an IBM-compatible PC. MiniOCS / MiniRCS models, which have built-in networking capabilities, use CsCAN (pronounced "Sea-scan") protocol and standard CAN network hardware. CAN-based network hardware is used in the controllers because of CAN's automatic error detection, ease of configuration, low-cost of design and implementation and ability to operate in harsh environments. The MiniOCS / MiniRCS can also be used in DeviceNet networks. Networking abilities are built-in to the MiniOCS / MiniRCS and require no external or additional modules. When several MiniOCS / MiniRCS units are networked together to achieve a specific purpose, the system acts like a large parallel-processing controller.

The MiniOCS / MiniRCS have standard features consisting of the following:

- 24 VDC powered
- One Internal I/O Module
- RS-232 Programming Port
- Integrated Bezel
- Real-Time Clock
- Flash Memory for easy field upgrades

1.2.2 Cscape Software

Cscape Software (pronounced "Sea-scape") is used with the MiniOCS / MiniRCS, OCS, and RCS products. (The part number for Cscape is IC300OSW232.) Cscape stands for **C**ontrol **S**tation **C**entral **A**pplication **P**rogramming **E**nvironment. The Windows-based software package is easy to use and aids in the integration of a CAN-based Distributed Control System. The program is used for configuring controllers and I/O Modules. Cscape is also used for programming MiniOCS / MiniRCS ladder logic, programming user displays for the MiniOCS, configuring the network for global digital and analog data, setting system-wide security and monitoring controllers in the system. Provided there is **one serial connection** to one node on the network (i.e., CsCAN Network), the operator has control over the entire system. The operator can upload, download, monitor and debug to any node on the network.

1.2.3 MiniOCS / MiniRCS Specifications

TBD = To Be Determined

Table 1.1– Physical Specifications

MiniOCS and MiniRCS		
Operating Temperature*	0°C to +50°C* (* Although the MiniOCS / MiniRCS withstands the temperature range of 0°C to +60°C, such temperatures can decrease the life of the display. The recommended rating is 0°C to +50°C.)	
Humidity	5% to 95% non-condensing	
NEMA Rating	NEMA 4X	
Primary Power Range	10-30VDC	
	Mini OCS	**Mini RCS**
Maximum Power Draw (Non-network Version)	200mA max. @ 24VDC	TBD
Maximum Power Draw (Network Version)	200mA max. @ 24VDC	TBD
Maximum Inrush Current ((Non-network Version)	900mA max. @ 24VDC for 1mS	TBD
Maximum Inrush Current (Network Version)	900mA max. @ 24VDC for 1mS	TBD
Ladder Execution Typical Execution Speed	2.0ms. per 1K of Boolean logic.	
CAN Power Range	12 – 25 VDC	
CAN Power Current	75mA maximum	
Serial	Standard 9 pin RS-232 for programming, monitoring, and network administration from a IBM compatible PC	
CAN	CsCAN Network / DeviceNet	
Input / Output	One factory-installed I/O board per model	
Keypad	10 user-programmable keys + , Esc, Enter and 4 direction keys Faceplate made of Marnot® XL Polyester by Tekra®.	
UL	See GFK-1754	
CE	See GFK-1755	

MiniOCS	
Height	4.4” (111.76mm)
Width	7” (177.80)
Mounting Depth	2.25” (57.15) (approximately 2.75” [69.85] including Ground Screw extension)
User Keys (MiniOCS Only)	17
Display (MiniOCS only)	2x20 LCD w/backlight; 3.2mm w x 5.55mm h characters
MiniRCS	
Height	4.13” (104.78mm)
Width	5.83” (147.98mm)
Mounting Depth	1.83” (46.48mm) (approximately 2.33” [59.18] including Ground Screw extension)

1.3 MiniOCS / MiniRCS Resources

1.3.1 Overview

This section defines the resource limits that a programmer needs to know when writing a program using the MiniOCS / MiniRCS.

A MiniOCS / MiniRCS combine local I/O (analog and digital), networking, and controller, into a single product. The MiniOCS also provides an operator interface (display and keypad). The controller portion of the MiniOCS / MiniRCS is programmed in ladder logic via the Windows-based Cscape™ (Control Station Central Application Programming Environment) package. Each MiniOCS / MiniRCS provide a set of resources for use by the ladder logic control program as indicated in Table 1.2. The table shows the resources available in MiniOCS / MiniRCS products. Note that although each register type inherently consists of either 1-bit or 16-bit registers, all registers can be accessed via User Screens and/or Ladder Code as 1, 8, 16 or 32-bit values or as ASCII character strings.

Table 1.2 – MiniOCS/MiniRCS Resource Limits	
%S Registers	8
%SR Registers	192
%T Registers	2048
%M Registers	2048
%R Registers	2048
%K Registers	10
%D Registers	200
%I Registers	2048
%Q Registers	2048
%AI Registers	512
%AQ Registers	512
%IG Registers	0 / 64 / 0
%QG Registers	0 / 64 / 0
%AIG Registers	0 / 32 / 16
%AQG Registers	0 / 32 / 16
Network Port	None / CsCAN™ / DeviceNet™
Controllers Per Network	0 / 253 / 64
SmartStack I/O Modules	1 Slot
Keypad	16 Keys (Membrane) The faceplate is made of Marnot® XL Polyester by Tekra®. The material is resistant to most corrosive substances found in industrial environments. The material also holds up well in most industrial conditions. If used outdoors, the materials can yellow or crack.

Local MiniOCS Display / Remote Text Terminal for MiniRCS and MiniOCS			
Display	2x20 Characters (Text LCD)	Text Tables	200
Screen Memory	64K	Items Per Text Table	20
User Screens	200	Ladder Code	64K
Data Fields Per User Screen	10		

1.3.2 Resource Definitions

This section defines the resources listed in Table 1.2.

System Registers

System Registers (%S and %SR) are used to store general OCS or RCS status information. This information is used internally, and is also available to the operator via the System Menu, using the Control Station's display and keypad. The System Registers are also available for User Screens and can be accessed by Ladder Code.

a. %S Registers

%S Registers are 1-bit memory locations, containing system status information, implemented as shown in Table 1.3:

Table 1.3 - %S Registers

Register	Name	Description
%S1	FST_SCN	On during first scan after entering RUN mode
%S2	NET_OK	On if Network is functioning properly
%S3	T_10MS	On for 5 mS; Off for 5 mS
%S4	T_100MS	On for 50 mS; Off for 50 mS
%S5	T_SEC	On for 500 mS; Off for 500 mS
%S6	IO_OK	On if SmartStack I/O is configured properly
%S7	ALW_ON	Always On
%S8	ALW_OFF	Always Off

b. %SR Registers

%SR Registers are 16-bit memory locations, containing system status information, implemented as shown in Table 3. **Note:** Where 2 %SRs are combined to make a 32-bit value, the lower numbered %SR is the low word, while the higher numbered %SR is the high word.

Table 1.4 - %SR Registers

Register	Name	Description	Min	Max
%SR1	USER_SCR	Current User Screen Number (0=none)	0	200
%SR2	ALRM_SCR	Current Alarm Screen Number (0=none)	0	200
%SR3	SYS_SCR	Current System Screen Number (0=none)	0	11
%SR4	SELF_TEST	Bit-Mapped Self-Test Result	0	65535
%SR5	CS_MODE	Control Station Mode (0=Idle, 1=Do I/O, 2=Run)	0	2
%SR6	SCAN_RATE	Average Scan Rate (in tenths of mS)	-	1000
%SR7	MIN_RATE	Minimum Scan Rate (in tenths of mS)	-	1000
%SR8	MAX_RATE	Maximum Scan Rate (in tenths of mS)	-	1000
%SR9-10	EDIT_BUF	Data Field Edit Buffer	0	2^{32}-1
%SR11-12	LADDER_SIZE	Ladder Code Size	2	64K
%SR13-14	UTXT_SIZE	User Text Screen Table Size	4	64K

Table 1.4 - %SR Registers				
Register	Name	Description	Min	Max
%SR15-16	Reserved	-	-	-
%SR17-18	IO_SIZE	I/O Configuration Table Size	16	64K
%SR19-20	NET_SIZE	Network Configuration Table Size	34	32K
%SR21-22	SD_SIZE	Security Data Table Size	-	-
%SR23	LADDER_CRC	Ladder Code CRC	0	65535
%SR24	UTXT_CRC	User Text Screen Table CRC	0	65535
%SR25	Reserved	-	-	-
%SR26	IO_CRC	I/O Configuration Table CRC	0	65535
%SR27	NET_CRC	Network Configuration Table CRC	0	65535
%SR28	SD_CRC	Security Data Table CRC	0	65535
%SR29	NET_ID	This Station's Primary Network ID (CsCAN)	1	253
		This Station's Primary Network ID (DeviceNet)	0	63
%SR30	NET_BAUD	Network Baud Rate (CsCAN) (0=125KB; 1=250KB; 2=500KB; 3=1MB)	0	3
		Network Baud Rate (DeviceNet) (0=125KB; 1=250KB; 2=500KB)	0	2
%SR31	NET_MODE	Network Mode (0=Network Not Required; 1=Network Required; 2=Reserved; 3=Network Required and Optimized)	0	3
%SR32	LCD_CONT	LCD Display Contrast Setting	0	255
%SR33	FKEY_MODE	Function Key Mode (0=Momentary; 1=Toggle)	0	1
%SR34	SERIAL_PROT	RS232 Serial Protocol Mode (0=Firmware Update (RISM); 1=CsCAN; 2=Generic (Ladder- Controlled); 3=Modbus RTU; 4=Modbus ASCII)	0	4
%SR35-36	SERIAL_NUM	This Station's 32-bit Serial Number	0	2^{32}-1
%SR37	MODEL_NUM	This Station's Binary Model Number	0	65535
%SR38	ENG_REV	Main CPU Engine Firmware Rev Number x 100	0000	9999
%SR39	BIOS_REV	Main CPU BIOS Firmware Rev Number x 100	0000	9999
%SR40	FPGA_REV	FPGA Image Rev Number x 10	000	255
%SR41	LCD_COLS	LCD Text Display Number of Columns	20	20
		LCD Graphics Display Number of Columns	240	240
%SR42	LCD_ROWS	LCD Text Display Number of Rows	2	4
		LCD Graphics Display Number of Rows	128	128
%SR43	KEY_TYPE	Keypad Type (0=16 Keys; 1=17 Keys; 2=32 Keys; 3=36 Keys)	0	3
%SR44	RTC_SEC	Real-Time-Clock Second	0	59
%SR45	RTC_MIN	Real-Time-Clock Minute	0	59
%SR46	RTC_HOUR	Real-Time-Clock Hour	0	23
%SR47	RTC_DATE	Real-Time-Clock Date	1	31
%SR48	RTC_MON	Real-Time-Clock Month	1	12
%SR49	RTC_YEAR	Real-Time-Clock Year	1996	2095
%SR50	RTC_DAY	Real-Time-Clock Day (1=Sunday)	1	7
%SR51	NET_CNT	Network Error Count	0	65535
%SR52	WDOG_CNT	Watchdog-Tripped Error Count	0	65535
%SR53-54	BAD_LADDER	Bad Ladder Code Error Index	0	65534
%SR55	F_SELF_TEST	Filtered Bit-Mapped Self-Test Result	0	65535
%SR56	LAST_KEY	Key Code of Last Key Press or Release	0	255
%SR57	BAK_LITE	LCD Backlight On/Off Switch (0=Off; 1=On)	0	1
%SR58	USER_LEDS	User LED Control / Status	0	65535
%SR59	S_ENG_REV	Slave CPU Engine Firmware Rev Number x 100	0000	9999
%SR60	S_BIOS_REV	Slave CPU BIOS Firmware Rev Number x 100	0000	9999
%SR61	NUM_IDS	This Station's Number of Network IDs (CsCAN)	1	253
		This Station's Number of Network IDs (DeviceNet)	1	1
%SR62-192	Reserved	-	-	-

User Registers

User Registers (%T, %M and %R) are used to store application-specific Mini data. This data can be accessed via User Screens and/or by Ladder Code.

a. %T Register

A %T Register is a non-retentive 1-bit memory location, used to store application-specific state information.

b. %M Registers

A %M Register is a retentive 1-bit memory location, used to store application-specific state information.

c. %R Registers

A %R Register is a retentive 16-bit memory location, used to store application-specific values.

HMI Registers

HMI Registers (%K and %D) give the user access to the OCS or RCS keypad and display.

The MiniOCS has a membrane keypad and text-based LCD display, allowing the operator to enter and display general and application-specific information. This same information can be entered and displayed for the MiniRCS (and MiniOCS if desired) via a remote PC using Cscape's Remote Display Terminal function.

a. %K Registers

A %K Register is a non-retentive 1-bit memory location (contact), used to store the state of a function key on the Control Station's keypad. If the function keys are set for momentary mode, a function key's associated %K register will be ON as long as the function key is pressed. If the function keys are set for toggle mode, a function key's associated %K register will toggle each time the function key is pressed.

b. %D Registers

A %D Register is a non-retentive 1-bit memory location (coil), which can be turned ON by Ladder Code to cause the corresponding User or Alarm Screen to be displayed.

c. User Screens

A User Screen is a combination of fixed text or graphics, along with variable Data Fields (called Graphics Objects in the MINIOCS), which together fill the LCD display screen. These screens are defined via Cscape dialogs and are then downloaded and stored into the Control Station's Flash memory. User Screens can be selected for display by operator entries on the keypad, or by Ladder Code.

d. Data Fields

A Data Field is an area on a User Screen where variable data is displayed and edited. The source data for a Data Field can be any of the Control Station's Register resources as defined above. The field size and display format is programmable via Cscape dialogs.

e. Text Tables

A Text Table is a list of Text Items, which can be used in a Data Field, to display descriptive words and phrases to describe the value of a Register, instead of displaying numeric values. A simple example of this, would allow the strings “OFF” and “ON” to be displayed, instead of 0 and 1, to describe the state of the %I4 digital input. The maximum number of Text Tables and Text Items per Text Table is shown in Table 1, but the number can be further limited by overall User Screen memory usage.

Physical I/O Registers

Physical I/O Registers (%I, %Q, %AI and %AQ) give the user access to the Physical I/O Module data. This data can be accessed via User Screens and/or by Ladder Code.

a. %I Registers

A %I Register is a 1-bit memory location, which is normally used to store the state of one of the digital inputs associated with a Physical I/O module. When used in this way, %I registers are non-retentive. All extra %I registers, which are not associated with physical inputs, are retentive, and can be used just like %M registers.

b. %Q Registers

A %Q Register is a non-retentive 1-bit memory location, which is normally used to store the state of one of the digital outputs associated with a Physical I/O module.

c. %AI Registers

A %AI Register is a 16-bit memory location, which is normally used to store the value of one of analog inputs associated with a Physical I/O module. When used in this way, %AI registers are non-retentive. All extra %AI registers, which are not associated with physical inputs, are retentive, and can be used just like %R registers.

d. %AQ Registers

A %AQ Register is a non-retentive 16-bit memory location, which is normally used to store the value of one of the analog outputs associated with a Physical I/O module.

Global Data I/O Registers

Global Data I/O Registers (%IG, %QG, %AIG and %AQG) give the user access to the Network Port’s Global I/O data. This data can be accessed via User Screens and/or by Ladder Code.

a. %IG Registers

A %IG Register is a retentive 1-bit memory location, which is normally used to store a global digital state obtained from another Control Station on the network.

b. %QG Registers

A %QG Register is a retentive 1-bit memory location, which is normally used to store a digital state to be sent as global data to the other Control Stations on the network.

c. %AIG Registers

A %AIG Register is a retentive 16-bit memory location, which is normally used to store a global analog value obtained from another Control Station on the network.

d. %AQG Registers

A %AQG Register is a retentive 16-bit memory location, which is normally used to store an analog value to be sent as global data to the other Control Stations on the network.

e. Network Port

The CsCAN Network is based on the Bosch Control Area Network (CAN), and implements the CsCAN Protocol which is designed to take maximum advantage of the global data broadcasting capability of CAN. Using this network protocol, up to 64 Control Stations can be linked without repeaters, and up to 253 Control Stations can be linked by using 3 repeaters. For more information regarding CsCAN Protocol, refer to the **CsCAN Protocol Specification** document.

DeviceNet is an "open" higher layer protocol, which is supported by products from multiple vendors. In an OCS or RCS, DeviceNet can be loaded as a replacement for the CsCAN Protocol Message Layer, and as a result, the OCS or RCS becomes a DeviceNet Slave device. Note that the Mini still implements the CsCAN Protocol Command Layer with respect to the RS232 programming port. For more information regarding DeviceNet Protocol, contact the DeviceNet governing body (ODVA).

Ladder Code

The Ladder Code, stores ladder instructions generated by Cscape. This Ladder Code is downloaded and stored into the Control Station's Flash memory, to be executed each controller scan, when the controller is in RUN mode.

1.4 MiniOCS / MiniRCS Models

A list of MiniOCS and MiniRCS models is contained in Appendix A. Because there are several models of MiniOCS / MiniRCS models available, the MiniOCS / MiniRCS can be used in a wide range of applications. The MiniOCS consists of an Operator Control Station, and the MiniRCS consists of a Remote Control Station. Each model comes equipped with one factory installed I/O board. The models vary according to the type of I/O board installed and are available in non-network and network versions. Network versions contain an additional connector allowing connectivity to CAN networks. (See Appendix A to view MiniOCS / MiniRCS data sheets.)

1.5 Additional References

For further information regarding products covered in this manual, refer to the following reference:

For further information regarding products covered in this manual, refer to the following references:

a *DeviceNet ä Implementation Using Control Station Modules* (GFK-1754) - Covers the implementation of Control Station products in a DeviceNet network.

b. *Cscape Reference Manual* (GFK-1722) – Topics in this manual have been specifically selected to assist the user through the programming process.

1.6 Technical Support

For user manual updates, contact Technical Services at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:

(+) 353-21-4321-266

NOTES

CHAPTER 2: INSTALLATION

2.1 MiniOCS Mounting Requirements

2.1.1 MiniOCS Mounting Procedures (Installed in a Panel Door)

The MiniOCS is designed for permanent panel mounting. To install the MiniOCS, follow the instructions below and use the provided template.

1. Prior to mounting the MiniOCS, observe requirements for the panel layout design and adequate clearances. A checklist is provided in Section 2.3.1

2. Cut the host panel as described in the Figures 2.1 – 2.6.

Warning: Make sure the power and network connectors are removed from the MiniOCS.

3. Insert the MiniOCS through the panel cutout (from the front). The gasket material needs to lie between the host panel and the MiniOCS panel.

4. Install and tighten the mounting clips (provided with the MiniOCS) until the gasket material forms a tight seal. (See Figure 2.7.)

Caution: Do not over-tighten. Over-tightening can potentially damage the case.

5. Connect the communications, programming, and power cables to the MiniOCS ports using the provided connectors.

6. Begin configuration procedures for the MiniOCS models.

2.1.2 MiniOCS Dimensions and Panel Cut-outs

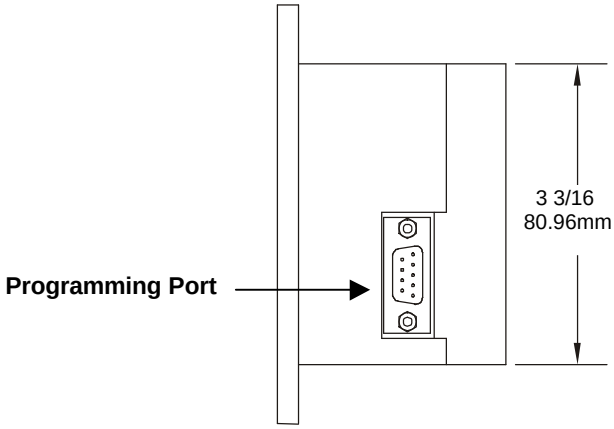


Figure 2.1 –Right-end View Network Model

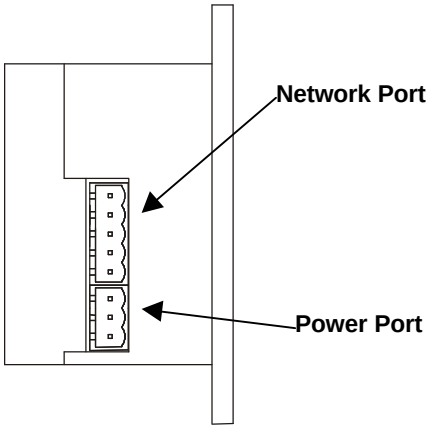


Figure 2.2 Left-end View Network Model

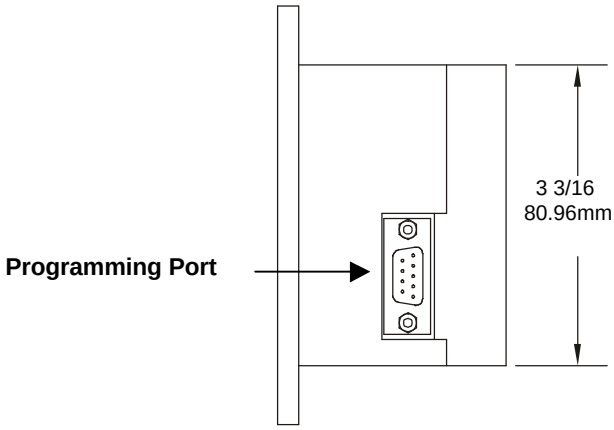


Figure 2.3 - Right-end View Non-Network Model

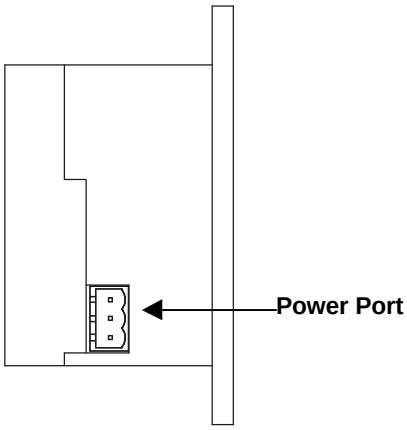


Figure 2.4 - Left-end View Non-Network Model

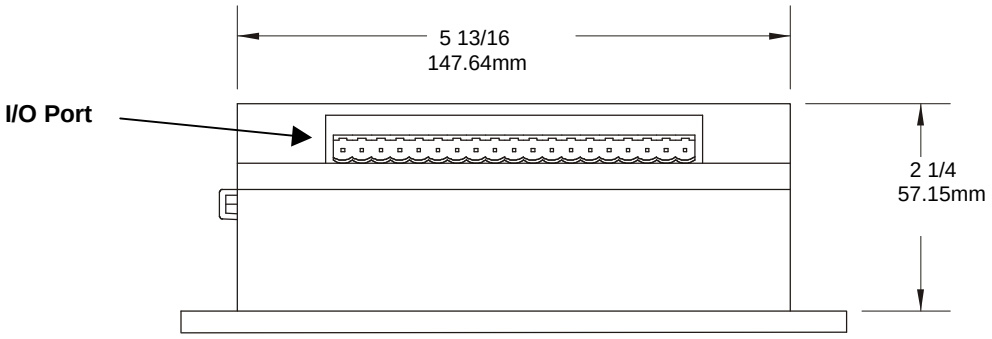


Figure 2.5 –Bottom View

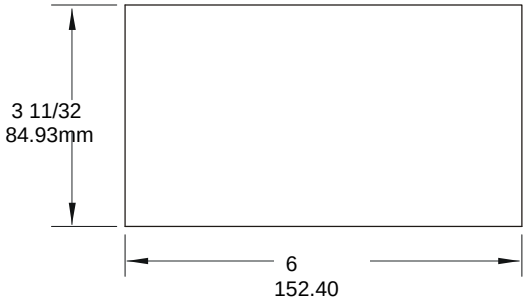


Figure 2.6 –Panel Cut-out for MiniOCS

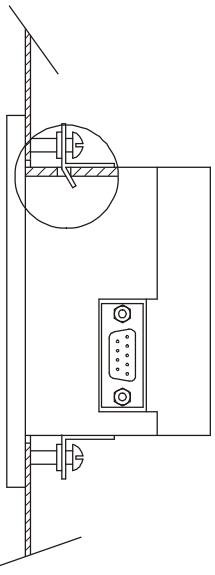


Figure 2.7 – MiniOCS Mounted in Panel Box using Mounting Clips.

2.1.3 MiniOCS Mounting Orientation

The bases of the MiniOCS model needs to be mounted with the proper orientation.

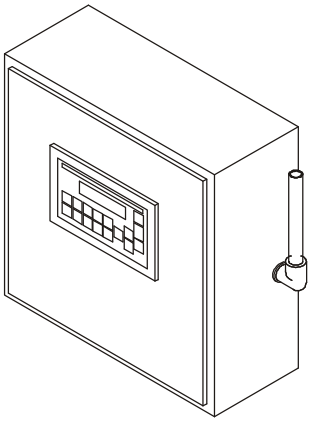


Figure 2.8 - Orientation of MiniOCS (Shown in Panel Box)

NOTE: There are NO orientation restrictions on the MiniOCS. *However, the above orientation provides for optimum readability of the screen and ease of use of the keypad.*

2.2 MiniRCS Mounting Requirements

2.2.1 MiniRCS Mounting Procedures (Installed in a Panel Box)

The MiniRCS is designed for permanent installation in a panel box. *To install the MiniRCS in a panel box, use the instructions that follow:*

1. Prior to mounting the MiniRCS, observe requirements for the panel layout design and adequate clearances. A checklist is provided in Section 2.3.1.

2. Drill holes as described in the Figures 2.9.

Warning: Make sure the power and network connectors are removed from the MiniRCS.

3. Install and tighten washers and nuts**.** Do not over-tighten.

4. Connect the communications and power cables to the MiniRCS ports using the provided connectors.

5. Begin configuration procedures for the MiniRCS models.

2.2.2 MiniRCS Dimensions and Panel Cut-outs

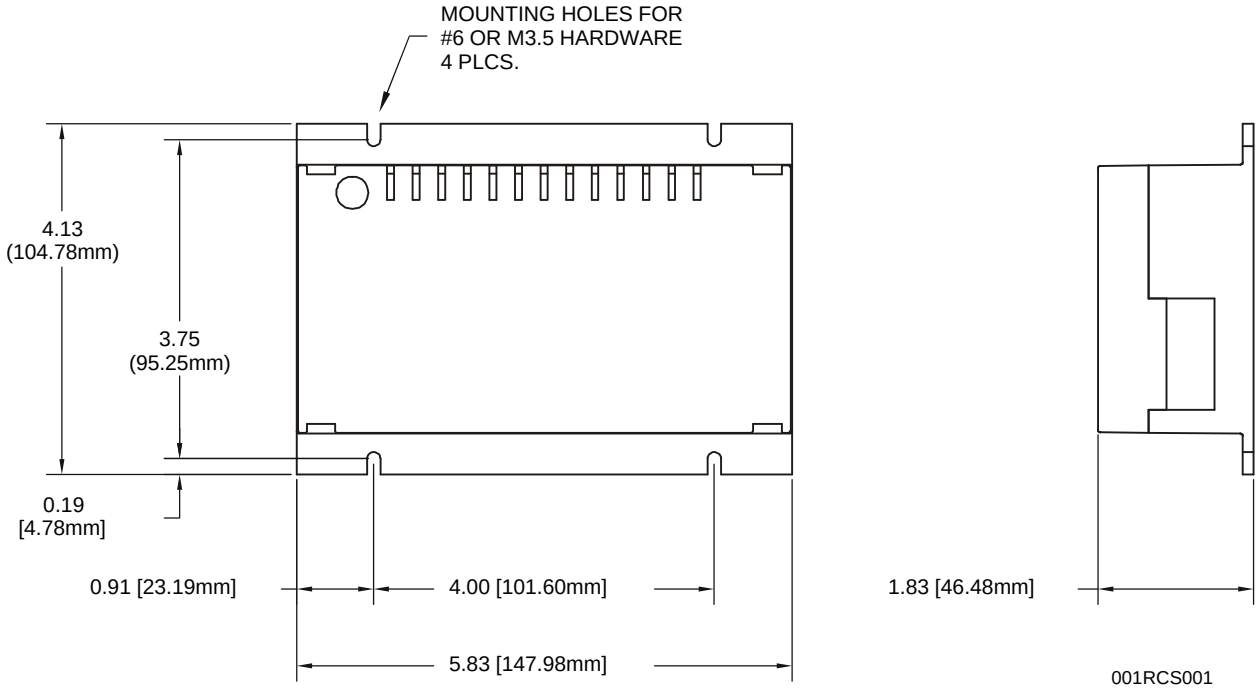


Figure 2.9 – MiniRCS Dimensions / Mounting Holes and MiniRCS Side View

2.2.3 MiniRCS Mounting Orientation

There are NO orientation restrictions on the MiniRCS. *However, the orientation shown provides for the ease of use of the keypad.*

2.3 Factors Affecting Panel Layout Design and Clearances

Warning:	**It is important to follow the requirements of the panel manufacturer and to follow applicable electrical codes and standards.**

The designer of a panel layout needs to assess the requirements of a particular system and to consider the following design factors. *A convenient checklist is provided in Section 2.3.1.*

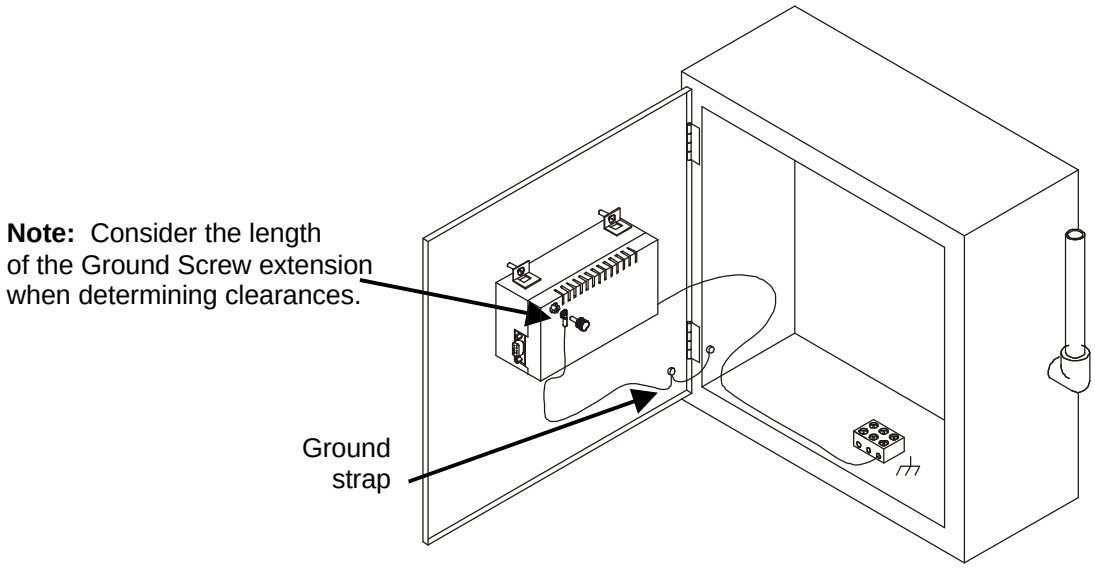


Figure 2.10 – Back view of MiniOCS (Shown On Panel Door)

a. Clearance / Adequate Space

Install devices to allow sufficient clearance to open and close the panel door. Note that the MiniOCS is mounted on a panel door and the MiniRCS is mounted in a panel box.

Table 2.1 – Minimum Clearance Requirements for Panel Box and Door	
Minimum Distance between base of device and sides of cabinet	2 inches (50.80mm)
Minimum Distance between base of device and wiring ducts	1.5 inches (38.10mm)
If more than one device installed in panel box (or on door): Minimum Distance between bases of each device	4 inches between bases of each device (101.60mm)
When door is closed: Minimum distance between device and closed door (Be sure to allow enough depth for MiniOCS / MiniRCS Model and Ground Screw Extension.)	2 inches (50.80mm)

b. Grounding

Warning: Be sure to meet the ground requirements of the panel manufacturer and also meet applicable electrical codes and standards.

Warning: To provide maximum noise immunity and to insure minimum EMI radiation, the V- signal (DC power return) need to be connected to earth ground at the power supply. The user must ensure that the power supply selected is compatible with this method of grounding.

Panel box: The panel box needs to be properly connected to earth ground to provide a good common ground reference.

Panel door: Tie a low impedance ground strap between the panel box and the panel door to ensure that they have the same ground reference (Figure 2.10).

Devices in panel box and on the panel box door:

Use the mounting hardware provided with the device, which includes mounting clips.

c. Temperature / Ventilation

Ensure that the panel layout design allows for adequate ventilation and maintains the specified ambient temperature range. Consider the impact on the design of the panel layout if operating at the extreme ends of the ambient temperature range. For example, if it is determined that a cooling device is required, allow adequate space and clearances for the device in the panel box or on the panel door.

d. Orientation

Observe guidelines for proper orientation of the bases when mounting the MiniOCS / MiniRCS . (Refer to Section 2.1.3). Proper orientation helps to ensure a good connection when MiniOCS / MiniRCS models are installed into the devices.

e. Noise

Consider the impact on the panel layout design and clearance requirements if noise supression devices are needed. Be sure to maintain an adequate distance between the MiniOCS / MiniRCS and noisy devices such as relays, motor starters, etc.

Note: Do not route power and signal wires in the same conduit.

2.3.1 Panel Layout Design and Clearance Checklist:

The following list provides highlights of panel layout design factors.

____Meets the electrical code and applicable standards for proper grounding, etc.?

____Meets the panel manufacturer's requirements for grounding, etc.?

____Is the panel box properly connected to earth ground? Is the panel door properly grounded? Has the appropriate procedure been followed to properly ground the devices in the panel box and on the panel door? (See Section 2.3 [b.])

____Are minimum clearance requirements met? (See Table 2.1.) Can the panel door be easily opened and closed? Is there adequate space between device bases as well as the sides of the panel and wiring ducts?

