Discrete Input Modules
IC697MDL653

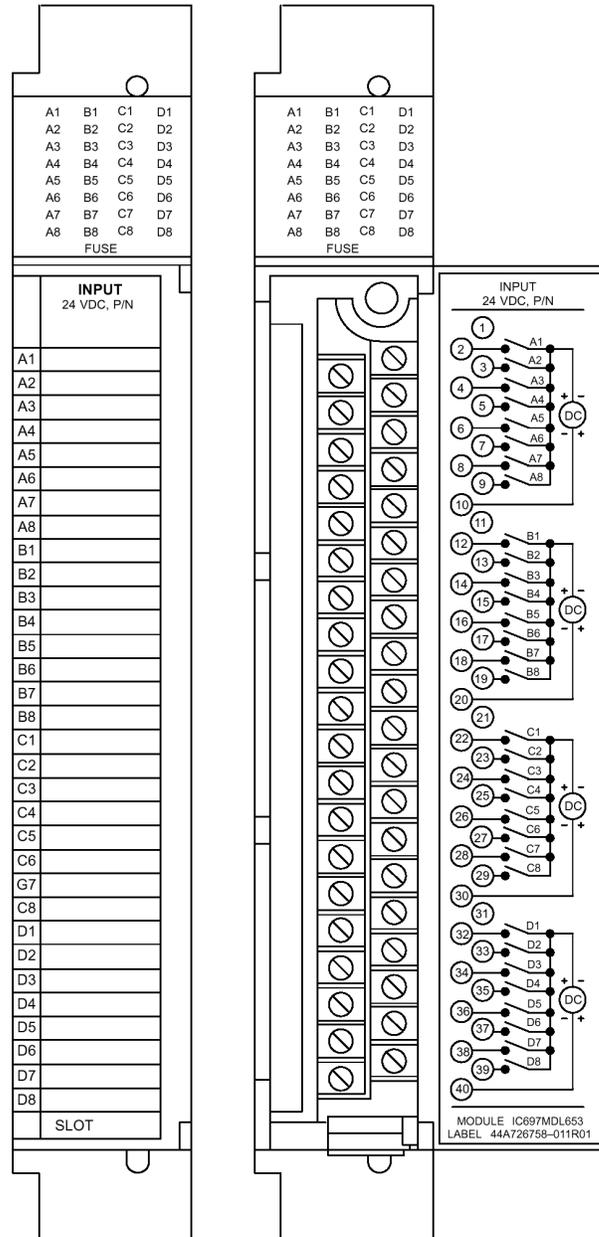**24 Volt DC Positive/Negative Logic, 32-Point Input Module**

Features

- 32 Points – Four isolated groups of eight points each
- Positive/Negative Logic Compatibility
- Proximity switch compatible
- Input filter selectable – 1 ms or 10 ms
- First input configurable as interrupt

Functions

The 24 Volt DC Positive/Negative Input Module provides 32 input points in four isolated groups of eight points each. The input current–voltage characteristics meet IEC standard (type 1) specifications.

LED indicators that show the ON–OFF status of each point on the logic (PLC) side of the circuit are located at the top of the module.

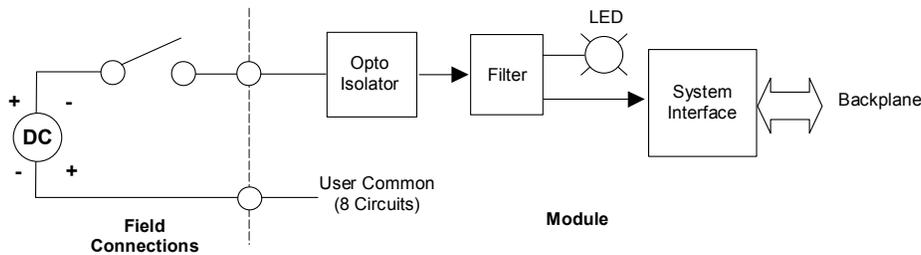## Operation of the 24 Volt DC Positive/Negative Input Module

Figure 1. Block Diagram for IC697MDL653

Input Characteristics

This module has both positive and negative logic characteristics – it sinks or sources current from the input device to the user common. The input device is connected between the power bus and the module input as shown above. This module is compatible with a wide variety of input devices, such as:

- Pushbuttons, limit switches, selector switches;
- Electronic proximity switches, both 2 and 3–wire.

In addition, inputs on this module may be directly driven by a compatible voltage output module.

