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Instruction Bulletin

Subject: SY/MAX®

CLASS 8030 TYPE RIM-331
24V DC 32 FUNCTION INPUT MODULE



DESCRIPTION

The Type RIM-331 24V DC Input Module contains 32 optically isolated inputs which are capable of receiving signals from such input devices as limit switches, pushbuttons, selector switches, and solid state logic circuits. The module may be inserted into any slot of a register rack (except slot 1) or the register slot of a digital rack.

Each of the 32 inputs has a red LED indicator on the front of the module which illuminates when receiving an "ON" signal from the input device (proper voltage applied at the wiring terminal). A marking area for input identification by the user is provided next to the user terminals.

SPECIFICATIONS

Inputs per Module	32
Type of Isolation	Optical
Isolation Rating	2500 V RMS
Voltage Operating Range	21-29 V DC
Current Operating Range	10-14 mA
Must Turn On Voltage	16 V
Must Turn On Current	7.0 mA (at 15 V)
Must Turn Off Voltage	5 V
Must Turn Off Current	2.2 mA (at 5 V)
Input Impedance	2.15 K OHMS Resistive
Turn on Time	2.5 msec. nominal
Turn off Time	2.5 msec. nominal
Rated Current Draw on SY MAX Power Supply	520 mA per module at 75% Duty Cycle 600 mA per module at 100% Duty Cycle
LED Operation Indication	Red LED illuminated when input module is receiving "ON" signal from field input device.
Ambient Temperature Rating	0-60° C
Humidity Rating	5-95% non-condensing
Weight (unpackaged)	4.4 lbs/2 kg
Used with these Rack Assemblies	RRK-100, RRK-200, RRK-300, HRK-100, HRK-150, HRK-200, CRK-210, CRK-300, DRK-210, DRK-300, GRK-110, GRK-210
Compatible with Output Modules	ROM-441
Dimensions (H x W x D)*	12.0 x 1.5 x 9.5 inches (304.8 x 38.1 x 241.3 mm)

* See application considerations.

TYPICAL WIRING

Field input devices are wired to the two terminal blocks on the front of the module. The upper terminal block corresponds to the first 16 inputs and includes common terminals "1A" and "2A". The lower terminal block corresponds to the second 16 inputs and includes common terminals "3A" and "4A". The "1A" terminal is the common terminal for the first eight inputs located directly below it (numbered 1 through 8). The "2A" terminal is the common terminal for the next eight inputs located directly below that terminal (numbered 9 through 16). Similarly, "3A" and "4A" are the common terminals for the next 16 inputs located directly below each one (numbered 1 through 8 and 9 through 16 respectively). If a single voltage supply is used for more than one group of eight inputs, the "A" terminals for each group may be connected together. Figure 1 illustrates the typical wiring of the RIM-331 input module.

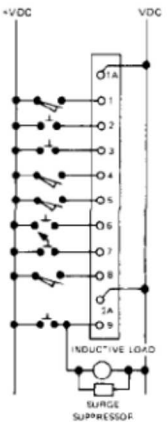


Figure 1 — Typical Wiring

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NOTE: Surge suppression, as shown in Figure 1, is required only when an inductive load is in parallel with the programmable controller input.

The portion of the terminal block which plugs into the module connectors is labeled either "1A 2A" or "3A 4A" to correspond to either the first or second group of 16 inputs.

Thirty-two LED indicators, in groups of 16, are located on the front of the module. The group labeled "1A 2A" corresponds to the first 16 inputs (running top to bottom). The group labeled "3A 4A" corresponds to the second group of 16 inputs.

TERMINAL BLOCKS

The terminal block areas of the RIM-331 Input Module have been modified in series F1 and later devices. The differences are indicated here.

On *pre-series F1 input modules* the terminal blocks have been color coded to ensure proper alignment for insertion. The top group of sixteen inputs is colored blue to match a blue coded area on the module, and the bottom group of sixteen inputs is colored white to match a white coded area on the module. Alignment markings and color coding on the terminal blocks *must* match with color coded areas on the module.

On *series F1 and later input modules* the terminal blocks are keyed for proper alignment, and therefore, no color coded alignment marking is necessary.