____Is the panel box deep enough to accommodate the MiniOCS / MiniRCS. (Be sure to consider the Ground Screw extension.)

____Are the device bases oriented correctly? (See Section 2.1.3.) The MiniOCS / MiniRCS devices are mounted on the door of a panel box.

____Is there adequate ventilation? Is the ambient temperature range maintained? Are cooling or heating devices required?

____Are noise suppression devices or isolation transformers be required? Is there adequate distance between the base of the MiniOCS / MiniRCS and noisy devices such as relays or motor starters? Ensure that power and signal wires are not routed in the same conduit.

____Are there other requirements that impact the particular system, which need to be considered?

Warning: To provide maximum noise immunity and to insure minimum EMI radiation, the V- signal (DC power return) need to be connected to earth ground at the power supply. The user must ensure that the power supply selected is compatible with this method of grounding.

2.4 Ports, Connectors, and Wiring

2.4.1 Power, Network, and Programming Ports

The MiniOCS / MiniRCS Power, Network, and Programming Ports are shown in Figures 2.11 – 2.12 for both the network and non-network versions of the MiniOCS / MiniRCS. The MiniOCS / MiniRCS I/O Module receptacle is located on the bottom.

2.4.2 Primary Power Port

Table 2.2 – Primary Power Port Pins		
Pin	**Signal**	**Description**
1	⏚	Frame Ground
2	V+	Input power supply voltage
3	V-	Input power supply ground

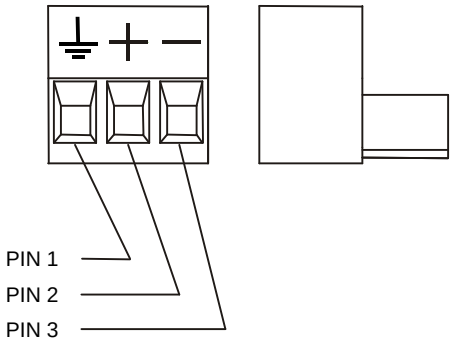


Figure 2.11 Power Connector (Primary Power Port)
(Front and Side Views Shown)

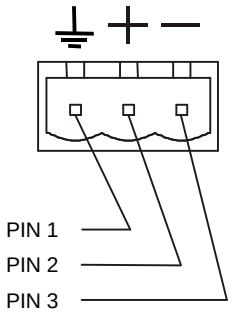


Figure 2.12 As viewed looking at the Mini

Note: Power Supply Voltage Range is from 10-30 VDC.

Warning: To provide maximum noise immunity and to insure minimum EMI radiation, the V-signal (DC power return) need to be connected to earth ground at the power supply. The user must ensure that the power supply selected is compatible with this method of grounding.

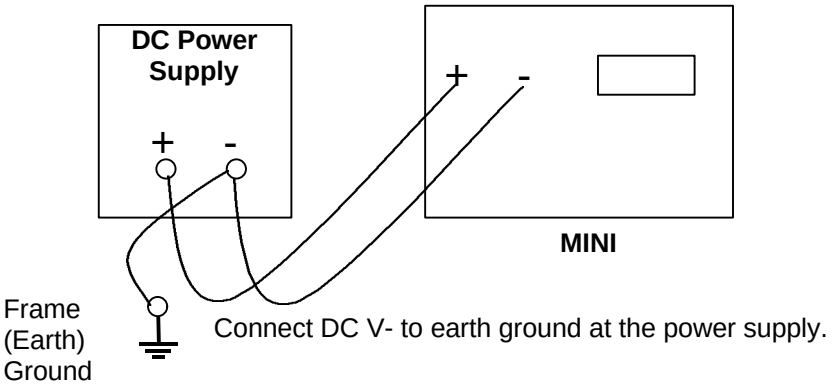


Figure 2.13 - Grounding

2.3.3 CAN Network / DeviceNet Network Port and Wiring

Table 2.3 – CAN Port Pins

Pin	Signal	Description
1	V-	Power -
2	CN_L	Signal -
3	SHLD	Shield
4	CN_H	Signal +
5	V+	Power +

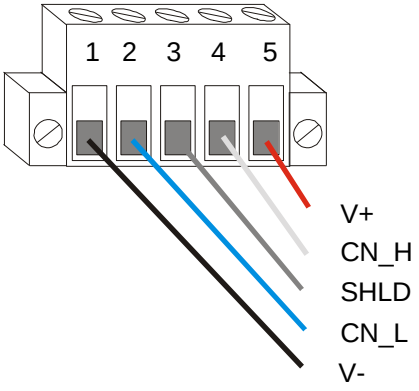


Figure 2.14 – Network Connector (CAN Port)

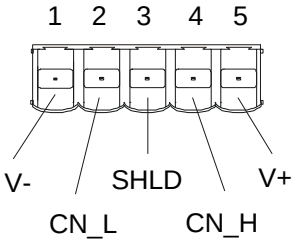


Figure 2.15 – As viewed looking at the Mini

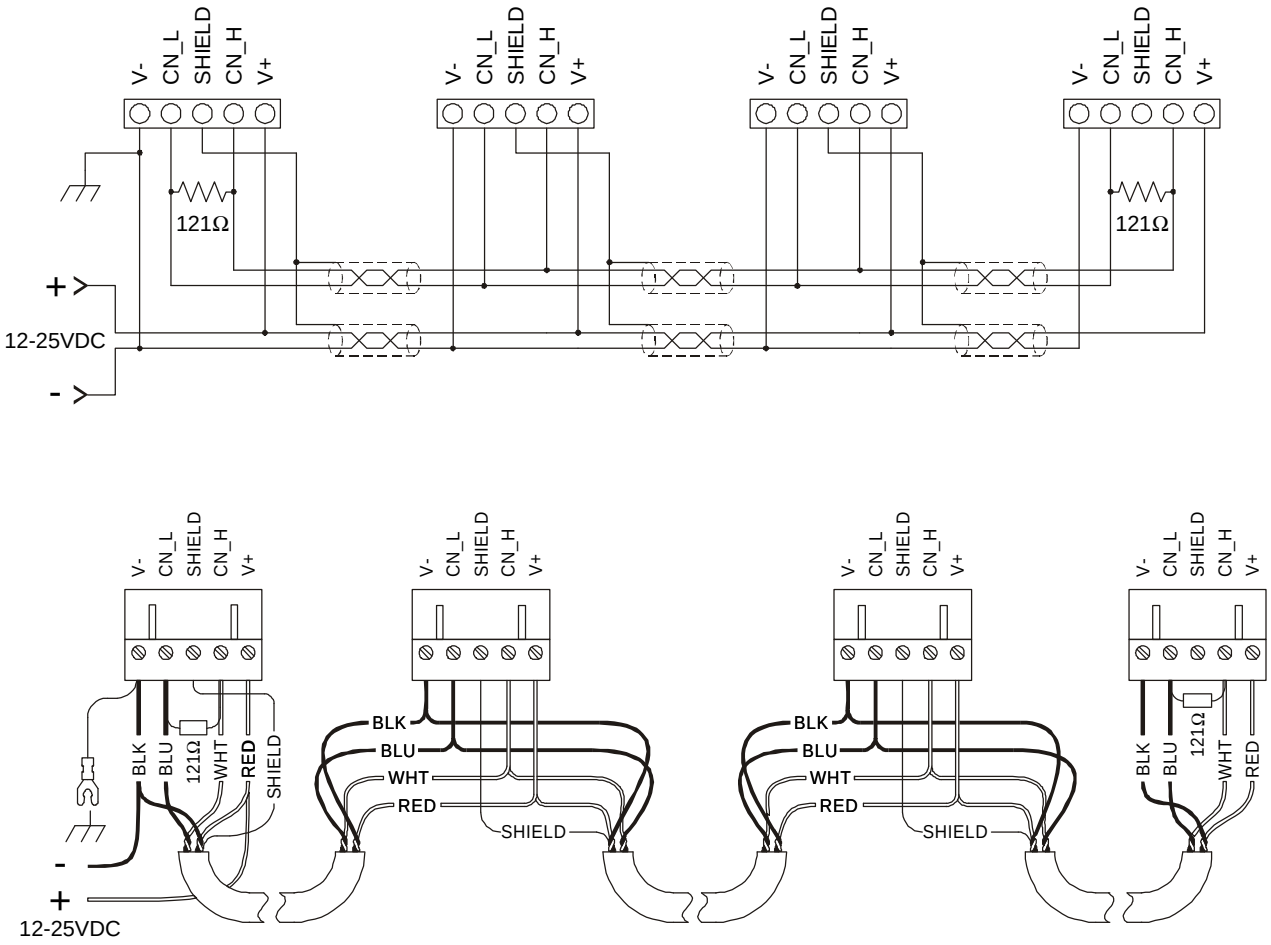


Figure 2.16 – CAN Wiring

a. CAN Wiring Rules (See Figure 2.16.)

1. Wire the CAN network in a daisy-chained fashion such that there are exactly two physical end-points on the network.
2. The two nodes at the physical end-points need to have 121 ohm 1% terminating resistors connected across the CN_L and CN_H terminals.
3. Use data conductors (CN_L and CN_H) that are 24 AWG shielded twisted pair for “thin cable” and 22 AWG shielded twisted pair for “thick cable.” They must also have 120-ohm characteristic impedance. In typical industrial environments, use a Belden wire #3084A (“thin”). Use #3082A (“thick”) for network cable lengths greater than 100 meters environments where noise is a concern. Place data conductors (CN_L and CN_H) into a twisted pair together.
4. Use power conductors (V- and V+) that are 18 AWG twisted-pair for “thin cable” and 15 AWG twisted-pair for “thick cable.” Place power conductors (V- and V+) into a twisted pair together.
5. Connect the V- power conductor to a good earth ground **at one place only** on the network, preferably physical endpoints.
6. For a section of cable between two nodes, the cable shield is connected to the cable shield input at *one end of the cable only.*

7. A CAN network (without repeaters) is limited to 64 nodes (with 63 cable segments) with a maximum combined cable length of 1500 ft. at 125KBaud.
8. Up to four CAN network segments, which adhere to the above rules, may be connected together using three CAN repeaters. In this manner, a CAN network may be extended to 253 nodes with a total cable distance of 6000 ft. at 125KBaud.

b. CsCAN or DeviceNet Cable

The 5-wire, multi-conductor copper cable used in CsCAN or DeviceNet network include:

1. Two wires used as a transmission line for network communications.
2. Two wires used to transmit network power.
3. One conductor used as an electromagnetic shield.

Cabling is available in a variety of current-carrying capacities. On a CsCAN or DeviceNet fieldbus, every device must, at least, power its network transceivers from the network power supply. Some devices draw all of their power from the network supply.

In CsCAN or DeviceNet, thick and thin cable is used as indicated:

1. **Thick cable:** Use for long distances and more power. Usually used for Trunk cable.
2. **Thin cable:** Use for shorter distances. Usually used for drop cables or where cable flexibility is needed.

Table 2.4 -CsCAN / DeviceNet Cable Specifications	
Thick Cable – general specifications (e.g., Belden 3082A)	Two twisted shielded pairs –Common axis with drain wire in center. One signal pair (#18), blue/white; One power power pair (#15) black/red. Separate aluminized mylar shields around power pair and signal pair. Overall foil/braid shield with drain wire (#18), bare*. High Speed (Vp=75% min), low loss, low distortion, data pair (to keep propagation delays to a minimum). 8 amp maximum current capacity. PVC insulation on power pair. Industrial temperature range. High flexibility.
Thin Cable – general specifications (e.g., Belden 3084A)	Two twisted shielded pairs –Common axis with drain wire in center. One signal pair (#24), blue/white; One power power pair (#22) black/red. Separate aluminized mylar shields around power pair and signal pair. Overall foil/braid shield with drain wire (#22), bare*. High Speed (Vp=75% min), low loss, low distortion, data pair (to keep propagation delays to a minimum). 3 amp maximum current capacity. PVC insulation on power pair. Industrial temperature range. High flexibility
Network Topology	Bus with limited branching (truckline / dropline)
Redundancy	Not Supported
Network Power for Node devices	Nominal 24 VDC ±4%
Allowed Nodes (Bridging excluded)	64 nodes
Data Packet Size	0-8 bytes with allowance for message fragmentation
Duplicate Address Detection	Addresses verified at power-up
Error Detection / Correction	CRC – retransmission of message if validity not acknowledged by recipient.
* The drain wire connects shields within the cable and serves as a means to terminate the shield into the connector.	

c. Bus Length

Several factors affect the maximum length of the bus including the accumulated length of drop lines, cable type, transfer rate and the number of drop lines. Although a branch is limited to one network per drop, it can have multiple ports. A branch can not exceed 6 meters.

Table 2.5 - CAN Network Baudrate vs. Total Cable Length Note: The following values apply to both CsCAN or DeviceNetworks except as indicated.	
Thick Cable: Network Data Rate	**Maximum Total Cable Length**
1Mbit / sec. (Does not apply to DeviceNet.)	40m (131 feet)
500Kbit / sec.	100m (328 feet)
250Kbit / sec.	200m (656 feet)
125Kbit / sec.	500m (1,640 feet)
Thin Cable Maximum Total Cable Length	
Maximum bus length is independent of network data rate. Maximum bus length is 100m. **Note: Network baud rates above 250Kbit/sec are not recommended for the MiniOCS / MiniRCS . The potential for a high rate of network messages can cause an unacceptable increase in the ladder scan rate.**	

d. Bus Power and Grounding

When using CsCAN or DeviceNet:

1. A power supply of 24VDC (±4%) at 16A maximum is required for use in a CsCAN / DeviceNet network
2. With thick cable, a single network segment can have a maximum of 8A. To do this, the power supply needs to be located in the center of two network segments.
3. Thin cable has maximum of 3A.
4. All cable shields must be tied to ground at each device connection by tying the bare wire of the cable to pin 3 (shield) of the connector.
5. Ground the CsCAN / DeviceNet network power supply at one point only. The V- signal must be connected to Protective Earth Ground at the power supply only. If multiple power supplies are used, only one power supply must have V- connected to Earth Ground.

2.3.4 RS-232 Programming Port and Wiring

Table 2.6 – RS-232 Port Pins

Pin	Signal	Description	Direction
1	DCD	Always high	Out
2	RXD	Received Data	Out
3	TXD	Transmitted Data	In
4	DTR	Data Terminal Ready	In
5	GND	Ground	-
6	DSR	Data Set Ready	Out
7	RTS	Request to Send	In
8	CTS	Clear to Send	Out
9	RI	Ring Indicate	Out

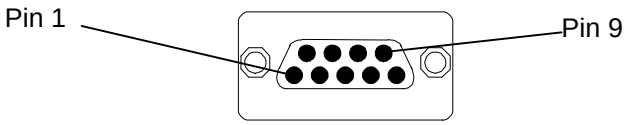


Figure 2.17 – RS-232 Port

a. RS-232 Communications Wiring

The MiniOCS / MiniRCS features an RS-232 port (Programming/Debug) for connection to a personal computer. This port is used for the purposes of MiniOCS / MiniRCS programming, configuring, monitoring, and debugging. This port can also be used for general ladder logic controlled serial communications to printers, modems, terminals, etc. When ladder has control of this port, it is not available for programming or debugging. The wiring diagram for the RS-232 ports is shown in Figure 2.18. For connection between the MiniOCS / MiniRCS and the PC, the use of a shielded, multiple conductor wire with a maximum length of 15.24 meters (50 feet) enables proper performance.

Note: A shorter cable can be required when used for high-speed MiniOCS / MiniRCS firmware updating.

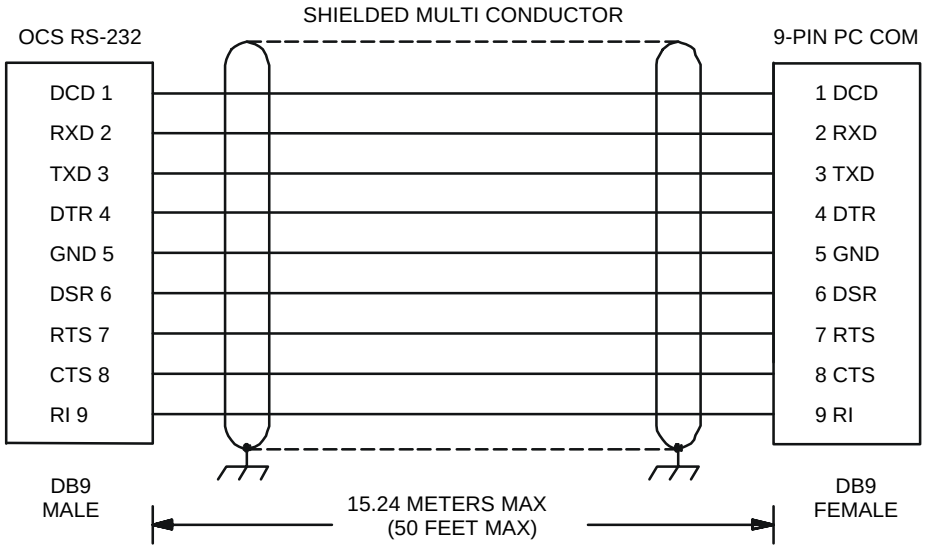


Figure 2.18 – MiniOCS / RCS to PC Wiring

2.3.5 Modem Setup

A modem can be used for remote communications between a computer (using Cscape Software) and the MiniOCS / MiniRCS. The modem must operate at 9600 baud or higher.

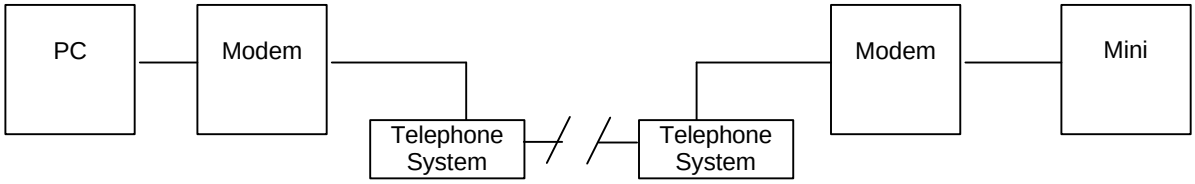


Figure 2.19 – Modem Setup

a. Setup

Setup the modems to match the default serial port characteristics of the MiniOCS / MiniRCS.

9600 baud
8 data bits
No parity
1 stop bit
disable error checking
disable compression

b. Cable Wiring

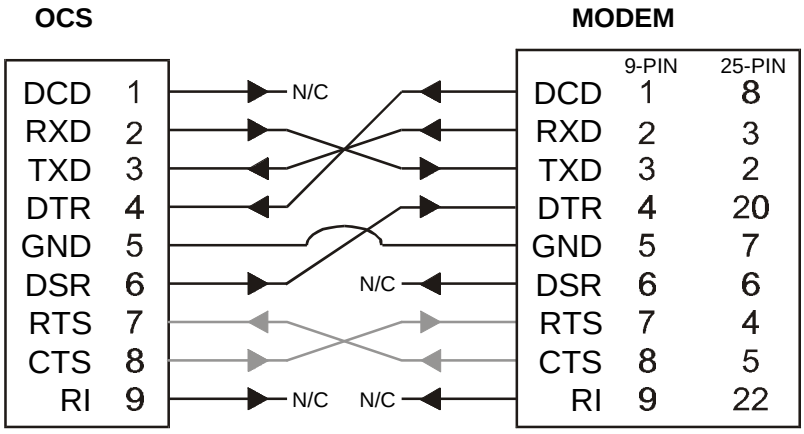


Figure 2.20 – Modem Wiring

Note: If the modem has a DB25 connector, a 9-to-25-pin adapter may need to be supplied.

The grayed connections ⟶ are used only if hardware handshaking between the controller and modem is required.

The wire type used in <u>not</u> overly critical except where the length of the cable must be between 30 and 50 feet (10 to 15 meters). In all cases, the cable must be shielded multi-conductor with conductors of at least 20 gauge. The length of the cable must be as short as possible, and in no case, longer than 50 feet (15 meters).

The modem must be located as close as possible to the OCS, preferably less than one meter. However, EIA-232 specifications allow for cable runs up to 50 feet (15 meters). If cable lengths longer than 30 feet (10 meters) are required, a special low capacitance cable must be used.

Warning: Damage can result if the CD and RI lines are connected to each other or to any other signal on the connector or through the cable to the other unit.

Warning: To connect a modem to the MiniOCS / MiniRCS the controller to modem cable must be constructed or purchased. Using a Null Modem cable can cause damage to the MiniOCS / MiniRCS, modem or both.

c. Recommended Modem

U.S. Robotics Sportster Modem (Model 0701) (56K v.90)

For additional information regarding the use of modems with Control Station products, contact Technical Support. (See Section 1.6.)

2.5 Selecting DeviceNet Network (Firmware Update Wizard)

To use the OCS in a DeviceNet network, use Cscape's Firmware Update Wizard. Select **File, Firmware Update Wizard** from the pull-down menu. The following screen appears.

Figure 2.21 – Using Firmware Update Wizard

Select the product type (MiniOCS or MiniRCS) using the pull-down menu and click on the circle next to the desired network. Press **OK**. On the next screen, press **Send**. Firmware is now updated.

2.6 MiniOCS / MiniRCS LEDs

The following LED information is provided for the MiniOCS / MiniRCS.

Table 2.7 – LEDs

LED	MiniOCS / MiniRCS
RUN	• OFF indicates OCS is in IDLE/STOP mode. • Flashing indicates DO / IO mode or RUN with no ladder program. • ON indicates ladder code running.
OK	• OFF indicates one or more self-tests failed. • ON indicates all self-tests passed. • FLASHING indicates all self-tests passed and one or more I/O points is currently forced.

MiniOCS LED status is indicated on the physical unit as shown in the following figure.

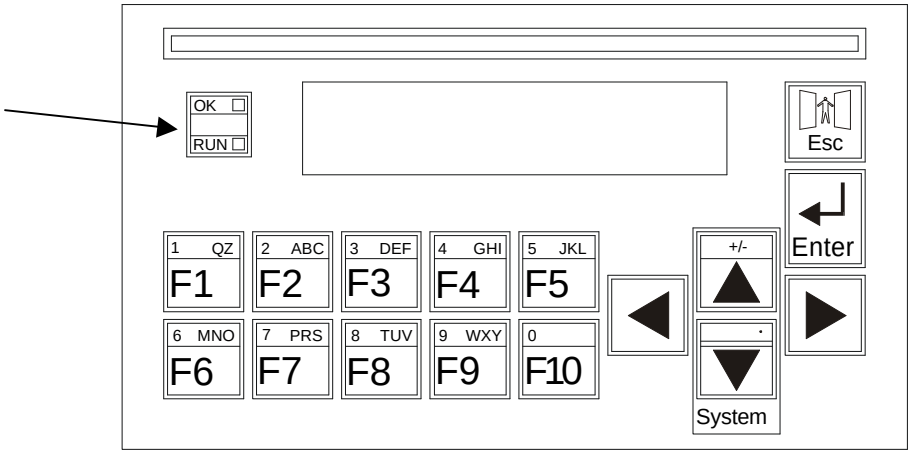


Figure 2.22 – MiniOCS LEDs

The MiniRCS LEDs are also viewed by looking at the physical unit. They are <u>not</u> viewable from a remote screen.

001RCS002

Figure 2.23 – MiniRCS LEDs (I/O Connections Not Shown)

2.7 Mini Battery Replacement

The following instructions apply to the MiniOCS and MiniRCS.

1. Disconnect power from the unit.
2. Remove ground screw (item #1) from back of unit.
3. Remove back cover (item #2) by carefully pressing in on one corner locking tab and lifting back cover to disengage the locking tab. Repeat this for all four corners.
4. Unscrew the grounding spacer (item #3) using a ¼" Hex nut driver.
5. Gently lift up and remove the I/O board (item #4) from the three snap top fasteners on the CPU board.
6. Once the CPU board is exposed locate the battery (item #5, U7). Remove the battery by prying up slightly on each end until it lifts free. Dispose of the battery.

Warning: Disposal of lithium batteries must be done in accordance with federal, state, and local regulations. Be sure to consult with the appropriate regulatory agencies *before* disposing batteries. In addition, do not re-charge, disassemble, heat or incinerate lithium batteries.

7. Replace the battery with HE500BAT005 noting the polarity tab at one end of the battery. Use care when replacing the battery that this tab is located in the right direction. Use only the authorized battery part number shown above.

Warning: Do not make substitutions for the battery. Be sure to only use the authorized part number to replace the battery.

8. Reassemble the Mini unit by first replacing the I/O board then replacing the ¼" hex spacer. It is recommended that *Loctite â 222MS Threadlocker* or an equivalent be applied to the male threads of item #xx before reassembling. Line up the back cover with ground hole over the ground spacer and press back in place. Make sure all four locking tabs of the back cover snap into place. Reconnect the ground wire. Follow the instructions in the units' manual for powering up the Mini and restoring it to operation.

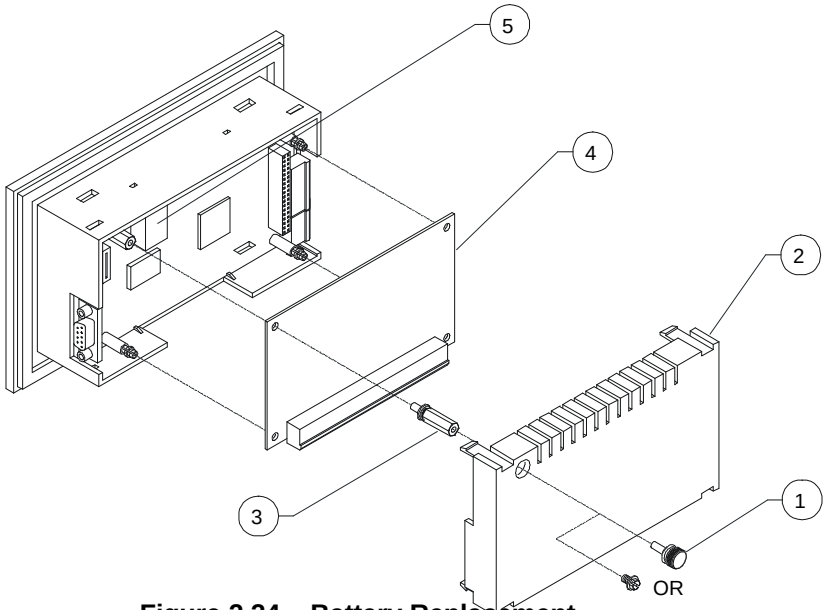


Figure 2.24 – Battery Replacement

CHAPTER 3: SYSTEM MENU

3.1 General

Chapter Three describes the System Menu for the MiniOCS / MiniRCS.

The System Menu is used to access and edit information using the MiniOCS front panel or using the **Remote Text Terminal**, which is a feature available in both the MiniOCS and the MiniRCS. The Remote Text Terminal is particularly useful when using the MiniRCS, because the MiniRCS does not have a physical front panel display screen or keypad. For more information, see Section 4.1.

The following list contains examples of parameters that can be set using the System Menu:

- Network ID
- Network Baud
- RS232 Mode
- Time/Date
- LCD contrast
- Fkeys mode

3.2 Navigating Through the System Menu

Prior to configuration, it is important to know how to navigate through the System Menu using the following guidelines.

1. Pressing the ↑ and ↓ keys scroll up or down through the menu options.
2. Pressing the **Enter** key selects the system screen that the indicator arrow is pointing to.
3. Once in a system screen, press **ESC** (if not currently modifying a field) to return to the main System Menu.

3.3 Editing System Menu Screen Fields

Prior to configuration, it is important to know how to edit the System Menu screen fields using the following guidelines.

1. Some fields in the system screens are editable; others are not editable. The MiniOCS / MiniRCS model indicates an editable field with a solid cursor (_) under the first character in the field.
2. To change a value in an editable field, press the **Enter** key to select edit mode. The MiniOCS / MiniRCS model indicates edit mode by displaying a flashing block cursor.
3. In edit mode, the fields require one of the following methods for modifying the value. Refer to the field description to determine which method to use.

    - Enumerated entry - use ↑ and ↓ keys to select appropriate value.
    - Numeric entry - use Numeric keys or ↑ and ↓ keys on the appropriate digit.
    - Bar graph entry - use ← and → keys to adjust value.

4. After the value is correctly entered, press the **Enter** key to accept the value.
5. Should the user not wish to accept the value before the **Enter** key is pressed, the **ESC** key may be pressed instead. This action restores the original value to the display. The MiniOCS / MiniRCS model also immediately exits edit mode; however, the Text models remains in edit mode with the original value and requires the **Enter** key to be pressed to exit.

3.4 Remote Screen / Keypad (Using Remote Text Terminal and Status Bar)

The MiniRCS has the same functionality as the MiniOCS except that it does not have a local operator screen and keypad. However, the MiniRCS (as well as the MiniOCS) supports a remote operator screen and keypad through a PC connected to the Mini unit's built-in network or serial port. If desired, the remote operator interface and keypad can be displayed (using Cscape software) by pressing **Screens, Remote Text Terminal**. A virtual display screen and keypad appear that are similar to that of the MiniOCS, and the user can navigate through the system menu, make selections, and edit fields using a mouse. In addition, the **Cscape Status Bar** can be used as a tool to ensure that communications are properly established. **For more information on the Remote Test Terminal and the Cscape Status Bar feature, see Section 4.1.**

3.5 Initial System Menu Screens and Self-Test

Note: The examples in this chapter depict the MiniOCS, but the information also applies to the MiniRCS when using the Remote Text Terminal screen. (Refer to Section 3.4.)

1. After turning on the power to the Mini, the following screen appears which indicates the product name and the network it is connected to. It also indicates that the Self-Test is running. (This screen does not appear when using the Remote Text Terminal.)

```
MiniOCS – CsCAN

Self-Test Running
```

a. If the Self-Test passes, the following screen appears:

```
** Self-Test **
**** Passed ****
```

b. If the Self-Test fails, see **View OCS(RCS) Diags** in Section 3.7.

3.6 Entering the System Menu

a. To enter the System Menu on the MiniOCS using the **local** keypad, press both the ↑ and ↓ keys at the same time. Notice that the two keys are surrounded by a white outline and the word "System" on the silkscreen of the keypad.

b. If using the MiniRCS, refer to Section 4.1 in its entirety to use the **Remote Text Terminal** to create a virtual keypad and screen. Be sure to follow the procedures to establish and verify proper communications (Section 4.1.3). After doing so, the following menu options can be accessed by clicking the specified key in the display representation using a mouse.

3.7 System Menu Option Screens

In addition to providing access to the MiniOCS / MiniRCS, configuration parameters, the System Menu also provides power-up and runtime status. For brevity, both configuration and status fields are covered in this section

There are up to ten different menu options which include the following:

- Set Network ID
- Set Network Baud
- Set Contrast
- View OCS(RCS) Status
- View OCS(RCS) Diags
- View I/O LEDs
- View I/O Slots
- View Char Set
- Set Fkeys Mode
- Set RS232 Mode.
- Set Time/Date

- **Set Network ID**

This screen contains two fields. The first field contains the current network status. The second field contains the current Network ID of the model. The second field is numerically editable and is used to configure the Network ID.

Each unit on the network **needs a unique ID number**. The correct ID number should be entered here before physically attaching the unit to the network.

Cscan model:	[1 - 253]
DeviceNet model:	[0 - 63]

Note: If the Network ID setting is changed, the unit stops executing the ladder code (for up to 1 second) while the network is re-tested. If the “Network OK?” status changes from “Yes” to “No,” the new Network ID is a duplicate, and another ID needs to be selected.

- **Set Network Baud**

This screen contains an editable enumerated field allowing the user to select the current baud rate of the network.

Cscan model:	[125K, 250K, 500K, 1M]
DeviceNet model:	[125K, 250K, 500K]

Note: All devices on the network must be at the same baud rate. A device configured for the wrong baud rate may shut down the network entirely.

- **Set Contrast**

This menu contains an editable bar graph entry allowing the user to set the contrast of the LCD display.

- **View OCS (RCS) Status**

This screen contains both a single enumerated editable field that sets the MiniOCS / MiniRCS scan mode and status fields that display information about the internal state of the MiniOCS/ MiniRCS. Pressing the ↑ and ↓ keys scrolls through the different items. Pressing Esc returns to the System Menu.

Parameter	Description
OCS Mode	Displays the current scanning mode (**Idle**, **Run**, **DoIO**). In *Idle* mode, the I/O is not scanned and the OCS ladder program does not execute. The green "RUN" LED is OFF. In *Run* mode, the ladder program executes and the green "RUN" LED illuminates. *DoIO* mode is similar to *Run* mode, except the ladder logic is not solved. When the OCS is in *DoIO* mode, the user is able to exercise all of the I/O from Cscape, without interference from the ladder program. In this mode the green "RUN" LED flashes. This feature is a valuable troubleshooting tool.
Scan-Rate	Shows the number of milliseconds for the scan. The scan-rate is the sum of the time required to execute the following items: a. Scan inputs b. Solve logic c. Write outputs d. Handle network communications e. Handle host communications request f. Process data for operator interface
OCS Net Use	Shows the percentage of the network used by the Mini.
All Net Use	Shows the percentage of the network used by all devices on the network.
Ladder Size	Shows the number of bytes used by the ladder program.
Config Size	Shows the number of bytes used by the I/O configuration
Text Size	Shows the number of bytes used by the text screens
Firmware Rev	Shows the execution engine firmware version.
BIOS Rev	Shows the BIOS firmware revision.
FPGA Rev	Shows the FPGA Image version.
Self-Test	Shows if the power-up self-test passed or failed by displaying **Ok** or **Fault**.

- **View OCS(RCS) Diags**

This screen displays a list of self-test diagnostics results (no editable fields). Each item describes a test and shows a result of **Ok** if the test passed or **Fault/Warn** if an error was found while running the test. **Fault** indications will prevent the loaded application from running. **Warn(**ing) indications allow the application to run but inform the user that a condition exists that needs correction.

System BIOS - This test checks for a valid BIOS portion of the controller firmware.
- **Ok** The loaded BIOS firmware is valid
- **Fault** The loaded BIOS is invalid.

(Engine) Firmware - This test validates the controller firmware.
- **Ok** The firmware is valid.
- **Fault** The controller firmware is invalid.