The input circuitry provides sufficient current to ensure reliable operation of the switching device. Input current is typically 10mA in the ON state. An input in the OFF state can accept up to 2mA leakage current without turning on.

Proximity Switch Compatibility

3–wire proximity switches are easily applied, since they provide low voltage drop in the ON state and low leakage current in the OFF State.

2–wire proximity switches derive their power from the signal connections; thus both the ON state voltage and the OFF state leakage current are higher than for 3–wire devices. This module is compatible with many such 2–wire devices; however each device type must be carefully evaluated for compatibility in both the ON and OFF states.

To determine compatibility with a specific proximity switch, find the ON state characteristics of the switch in the following diagram. If that point falls to the left of the input load line, the ON state characteristics are compatible. As an example, the ON state requirements of a compatible proximity switch of 3mA at 5 volts drop are shown below. OFF state compatibility is assured if the proximity switch leakage is less than 3mA with a module input voltage of 5 volts or less.
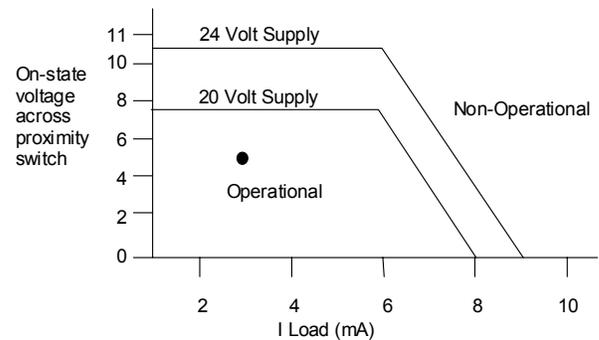
Input Filter Selection

This module can be configured to have either a 1 ms or 10 ms input filter. Configuration is on a module, not per point basis; all points have the same filter time. See the *PLC Reference Manual* for detailed information.

Interrupt Input

If the CPU supports input interrupts, input point A1 may be configured to cause an interrupt. Configuration allows the CPU to be interrupted on either the rising or falling edge of the signal transition. Interrupt response is not affected by input filter time selection. Refer to the *PLC Reference Manual* for detailed information.

Module Keying

Earlier versions of this module included a mechanical key to prevent inadvertently replacing a module with another of the wrong type. The key latched onto the backplane center rail when the module was first installed, and remained on the backplane if the module was removed.

A new module without this keying feature can be installed in a previously-keyed slot without removing the earlier keying. However, the key is easily removed by pushing it upward to unhook the latch while pulling it off the rail.

Module Features
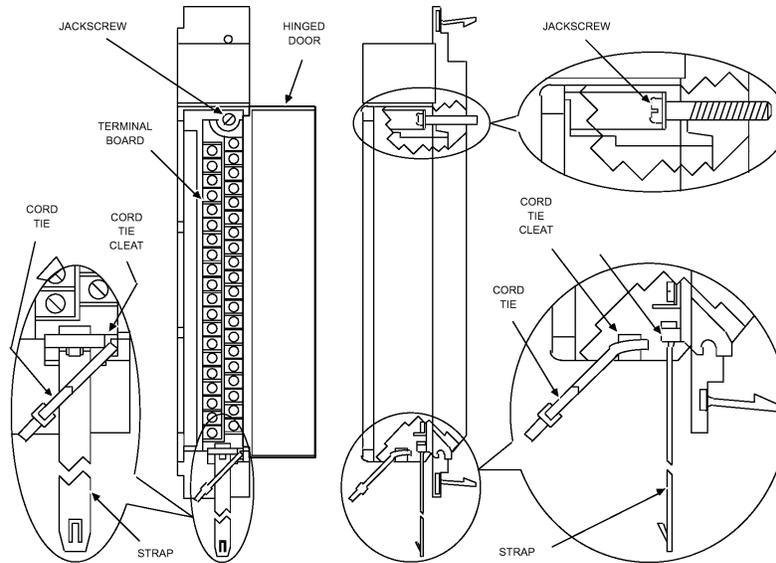
Recommended Field Wiring Procedures

The following procedures are recommended when connecting field wiring to the detachable terminal board on this input module.

1. Turn off power before removing or installing terminal boards.

2. Open the hinged door on the module. The terminal board can be removed by turning the jackscrew counter-clockwise until it is disengaged.
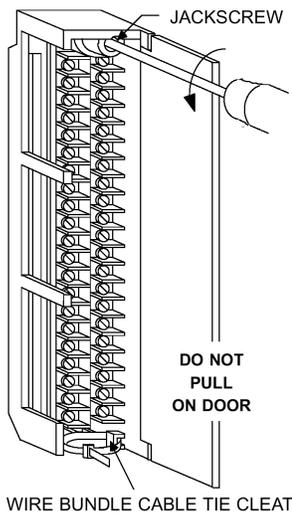
3. To remove the terminal board, grasp the top of the terminal board and swing it outward.

