GE Fanuc Automation

Programmable Control Products

Series Five™ Programmable Controller

I/O Module Specifications

GFK–0123A

October, 1989

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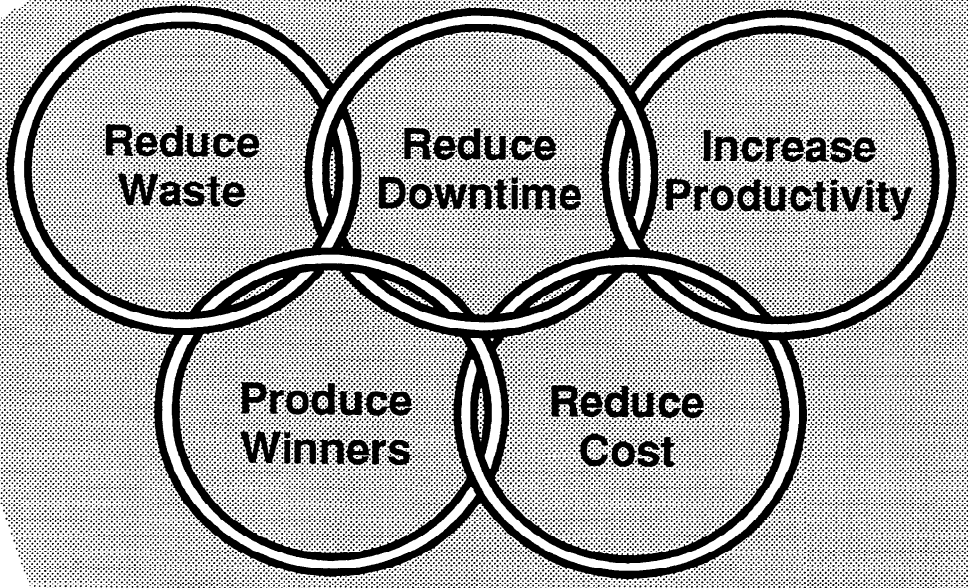

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Preface

Included in this manual is the information required to install, interface to, and wire the Input and Output modules for the Series Five Programmable Logic Controller. I/O Modules available as of this printing include discrete input and output, and analog input and output. The contents of this manual will be updated periodically to add new modules as they are made available. The modules included in this manual are presented in sequential order by catalog number.

There are two sections in this manual. *Section 1* describes the features that are common to all of the modules, including physical appearance, environmental information, and assignment of I/O references. *Section 2* contains specific information for each module, including a basic description of the module, specifications for the module, and an illustration which provides wiring and interface information.

Revision Information

This manual is a revision to the previous version, which was dated March, 1988. Information has been added for the following new modules:

1. IC655MDL503 - 24 VDC Input, Positive/Negative logic, 64 Points
2. IC655MDL524 - Input Simulator, 16 or 32 points
3. IC655MDL527 - 115/230 VAC Isolated Input, 16 points
4. IC655MDL533 - 5/12 VDC TTL Input, Positive/Negative logic, 64 Points.
5. IC655MDL586 - Isolated Relay Output, 16 Points.
6. IC655MDL593 - 5/12 VDC TTL Output, Positive logic, 64 Points.
7. IC655ALG567 - Analog Output, 2 Channel, -10 to +10 V

Other changes:

- Information in tables has been updated to reflect the new modules.
- Calibration procedures have been revised for Analog modules.
- Required FCC and Canadian notes concerning Radio Frequency Interference (RFI) added.

Related Publications

GEK-0122 Series Five™ User's Manual
GFK-0023 Logicmaster™ 5 Programming and Documentation Software User's Manual
GFK-0244 Series Five™ Data Communications User's Manual
GFK-0248 Series Five™ Genius Bus Controller User's Manual
GFK-0269 Series Five™ ASCII/BASIC User's Manual
GFK-0355 Series Five™ High Speed Counter User's Manual

Henry A. Konat
Senior Technical Writer

The Series Five Programmable Logic Controller and its associated modules have been tested and found to meet or exceed the requirements of FCC Rule, Part 15, Subpart J. The following note is required to be published by the FCC.

NOTE

This equipment generates, uses, and can radiate radio frequency energy and if not installed in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

The following note is required to be published by the Canadian Department of Communications.

NOTE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

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Contents

SECTION 1
General I/O Information

Introduction

Series Five I/O modules are highly reliable modules which use the latest technology and manufacturing practices. This section contains useful information which is common to all Series Five I/O modules. Section 2 includes specifications for each module, information on how to connect field wiring to each module, and a typical circuit for each module. Modules are listed alphanumerically by catalog number, and grouped as discrete input and output modules followed by analog input and output modules.

Series Five I/O Modules

A list of Series Five I/O modules is provided in the following table. For current information on availability of I/O modules, consult your local GE Fanuc PLC distributor, or GE Fanuc sales office.

Table 1. Series Five I/O Modules

Catalog Number	Module Description	Current/Voltage Rating	No. of Circuits
IC655MDL501	12 - 24 VDC Input, Negative Logic	7 mA @ 12 VDC 15 mA @ 24 VDC	16
IC655MDL502	12 - 24 VDC Input, Negative Logic	10 mA @ 24 VDC	32
IC655MDL503	24 VDC Input, Positive/Negative Logic	5 mA @ 24 VDC	64
IC655MDL511	24 - 48 VAC/DC Isolated Input, Positive Logic	7 mA @ 24 VDC 14 mA @ 48 VDC	16
IC655MDL512	12 - 24 VAC/DC Input, Positive Logic	10 mA @ 24 VDC	32
IC655MDL524	Input Simulator	n/a	16 or 32
IC655MDL525	115/230 VAC Input	8.4 mA @ 115 VAC 18 mA @ 230 VAC	16
IC655MDL526	115 VAC Input	14.5 mA @ 115 VAC	32
IC655MDL527	115/230 VAC Isolated Input	8.4 mA @ 115 VAC 18 mA @ 230 VAC	16
IC655MDL533	5 - 12 VDC TTL Input, Positive/Negative Logic	2.5 mA @ 5 VDC 7.5 mA @ 12 VDC	64
IC655MDL551	12 - 24 VDC Output, Negative Logic	2A	16
IC655MDL552	12 - 24 VDC Output, Negative Logic	0.5A	32
IC655MDL555	12 - 24 VDC Output, Positive Logic	2A	16
IC655MDL556	12 - 24 VDC Output, Positive Logic	0.5A	32
IC655MDL575	115/230 VAC Output	2A	16
IC655MDL576	115/230 VAC Isolated Output	2A	16
IC655MDL577	115/230 VAC Output	1A	32
IC655MDL580	Relay Output	2A Resistive	16
IC655MDL581	Relay Output	2A Resistive	32
IC655MDL586	Isolated Relay Output	2A Resistive	16
IC655MDL593	5 - 12 VDC TTL Output, Positive Logic	90 mA @ 14 VDC (current sinking)	64
IC655ALG516	Analog Input, 8 Channels	1 to 5 V, 0 to +10 V -10 to + 10 V 4 to 20 mA	8
IC655ALG566	Analog Output, 2 Channels	0 to +10 V 4 to 20 mA	2
IC655ALG567	Analog Output, 2 Channel	-10 to +10 V	2

General Specifications

The following table provides a list of general specifications common to all of the Series Five I/O modules. For individual module specifications, refer to the module descriptions which are found in Section 2.

Table 2. I/O Module General Specifications

Operating Temperature	0 to 60°C (32 to 140°F) (at outside of rack, no fans or forced air)
Storage Temperature	-20 to 70°C (-4 to 158° F)
Humidity	5% to 95% (non-condensing)
Environment	no corrosive gases
Dielectric withstand	1500 VAC for one minute
Insulation Resistance	>10 Mohms @ 500 VDC (between chassis and power source)
Meets Agency Standards for:	
Showering Arc Test	NEMA ICS 2.230.40
Shock	Mil-std 810C method 516.2 JIS.C 0911 11 B
Vibration	Mil-std 810C method 514.2 JIS.C 0912 10 G
Radio Frequency Interference	FCC Class A, part 15, subpart J
Insulation resistance	1500 VAC Hipot
Noise Immunity	Sanki 1 mSec, 1 KV pulses
Maximum Wire Size (With Terminal Block Cover on and all wires connected)	One AWG #16 or Two AWG #18 with 1/4" spade lugs.

Summary of I/O Module Power Consumption

The load requirements for Series Five I/O modules are listed in the following table. These load requirements consist of the load placed on the internal +5 VDC power which is supplied by the power supply installed in the base unit in which the modules are installed. Use this table to determine the total current requirements for all I/O modules to be installed in a base unit, and as a guide for selecting the power supply to be installed in a base unit.

The load of other modules that are installed in the base unit, e.g., CPU, Communications Control, or any other smart modules, must also be included in the total load calculation.

Table 3. Summary of I/O Module Power Consumption

Catalog Number	Module Description and Number of Circuits	Supply Current (Milliamps)	
		Typical	Maximum
IC655ALG516	Analog Input, (8)	-	250
IC655ALG566	Analog Output, (2)	-	150
IC655ALG567	Analog Output, (2)	-	150
IC655BEM500	Local I/O Interface	-	380
IC655BEM530	Series Three I/O Interface	-	200
IC655MDL501	12 - 24 VDC Input, Negative Logic (16)	64	80
IC655MDL502	12 - 24 VDC Input, Negative Logic (32)	130	150
IC655MDL503	24 VDC Input, Positive/Negative Logic (64)	136	180
IC655MDL511	24 - 48 VAC/DC, Isolated Input, Positive Logic (16)	80	100
IC655MDL512	12 - 24 VAC/DC Input, Pos. Logic (32)	160	180
IC655MDL524	Input Simulator (16 or 32)	112	200
IC655MDL525	115/230 VAC Input, (16)	64	100
IC655MDL526	115 VAC Input, (3)	160	180
IC655MDL527	115/230 VAC Isolated Input (16)	64	100
IC655MDL533	5 - 12 VDC TTL Input (64)	136	180
IC655MDL551	12 - 24 VDC Output, Negative Logic (16)	150	170
IC655MDL552	12 - 24 VDC Output, Negative Logic (32)	260	300
IC655MDL555	12 - 24 VDC Output, Positive Logic (16)	150	170
IC655MDL556	12 - 24 VDC Output, Positive Logic (32)	600	800
IC655MDL575	115/230 VAC Output, (16)	560	650
IC655MDL576	115/230 VAC Isolated Output, (16)	560	650
IC655MDL577	115/230 VAC Output, (32)	580	640
IC655MDL580	Relay Output, (16)	152	180
IC655MDL581	Relay Output, (32)	260	300
IC655MDL586	Isolated Relay output (16)	152	180
IC655MDL593	5 - 12 VDC TTL Output (64)	360	450
IC655APU500	ASCII/BASIC Module	-	600
IC655APU510	High Speed Counter	-	100
IC655BEM510	Genius Bus Controller	-	500
IC655CCM500	CCM Communications	-	1000

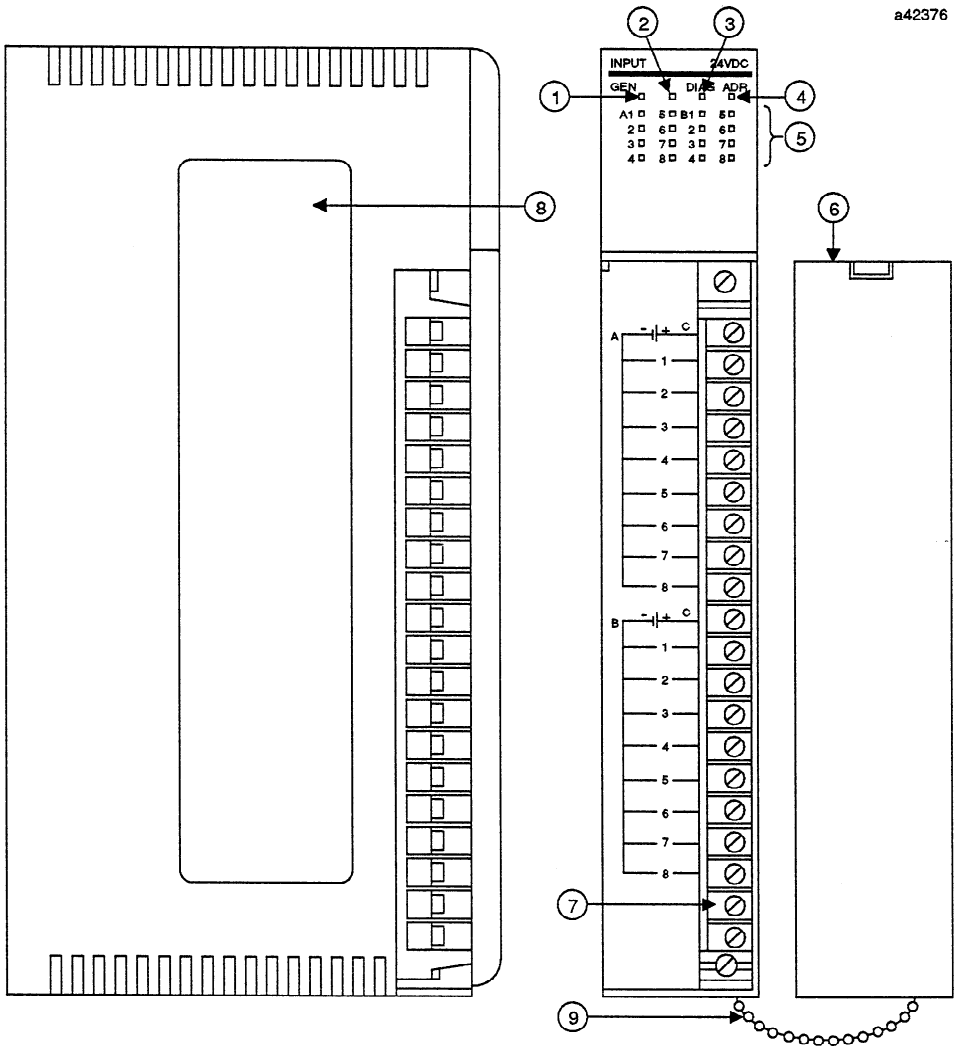
I/O Module Features

Series Five I/O modules include discrete input and output, high-density discrete input and output, analog input and output, high speed counter, and an ASCII/BASIC Module. All of the I/O modules are physically the same size and are enclosed in a plastic module housing. All of the modules have a removable sideplate on the left side of the module. This sideplate allows easy access to module features requiring user access, such as replaceable fuses or DIP switches requiring configuration, For information about fuses in specific modules, refer to Table 1-4.

I/O modules connect to the backplane through a single connector on the module which mates with a connector mounted on the base unit backplane directly behind each I/O slot. No special tools are required to install your I/O modules. Modules are held firmly in place by fastening two easily accessible captive screws, one at the top and one at the bottom of the module. Each module is color coded with a narrow horizontal stripe across the top of the faceplate. A red stripe indicates a high-voltage module, a blue stripe indicates a low-voltage module, and a white stripe indicates a signal level or other type of module.

I/O Module - Wiring to Terminal Block

The following figure is an illustration of a typical Series Five I/O module which has its associated field wiring terminated at a removable terminal block. This terminal block is used on 16 and 32 point I/O modules. Features common to 16 and 32 point Series Five I/O modules are pointed out in the illustration. These features are described later in this section.



1. ON WHEN I/O REFERENCE IS LOCATED IN I1+, O1+, I2+ OR O2+ STATUS TABLE.
2. UNUSED ON INPUT MODULES
   FB - BLOWN FUSE INDICATOR
   ON OUTPUT MODULES.
3. OFF : OPERATION NORMAL
   ON : LOOSE OR MISSING TERMINAL BLOCK, NO VOLTAGE FROM EXTERNAL POWER SOURCE, OR OTHER PROBLEM WITH THIS MODULE.
4. OFF : 16 OR 32 LEDs BELOW INDICATE ON OR OFF STATUS OF I / O POINTS
   ON : STARTING ADDRESS OF MODULE INDICATED BY TOP 16 LEDs.
5. LED INDICATORS SHOW STATUS OF I / O POINTS OR STARTING I / O ADDRESS OF MODULE. 32 POINT MODULES HAVE 4 GROUPS A1-8, B1-8, C1-8, D1-8.
6. FACEPLATE COVER. INSERT FOR CIRCUIT IDENTIFICATION ATTACHES TO BACK.
7. TERMINAL BLOCK FOR FIELD WIRING TO 16 AND 32 POINT MODULES.
8. REMOVABLE COVER FOR ACCESS TO USER ITEMS (IF ANY).
9. BEAD CHAIN INCLUDED WITH EACH MODULE.

Figure 1. Typical I/O Module with Removable Terminal Block

I/O Module - Wiring to Connectors

The following figure is an illustration of a typical 64 point high-density Series Five I/O module which has its field wiring terminated at two connectors mounted on the front of the module. Features common to 64 point I/O modules are pointed out in the illustration and are described later in this section.

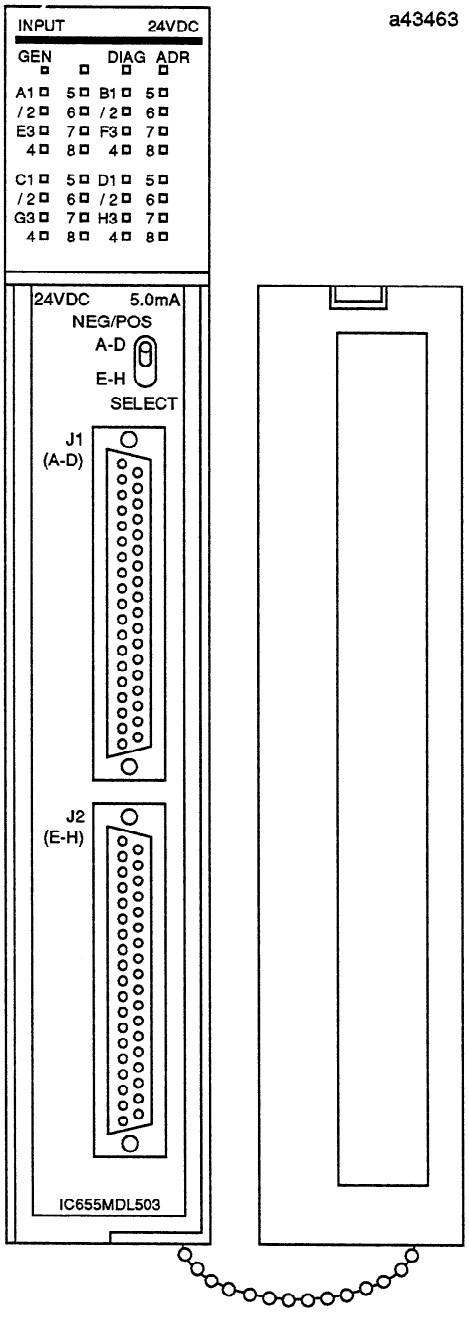


Figure 2. Typical I/O Module with Connectors

I/O Module Keying

All 16 and 32 point Series Five I/O modules are mechanically keyed to prevent accidental connection of a prewired removable terminal block to the wrong module type; for example, a 115 VAC terminal block onto a 24 VDC board. Individual module keying must be done by the user at installation according to a predetermined key chart. Each I/O module has packed with it a set of instructions for installing the keys, and the type of key for that terminal block. There are two types of keys, one type for modules with 20 terminals on the terminal block, and one type for modules with 38 terminals on the terminal block. The correct type of keys are included with each I/O module. The following figure is an illustration of the instruction sheet packed with each module.

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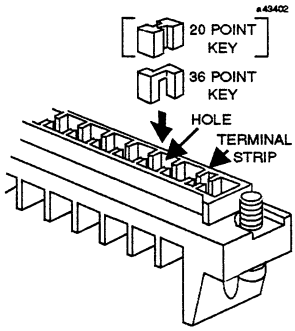
GFJ-007A

Series Five I/O Module Terminal Block Key Chart

Each type of Series Five I/O module can be uniquely keyed to its terminal block. This helps prevent an accidental mismatch between an I/O module and its terminal block during the installation and maintenance of the system.

To implement this keying function, install the included keys in the terminal block per the chart below.



Module Type	Terminal Block Type	Catalog Number	Product Description	Key Position						
				A1	A2	A3	A4	B1	B2	B3
Input Module	20 Point	IC655MDL501	12-24 VDC Neg. Logic	•	•					
		IC655MDL525	115/230 VAC	•						•
	38 Point	IC655MDL502	12-24 VDC Neg. Logic	•		•				
		IC655MDL511	24-48 VAC/DC		•	•				
		IC655MDL512	12-24 VAC/DC	•				•		
		IC655MDL526	115 VAC	•					•	
		IC655MDL527	115/230 VAC Isolated			•				•
Output Module	20 Point	IC655MDL551	12-24 VDC Neg. Logic					•	•	
		IC655MDL555	12-24 VDC Pos. Logic					•		•
		IC655MDL575	115/230 VAC		•					•
		IC655MDL580	Relay			•		•		
	38 Point	IC655MDL552	12-24 VDC Neg Logic						•	•
		IC655MDL556	12-24 VDC Pos. Logic			•		•		
		IC655MDL576	115/230 VAC Isolated		•					•
		IC655MDL577	116/230 VAC		•			•		
		IC655MDL581	Relay			•			•	
		IC655MDL586	Relay Isolated	•						•
Special Module	20 Point	IC655ALG566	Analog Output	•				•		
		IC655ALG567	Analog Output	•				•		
	38 Point	IC655ALG516	Analog Input		•				•	
		IC655APU510	High Speed Counter					•		•

Figure 3. I/O Module Terminal Block Key Location Chart

Diagnostic Keying Check

The CPU also provides a diagnostic "keying" check of the I/O modules to ensure that a previously installed module is replaced in the correct slot. If the module configuration in the I/O slots is different than it was on the previous power-up, the CPU optionally detects this and provides an error indication, if the I/O configuration check is enabled. Normal operation cannot proceed until the modules are inserted correctly, or until Logicmaster 5 software tells the CPU to accept the new configuration, or to continue running assuming the old configuration.

Terminal Block for Field Wiring (16 and 32 Point Modules)

An easily removed cover on the front of the module provides access to a terminal block for connection of field wiring. Terminal blocks have either 20 (16 circuit modules) or 38 (32 circuit modules) terminals. The terminal block is removable to allow for prewiring of systems, easy replacement of modules, and for troubleshooting. Terminals on the connector block will accept one AWG #16 (1.2 mm^2) or two AWG #18 (1 mm^2) wires with 1/4" spade lugs. Field wiring to the terminal block is routed into the bottom of the module through a cutout in the bottom front of the case.

Connector for Field Wiring to 64 Point Modules.

Each of the 64 point I/O modules has two 37-pin subminiature D-type connectors mounted on the front of the module for connecting user supplied input devices to Input modules, or for connecting Output modules to user supplied loads. Each connector provides for connection to 32 of the 64 circuits on a module. Each 64 point I/O module is shipped with two unwired male connectors which mate with the connectors on the module. These connectors are provided for building cables for connection to field devices.

A toggle switch on the front of the module allows the user to choose the groups of I/O points to be monitored by the 32 status indicators located at the top of the module, either group A through D, or group E through H. The top connector provides connection to groups A1 through A8, B1 through B8, C1 through C8, and D1 through D8, while the bottom connector provides connection to groups E1 through E8, F1 through F8, G1 through G8, and H1 through H8.

Faceplate

Each 16 and 32 point module has a protective plastic cover over the terminal block. This cover protects the user from coming in contact with potentially hazardous voltages present at the terminal block. The faceplate cover for the 64 point modules has two cutouts through which the connectors are accessed for connection to field devices. A short length of plastic bead chain is included with each I/O module and can be attached to the faceplate and module housing. When attached, this faceplate chain allows the faceplate to hang from the module and not be misplaced. A self-adhesive gray insert is provided with each 16 and 32 point I/O module for attachment to the back of the faceplate cover. This insert has a lined area divided into sections corresponding to the terminals on the block. This insert provides a convenient place to record circuit identification information.

Status Indicators

The ON or OFF status of each I/O point is indicated by the state of a corresponding LED, which is either ON or OFF. 32 point I/O modules have 35 or 36 LEDs and the 16 point I/O modules have 19 or 20 LEDs that are visible at the top of the module. 16 or 32 of these LEDs indicate the ON or OFF status of

the module's input or output circuits, as applicable. For 64 point modules, the 32 LEDs indicate the status of the 32 inputs or outputs associated with one connector. A toggle switch provides a choice between the two groups of 32 (total 64) Inputs or Outputs being monitored; either group A to D or group E to H. The top 16 LEDs can also be programmed, through Logicmaster 5 or the Series Five Operator Interface Unit, to indicate the starting I/O address of the module instead of the module I/O point status. The other 3 or 4 LEDs (Output modules have 4, Input modules have 3) are used for diagnostic purposes as described below.

GEN On when the I/O reference assigned to the module is located in either the I1+, O1+, I2+, or O2+ table.

FB Output modules only. When ON, indicates that a fuse has blown in the module (output point must be ON, a load must be connected, and the CPU must be in the RUN mode). This location is blank on Input modules.

DIAG When ON, indicates a loose or missing terminal block, no external supply voltage, or that an internal failure has been detected in the module.

ADR If ON, indicates that the LEDs normally used for circuit ON or OFF status have been commanded by the CPU to display the module's starting I/O address.

I/O Module Starting Address Display

In addition to providing the on or off status of I/O points, the 16 LEDs located directly below the 4 diagnostic LEDs in the top row on an I/O module, provide a dual function in that they also allow you to read the starting I/O address of the module when commanded to do so through Logicmaster 5 or the Series Five Operator Interface Unit. To do this from Logicmaster 5, you must be in the I/O CONFIGURATION UTILITIES menu and select F6, which is the I/O Module Address/Status softkey. This allows you to select whether the status of the I/O points or the starting address of the module will be displayed on the LEDs. The Logicmaster 5 software allows you to toggle between these two modes when the system is on-line. For detailed information, refer to GFK-0023, which is the *Logicmaster™ 5 Programming and Documentation Software User's Manual.*

To perform this function from the Operator Interface Unit, select sub-menu 43 (LED Mode) from main menu 4 (I/O Configuration). You can then command the I/O modules to display each modules's starting I/O address as an alternative to the normal display of the On or Off state of each point on a module. For detailed information, refer to GFK-0181, which is the *Series Five Programmable Controller Operator Interface Unit User's Manual.*

When the I/O Address mode is selected, the ADR indicator on the top row of LEDs will turn on to indicate that the 16 I/O Address/Status LEDs are in the I/O Address mode, and the starting address of each module will be displayed on the LEDs. When the LEDs are commanded to the I/O Address mode, the starting address of each module in the system is displayed as a 4-digit BCD number, with the least significant bit (1's digit) read on the four LEDs in the right vertical column, and the most significant bit (1000's digit) read on the four LEDs in the left vertical column. The binary weight of the four LEDs in each column, reading from top-to-bottom, is 1 - 2 - 4 - 8. The following example shows how to read a typical starting address of an I/O module.