APPLICATION CONSIDERATIONS

- Each 8 inputs sharing a common "A" terminal are electrically isolated from the other inputs on the module.
- Before removing either of the terminal blocks from the module, remove *all* power to the module and the terminal blocks. Next, remove the top and bottom screws from the terminal retaining bar, remove the terminal retaining bar and then slide the terminal blocks to the right.
- In those applications where an inductive load such as a motor starter or solenoid is wired in parallel with a Type RIM-331 Input Module, a suppressor must be installed as indicated in Figure 1. A typical suppressor for 24 V DC operation consists of a 0.5 mfd, 400 volt capacitor with a 220 ohm resistor in series.
- Note that an "appreciable glow" from the LED may be seen when high leakage current solid-state, input devices are used with a RIM-331, even though the input module is actually off. The must turn off voltages and currents are as listed in the specifications. If the off state leakage current of the input device connected to the Type RIM-331 Input Module is greater than 2.2 mA, consult the factory for recommended signal conditioning.
- When the Type RIM-331 Input Module is located in the same rack as the processor the only processors which will allow the inputs to be forced ON and OFF are the Models 300, 400 and 600. The Model 500 and 700 processors do not support the forcing function. Instead, they rely on the forcing capability in the Local Interface Module to provide this function. Therefore, when the input module is mounted in a remote rack the inputs may be forced ON and OFF by *any* processor.
- The polarity of the supply must be as shown in Figure 1. In so doing, terminals 1A, 2A, 3A and 4A must be connected to the negative of the supply.
- Each terminal will accept one #14 or two #20 gage wires.
- When using the DISPLAY mode of the Class 8010 Type SPR-2XX and SPR-3XX CRT Programmers or SY/MATE*, all contacts and coils associated with register slot mounted digital I/O modules will be shown with the prefix (R) in front of the address. These (R) designated contacts and coils are associated with actual inputs and outputs and should not be confused with contacts and coils associated with internal relays.

*NOTE: When using SYM-323 Series B and SYM-324 Series A or later, all contacts and coils associated with digital I/O modules will be shown with the prefix (I) in front of the address if it is an input or (O) if it is an output or contact of an external output.

- The RIM-441 Input Module is an over-sized input module and extends approximately three inches beyond the front edge of the rack when properly installed.
- Current-sinking sensors cannot normally be directly connected to the Class 8030 RIM-331 24 VDC Input Module since this module is also a current-sinking device. However, sensors can be used if proper wiring and programming techniques are followed. See the section of this bulletin titled "Wiring for Current-Sinking Sensors" on page 4 for instructions.
- Spare labels and terminal blocks may be purchased separately from Square D Company. For extra labels, order a Class 8030 Type CBP-134 Label Kit. This kit will provide you with ten additional labels. For extra terminal blocks, order a Class 8030 Type CBP-132 Terminal Kit. This kit provides two additional terminal blocks.

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MODULE KEYING

Each socket on the rack assembly may be keyed to accept only one type of I/O module. An optional keying pin kit, Class 8030 Type CBP-104, is available for this purpose. The correct position of the keying pin for the Type RIM-331 24V DC Input Module is between pins 15, 16 and 17, 18 (see Figure 3). The keying pin is simply inserted manually into the slot in the rack connector using the keying pin insertion tool provided with the kit. See Figure 4.

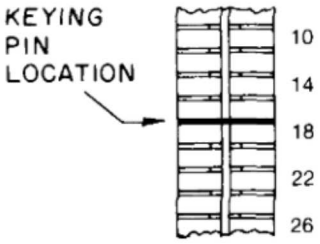


Figure 3
Keying Pin Location

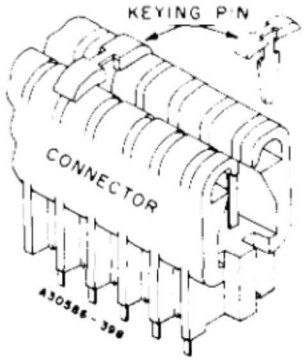


Figure 4
Keying Pin Insertion

CAUTION: When inserting or removing the keying pins, use care to avoid touching the contact fingers within the connector. Improper insertion/removal may damage the connector.

INSTALLATION INSTRUCTIONS

The Type RIM-331 Input Module may be installed in a register slot of a Class 8030 Type CRK, DRK, GRK, HRK, or RRK rack assembly. The module receives 5V DC power and ground from the edge connector at the back of the rack.

NOTE: Refer to the Power Supply and Rack Instruction Bulletins to insure proper grounding.

To install the module in a rack assembly, use the following procedure:

1) Remove all power from the rack assembly.

2) Insert the module into the register slot until firmly seated against the stud (the middle post above the socket in that slot).

3) Tighten the captive screw to assure that the module is secured.

To remove the module from the rack assembly, use the following procedure:

1) Turn the processor keyswitch to "HALT" or "DISABLE OUTPUTS" position and remove power from the power supply feeding the rack assembly.

2) Because voltages can be present at the terminal strips on the module even when the module is unpowered, all power to the terminal blocks should also be shut off before the module is handled. Next, remove the terminal strips from the module by removing the screws from the terminal retaining bar, removing the terminal retaining bar, and then sliding the terminal strips to the right.

3) Finally, remove the module from the rack by raising the latching clamp, loosening the module mounting screw and pulling the module from the rack assembly.

REGISTER USAGE FOR RACK ADDRESSING

Each type RIM-331 Input Module will occupy two registers in the system. When located in a register slot to the right of a Model 500 or Model 700 processor, the RIM-331 must be assigned four registers even though only the first two of the four registers are used. The remaining two registers cannot be used.

When mounted in the same rack as a Model 300 processor a minimum of two registers must be assigned to each RIM-331 Input Module. When the Model 300 processor is mounted in an RRK-200 register rack, slot 9 may not be used for any digital I/O modules. Slot 9 cannot be addressed by the Model 300 and therefore may be used to power any register module which requires only power, and which does not require registers, such as the D-LOG or SY/NET module.