User Program - This tests for a valid user program and configuration data.
- **Ok** The user program and configuration is valid.
- **Fault** The user program and/or configuration are not valid.

System RAM - This test checks the functionality of the controller RAM at power up.
- **Ok** The RAM is functioning correctly.
- **Fault** The RAM is not functioning correctly.

Logic Error - This test checks for problems with the user program while running.
- **Ok** No errors have been encountered while running a user program.
- **Fault** Indicates the user program contained an instruction that was invalid or unsupported.

W-Dog Trips - This test checks for resets caused by hardware faults, power brownouts or large amounts of electrical interference.
- **0** No unintentional resets have occurred.
- **xx** Indicates a fault with xx showing the number of occurrences.

Net Errors - This test checks for abnormal network operations while running. (Network models only.)
- **0** No network errors were counted
- **xx** Indicate serious networking problems exist, xx indicates the number of occurrences.

Network State - This test checks that the network sub-system is powered and operating correctly. (Network models only.)
- **Ok** The network system is receiving power and has determined other devices are communicating on the network.
- **Warn** Power is not being applied to the network or no other devices were found to be communicating on the network.

Network ID - This test checks that the network ID is valid. (Network models only.)
- **Ok** The network ID is valid.
- **Warn** The network ID is not valid for the selected protocol.

Dup Net ID - This test checks for duplicate IDs on a network. (Network models only.)
- **Ok** This controller's ID was not found to be a duplicate.
- **Warn** Another controller on the network was found with the same ID as this controller.

DeviceNet In - (DeviceNet model only.)
- **Ok** DeviceNet master is maintaining a polled connection and not sending IDLE.
- **Warn** The DeviceNet master is no longer maintaining a polled connection or sending IDLE. (IDLE is a network state in which 'some' masters maintain a polled connection but sends zero data if an associated PLC controller is in IDLE mode. Refer to Master documentation for more information.)

Clock Error - This test checks that the real time clock contains valid data.
- **Ok** The real time clock contains valid data.
- **Warn** Indicates invalid data in the real time clock.

I/O System - This test checks that the I/O configuration downloaded and the physical devices (SmartStack) attached to the controller match.
- **Ok** The I/O configuration matched the installed modules.
- **Warn** Indicates the downloaded configuration and attached modules do not match. (See View I/O Slot system screen for more information.)

- **View I/O LEDs**

The View I/O LEDs simulate the LEDs and show the statuses of the first 16 %I and first 16 %Q registers.

- **View I/O Slots**

The View I/O Slots screen allows the user to view any MiniOCS / MiniRCS CPU model number. The View I/O Slots screen also indicates the keypad being used (by displaying the number of keys) and the type of LCD being used (by displaying the character grid). Press the ↑ and ↓ keys to scroll up and down through the options. Press **ESC** to return to the System Menu.

When viewing the CPU model in the, there are five possible displays:

1. If the Mini is properly configured and no I/O board is present, the message "-I/O Missing" is displayed in the appropriate slot.

2. If the wrong I/O board is physically attached to the Mini, the following message is displayed (?CPU:MiniOCS/RCSxxx.) (Note that the MiniOCS/RCSxxx is the actual product number of the attached MiniOCS / MiniRCS .)

3. If an I/O board that is not supported by the Mini firmware is attached, the CPU slot indicates that an "*Unsupported" module is attached. The I/O board is either defective or a firmware upgrade is required to support the I/O board.

4. If there is an I/O board attached to the Mini, and the Mini is not configured yet, the message (+CPU:MiniOCS/RCSxxx) is displayed. (Note that the MiniOCS/RCSxxx is the actual product number of the attached MiniOCS.)

5. If the MiniOCS is configured and has the correct I/O board, the message (CPU: MiniOCS/RCSxxx) is displayed. (Note that the MiniOCS/RCSxxx is the actual product number of the attached Mini.

- **View Char Set**

The View Char Set allows the user to view the entire character set available in the Mini. The character set range is from 8-255. To select a character for viewing, press `Enter` and then use the ↑ and ↓ keys to scroll through the character set. Press `Enter` and then `Esc` to return to the System Menu.

- **Set FKeys Mode**

This screen contains an editable enumerated field that allows the Function keys to be configured to operate in one of two modes. When a function key is pressed, it can TOGGLE the point associated with the key or it can MOMENTARILY turn the point ON when the key is pressed.

- **Set RS232 Mode**

This screen contains an editable enumerated field that allows the mode of the serial port to be set to one of two modes. The **CsCAN** mode allows Csape to connect to the serial port for uploads, downloads, monitoring and control. The **Update** mode allows a firmware update and factory test utility to be used. When Update mode is selected, the firmware is ready to download when the OK LED flashes. When using Cscape to perform firmware updates, the “Update” mode is not necessary.

- **Set Time/Date**

This screen contains two editable enumerated fields for displaying and modifying the Mini’s time and date. Each field is subdivided and allows the ↑ and ↓ key to modify the value.

NOTES

CHAPTER 4: KEYPAD AND SCREEN

4.1 Remote Screen and Keypad Capability

4.1.1 Remote Text Terminal

The MiniRCS has the same functionality as the MiniOCS except that it does not have a local operator screen and keypad. However, the MiniRCS (as well as the MiniOCS) supports a remote operator screen and keypad through a PC connected to the Mini unit's built-in network or serial port. The remote operator interface and keypad can be displayed using Cscape software by pressing **Screens, Remote Text Terminal**. A virtual display screen and keypad appear that are similar to the MiniOCS physical front panel, and the user can navigate through various screens, make selections, and edit fields using a mouse.

4.1.2 Cscape Status Bar

When the MiniOCS/ MiniRCS is connected to a PC using Cscape software, *and* the Remote Text Terminal feature is selected, a Cscape Status Bar appears at the bottom of the screen. The Cscape Status Bar can be used to determine if communications have been established between the Mini and the Cscape program. Components of the Cscape Status Bar are explained in Figure 4.1.

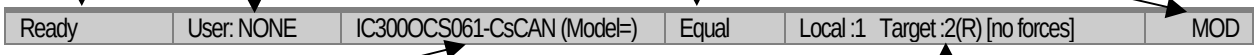
Message Line - contains Cscape messages sent by the programs. The contents of these messages are context sensitive. The Message line can be empty.

Equal Indicator – indicates whether the current program in Cscape is equal to the program stored in the Target Controller.

- If ***Equal***, the program in Cscape is the same as the program stored in the Target Controller.
- If ***Not Equal***, the program in Cscape is not the same as the program stored in the Target Controller.
- If **Unknown**, there may have been a change since the last time the program in Cscape was compared to the Target Controller.

Current User - indicates who is logged (for security purposes).

File Modified Indicator - indicates that the file in the selected window has been modified but has not been saved.



Controller Model - Network (Model Confirmation)

- ***Controller Model*** indicates the MiniOCS or MiniRCS for which the program in Cscape is configured.
- ***Network*** indicates the type of network that the program in Cscape expects to use (e.g., CsCAN or DeviceNet).
- ***(Model Confirmation)*** provides the following indications:
- **(Model=)** - the actual Target Controller matches the configured Controller Model and Network.
- **(Model Not=)** – the actual Target Controller does not match the configured Controller Model and Network.
- **(Model ?)** – there may have been a change since the last time the Target Controller was compared to the configured
- Controller Model and Network.

Communications Status - indicates the current status of the "pass through" Connector.

- **Local: xx** – indicates the Network ID of the Mini to which the Cscape program is physically connected through its serial port. It can serve as a "pass through" device to other nodes on the network.
- **Target: yy(R)** – indicates the Network ID of the Mini with which the Cscape program is exchanging data.
  Note: The **Local** unit and **Target** unit can be the same unit or they can be separate units.

The following are status indicators:

(R) – Running
(D) - Do I/o
(I) – Idle
(?) – Cscape is not communicating with the remote unit.
[no forces] – indicates no I/O has been forced.

4.1.3 Establishing Communications using the Remote Text Terminal

1. Start Cscape software. Press **Screens, Remote Text Terminal**.
2. Establish communications between the Cscape program and Mini by pressing **Controller, Set Network Target ID**. Set the Target ID.
3. Again, select **Controller**, **Configure I/O**. Follow the procedures specified in Chapter Five: Configuration.
4. Download the program from Cscape to the Mini by pressing **Program, Download**.
5. Check the **Cscape Status Bar** as described in Section 4.1.2 to ensure that the program in Cscape matches the program downloaded to the Mini model. Be sure to check the Status Bar often. Another way to check that the download occurred is to press **Program, Verify**.
6. Click on the **System Key** in the display representation and continue the procedures to enter the system menu described in Chapter Three .

4.2 Keypad Description

The MiniOCS keypad contains 10 user-programmable keys, `Esc`, `Enter` and four direction keys.

The user-programmable keys, or function keys, also serve the purpose of numeric and alphabetic character entry. Function keys `F1-F10` are available (%K registers). Depending on the configuration of the MiniOCS and the field needing to be edited, the MiniOCS automatically knows what type of digit or alphanumeric character needs to be entered.

The MiniOCS keypad also contains four direction keys. The ↑ and ↓ keys contain split fields. The ↑ key also contains the `+/-` function. The ↓ key also contains the `.` function. Similar to the operation of the function keys, the MiniOCS automatically knows if a decimal point or a positive or negative indicator is required. The ↑ and ↓ keys are also used to increment and decrement fields, respectively. The ← and → keys are used to move the cursor from one character to another in an editable field and to switch from one editable field to another editable field.

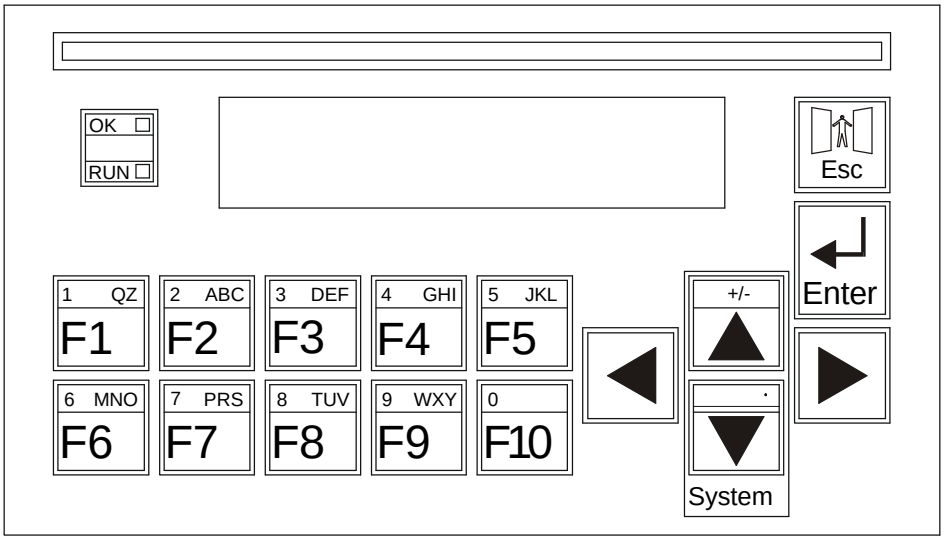


Figure 4.2- MiniOCS Keypad

The MiniOCS features an Esc and an Enter key. The Esc key is used to exit out of a number of different menus and fields or abort an editing operation. The Enter key is used to select a field for editing and for sending data to the MiniOCS. The Enter key can also be used to escape out of some selected fields.

The MiniOCS keypad has “OK” and “RUN” indicators. These indicators are green LEDs that are built into the keypad. When there are no errors present in the MiniOCS and the Self-Tests have “passed,” the green “OK” LED illuminates. When the controller is running logic, the RUN LED illuminates. If the controller is in the RUN mode with no logic loaded or if it is in the DO I/O mode, the RUN LED flashes.

4.3 Operation

When the MiniOCS unit first powers-up, it displays “MiniOCS Self-Test In Progress.”Next, the message “MiniOCS Self-Tests In Progress...” appears. After the Mini displays this message, the unit performs tests to examine the current state of the network. Four different scenarios can occur:

Scenario #1: No power is supplied to the CAN port. The message “No Network Power Network Disabled” is displayed. Assuming the controller is configured to require the network, the OCS then displays the message “Self-Tests Failed.” Also, there is a Fault Code of 80 displayed in “View OCS Info” in the System Menu (see Chapter 3). The green “OK” light does not illuminate.

Scenario #2: No other units are on the CAN network (or this is the first device to power-up on the network). The message "**Waiting for Net: F1 = Disable Net**" is shown. If another device is placed on the CAN network, the message clears and operation continues. The message “Self-Tests Passed” is displayed. The green “OK” light illuminates. If F1 is pressed the message “No Net Response Network Disabled” appears and is followed by the message “Self-Tests Failed”. The green “OK” light does not illuminate.

Scenario #3: If a unit powers-up and finds another unit with the same node number as itself, the display shows "**Duplicate ID Network Disabled**". The network is disabled, and the unit displays the message “Self-Tests Failed.” The green “OK” light does not illuminate.

Note: The ID checking works when one of two devices with the same ID is powered-up more than 1 second before the other. If both devices are powered-up at the same time, this method of ID checking may not work. In this case, the Mini continues to check for duplicate IDs during operation.

Scenario #4: If a unit powers up and it has network power, and other units are powered up on the network, the message “Self-Tests Passed” is displayed, and the green “OK” light is illuminated.

At any time, the Mini unit can be reset by pressing: ↑ + F1 + F2 (press the keys **at the same time**)

4.4 User Screens

In the normal operating mode there are a set of user-defined screens that can be scrolled through using the ↑ and ↓ keys.

If the ladder program energizes a text coil, the screen associated with this coil is displayed and overrides the "normal" user screens. This is designed to show alarm conditions or to display other ladder-detected events. When the text coil is de-energized, the previous screen that was being viewed before the alarm is returned.

If the screen contains an editable field, the user can press the `Enter` key to enter the edit mode. When in edit mode, a cursor appears on one digit of the editable field. Use the direction keys (← and →) to move to the cursor to the desired position. Use the ↑ and ↓ keys to increment or decrement the digit or enter the number/data with the alphanumeric keys.

If there is more than one field on the screen needing to be edited, use the direction keys (← and →) to move the cursor to the desired location.

The value chosen by the user may not exceed the minimum or maximum set by the user program. If the user tries to exceed the maximum point or enter a value below the minimum point, the value does not change.

Note: If the MiniOCS displays “>>>>>>” in a text field, the value is too big to display in the field or is above the maximum for an editable field. If the MINI displays “<<<<” in a text field, the value is too small to display or is below the minimum for an editable field.

4.4.1 Cursor Types

There are three different cursor types, which may show on the display:

a. Solid underline
b. Blinking block
c. Blinking underline

A *solid underline cursor* appears under an editable field which is not being edited yet. The ← key and the → key can be used to move this type of cursor to select a different editable field, if required. Press **Enter** to start editing the selected field. This causes a *blinking block cursor* to appear.

A *blinking block cursor* appears in an editable field when Enter is first pressed to start editing the field. The *blinking block cursor* indicates that the field will be cleared when a numeric (or alphanumeric for an ASCII field) key is pressed. This allows a new value to be entered for the field just as it would be entered on a PC keyboard or a calculator. If a direction key (←, →,↑,↓) is pressed, the cursor changes from a *blinking block* to a *blinking underline*, and single-digit edit mode is entered.

A *blinking underline cursor* appears under an editable field which is being edited in single digit edit mode. In this mode, the digit (or character) above the cursor can be modified individually. This can be done by pressing ↑ or ↓ (increments or decrements) or by pressing a numeric (or alphanumeric) key. Pressing ← or → moves the cursor to the previous or next digit (or character).

NOTES

CHAPTER 5: CONFIGURATION

5.1 General

Chapter Five provides preliminary configuration procedures that are applicable to all MiniOCS / MiniRCS models.

Remote Screen Usage for the the MiniRCS: The MiniRCS has the same functionality as the MiniOCS except that it does not have a local operator screen and keypad. However, the MiniRCS supports a remote operator screen and keypad. through a PC connected to the Mini unit's built-in network. If desired, the remote operator interface and keypad can be displayed (using Cscape software) by pressing **Screens, Remote Text Terminal**. A virtual display screen and keypad appears that is similar to that of the MiniOCS. In addition, a Status Bar can be used as a tool to ensure that communications are properly established. **For more information on the Remote Test Terminal and the Status Bar feature, see Section 4.1.**

Note: The examples in this chapter depict the MiniOCS, but the information also applies to the MiniRCS when using the Remote Text Terminal screen.

The MiniOCS / MiniRCS models use Cscape Software for configuration. General information is also provided pertaining to the screens that the user encounters when configuring specific modules. In addition, each MiniOCS / MiniRCS model has its own data sheet which covers specifications, wiring and other pertinent information. (See Appendix A.)

5.2 Preliminary Configuration Procedures

1. The MiniOCS / MiniRCS configuration is accomplished through the Configure Controller Type Dialog.

Note: The configuration examples in this chapter depict the MiniOCS, but the procedures also apply to the MiniRCS as well.

a. Using Auto Configuration

From the Main Menu, select Controller|Configure for the following dialog. If the desired MiniOCS / MiniRCS is physically connected to the PC, press **Auto Config**. A dialog box appears and indicates that settings will be deleted from currently configured models. If OK, press **Yes**. Then press **OK**.

To obtain a description of the MiniOCS / MiniRCS model, double-click on the box (or press the top **Config** button) to select the desired controller from the pull-down menu.

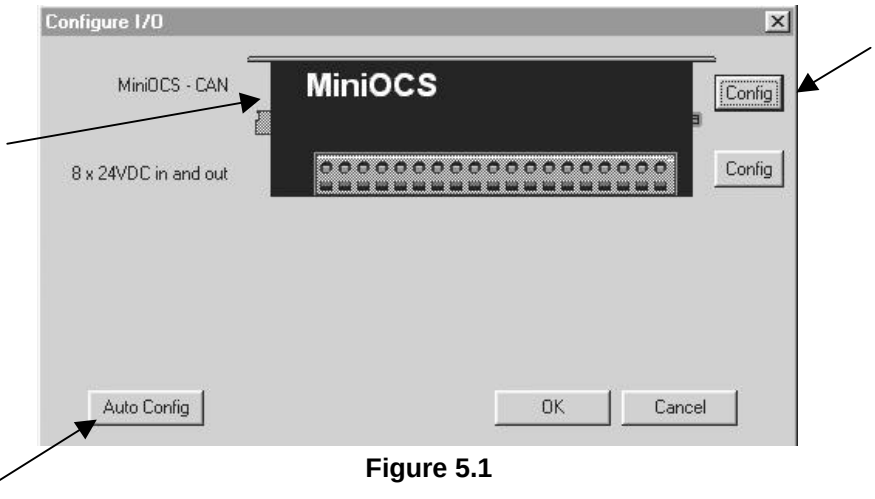


Figure 5.1

Note: The configuration examples in this chapter depict the MiniOCS, but the procedures also apply to the MiniRCS.

b. Manual Selection of MiniOCS / MiniRCS Model and Obtaining a Description of the Model

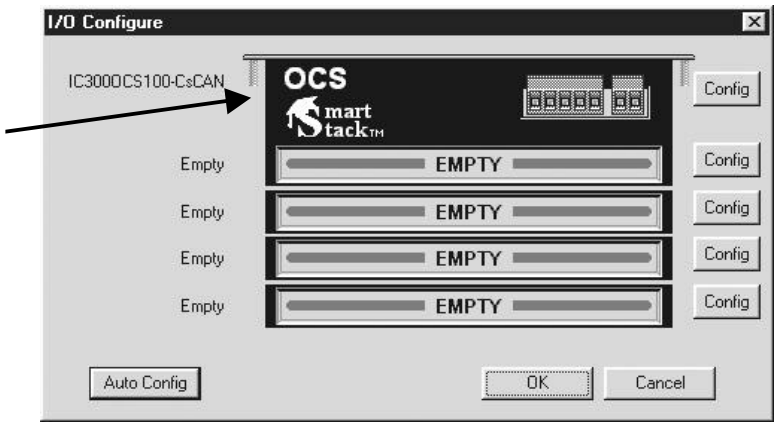


Figure 5.2

If a different controller is installed, select the MiniOCS / MiniRCS by double-clicking on the box (or press the top **Config** button) and select the desired controller from the pull-down menu.

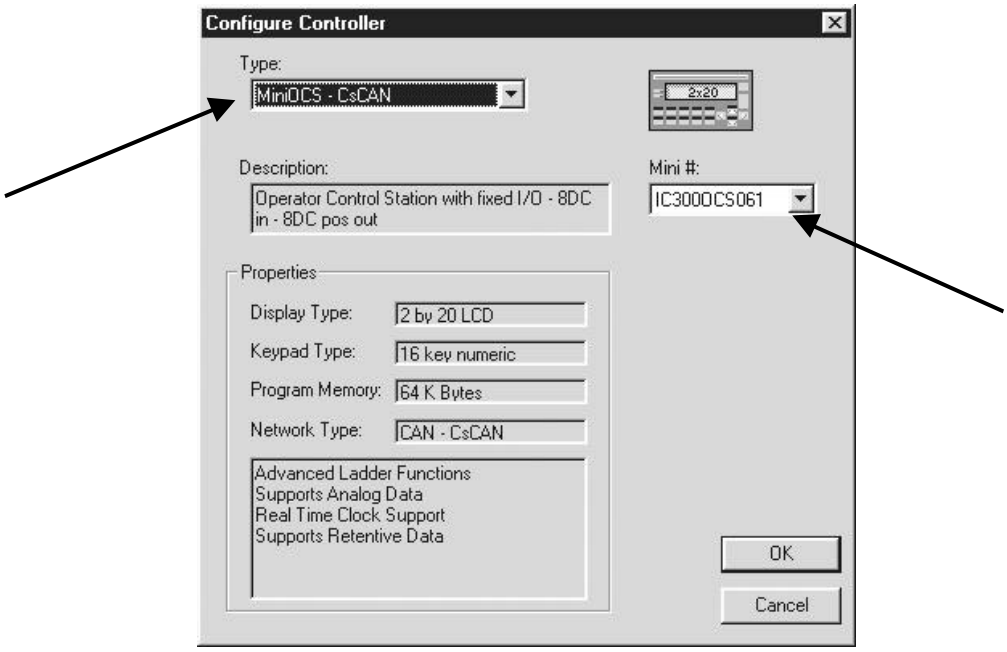


Figure 5.3

Note: The configuration examples in this chapter depict the MiniOCS, but the procedures also apply to the MiniRCS.

Using pull-down menus, select either a network version of the MiniOCS / MiniRCS (**MiniOCS / MiniRCS – CsCAN**) or a non-network version (**MiniOCS / MiniRCS – No net**). Then, select the MiniOCS / MiniRCS model that is going to be configured. A description of the selected model is provided on this screen. Press **OK**.

2. The following screen appears.

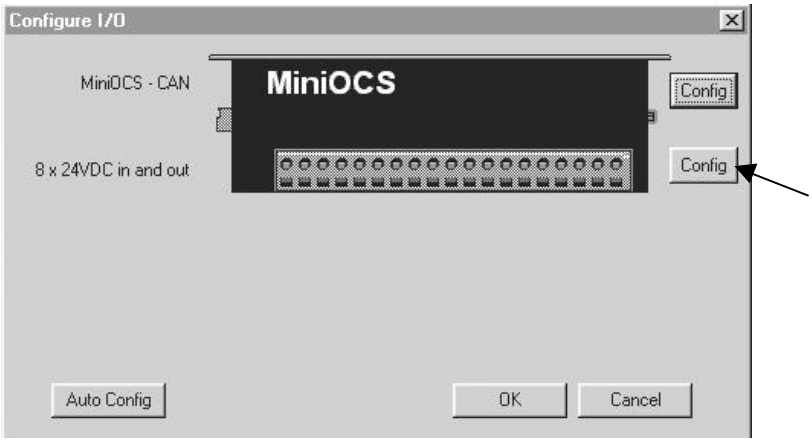


Figure 5.4

3. To view the registers associated with the MiniOCS / MiniRCS model, press the lower **Config** button.

a. A screen appears showing the **I/O Map** for the MiniOCS / MiniRCS model selected. The user (i.e., programmer) needs to view the I/O Map to determine which registers are assigned to the model.

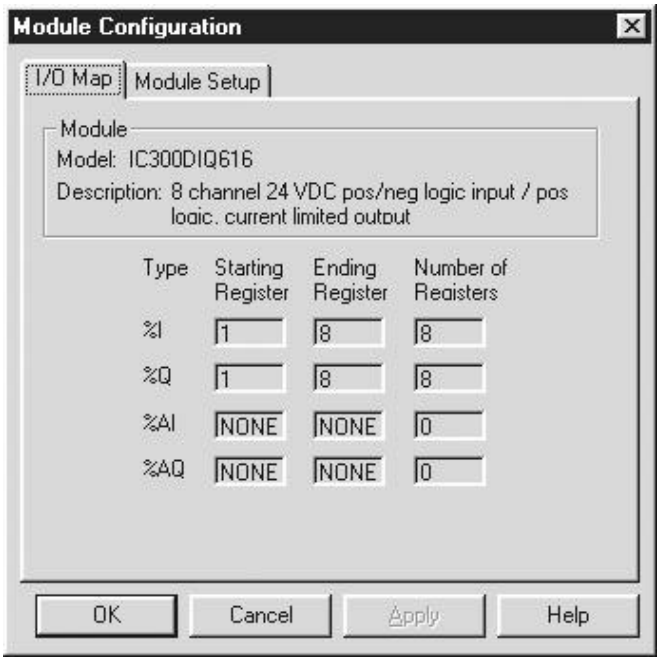


Figure 5.5

Model number:	Provides the I/O part number.
Description:	Describes the number of input and output channels and other key characteristics of the module.
Type:	Displays the register types assigned to the module.
Starting/Ending :	Denotes the starting and ending locations of the register type.
Number:	Indicates the quantity for a particular register type.

Note: Do not confuse the described number of input and output channels with the numbers found in the Type column (i.e., %I and %Q). The numbers do not necessarily match.

b. Selecting the **I/O Map** tab provides information about the I/O registers, which are assigned to a specific MiniOCS / MiniRCS Module. The I/O Map is determined by the model number. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

4. There is no further configuration required for *most* MiniOCS / MiniRCS models. The exceptions are the High Speed Counter MiniOCS / MiniRCS Models which include 033/063 and 034/064. Refer to the *SmartStack High Speed Counter Supplement* for further information.

NOTES

INDEX

APPENDIX A: MINI OCS AND MINI RCS MODELS

Table A.1 – Mini OCS and Mini RCS Modules		
DIGITAL INPUT AND OUTPUT COMBINATION MODULES		
Mixed DC I/O	8 Channel, 12/24VDC In, (Isolated) Digital In, Positive/Negative Logic 8 Channel, 10-28VDC (Sourcing) Out, Positive Logic (.5A)	IC300OCS031 IC300OCS061 IC300RCS061
Mixed DC I/O	8 Channel, 12/24VDC (Isolated) Digital In, Positive/Negative Logic, 8 Channel, 24VDC Out, Negative Logic (.5A)	IC300OCS032 IC300OCS062 IC300RCS062
Mixed I/O	8 Channel, 12/24VDC (Isolated) Digital In, Positive/Negative Logic, 6 Channel, 3A Relay Out	IC300OCS035 IC300OCS065 IC300RCS065
Mixed I/O	8 Channel, 120VAC In, Positive Logic 8 Channel, 80-240VAC Out, Positive Logic	IC3000CS036 IC300OCS066 IC300RCS066
Mixed I/O	8 Channel, 120 VAC In Positive Logic 6 Channel, 3A Relay Out	IC300OCS037 IC300OCS067 IC300RCS067
Mixed I/O Module	14 Channel, 12/24 Vdc In, Positive/Negative Logic 10 Channel, 3A Relay Out	IC300OCS045 IC300OCS075 IC300RCS075
AC Input /AC Output	8 Channel, 120 / 240 VAC In, Positive Logic 8 Channel, 80-240 VAC Out, Positive Logic	IC3000CS038 IC300OCS068
AC Input /AC Output	14 Channel, 120 VAC In, Positive Logic 10 Channel, 3A Relay Out	IC300OCS047 IC300OCS077 IC300RCS077
Mixed DC I/O	16 Channel, 12/24VDC In (Isolated) Digital In, Positive/Negative Logic 12 Channel, 10-28VDC (Sourcing) Out, Positive Logic	IC300OCS041 IC300OCS071 IC300RCS071
Mixed DC I/O	16 Channel, 12/24 VDC In, Positive/Negative Logic 12 Channel, 24 VDC Out, Negative Logic	IC300OCS042 IC300OCS072 IC300RCS072
Temperature I/O	2 Channel, Relay 2 Channel, Analog Output 2 Channel,SSR Driver	IC300OCS049 IC300OCS079 IC300RCS079
Table continued on next page		

ANALOG / DIGITAL INPUT AND OUTPUT COMBINATION MODULES		
+/-10VDC Analog / Digital I/O	4 Channel, Analog Input, +/-10VDC In 2 Channel Analog Output, +/-10VDC Out 8 Channel, 12 Bit Resolution, 24VDC Bipolar Digital Input 8 Channel, 12 Bit Resolution, 10-28VDC, 0.5 Amp Sourcing Digital Output	IC300OCS052 IC300OCS082 IC300RCS082
4-20mA Analog / Digital I/O	4 Channel, Analog Input, 20mA In 2 Channel Analog Output, 20mA Out 8 Channel, 12 Bit Resolution, 24VDC Bipolar Digital Input 8 Channel, 12 Bit Resolution, 10-28VDC, 0.5 Amp Sourcing Digital Output	IC300OCS053 IC300OCS083 IC300RCS083
24VDC Bipolar Analog / Digital I/O	2 Channel, Analog Input, 20mA In 2 Channel Analog Output, 20mA Out 8 Channel, 24VDC Bipolar Digital Input 8 Channel, 24VDC Sinking Digital Output	IC300OCS055 IC300OCS085 IC300RCS085
24VDC Bipolar Analog / Digital I/O	4 Channel, Isolated Analog Input, 20mA In 2 Channel Isolated Analog Output, 20mA Out 8 Channel, 10-30VDC Bipolar Digital Input 8 Channel, 10-30VDC Sourcing Digital Output	IC300OCS057 IC300OCS087 IC300RCS087
SPECIALTY MODULES		
High Speed Counter Product also has a detailed Supplement (GFK-1643) is ordered separately.	High Speed Counter Inputs, Sourcing Pulse Outputs Pulse Width Modulation	IC300OCS033 IC300OCS063 IC300RCS063
	High Speed Counter Inputs, Sinking Pulse Outputs	IC300OCS034 IC300OCS064 IC300RCS064

Mixed DC I/O Module

IC300OCS031 / IC300OCS061
IC300RCS061
12/24 Vdc In, Positive/Negative Logic
24Vdc Out, Positive Logic

Mini OCS/RCS

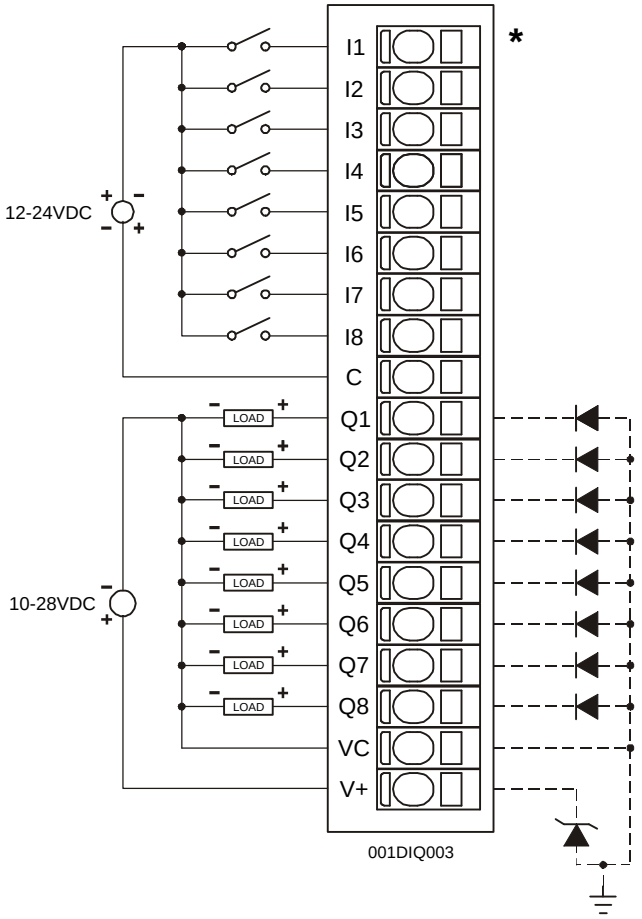
1 SPECIFICATIONS

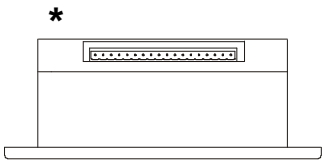
INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Bus)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC	Status Indicator	8 LEDs

OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per channel	0.5A Max.	Status Indicator	8 LEDs
Output Protection	Short Circuit		

General Specifications			
Required Power (Steady State)	4.8W (200mA max @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA @ 24VDC for 1mS.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9 oz. (256 g)