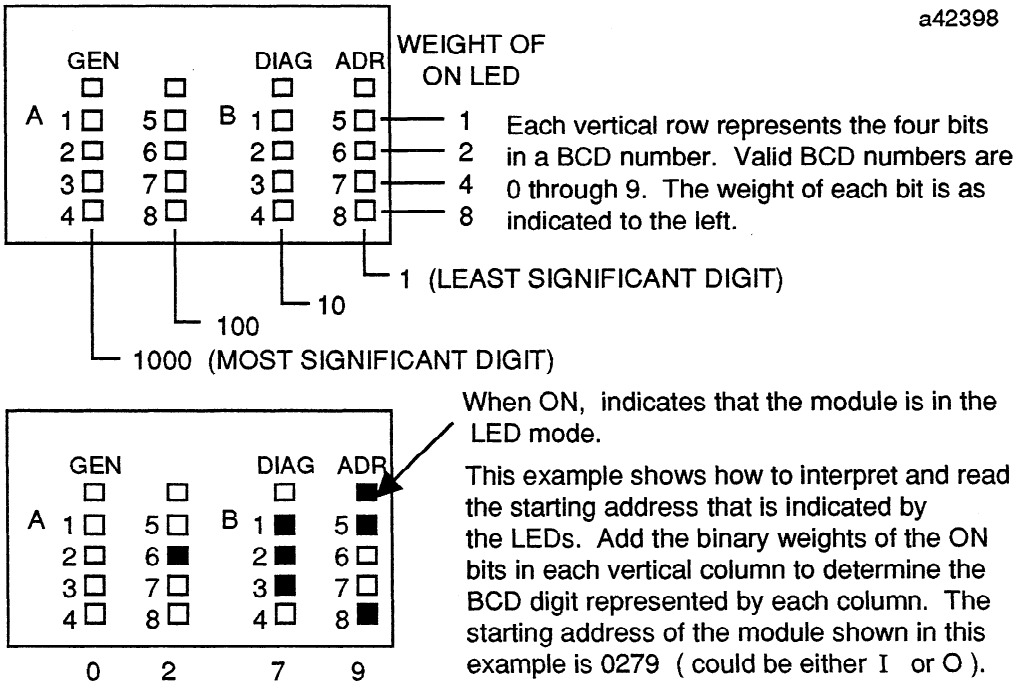


Figure 4. Reading I/O Module Starting Address on LEDs

This function is especially useful while debugging a new system or for troubleshooting, or anytime that you may want to verify the starting address of a module in a particular slot. To return the LEDs to the I/O point status indication mode using Logicmaster 5, you must return to the I/O CONFIGURATION UTILITIES menu, select the F6 softkey, and toggle to STATUS. To leave the LED mode using the Operator Interface Unit: while in sub-menu 43, position the cursor over RST and press the ENT key. This returns the LED display to the normal I/O status display.

Series Five I/O Module Installation

Series Five I/O modules can be installed in any available I/O slot in a base unit. Base units are available that can contain either 6 (IC655CHS506) or 8 (IC655CHS508) I/O modules.

Assigning References to I/O Modules

References for each I/O module in a base unit can be assigned by the user through Logicmaster 5, or can be assigned sequentially by the CPU starting with reference 0001 through reference 1024 (input and output references are assigned independently, that is, 0001 to 1024 for inputs and 0001 to 1024 for outputs). To accomplish this in an orderly fashion, the CPU must know in what order to assign the references to base units in the system. To do this, each of the base units in the system must be assigned an I/D number. The recommended method for assigning references is for the user to assign them through Logicmaster 5. Refer to the Series Five User's manual, GFK-0122, for more information on assigning references.

Assigning Base Unit ID Numbers

Base unit ID numbers, from 0 through 7, are assigned by setting a small rotary switch, located directly above the I/O expansion connector on the left side of the base unit, to the desired ID number. The ID numbers can be assigned in any order to satisfy the application, they do not have to be assigned sequentially.

NOTE

Base unit ID Numbers and reference numbers must not be duplicated. Use each ID number once and only once. Each base unit ID must be unique. The I/O module addresses assigned to base units must not be duplicated. Since the CPU does not detect duplicate addresses, it is the responsibility of the user to verify that addresses are unique for each base unit.

When assigned by the CPU, I/O references for individual modules are assigned in base units starting with low numbers and proceeding sequentially to high numbers. When assigned by the user, references do not have to be assigned sequentially. The location and physical appearance of the base unit ID switch is shown below along with an example of typical settings.

a42409

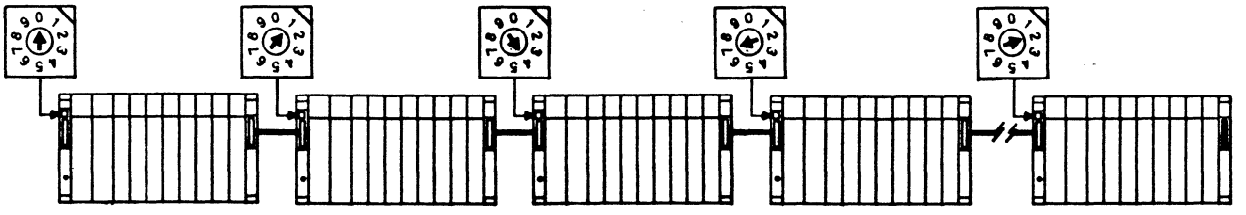


Figure 5. Example of Base Unit Identification Switch Settings

Fuses for Output Modules

The following table is a list of fuses that are used in Series Five Output modules.

Table 4. Fuses for Output Modules

Module Type	Catalog Number	Fuse Type †	Current Rating	Slow/Fast Blow	Quantity On Module	User Replaceable
24VDC Out, Neg Logic	IC655MDL551	MF51SH8	8 amp	Fast	4	Yes
24VDC Out, Neg Logic	IC655MDL552	MF51SH3	3 amp	Fast	4	Yes
24VDC Out, Pos Logic	IC655MDL555	MF51SH8	8 amp	Fast	4	Yes
24VDC Out, Pos Logic	IC655MDL556	MF51SH3	3 amp	Fast	4	Yes
115/230VAC Out	IC655MDL575	MF51SH8	8 amp	Fast	2	Yes
115/230VAC Isol Out	IC655MDL576	MC3	3 amp	Fast	16	No
115/230VAC Out	IC655MDL577	MC5	5 amp	Fast	4	No
Relay Out	IC655MDL580	MF51SH8	8 amp	Fast	4	Yes

† MF51SH3, MF51SH8 - 20 mm x 5.2 mm - cartridge type
MC3, MC5 - 9 mm x 2.7 mm - pigtail type, soldered-in place

Ring and Spade Lugs

The following list of ring and spade lugs have been tested and can be used for connecting field wiring to the terminal blocks on Series Five I/O modules. Most 1/4″ ring or spade lugs will fit the terminals.

Table 5. Recommended Lugs for Field Wiring Connections

Type of Lug	Wire Size AWG # (mm^2)	AMP Catalog Number
spade	22 - 16 (0.38 - 1.2 mm^2)	52929
spade	16 - 14 (1.2 - 1.9 mm^2)	52935
spade	12 - 10 (3.0 - 5.2 mm^2)	52941
ring	16 - 14 (1.2 - 1.9 mm^2)	32422
ring	22 - 18 (0.38 - 1.0 mm^2)	31822

I/O Module Installation Procedures

Installation instructions common to all I/O modules are described in the following discussion. Specific field wiring information for individual I/O modules can be found in Section 2 of this manual.

- Do not install or remove any I/O module when power is applied to a base unit. If this is done, the module could be damaged.
- The I/O module to be installed should be positioned over the selected base unit slot position. Slot positions are numbered 0 through 5 in a 6-slot base unit and 0 through 7 in an 8-slot base unit. Position the I/O module so that the connector on the back of the module is lined up with the mating connector on the base unit.
- Firmly push the I/O module onto the base unit connector so that it is securely mated with it.
- Secure the I/O module to the base unit by fastening the 2 captive screw fasteners, one at the top and one at the bottom of the module, with a long, narrow bladed screwdriver.
- After installing all modules in a base unit, you should then run field wiring to the terminal block, or connectors, on each module. Recommended routing of field wiring is to run the wiring harness along the bottom of the modules, then break-out the wires for each module and route them to the terminal block or connectors through the cutout at the bottom front of the module.

WARNING

When handling terminal blocks on 16 and 32 point modules, be aware that voltages from user devices may be present on a module's screw terminals, even though power to a base unit is turned off. Care must be taken any time you are handling the module's terminal block or any wires connected to it.

Field Wiring Considerations

It is recommended that the following procedures be followed when routing and connecting field wiring from input devices to the PLC or to output devices to be controlled by the PLC.

- All low level signal wires should be be run and contained in conduit separate from other field wiring.
- AC power wiring should be run and contained in conduit separately from DC field wiring.

WARNING

It is the user's responsibility to calculate the maximum current for each wire and to observe proper wiring practices. Failure to do so may cause injury to personnel or damage to equipment.

- Do not route field wiring close to any device that could be a potential source of electrical interference.
- If severe noise problems are present, additional power supply filtering or an isolation transformer may be required.
- Ensure proper grounding procedures to minimize potential safety hazards to personnel.
- Label all wires to I/O devices. Record circuit identification numbers or other pertinent data on the inserts provided for attachment to the back of module faceplates.

Terminal Block Extender

A Terminal Block Extender, catalog number IC655ACC527, is available to temporarily extend the removable I/O terminal block away from the module to allow more room when initially dressing wires at the terminal block. Mounting of the Terminal Board Extender is shown below.

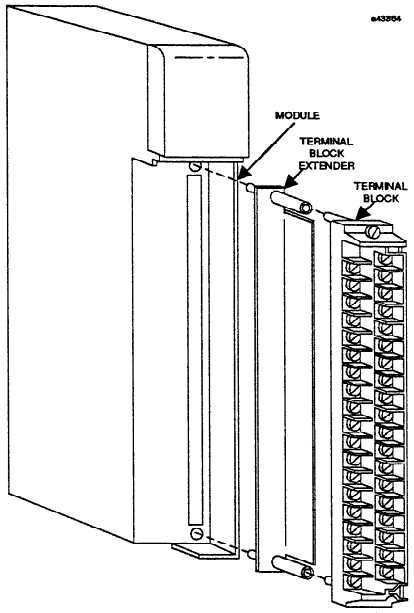


Figure 6. Mounting the Terminal Block Extender

SECTION 2
Module Specifications

This section contains individual specifications and wiring information for each of the Series Five I/O modules. Modules are listed by type - either Input, Output, or Analog and catalog number.

Quick Guide to Location of Module Specifications

The location of individual module specifications in this section is listed below by page number.

Table 6. Guide to Location of I/O Module Specifications

Module Name and Type	Number of Circuits	Catalog Number	Page Number
24 VDC Input, Negative Logic	16	IC655MDL501	14
24 VDC Input, Negative Logic	32	IC655MDL502	16
24 VDC Input, Positive/Negative Logic	64	IC655MDL503	18
24 VAC/DC Isolated Input, Positive Logic	16	IC655MDL511	20
24 VAC/DC Input, Positive Logic	32	IC655MDL512	22
Input Simulator	16/32	IC655MDL524	24
115/230 VAC Input	16	IC655MDL525	26
115 VAC Input	32	IC655MDL526	28
115/230 VAC Isolated Input	16	IC655MDL527	30
5-12 VDC TTL Input, Positive/Negative Logic	64	IC655MDL533	32
24 VDC Output, Negative Logic, 2 Amp	16	IC655MDL551	36
24 VDC Output, Negative Logic, 0.5 Amp	32	IC655MDL552	38
24 VDC Output, Positive Logic, 2 Amp	16	IC655MDL555	40
24 VDC Output, Positive Logic, 0.5 Amp	32	IC655MDL556	42
115/230 VAC Output, 2 Amp	16	IC655MDL575	44
115/230 VAC Isolated Output, 2 Amp	16	IC655MDL576	46
115/230 VAC Output, 1 Amp	32	IC655MDL577	48
Relay Output, 2 Amp	16	IC655MDL580	50
Relay Output, 2 Amp	32	IC655MDL581	52
Isolated Relay Output	16	IC655MDL586	54
5-12 VDC TTL Output, Positive Logic	64	IC655MDL593	56
Analog Input - 8 Channel	8	IC655ALG516	58
Analog Output - 2 Channel, 0 to +10V/4 to 20 mA	2	IC655ALG566	69
Analog Output - 2 Channel, -10 to +10V	2	IC655ALG567	75

24 VDC Input, Negative Logic, 16 Circuits
IC655MDL501

This module provides 16 circuits for connection to user input devices. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they provide the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The input circuits are divided into two groups, A and B, with the input terminals for each group labeled 1 to 8. Each group has a single common connection, labeled C, for the eight circuits in the group. The user must supply a 12 to 24 VDC source of power for sensing the state of the inputs to the module. Both groups can be powered from a single power source or each group can be powered from a separate source.

Table 7. Specifications for 24 VDC Input, Negative Logic - 16 Circuits

Input Circuit Type	Negative Logic
Number of Circuits	16
Internal Circuit Grouping	Two groups, eight circuits per group
Operating Voltage	12 to 24 VDC
Maximum Voltage (open circuit)	26.4 VDC
Input Current	7 mA at 12 VDC; 15 mA at 24 VDC
ON Level	10 VDC; between C and Input terminal
OFF Level	5.5 VDC; between C and Input terminal
Maximum OFF Leakage	3.0 mA
Minimum ON Current	5.5 mA
OFF to ON Response	3 to 10 ms
ON to OFF Response	3 to 12 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Total; 64 mA (typical), 80 mA (maximum) Per On Point; 4 mA
Weight	42 oz (650 g)

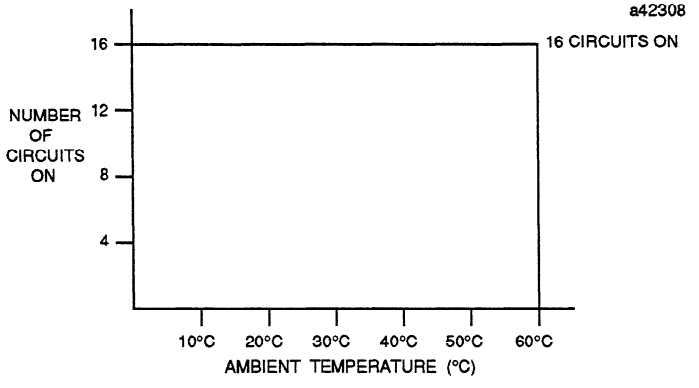


Figure 7. Input Points vs. Temperature for IC655MDL501

Wiring Information - IC655MDL501

The following figure provides the information required for connecting field devices to this module.

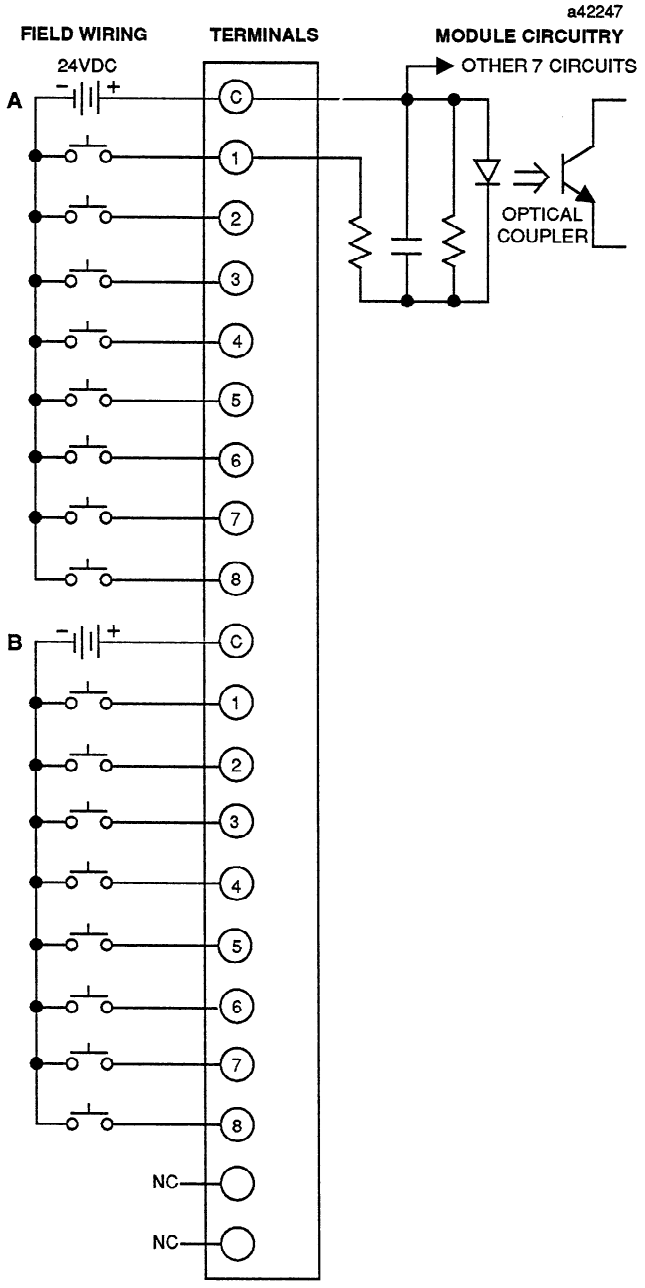


Figure 8. Field Wiring and Typical Circuit for IC655MDL501

24 VDC Input, Negative Logic, 32 Circuits
IC655MDL502

This module provides 32 circuits for connection to user input devices. 32 LEDs on the front of the module provide a visual indication of the status of each circuit. Each LED reflects the ON or OFF state of the corresponding circuit. When commanded through programming, the top 16 LEDs provide the starting I/O address for the module. Input circuits are divided into four groups, with 8 circuits in each group. Field Wiring to each circuit is made to the removable terminal block on the front of the module. The groups are labeled A, B, C, and D, with the input terminals in each group labeled 1 to 8. Each group has a single common connection, labeled C, for the eight circuits in the group. The user must supply a 12 to 24 VDC source of power for sensing the state of the inputs to the module. All four groups can be powered from a single power source or each group can be powered from a separate source.

Table 8. Specifications for 24 VDC Input, Negative Logic - 32 Circuits

Input Circuit Type	Negative Logic
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group
Operating Voltage	10.2 to 26.4 VDC
Maximum Voltage (open circuit)	26.4 VDC
Input Current	10 mA at 24 VDC
ON Level	6.5 VDC; between C and Input terminal
OFF Level	4.0 VDC; between C and Input terminal
Maximum OFF Leakage	1.5 mA
Minimum ON Current	3.5 mA
OFF to ON Response	3.7 to 10 ms
ON to OFF Response	3.5 to 12.5 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 130 mA (typical), 150 mA (maximum) Per On Point; 4 mA
Weight	48 oz (750 g)

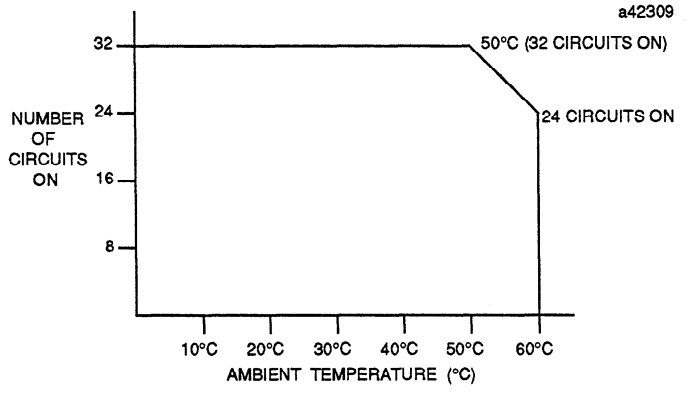


Figure 9. Input Points vs. Temperature for IC655MDL502

Wiring Information - IC655MDL502

The following figure provides the information required for connecting field devices to this module.

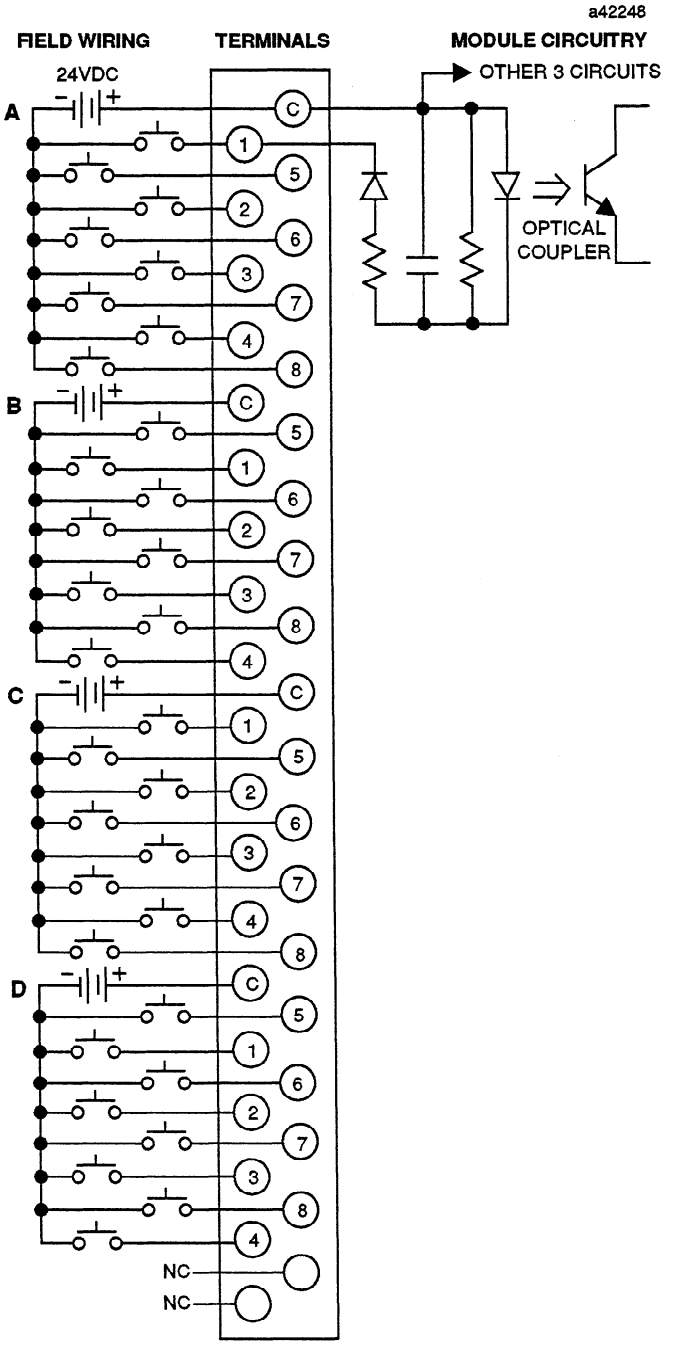


Figure 10. Field Wiring and Typical Circuit for IC655MDL502

24 VDC Input, Positive/Negative Logic, 64 Circuits
IC655MDL503

This module provides 64 circuits for connection to user input devices. 32 LEDs on the module indicate the status of the 32 Inputs associated with one connector. A toggle switch above the top (J1) connector allows the user to choose the group of inputs being monitored (A to D, or E to H). The top 16 LEDs perform a dual function. They normally provide a visual indication of the status of each input circuit with each LED reflecting the ON or OFF state of the corresponding circuit. Second, when commanded through programming, they indicate the starting I/O address for the module.

Field wiring connections from input devices is made to two 37-pin subminiature D-type connectors (labeled J1 (A-D) and J2 (E-H)), mounted on the front of the module. One connector is used for two groups with 16 inputs in each group. The four groups are labeled A and B (group 1), C and D (group 2), E and F (group 3), and group 4 is G and H. The pins in each group are labeled 1 to 8, for example: group 1 is A1 to A8 and B1 to B8. Each group has a common connection, labeled C. The user must supply the source of power, which can be from 20 to 28 VDC, to reflect the state of the inputs to the module. All groups can be powered from a common source or from different sources. The circuits can operate as either positive or negative logic, depending on how the source voltage is connected to the module. Examples of these connections are shown in the following wiring diagram for the module.

Table 9. Specifications for 24 VDC Input, Positive/Negative Logic - 64 Circuits

Input Circuit Type	Positive/Negative Logic (selectable)
Number of Circuits	64
Internal Circuit Grouping	Four groups, 16 circuits per group
Operating Voltage	20 to 28 VDC
Input Current	5 mA at 24 VDC
ON Level (E applied by user)	19 VDC; between C and Input terminal
OFF Level (E applied by user)	10 VDC; between C and Input terminal
Maximum OFF Leakage	1.6 mA
Minimum ON Current	3.5 mA
OFF to ON Response	2 to 10 ms
ON to OFF Response	2 to 10 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 136 mA (typical), 180 mA (maximum) 50 mA + 0.1 mA per On point + 2.5 mA per On LED
Weight	39 oz (600 g)

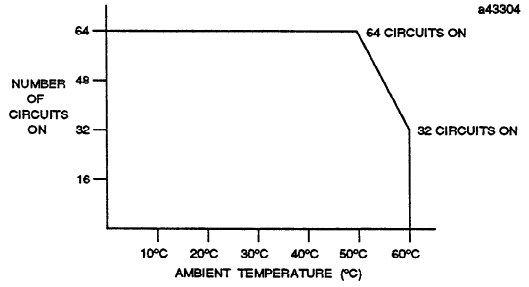


Figure 11. Input Points vs. Temperature for IC655MDL503

Wiring Information - IC655MDL503

The following figure provides the information required for connecting field devices to this module.

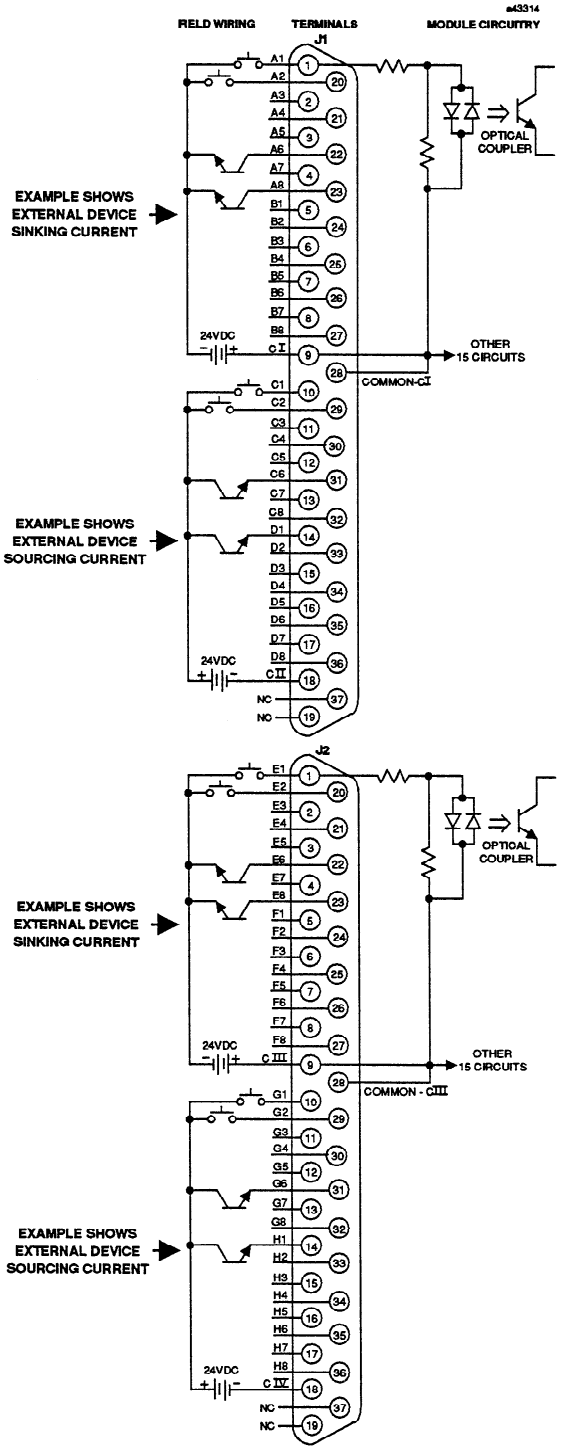


Figure 12. Field Wiring and Typical Circuit for IC655MDL503

24 VAC/DC Isolated Input, Positive Logic, 16 Circuits
IC655MDL511

This module provides 16 circuits for connection to user input devices. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, the top 16 LEDs provide the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The input circuits are labeled 1 through 16 with each input having a separate common associated with it. All common connections are labeled C. Each circuit is isolated from the other circuits, relative to the power source. The user must supply a source of power, which can be 24 to 48 VAC or 24 to 48 VDC, to sense the state of the inputs to the module. Each input can be powered from a separate power source or a single power source can be used to power all of the inputs.

