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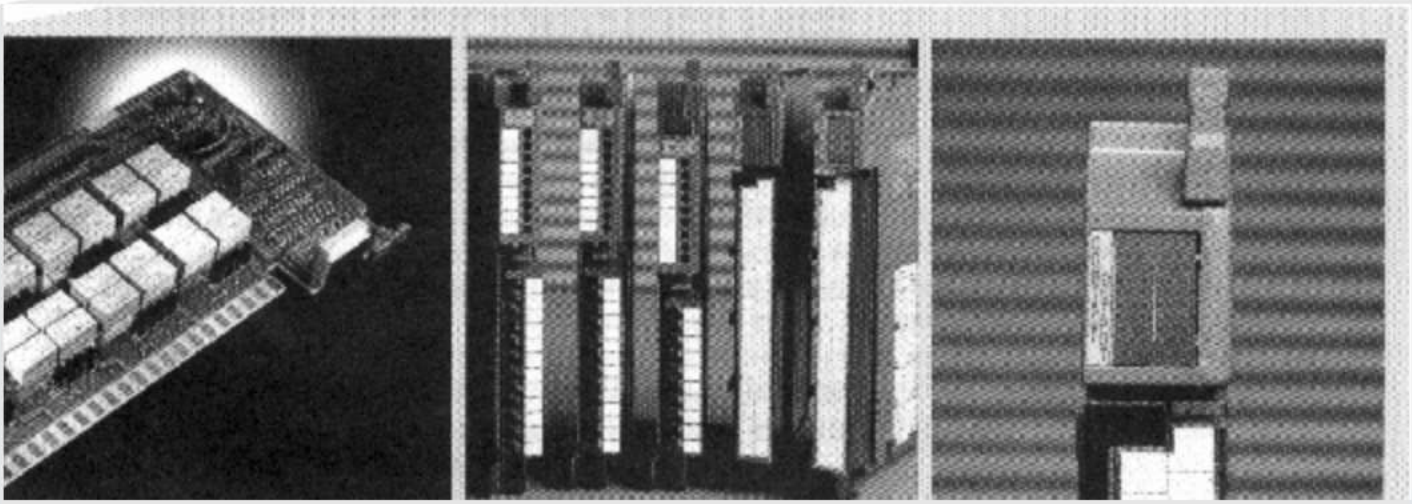
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Find the *Rockwell / Allen-Bradley 1771-OW* at our website: *Click HERE*

1771 Digital I/O
Relay Contact Output Modules

(Cat. Nos. 1771-OW, -OW16, -OWN, -OWNA, -OX, -OYL, -OZL)

Product Data



Eliminate leakage current. Relay contact output modules offer dry circuits, that is, circuits without leakage current. Leakage currents are present on solid-state outputs; these currents are capable of energizing highly sensitive output load devices such as low-power latching relays. Open contacts on output relays assure that no leakage currents occur in critical applications.

Select the configuration mode for outputs. Allen-Bradley relay contact output modules offer either normally-open (Form A) or normally-closed (Form B) configurations. You can select the form configuration for four of the contact output modules, the 1771-OW, -OW16, -OWN, and -OX. The 1771-OW has eight selectable outputs. The 1771-OW16 has eight normally-open and eight selectable outputs. The 1771-OWN has 32 selectable outputs.The 1771-OX has four selectable outputs. Selectable–configuration means you can predetermine whether an output will be on or off when local power is lost to the control system or the output module. The 1771-OWNA has 32 non-selectable normally-open contacts.

Rockwell Automation
Allen-Bradley

Publication 1771-2.181 – September 1997

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Benefits

Provide output isolation. Isolation helps assure that a failure on one output circuit does not pull down another output circuit, thus increasing overall system integrity. This isolation also protects the backplane logic from line transients on the output circuits.

Increase flexibility in applied voltages. You can apply either ac or dc voltages to relay contact output circuits. The range of these voltages can be broad (within the module's operating specifications) without impacting the module's performance.

Sink or source power. Contacts on relays permit dc outputs to be sinking or sourcing as required by the devices being controlled. Solid-state outputs require specific compatibility with the load device as to current sinking or sourcing.

Switch analog signals through relays. You can use analog module inputs for different devices by switching circuits through relays. Analog signals are typically low voltage (+10V dc) and low current (4-20 mA). Contact resistance can be critical, and should be accounted for in low-impedance circuits.

Using This Publication

This publication provides you with information about Allen-Bradley's relay contact output modules. The publication is divided into two sections. The first section contains general information that pertains to all of the relay modules; the second section contains module-specific information. The following table lists the relay contact modules and the page number on which you can find information about each.

Relay Contact Output Modules

For more information about this module:	Refer to page:
1771-OW (8 outputs/selectable)	15
1771-OW16 (8 fixed, 8 selectable)	15
1771-OWN (32 outputs/selectable)	17
1771-OWNA (32 outputs)	19
1771-OX (4 outputs/power)	21
1771-OYL (24V/8outputs)	23
1771-OZL (24V/8outputs)	25

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Allen-Bradley relay contact output modules use one of the following relay types:

Relay Type	Catalog Number
Electromechanical	1771-OW 1771-OW16 1771-OWN 1771-OWNA
Dry-Reed	1771-OYL, 1771-OYZ
Mercury-Wetted	1771-OX

Electromechanical Relays

Electromechanical relays contain the most economical design for power applications. These modules typically can handle line surges and noise through closed contacts. Electromechanical relays are not recommended for low voltage/low current applications. Electromechanical relays are generally slower than dry-reed relays. They are not recommended for use in environments with contaminants such as acid, ammonia, nitrogen, or chlorine (noxious environments) because they are not hermetically sealed. Allen-Bradley modules that use electromechanical relays include the 1771-OW, 1771-OW16, 1771-OWN, and 1771-OWNA modules.

Dry-Reed Relays

Dry-reed relays are noted for their speed. These relays are well-suited for low-voltage, low-power applications. They are hermetically sealed and thus offer protection in noxious environments. Dry reeds, however, cannot handle surge currents due to their low-voltage design. Allen-Bradley modules that use dry-reed relays are the 1771-OYL and 1771-OZL modules.

Mercury-Wetted Relays

The mercury-wetted relay is a power version of the dry-reed switch. These relays feature long life and high contact reliability because the mercury re-coats the contacts on every operation. Mercury-wetted relays are also hermetically sealed and have no bounce on outputs and offer a clean switch. Of the three types of relays, mercury-wetted relays are the slowest (10 ms). ATTENTION: The 1771-OX module contains mercury-wetted relays. At the end of the equipment's life, it should be collected separately from any unsorted municipal waste.

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The following table lists the Allen-Bradley relay contact output modules and shows compatibility and use of data table for each.

System Compatibility and Use of Data Table

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Relay contact output modules receive power through the 1771 I/O chassis backplane from the chassis power supply. Refer to the module specifications on pages 11 through 24 for the current required from the power supply (in mA) to operate the module. You should total the current requirements for all the modules in the chassis to avoid overloading the power supply or the I/O chassis backplane.

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Plastic keying bands shipped with each I/O chassis let you configure your I/O slots to accept only one type of module. You can configure any backplane connector in an I/O chassis to receive your contact output module except for the leftmost connector, which is reserved for adapter or processor modules. Since mixed voltages are often used on relay modules, most of the contact output relay modules all have the same keying slots. Refer to the module specifications for specific keying positions.

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Status indicators on the front of each module show the system logic side status of the output relays. Each module has one indicator per output. When the indicator is on, it means the output relay coil is energized; when the indicator is off, it means the output relay coil is not energized. You can quickly isolate many types of external hardware-related faults by comparing these indicators with their corresponding output devices, and the control program.

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When using relay contact output modules, you must consider the following:

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Relays have a finite number of operations during their life. This varies depending on the current loads and voltages you apply relative to the relay's design specifications. A relay that is always operating at the same load conditions has a very predicatable life. A low power load delivers longer contact life when the minimum load conditions are met. Varying load conditions can drastically shorten contact life. Do not operate a contact at low current or voltage conditions after operating the same relay under high power conditions. Operate at low power first, then at high power.

Electromechanical relays typically have a longer life than dry-reed relays. When selecting a relay type, we recommend that you consider the number of operations expected over time and the load placed on the relay.