2 WIRING

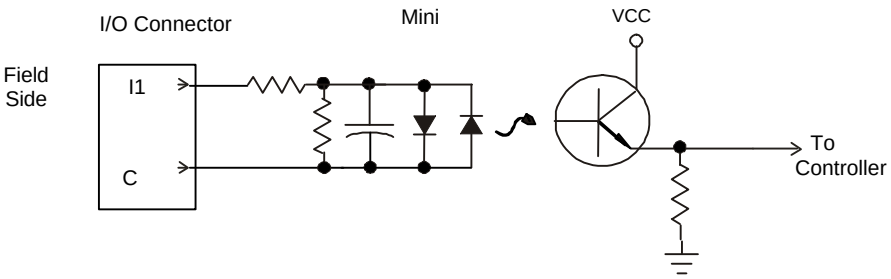


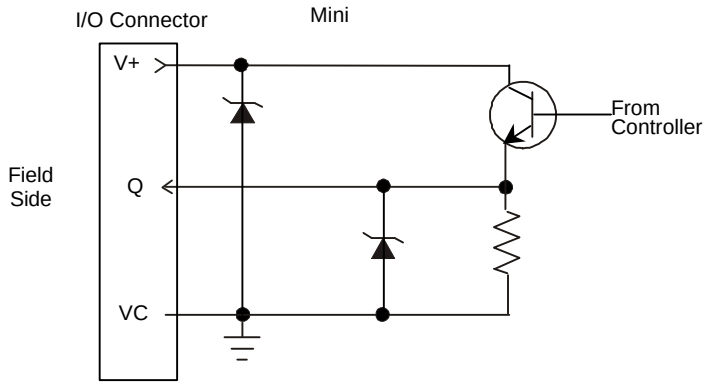


Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Common
V+	Load Voltage +

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 600 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

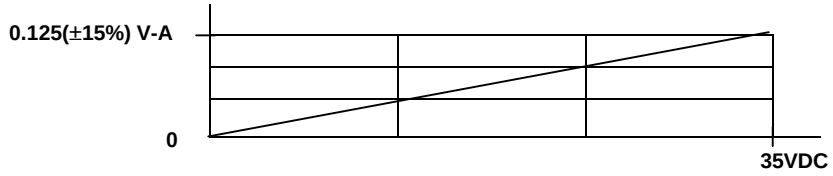
5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

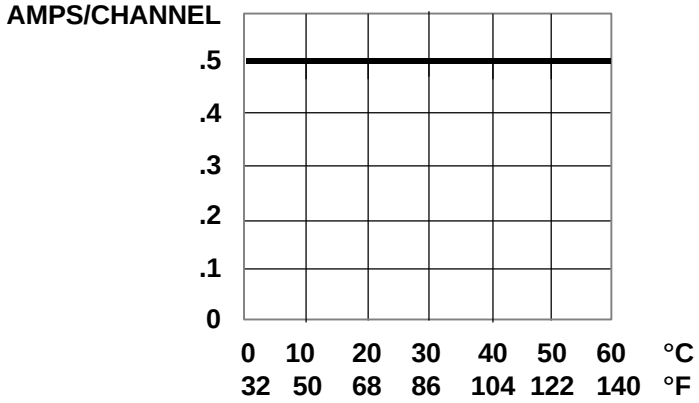
6 INPUT CHARACTERISTICS

Digital Input Chart



7 OUTPUT CHARACTERISTICS

Derating Chart



8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

Mixed DC I/O Module

IC300OCS032 / OCS062
IC300RCS062
12/24 Vdc In, Positive/Negative Logic
24Vdc Out, Negative Logic

Mini OCS/RCS

1 SPECIFICATIONS

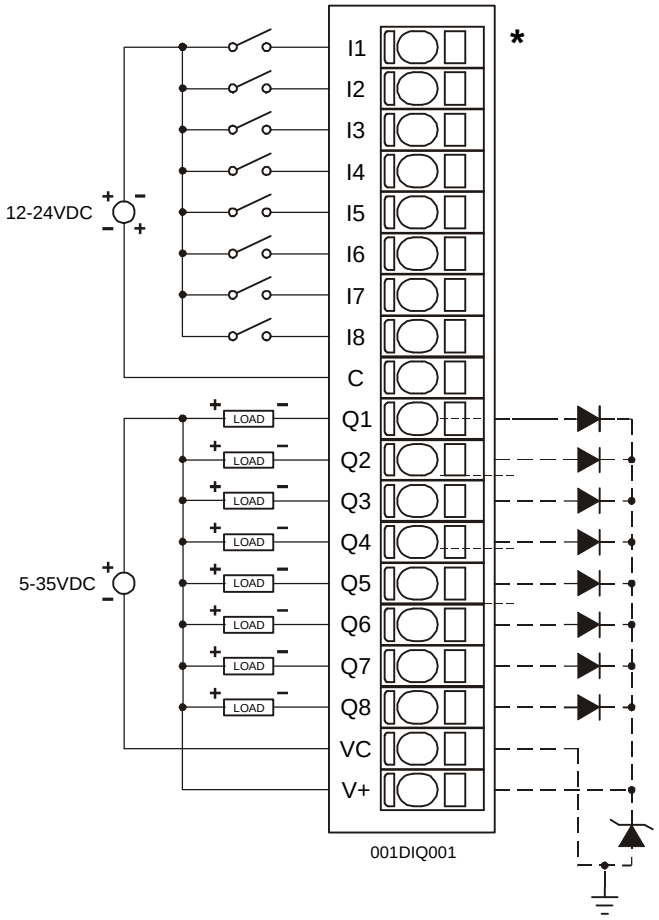
INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Common)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC	Status Indicator	8 LEDs

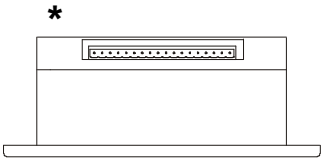
OUTPUT			
Outputs per Module	8	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100µA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channel
Output Type	Sinking / 10K Pull-Up	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
Output Characteristics	Current Sinking	ON to OFF Response	1ms.
ON Voltage Level	1.5VDC Max.	Status Indicator	8 LEDs
Maximum Load Current per channel	0.5A Max.		

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
		Weight	9 oz. (256 g)

GFK-1678B

2 WIRING



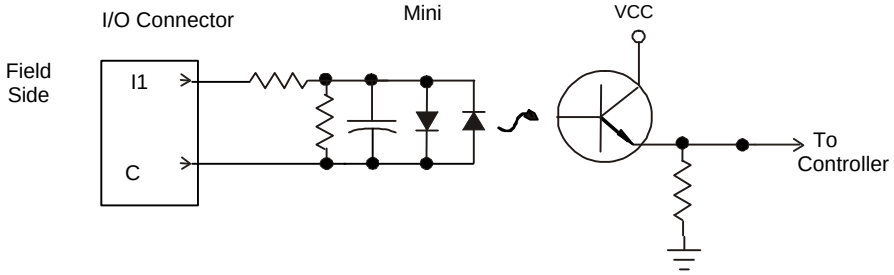


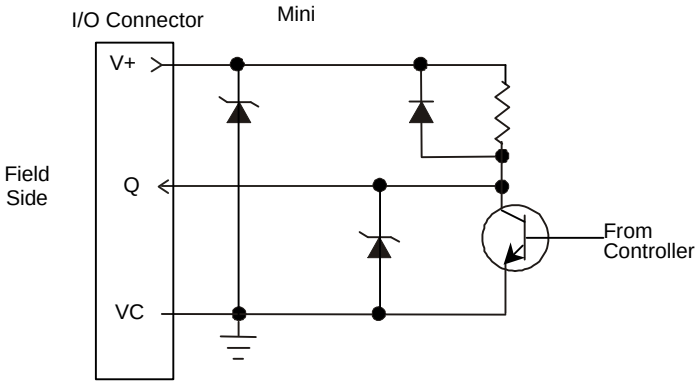
Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Common
V+	Load Voltage +

Warning: Wiring the positive side of the DC source to loads connected to outputs 1 through 8 and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

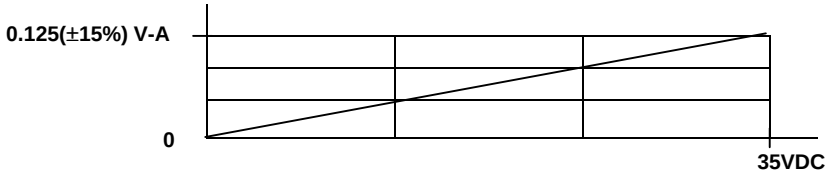
5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

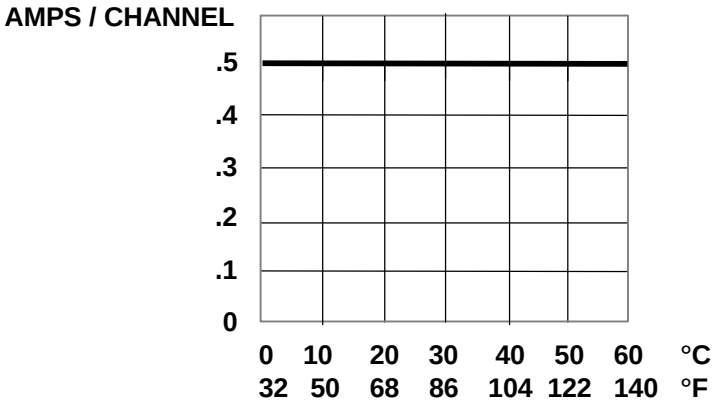
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart



7 TECHNICAL ASSISTANCE

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Europe:
(+) 353-21-4321-266

High Speed Counter

IC300OCS033 / IC300OCS063
IC300RCS063
High Speed Counter Inputs
Sourcing Pulse Outputs

MINI OCS/RCS

This product also has a detailed supplement (GFK-1643) available.

1 SPECIFICATIONS

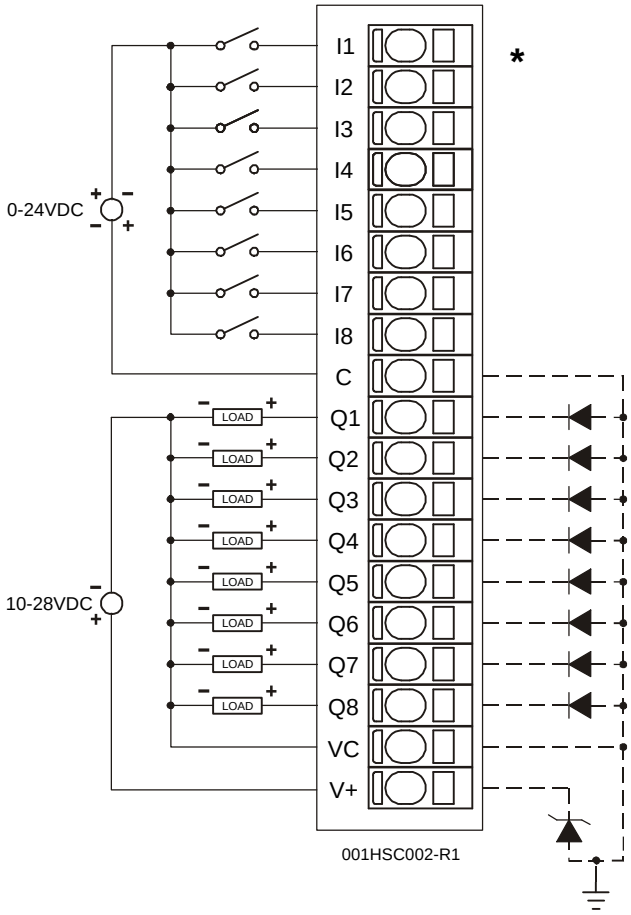
INPUT						
Inputs per Module	8				Commons per Module	1
Programmable Input Voltage Ranges	Zero Crossing	TTL / 5 VDC	12 VDC	24 VDC	Input Type	Positive Logic
					Peak Voltage	35 VDC Max.
ON Voltage Level	+ 0.1	+ 2	+ 8	+ 16	Input Impedance	10K Ohms
OFF Voltage Level	- 0.1	+ 0.8	+ 4	+ 8	Input Filter	500KHz, 50KHz, 5KHz

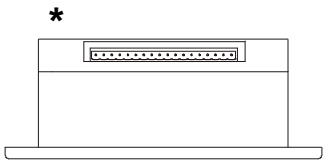
OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	10µs.
Output Type	Sourcing / 10K Pull-Down Positive Logic	ON to OFF Response	10µs.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current Per Output	0.5A Max.	Output Protection	Short Circuit

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA @ 24VDC for 1 ms.	UL	Operating Temperature Code T4A; Also refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

GFK-1679B

2 WIRING

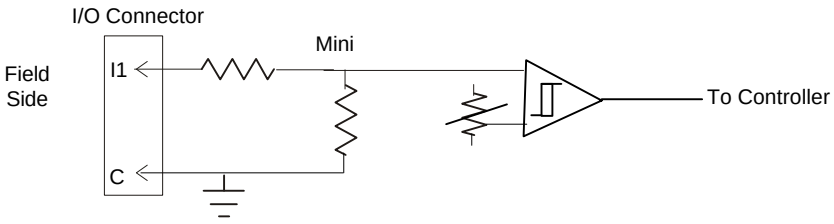


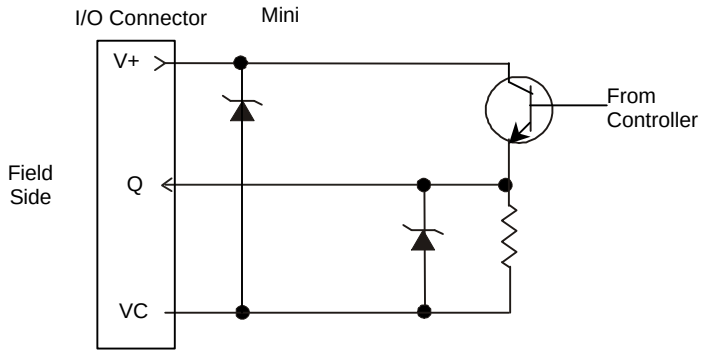


Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Common
V+	Load Voltage +

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 300 watts.

4 CONFIGURATION AND INPUT/OUTPUT MODES

Note: The status of the I/O can be monitored in Cscape Software.

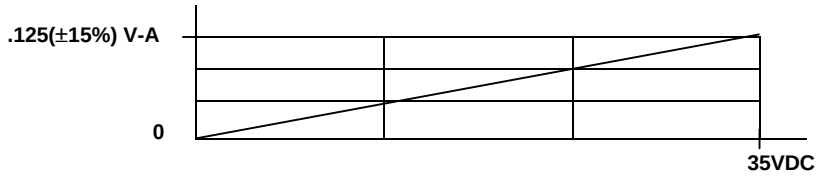
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual.

   There are two screen tabs for this model – the **I/O Map** tab and the **Module Setup** tab. The I/O Map is not edited by the user. The I/O Map describes which I/O registers are assigned to a specific Mini OCS model. The I/O Map is determined by the model number.

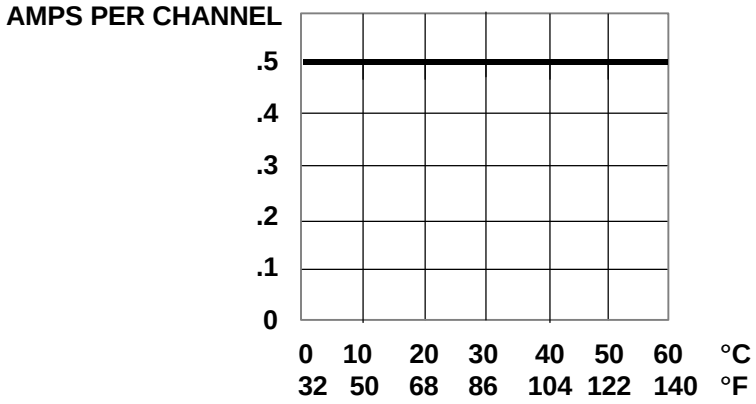
2. Consult the **SmartStack High Speed Counter Manual** (GFK-1643) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

5 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



6 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

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Europe:
(+) 353-21-4321-266

High Speed Counter

MINI OCS/RCS

IC300OCS034 / IC300OCS064
IC300RCS064
High Speed Counter Inputs
Sinking Pulse Outputs

This product also has a detailed supplement (GFK-1643) available.

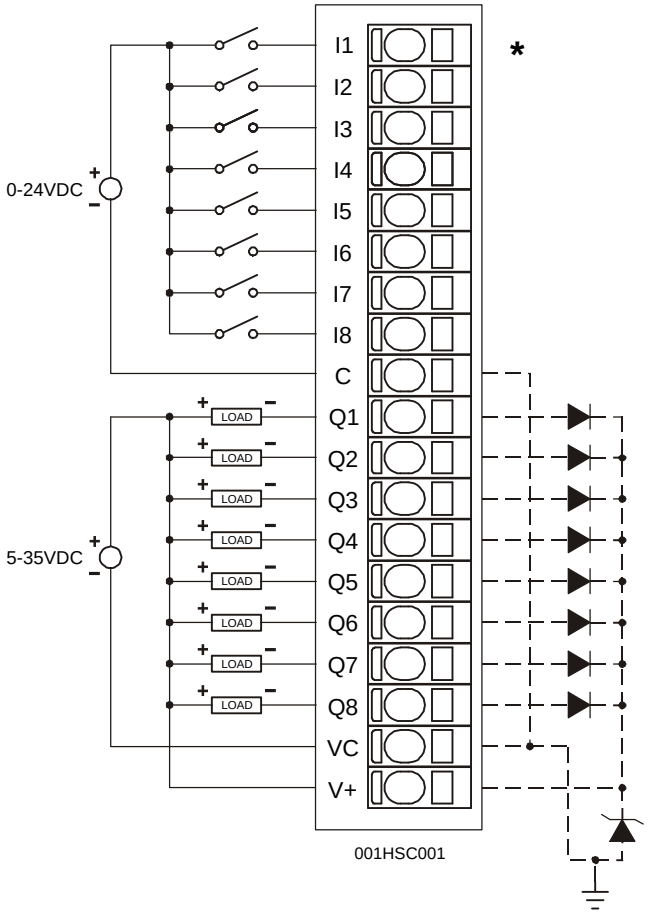
1 SPECIFICATIONS

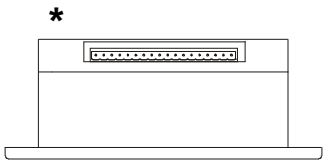
INPUT						
Inputs per Module	8				Commons per Module	1
Programmable Input Voltage Ranges	Zero Crossing	TTL / 5 VDC	12 VDC	24 VDC	Input Type	Positive Logic
					Peak Voltage	35VDC Max.
ON Voltage Level	+ 0.1	+ 2	+ 8	+ 16	Input Impedance	10K Ohms
OFF Voltage Level	- 0.1	+ 0.8	+ 4	+ 8	Input Filter	500KHz, 50KHz, 5KHz

OUTPUT			
Outputs per Module	8	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100µA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channel
Output Type	Sinking / 10K Pull-Up Negative Logic	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	0.3µS.
Output Characteristics	Current Sinking	ON to OFF Response	2µS.
ON Voltage Level	1.5VDC Max. @ 500mA 0.7 VDC Max. @ 250mA	Maximum Load Current per Output	0.5A

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	UL	Operating Temperature Code T4A; Also refer to GFK-1754
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
Operating Temperature	0° to 50° Celsius		

2 WIRING



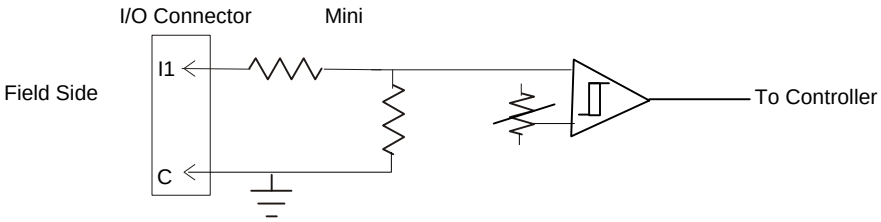


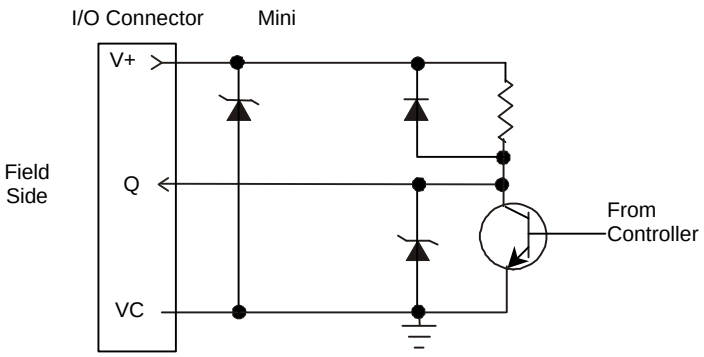
Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	**Common[1]**
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	**Common[1]**
V+	Load Voltage +
[1] **Internally Connected**	

Warning: Wiring the positive side of the DC source to loads connected to outputs 1 through 8 and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

4 CONFIGURATION AND MODES

Note: The status of the I/O can be monitored in Cscape Software.

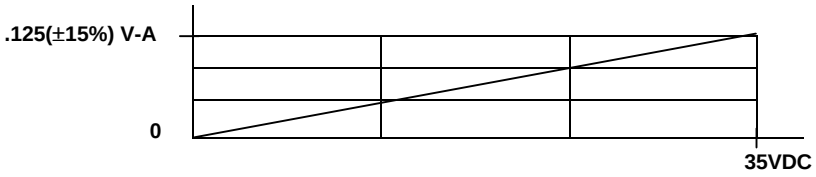
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual.

   There are two screen tabs for this model – the **I/O Map** tab and the **Module Setup** tab. The I/O Map is not edited by the user. The I/O Map describes which I/O registers are assigned to a specific Mini OCS model. The I/O Map is determined by the model number.

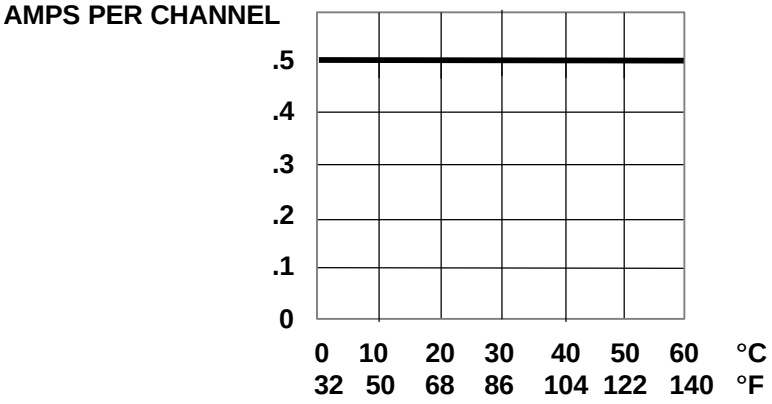
2. Consult the **SmartStack High Speed Counter Manual** (GFK-1643) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

5 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



6 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

Mixed I/O Module

IC300OCS035 / IC300OCS065
IC300RCS065
12/24 Vdc In, Positive/Negative Logic
3A Relay Out

Mini OCS/RCS

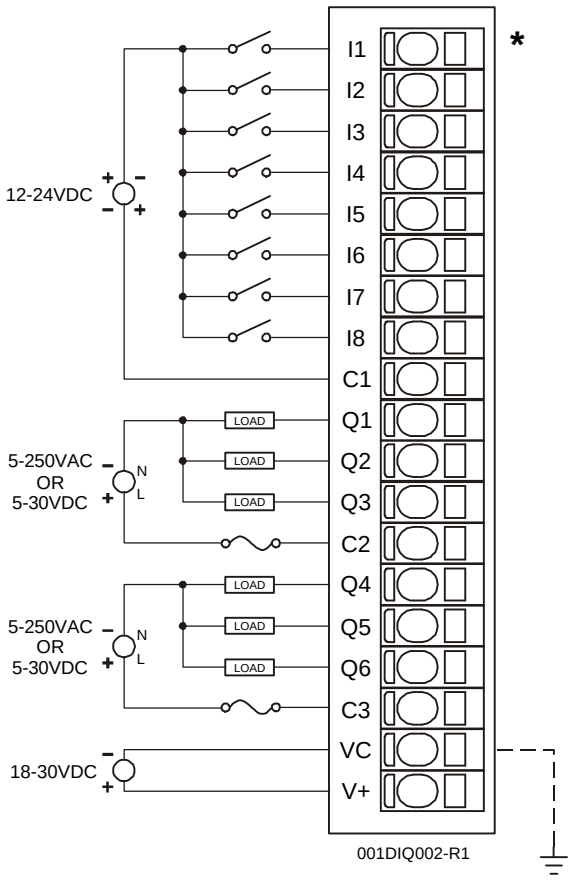
1 SPECIFICATIONS

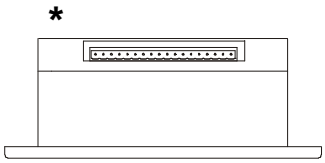
INPUT			
Inputs per Module	8 isolated	Input Impedance	> 10K Ohms
Commons per Module	1	Minimum ON Current	1mA
Input Voltage Range	12/24VDC	Maximum OFF Current	200µA
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
ON Voltage level	Min. 9VDC	ON to OFF Response	1ms.
OFF Voltage level	Max. 3VDC	Status Indicator	8
Isolation (Common to Common and Channel to Common)	500VDC		

OUTPUT			
Outputs per Module	6 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A per channel
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	.3ms. Typical
ON Voltage drop	0.2V Max.	Status Indicator	6
Fuses	10A common	Isolation (Common to Common and Channel to Common)	500VDC
Maximum Load current (resistive) per channel	3A		

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9 oz. (256 g)

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

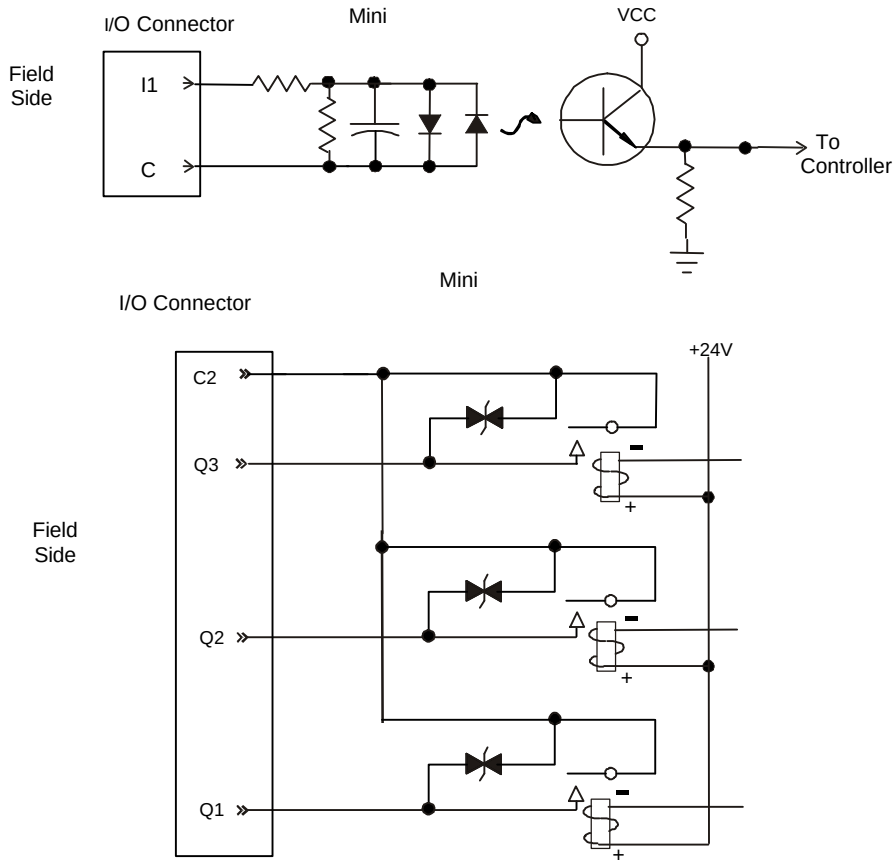
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1
Q1	Output 1
Q2	Output 2
Q3	Output 3
C2	Common 2
Q4	Output 4
Q5	Output 5
Q6	Output 6
C3	Common 3
VC	Relay Coil Voltage Common
V+	Relay Coil Voltage +

Warning: To protect the module and associated wiring from load faults, use external fuses **(10 A)** as shown. **This warning affects Mini OCS035 / OCS065, Revisions E or higher and all versions of the Mini RCS065.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 6 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

3 INTERNAL CIRCUIT SCHEMATIC



Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

Electro-mechanical relays comply with IEC1131-2.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

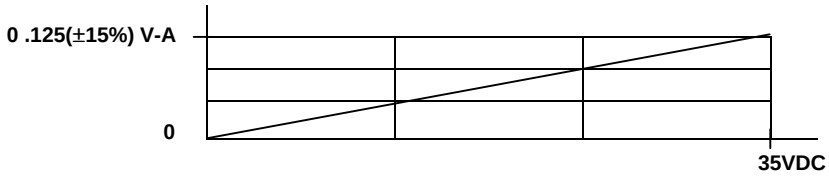
When found on the product, the following symbols specify:

Warning: Consult user documentation.

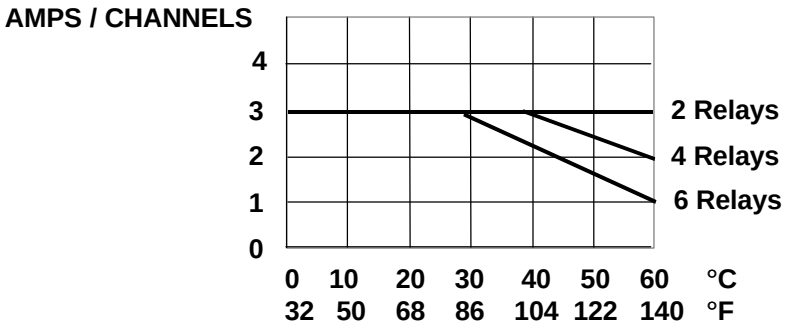
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart



Typical Relay Life			
Voltage (Resistive)	**Load Current**		
	1 Amp	**2 Amp**	**3 Amp**
30VDC	600K	250K	125K
125VAC	750K	300K	150K
250VAC	500K	200K	100K

7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

AC Input /AC Output Module

Mini OCS/RCS

IC300OCS036 / IC300OCS066
IC300RCS066
120 VAC In, Positive Logic
80-260 VAC Out, Positive Logic

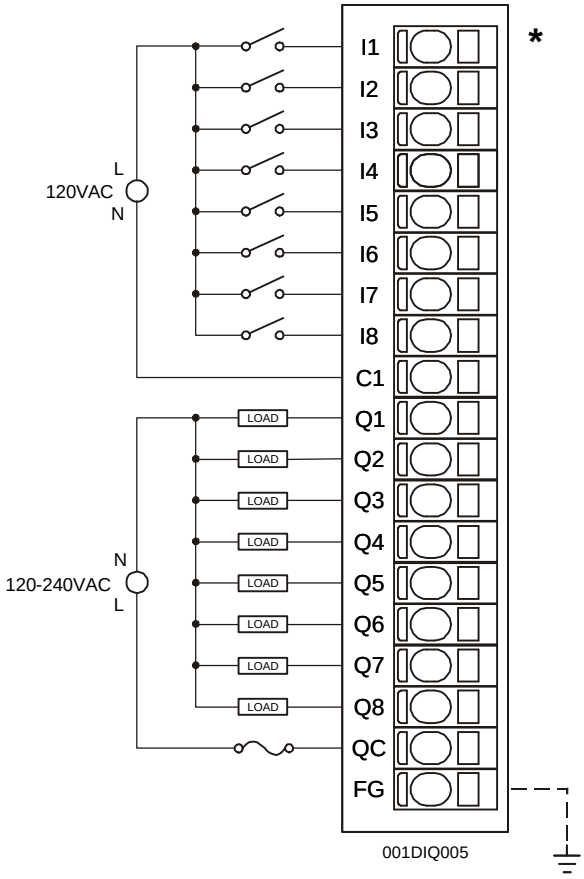
1 SPECIFICATIONS

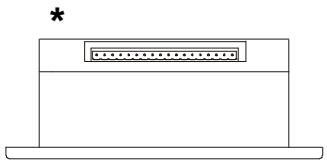
INPUT			
Inputs per Module	8	Input Impedance	0.01µF +10K
Commons per Module	1	Isolation (Channel to Common)	500VDC
Input Voltage Range	120 – 160 VAC	Minimum ON Current	1mA.
Peak Voltage	160VAC	Maximum OFF Current	200µA.
AC Frequency	60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF Response	50ms.
OFF Voltage level	30VAC Max.	Status Indicator	8

OUTPUT			
Outputs per Module	8	Maximum Load Current per output	.3A Max.
Commons per Module	1	Maximum Leakage Current	15µA Max.
Operating voltage	260VAC Max.	Maximum Inrush Current	500mA
Output Type	MOSFET	OFF to ON Response	10ms. Max.
Contact Voltage	260VAC Max.	ON to OFF Response	3ms. Max.
ON Voltage level	1V Max.	Status Indicator	8
Isolation (Channel to Channel and Channel to Common)	500VDC		

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (256 g)

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

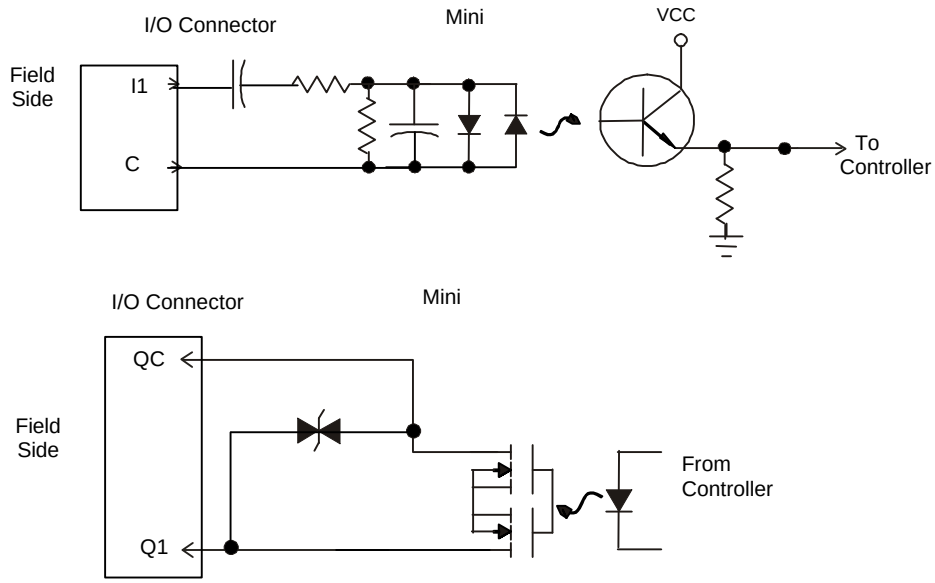
Pins	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
IC	Input Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
QC	Output Common
FG	Frame Ground

Warning: To protect the module and associated wiring from load faults, use external fuse **(2.5A)** as shown. **This warning affects OCS036 / 066, Revisions E or higher and all versions of the Mini RCS066.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 8 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

3 INTERNAL CIRCUIT SCHEMATICS



Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

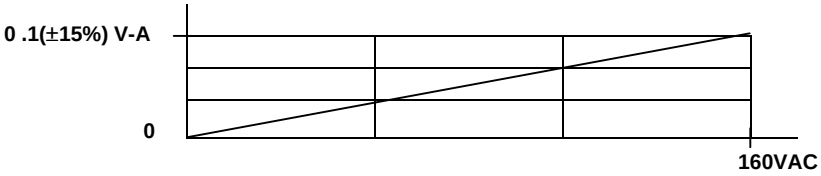
When found on the product, the following symbols specify:

Warning: Consult user documentation.