Table 10. Specifications for 24 VAC/DC Isolated Input, Positive Logic - 16 Circuits

Input Circuit Type	Positive Logic
Number of Circuits	16
Internal Circuit Grouping	16 separate circuits
Operating Voltage	20 to 60 VAC or dc
Maximum Voltage (open circuit)	60 V
Input Current	20 mA ac/dc
ON Level	20 VAC/DC; between C and Input terminal
OFF Level	5.0 VAC/DC; between C and Input terminal
Maximum OFF Leakage	1.0 mA ac/dc
Minimum ON Current	5.0 mA ac/dc
OFF to ON Response	5.0 to 30 ms
ON to OFF Response	10.0 to 50.0 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 80 mA (typical), 100 mA (maximum) Per On Point; 5 mA
Weight	45 oz (700 g)

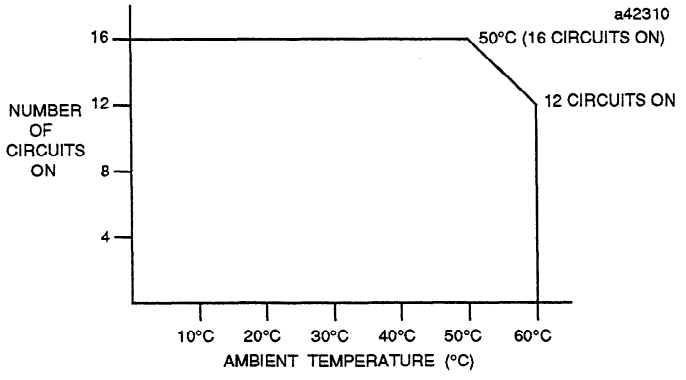


Figure 13. Input Points vs. Temperature for IC655MDL511

Wiring Information - IC655MDL511

The following figure provides the information required for connecting field devices to this module.

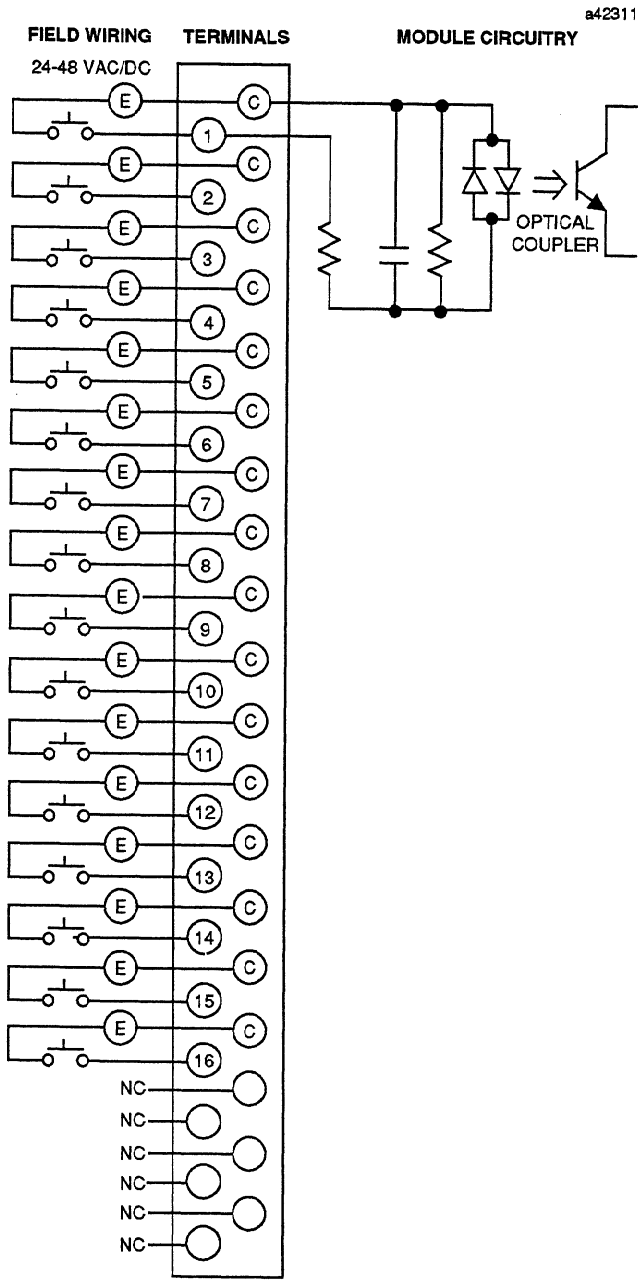


Figure 14. Field Wiring and Typical Circuit for IC655MDL511

24 VAC/DC Input, Positive Logic, 32 Circuits
IC655MDL512

This module provides 32 circuits for connection to user input devices. 32 LEDs on the front of the module provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, these LEDs provide the starting I/O address for the module. Field wiring connections to each circuit are made to the removable terminal block on the front of the module. Input circuits are divided into four groups, with 8 circuits in each group. The groups are labeled A, B, C, and D, and the input terminals in each group are labeled 1 to 8. Each group of eight has a single common connection, labeled C. The user must supply a source of power, which can be 12 to 24 VAC or 12 to 24 VDC, to sense the state of the inputs to the module. Each group of inputs can be powered from a separate power source or a single power source can be used to power all groups of inputs.

Table 11. Specifications for 24 VAC/DC Input, Positive Logic - 32 Circuits

Input Circuit Type	Positive Logic
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group
Operating Voltage	10.2 to 26.4 VAC or dc
Maximum Voltage (open circuit)	26.4 VAC or dc
Input Current	10 mA at 24 VAC/DC
ON Level	10 VAC/DC; between C and Input terminal
OFF Level	3.0 VAC/DC; between C and Input terminal
Maximum OFF Leakage	1.0 mA ac/dc
Minimum ON Current	4.0 mA ac/dc
OFF to ON Response	5.0 to 30 ms
ON to OFF Response	10.0 to 50.0 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 160 mA (typical), 180 mA (maximum) Per On Point; 5 mA
Weight	48 oz (750 g)

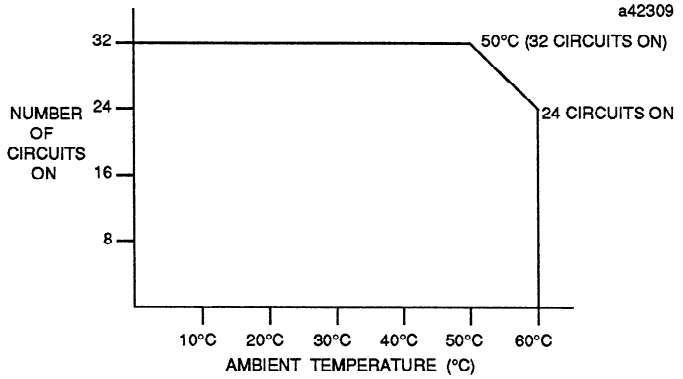


Figure 15. Input Points vs. Temperature for IC655MDL512

Wiring Information - IC655MDL512

The following figure provides the information required for connecting field devices to this module.

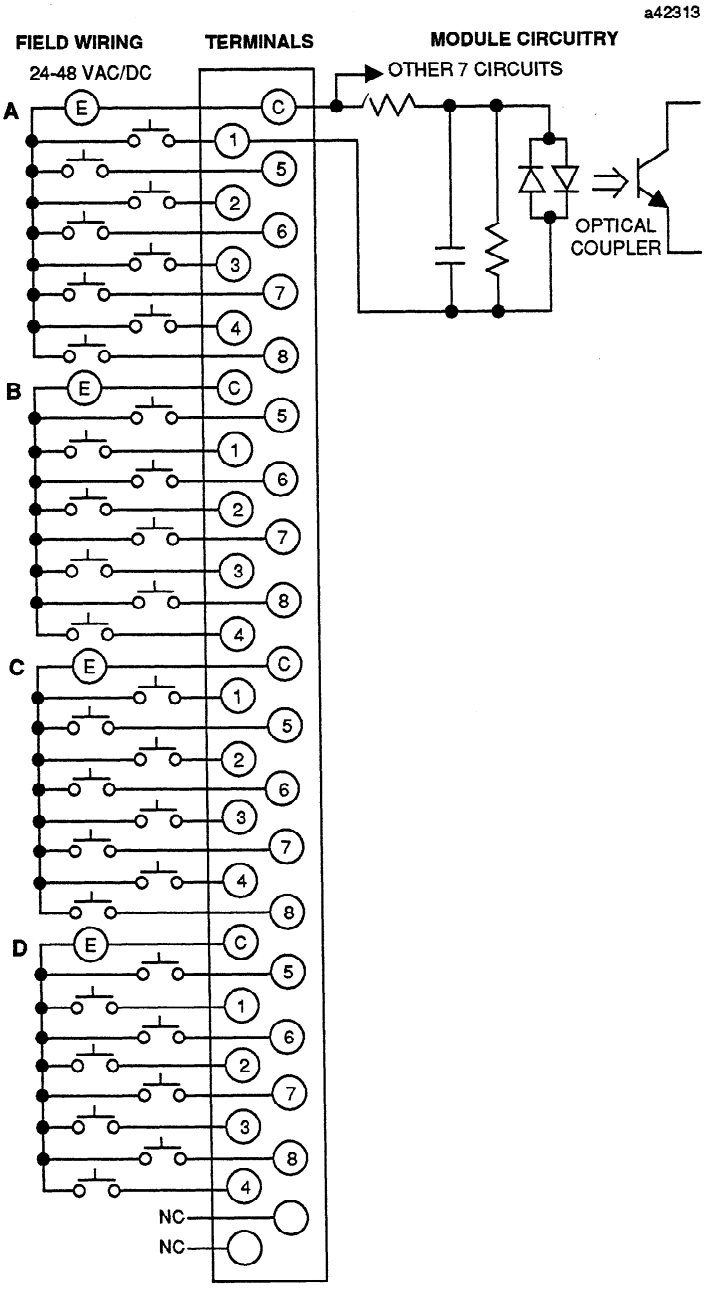


Figure 16. Field Wiring and Typical Circuit for IC655MDL512

Input Simulator, 16/32 Circuits
IC655MDL524

The Input Simulator module has 32 two-position toggle switches on the front of the module. Each switch can be programmed as a discrete input device. This module allows simulation of either 16 point or 32 point input modules. A toggle switch, accessed by removing the side cover of the module, allows configuration of the module for either 16 or 32 points. When the mode switch is set for 16 points, only the top 16 switches (labeled A1 through A8 and B1 through B8) are active, the remaining 16 switches are disabled. This module requires no field connections.

The Input Simulator is a valuable tool when developing programs and troubleshooting since it can be substituted for actual inputs until the program or system is debugged. It can also remain permanently in the system to provide 16 or 32 conditional input contacts for manual control of output devices.

There are 32 LED indicators at the top of the module with each LED correspond to the similarly labeled switch. The corresponding LED turns ON when the switch is placed in the ON position, and is OFF when the switch is in the OFF position. The LEDs are arranged in four groups with 8 LEDs in each group. The top two groups are labeled A1 through 8 and B1 through B8, and the bottom two groups are labeled C1 through C8 and D1 through D8.

Table 12. Specifications for Input Simulator, 16 or 32 Points

Number of Circuits	16 or 32 (switch selectable)
OFF to ON Response	10 ms
ON to OFF Response	11 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 112 mA (typical), 200 mA (maximum)
Weight	30 oz (460 g)

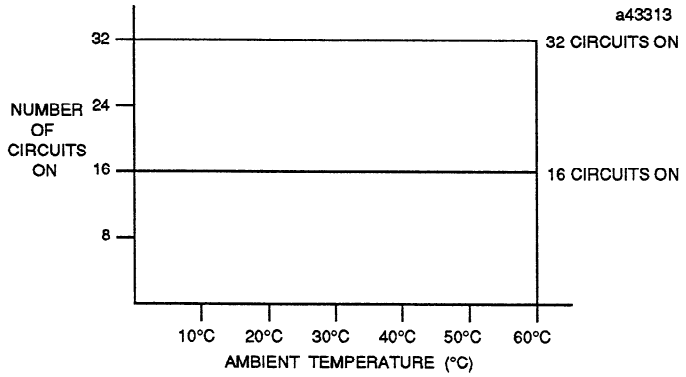


Figure 17. Input Points vs. Temperature for IC655MDL524

Input Simulator Module

The Input Simulator module for the Series Five PLC is shown in the following illustration.

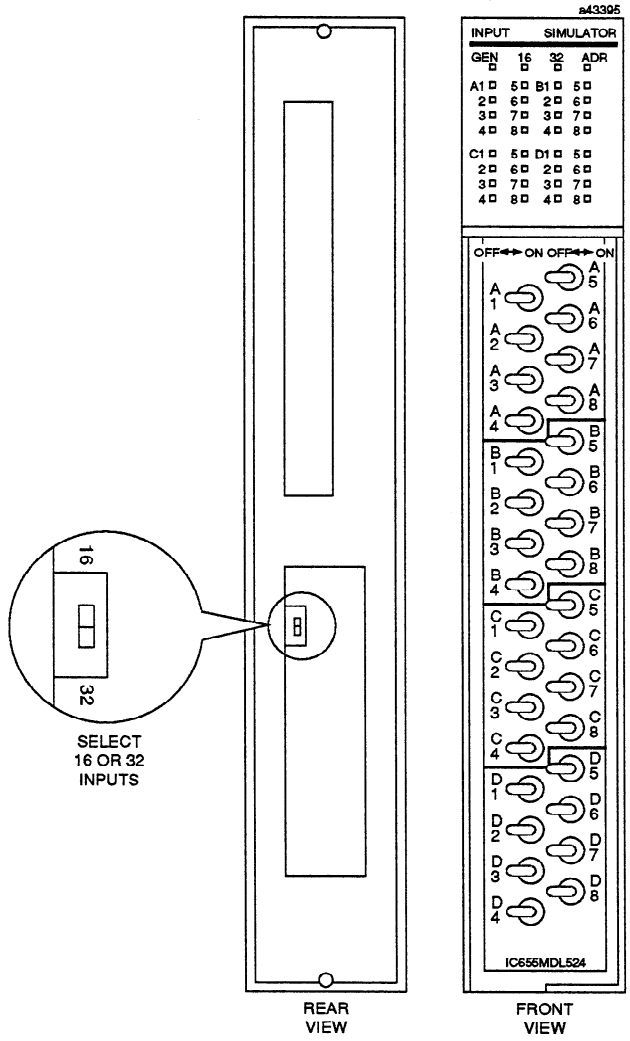


Figure 18. Input Simulator - IC655MDL524

115/230 VAC Input, 16 Circuits
IC655MDL525

This module provides 16 circuits for connection to user input devices. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they provide the starting I/O address for the module. The input circuits are divided into two groups, with 8 circuits in each group. Connections to each circuit are made to the removable terminal block on the front of the module. The two groups are labeled A and B, with the input terminals for each group labeled 1 to 8. Each group has a single neutral connection, labeled N, for the eight circuits in the group. The user must supply a 115 to 230 VAC source of power for sensing the state of the inputs to the module. Both groups can be powered from a single power source or each group can be powered from a separate source.

Table 13. Specifications for 115/230 VAC Input - 16 Circuits

Input Circuit Type	AC
Number of Circuits	16
Internal Circuit Grouping	Two groups, eight circuits per group
Operating Voltage	80 to 265 VAC, 48 to 63 Hz
Maximum Voltage (open circuit)	265 VAC
Input Current	8.4 mA at 100 VAC; 18 mA at 230 VAC
ON Level	80 VAC; between N and Input terminal
OFF Level	30 VAC; between N and Input terminal
Maximum OFF Leakage	2.0 mA
Minimum ON Current	5.5 mA
OFF to ON Response	5 to 30 ms
ON to OFF Response	10 to 50 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Total; 64 mA (typical), 100 mA (maximum) Per On Point; 4 mA
Weight	42 oz (650 g)

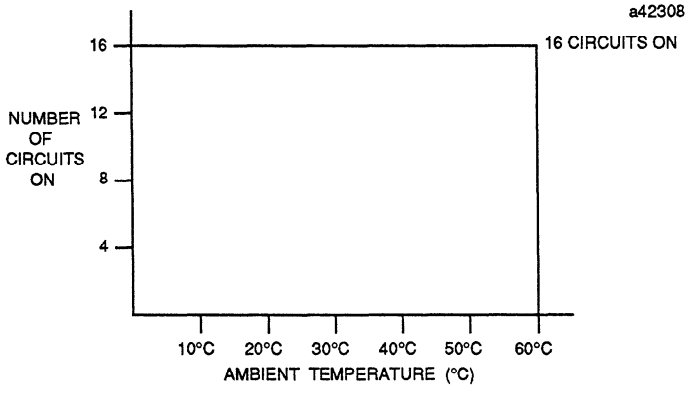


Figure 19. Input Points vs. Temperature for IC655MDL525

Wiring Information - IC655MDL525

The following figure provides the information required for connecting field devices to this module.

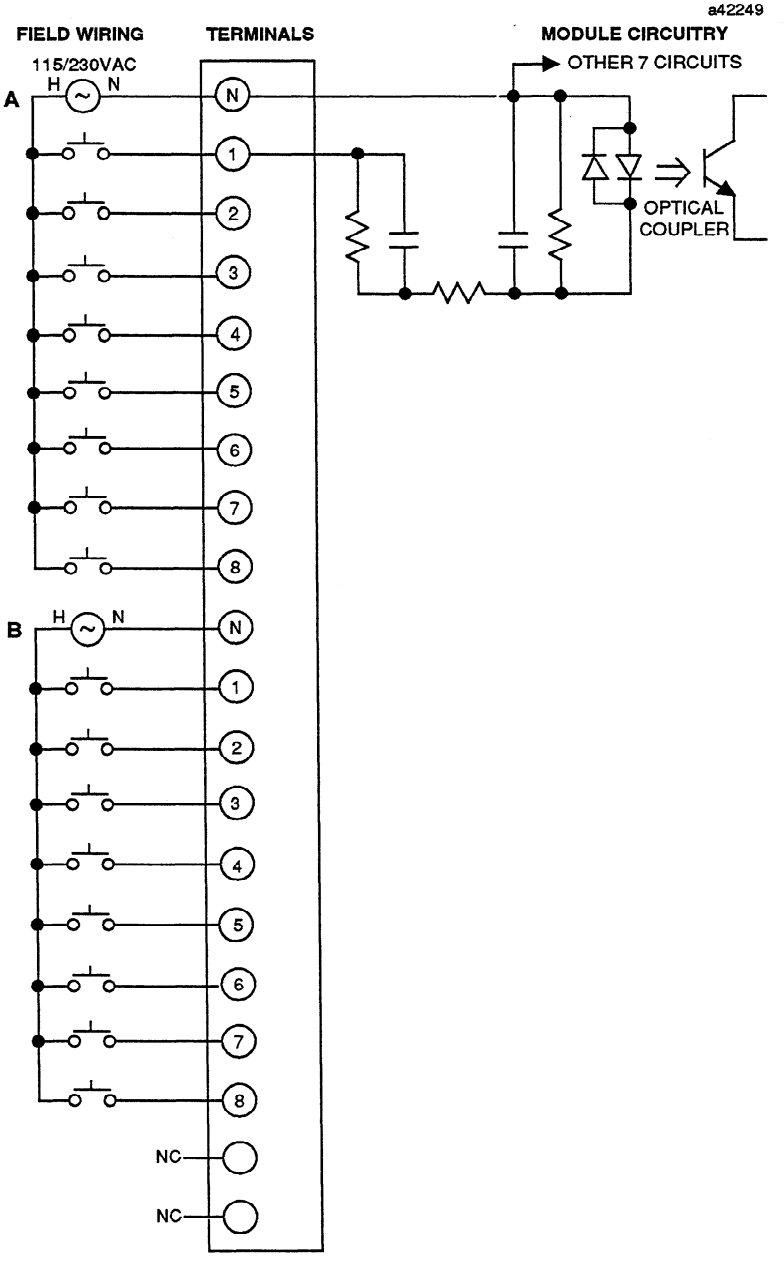


Figure 20. Field Wiring and Typical Circuit for IC655MDL525

115 VAC Input, 32 Circuits
IC655MDL526

This module provides 32 circuits for connection to user input devices. 32 LEDs on the front of the module provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, these LEDs provide the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The input circuits are divided into four groups with 8 circuits in each group. The four groups are labeled A, B, C, and D, and the terminals for each circuit in the group are labeled 1 to 8. Each group has a single neutral connection, labeled N, for the eight circuits in the group. The user must supply a 115 VAC source of power for sensing the state of the inputs to the module. All four groups can be powered from a single power source or each group can be powered from a separate source.

Table 14. Specifications for 115 VAC Input - 32 Circuits

Input Circuit Type	AC
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group
Operating Voltage	80 to 132 VAC, 48 to 63 Hz
Maximum Voltage (open circuit)	132 VAC
Input Current	14.5 mA at 115 VAC, 60 Hz
ON Level	80 VAC; between N and Input terminal
OFF Level	20 VAC; between N and Input terminal
Maximum OFF Leakage	2.0 mA
Minimum ON Current	8.0 mA
OFF to ON Response	5 to 30 ms
ON to OFF Response	10 to 50 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Total; 160 mA (typical), 180 mA (max.) Per On Point; 5 mA
Weight	50 oz (780 g)

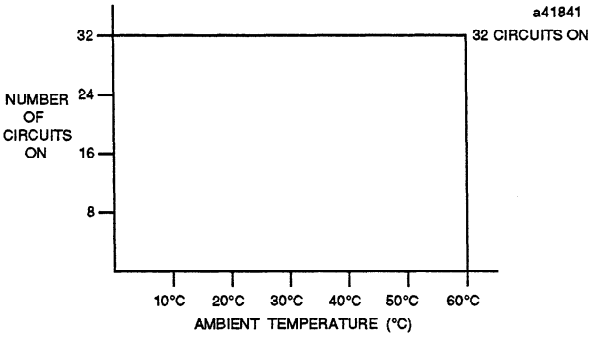


Figure 21. Input Points vs. Temperature for IC655MDL526

Wiring Information - IC655MDL526

The following figure provides the information required for connecting field devices to this module.

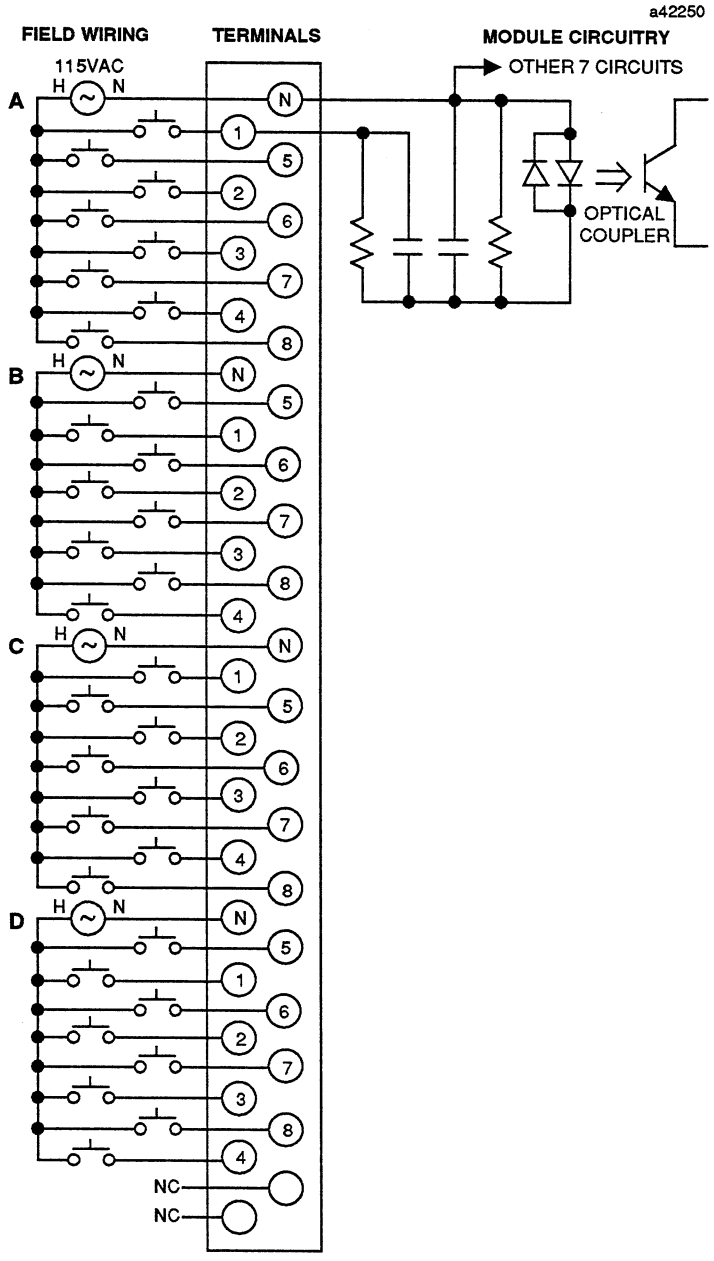


Figure 22. Field Wiring and Typical Circuit for IC655MDL526

115/230 VAC Isolated Input, 16 Circuits IC655MDL527

This module provides 16 isolated circuits for connection to user input devices. 16 LEDs on the front of the module provide a visual indication of the status of each circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, these LEDs provide the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The input circuits are isolated from each other relative to the AC power source. Each input has a separate neutral connection, which allows each input to be powered from different phases of the AC supply, if required. The user must supply a source of AC power, which can be from 80 to 265 VAC, for sensing the state of the inputs to the module.

Table 15. Specifications for 115/230 VAC Isolated Input - 16 Circuits

Input Circuit Type	Optically isolated
Number of Circuits	16
Internal Circuit Grouping	Each circuit isolated from other circuits
Operating Voltage	80 to 265 VAC, 48 to 63 Hz
Maximum Voltage (open circuit)	265 VAC
Input Current	8.4 mA at 115 VAC, 60 Hz 18 mA at 230 VAC, 60 Hz
ON Level	80 VAC; between N and Input terminal
OFF Level	30 VAC; between N and Input terminal
Maximum OFF Leakage	2.0 mA
Minimum ON Current	5.5 mA
OFF to ON Response	5 to 30 ms
ON to OFF Response	10 to 50 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Total; 64 mA (typical), 100 mA (max.) Per On Point; 4 mA

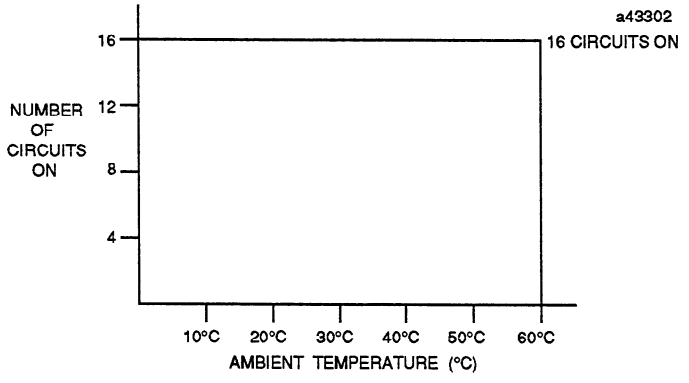


Figure 23. Input Points vs. Temperature for IC655MDL527

Wiring Information - IC655MDL527

The following figure provides the information required for connecting field devices to this module.