The switching frequency of a relay is limited by its mechanical characteristics. To obtain maximum relay life, do not exceed the maximum switching frequency of the module.

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All types of relay outputs have a specified time in which contact is made or broken (pull-in or drop-out times). Dry-reed relays are notably faster than electromechanical. Electromechanical and dry-reed relays have contact bounce. Mercury-wetted relays do not have bounce.

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All wiring between the module and the load creates a certain amount of capacitive loading for the relay contacts. This capacitance is discharged during contact closure. The resulting peak current flow causes additional wear of the contact. Avoid this effect by keeping your cable lengths as short as possible, and, if possible, insert a resistor in series with your load. Locate the resistor as near as possible to the field wiring arm. Size the resistor properly.

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Many loads (relays, coils, motor starters, solenoids, motors, etc.) contain a certain amount of inductance. This inductance does not allow an instantaneous change of current when the relay contacts open. As a result, the voltage across the contacts rises to a very high level, and causes arcing between the contacts. This arcing reduces the life of the contacts.We recommend you use a resistor-capacitor (RC) network (also called a "snubber") across the contacts in all circuits.

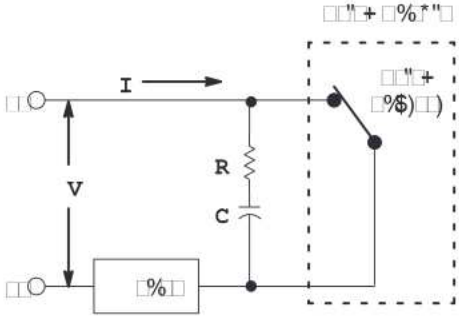
ATTENTION: Failure to use a resistor-capacitor (RC) network across the relay contacts can result in generation of electromagnetic noise which could disrupt nearby electrical equipment, including the 1771 I/O chassis.

The best location for the RC network is across the relay contact terminals on the field wiring arm. This location suppresses the noise where it is generated, and does not let the noise radiate along the wiring going to the load.

The 1771-OW, -OW16, -OWN, -OWNA, -OYL, and -OZL modules are not approved by UL/CSA for use with reactive loads. The 1771-OX module is designed with selectable dc surge protection circuitry.

The formula necessary to determine the appropriate values for the RC network is shown below. Use a capacitor with an ac voltage rating greater than the maximum voltage seen across the contacts. Use a 5%, 1 Watt carbon composition resistor.

Resistor-Capacitor Network Calculation of Values



$C = I^2/10$ in μF

$R = V/(10I^a)$ in ohms

Where: I = Amps
V = Volts
a = 1 + (50/V)

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Incandescent lamps also create a spike due to their low turn-on resistance before they become hot. Therefore, you must use derating or surge suppression (for example Allen-Bradley surge suppressors 1492-H2K120, 1492-H2K024, and 1492-H2K240). Specified relay current is typically derated at ten times the steady-state current of the incandescent lamp load. For derating, you can calculate cold-start load by measuring the cold load resistance. You can also experience large current surges when bulbs burn out (e.g. 20-50 amps).

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The operating temperature of the relay greatly influences the life of the relay contacts. The 1771 relay contact output modules have a maximum operating temperature of 60°. Operation at lower temperatures will extend relay contact life.

Since electromechanical relays are not hermetically sealed, they are not recommended in environments with contaminants such as acid, ammonia, nitrogen, and chlorine— especially with voltages under 24V ac/dc or for prolonged periods without operation. Such environments contaminate the relay contacts, causing reliability problems. Higher voltage usage, between 24 and 120V ac/dc, and continued operation help keep contacts clean as a result of the burning off of contact contaminants. Relays are also subject to reliability problems under high vibration environments as mechanical motion can intermittently break contacts.

Mercury-wetted relays and dry-reed relays are hermetically sealed from the environments, thus preventing environmental reliability problems. Mercury-wetted relays are generally sensitive to mounting position.

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The life of the relays in the output modules is directly affected by the load through the contacts and the operating temperature.

Minimum currents and voltages specified for 1771 relay contact output modules are selected to provide clean contacts throughout the life of the contacts. The relays can operate below the minimum specifications, but operation will not be reliable.

Exceeding the maximum power ratings for the module will shorten the life of the relay contacts. Do not operate relay contact output modules at power levels greater than maximum specifications.

By using the operating range graphs, you can determine if you are within the operating capability of the relay. You only need to know any two of the following:

- voltage
- load current (mA)
- load power consumption (W)

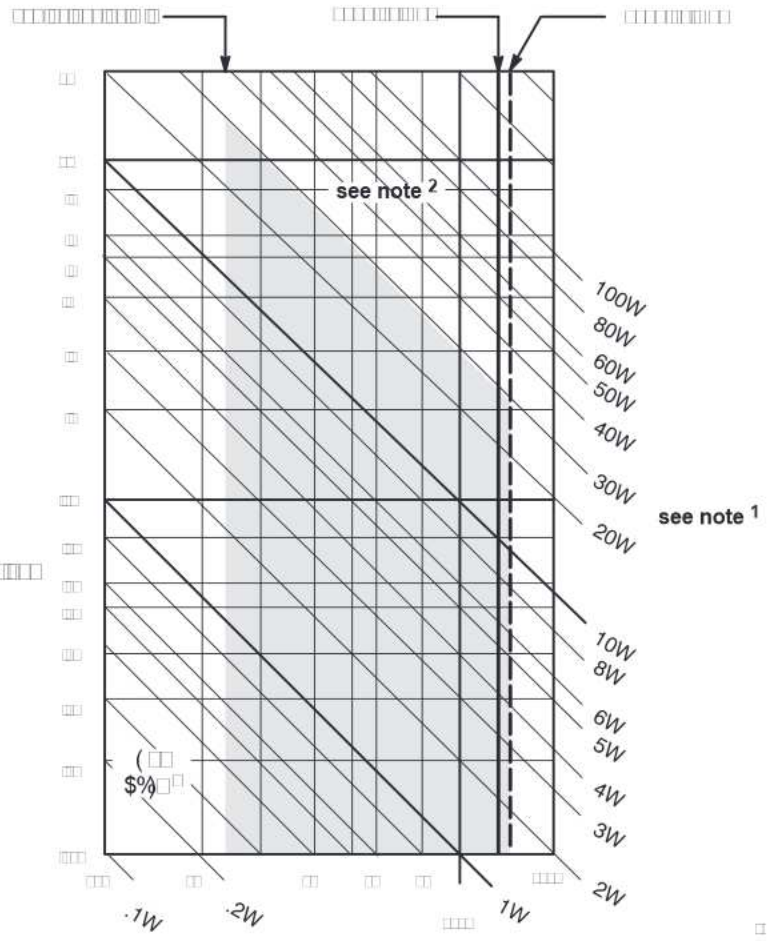
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Using Figure 1, follow this example:

Given a 30V dc, 4W indicator, is this in operating range?