> ### Caution
>
> **Do not use the hinged door to remove the terminal board. The door could be damaged if this is done.**

4. The terminal board accepts wire sizes from AWG #22 (0.36 mm^2) through AWG #14 (2.10 mm^2). When using AWG #14 (2.10 mm^2) wire for wiring all points, do not exceed a maximum insulation diameter of 0.135 inch (3.43mm). To ensure proper connection, two wires may be terminated on one terminal only if both wires are the same size.

5. The terminal board accepts a maximum of 40 AWG #14 (2.10 mm^2)wires. If AWG #14 (2.10 mm^2) wires are used, place wire at least 8 inches (203mm) from termination end to provide space for the hinged door to close. After completing connections to all modules in a rack, the wire bundle must be secured. To ensure that the wire bundle is secured properly, it is recommended that a cable tie be wrapped around the wire bundle and tightly secured through the cable tie cleat at the bottom of the terminal board. For extremely large wire bundles, additional cable ties should be used.

6. The module's door label shows circuit wiring information and provides space to record circuit wiring identification. A slot is provided on the hinged door to allow for insertion of this label. If the label is difficult to insert, crease the scored edge before insertion.

7. Field wiring connections are shown below. Since each group of eight inputs is isolated from the others, a wire from the power source to the power input terminal for each group (terminal number 10, 20, 30, or 40) is required (power input terminals for each group are not connected to each other inside the module).
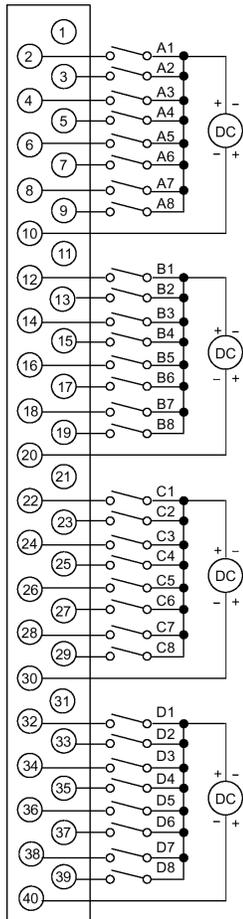

Figure 2. Field Wiring Connections for IC697MDL653

▪ After field wiring is completed, fasten the terminal board to the rack by inserting the terminal board strap (attached to each module) into the small rectangular slots in the bottom card guide grill on the rack. This strap not only secures the terminal board to the rack, it also provides a way of identifying the wired terminal board with its rack slot location.

8. For adequate module ventilation, it is recommended that at least a 6 inch (152mm) clearance be allowed above and below the rack grill. Wire bundles should not obstruct the rack grill.

Removing an I/O Module

The instructions below should be followed when removing an I/O module from its slot in a rack.

▪ Grasp the board firmly at the top and bottom of the board cover with your thumbs on the front of the cover and your fingers on the plastic clips on the back of the cover.

▪ Squeeze the rack clips on the back of the cover with your fingers to disengage the clip from the rack rail and pull the board firmly to remove it from the backplane connector.

▪ Slide the board along the card guide and remove it from the rack.

Table 1. Specifications for Module IC697MDL653

Rated Voltage	24 volts DC
Inputs per Module	32 (four groups of eight inputs each).
Isolation	1500 volts RMS – any input to backplane
	500 volts RMS between input groups
Input Voltage Range (V_s)	-3 to +30 volts DC
Input Current	10mA (typical) at rated voltage
Input Impedance	2.6K ohms, typical
Input Characteristics –	
On-state Voltage	13.5 volts to 30 volts
Off-state Voltage	0 to 5 volts
On-state Current	6mA to 15mA
Off-state Current	0 to 2mA (2mA mimimum at 5V input)
Filter Delay Time	1 ms or 10 ms configurable
Current Required from 5VDC backplane bus	0.30 amps

For installations requiring compliance to more stringent requirements (for example, FCC or European Union Directives), refer to GFK-1179 *Installation Requirements for Conformance to Standards.*

Table 2. Ordering Information

Description	Catalog Number
Input Module: 24 Volt DC Positive/Negative Logic, 32 Points	IC697MDL653

Note: For Conformal Coat option, or Low Temperature Testing option please consult the factory for price and availability.