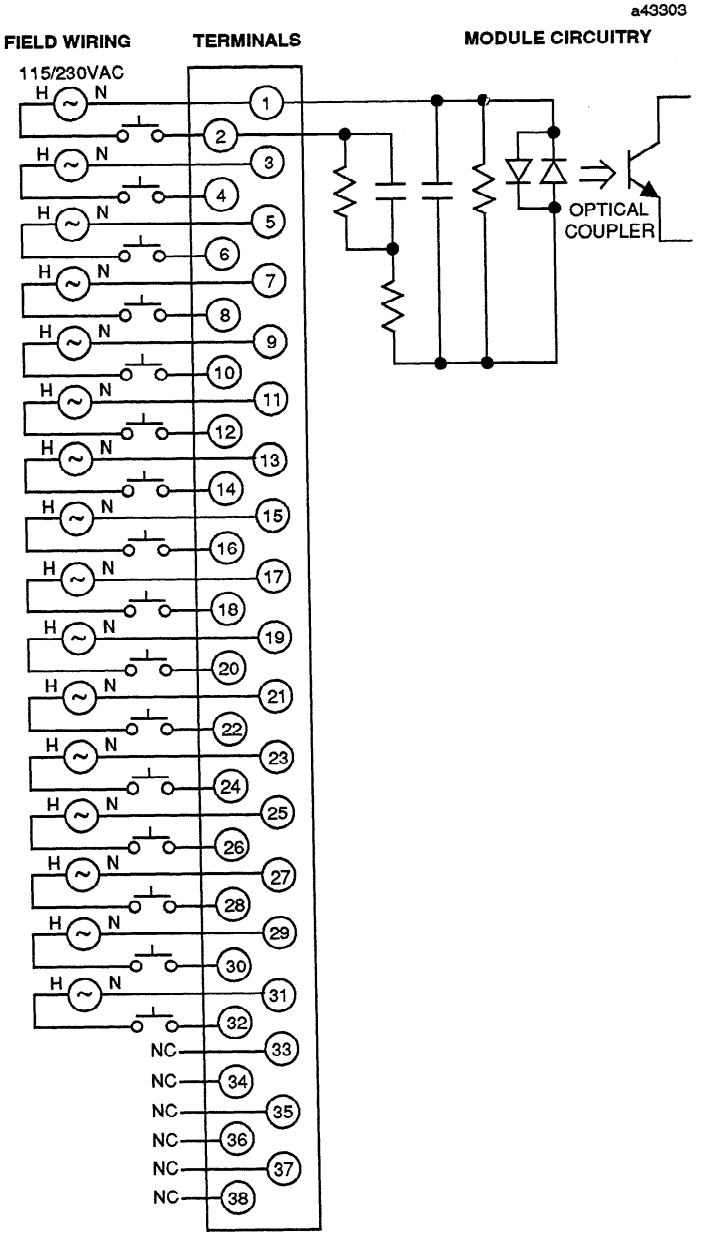


Figure 24. Field Wiring and Typical Circuit for IC655MDL527

5/12 VDC TTL Input, Positive/Negative Logic, 64 Circuits IC655MDL533

This module provides 64 circuits for connection to user input devices. 32 LEDs on the module indicate the status of the 32 Inputs associated with one connector. A toggle switch above the top (J1) connector allows the user to choose the group of inputs being monitored (A to D, or E to H). The top 16 LEDs perform a dual function. They normally provide a visual indication of the status of each input circuit with each LED reflecting the ON or OFF state of the corresponding circuit. Second, when commanded through programming, they indicate the starting I/O address for the module.

Field wiring connections from input devices is made to two 37-pin subminiature D-type connectors (labeled J1 (A-D) and J2 (E-H)), mounted on the front of the module. One connector is used for two groups with 16 inputs in each group. The four groups are labeled A and B (group 1), C and D (group 2), E and F (group 3), and group 4 is G and H. The pins in each group are labeled 1 to 8, for example: group 1 is A1 to A8 and B1 to B8. Each group has a common connection, labeled C. The user must supply the source of 5 to 12 VDC power to reflect the state of the inputs to the module. All groups can be powered from a common source or from different sources. The circuits can operate as either positive or negative logic, depending on how the source voltage is connected to the module.

Table 16. Specifications for 5/12 VDC Input, Positive/Negative Logic - 64 Circuits

Input Circuit Type	Positive/Negative Logic (selectable by wiring)
Number of Circuits	64
Internal Circuit Grouping	Four groups, 16 circuits per group
Operating Voltage	4.75 to 13.2 VDC
Maximum Voltage (open circuit)	15 VDC
Input Current	2.5 mA at 5 V, 7.5 mA at 12 V
ON Level	4.0 VDC; between C and Input terminal
OFF Level	2.0 VDC; between C and Input terminal
Maximum OFF Leakage	0.8 mA
Minimum ON Current	1.8 mA
OFF to ON Response	1 to 4 ms
ON to OFF Response	1 to 4 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	Total; 136 mA (typical), 180 mA (maximum) 50 mA + 0.1 mA per On point + 2.5 mA per On LED
Weight	39 oz (600 g)

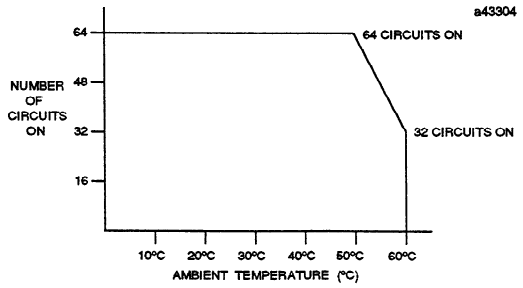


Figure 25. Input Points vs. Temperature for IC655MDL533

TTL Compatibility

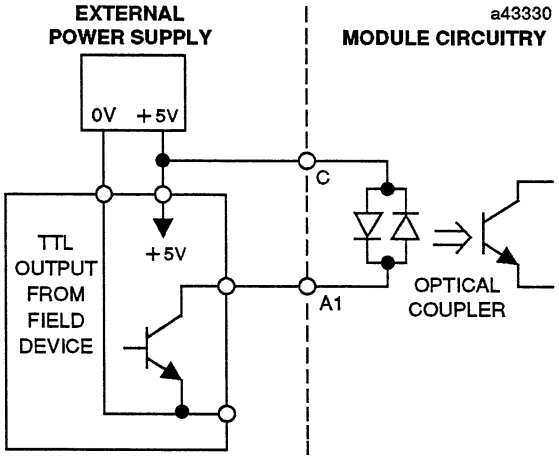
The following information is a guide to the TTL compatibility of this module. Compatibility is dependent on how the power for the TTL outputs is connected to the module. Examples of the two possible conditions are shown below; one with the common connected to +5V, and the other with the common connected to ground.

NOTE

In order for the TTL circuits on this module to work correctly, the user must ensure that the external power supply is the same supply that is driving the TTL outputs.

Example 1: Common connection of module tied to +5V.

An example of this conection is shown below.

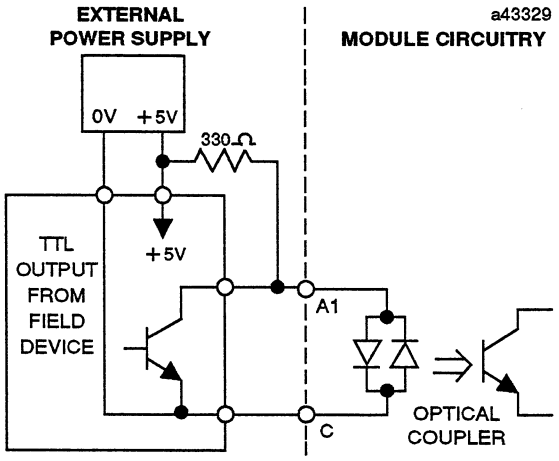


If connected to a +5 VDC supply which is also used to power the external TTL outputs, and the open collector or bipolar TTL outputs are tied to the Common terminal, then this module is compatible with the following logic families:

- Standard TTL outputs
- 74LS TTL series outputs
- 74S TTL series outputs
- CMOS HC series outputs
- 4049 and 4050 CMOS outputs (but not other 4000 series CMOS outputs)

Example 2: Common connection of module tied to ground.

An example of this connection is shown below.



If connected to a +5 VDC supply which is also used to power the external TTL outputs, and the external TTL common is connected to the Common terminal on this module, then this module is compatible with the following logic families:

- Standard TTL outputs (with external 330 ohm pull-up resistor to +5 V)
- 74S series TTL outputs (with external 330 ohm pull-up resistor to +5 V)
- Standard 400 series CMOS outputs (with external 330 ohm pull-up resistor to +5 V)
- HC series CMOS (no pull-up resistor required)

Wiring Information - IC655MDL533

The following figure provides the information required for connecting field devices to this module.

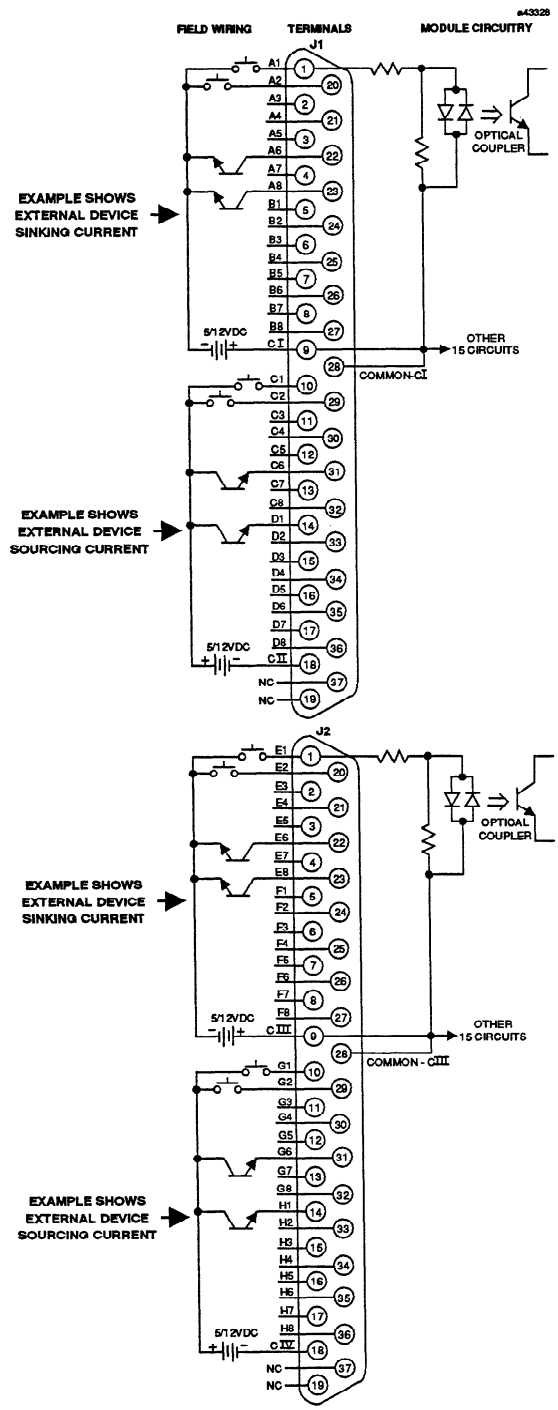


Figure 26. Field Wiring and Typical Circuit for IC655MDL533

24 VDC Output Negative Logic, 2 Amp - 16 Circuits
IC655MDL551

This module provides 16 circuits for controlling user output loads. The output switching capacity of this module is two amps. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED normally reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into two groups. The groups are labeled A and B, with the terminals in each group labeled 1 to 8. Each group has a single common connection, labeled C, for the eight circuits in the group. The user must supply a 24 VDC source of power, which provides power for both the load and the output circuit. Both groups can be powered from a single power source or each group can be powered from a separate source.

Table 17. Specifications for 24 VDC Output, Negative Logic, 2 Amp, 16 Circuits

Output Circuit Type	N-MOS FET, open drain
Number of Circuits	16
Internal Circuit Grouping	Two groups, eight circuits per group.
Operating Voltage	4.5 to 26.4 VDC
Peak Voltage	40.0 VDC
Maximum Operating Current	2.0 amps, 5 amps/group of 4; 10 amps/common, 20 amps/module
Maximum Leakage Current	0.1 mA at 40 VDC
ON Voltage Drop	0.5 VDC at 2 amps, 0.2 VDC at 1 amp
Smallest Recommended Load	0.2 mA at 5 VDC
Maximum Inrush current	6 amps for 100 ms, 12 amps for 10 ms
OFF to ON Response	0.1 ms
ON to OFF Response	0.1 ms
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	8 amps (1 for each group of four circuits), fast blow. *Total current should not exceed 5 amps per group of 4 outputs.*
Internal Power Consumption, (5 VDC)	Total; 150 mA (typ), 170 mA (max) Per On Point; 9 mA
External Power Supply Requirements	Voltage: 24 VDC, ±10% Current: 35 mA maximum at 26.4 VDC

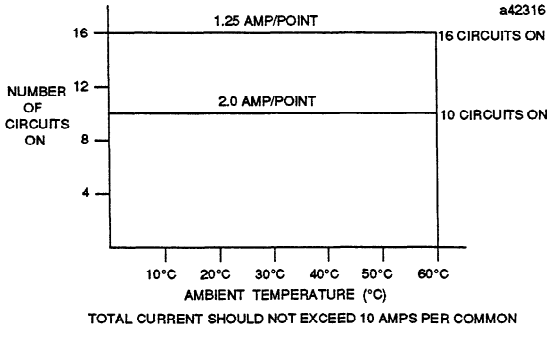


Figure 27. Output Points vs. Temperature for IC655MDL551

Wiring Information - IC655MDL551

The following figure provides the information required for connecting user supplied loads and power source to this module.

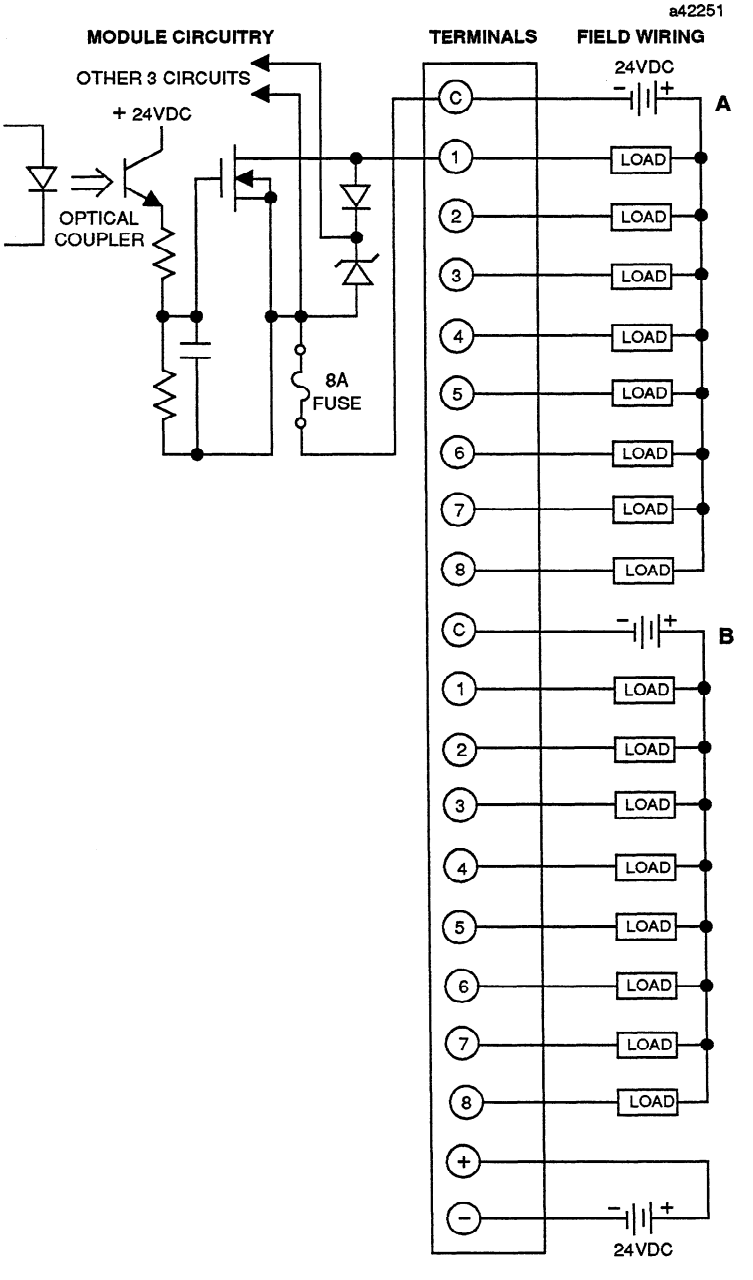


Figure 28. Field Wiring and Typical Circuit for IC655MDL551

24 VDC Output Negative Logic, 0.5 Amp - 32 Circuits IC655MDL552

This module provides 32 circuits for controlling user output loads. The output switching capacity of this module is 0.5 amps. The top 16 LEDs on the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into four groups. The groups are labeled A, B, C, and D, and the terminals in the group are labeled 1 to 8. Each group has a common connection, labeled C, on the terminal block; however, all 4 commons are tied together internally. The user must supply a 24 VDC source of power, which provides power for both the load and the output circuit. All groups can be powered from a single power source or each group can be powered from a separate source.

Table 18. Specifications for 24 VDC Output, Negative Logic, 0.5 Amp - 32 Circuits

Output Circuit Type	NPN open collector
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group
Operating Voltage	4.5 to 26.4 VDC
Peak Voltage	40.0 VDC
Maximum Operating Current	0.5 amps; 2 A/common; 8 A total/module
Maximum Leakage Current	0.1 mA at 40 VDC
ON Voltage Drop	0.5 VDC at 0.5 amps; 0.2 VDC at .1 amp
Smallest Recommended Load	0.2 mA at 5 VDC
Maximum Inrush current	1 amp for 100 ms; 2 amps for 10 ms
OFF to ON Response	0.1 ms
ON to OFF Response	0.1 ms
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	3 amps (1 for each group of eight circuits), fast blow
Internal Power Consumption, (5 VDC)	Total; 260 mA (typ), 300 mA (max) Per On Point; 8 mA
External Power Supply Requirements	Voltage: 24 VDC, ±10% Current: 250 mA maximum at 24.0 VDC

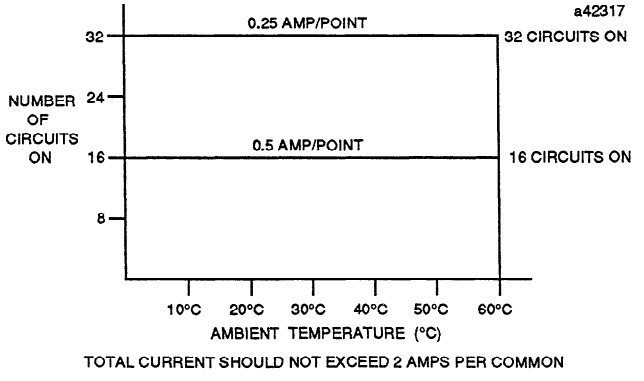


Figure 29. Output Points vs. Temperature for IC655MDL552

Wiring Information - IC655MDL552

The following figure provides the information required for connecting user supplied loads and power source to this module.

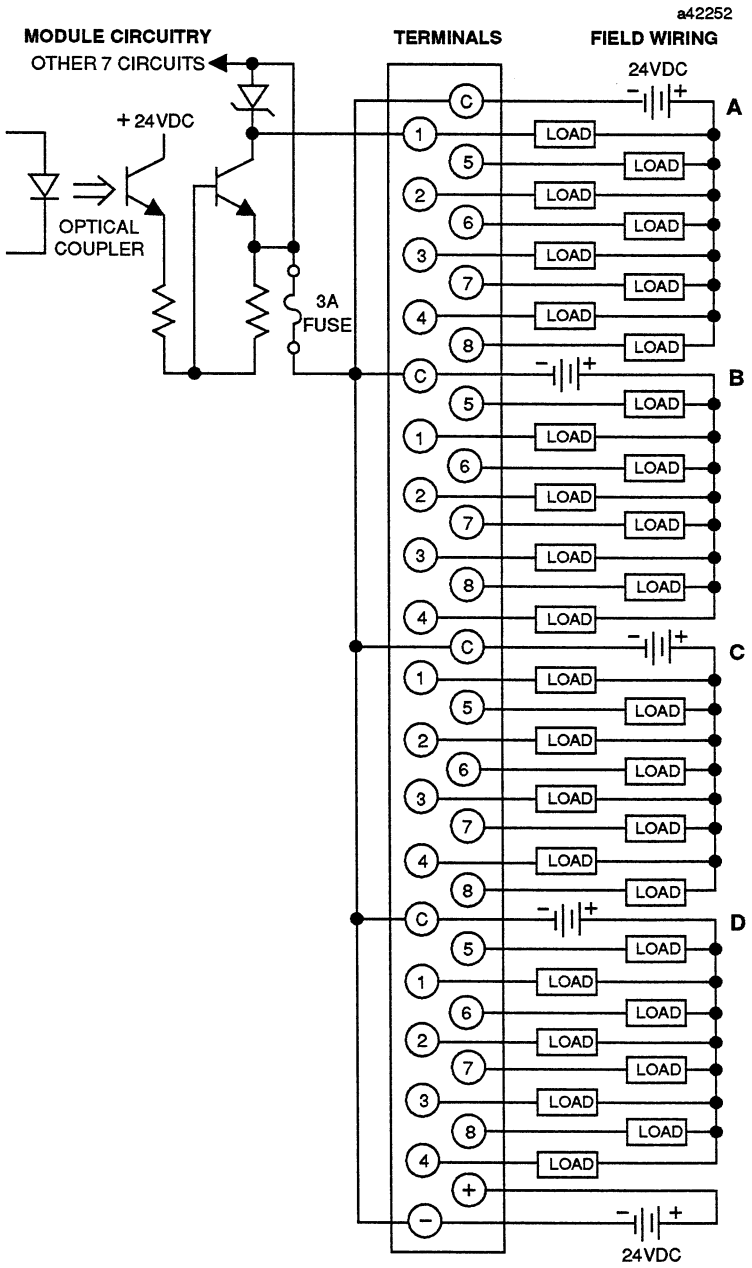


Figure 30. Field Wiring and Typical Circuit for IC655MDL552

24 VDC Output Positive Logic, 2 Amp - 16 Circuits
IC655MDL555

This module provides 16 circuits for controlling user output loads. The output switching capacity of this module is two amps. 16 LEDs on the front of the module provide a dual function. First, they provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. Second, when commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into four groups internally. On the terminal block, the groups are combined and are labeled A and B, with 8 circuits in each group. The terminals in each group are labeled 1 to 8. Each group of eight has a single common connection, labeled C. The user must supply a 24 VDC source of power, which provides power for both the load and the output circuit. Both groups can be powered from a single power source or each group can be powered from a separate source.

Table 19. Specifications for 24 VDC Output, Positive Logic, 2 Amp - 16 Circuits

Output Circuit Type	P-MOS FET, open drain
Number of Circuits	16
Internal Circuit Grouping	Four groups, four circuits per group. (One common for each two groups)
Operating Voltage	5.0 to 26.4 VDC
Peak Voltage	40.0 VDC
Maximum Operating Current	2 amps; 10 amps/common; 20 amps/module
Maximum Leakage Current	0.1 mA at 40 VDC
ON Voltage Drop	0.5 VDC at 2 amps; 0.2 VDC at 1 amp
Smallest Recommended Load	0.2 mA at 5 VDC
Maximum Inrush current	6 amps for 100 ms; 12 amps for 10 ms
OFF to ON Response	0.1 ms
ON to OFF Response	0.1 ms
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	8 amps (1 for each group of four circuits), fast blow. *Total current should not exceed 5 amps per group.*
Internal Power Consumption, (5 VDC)	Total; 150 mA (typ), 170 mA (max) Per On Point; 9 mA
External Power Supply Requirements	Voltage: 24 VDC, 10% Current: 50 mA maximum at 26.4 VDC

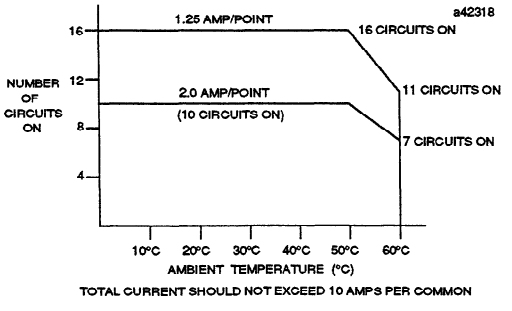


Figure 31. Output Points vs. Temperature for IC655MDL555

Wiring Information - IC655MDL555

The following figure provides the information required for connecting user supplied loads and power source to this module.

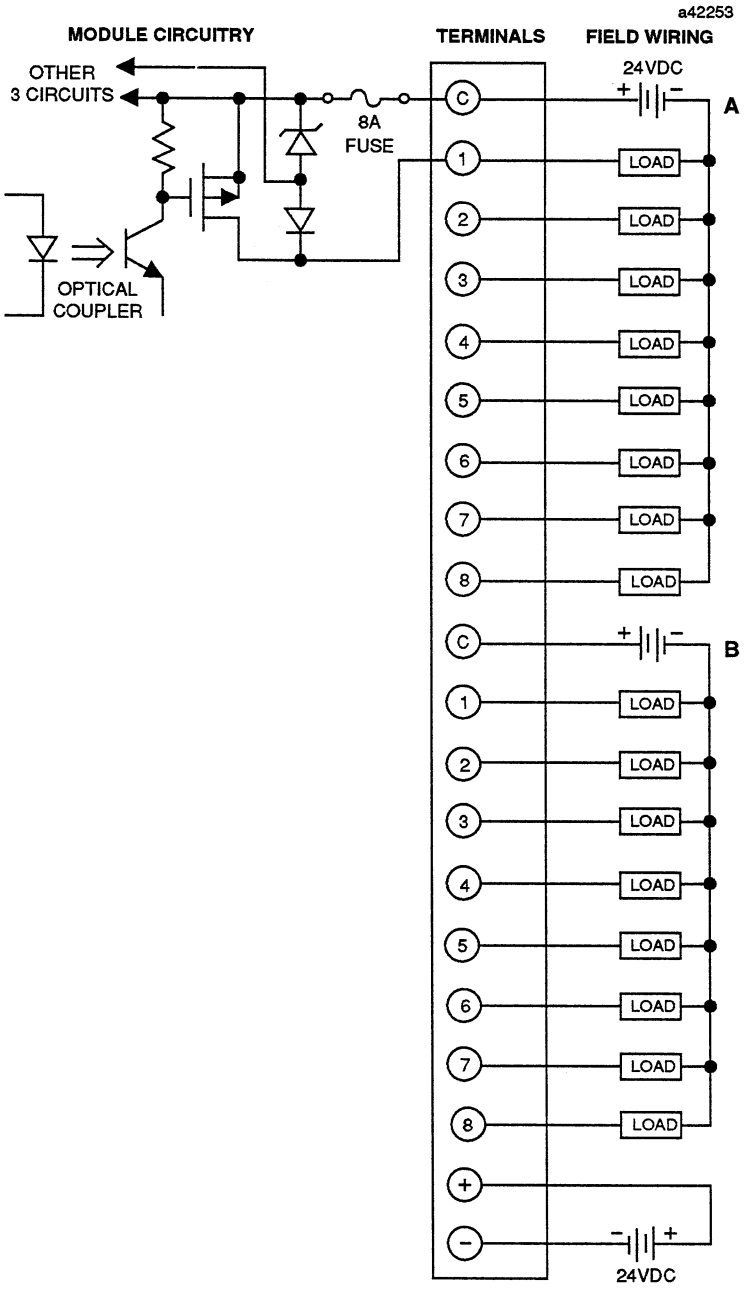


Figure 32. Field Wiring and Typical Circuit for IC655MDL555

24 VDC Output Positive Logic, 0.5 Amp - 32 Circuits
IC655MDL556

This module provides 32 circuits for controlling user output loads. The output switching capacity of this module is 0.5 amps. The top 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into four groups, with the groups labeled A, B, C, and D on the terminal block. The terminals in each group are labeled 1 to 8. Each group has a common connection, labeled C on the terminal block. The user must supply a 24 VDC source of power for the loads connected to the module. All groups can be powered from a single power source or each group can be powered from a separate source.