The RIM-331 may not be used in slots 17 and 18 of an RRK-300 register rack. These two, lower right-most slots are non-addressable by any SY/MAX processor.

SIMPLIFIED SCHEMATIC OF MODULE

Figure 5 illustrates one of the 32 input circuits within the module. Each terminal marked "A" is common to 8 of the module's 32 inputs.

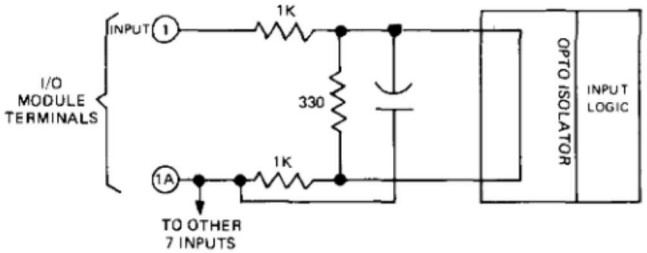


Figure 5
Simplified Schematic of One Input Circuit

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WIRING FOR CURRENT-SINKING SENSORS

Figure 6 shows a typical connection diagram for a current-sinking sensor. Assuming that the "L" terminal is normally open (NO), the load would energize when the sensor becomes "activated" by sensing the appropriate level of temperature, pressure, etc. This type of wiring connection would allow only four sensors to be wired to the *RIM-331 module.*

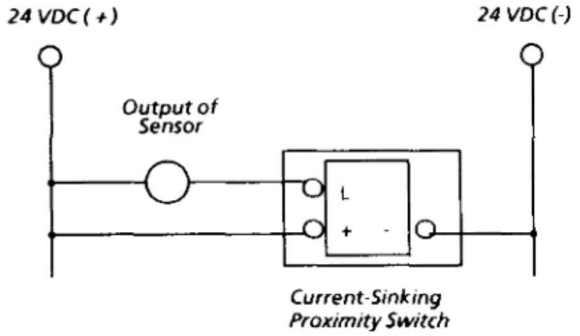


Figure 6
Normal Wiring for Current-Sinking Input Device

Figure 7 shows an alternate connection diagram for a current-sinking sensor. The resistor acts as the load for the "L" terminal of the sensor. Assuming that the "L" terminal is normally open (NO), the programmable controller input point would be normally energized, and would deenergize when the sensor becomes "activated" by sensing the appropriate level of temperature, pressure, etc. This type of wiring connection causes the logic to be inverted, but there are at least three methods of reinverting the logic.

1) Use a proximity switch with a normally closed (NC) output.

2) Use inverted logic throughout the PLC program for the inverted input points. (Use NC contacts where you would normally use the NO contacts, and vice versa.)

3) Reinvert the inverted logic points (have a NC contact for each inverted input point feeding a separate internal coil address) and use the reinverted internal points in the rest of the PLC ladder program instead of the inverted input points.

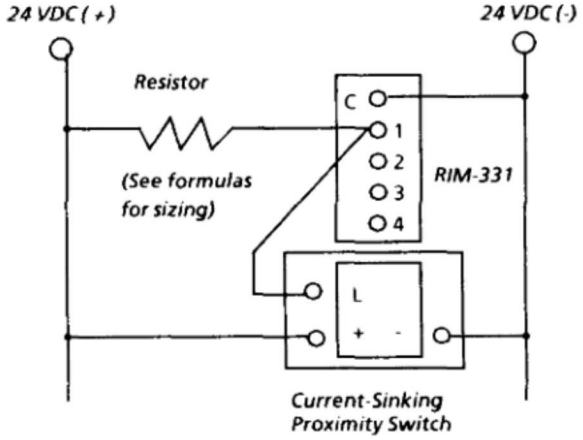


Figure 7
RIM-331 Wiring for Current-Sinking Input

The resistor should not exceed 2000 ohms, but will probably have to be lower depending on the specifications for the sensor. The resistance should be kept as high as possible to minimize current requirements from the DC power and to minimize heat production in the resistor. The maximum allowable resistance depends on the DC voltage available and the maximum leakage current of the sensor's "L" terminal, per the following formula:

$$R = \frac{(V - 12.5) \times 1000}{I + 5.75}$$

V = Applied DC voltage (Volts)
R = Maximum resistance (Ohms)
I = Maximum sensor leakage (Milliamps)

The wattage rating of the resistor depends on the DC voltage available and the resistor's resistance, per the following formula:

$$W = \frac{(V - 0.7) \times (V - 0.7) \times 2}{R}$$

V = Applied DC voltage (Volts)
W = Minimum wattage (Watts)
R = Resistance (Ohms)

The above formula provides a wattage cushion so that the resistor will operate reasonably cool even for a 100% duty cycle. Wattage size may be reduced for lower duty cycles (sensor conducting current for short periods of time, with non-conducting periods which allows the resistor to cool off).

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