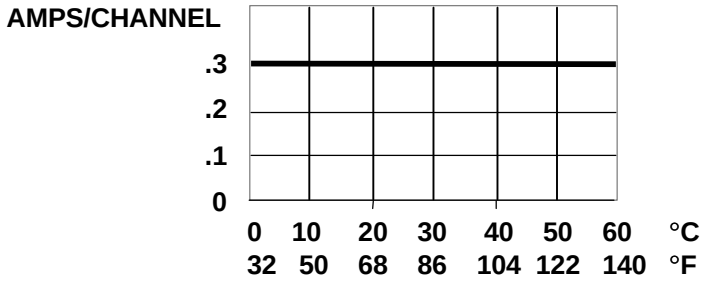
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart

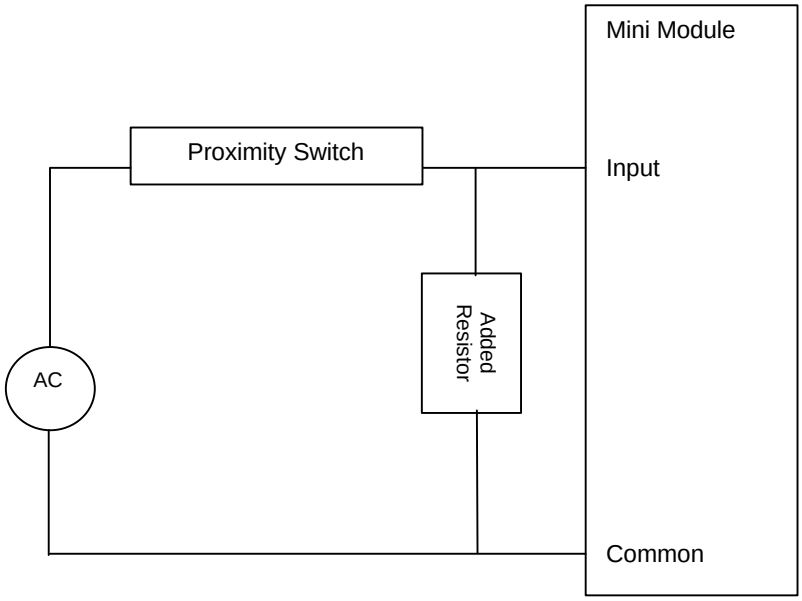


Derating Output Chart



The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor



7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

AC Input /AC Output Module

Mini OCS/RCS

IC300OCS037 / IC300OCS067
IC300RCS067
120 VAC In, Positive Logic
3A Relay Out

1 SPECIFICATIONS

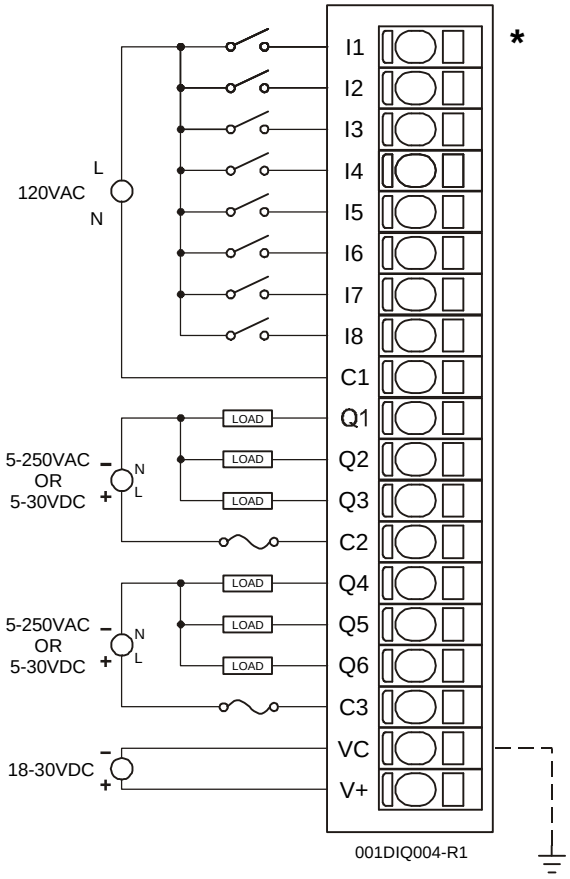
INPUT			
Inputs per Module	8	Input Impedance	0.01µF +10K
Commons per Module	1	Isolation (Channel to Bus)	500VDC
Input Voltage Range	120 – 160 VAC	Minimum ON Current	1mA.
Peak Voltage	160VAC	Maximum OFF Current	200µA.
AC Frequency	50 / 60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF Response	50ms.
OFF Voltage level	30VAC Max.	Status Indicator	8

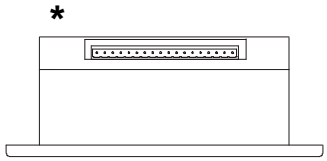
OUTPUT			
Outputs per Module	6 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A per channel
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	0.3ms. Typical
ON Voltage drop	.1V Max.	Status Indicator	6
Fuses	10A common	Isolation (Channel to Channel and Channel to Common)	500VDC
Maximum Load current (resistive) per channel	3A		

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Operating Temperature Code T4A; Also refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9oz. (256 g)

GFK-1683B

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

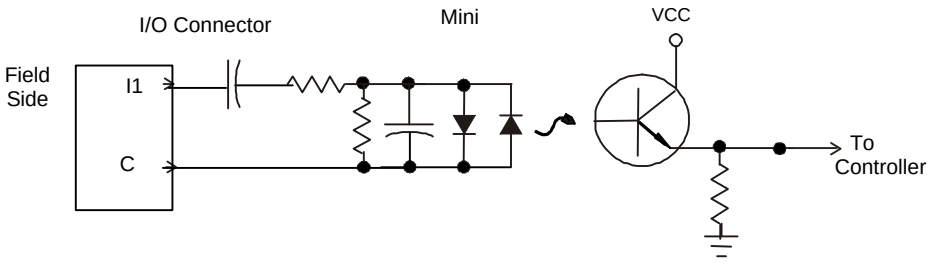
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1
Q1	Output 1
Q2	Output 2
Q3	Output 3
C2	Common 2
Q4	Output 4
Q5	Output 5
Q6	Output 6
C3	Common 3
VC	Relay Coil Voltage Common
V+	Relay Coil Voltage +

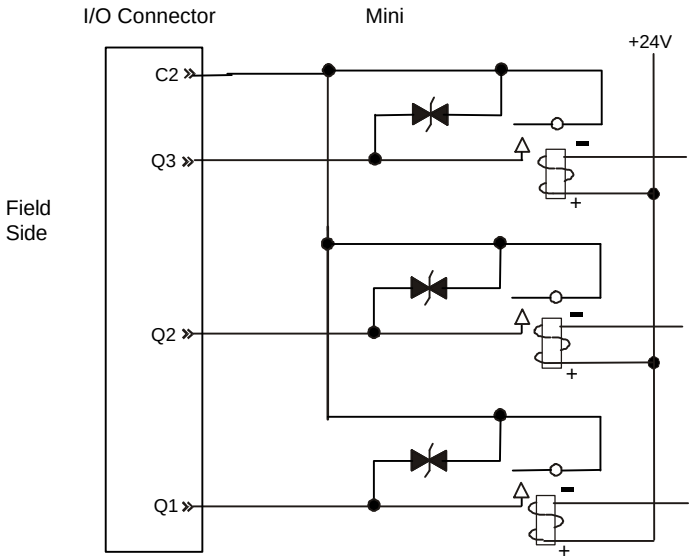
Warning: To protect the module and associated wiring from load faults, use external fuse **(10 A)** as shown. **This warning affects OCS037 / OCS067, Revisions E or higher and all versions of the Mini RCS067.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 6 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

3 INTERNAL CIRCUIT SCHEMATICS





Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

Electro-mechanical relays comply with IEC1131-2.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

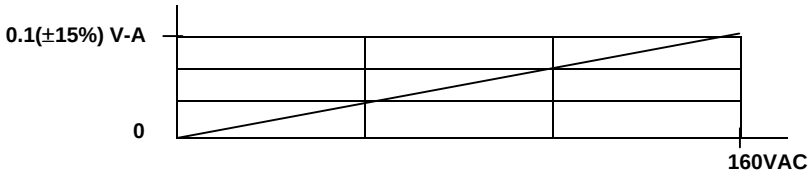
When found on the product, the following symbols specify:

Warning: Consult user documentation.

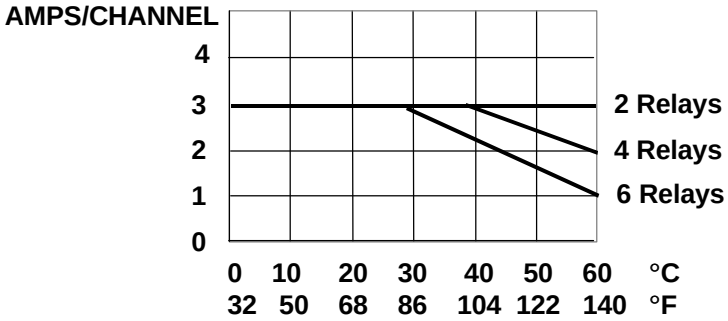
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



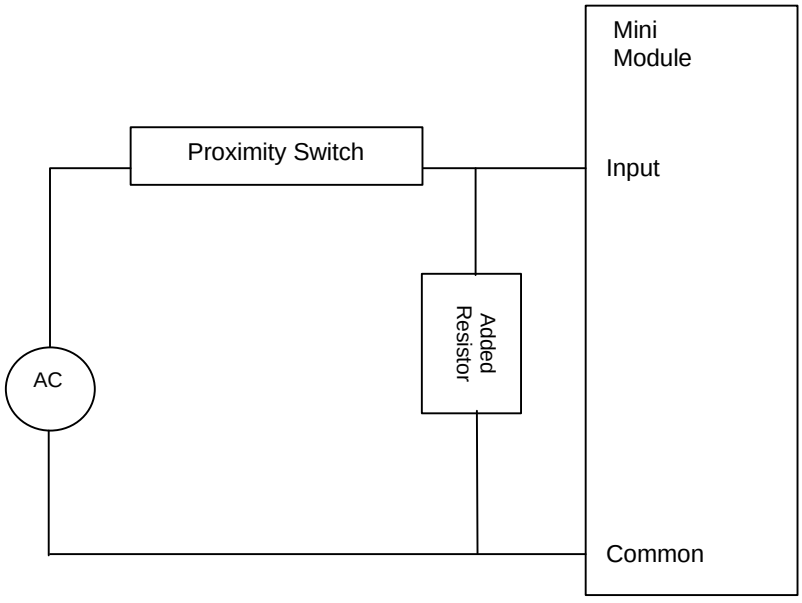
Derating Output Chart



Typical Relay Life			
Voltage (Resistive)	**Load Current**		
	1 Amp	**2 Amp**	**3 Amp**
30VDC	600K	250K	125K
125VAC	750K	300K	150K
250VAC	500K	200K	100K

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor



7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

AC Input /AC Output Module

IC300OCS038 / IC300OCS068
120 / 240 VAC In, Positive Logic
80-250 VAC Out, Positive Logic

Mini OCS/RCS

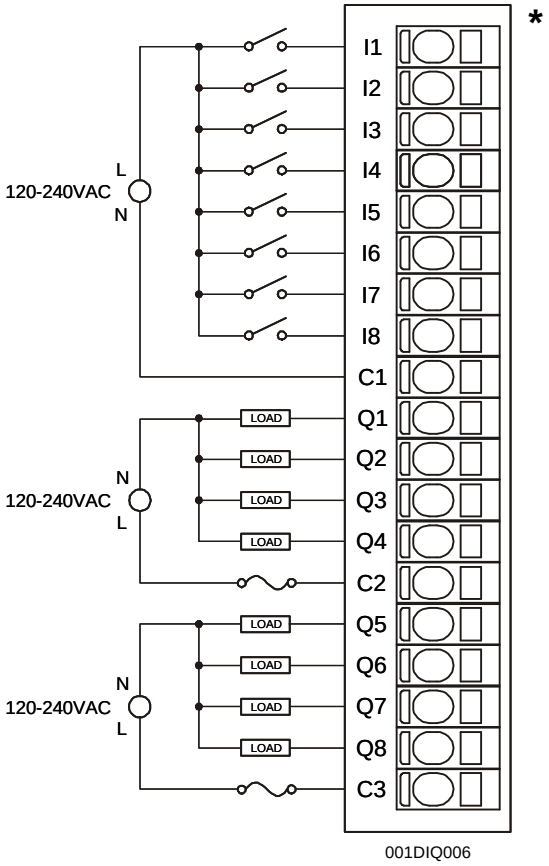
1 SPECIFICATIONS

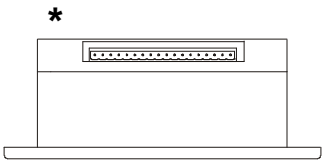
INPUT			
Inputs per Module	8	Input Impedance	0.01µF +10K
Commons per Module	1	Isolation (Channel to Common)	1500VDC
Input Voltage Range	120 – 240 VAC	Minimum ON Current	1ms.
Peak Voltage	275 VAC	Maximum OFF Current	1ms.
AC Frequency	60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF Response	50ms.
OFF Voltage level	30VAC Max.	Status Indicator	8 LEDs
OUTPUT			
Outputs per Module	8	Maximum Load Current per output	2A Max.
Commons per Module	2	Maximum Leakage Current	600µA Max.
Operating voltage	250VAC Max.	Maximum Inrush Current	4A
Output Type	Triac	OFF to ON Response	10ms. Max.
ON Voltage level	1.6V Max.	ON to OFF Response	10ms. Max.
Isolation (Channel to Common)	1500VDC	Status Indicator	8

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (256 g)

GFK-1890

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

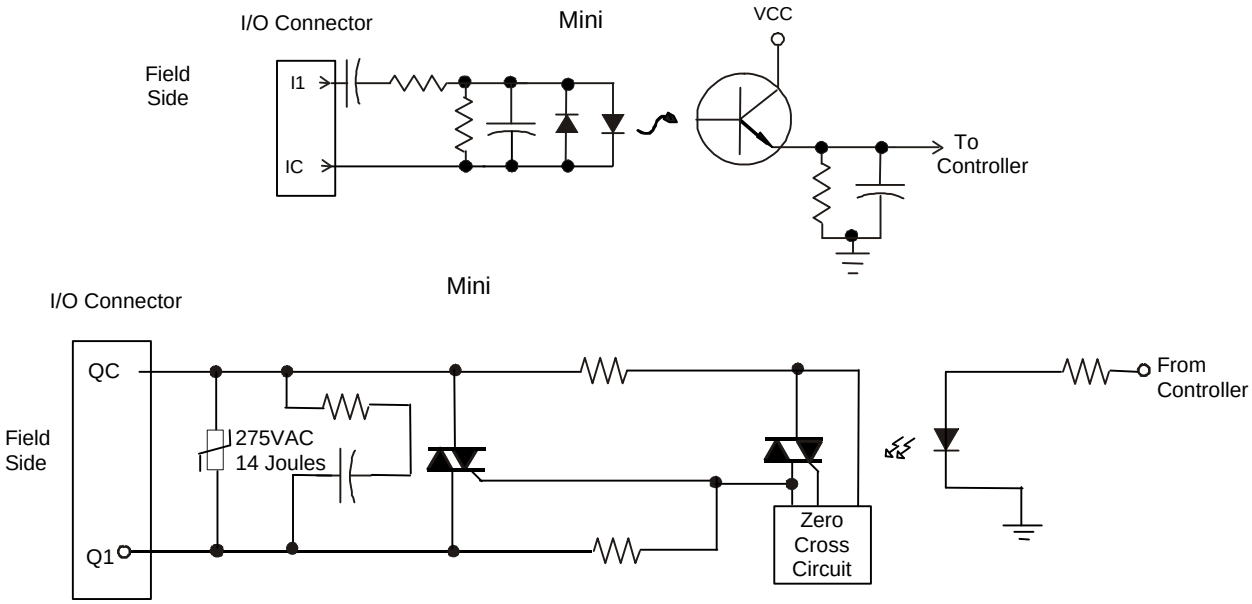
Pins	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
IC	Input Common Isolated
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
C2	Output Common 2 Isolated
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
C3	Output Common 3 Isolated

Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)** as shown. **This warning affects OCS038 / OCS068, Revisions E or higher.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 8 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

3 INTERNAL CIRCUIT SCHEMATICS



Specification for transient voltage suppressors (MOVs) used on output circuitry is 275VAC, 14 Joules.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

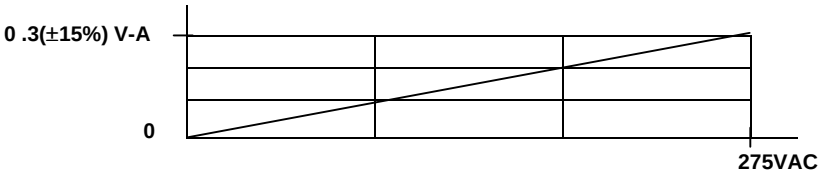
When found on the product, the following symbols specify:

Warning: Consult user documentation.

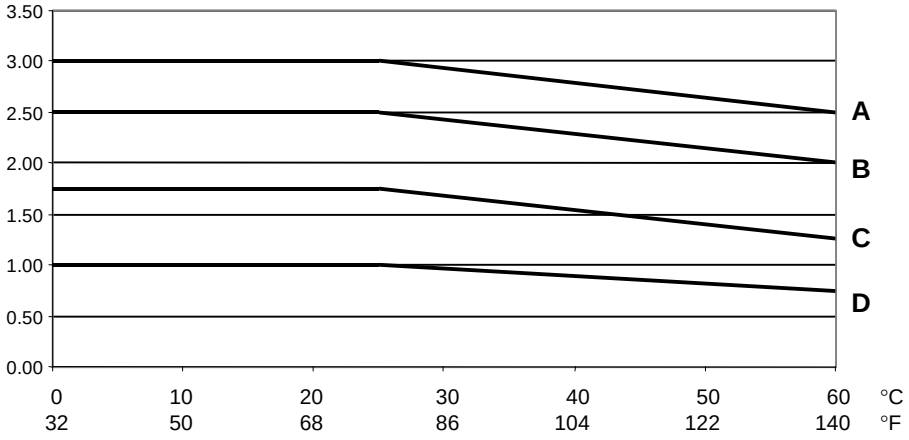
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



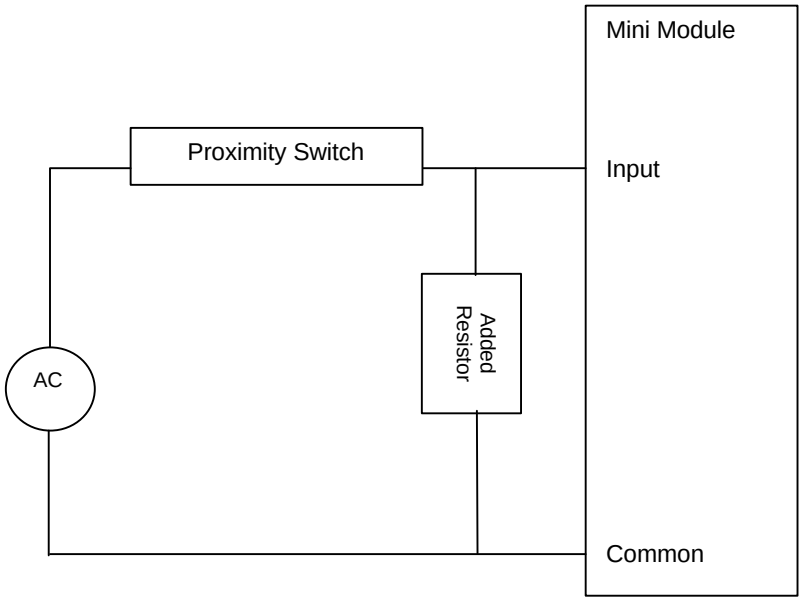
Derating Legend	
A	1 Channel ON
B	2 Channels ON ▪ One even channel and one odd channel or ▪ One low channel (1-4) and one high channel (5-8).
C	4 Channels ON ▪ One channel (1 or 3) ▪ One channel (2 or 4) ▪ One channel (5 or 7) ▪ One channel (6 or 8)
D	8 Channels ON

For maximum output power, loads are to be distributed between even and odd channels, and also, between low (1-4) and high (5-8) channels. Allow for ample air circulation around the module. Current levels typically need to be reduced by 0.5 amp for restricted air flow.

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor

240VAC: 15K ohm, 10W resistor *or* 0.22µF metallized film capacitor rated for 240VAC service in series with 470 ohm, 0.5W resistor



7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

Mixed DC I/O Module

IC300OCS041 / IC300OCS071
IC300RCS071
12/24 Vdc In, Positive/Negative Logic
(16 Input Channels)
10-28Vdc Out, Positive Logic
(12 Output Channels)

Mini OCS/RCS

1 SPECIFICATIONS

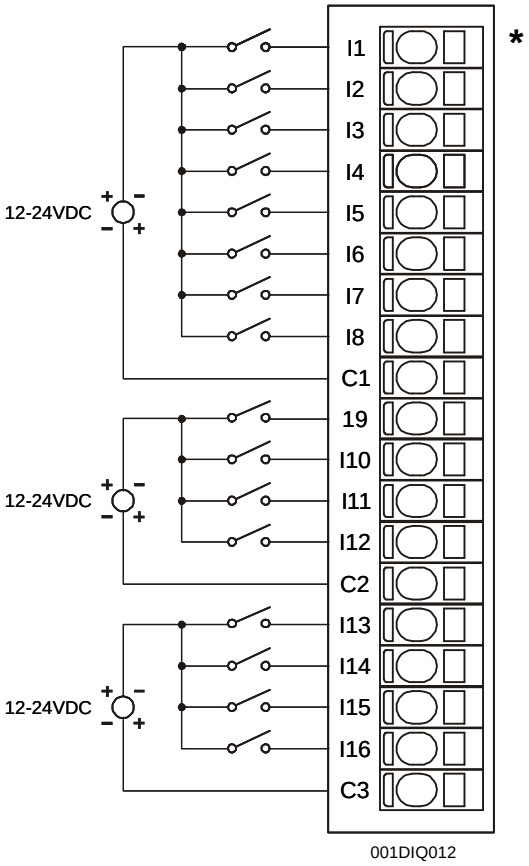
INPUT			
Inputs per Module	16	Input Characteristics	Bidirectional
Commons per Module	3	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Channel)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC /1mA minimum	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		

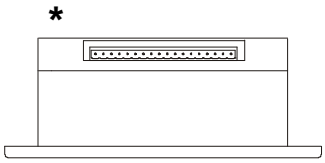
OUTPUT			
Outputs per Module	12	Maximum Inrush Current	650mA
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per channel	0.5A Max.	Output Protection	Short Circuit

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Operating Temperature Code T4; Also refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

2 WIRING

2.1 Input Wiring

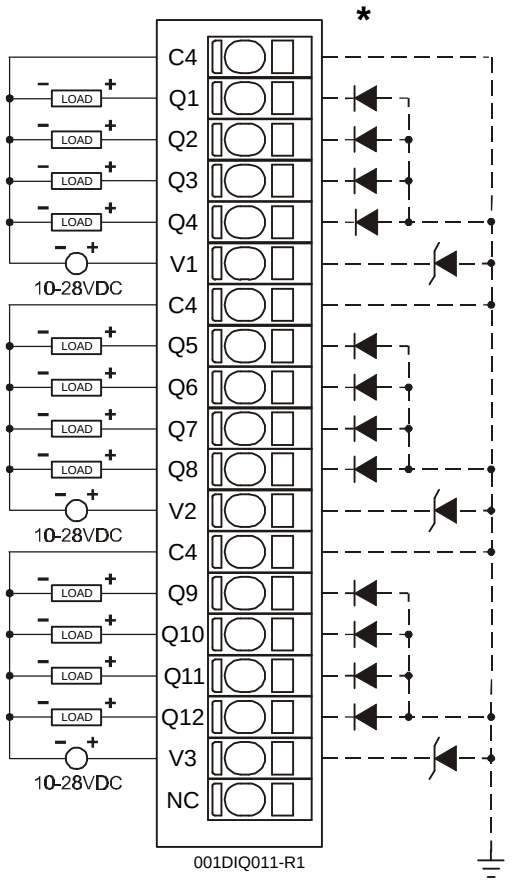


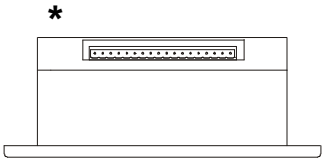


Mini Top View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1 (Isolated)
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
C2	Common 2 (Isolated)
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C3	Common 3 (Isolated)

2.2 Output Wiring

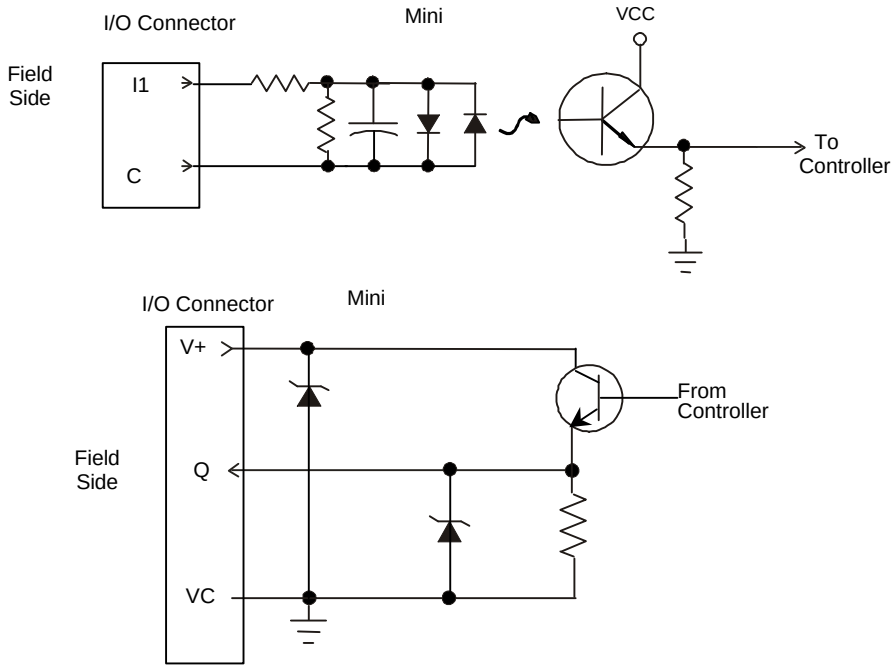




Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
C4	Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
V1	Load Power 1
C4	Common
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
V2	Load Power 2
C4	Common
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
V3	Load Power
NC	No Connection

3 INTERNAL SCHEMATIC DRAWING



Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 600 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

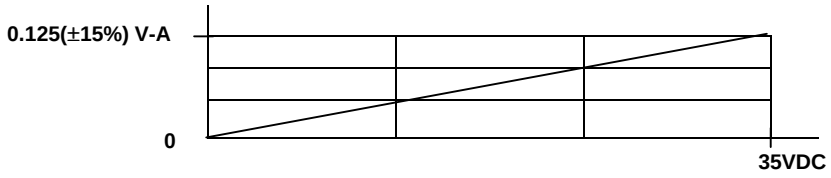
5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

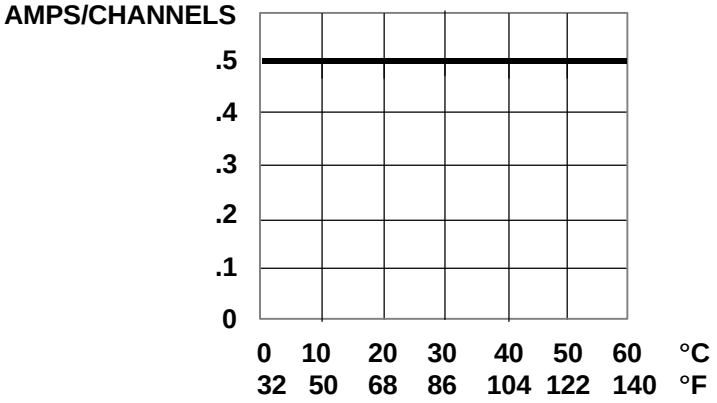
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

Mixed DC I/O Module

Mini OCS/RCS

IC300OCS042 / IC300OCS072
IC300RCS072
(16 Input Channels)
12/24 Vdc In, Positive/Negative Logic
24Vdc Out, Negative Logic
(12 Output Channels)

1 SPECIFICATIONS

INPUT			
Inputs per Module	16	Input Characteristics	Bidirectional
Commons per Module	3	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Bus)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		

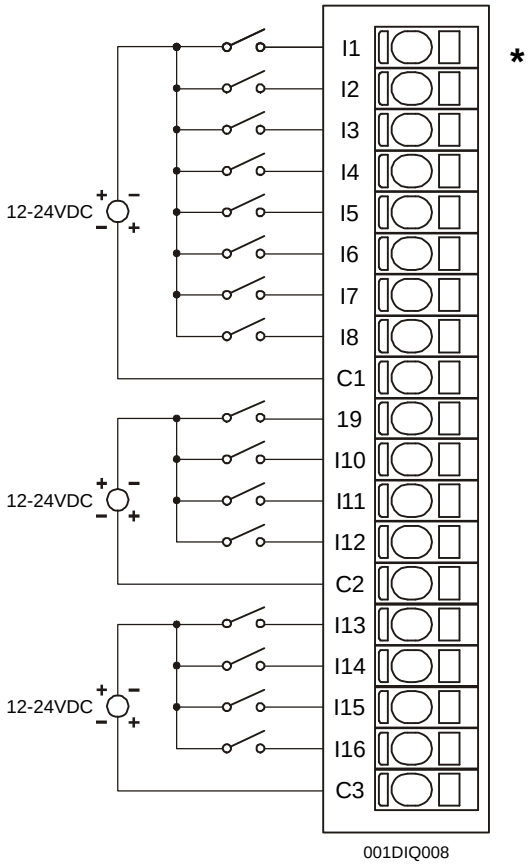
OUTPUT			
Outputs per Module	12	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100µA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channel
Output Type	Sinking / 10K Pull-Up	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
Output Characteristics	Current Sinking	ON to OFF Response	1ms.
ON Voltage Level	1.5VDC Max.		
Maximum Load Current per channel	0.5A Max.		

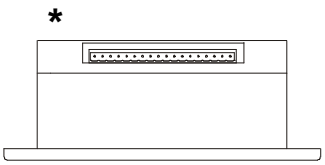
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Operating Temperature Code T4A; Also refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
		Weight	9.5 oz. (270 g)

GFK-1685B

2 WIRING

2.1 Input Wiring

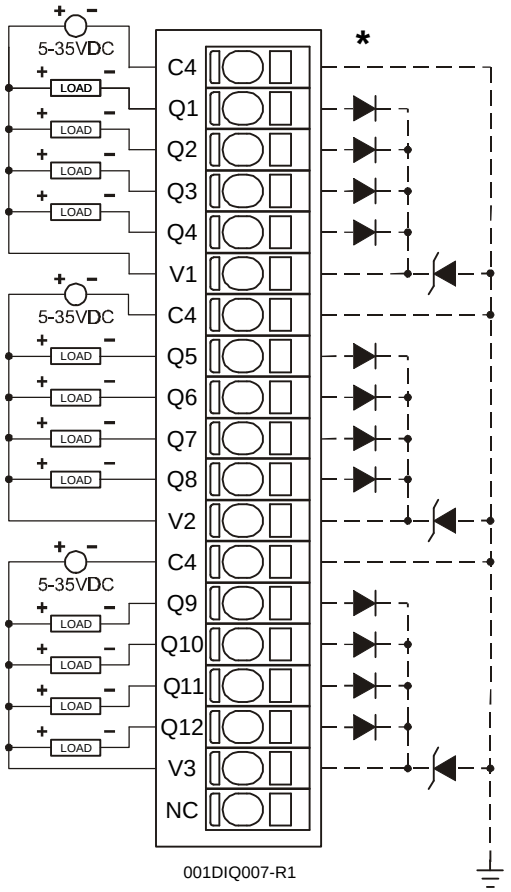


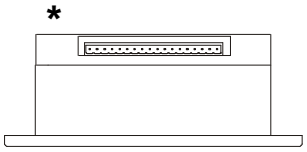


Mini Top View – Shows corresponding I/O pin location

Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
C2	Common 2
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C3	Common 3

2.2 Output Wiring



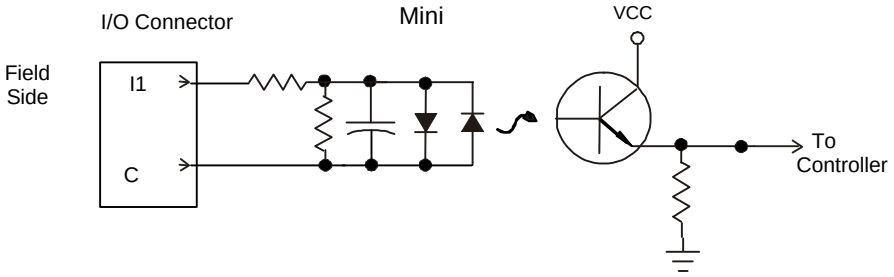


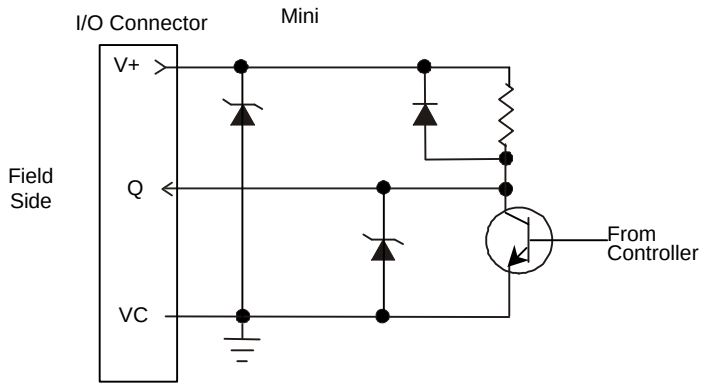
Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
C4	Common 4
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
V1	Load Power 1
C4	Common 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
V2	Load Power 2
C4	Common 4
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
V3	Load Power 3
NC	No Connection

Warning: This is a negative logic device. Use of it may be considered an unsafe practice under CE directives.