Table 20. Specifications for 24 VDC Out, Pos. Logic, 0.5 Amp - 32 Circuits

Output Circuit Type	NPN emitter follower
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group.
Operating Voltage	5.0 to 26.4 VDC
Peak Voltage	40.0 VDC
Maximum Operating Current	0.5 amps; 2 amps/common; 8 amps/module
Maximum Leakage Current	0.1 mA at 40 VDC
ON Voltage Drop	1.5 VDC at 0.5 amps; 0.8 VDC at .1 amp
Smallest Recommended Load	0.2 mA at 5 VDC
Maximum Inrush current	1 amp for 100 ms; 2 amps for 10 ms
OFF to ON Response	0.1 ms
ON to OFF Response	1.0 ms
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	3 amps (1 for each group of eight circuits), fast blow.
Internal Power Consumption, (5 VDC)	Total; 600 mA (typ), 800 mA (max) Per On Point; 20 mA

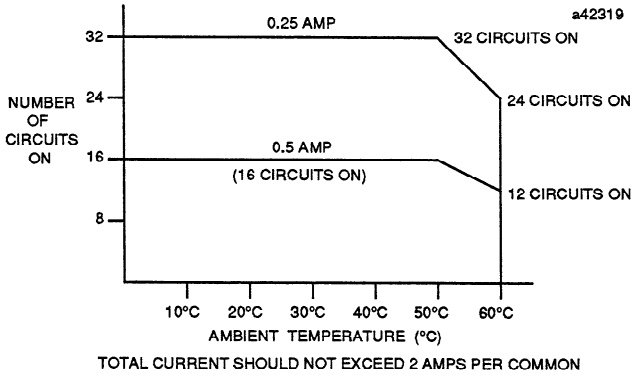


Figure 33. Output Points vs. Temperature for IC655MDL556

Wiring Information - IC655MDL556

The following figure provides the information required for connecting user supplied loads and power source to this module.

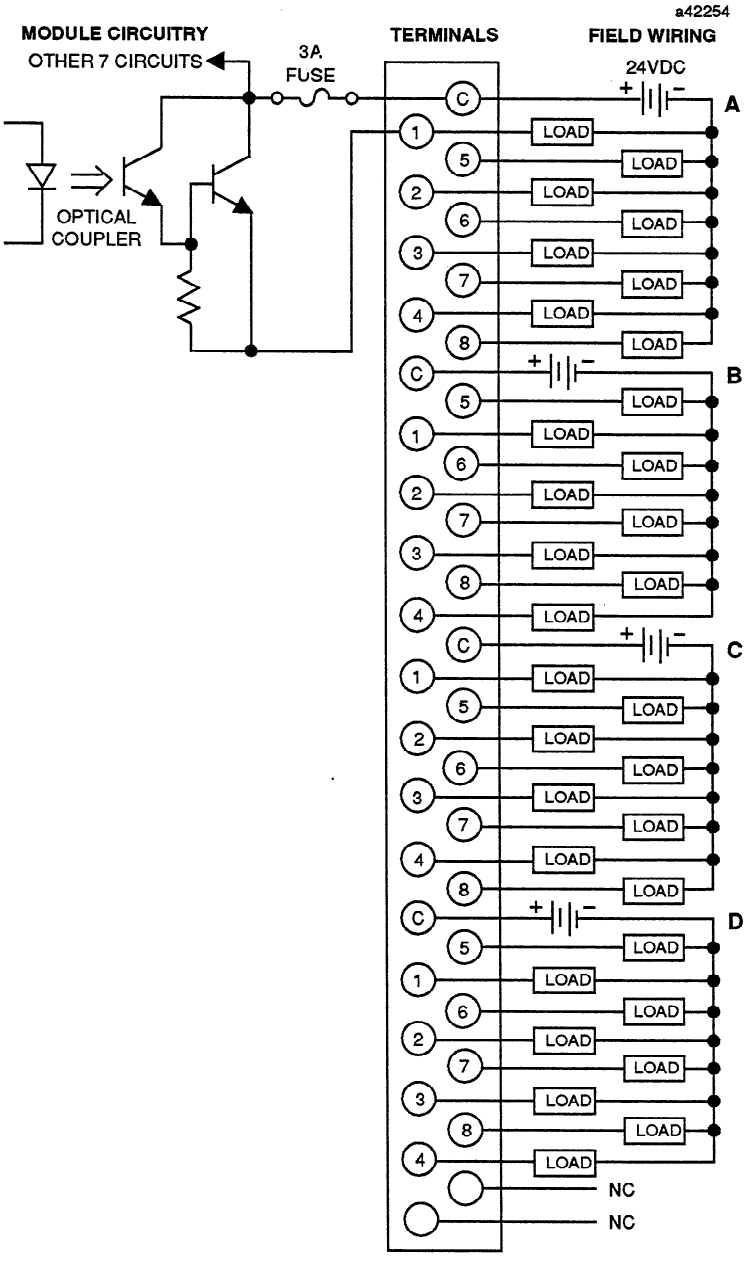


Figure 34. Field Wiring and Typical Circuit for IC655MDL556

115/230 VAC Output, 2 Amp - 16 Circuits
IC655MDL575

This module provides 16 circuits for controlling user output loads. The output switching capacity of this module is two amps. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into two groups . On the terminal block, they are labeled A and B, with the terminals in each group labeled 1 to 8. Each group of eight has a single Hot connection, labeled H. The user must supply an source of power for the loads connected to the module's output circuits. Each group must be powered from a separate source. Specifications for this module are listed below.

Table 21. Specifications for 115/230 VAC Output, 2 Amp - 16 Circuits

Output Circuit Type	Triac
Number of Circuits	16
Internal Circuit Grouping	Two groups, eight circuits per group. (One hot connection for each group)
Operating Voltage	15 to 265 VAC, 48 to 63 Hz
Peak Voltage	265 VAC
Maximum Operating Current	2.0 amps 5 amps/common; 10 amps/module
Maximum Leakage Current	4.0 mA at 265 VAC, 60 Hz
ON Voltage Drop	1.5 VAC at 2 amps
Smallest Recommended Load	10.0 mA at 15 VAC
Maximum Inrush current	30 amps for 10 ms; 10 amps for 100 ms
OFF to ON Response	< 1 ms at 60 Hz
ON to OFF Response	< 10 ms at 60 Hz
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	8 amps (1 for each group of eight circuits), fast blow
Internal Power Consumption, (5 VDC)	Total; 560 mA (typ), 650 mA (max) Per On Point; 35 mA
Weight	58 oz (900 g)

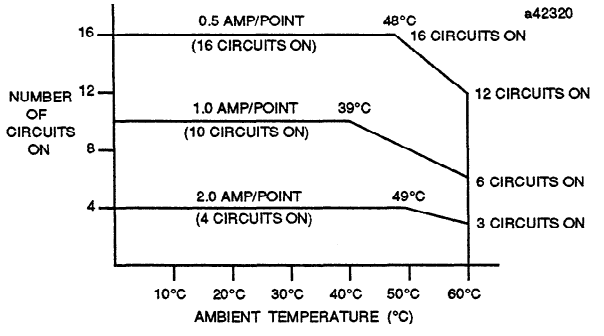


Figure 35. Output Points vs. Temperature for IC655MDL575

Wiring Information - IC655MDL575

The following figure provides the information required for connecting user supplied loads and power source to this module.

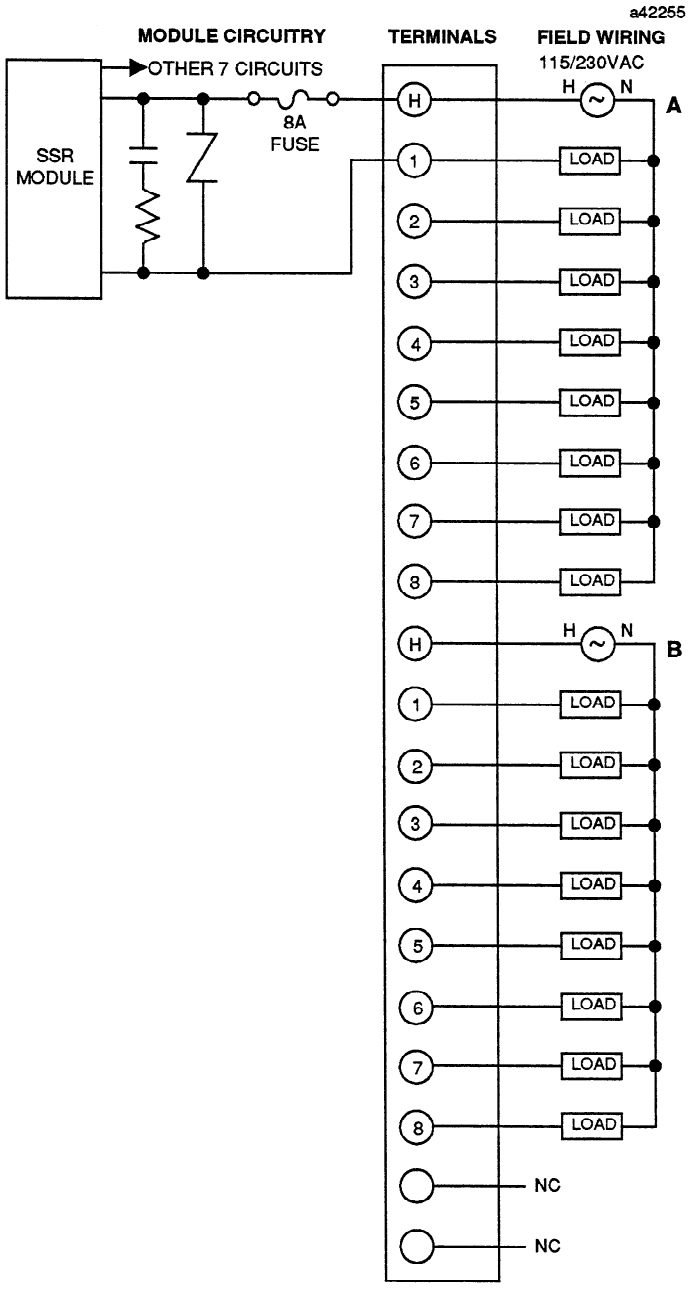


Figure 36. Field Wiring and Typical Circuit for IC655MDL575

115/230 VAC Isolated Output, 2 Amp - 16 Circuits
IC655MDL576

This module provides 16 isolated circuits for controlling user output loads. The output switching capacity of this module is two amps. 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. Each circuit is isolated from the other circuits on this module relative to the ac power source. Each output has two terminals associated with it which allows different ac power sources for each circuit; e.g. different phases. These terminals are labeled H1 and 1, through H7 and 7. There are two groups of these connections on the terminal block. The user must supply the AC source (or sources) of power for the loads connected to the module's output circuits.

Table 22. Specifications for 115/230 VAC Isolated Output - 16 Circuits

Output Circuit Type	Triac
Number of Circuits	16
Internal Circuit Grouping	Isolation between each circuit.
Operating Voltage	15 to 265 VAC, 48 to 63 Hz
Peak Voltage	265 VAC
Maximum Operating Current	2.0 amps 2 amps/common; 10 amps/module
Maximum Leakage Current	4.0 mA at 265 VAC, 60 Hz
ON Voltage Drop	1.5 VAC at 2 amps
Smallest Recommended Load	10.0 mA at 15 VAC
Maximum Inrush current	8 amps for 10 ms; 4 amps for 100 ms
OFF to ON Response	< 1 ms at 60 Hz
ON to OFF Response	< 10 ms at 60 Hz
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	3 amps (1 for each circuit), fast blow
Internal Power Consumption, (5 VDC)	Total; 560 mA (typ), 650 mA (max) Per On Point; 35 mA
Weight	60 oz (920 g)

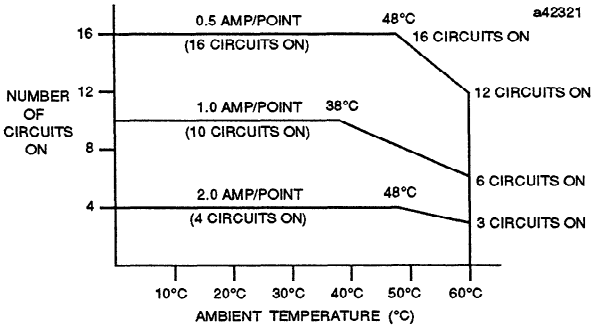


Figure 37. Output Points vs. Temperature for IC655MDL576

Wiring Information - IC655MDL576

The following figure provides the information required for connecting user supplied loads and power source to this module.

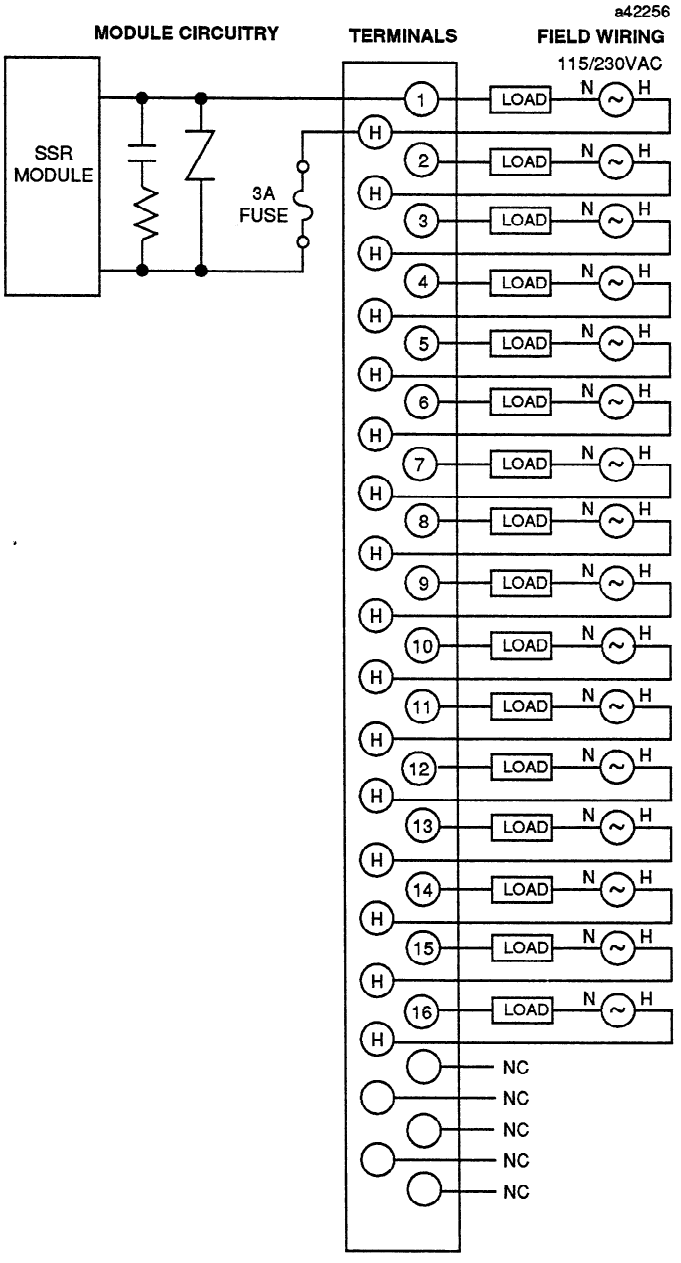


Figure 38. Field Wiring and Typical Circuit for IC655MDL576

115/230 VAC Output, 1 Amp - 32 Circuits IC655MDL577

This module provides 32 circuits for controlling user output loads. The output switching capacity of this module is one amp. The top 16 LEDs on the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. When commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into four groups of eight. On the terminal block, they are labeled A, B, C, and D. The terminals in each group are labeled 1 to 8. Each group of eight has a single Hot connection, labeled H. The user must supply an source of power for the loads connected to the module's output circuits. Each group must be powered from a separate source. Specifications for this module are listed below.

Table 23. Specifications for 115/230 VAC Output, 1 Amp - 32 Circuits

Output Circuit Type	Triac
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group. (One hot connection for each group)
Operating Voltage	15 to 265 VAC, 48 to 63 Hz
Peak Voltage	265 VAC
Maximum Operating Current	1.0 amp; 3 amps/common; 12 amps/module
Maximum Leakage Current	2.5 mA at 265 VAC, 60 Hz
ON Voltage Drop	1.5 VAC at 1 amp
Smallest Recommended Load	10.0 mA at 15 VAC
Maximum Inrush current	10 amps for 10 ms; 5 amps for 100 ms
OFF to ON Response	1 ms at 60 Hz
ON to OFF Response	1 ms +1/2 cycle
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	5 amps (1 for each group of eight circuits), fast blow
Internal Power Consumption, (5 VDC)	Total: 580 mA (typ); 640 mA (max) Per On Point; 18 mA

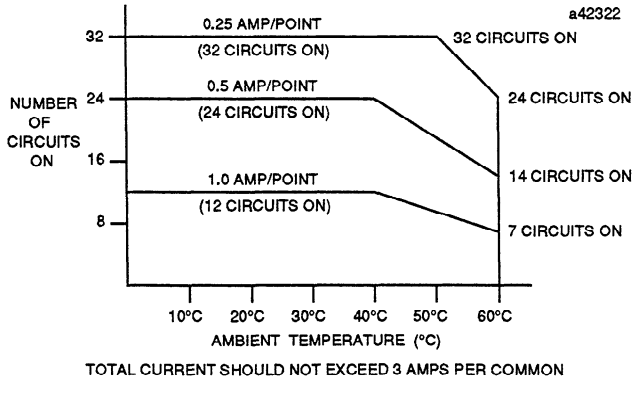


Figure 39. Output Points vs. Temperature for IC655MDL577

Wiring Information - IC655MDL577

The following figure provides the information required for connecting user supplied loads and power source to this module.

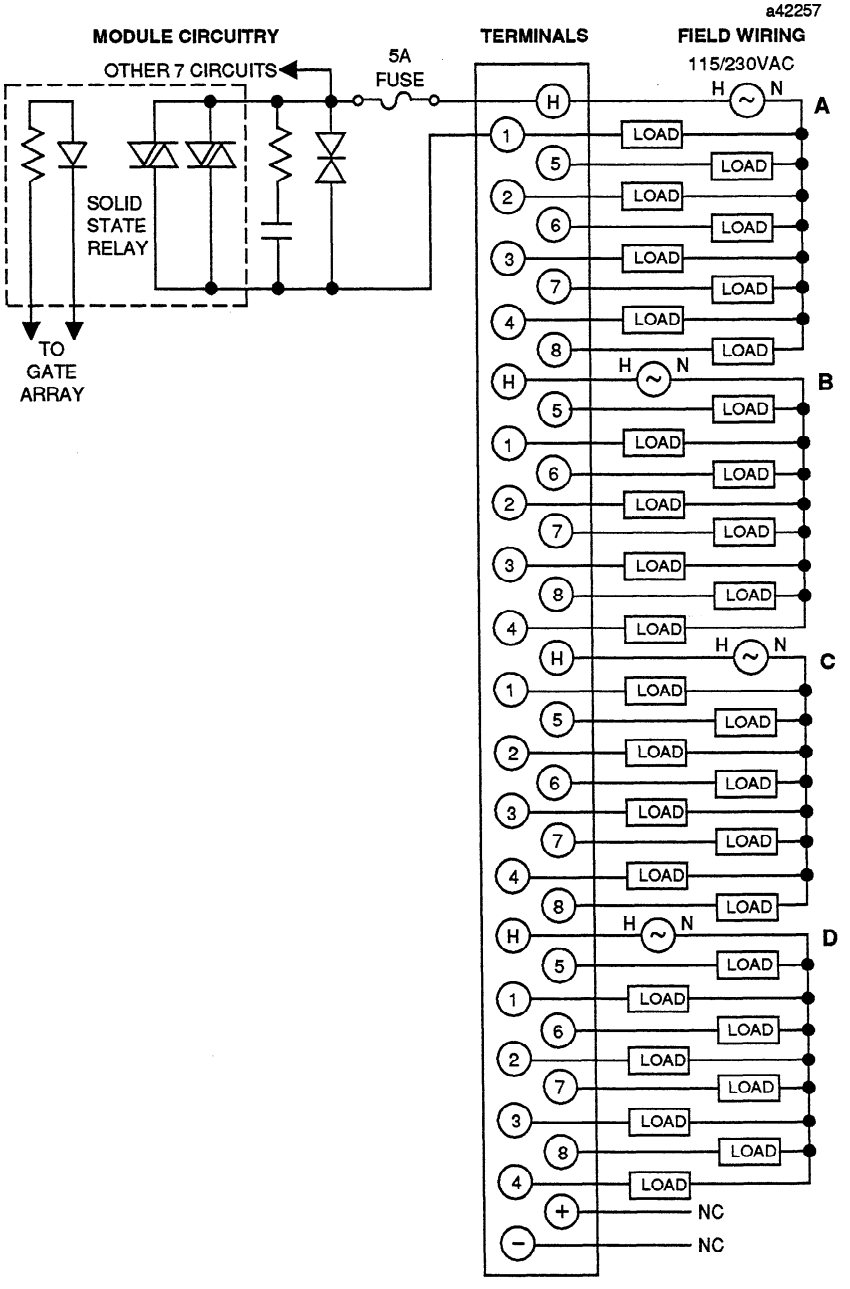


Figure 40. Field Wiring and Typical Circuit for IC655MDL577

Relay Output, 2 Amp - 16 Circuits
IC655MDL580

This module provides 16 normally-open relay circuits for controlling user output loads. Output switching capacity is two amps, resistive load. 16 LEDs on the module provide a dual function. They provide a visual indication of the status of each output circuit; each LED reflects the ON or OFF state of the corresponding circuit. When commanded through programming, the module's starting I/O address is displayed. Circuit connections are made to the removable terminal block on the front of the module. The output circuits are divided into two groups of eight. On the terminal block, they are labeled A and B, with each terminal in the group labeled 1 to 8. Each group of eight has a single common connection, labeled H. This terminal serves as the hot or common terminal for AC loads or DC loads. The user must supply the AC or DC source of power for loads connected to the module's output circuits, and 24 VDC to power the module's output circuitry.

Table 24. Specifications for Relay Output, 2 Amp - 16 Circuits

Output Circuit Type	Relay Contact, Normally Open
Number of Circuits	16
Internal Circuit Grouping	Two groups, eight circuits per group
Operating Voltage	5 to 30 VDC or 5 to 265 VAC
Peak Voltage	265 VAC
Maximum Operating Current	5.0 amps resistive load; any rated AC voltage
(see following table)	8 amps/common; 16 amps/module
Maximum Leakage Current	0.1 mA at 265 VAC, 60 Hz
Smallest Recommended Load	5.0 mA at 5 VAC/DC
Maximum Inrush current	5 amps
OFF to ON Response	< 12 ms
ON to OFF Response	< 12 ms
Status Indicator Location	Logic side
Fuses Rating and Type, Internal	8 amps (1 for each group, fast blow)
Internal Power Consumption, (5 VDC)	Total; 152 mA (typ), 180 mA (max)
	Each On Point; 9.5 mA
External Power Supply Requirements	Voltage: 24 VDC, 10%; Current: 160 mA at 26.4 VDC
Weight	60 oz (920 g)

Table 25. Load Current Limitations

Operating Voltage	Maximum Current for Load Type		Typical Contact Life (number of Operations)
	Resistive	Lamp or Solenoid †	
24 to 120 VAC	5 amps	1 amp	200,000
24 to 120 VAC	1 amp	.2 amps	400,000
24 to 120 VAC	.1 amps	.02 amps	1,000,000
240 VAC	5 amps	1 amp	100,000
240 VAC	1 amp	.2 amps	300,000
240 VAC	.1 amps	.02 amps	900,000
24 VDC	-	3 amps	100,000
24 VDC	5 amps	1 amp	200,000
24 VDC	1 amp	.2 amps	1,000,000
24 VDC	.1 amps	.02 amps	1,000,000
110 VDC	.4 amps	.1 amps	200,000

†Assumes a 15 ms time constant

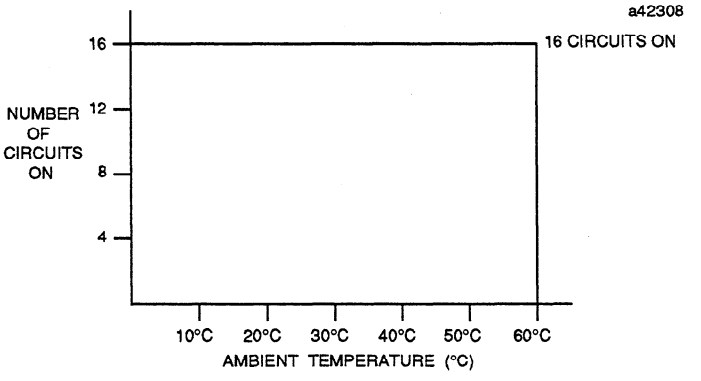


Figure 41. Output Points vs. Temperature for IC655MDL580

Wiring Information - IC655MDL580

The following figure provides the information required for connecting field devices to this module.