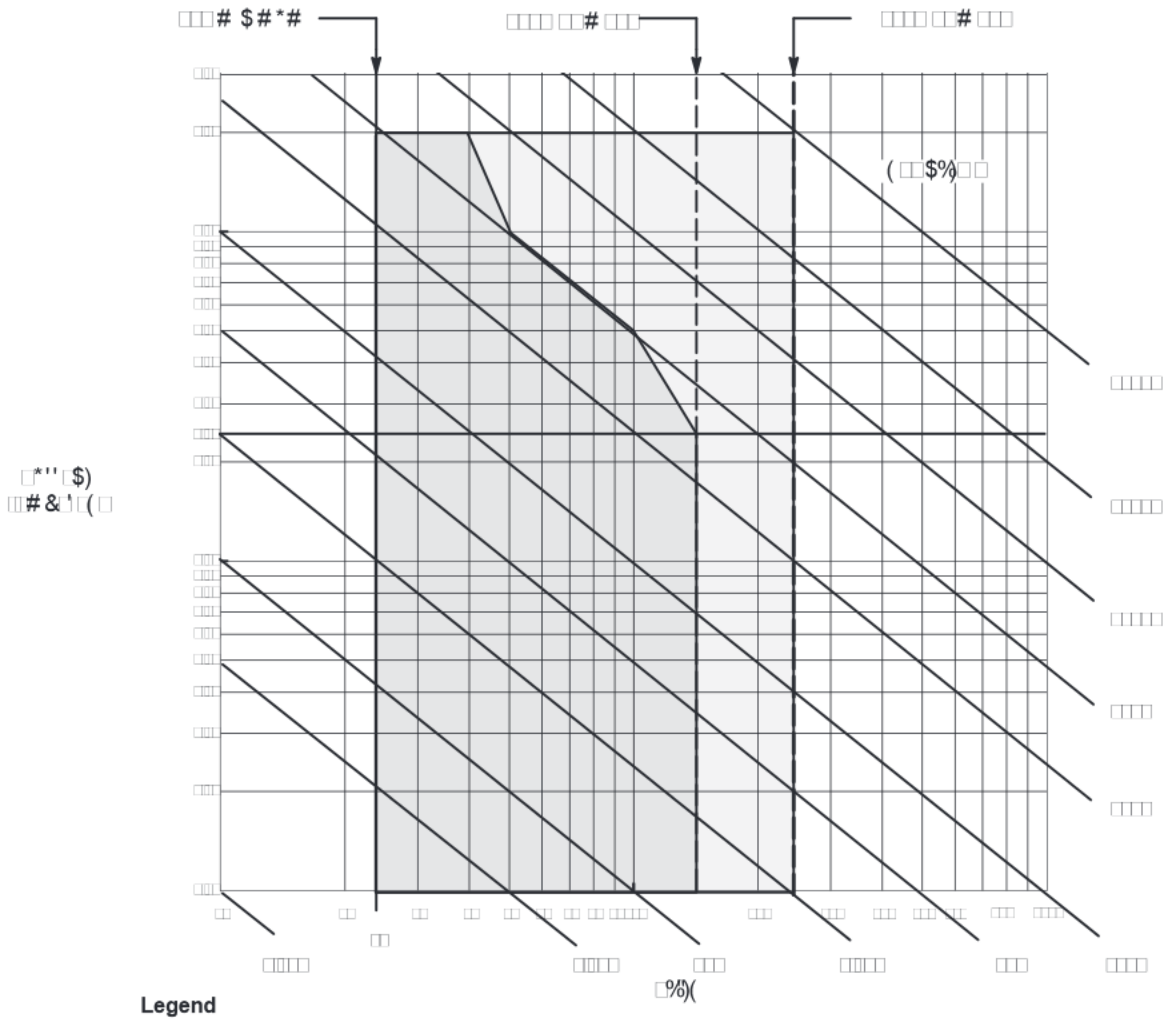
1. Locate the vertical line for 30V.
2. Locate the angled line for 4W; it is at this angle (\).
3. Find where the two lines cross. If this is within the shaded area of the graph, you are in the permissible operating area for the relay contact output module. (In this example, you are in the permissible operating range.)

Refer to the following operating range graphs to determine the operating capability of the relay.



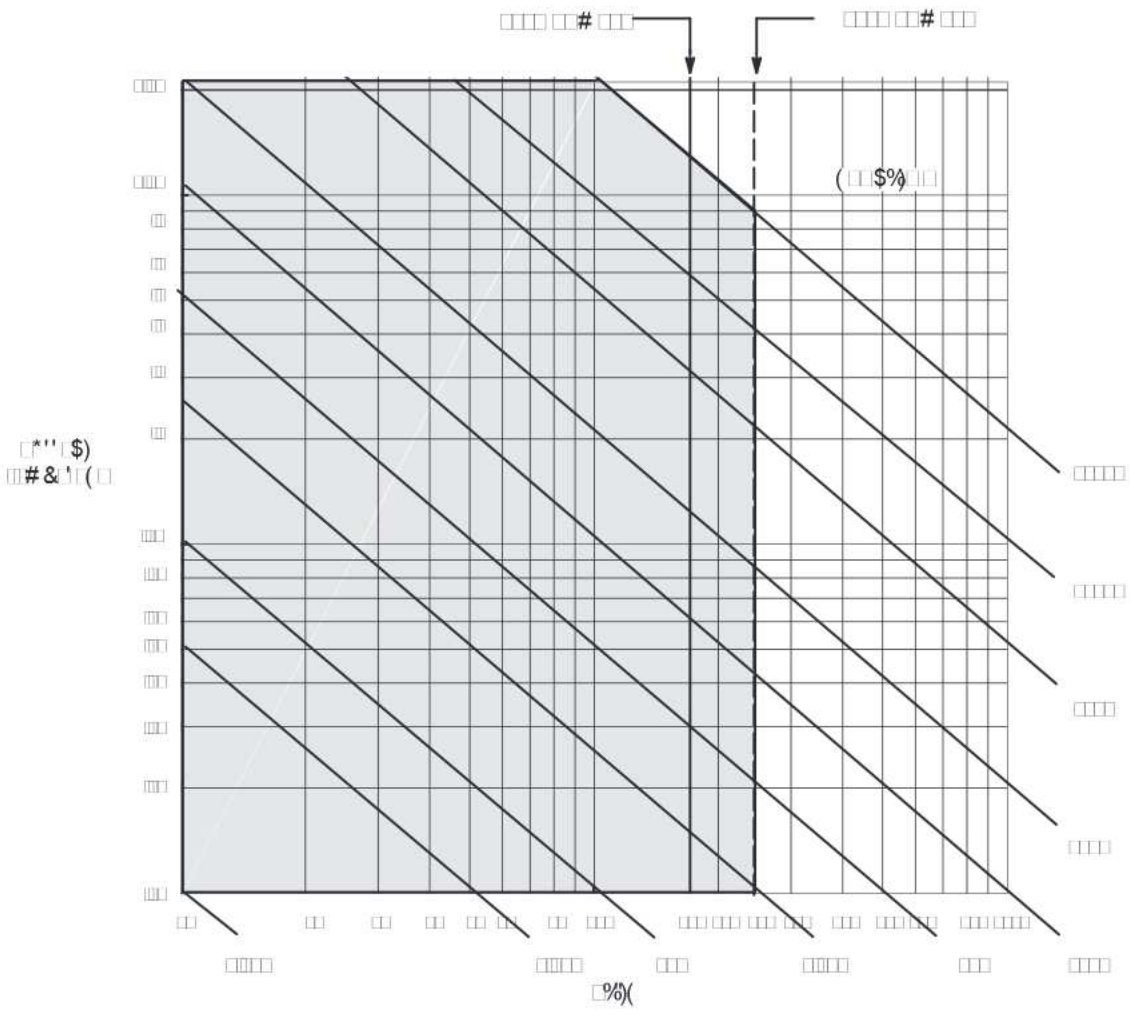
2 CAUTION! Do not operate in this area.

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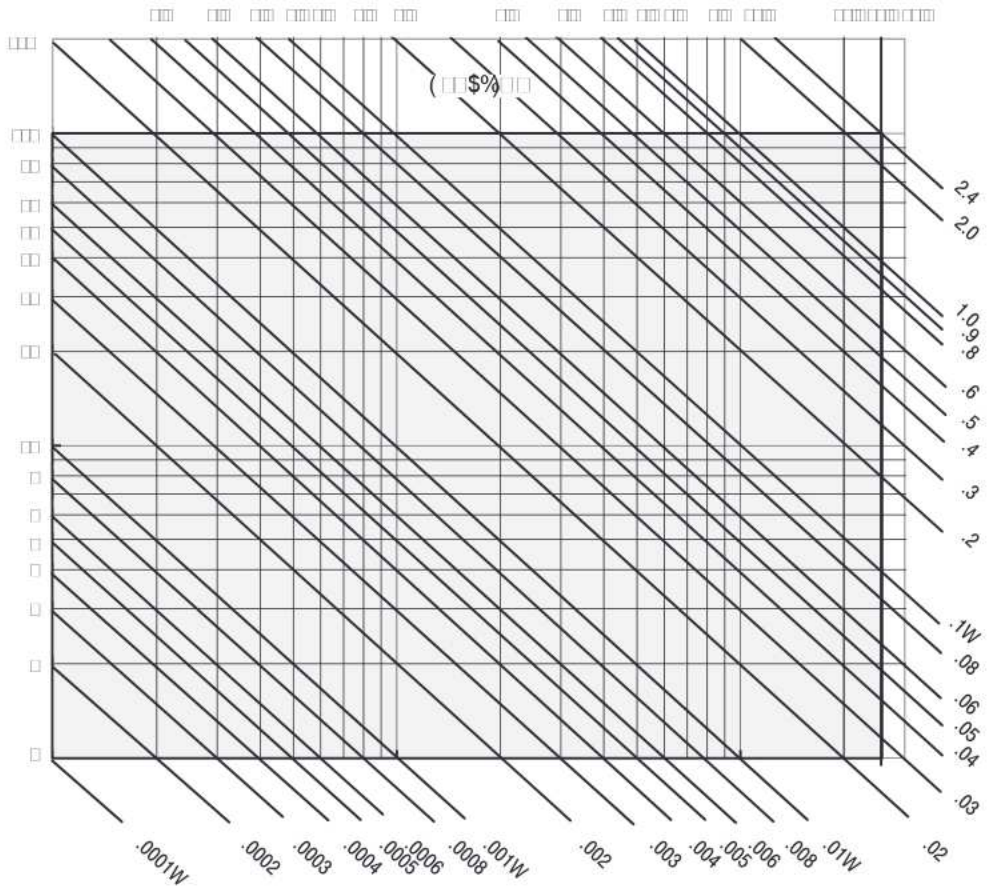
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[2] **CAUTION!** Do not operate in this area.