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

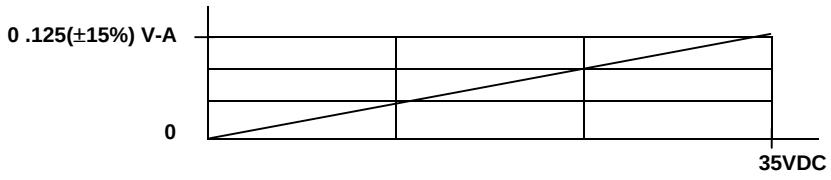
5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

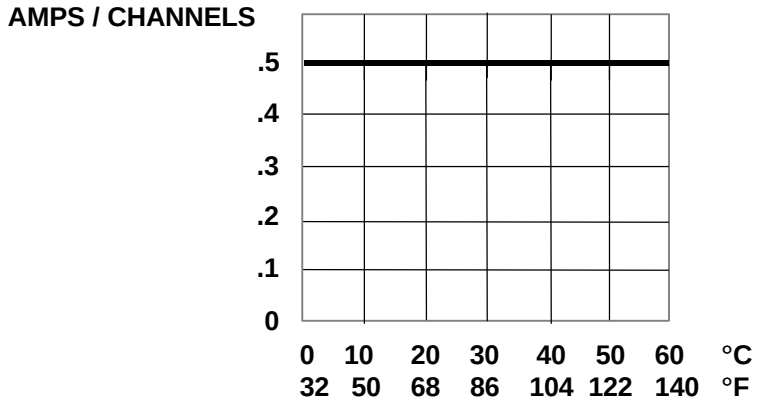
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart



7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

Mixed I/O Module

IC300OCS045 / IC300OCS075
IC300RCS075
12/24 Vdc In, Positive/Negative Logic
3A Relay Out

Mini OCS/RCS

1 SPECIFICATIONS

INPUT			
Inputs per Module	14 isolated	Minimum ON Current	1mA
Commons per Module	3	Maximum OFF Current	200µA
Input Voltage Range	12/24VDC	OFF to ON Response	1ms.
Peak Voltage	35VDC Max.	ON to OFF Response	1ms.
ON Voltage level	Min. 9VDC	Isolation (Channel to Common)	500VDC
OFF Voltage level	Max. 3VDC		
Input Impedance	> 10K Ohms		

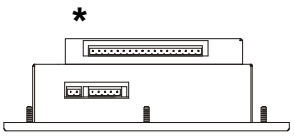
OUTPUT			
Outputs per Module	10 relay	Maximum Inrush Current	3A
Commons per Module	2	Minimum Load	None
Output Type	Relay	OFF to ON Response	6ms. Typical
Coil Voltage	18-30VDC	ON to OFF Response	0.3ms. Typical
Contact Voltage	250VAC / 30VDC Max.	Isolation (Channel to Channel and Channel to Common)	2500VDC
ON Voltage drop	0.2V Max.	Maximum Leakage Current	5µA
Maximum Load current (resistive) per output	3A		

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

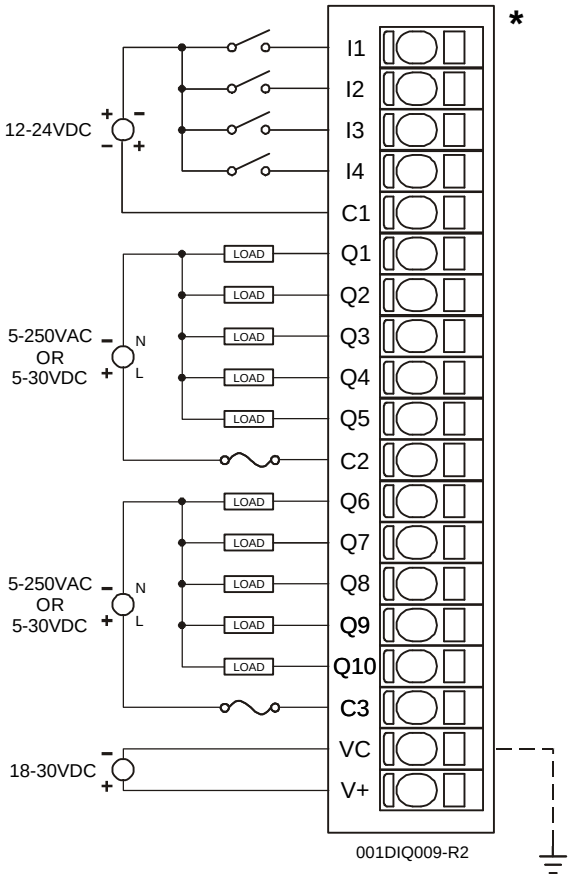
GFK-1728A

2 WIRING

2.1 Input / Output Connector Wiring



Mini Bottom View – Shows Corresponding I/O Pin



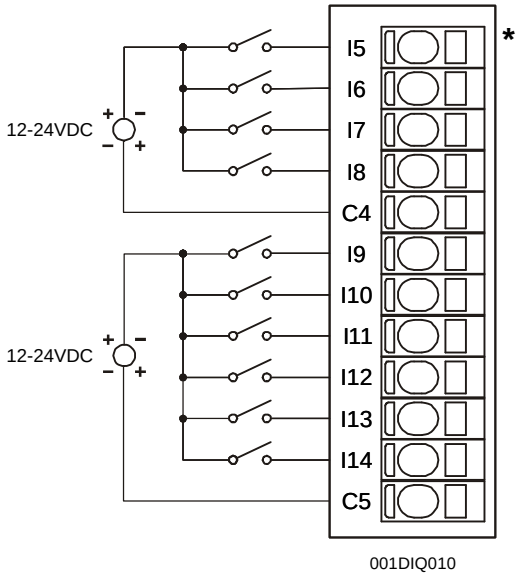
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C1	Common for Inputs1,2,3,4
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
C2	Common for Outputs 1,2,3,4,5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
C3	Common for Outputs 6,7,8,9,10
VC	Relay Coil power common, connected to bus common internally.
V+	Relay Coil Power, +18 to +30VDC, 90mA max.

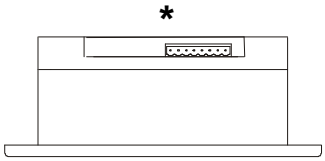
Warning: To protect the module and associated wiring from load faults, use external fuse (**10 A**) as shown. **This warning affects OCS045 / OCS075, Revisions E or higher and all versions of the Mini RCS075.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 10 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

2.2 Input Connector Wiring

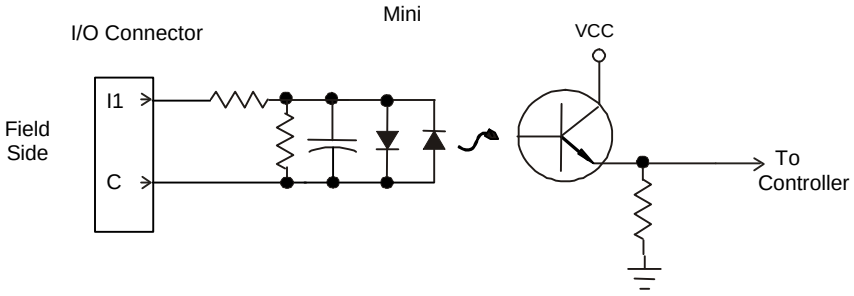


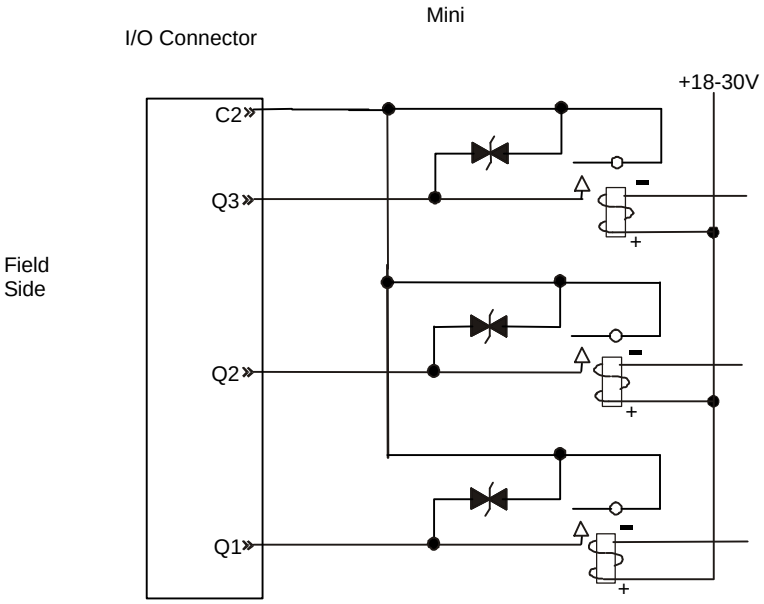


Mini Top View – Shows corresponding I/O pin location

Pin	Signal
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C4	Common for Inputs 5,6,7,8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
C5	Common for Inputs 9,10,11,12,13,14

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC bi-directional 400 watts.

Note: Electro-mechanical relays comply with IEC1131-2.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

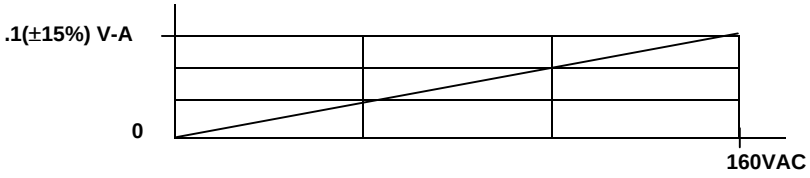
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

Warning: Consult user documentation.

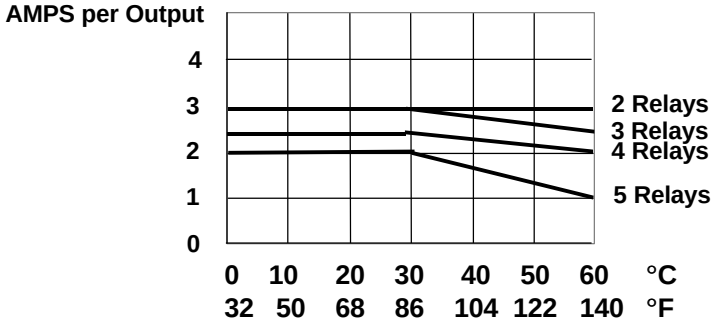
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart
(Each group of 5)



Typical Relay Life				
Voltage (Resistive)	**No Load**	**Load Current**		
		1 Amp	**2 Amp**	**3 Amp**
30VDC	20 Million	600K	250K	125K
125VAC		750K	300K	150K
250VAC		500K	200K	100K

7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

AC Input /AC Output Module

Mini OCS/RCS

IC300OCS047 / IC300OCS077
IC300RCS077
120 VAC In, Positive Logic
3A Relay Out

1 SPECIFICATIONS

INPUT			
Inputs per Module	14	Input Impedance	0.01µF +10K
Commons per Module	3	Isolation (Channel to Common)	1500VDC
Input Voltage Range	120 – 160 VAC	Minimum ON Current	1mA.
Peak Voltage	160VAC	Maximum OFF Current	200µA.
AC Frequency	50 / 60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF Response	50ms.
OFF Voltage level	30VAC Max.		

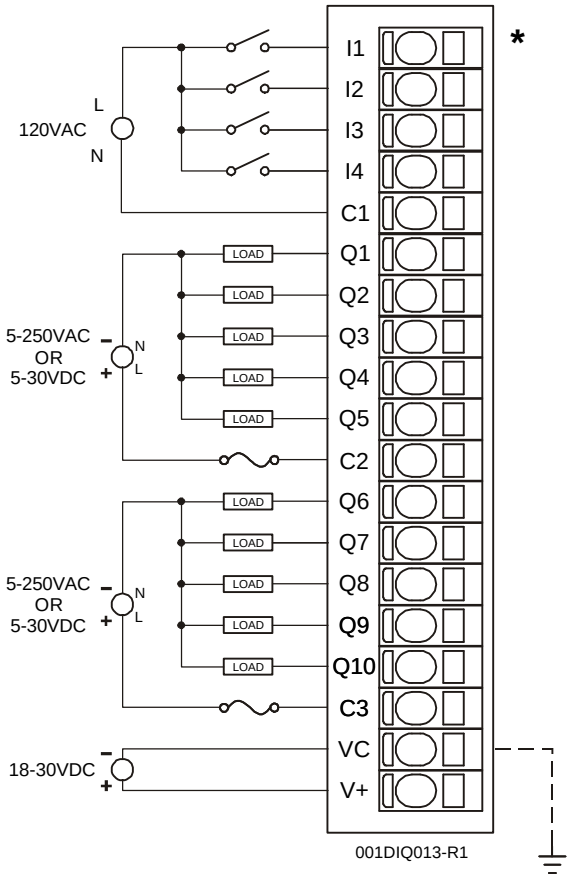
OUTPUT			
Outputs per Module	10 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	0.3ms. Typical
ON Voltage drop	0.2VDC max.	Isolation (Channel to Channel and Channel to Common)	2500VDC
Maximum Load current (resistive) per channel	3A		

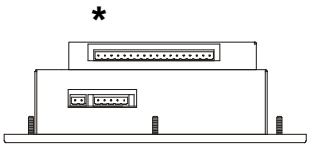
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

GFK-1729A

2 WIRING

2.1 Input / Output Connector Wiring





Mini Bottom View – Shows Corresponding I/O Pin

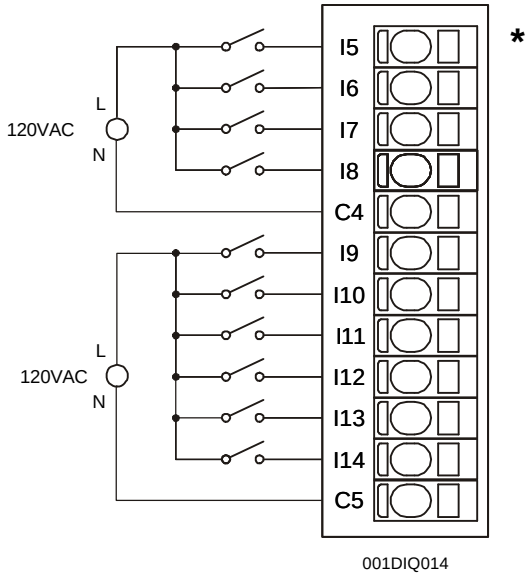
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C1	Common for Inputs 1,2,3,4
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
C2	Common for Outputs 1,2,3,4,5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
C3	Common for Outputs 6,7,8,9,10
VC	Relay Coil power common, connected to bus common internally.
V+	Relay Coil power + 18 to +30VDC, 90mA max.

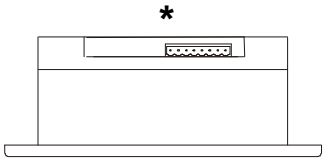
Warning: To protect the module and associated wiring from load faults, use external **(10 A)** fuse(s) as shown. **This warning affects OCS047 / OCS077, Revisions E or higher and all versions of the Mini RCS077.**

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 1 through 10 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

2.2 Input Connector Wiring

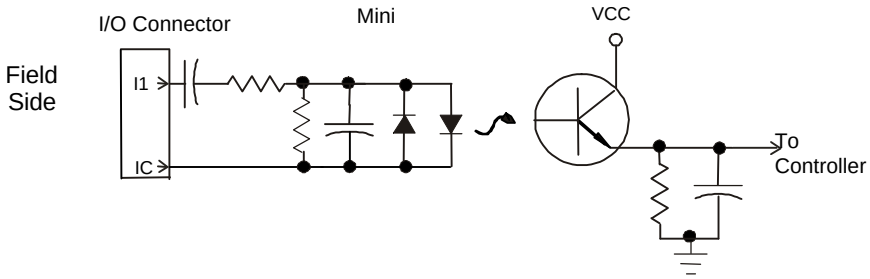


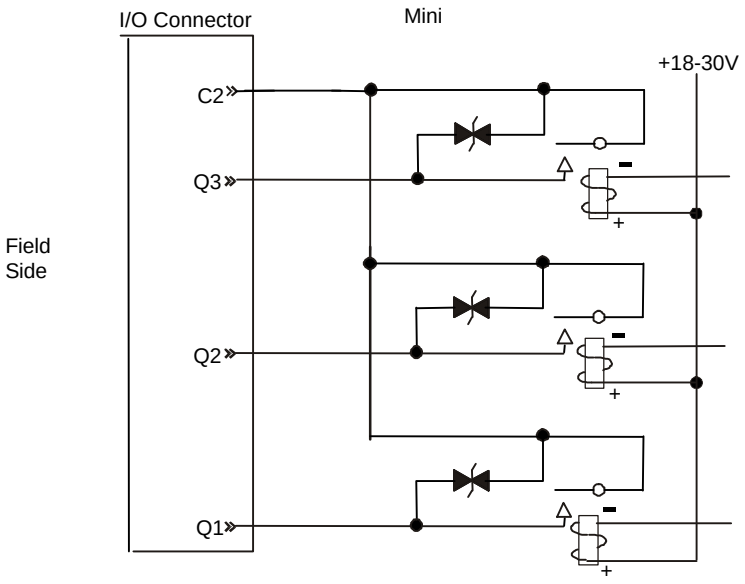


Mini Top View – Shows corresponding I/O pin location

Pin	Signal
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C4	Common for Inputs 5,6,7,8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
C5	Common for Inputs 9,10,11,12,13,14

3 INTERNAL SCHEMATIC DRAWINGS





Specification for transient voltage suppressors (transorbs) used on output circuitry is 400V bi-directional 400W.

Note: Electro-mechanical relays comply with IEC1131-2.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INSTALLATION / SAFETY

Warning: Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

When found on the product, the following symbols specify:

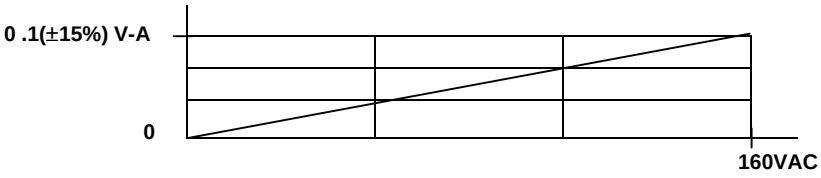
Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

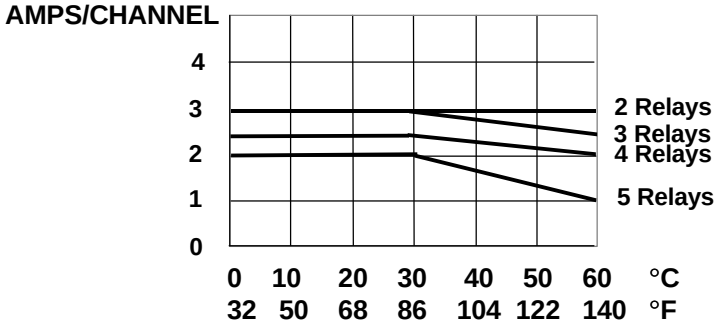
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



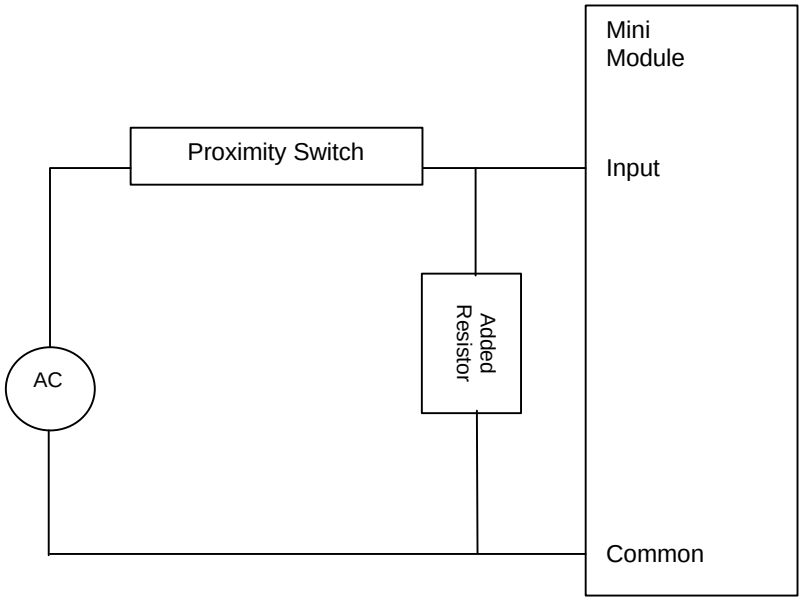
Derating Chart
(Each group of 5)



Typical Relay Life				
Voltage (Resistive)	No Load	Load Current 1 Amp	2 Amp	3 Amp
30VDC	20 Million	600K	250K	125K
125VAC		750K	300K	150K
250VAC		500K	200K	100K

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor



7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

Temperature I/O Module

Mini OCS/RCS

IC300OCS049 / IC300OCS079
IC300RCS079

1 SPECIFICATIONS

Relay Outputs				
Number of Channels	2 N.O. Relays		Maximum Load Current (resistive) per channel	10A Max.
Commons per Module	2		Maximum Leakage Current	5µA
Digital Output Registers Consumed by Cscape (%Q)	1,2 of 8		ON Voltage Level	0.15V
Isolation (Channel to Channel) (Channel to Common)	500VDC 400VDC		OFF to ON Response	10ms Max.
Output Type	N.O.		ON to OFF Response	5ms. Max.
Maximum Load Voltage	250VAC or 30VDC Max.		Protection	Transient voltage suppressor across contacts.
Analog Outpus				
Number of Channels	2		Analog Output Registers Consumed by Cscape (%AQ)	2
Commons per Module	1			
Output Ranges (including over-range)	20.47mA; Clamped @-0.5 - +33VDC Nominal		Additional error for temperatures other than 25°C	0.01% / °C
Resolution	12 Bits		Maximum Error at 25°C	0.1%
Output Voltage	4 - 30VDC		Load Impedance	≤ 1.1kΩ @ 24VDC Loop Voltage
SSR Driver				
Number of Channels	2		Minimum Load	None
Commons per Module	1		OFF to ON Response	1ms.
Digital Output Registers Consumed by Cscape (%Q)	3,4 of 8		ON to OFF Response	1ms.
Output Type	Sourcing		Output Characteristics	Current Sourcing
Output Voltage	12VDC Min.		Output Protection	Transient voltage suppressors
Maximum Load Current per Output	15mA internally limited			

GFK-1825

Thermocouple Inputs			
Number of Channels	4	A/D Conversion Time	16 channels/second
Commons per Module	1 (for grounding shielded T/Cs only)	Analog Input Registers Consumed by Cscape (%AI)	4
Input Impedance	20Meg Ohm clamped @ ±24VDC	PLC Update Rate	Set by PLC Scan Rate
A/D Conversion Type	Integrating	Cold Junction	Internal
Types Supported	J, K, T, & E		
Open Thermocouple Response	High Temperature	Maximum Sustained Differential O/L	±15VDC
Thermocouple Common Mode Range	-10.5VDC to + 12VDC	Resolution	0.05°C

Thermocouple Type	**J**	**K**	**T**
Input Range Temperature	-210°C to 770°C (-346°F to 1418°F)	-270°C to 1380°C (-454°F to 2516°F)	-270°C to 410°C (-454°F to 770°F)
	E		
	-270°C to 1010°C (-454°F to 1850°F)		

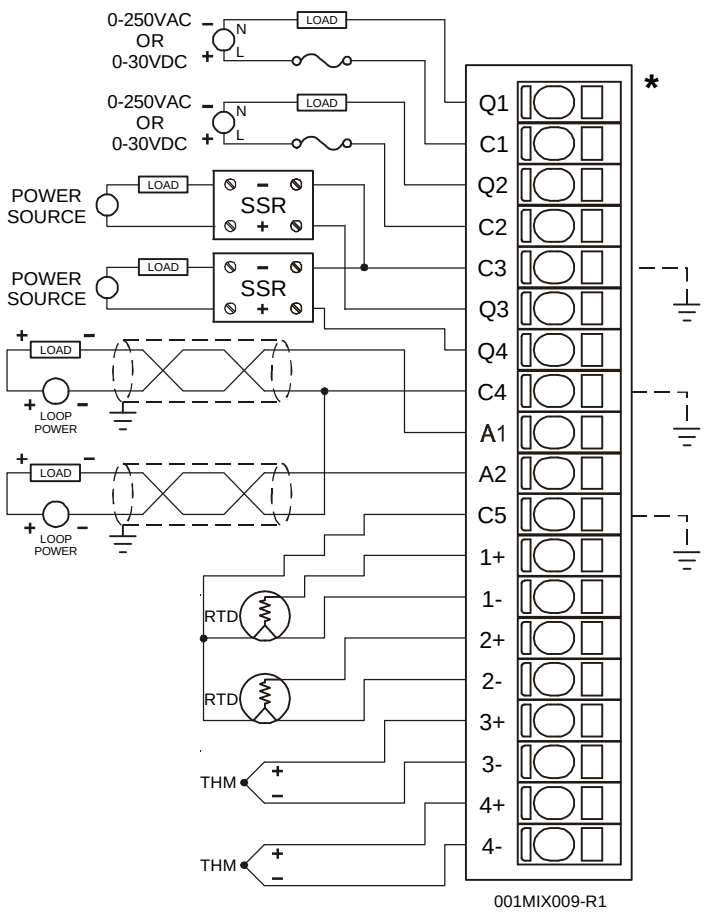
Accuracy of: Types J, K, T, & E	**Typical:** 25°C	±1°C	**Under Extremes:** 0°C, 50°C, or full load	**J:** ±5°C **E:** ±1°C **K:** ±3°C **T:** ±4°C

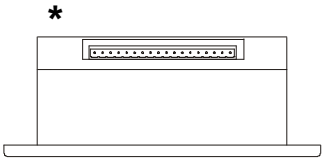
Note: Accuracy Specifications not guaranteed below -100°C for Thermocouple.

RTD Inputs			
Number of Channels	4	Input Transient Protection	Zener/Capacitor
Commons per Module	1	Resolution	0.05°C
Analog Input Registers Consumed by Cscape (%AI)	4	RTD Types Supported	PT100 (100 Ohms at 0°C, Platinum, Alpha 0.00385, DIN43760)
RTD Excitation Current	200µA, 25% duty cycle	Input Impedance	10Meg Ohm clamped @ ±24VDC
RTD Short	Indefinite	Input Range	-206.2°C to +856.8°C
Notch Filter	50-60 Hz. Software Selectable	PLC Update Rate	Set by PLC Scan Rate
A/D Conversion Time	8 channels/second	Accuracy	± 1°C
A/D Conversion Type	Integrating	Channel-to-Channel Tracking	0.1°C

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	UL	GFK-1754
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
Operating Temperature	0° to 50° Celsius		

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

Pin	Signal
Q1	Relay 1 NO Contact
C1	Relay 1 NO Contact
Q2	Relay 2 NO Contact
C2	Relay 2 NO Contact
C3	SSR Common
Q3	SSR Source 1
Q4	SSR Source 2
C4	20mA Analog Output Common
A1	20mA Analog Output 1
A2	20mA Analog Output 2
C5	THM Shield or RTD Common
1+	THM/RTD Channel 1+
1-	THM/RTD Channel 1-
2+	THM/RTD Channel 2+
2-	THM/RTD Channel 2-
3+	THM/RTD Channel 3+
3-	THM/RTD Channel 3-
4+	THM/RTD Channel 4+
4-	THM/RTD Channel 4-

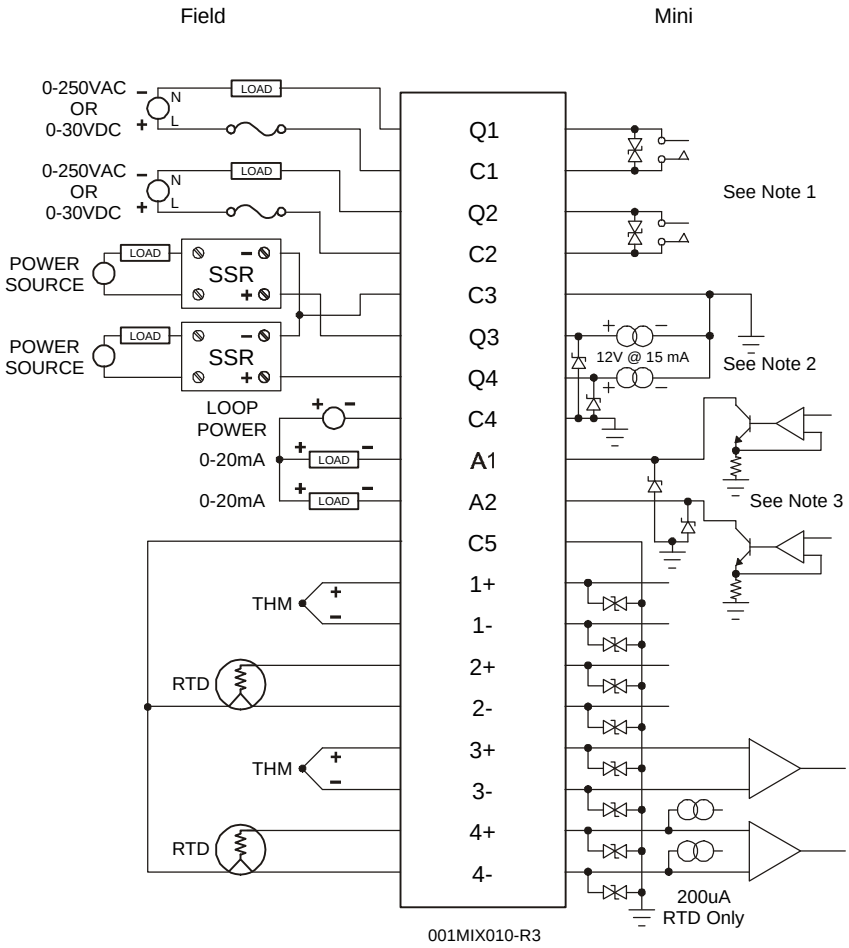
Note regarding Pin C5: The pin is not a THM common but is a thermocouple shielding termination point.

Note: All temperature inputs can be either Thermocouple or RTD inputs.

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs Q1 through Q2 and the neutral side of the AC source to the output common(s) create a Negative Logic condition, which may be considered an unsafe practice.

3 INTERNAL CIRCUIT SCHEMATIC



Note 1: Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC bi-directional 400 watts.

Note 2: Specification for transient voltage suppressors (transorbs) used on output circuitry is 15VDC, 300 watts.

Note 3: Specification for transient voltage suppressors (transorbs) used on output circuitry is 30VDC, 500 watts.

Electro-mechanical relays comply with IEC1131-2.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Module Setup Tab
The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Digital Outputs: The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

The digital outputs are assigned as follows assuming a start at %Q1:

%Q1 Relay 1
%Q2 Relay 2
%Q3 SSR Drive 1
%Q4 SSR Drive 2

2. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

> **Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

3. For Temperature Setup
a. Sensor Type for each channel must match what is physically attached.

b. Temperature format may be set for various C° or F° ranges.

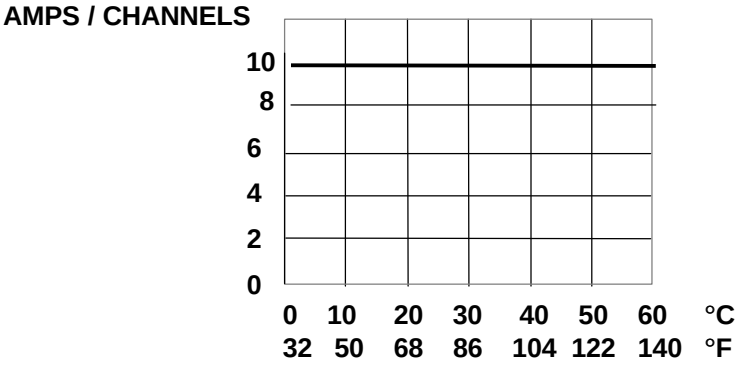
c. Filter Constant sets the level of digital filtering according to the chart below.

d. Reject Rates sets the frequency level for noise rejection at 50 or 60HZ.

I/O Map Tab
The I/O Map describes I/O registers. The I/O Map is not edited by the user.