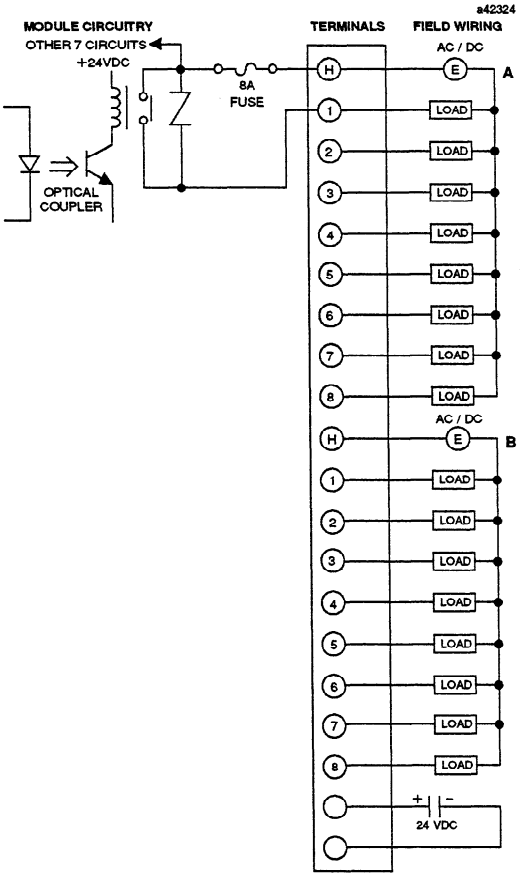


Figure 42. Field Wiring and Typical Circuit for IC655MDL580

Relay Output, 2 Amp - 32 Circuits
IC655MDL581

This module provides 32 normally-open relay circuits for controlling user output loads. The output switching capacity of this module is two amps, resistive load. The top 16 LEDs on the front of the module provide a dual function. They provide a visual indication of the status of each output circuit, with each LED reflecting the ON or OFF state of the corresponding circuit. And when commanded through programming, they indicate the starting I/O address for the module. Connections to each circuit are made to the removable terminal block on the front of the module. The output circuits are divided into four groups of eight. On the terminal block, they are labeled A, B, C, and D, with each terminal in the group labeled 1 to 8. Each group of eight has a single common connection, labeled H. This terminal serves as the hot terminal for AC loads or the common terminal for DC loads. The user must supply the AC or DC source of power for the loads connected to the module's output circuits, and 24 VDC to power the module's output circuitry.

Table 26. Specifications for Relay Output, 2 Amp - 32 Circuits

Output Circuit Type	Relay Contact, Normally Open
Number of Circuits	32
Internal Circuit Grouping	Four groups, eight circuits per group
Operating Voltage	5 to 24 VDC or 5 to 250 VAC
Peak Voltage	265 VAC
Maximum Operating Current	5 amps, resistive load
(see following table)	5 amps/common; 20 amps/module
Maximum Leakage Current	0.1 mA at 265 VAC, 60 Hz
Smallest Recommended Load	5.0 mA at 5 VDC
Maximum Inrush current	5 amps
OFF to ON Response	10 ms
ON to OFF Response	10 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Total; 260 mA (typ), 300 mA (max)
	Each On Point; 8.0 mA
External Power Supply Requirements	Voltage: 24 VDC, ±10%
	Current: 350 mA at 26.4 VDC

Table 27. Load Current Limitations

Operating Voltage	Maximum Current for Load Type		Typical Contact Life (number of Operations)
	Resistive	Lamp or Solenoid †	
24 to 120 VAC	5 amps	1 amp	200,000
24 to 120 VAC	1 amp	.2 amps	400,000
24 to 120 VAC	.1 amps	.02 amps	1,000,000
240 VAC	5 amps	1 amp	100,000
240 VAC	1 amp	.2 amps	300,000
240 VAC	.1 amps	.02 amps	900,000
24 VDC	-	3 amps	100,000
24 VDC	5 amps	1 amp	200,000
24 VDC	1 amp	.2 amps	1,000,000
24 VDC	.1 amps	.02 amps	1,000,000
110 VDC	.4 amps	.1 amps	200,000

†Assumes a 15 ms time constant

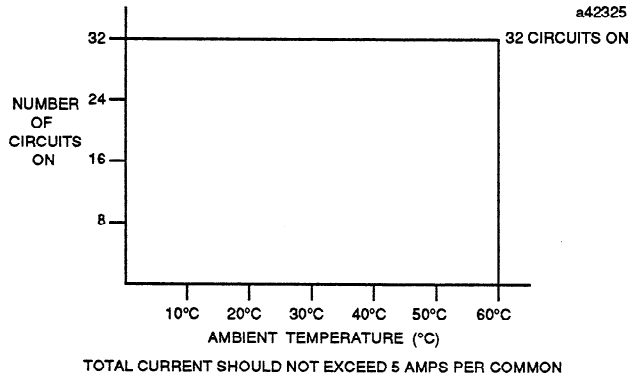


Figure 43. Output Points vs. Temperature for IC655MDL581

Wiring Information - IC655MDL581

The following figure provides the information required for connecting field devices to this module.

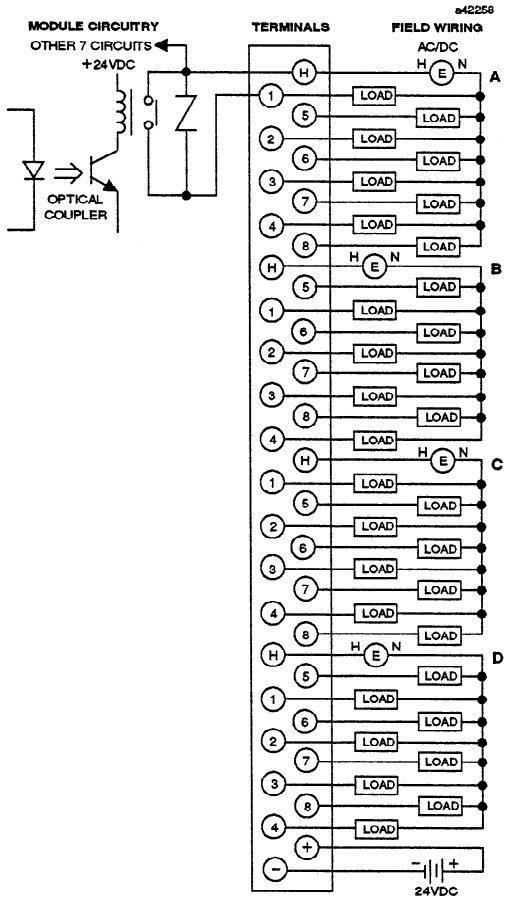


Figure 44. Field Wiring and Typical Circuit for IC655MDL581

Isolated Relay Output, 2 Amp - 16 Circuits
IC655MDL586

This module provides 12 normally-open and four form C relay circuits for controlling user output loads. The output switching capacity of this module is 2 amps, resistive load. The 16 status LEDs on the module provide a dual function. They normally provide a visual indication of the status of each output circuit with each LED reflecting the On or Off state of the corresponding output. The second function is that when commanded through programming, they indicate the starting I/O address of the module.

Connections to each circuit are made to the removable terminal block on the front of the module. Since these output circuits are isolated from each other, each output has a separate common connection. The user must supply the AC or DC power source for the loads connected to the module's output circuits, and 24 VDC to power the module's output circuitry.

Table 28. Specifications for Isolated Relay Out - 16 Circuits

Output Circuit Type	Relay Contact, 12 Normally-Open/4 form C
Number of Circuits	16
Internal Circuit Grouping	Isolated Relay Contact
Operating Voltage	5 to 30 VDC or 5 to 265 VAC
Peak Voltage	265 VAC
Maximum Operating Current	2 amps, resistive load
(see following table)	2 amps/common
Maximum Leakage Current	0.1 mA at 265 VAC, 60 Hz
Smallest Recommended Load	5.0 mA at 5 VDC
Maximum Inrush current	2 amps
OFF to ON Response	12 ms
ON to OFF Response	12 ms
Status Indicator Location	Logic side
Internal Power Consumption, (5 VDC)	Each On Point; 9.5 mA
	Total; 152 mA (typ), 180 mA (max)
External Power Supply Requirements	Voltage: 24 VDC, ±10%
	Current: 160 mA at 26.4 VDC

Table 29. Load Current Limitations

Operating Voltage	Maximum Current for Load Type		Typical Contact Life (number of Operations)
	Resistive	Lamp or Solenoid †	
24 to 120 VAC	2 amps	1 amp	200,000
24 to 120 VAC	1 amp	.2 amps	400,000
24 to 120 VAC	.1 amps	.02 amps	1,000,000
240 VAC	2 amps	1 amp	100,000
240 VAC	1 amp	.2 amps	300,000
240 VAC	.1 amps	.02 amps	900,000
24 VDC	-	3 amps	100,000
24 VDC	2 amps	1 amp	200,000
24 VDC	1 amp	.2 amps	1,000,000
24 VDC	.1 amps	.02 amps	1,000,000
110 VDC	.4 amps	.1 amps	200,000

†Assumes a 15 ms time constant

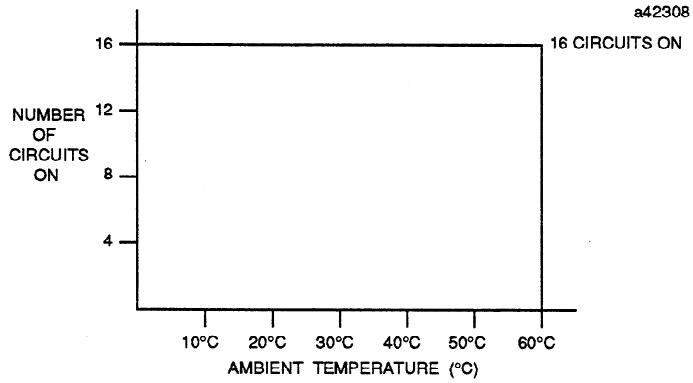


Figure 45. Output Points vs. Temperature for IC655MDL586

Wiring Information - IC655MDL586

The following figure provides the information required for connecting field devices to this module.

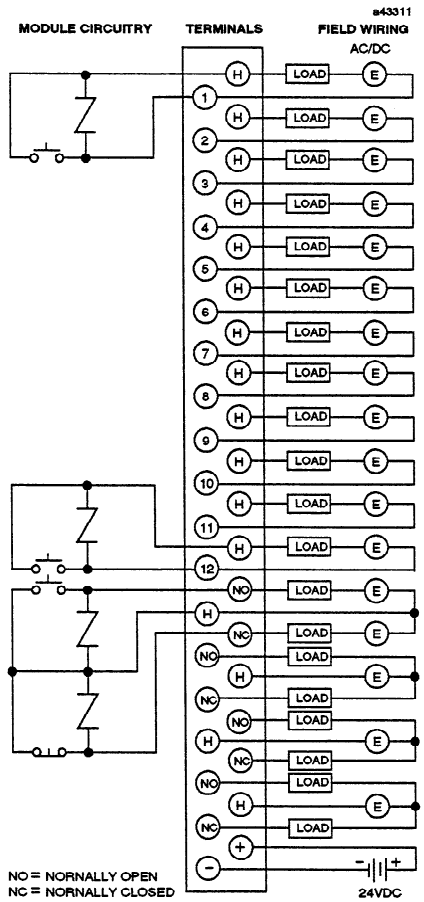


Figure 46. Field Wiring and Typical Circuit for IC655MDL586

5/12 VDC TTL Output Positive Logic, 64 Circuits IC655MDL593

This module provides 64 circuits for controlling user output loads. 32 LEDs on the module indicate the status of the 32 Outputs associated with one connector. A toggle switch above the top (J1) connector allows the user to choose the group of inputs being monitored (A to D, or E to H). The top 16 LEDs perform a dual function. They normally provide a visual indication of the status of each input circuit with each LED reflecting the ON or OFF state of the corresponding circuit. Second, when commanded through programming, they indicate the starting I/O address for the module.

Field wiring connections to output loads are made to two 37-pin subminiature D-type connectors (labeled J1 (A-D) and J2 (E-H)), mounted on the front of the module. One connector is used for two groups with 16 inputs in each group. The four groups are labeled A and B (group 1), C and D (group 2), E and F (group 3), and group 4 is G and H. The pins in each group are labeled 1 to 8, for example: group 1 is A1 to A8 and B1 to B8. Each group has a common connection, labeled C. The user must connect a 5 to 12 VDC power supply to each group, which supplies both the load and the output circuits. All groups can be powered from a common source or from different sources.

Table 30. Specifications for 5/12 VDC TTL Output Positive Logic - 64 Circuits

Output Circuit Type	NPN Transistor, open collector with internal pull-up
Number of Circuits	64
Internal Circuit Grouping	Four groups, 16 circuits per group
Operating Voltage	5 to 12 VDC
Peak Voltage	16.5 VDC
Maximum Current	90 mA at 15 VDC (current sinking); 1.44 amps/common
Maximum Leakage Current	.01 mA
ON Voltage Drop	0.4 V at 90 mA/15 V
OFF to ON Response	< 0.1 ms
ON to OFF Response	0.1 ms
Status Indicator Location	Logic side
Internal Power Consumption (5 VDC)	50 mA + 3.6 mA per On point + 2.5 mA per On LED Total; 360 mA (typical), 450 mA (maximum)
External Power Supply Required	5 to 15 VDC, ±10%
Weight	36 oz (560 g)

Table 31. Maximum Voltage - Current

Vcc		5 VDC	12 VDC	15 VDC
Maximum Current Sourcing	at Output Voltage 3.5V	0.1 mA	-	-
	at Output Voltage 6.0V 8.0V	- -	2.5 mA 1.0 mA	- -
	at Output Voltage 6.0V 8.0V 10.0V 12.0V	- - - -	- - - -	3.8 mA 2.8 mA 1.8 mA 0.8 mA
Maximum Current Sinking	at ON Voltage Drop 0.4V	15 mA	60 mA	90 mA

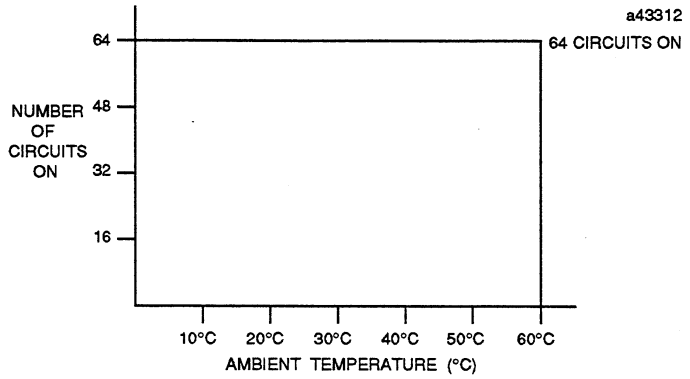


Figure 47. Output Points vs. Temperature for IC655MDL593

Wiring Information - IC655MDL593

The following figure provides the information required for connecting field devices to this module.

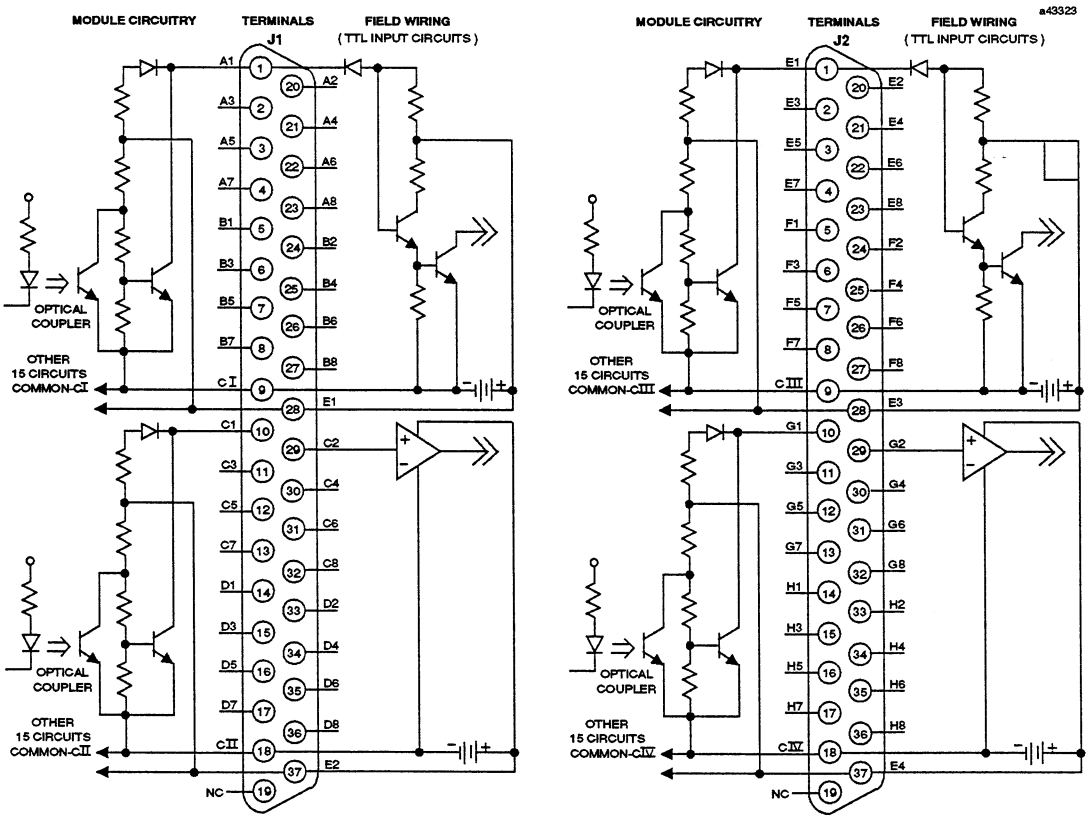


Figure 48. Field Wiring and Typical Circuit for IC655MDL593

8 Channel Analog Input
IC655ALG516

The Series Five 8 channel Analog Input module provides eight input channels, each capable of converting an analog input signal to a digital signal for use as required by your application. Connections are provided at the 38 terminal removable terminal block for either voltage or current inputs. These inputs can be +1 to +5 V, 0 to +10 V, -10 to +10 V, or 4 to 20 mA. Resolution of the converted signal is 12 bits binary (1 part in 4096).

Three groups of LEDs provide a visual indication of module status. A 12-bit LED display provides a visual indication of the input data. The channel to be displayed is selected by successive depressions of a pushbutton switch on the front of the module. A group of eight LEDs indicates the selected channel and another group of eight shows the channel being scanned.

There are three other LEDs on the faceplate. GEN is on when the module address is mapped into either the I1+ or I2+ status table; DIAG when on, indicates that an internal failure has been detected by the module, and ADR, when on indicates that the 8 LEDs in the two columns to the right have been instructed by the CPU to display the module's starting address in BCD format.

Inputs to the module can be either single ended or differential voltages or a current source. This module uses an integrating type converter for analog to digital conversion and the conversion time is selectable, either 10 ms or 100 ms. The integrating converter also provides immunity to noise spikes and has excellent 60 Hertz noise rejection. Isolation between user inputs and the base unit power supply is provided by opto-isolators on the module. An Analog Input module consumes 32 consecutive Input points, beginning with the first Input reference assigned to the slot in which the module is installed.

Input range, conversion time, and number of channels to be scanned are selected by configuration of a group of DIP switches and jumpers. Field wiring is made to the removable terminal block on the module. A source of 24 VDC power must be supplied by the user to power some of the module's internal circuits.

The following table provides a list of specifications for the Analog Input module.

Table 32. Specifications for 8 Channel Analog Input - IC655ALG516

Input Ranges	+1 to +5 V, 4 to 20 mA, 0 to +10 V, -10 to +10 V
Channels	8
Resolution	12 Bit Binary (1 part in 4096)
Input Type	Differential, single ended, or current
Input Impedance	1 Mohm minimum, (voltage input) 250 ohms, current input
Absolute Maximum Voltage	± 15 V (maximum voltage to apply to any channel)
Linearity	± 0.05%, maximum
Accuracy vs. Temperature	± 50 ppm (parts per million) per 1°C
Total Accuracy	± 0.4% maximum at 25°C
Conversion Method	Integration
Conversion Time	10 ms or 100 ms (jumper selectable)
Sample Time	10 ms or 100 ms, plus one scan time (typical)
Noise Rejection Ratio	
Normal Mode	-6 db at 100 Hz, -60 db at 50 Hz
Common Mode	60 db at less than 100 Hz
Visual Display	12 bits: Input data display 8 bits: Channel selected for data display 8 bits: Channel being scanned
Internal Power Consumption	+5 VDC, 250 mA maximum (supplied by base unit power supply)
External Power Requirement	24 VDC ± 10%, 150 mA maximum (supplied by user)
Input Points Required	32 consecutive points for each module
Diagnostic LED (DIAG)	ON for no external power, or if terminal strip disconnected.
Isolation	Photo-coupling

Conversion Time and Sample Time Description

Conversion Time is the time required to look at the analog input data, convert it to a digital value, and prepare it for use by the CPU. The conversion time for this Analog Input module is jumper selectable and can be either 10 milliseconds or 100 milliseconds. The module can convert only one of the selected input channels at a time, and starts converting the next successive channel immediately after the present channel is converted.

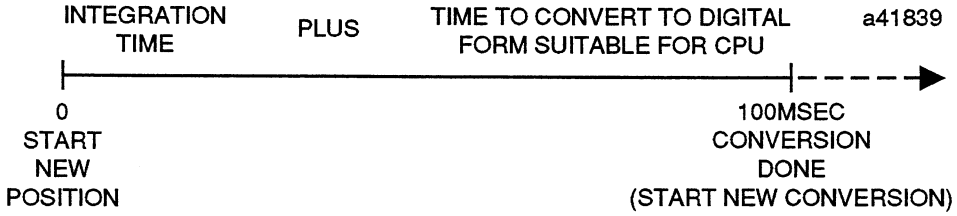


Figure 49. Analog Conversion Time

Sample Time is the time between successive readings of the analog input data that will result in new data being used by the CPU. For this module, the sample time is equal to *(CT + ST) x n*, where CT is the 10 or 100 ms conversion time, ST is the CPU scan time, and n is the number of channels being scanned. For example, if the conversion time is 10 ms, 4 channels are being scanned, and the CPU scan time is 50 ms, then each of the 4 channels will have new data every (10 ms + 50 ms) x 4 = 240 ms. This is the key timing parameter to consider when designing systems using this module. For the following example of sample time, assume a typical CPU scan time of 20 milliseconds.

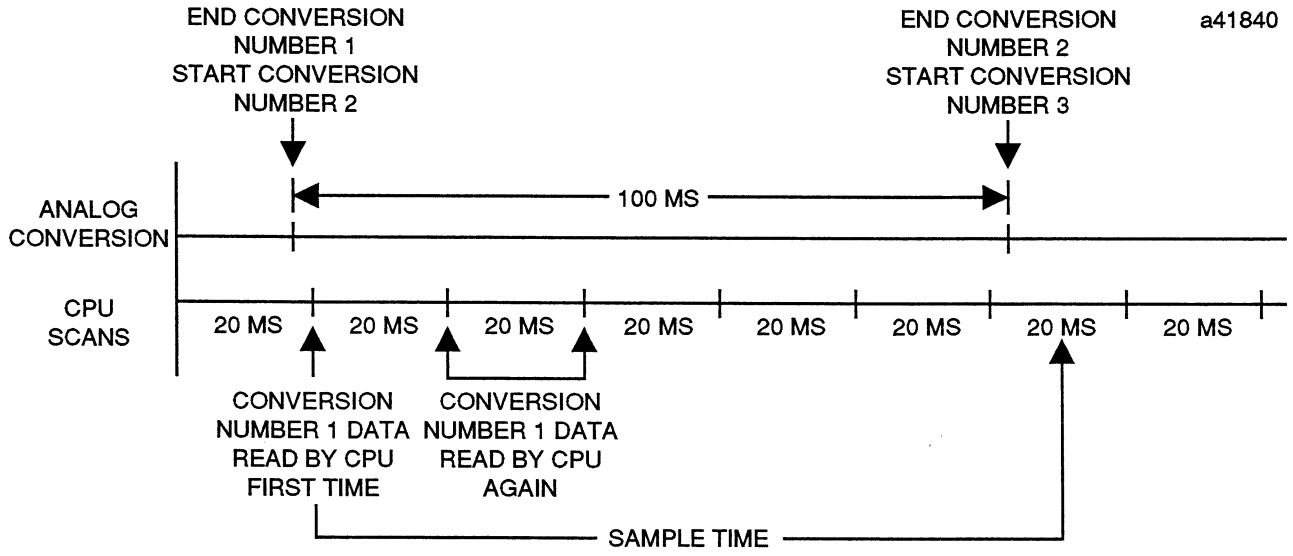


Figure 50. Example of Analog Sample Time

User Items

The following figure is an illustration of the Analog Input module showing the user features on the faceplate and location of jumpers and switches requiring user configuration.

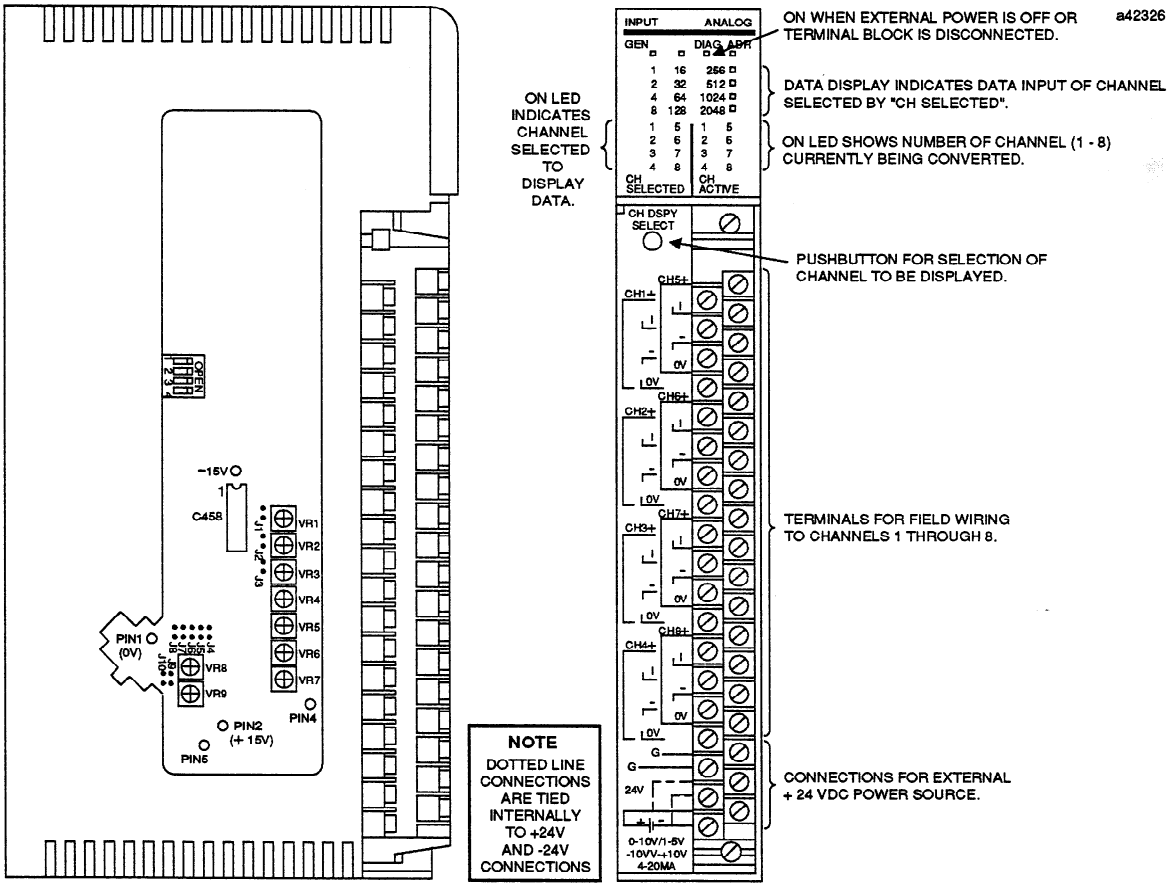


Figure 51. Analog Input User Items

Jumper and DIP Switch Configuration

Prior to operation, the DIP switches and jumpers shown in the previous figure must be configured for proper operation of the Analog Input module. Settings for each configurable parameter are provided in the following tables.