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[1] Resistive loads only. ac or dc power = 2.4W max.
[2] **CAUTION!** Do not operate in this area.

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If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

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This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2EMC – Generic Immunity Standard, Part 2 – Industrial Environment

This product is intended for use in an industrial environment.

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This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131–2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Guidelines for Handling Lithium Batteries, publication AG-5.4
- Automation Systems Catalog, publication B111

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Individual discrete I/O modules can also comply with various other agency requirements when product or packaging is so marked.

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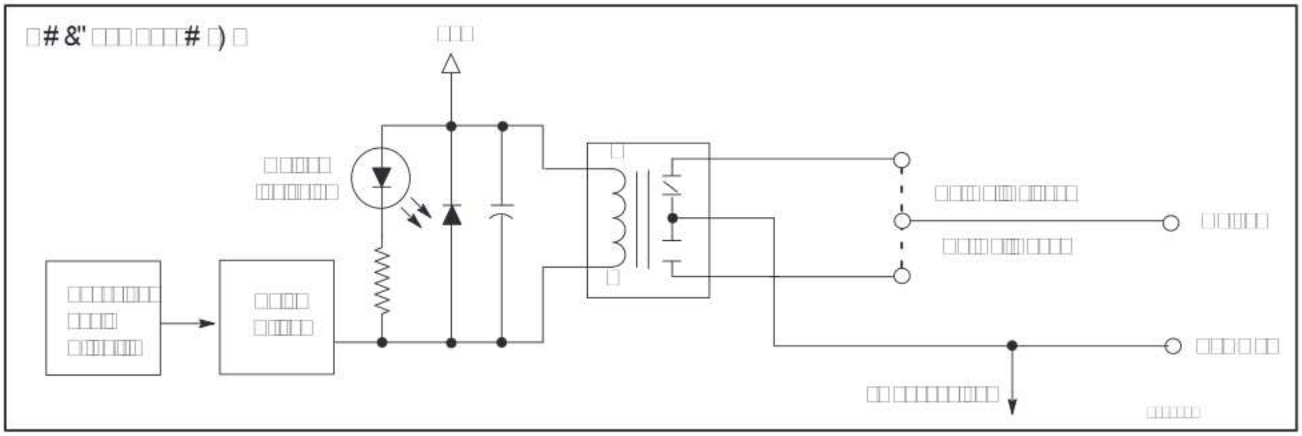
Refer to the following pages for detailed information about each Allen-Bradley relay contact output module. This information includes:

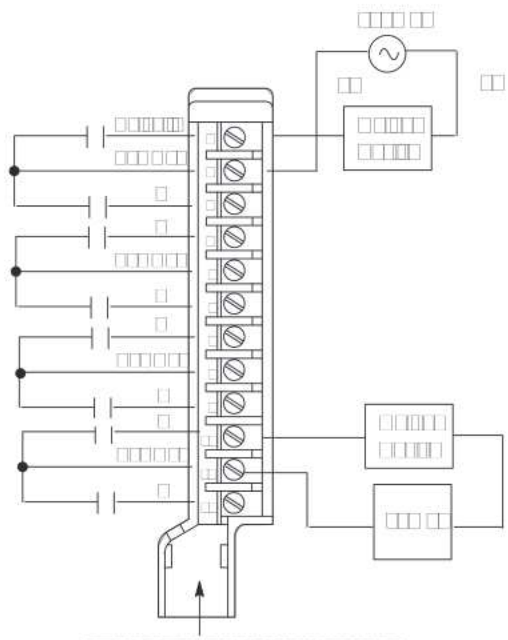
- simplified schematic
- application notes
- connection diagram
- driving an input module with an output module
- switch and jumper settings
- specifications

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1771-OW (8 outputs/selectable)	15
1771-OW16 (8 fixed, 8 selectable)	15
1771-OWN (32 outputs/selectable)	17
1771-OWNA (32 outputs)	19
1771-OX (4 outputs/power)	21
1771-OYL (24V/8outputs)	23
1771-OZL (24V/8outputs)	25

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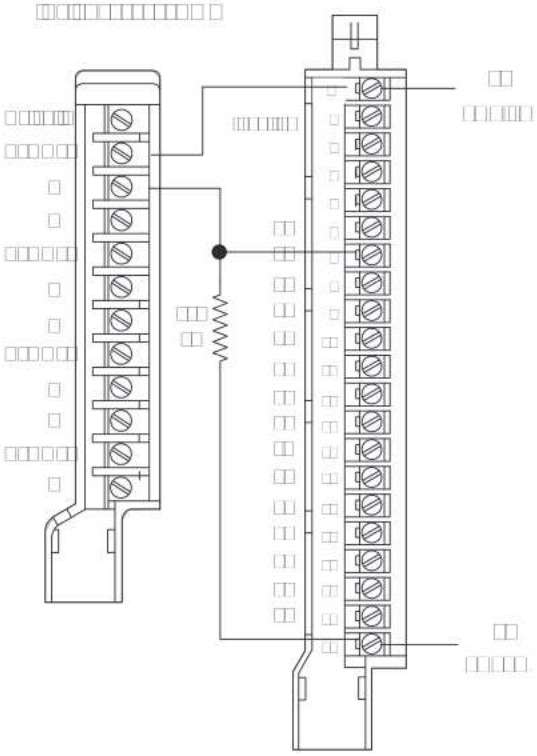
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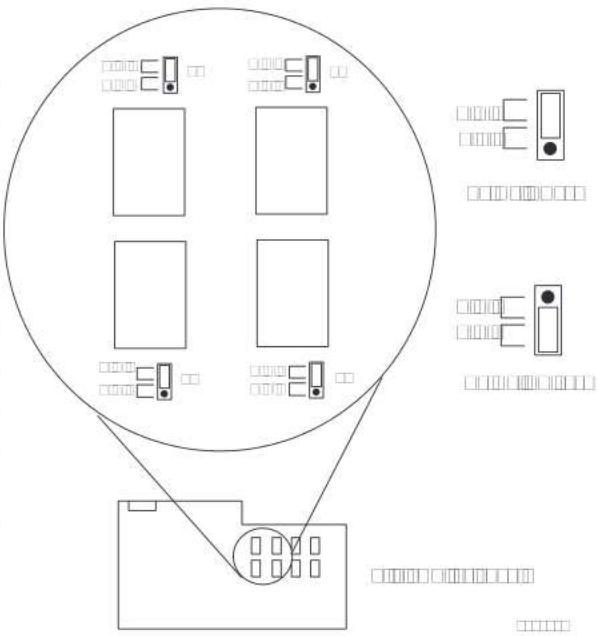