5 RELAY OUTPUT CHARACTERISTICS

Derating Chart for Relay Outputs



Typical Relay Life (Number of Cycles)			
Voltage and Load Type	**Load Current**		
	1 Amp	**5 Amp**	**10 Amp**
30VDC Resistive	800K	180K	100K
30VDC Inductive	500K	100K	Not Rated
250VAC Resistive	800K	180K	100K
250VAC Inductive	500K	100K	Not Rated

6 ANALOG OUTPUTS

6.1 Conversion Factor

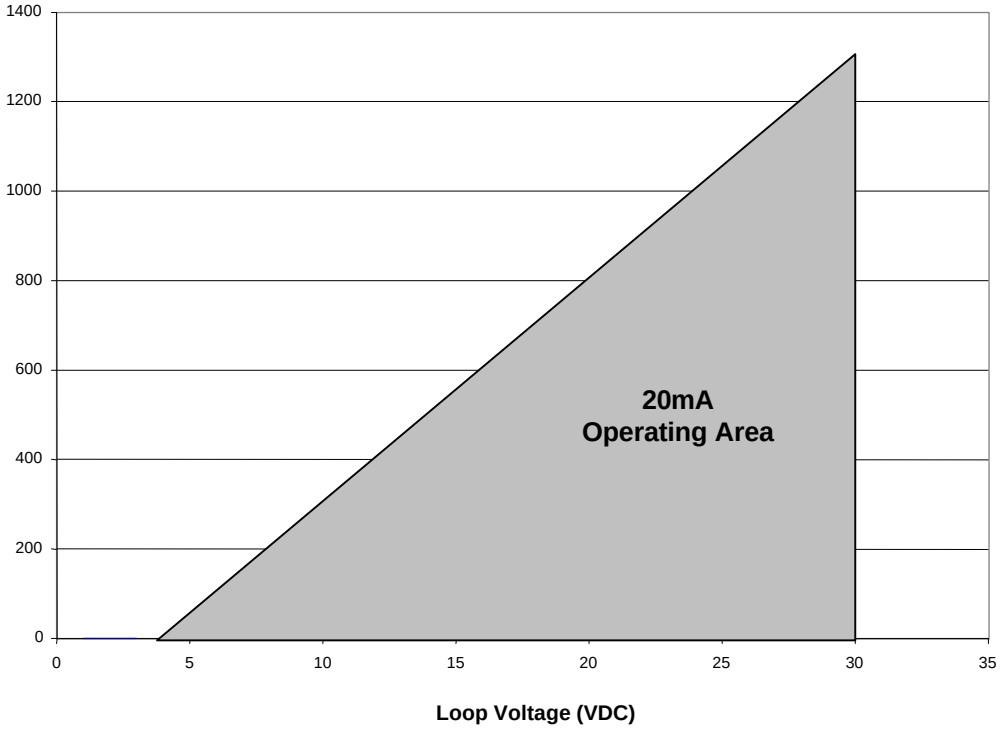
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

Example:

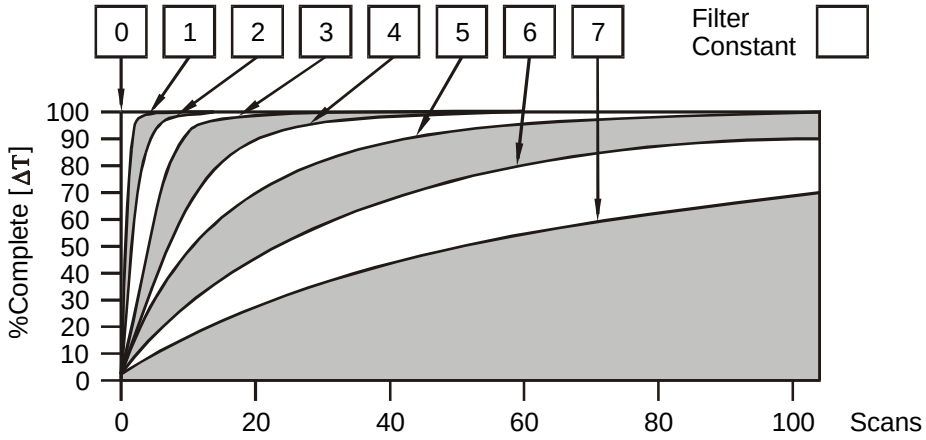
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

Conversion of Real-World Outputs into Controller			
Selected Current Range	**Output Current (mA)**	**Data**	**Conversion Factor**
0 to +20mA	+20.47	32752	0.000625
	+20.00	32000	
	0	0	

6.2 Operating Area



7 THERMOCOUPLE / RTD SCALING & CONVERSION FACTOR



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Filter Constant) on module response to a temperature change.

For a given module configuration, use the appropriate formula in the table to obtain the actual temperature (°C or °F) that is represented by the value in the %AI register.

Thermocouple or RTD Configuration	Temperature Conversion	
	Celsius	Fahrenheit
0.05°	°C = %AI / 20 *	°F = %AI / 20 *
0.1°	°C = %AI / 10	°F = %AI / 10
0.5°	°C = %AI / 2	°F = %AI / 2
* Maximum reading in 0.05°F or 0.05°C format is limited to 1638.3 because of %AI resolution.		

8 INSTALLATION / SAFETY

a. All applicable codes and standards should be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.
c. Shielded, twisted-pair wiring should be used for best performance.
d. Shields may be terminated at the module terminal strip.
e. In severe applications, shields should be tied directly to the ground block within the panel.
f. Interposing electrical devices (such as relays) in the analog signal path (RTD, Thermocouple) can cause errors due to resistive imbalance.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

When found on a product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

9 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

24VDC Bipolar Digital In
10-28VDC, 0.5A Sourcing Digital Out
IC300OCS052 / IC300OCS082
IC300RCS082
+/- 10V Analog In/Out

Mini OCS/RCS

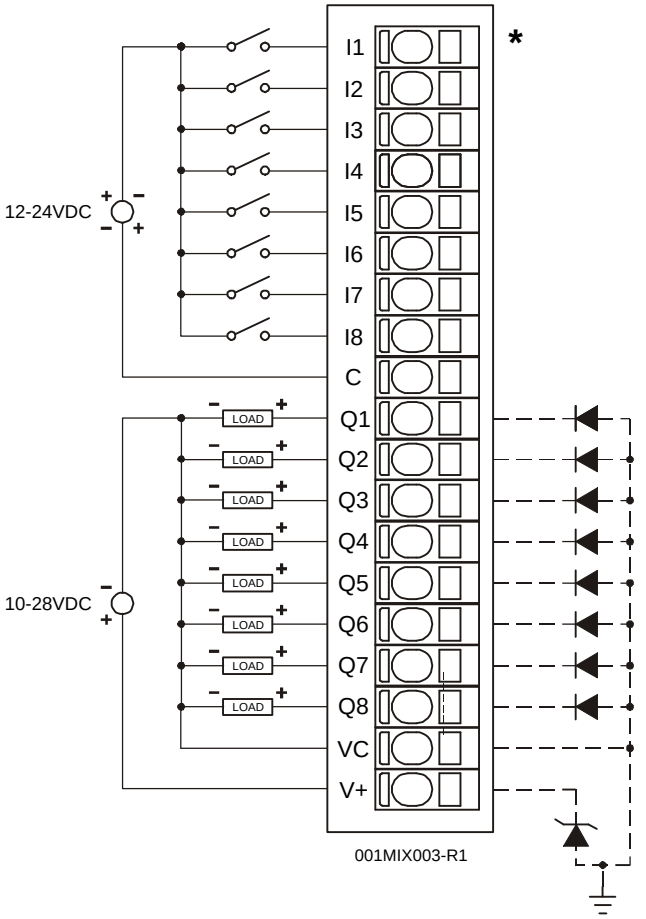
1 SPECIFICATIONS

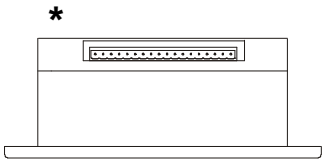
ANALOG INPUT			
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges (including over-range)	±10.23VDC	Usable Resolution	12- Bits
Resolution	12-Bit	Digital Filtering	Yes
Input Impedance	1Meg Ohm <12VDC or clamped @ 12VDC Nom.	Additional error for temperatures other than 25°C	0.01% / °C
Maximum Clamp Current	75mA.	Maximum Error at 25°C	0.1%
DIGITAL INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Bus)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		
ANALOG OUTPUT			
Number of Channels	2	Analog Outputs; Output Points Required	2
Output Ranges (including over-range)	± 10.23V	Additional error for temperatures other than 25°C	0.01% / °C
Resolution	12-Bits	PLC Update Rate	Set by PLC Scan Time
Peak Output Voltage	10.23V	Conversion Settling Time	1ms.
Load Impedance	2K Ohms Min.	Voltage Output Resolution	12 Bits
Load Capacitance	.01µF MAX	Maximum Error at 25°C	0.1%
DIGITAL OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per Output	0.5A Max.	Output Protection	Short Circuit

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Operating Temperature Code T4A; Also refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

2 WIRING

2.1 Digital Input / Output (P1)

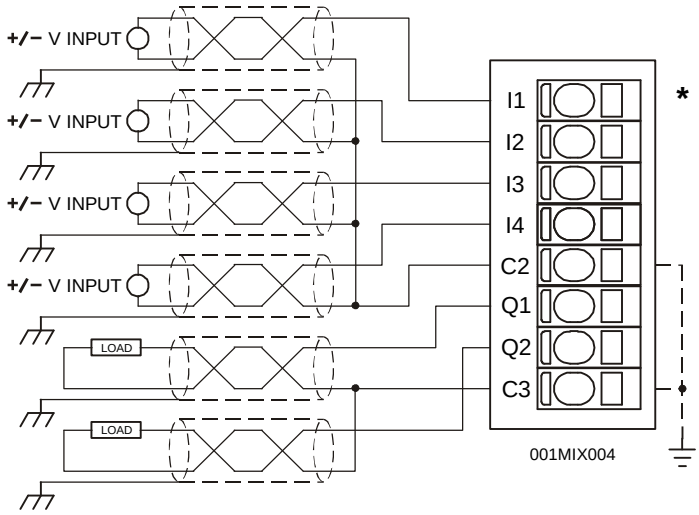


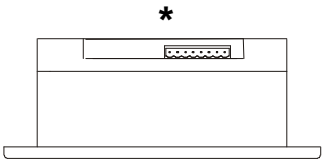


Mini Bottom View – Shows corresponding I/O pin location

Pin	Digital Input /Output
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common (Isolated)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Load Power Common
V+	Load Voltage +

2.2 Analog Input / Output (P2)

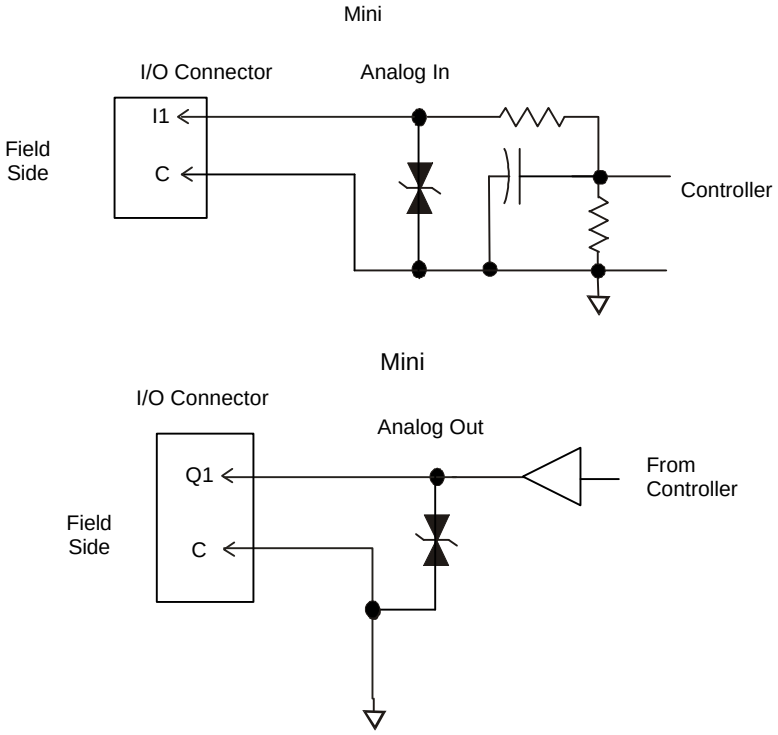




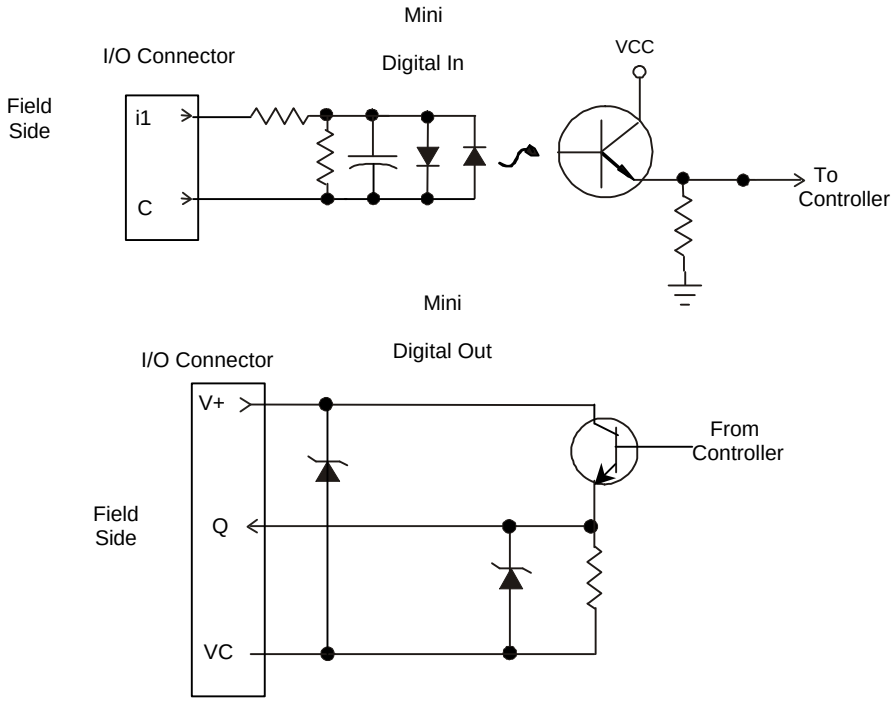
Mini Top View – Shows corresponding I/O pin location

Pin	Analog In and Out
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

INTERNAL CIRCUIT SCHEMATIC



Specification for transient voltage suppressors (transorbs) used on output circuitry is 12VDC, 600 watts.



Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 300 watts.

Note: Electro-mechanical relays comply with IEC1131-2.

CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Module Setup Tab

The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Digital Outputs: The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

2. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

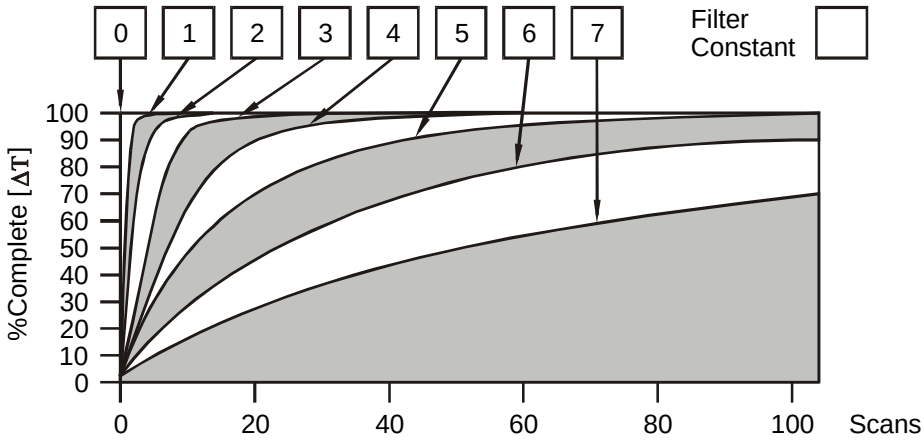
> **Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

3. For Analog Inputs:

a. Filter Constant sets the level of digital filtering according to the following chart.

I/O Map Tab

The I/O Map describes which I/O registers are assigned and is determined by the model number. The I/O Map is not edited by the user.



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Fillter Constant) on module response to a temperature change.

5 ANALOG INPUT and OUTPUT CONVERSIONS

5.1 Input Conversion Factor

The following table describes how real-world inputs are scaled into the controller. Given a known input voltage, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Voltage In (Vin) / Conversion Factor**

Example: The voltage range is +/-10VDC:

1. The known input voltage is 3 VDC.
2. Using the table, the conversion factor for the voltage range of +/-10VDC is 0.0003125.
3. To determine the data value, the formula is used:
   Data = Vin / Conversion Factor
   9600 = 3 VDC / 0.0003125

Conversion of Real-World Inputs into Controller			
Selected Voltage Range	**Voltage In (Vin) VDC**	**Data Out**	**Conversion Factor**
+/-10.00 VDC	+10.23	32736	0.0003125
	+10.00	32000	
	0	0	
	-10.00	-32000	
	-10.23	-32736	

5.2 Output Conversion Factor

The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output voltage, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Voltage Out (V out) / Conversion Factor**

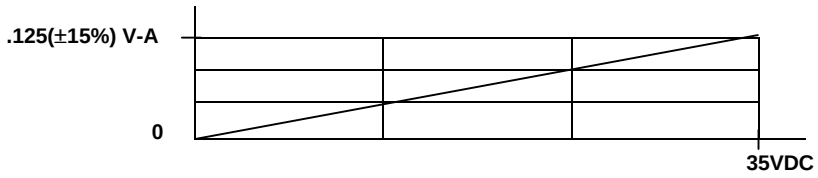
Example: The user selects ± 10 VDC output range:

1. The desired voltage is 3 VDC.
2. Using the table, the conversion factor for the voltage range of +/-10 VDC is 0.0003125
3. To determine the data value, the formula is used:
   Data = V out / Conversion Factor
   9600 = 3 VDC / 0.0003125

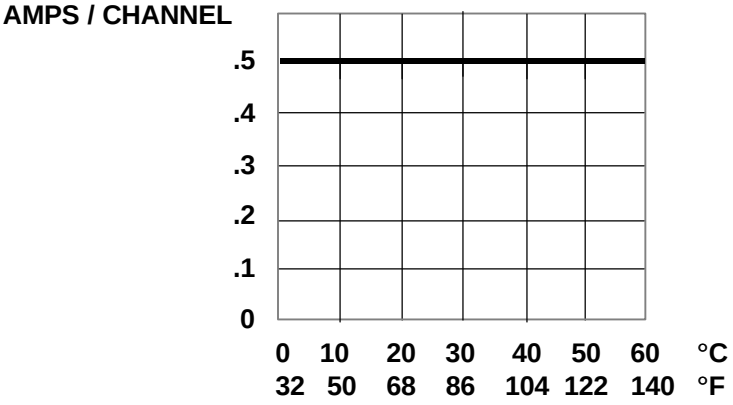
Conversion of Real-World Outputs into Controller			
Selected Voltage Output Range	**Data**	**Voltage Out (V out) VDC**	**Conversion Factor**
± 10 VDC Analog Out	+ 32736	+10.23	0.0003125
	+ 32000	+10.00	
	0	0.00	
	- 32000	-10.00	
	- 32736	-10.23	

6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



7 INSTALLATION / SAFETY

a. All applicable codes and standards should be followed in the installation of this product.
b. Shielded, twisted-pair wiring should be used for best performance.
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

24VDC Bipolar Digital In
10-28VDC, 0.5A Sourcing Digital Out
4-20mA Analog In/Out
IC300OCS053 / IC300OCS083
IC300RCS083

Mini OCS/RCS

1 SPECIFICATIONS

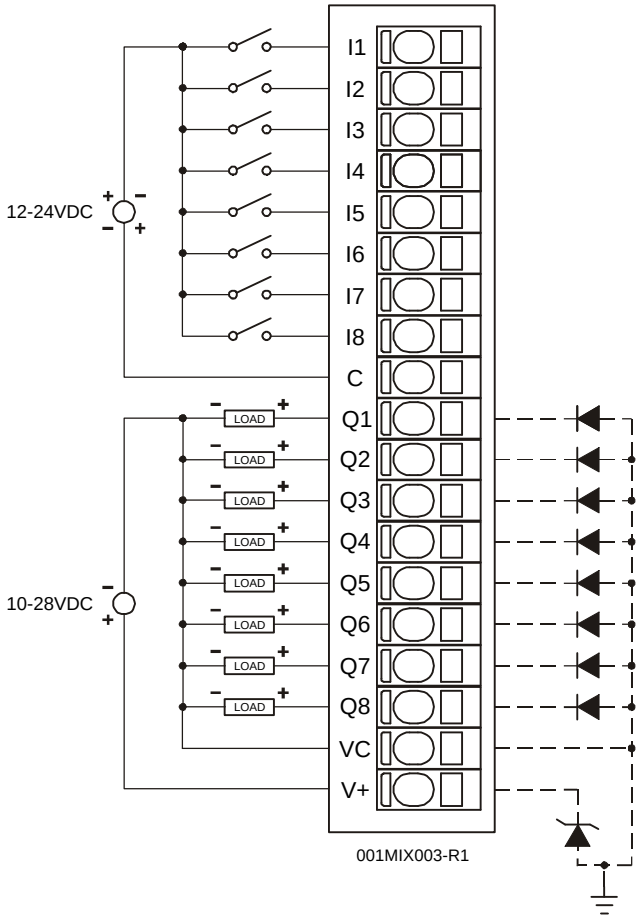
ANALOG INPUT			
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges (including over-range)	Nominal: 0-20.47mA	Conversion Time (PLC Update Rate)	Set by PLC Scan Time
Resolution	12-Bit	Converter Type	Successive Approximation
Input Impedance	200 Ohms < 12VDC, Clamped @ 12VDC, 35mA Max. Continuous	Additional error for temperatures other than 25°C	0.01% / °C
Maximum Error at 25°C	0.1%	Maximum Over-Current	35mA
DIGITAL INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Channel and Channel to Common)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		
ANALOG OUTPUT			
Number of Channels	2	Analog Outputs; Output Points Required	2
Output Ranges (including over-range)	20.47mA; Clamped @-0.5 - +33VDC Nominal	Additional error for temperatures other than 25°C	0.01% / °C
Resolution	12 Bits	Maximum Error at 25°C	0.1% (Note: Used 2% error under EMC testing.)
Output Voltage	4 - 30VDC		
DIGITAL OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per Output	0.5A Max.	Output Protection	Short Circuit

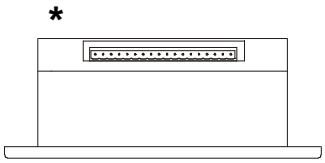
GFK-1686B

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	Refer to GFK-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	Refer to GFK-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

2 WIRING

2.1 Digital Input / Output (P1)

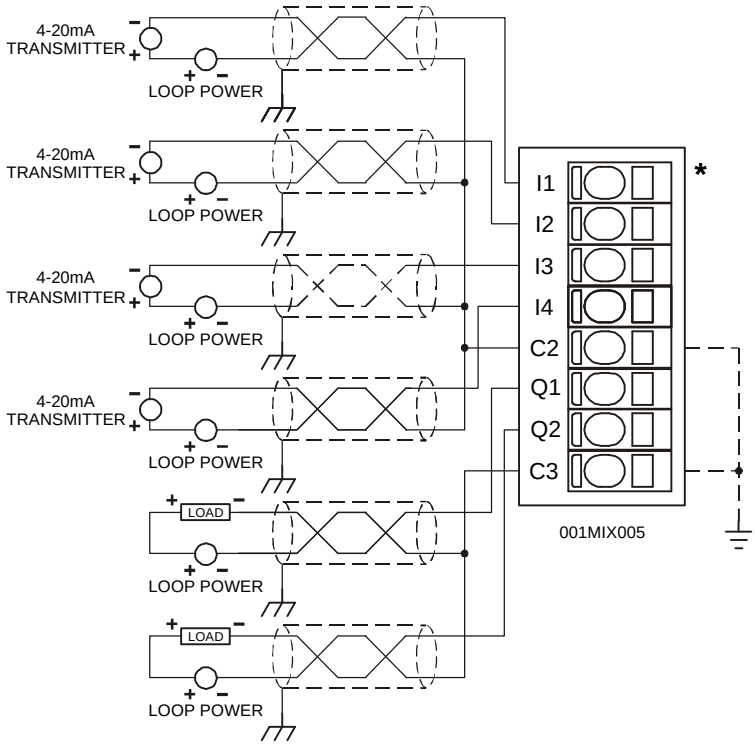


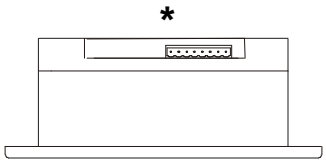


Mini Bottom View – Shows corresponding I/O pin location

Pin	Digital Input / Output
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common (Isolated)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Load Power Common
V+	Load Voltage +

2.2 Analog Input / Output (P2)

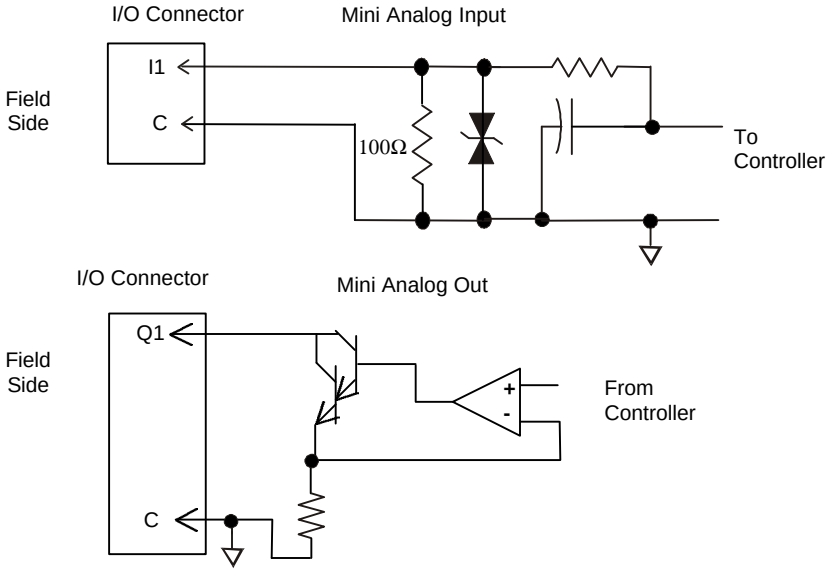




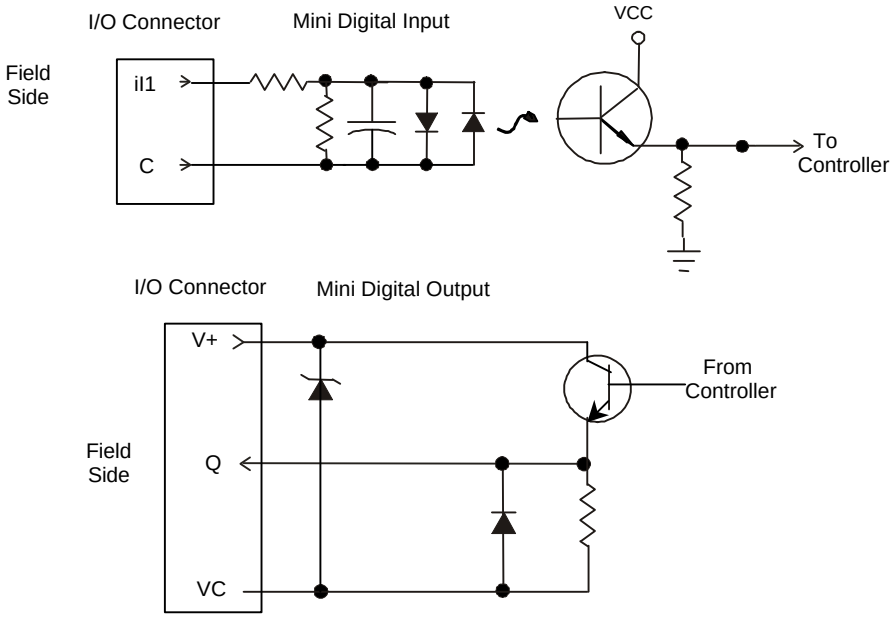
Mini Top View – Shows corresponding I/O pin location

Pin	Analog In and Out
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

3 INTERNAL CIRCUIT SCHEMATIC



Specification for transient voltage suppressors (transorbs) used on output circuitry is 30V, 300W.



Specification for transient voltage suppressors (transorbs) used on output circuitry is 33V, 300W.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Module Setup Tab
The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Digital Outputs: The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

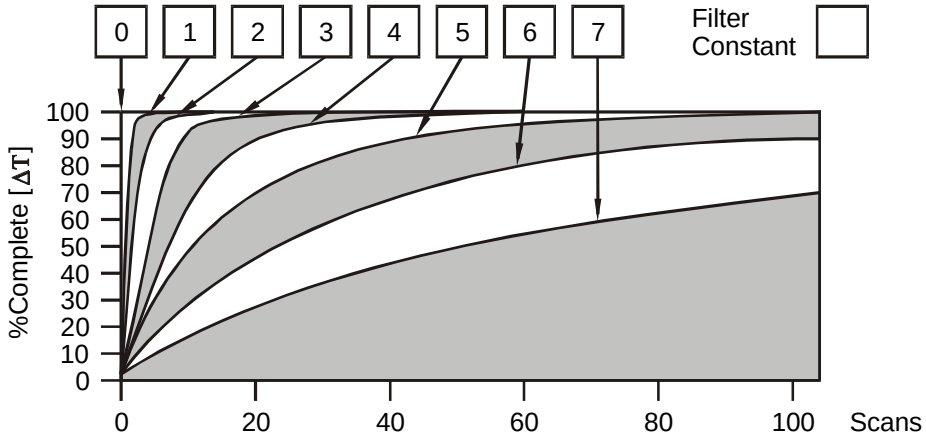
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

2. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

> **Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

3. For Analog Inputs:
Filter Constant sets the level of digital filtering according to the following chart.

I/O Map Tab
The I/O Map describes which I/O registers are assigned. The I/O Map is not edited by the user.



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Fillter Constant) on module response to a temperature change.