Table 33. Input Range Selection

Input Range	Pin Configuration
1 V to +5 V, 4 to 20 mA	J1 and J4
0 V to +10 V	J2 and J6 †
-10 V to +10 V	J3 and J5

† Factory setting

Table 34. Conversion Time Selection

Conversion Time	Pin Configuration
10 milliseconds	J8 and J9 †
100 milliseconds	J7 and J10

† Factory setting

Table 35. Value of Range Selection

DIP Switch 1	Range	Decimal Value
ON †	0 V to +10V 1 V to +5 V -10 V to + 10 V	0 to 4095 0 to 4095 0 to 4095
OFF	0 V to +10V 1 V to +5 V -10 V to + 10 V	Do not use Do not use -2048 to +2047

†Factory setting

Table 36. Range of Channels to be Scanned

DIP Switch Position	Range of Channels to be Scanned							
	1 †	1 - 2	1 - 3	1 - 4	1 - 5	1 - 6	1 - 7	1 - 8
2	OFF	ON	OFF	ON	OFF	ON	OFF	ON
3	OFF	OFF	ON	ON	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	ON	ON	ON

† Factory setting
OFF is the OPEN position on the DIP switch.

Analog Input Module Logic Diagram

This Analog Input module can be driven from differential, single ended, or current devices. The figure, below is an illustration of the schematic for one channel of the Analog Input module. All eight channels are the same. The following notes cable use should be followed when connecting user devices.

NOTE

Twisted-pair cable should be used when making connections to the module whenever possible. Twisted-pair with shield is preferred.

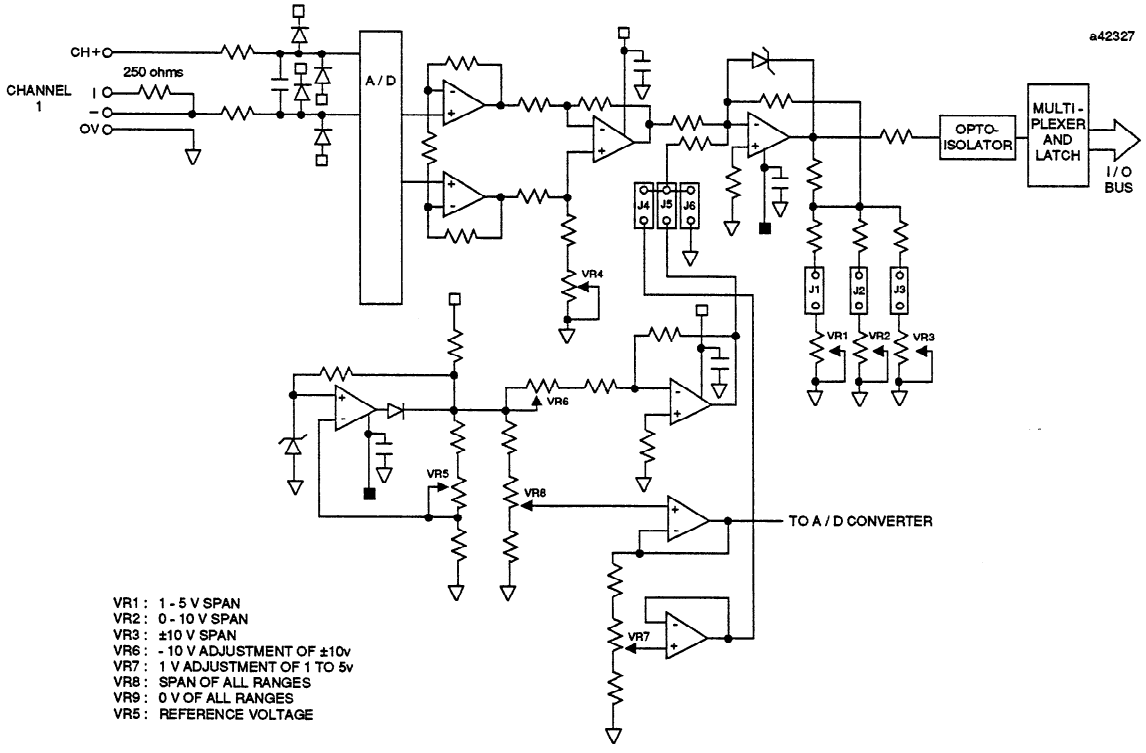


Figure 52. Analog Input Module Logic Diagram

Field Wiring Recommendations

The following recommendations should be observed for proper operation of the Analog input module.

- All unused inputs should be tied to the common connection (connect the +, -, and 0V terminals together on all unused channels).
- If the 24 VDC external supply is power cycled along with the Series 5 CPU/Analog module, glitches in analog input data may be present for a period of time. Do not cycle 24 VDC power if valid data is needed immediately after power-up. The time duration of these glitches depends on the power-up characteristics of the 24 VDC supply.
- If frequent momentary power cycles are anticipated (e.g. off 1 second, then back on), then at least 1 second should lapse before accepting analog data as valid.

Recommended Connection for External Power Source

A 24 VDC power source must be supplied by the user for connection to the module. The 24 VDC is converted to +15 VDC and -15 VDC in the module for internal circuit power requirements.

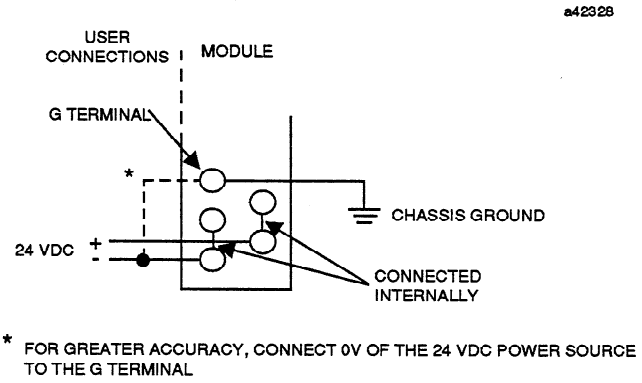


Figure 53. Recommended Connections for +24 VDC Power Source

Data Format

The Analog Input module uses 32 consecutive Input points beginning with the first Input point assigned to the slot in which the module is installed. The 32-bit data format contains the 12 data bits and a status bit for each channel. The status bit for a channel is a logic 1 (high), when that channel has valid data.

Table 37. Analog Input Data Format

Input Reference Number	Data Bit	Input Reference Number	Data Bit	Input Reference Number	Status Bit	Input Reference Number	Bit
1	1	9	9	17	CH 1	25	*
2	2	10	10	18	CH 2	26	*
3	3	11	11	19	CH 3	27	*
4	4	12	12	20	CH 4	28	*
5	5	13	(1)	21	CH 5	29	*
6	6	14	(1)	22	CH 6	30	*
7	7	15	(1)	23	CH 7	31	*
8	8	16	(1)	24	CH 8	32	*

* not used

1. Data bit 12 (MSB) to 16 indicates the sign of the data input when the -10 to +10 V range is selected. Bit ON; sign is -, bit OFF; sign is +.
2. Each Analog Input module consumes 32 consecutive Input points.
3. The Data Display LEDs on the module's faceplate correspond to the weight assigned to each bit as shown below.

Bit	Weight	Bit	Weight	Bit	Weight
1	1	5	16	9	256
2	2	6	32	10	512
3	4	7	64	11	1024
4	8	8	128	12	2048

Wiring Information - IC655ALG516

The following figures are a guide for connecting field devices to the Analog Input module.

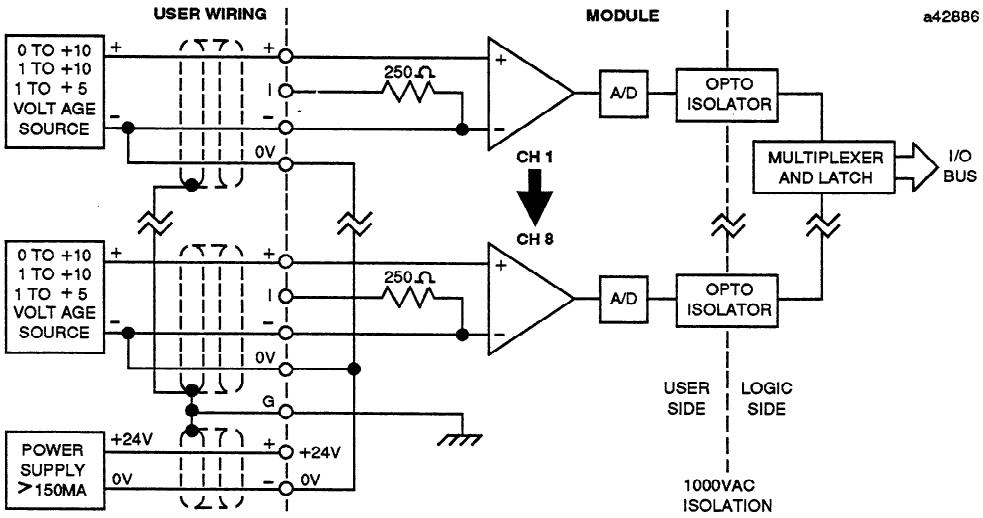


Figure 54. Single Ended Voltage Input - Typical Connections

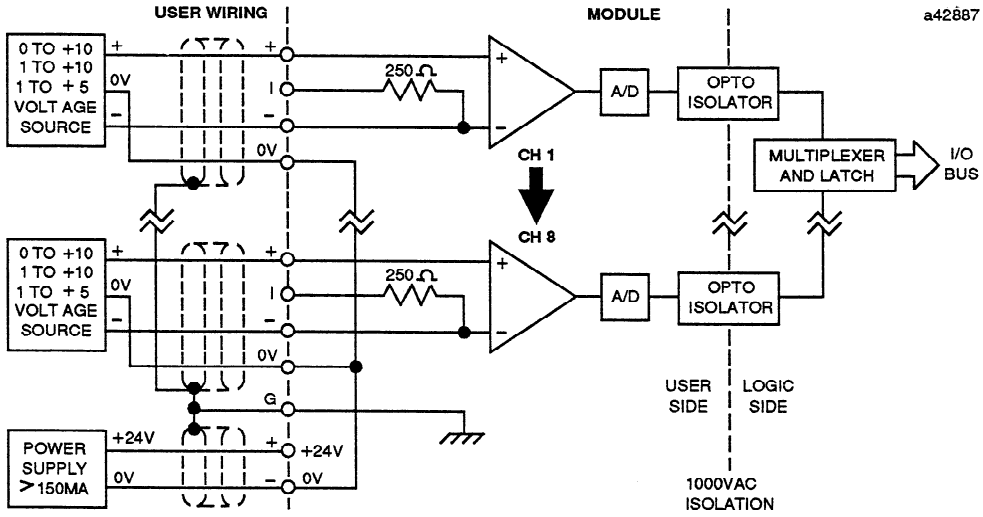


Figure 55. Differential Voltage Input - Typical Connections

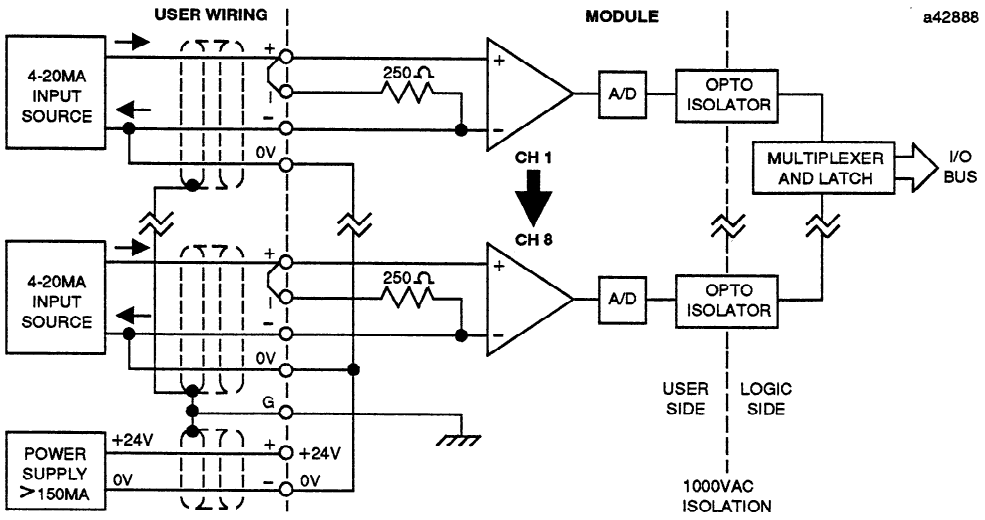


Figure 56. 4 to 20 MA Self Powered Input Source - Typical Connections

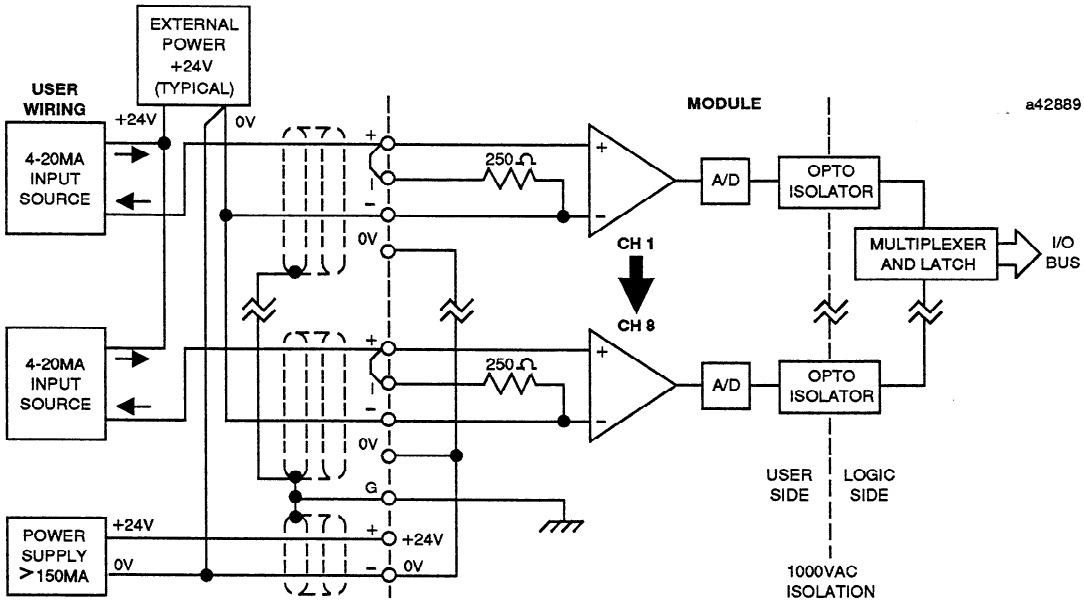


Figure 57. 4 to 20 MA Wire Transmitter (Requires External Power) - Typical Connections

Analog Input Module Calibration

Calibration in the field is normally not required since each Analog Input module is calibrated at the factory. If a module requires calibration, refer to the procedures listed below. Also, refer to the following figure as a guide to the location of test points and potentiometers used during the calibration procedure.

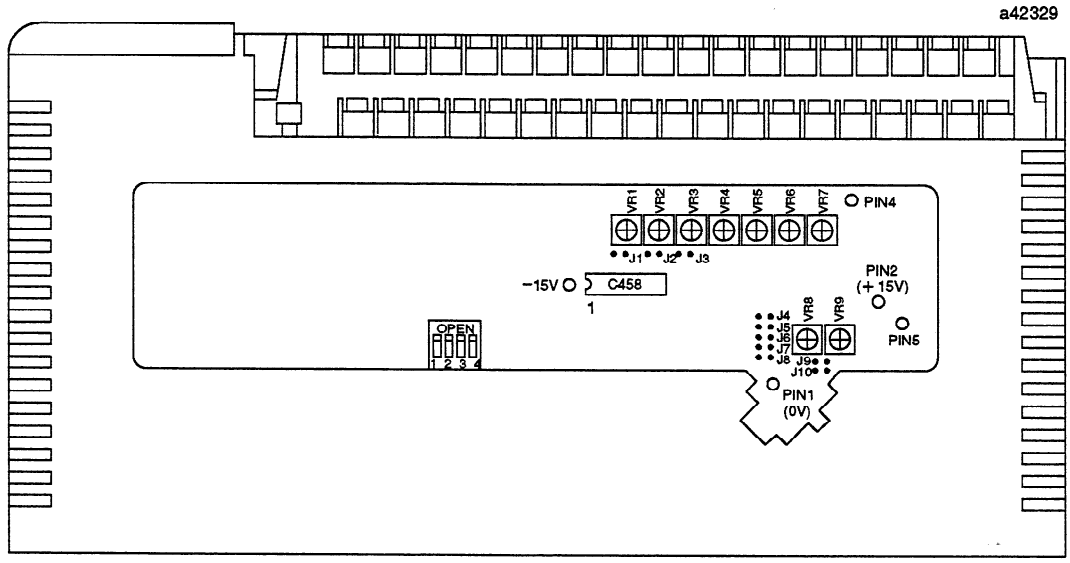


Figure 58. Location of Components Used for Calibration

Calibration Procedures

1. Adjust VR5 so that the voltage between pin 1 and pin 4 is +10.00 VDC.
2. Select a conversion time of 10 milliseconds by configuring jumpers J8 and J9.
3. Select the 0 to +10 V range by configuring jumpers J2 and J6.
4. DIP switch positions should be:
   A. Switch 1 = ON (sets sign of MSB (data bit 12) to +)
   B. Switch 2, 3, and 4 OFF (to scan only Channel 1)
5. Adjust VR8 so that the voltage between pin 5 and pin 1 is +4.750 VDC.
6. Connect a voltage source of +0.001 V to Channel 1 and adjust VR9 so that only bit 1 of the data display LEDs goes from ON to OFF.
7. Connect a voltage source of +9.999 V to Channel 1 and adjust VR2 so that all data display LEDs are ON, except the LSB (bit 1).
8. Adjustment of common mode:
   A. Apply a sine wave to channel 1 in the range of 0 to 10 V, peak-to-peak, at 50 Hz.

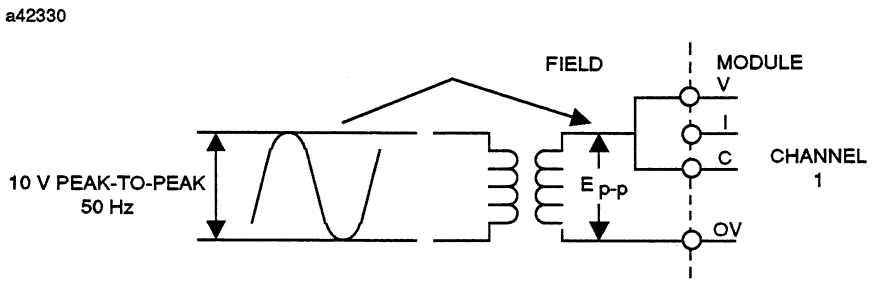


Figure 59. Sine Wave Input for Common Mode Adjustment

B. Adjust VR4 so that this signal is detected as being less than 10 mv (the 0 through 2 bits will be ON in the 0 to +10 V range).

9. Select the +1 to +5 V range by configuring J1 and J4.

   A. Apply +1.000 V to Channel 1 and adjust VR7 so that only bit 1 is flashing (LED 1 on data display).

   B. Apply +5.000 V to Channel 1 and adjust VR1 so that the data display LEDs are all ON, except LED 1.

   C. Repeat the two previous steps as necessary.

10. Select the -10 to +10 V range by configuring J3 and J5, and setting SW1 to the OFF position. Switch 1 in the OFF position sets the sign of the MSB to - (negative).

    A. Apply -9.998 V to Channel 1 and adjust VR6 so that the pattern observed on the data display is between ***1000 0000 0000*** and ***1000 0000 0001*** (MSB is the bit on the left of the pattern).

    B. Apply +0.002 V to Channel 1 and adjust VR3 so that only bit 1 (LED 1) goes from ON to OFF.

    C. Repeat step A, if the results are the same as previously obtained, proceed with step D. If not, repeat steps A and B until the desired results are obtained.

    D. Apply +9.995, ±5 mv and observe that the data pattern that you see on the data display LEDs is ***0111 1111 1111*** to ***0111 1111 1110***.

11. When the previous data pattern is correct, depress DIP switch 1 to the ON position and select the 0 to +10 V range by configuring J2 and J6.

12. Next, configure DIP switches 2 through 4, and check the other channels for calibration. Ensure that data can be displayed for each of the channels.

13. Check the current input for each channel (select the 1 to 5 V range by configuring JI and J4; this also selects the 4 to 20 mA range).

14. Select the 100 millisecond conversion time by configuring J7 and J10 and repeat the above steps. The results should be the same as with the 10 ms conversion time (there can be a 2 to 3 bit difference).

2 Channel Analog Output (0 to +10 V or 4 to 20 mA) IC655ALG566

This Series Five 2 Channel Analog Output module provides two output channels, each capable of converting 12 bits of binary (digital) data to an analog output for use as required by your application. This module provides both voltage and current outputs. Connections for field wiring are made to the 20 screws on the removable terminal block. These outputs can be voltage (0 to +10 V), or current (4 to 20 mA). Resolution of the converted signal is 12 bits binary (1 part in 4096). Twelve LEDs on the faceplate provide a 12-bit binary display which can indicate resolution of the output as a percent of full scale.

The module can drive either single ended or differential voltage devices or current devices. User devices to be driven are optically isolated from the base unit power supply by opto-isolators on the module. An Analog output module consumes 32 consecutive Output points, beginning with the first output reference assigned to the slot in which the module is installed.

In addition to the 12 LEDs described above, there are three other LEDs viewable on the faceplate. The GEN LED is on when the module address is mapped into either the O1+ or O2+ status table; the DIAG LED when on, indicates that an internal failure has been detected by the module. The ADR LED, when on, indicates that the 8 LEDs in the two columns to the right have been instructed by the CPU to display the starting address for the module in BCD format.

Table 38. Specifications for 2 Channel Analog Output

Output Ranges	0 to +10 V and 4 to 20 mA
Channels	2 (independent)
Resolution	12 Bit Binary (1 part in 4096)
Output Impedance	0.5 ohms maximum, voltage output
Output Current	20 mA maximum, voltage output
Load Impedance	550 ohms (max.), 5 ohms (min.), current output
Linearity	±0.05%, maximum
Accuracy vs. Temperature	±50 ppm (parts per million) per 1°C
Total Accuracy	±0.4% maximum at 25°C
Conversion Timing	Begins as soon as new data is loaded into the module from the CPU.
Conversion Time	0.1 milliseconds
Visual Display	12 LEDs for each channel. This 12 bit binary display indicates output voltage or current. Can be used to estimate output as a percent of full scale.
Isolation	Optical coupling
Internal Power Consumption	+5 VDC, 150 mA maximum (supplied by base unit power supply)
External Power Requirement	24 VDC ±10%, 200 mA maximum (supplied by user)
Output Points Required	32 consecutive points for each module
Diagnostic LED (DIAG)	ON for: no external power, or if terminal strip is disconnected.

User Items

The following figure is an illustration of the Analog Output module showing the user features on the faceplate There are no jumpers or switches on this module requiring configuration.

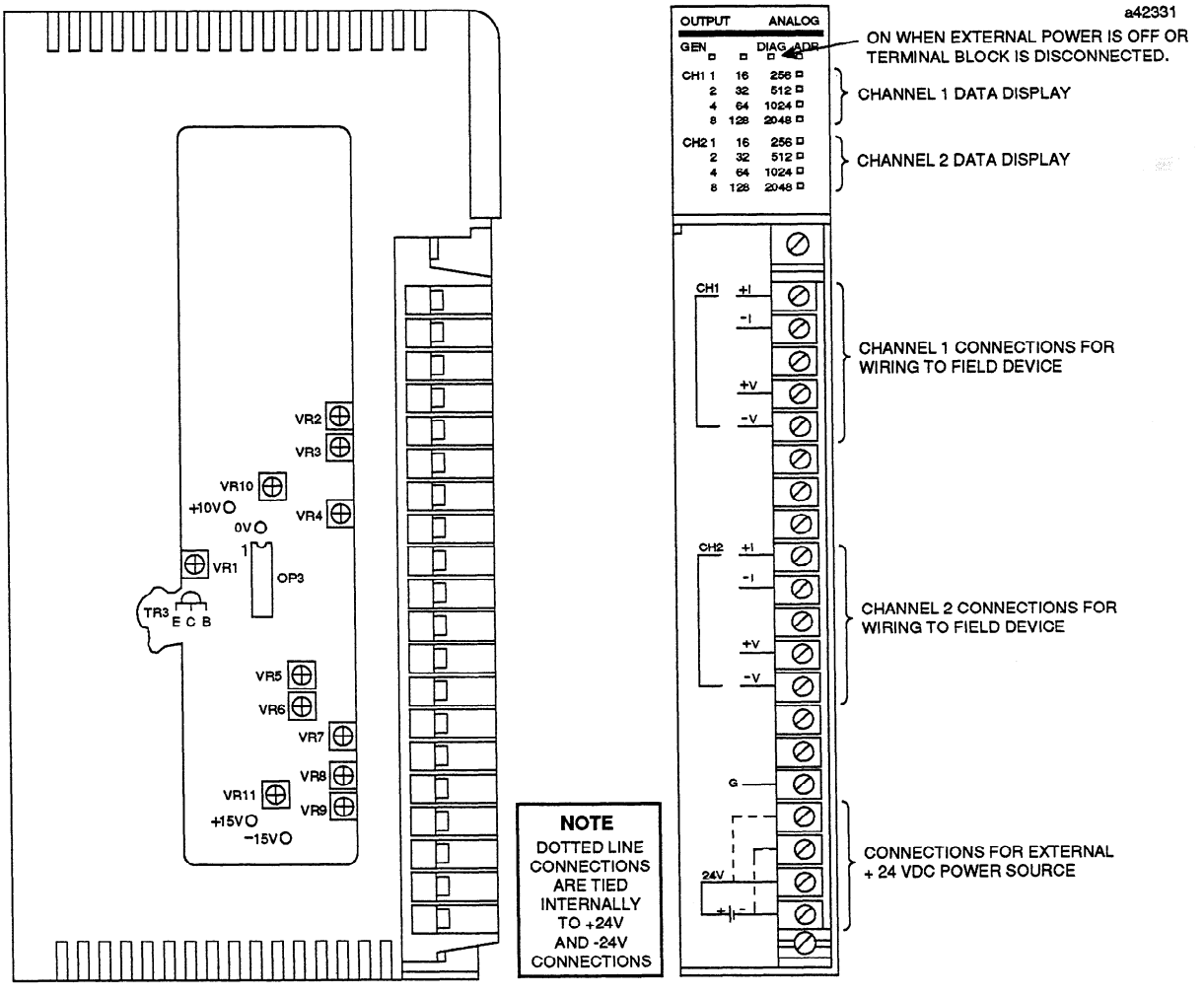


Figure 60. Analog Output Module (0 to +10V or 4 to 20 mA) User Items

Analog Output Module Circuitry

The Analog Output module is capable of driving devices requiring either single ended or differential voltage or current inputs. The following figure is an illustration of the logic diagram for one of the Analog Input module channels. The following group of notes is applicable to this module and should be followed when connecting user devices.