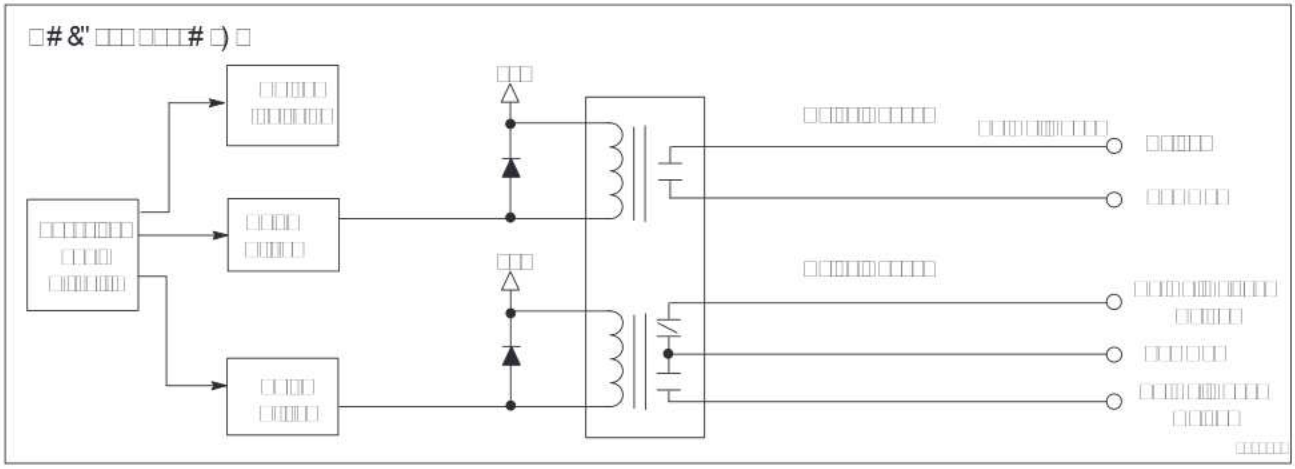
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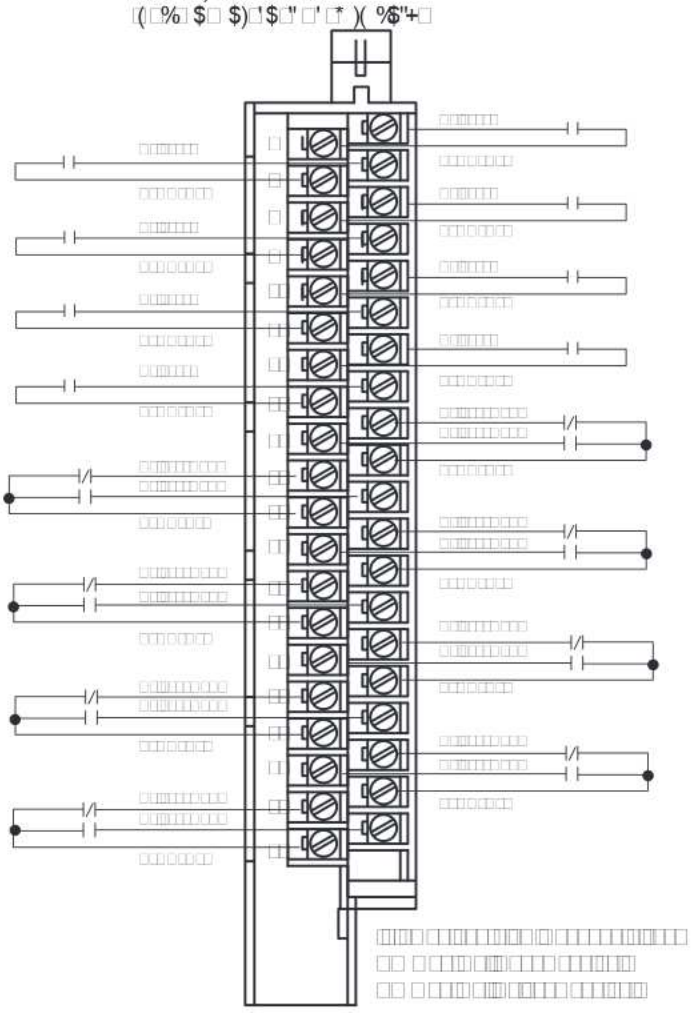
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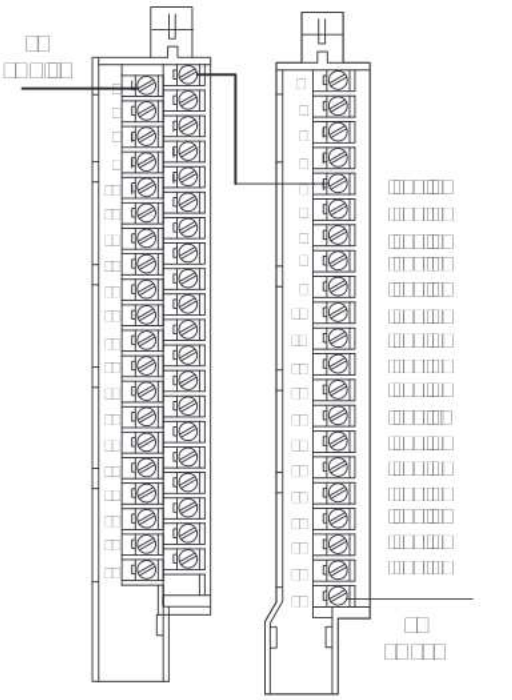
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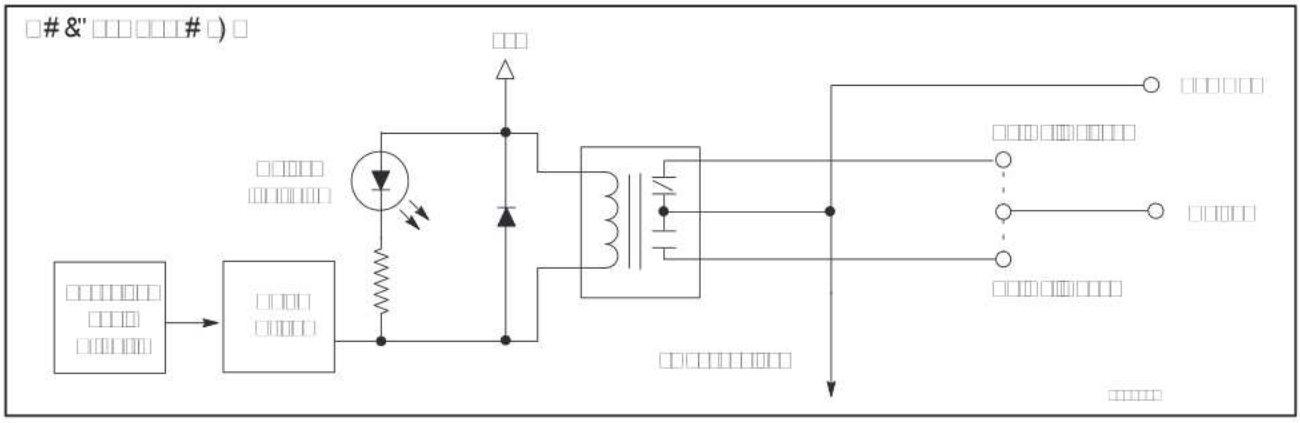