5 ANALOG INPUT CONVERSION FACTOR

The following table describes how real-world inputs are scaled into the controller. Given a known input current, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Input Current (mA) / Conversion Factor**

Example: The user selects a current range of 0 to +20mA:

1. The known input current is 14mA.
2. Using the table, the conversion factor for the current range of 0 - +20mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 0.000625

Conversion of Real-World Inputs into Controller			
Selected Current Range	**Input Current (mA)**	**Data**	**Conversion Factor**
0 to +20mA	+20.47	32752	0.000625
	+20.00	32000	
	0	0	

6 ANALOG CONVERSION OUTPUT FACTOR

The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

Example: The user selects a current range of +20mA:

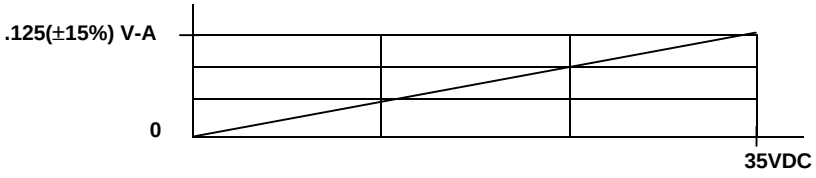
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

Conversion of Real-World Outputs into Controller			
Selected Current Range	**Output Current (mA)**	**Data**	**Conversion Factor**
0 to +20mA	+20.47	32752	0.000625
	+20.00	32000	
	0	0	

7 DIGITAL INPUT / OUTPUT CHARACTERISTICS

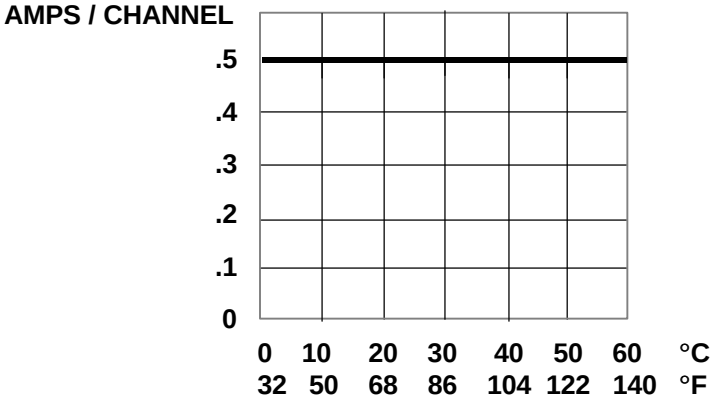
7.1 Digital Input

Digital Input Chart

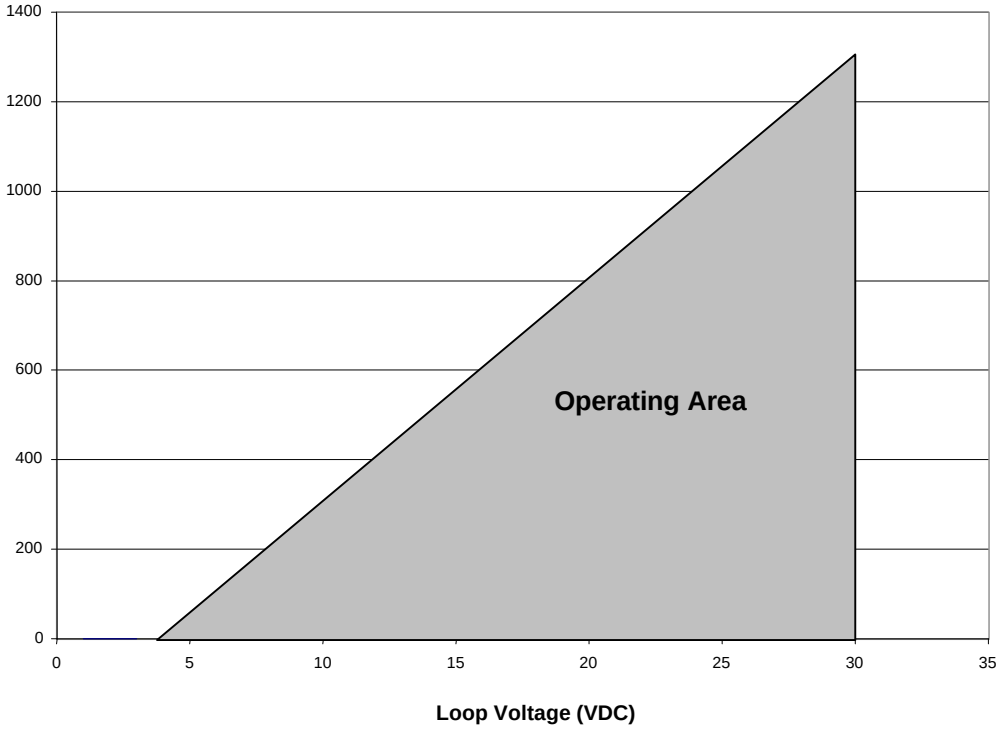


7.2 Digital Output

Derating Chart



6.3 Operating Area



7 INSTALLATION / SAFETY

a. All applicable codes and standards should be followed in the installation of this product.
b. Shielded, twisted-pair wiring should be used for best performance.
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

24VDC Bipolar Digital In
10-28VDC, 0.5A Sinking Digital Out
IC300OCS055 / IC300OCS085
IC300RCS085
4-20mA Analog In/Out

Mini OCS/RCS

1 SPECIFICATIONS

ANALOG INPUT			
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges (including over-range)	Nominal: 0-20.47mA	Conversion Time (PLC Update Rate)	Set by PLC Scan Time All channels updated to once per scan.
Resolution	12-Bit	Converter Type	Successive Approximation
Input Impedance	200 Ohms < 12VDC, Clamped @ 12VDC, 35mA Max. Continuous	Additional error for temperatures other than 25°C	0.01% / °C
Maximum Error at 25°C	0.1%	Maximum Over-Current	35mA
DIGITAL INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Common)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		
ANALOG OUTPUT			
Number of Channels	2	Analog Outputs; Output Points Required	2
Output Ranges (including over-range)	0-20.47mA; Clamped @-0.5 - +33VDC Nominal	Additional error for temperatures other than 25°C	0.01% / °C
Resolution	12 Bits	Maximum Error at 25°C	0.1% (Note: Used 2% error under EMC testing.)
Output Voltage	4 - 30VDC		
DIGITAL OUTPUT			
Outputs per Module	8	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100µA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channels
Output Type	Sinking / 10K Pull-Up	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
Output Characteristics	Current Sinking	ON to OFF Response	1ms.
ON Voltage Level	1.5VDC Max.	Maximum Current per Channel	500mA
		Total Maximum Current	4A

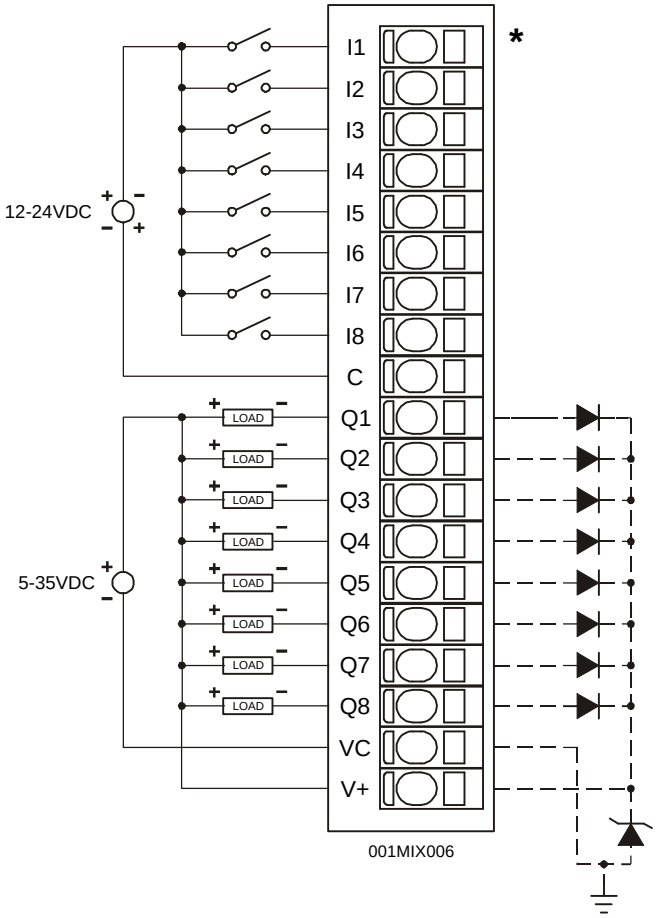
GFK-1841

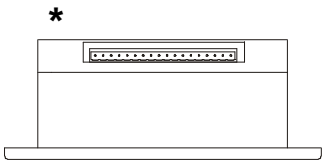
This Data Sheet is published individually & also as a part of the Mini Hardware Manual (GFK-1687B).

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	UL	GFK-1754
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
Operating Temperature	0° to 50° Celsius		

2 WIRING

2.1 Digital Input / Output (P1)



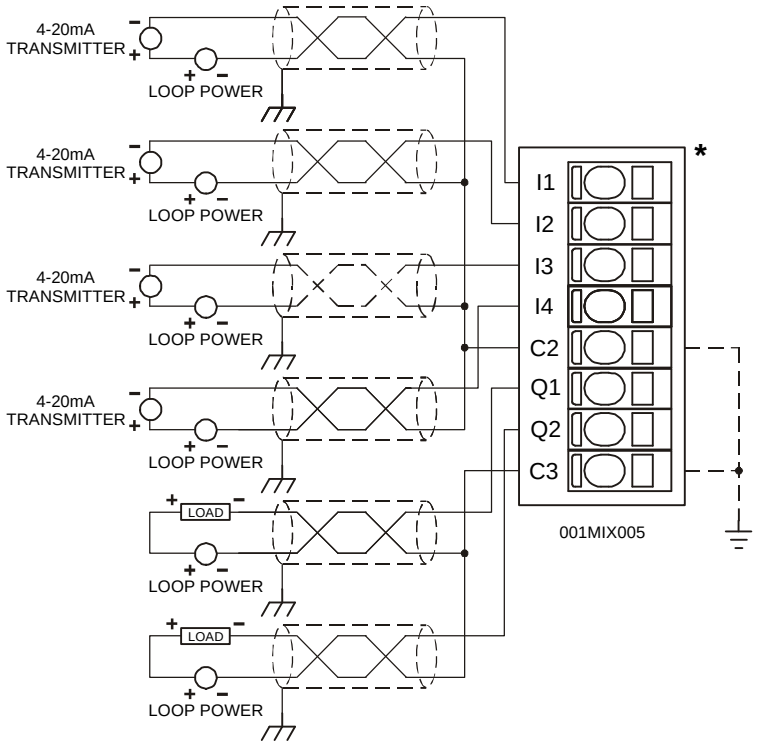


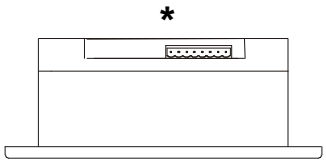
Mini Bottom View – Shows corresponding I/O pin location

Pin	Digital Input / Output
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Common
V+	Load Voltage +

Warning: This is a negative logic device. Use of it may be considered an unsafe practice under CE directives.

2.2 Analog Input / Output (P2)

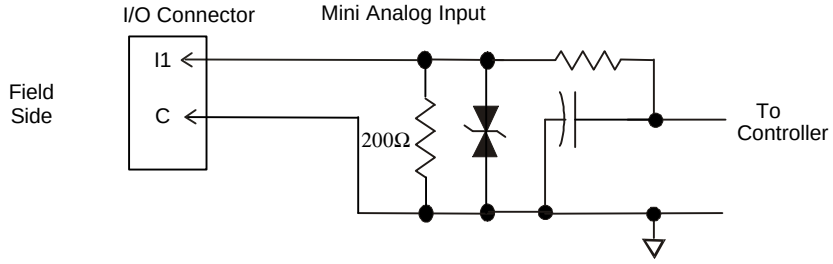


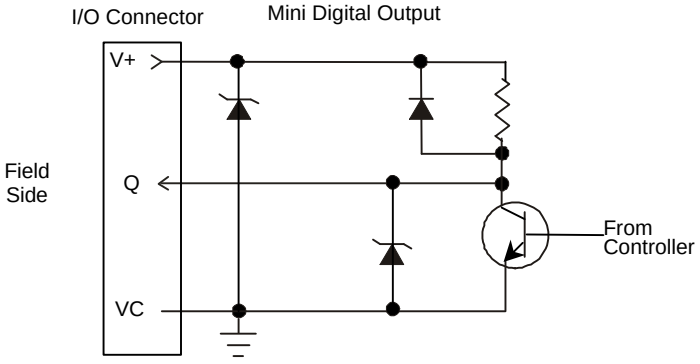


Mini Top View – Shows corresponding I/O pin location

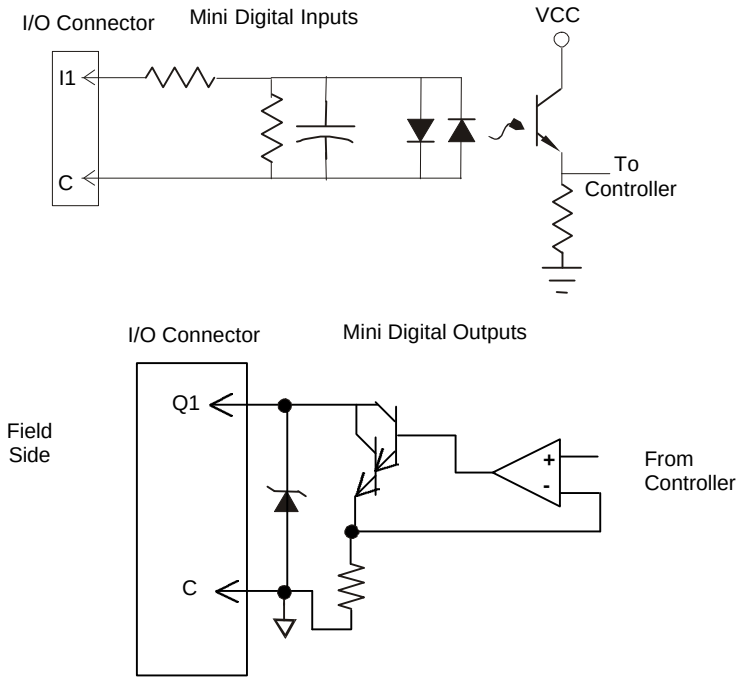
Pin	Analog In and Out
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

3 INTERNAL CIRCUIT SCHEMATIC





Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.



Specification for transient voltage suppressors (transorbs) used on output circuitry is 30VDC, 300 watts.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Module Setup Tab
The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Digital Outputs: The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

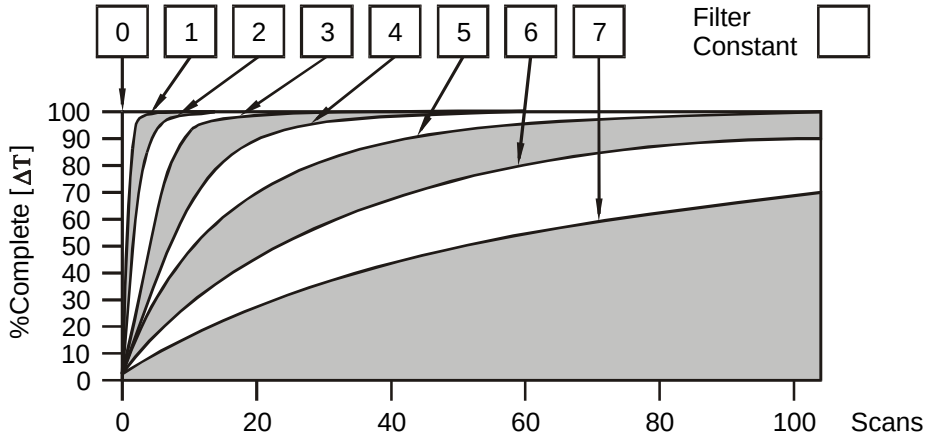
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

2. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

> **Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

3. For Analog Inputs:
Filter Constant sets the level of digital filtering according to the following chart.

I/O Map Tab
The I/O Map describes I/O registers. The I/O Map is not edited by the user.



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Fillter Constant) on module response to a temperature change.

5 ANALOG INPUT and OUTPUT CONVERSION FACTORS

5.1 Input Conversion Factor

The following table describes how real-world inputs are scaled into the controller. Given a known input current, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Input Current (mA) / Conversion Factor**

Example: The user selects a current range of 0 to +20mA:

1. The known input current is 14mA.
2. Using the table, the conversion factor for the current range of 0 to +20mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 0.000625

Conversion of Real-World Inputs into Controller			
Selected Current Range	**Input Current (mA)**	**Data**	**Conversion Factor**
0 to +20mA	+20.47	32752	0.000625
	+20.00	32000	
	0	0	

5.2 Output Conversion Factor

The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

Example: The user selects a current range of +20mA:

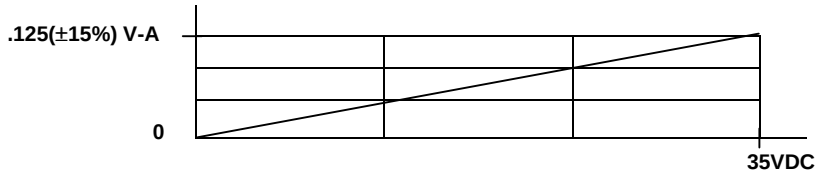
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

Conversion of Real-World Outputs into Controller			
Selected Current Range	**Output Current (mA)**	**Data**	**Conversion Factor**
0 to +20mA	+20.47	32752	0.000625
	+20.00	32000	
	0	0	

6 INPUT / OUTPUT CHARACTERISTICS

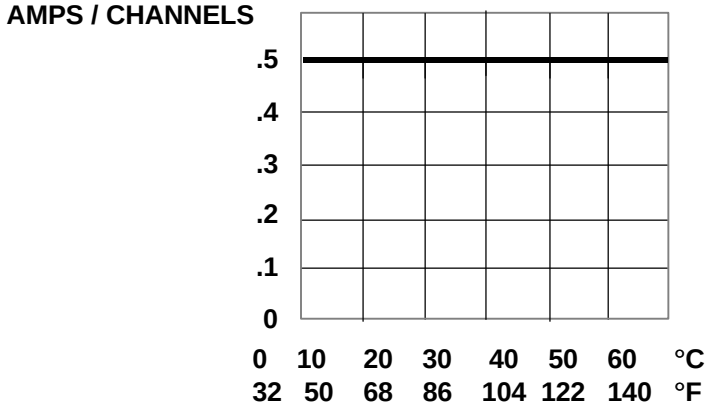
6.1 Digital Input

Digital Input Chart

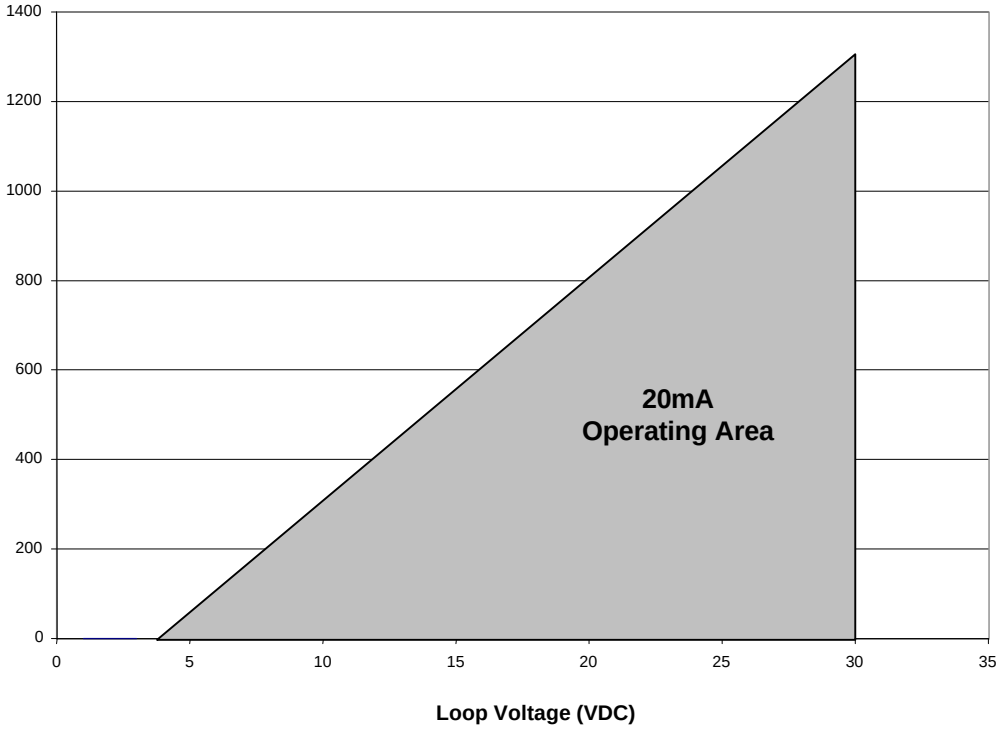


6.2 Digital Output

Derating Output Chart



6.3 Operating Area



7 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266

NOTES

24VDC Bipolar Digital In
10-30VDC, 0.5A Sourcing Digital Out
4-20mA Isolated Analog In/Out

IC300OCS057 / IC300OCS087
IC300RCS 087

Mini OCS/RCS

1 SPECIFICATIONS

ANALOG INPUT			
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges	Nominal: 4-20mA	Conversion Time (PLC Update Rate)	All channels updated once per PLC scan.
Resolution	12-Bits	Analog Isolation Channel to Channel and Channel to Common	1000VDC
Input Burden	50 Ohms + 3VDC, Clamped @ 6VDC, 35mA Max. Continuous	Additional error for temperatures other than 25°C	0.01% / °C
Maximum Error at 25°C	0.1%	Maximum Over-Current	35mA
DIGITAL INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Channel to channel and Channel to common	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC Minimum	ON to OFF Response	1ms.
OFF Voltage Level	3VDC Maximum		
ANALOG OUTPUT			
Number of Channels	2	Analog Outputs; Output Points Required	2
Output Range	Nominal: 4-20mA Clamped @-0.5 - +30VDC	Conversion Time (PLC Update Rate)	All channels updated once per PLC scan.
Resolution	12 Bits	Isolation Channel to Channel and Channel to Common	1000VDC
Maximum Error at 25°C	0.3%	Additional error for temperatures other than 25°C	0.01% / °C
		Output Voltage	4 - 30VDC
DIGITAL OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 30VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	30VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per Output	0.5A Max.	Output Protection	Short Circuit
Maximum Total Output	4A		

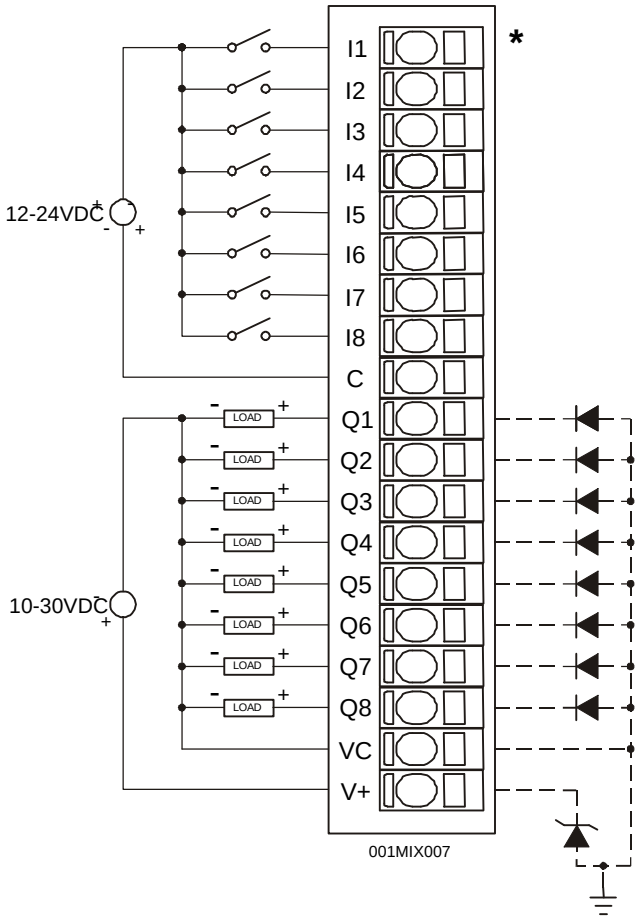
GFK-1842

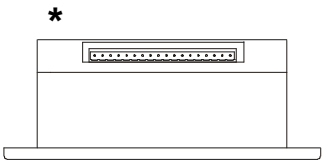
This Data Sheet is published individually & also as a part of the Mini Hardware Manual (GFK-1687B).

General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	CE	GE-1755
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	UL	GE-1754
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Spring Clamp, Removable
Operating Temperature	0° to 50° Celsius	Weight	9.5 oz. (270 g)

2 WIRING

2.1 Digital Input / Output (P1)

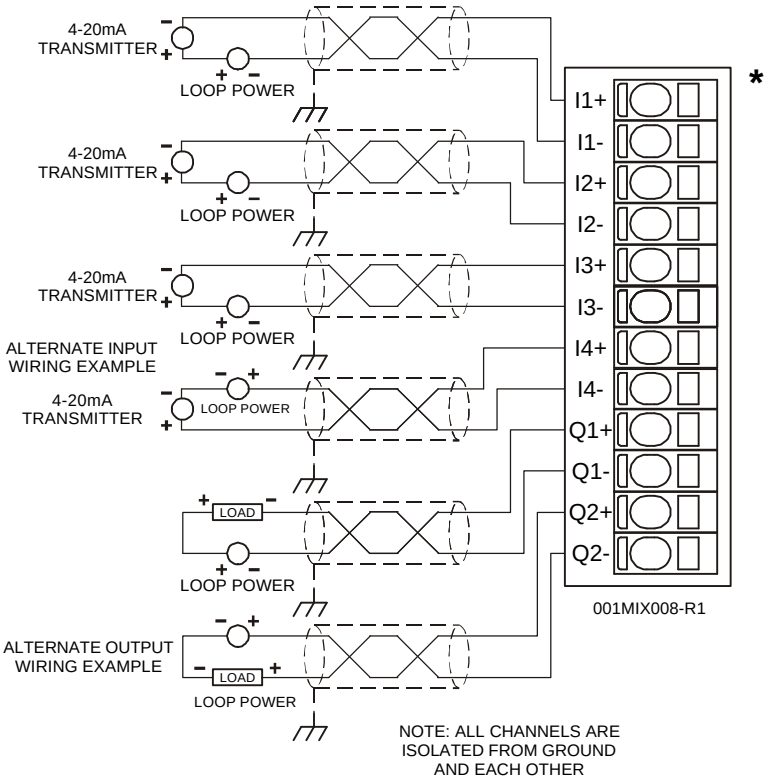


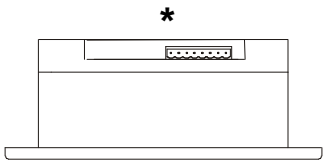


Mini Bottom View – Shows corresponding I/O pin location

Pin	Digital Input / Output
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common (Isolated)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Load Power Common
V+	Load Voltage +

2.2 Analog Input / Output (P2)

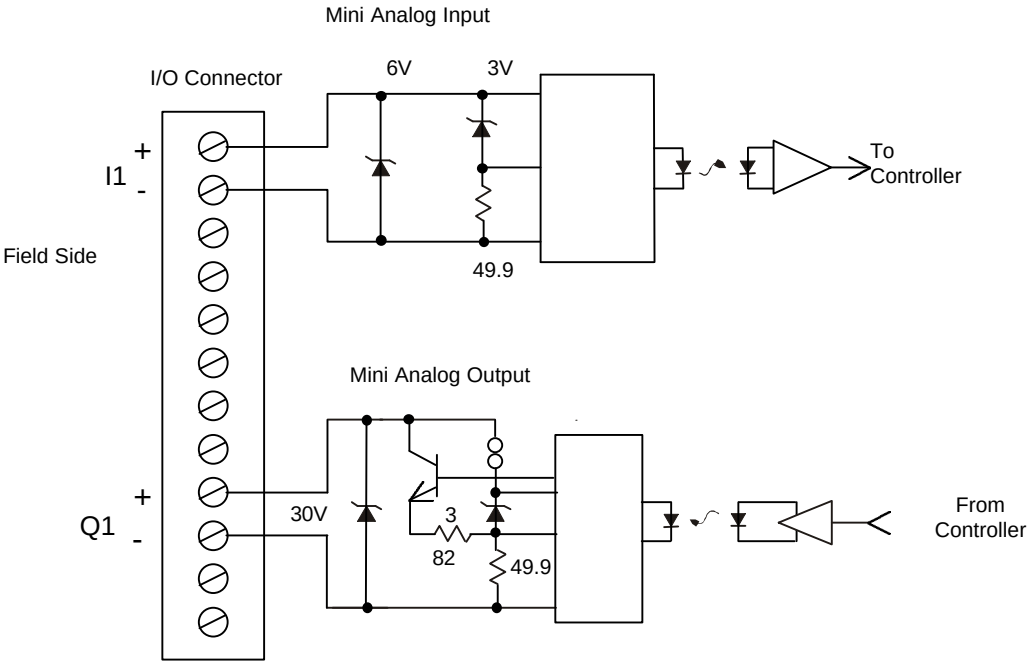




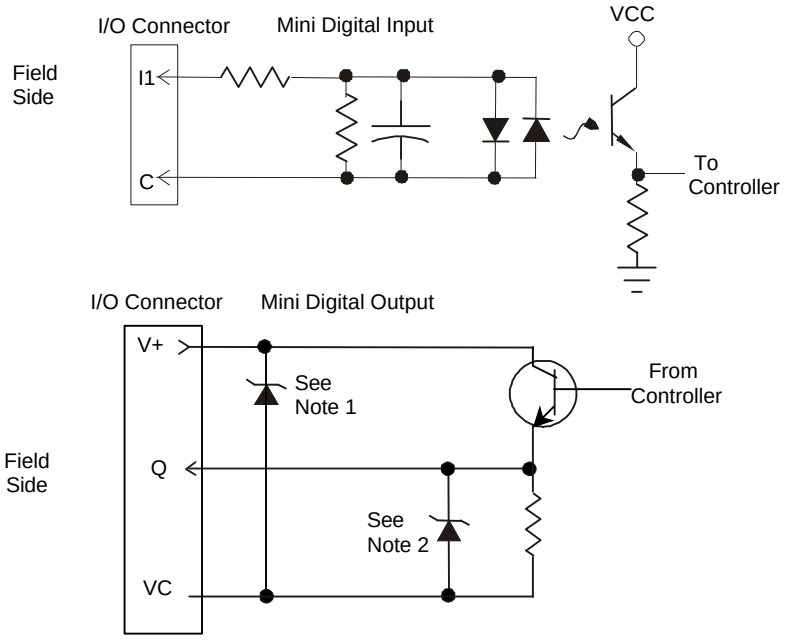
Mini Top View – Shows corresponding I/O pin location

Pin	Analog Input / Output Signal
I1+	Input 1+
I1-	Input 1-
I2+	Input 2+
I2-	Input 2-
I3+	Input 3+
I3-	Input 3-
14+	Input 4+
14-	Input 4-
Q1+	Output 1+
Q1-	Output 1-
Q2+	Output 2+
Q2-	Output 2-

3 INTERNAL CIRCUIT SCHEMATIC



Specification for transient voltage suppressors (transorbs) used on output circuitry is 30V, 300W.



Note 1: Specification for transient voltage suppressors (transorbs) used on output circuitry is 33V, 1500W.

Note 2: Specification for transient voltage suppressors (transorbs) used on output circuitry is 33V, 300W.

4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

Module Setup Tab

The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Digital Outputs: The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

Warning: The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

2. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

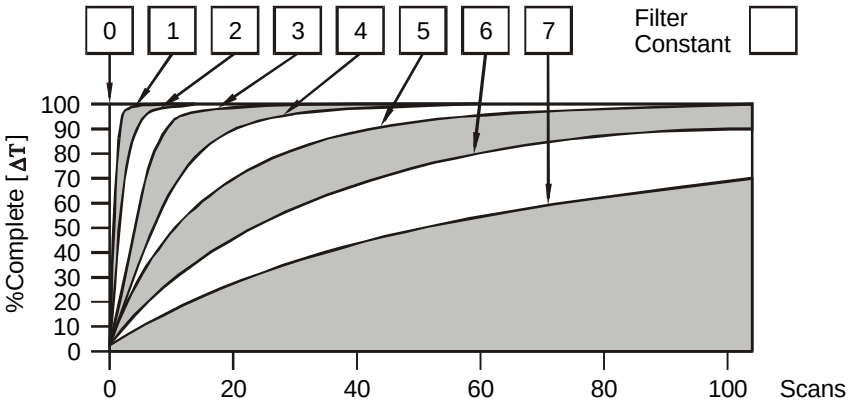
Warning: The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

3. For Analog Inputs:

Filter Constant sets the level of digital filtering according to the following chart.

I/O Map Tab

The I/O Map describes I/O registersThe I/O Map is not edited by the user.



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Filter Constant) on module response to an input change.

5 ANALOG INPUT / OUTPUT CHARACTERISTICS

5.1 Input Conversion Factor

The following table describes how real-world inputs are scaled into the controller. Given a known input current, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Input Current (mA) / Conversion Factor**

Example:

1. The known input current is 14mA.
2. Using the table, the conversion factor for the current range of 4 - +20mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 0.000625

Conversion of Real-World Inputs into Controller			
Selected Current Range	**Input Current (mA)**	**Data**	**Conversion Factor**
4 – 20mA	20.00	32000	0.000625
	4.00	6400	

5.2 Output Conversion Factor

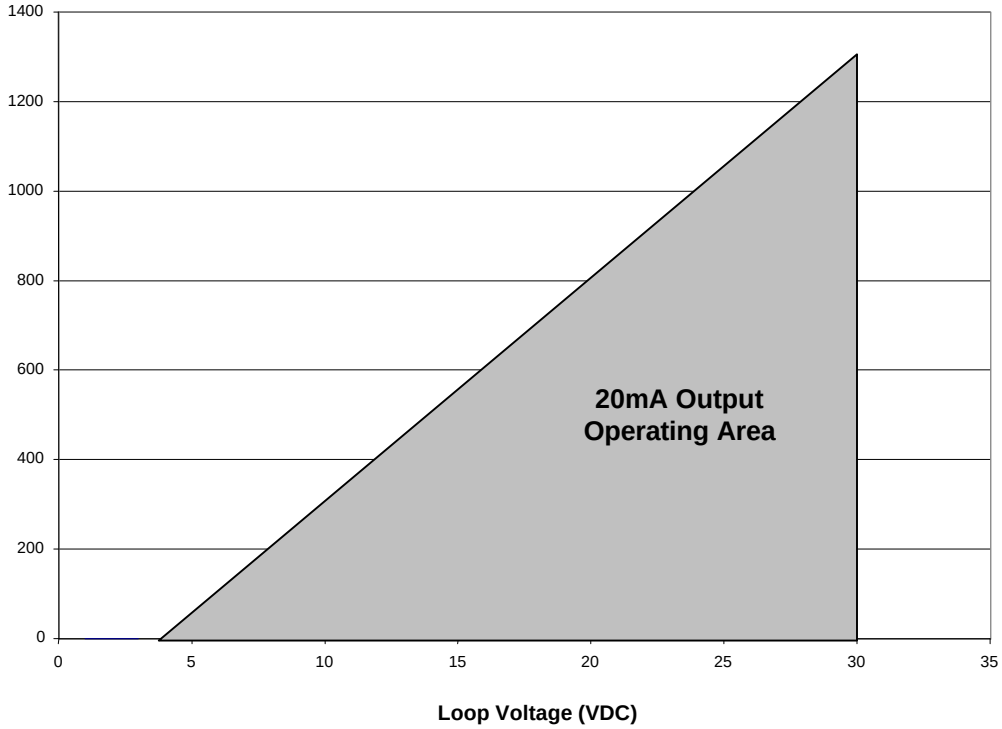
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

Example:

1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

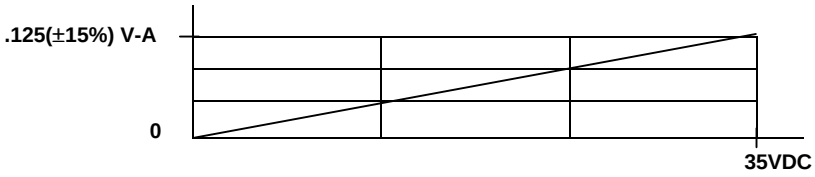
Conversion of Real-World Outputs into Controller			
Selected Current Range	**Output Current (mA)**	**Data**	**Conversion Factor**
4 – 20mA	20.00	32000	0.000625
	4.00	6400	

5.3 Output Operating Area

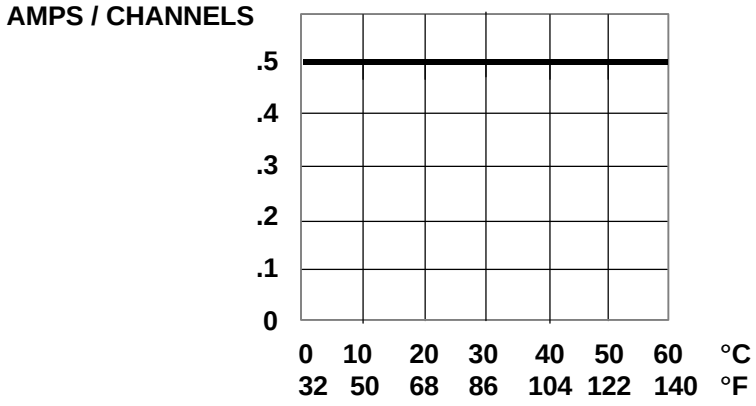


6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



7 INSTALLATION / SAFETY

a. All applicable codes and standards should be followed in the installation of this product.
b. Shielded, twisted-pair wiring should be used for best performance.
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

North America:
1-800-433-2682 or visit our website at www.gefanuc.com.

Europe:
(+) 353-21-4321-266