NOTE

Maximum loading is 20 mA for full voltage output; this does not apply to the 4 to 20 mA current output. Both outputs on this module are single ended and are referenced internally to the same user side common which is isolated from the Series Five PLC chassis ground. All 0V (user side common) points are connected together internally in this module. If multiple destinations are connected to the same output module, their reference points (0V) must be connected together and be at the same voltage. Twisted-pair cable should be used when possible; twisted-pair with shield is preferred.

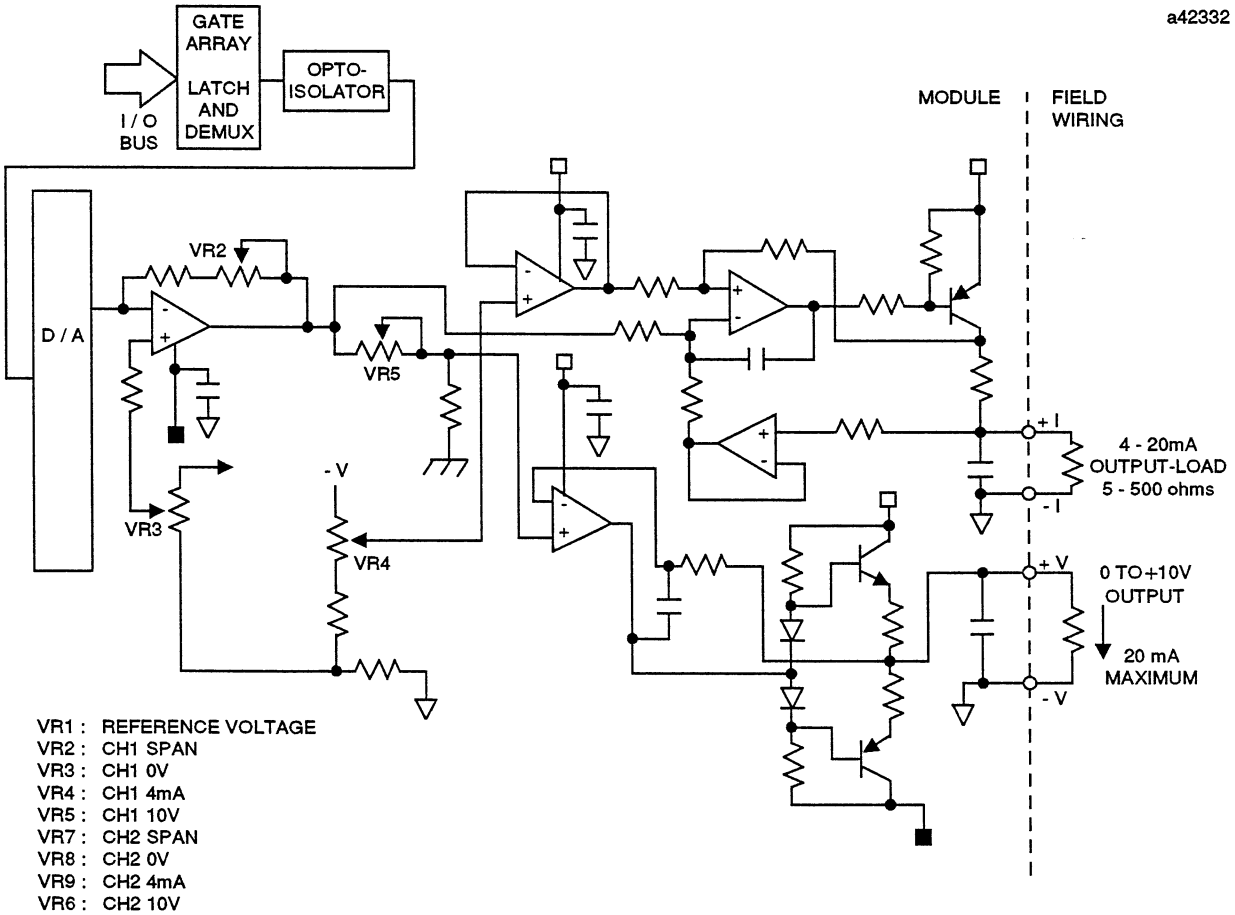


Figure 61. Logic Diagram for Analog Output Module - IC655ALG566

Recommended Connection for External Power Source

A 24 VDC power source must be supplied by the user for connection to the module. This 24 VDC voltage source is converted to various DC voltages in the module for internal circuit power requirements.

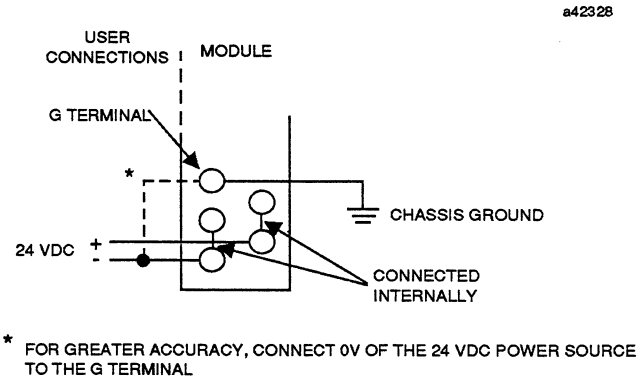


Figure 62. Recommended Connections for +24 VDC Power Source

Data Format

This Analog Output module consumes 32 consecutive output points beginning with the first output point assigned to the slot in which the module is installed. Each of the two channels uses 12 of the 32 bits for data. The following table shows the data format for each channel relative to the Output points.

Table 39. Analog Output Data Format

Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 2 Data Bit	Output Reference Number	CH 2 Data Bit
1	1	9	9	17	1	25	9
2	2	10	10	18	2	26	10
3	3	11	11	19	3	27	11
4	4	12	12	20	4	28	12
5	5	13	(1)	21	5	29	*
6	6	14	(1)	22	6	30	*
7	7	15	(1)	23	7	31	*
8	8	16	(1)	24	8	32	*

* not used

1. Data bit 12 (MSB) to 16 indicates the sign of the data input when the -10 to +10 V range is selected. Bit ON; sign is -, bit OFF; sign is +.

NOTE

In a Series Five program, the results of output value calculations (scaling) must not become negative. Negative 2's complement numbers correspond to binary values beyond 32767, i.e. a transition from 0 to -1 generates an output value change to maximum current (or voltage).

Analog Output Module Calibration

The Analog Output module is calibrated at the factory; calibration in the field is normally not required. If an Analog Output module requires calibration, refer to the procedures listed below. Also, refer to the following figure as a guide to the location of the potentiometers referenced in the calibration procedures.

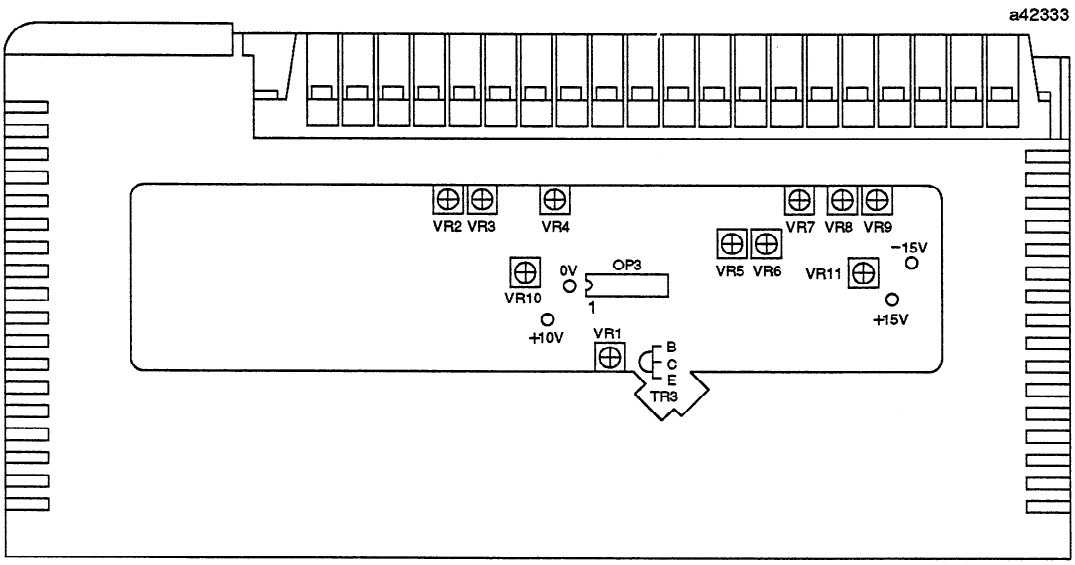


Figure 63. Location of User Items for Module Calibration

Calibration Procedures

1. Check voltage between the listed points.
   A. Between pin 0V and pin +15V: voltage must be 17.3 VDC to 18.7 VDC.
   B. Between pin 0V and pin -15V: voltage must be -15 VDC ±1.5 VDC.
2. If these voltages are not as listed, check the 24 VDC power supply connected to the module.
3. Adjust VR1 so that the voltage between pin 0V and pin +10V is 10.000 Volts dc.
4. Adjust VR3 so that the voltage output of Channel 1 is ±0.00 millivolts with all data 0 (zero).
5. Adjust VR8 so that the voltage output of Channel 2 is ±0.00 millivolts with all data 0 (zero)
6. Adjust VR4 so that the current output of Channel 1 is 4.000 milliamps with all data 0 (zero).
7. Adjust VR9 so that the current output of Channel 2 is 4.000 milliamps with all data 0 (zero).
8. Adjust VR2 so that the current output of Channel 2 is 20.000 milliamps with all data "1".
9. Adjust VR7 so that the current output of Channel 1 is 20.000 milliamps with all data "1".
10. Adjust VR5 so that the voltage output of Channel 1 is 10.000 Volts dc with all data "1".
11. Adjust VR6 so that the voltage output of Channel 2 is 10.000 Volts dc with all data "1".
12. Repeat steps 3 through 10 until all voltage and current readings are correct.

NOTE

When setting the range to 0 V and/or 4 mA, set the scale to 000H; when setting the range to full scale - set the scale to FFFH (from the user logic program).

2 Channel Analog Output (-10 to +10 V) IC655ALG567

This Series Five 2 Channel Analog Output module provides two output channels, each capable of converting 12 bits of binary (digital) data to an analog output for use as required by your application. This module provides only voltage outputs. The output voltage range is -10 to +10 volts. Connections for field wiring are made to the 20 screws on the removable terminal block. Resolution of the converted signal is 12 bits binary (1 part in 4096). Twelve LEDs on the faceplate provide a 12-bit binary display which can indicate resolution of the output as a percent of full scale.

The module can drive either single ended or differential voltage devices or current devices. User devices to be driven are optically isolated from the base unit power supply by opto-isolators on the module. An Analog output module consumes 32 consecutive Output points, beginning with the first output reference assigned to the slot in which the module is installed.

In addition to the 12 LEDs described above, there are three other LEDs viewable on the faceplate. GEN is on when the module address is mapped into either the O1+ or O2+ status table; DIAG when on, indicates that an internal failure has been detected by the module, and ADR, when on indicates that the 8 LEDs in the two columns to the right have been instructed by the CPU to display the module's starting address in BCD format.

Table 40. Specifications for 2 Channel Analog Output, -10 to +10 V

Output Range	-10 to +10 V
Channels	2 (independent)
Resolution	12 Bit Binary (1 part in 4096)
Output Impedance	0.5 ohms maximum, voltage output
Output Current	± 10 mA maximum
Load Impedance	1K ohm maximum
Linearity	±0.05%, maximum
Accuracy vs. Temperature	±50 ppm (parts per million) per 1°C
Total Accuracy	±0.4% maximum at 25°C
Conversion Timing	Begins as soon as new data is loaded into the module from the CPU.
Conversion Time	0.1 milliseconds
Visual Display	12 LEDs for each channel. This 12 bit binary display indicates output voltage. Can be used to estimate output as a percent of full scale.
Isolation	Optical coupling
Internal Power Consumption	+5 VDC, 150 mA maximum (supplied by base unit power supply)
External Power Requirement	24 VDC ±10%, 200 mA maximum (supplied by user)
Output Points Required	32 consecutive points for each module
Diagnostic LED (DIAG)	ON for: no external power, or if terminal strip is disconnected.

User Items

The following figure is an illustration of the Analog Output module showing the user features on the faceplate There are no jumpers or switches on this module requiring configuration.

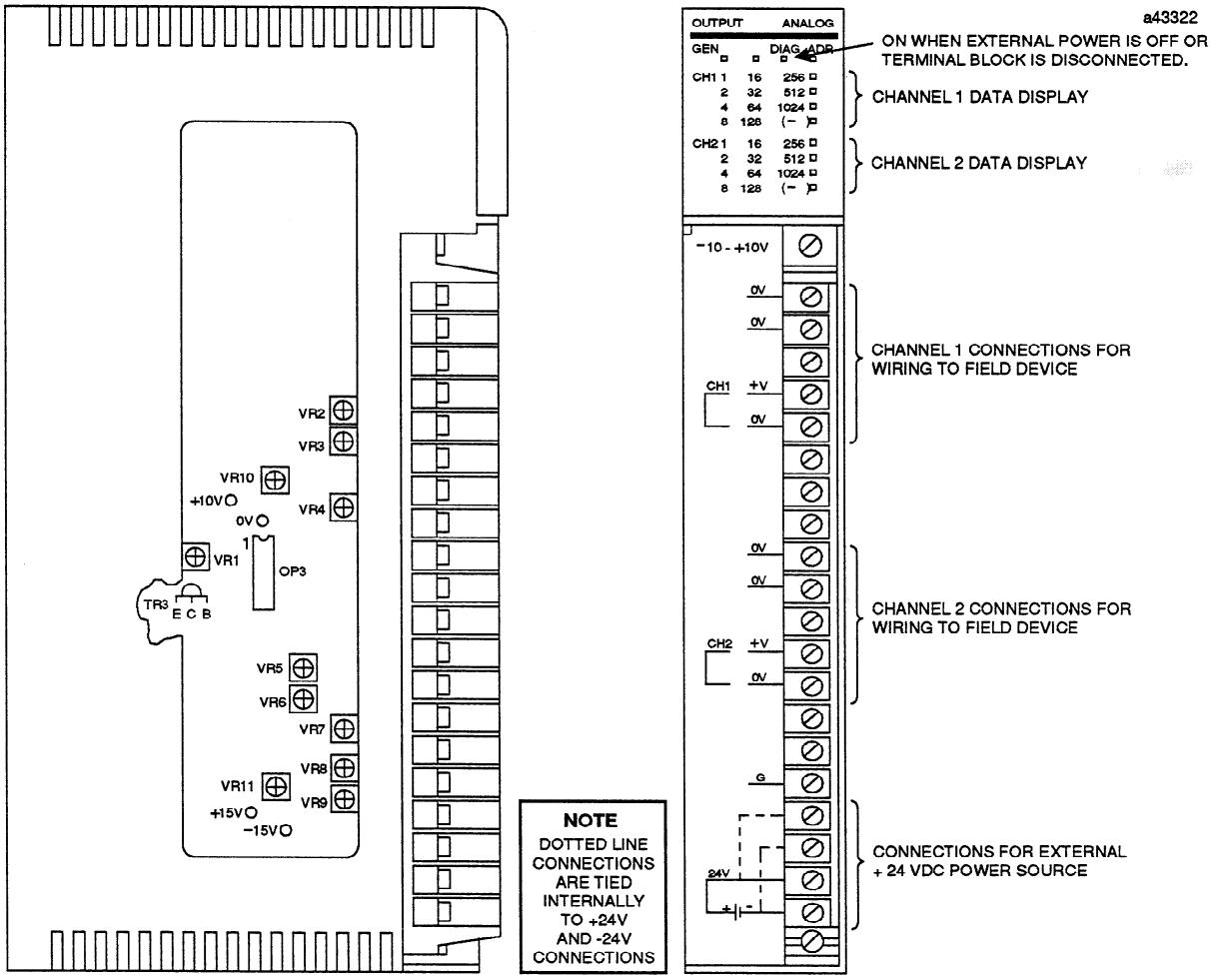


Figure 64. Analog Output Module (-10 to +10 V) User Items

Analog Output Module Circuitry

The Analog Output module is capable of driving devices requiring either single ended or differential voltage inputs. The following figure is an illustration of the logic diagram for one of the Analog Input module channels. The following group of notes is applicable to this module and should be followed when connecting user devices.

NOTE

Maximum loading is 20 mA for full voltage output. Both outputs on this module are single ended and are referenced internally to the same user side common which is isolated from the Series Five PLC chassis ground. All 0V (user side common) points are connected together internally in this module. If multiple destinations are connected to the same output module, their reference points (0V) must be connected together and be at the same voltage. Twisted-pair cable should be used when possible; twisted-pair with shield is preferred.

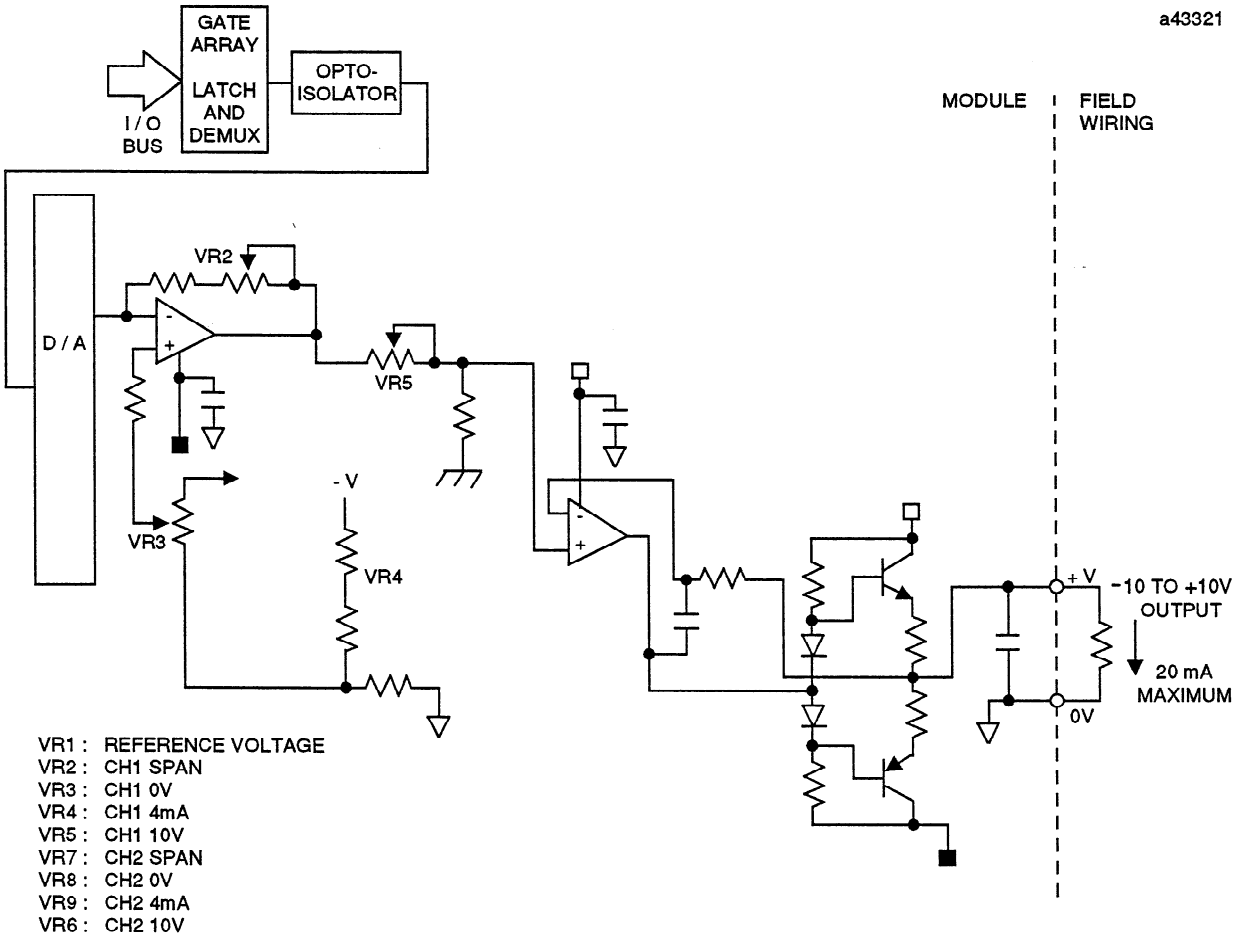


Figure 65. Logic Diagram for Analog Output Module - IC655ALG567

Recommended Connection for External Power Source

A 24 VDC power source must be supplied by the user for connection to the module. This 24 VDC voltage source is converted to various DC voltages in the module for internal circuit power requirements.

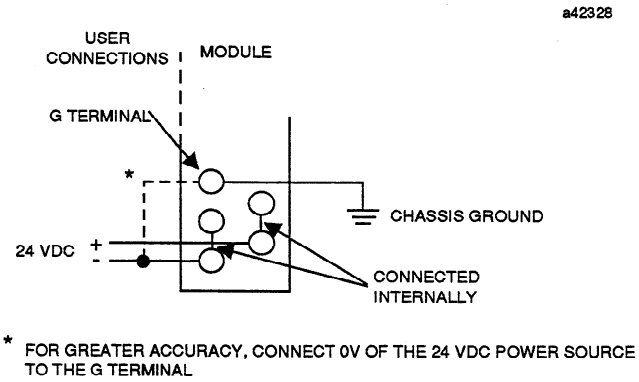


Figure 66. Recommended Connections for +24 VDC Power Source

Data Format

This Analog Output module consumes 32 consecutive output points beginning with the first output point assigned to the slot in which the module is installed. Each of the two channels uses 12 of the 32 bits for data. The following table shows the data format for each channel relative to the Output points.

Table 41. Analog Output Data Format

Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 2 Data Bit	Output Reference Number	CH 2 Data Bit
1	1	9	9	17	1	25	9
2	2	10	10	18	2	26	10
3	3	11	11	19	3	27	11
4	4	12	12	20	4	28	12
5	5	13	(1)	21	5	29	*
6	6	14	(1)	22	6	30	*
7	7	15	(1)	23	7	31	*
8	8	16	(1)	24	8	32	*

* not used

1. Data bit 12 (MSB) to 16 indicates the sign of the data input when the -10 to +10 V range is selected. Bit ON; sign is -, bit OFF; sign is +.

NOTE

In a Series Five program, the results of output value calculations (scaling) must not become negative. Negative 2's complement numbers correspond to binary values beyond 32767, i.e. a transition from 0 to -1 generates an output value change to maximum current (or voltage).

Wiring Information - IC655ALG567

The following figure is a guide for connecting the outputs to field devices.

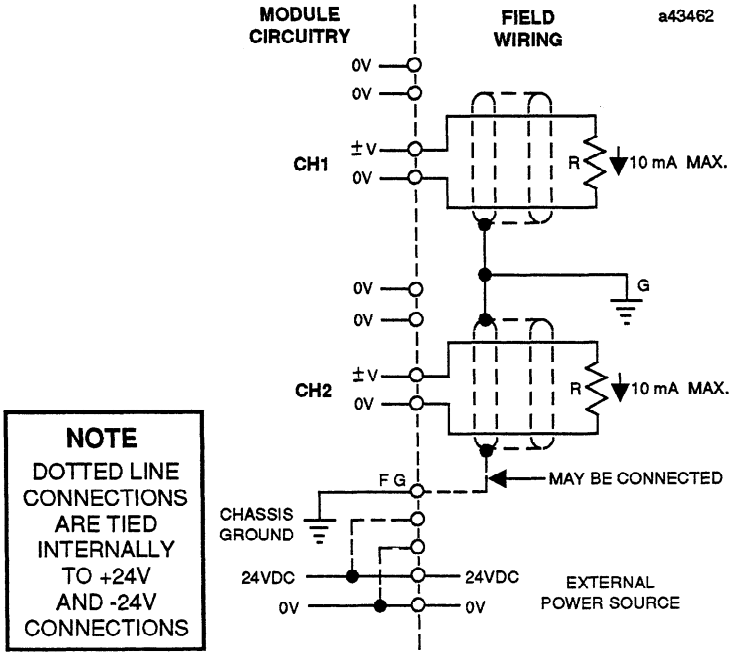


Figure 67. Field Wiring Connections for IC655ALG567

Analog Output Module Calibration

The Analog Output module is calibrated at the factory; calibration in the field is normally not required. If an Analog Output module requires calibration, refer to the procedures listed below. Also, refer to the following figure as a guide to the location of the potentiometers referenced in the calibration procedures.

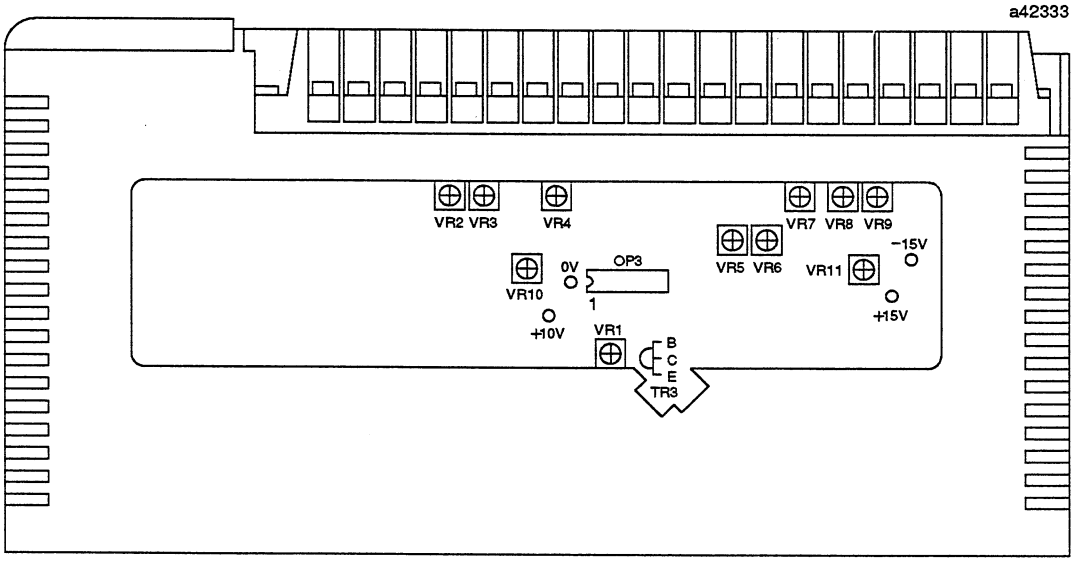


Figure 68. Location of User Items for Module Calibration

Calibration Procedures

1. Check voltage between the listed points.
   A. Between pin 0V and pin +15V: voltage must be 17.3 VDC to 18.7 VDC.
   B. Between pin 0V and pin -15V: voltage must be -15 VDC ±1.5 VDC.
2. If these voltages are not as listed, check the 24 VDC power supply connected to the module.
3. Adjust VR1 so that the voltage between pin 0V and pin +10V is 10.000 Volts dc.
4. Adjust VR3 so that the voltage output of Channel 1 is ±0.00 millivolts with all data 0 (zero).
5. Adjust VR8 so that the voltage output of Channel 2 is ±0.00 millivolts with all data 0 (zero)
6. Adjust VR5 so that the voltage output of Channel 1 is 10.000 Volts dc with all data "1".
7. Adjust VR6 so that the voltage output of Channel 2 is 10.000 Volts dc with all data "1".
8. Repeat steps 3 through 7 until all voltage readings are correct.

1

2

4

5

6

8

A

B

C

D

E

F

G

I

K

L

M

O

P

R

S

T

W

GE Fanuc Automation North America, Inc., Charlottesville, Virginia