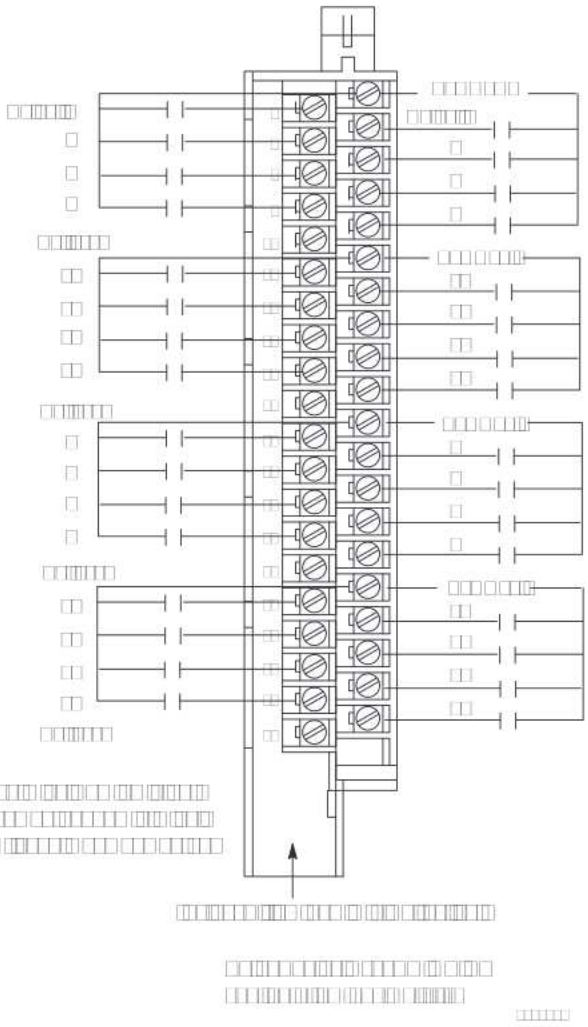


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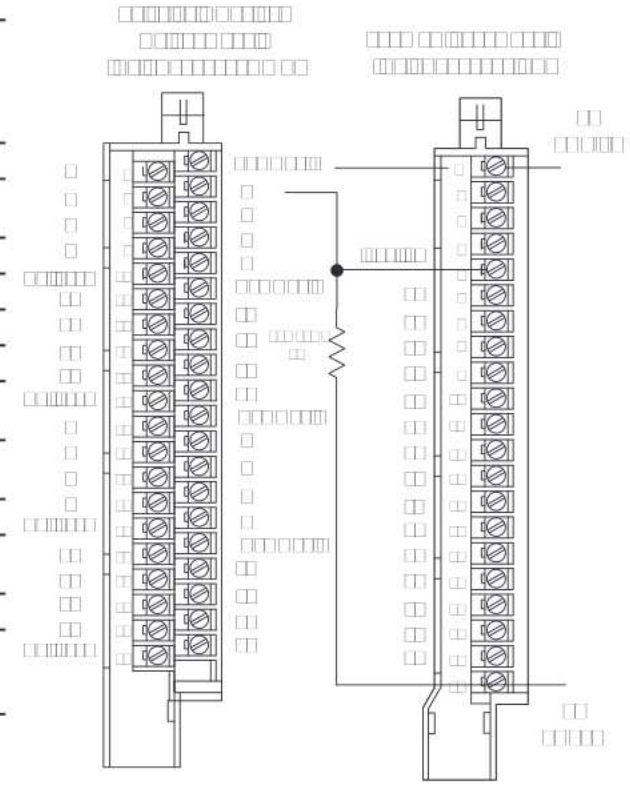


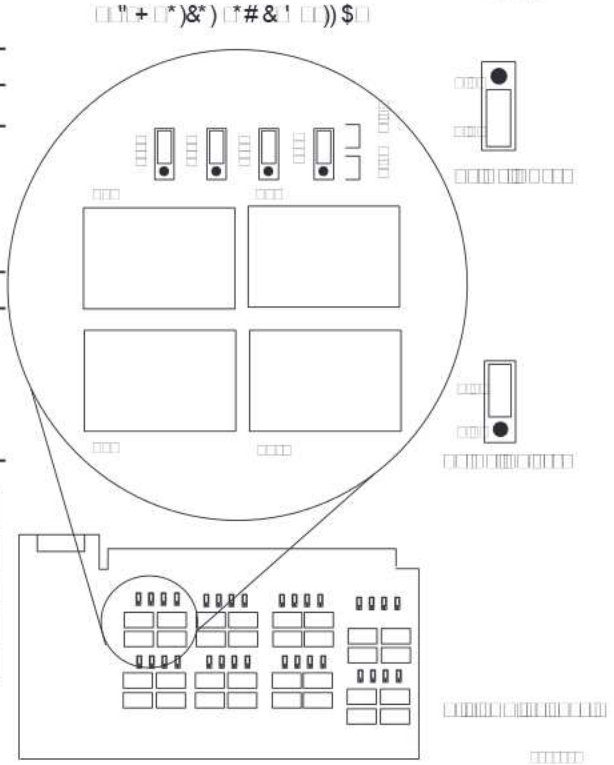




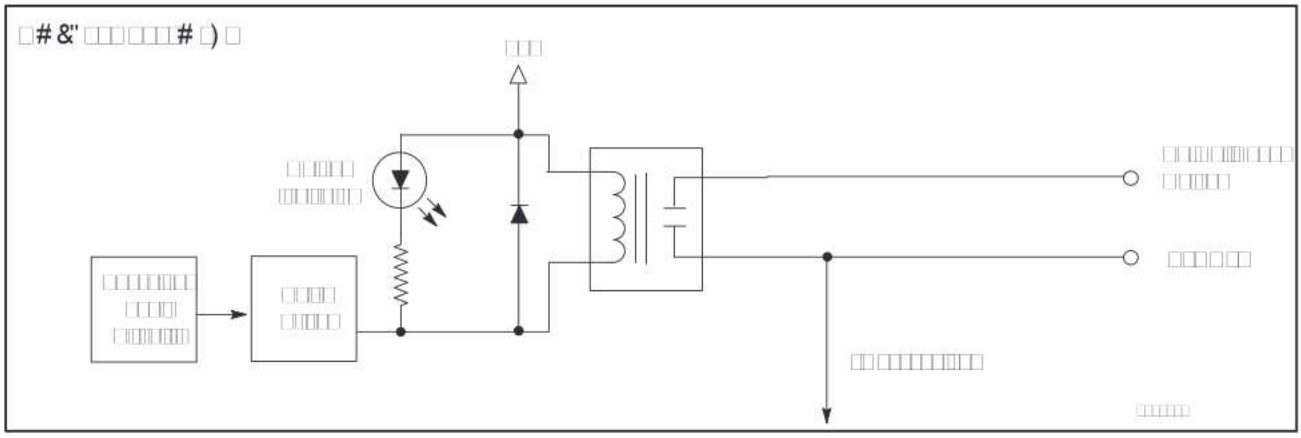
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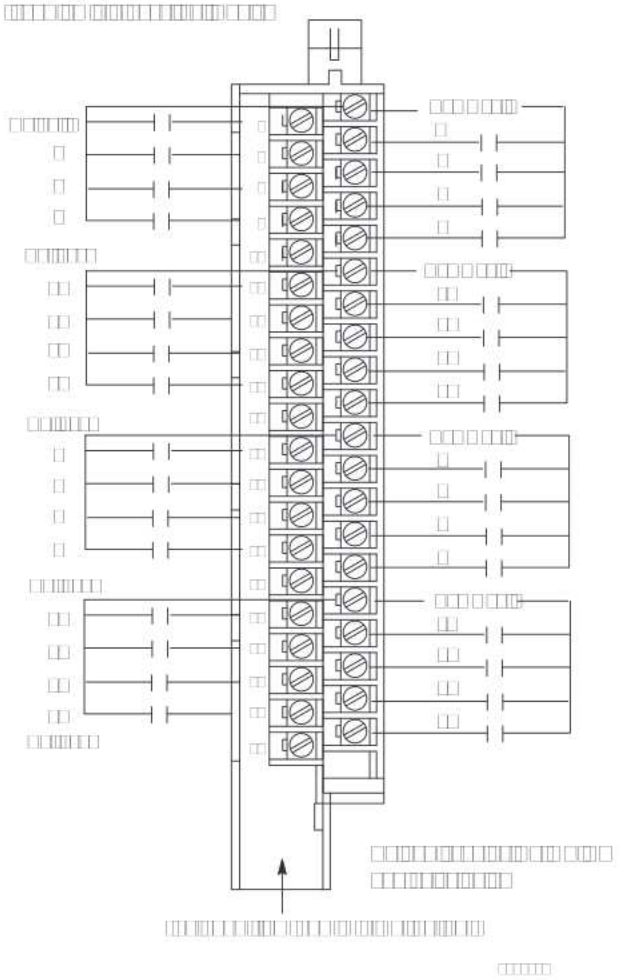
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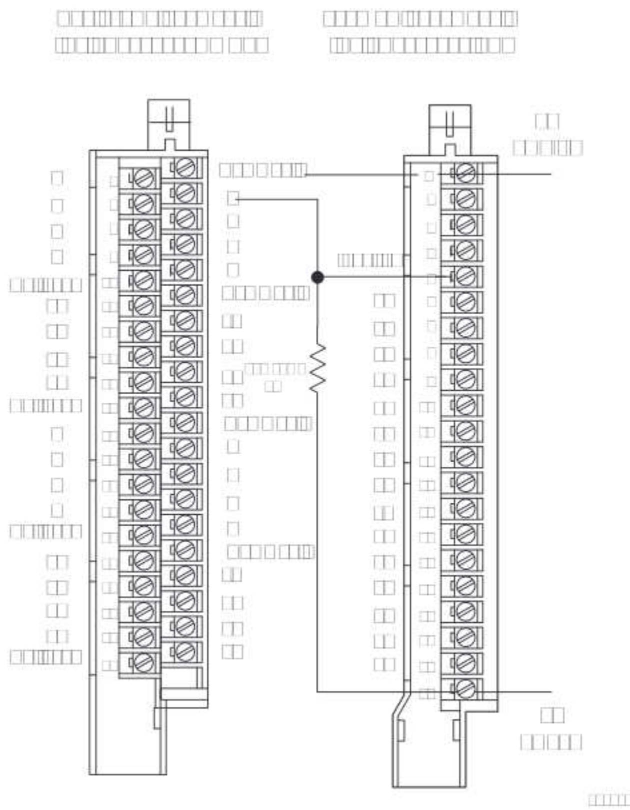




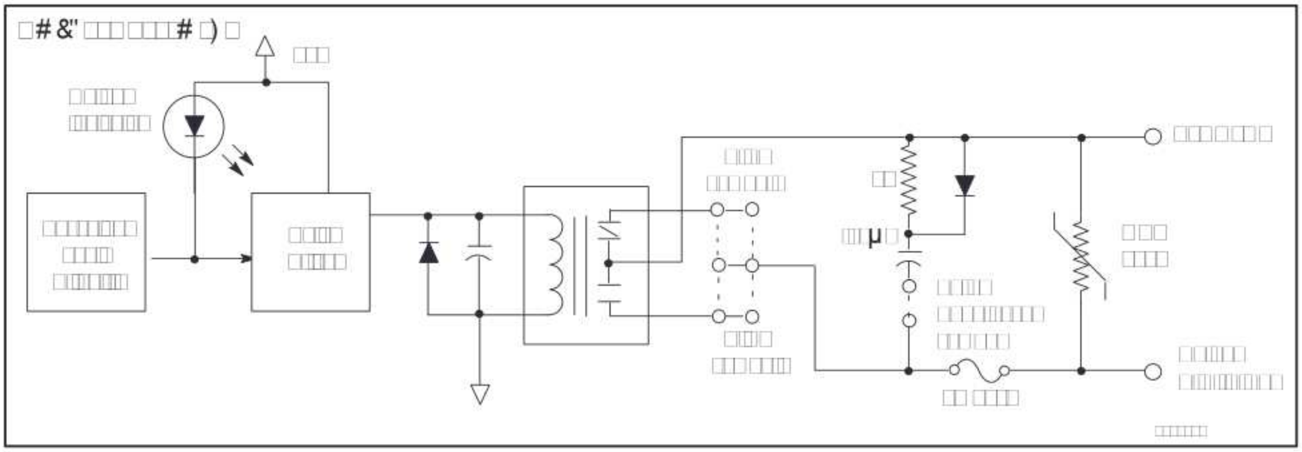
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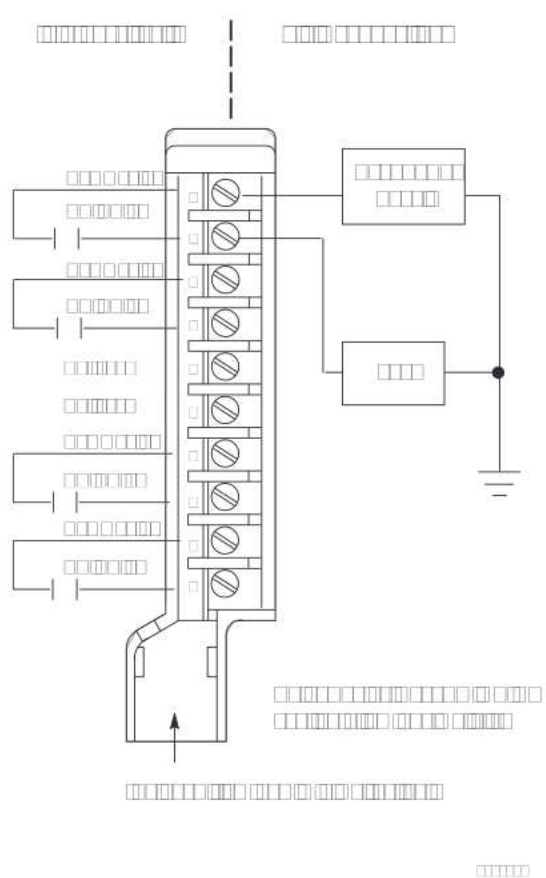






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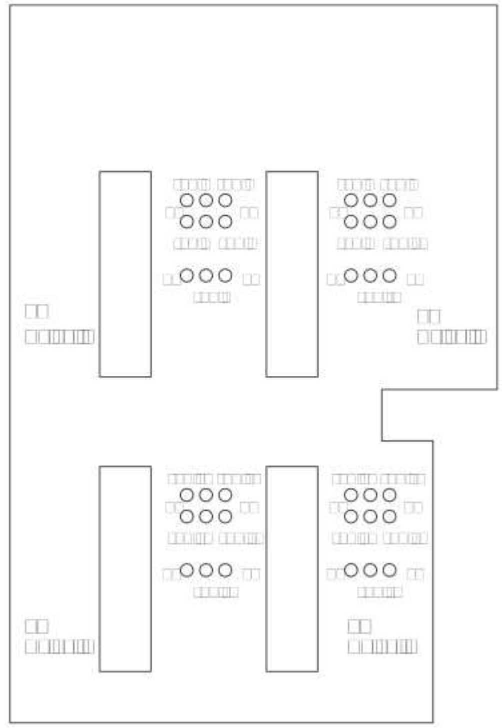
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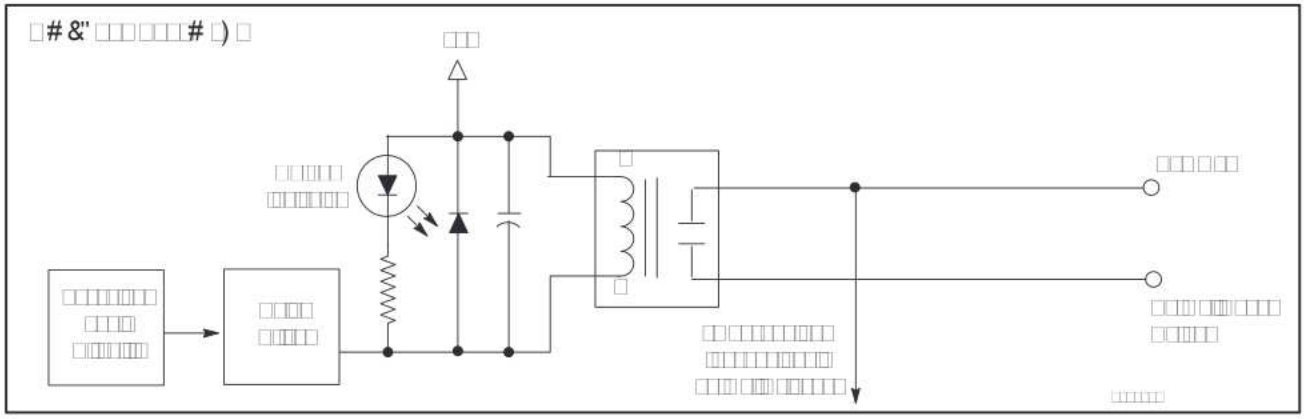
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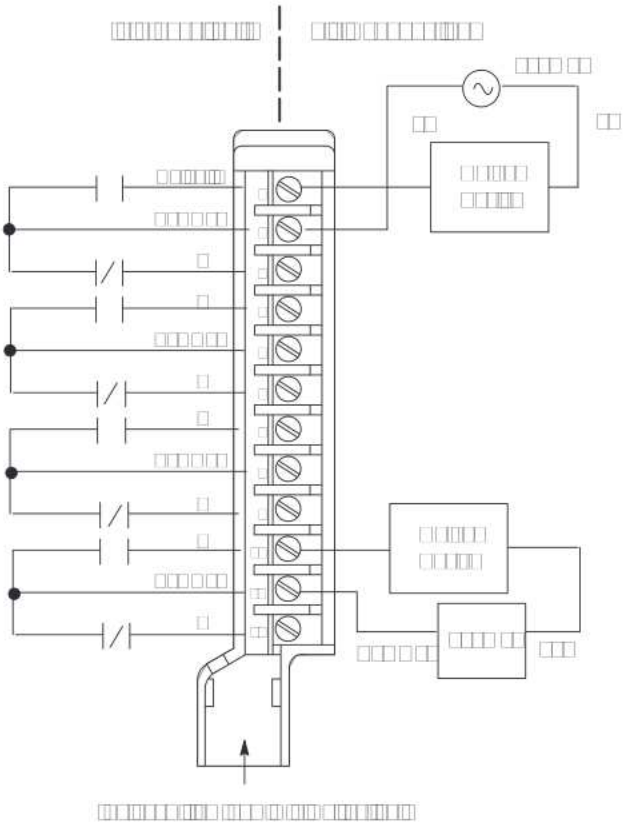
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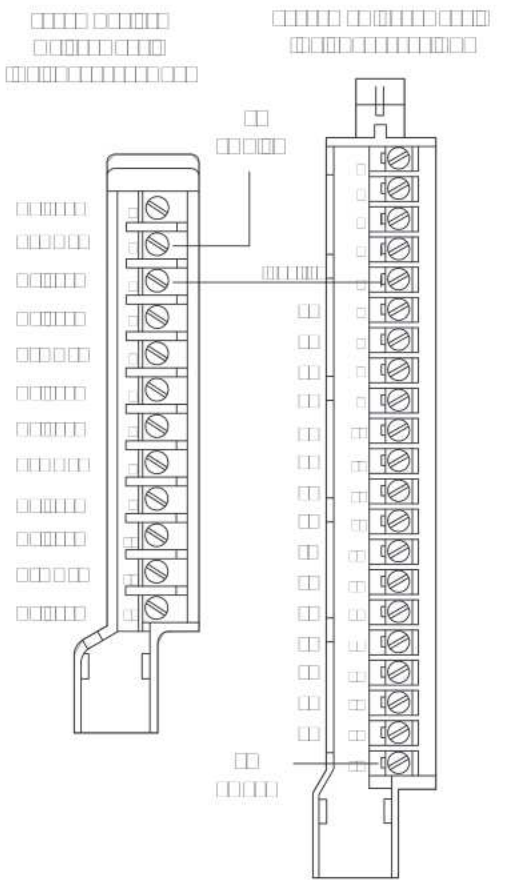
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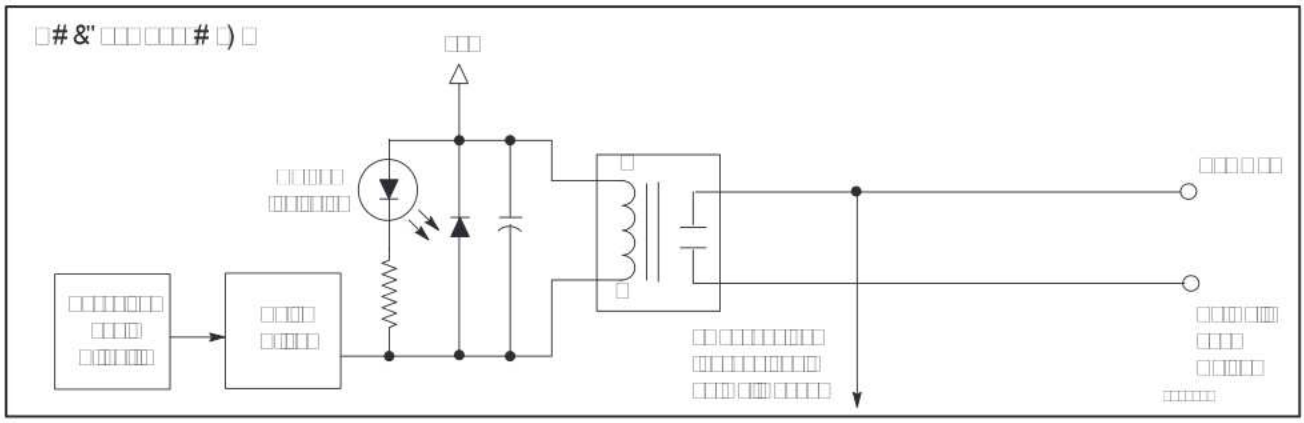


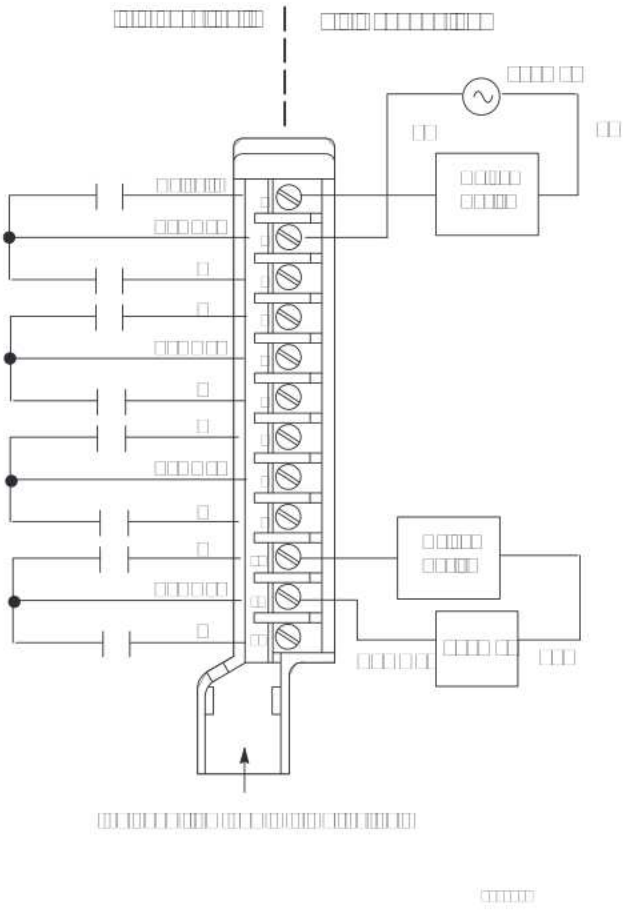


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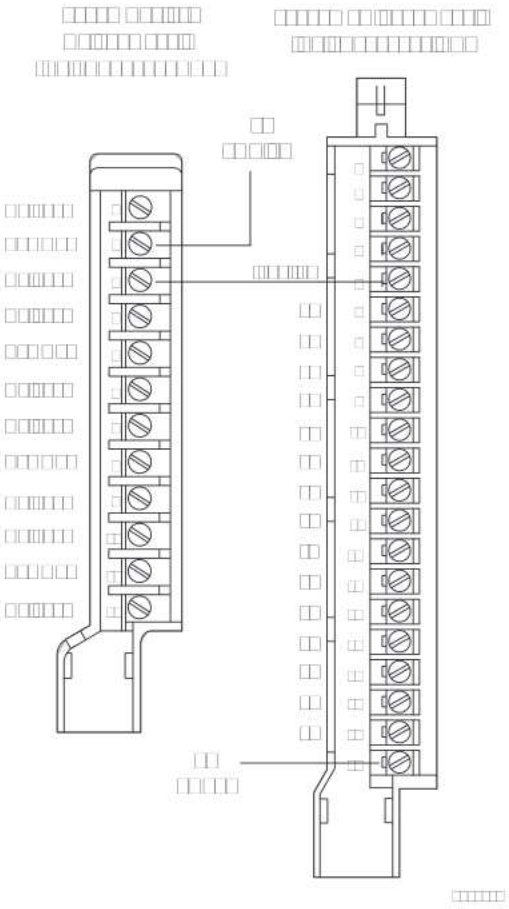






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You can refer to the following publications for more information about Allen-Bradley relay contact modules and other Allen-Bradley discrete I/O modules:

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