THE INPUT/OUTPUT SYSTEM

2

In the first module, you learned about the basic architecture and operation of the Allen-Bradley Micrologix 1000, including a brief introduction to its I/O system. This second module goes into more detail about the I/O system of the Micrologix 1000 PLC. It includes four sections:

1. Types of input/output devices
2. Input interfaces
3. Output interfaces
4. System and I/O power distribution wiring

Key Points

After finishing this module, you will:

- know the difference between the two types of I/O devices, including which type works with the Micrologix 1000
- understand the input interface configurations available in the Micrologix 1000, their functional differences, and their different wiring requirements
- understand the various output interface configurations and the wiring requirements of each
- have an overview of how to hook up a Micrologix 1000 and its I/O devices to the incoming power source

2-1 Types of Input/Output Devices

A MicroLogix 1000 PLC uses its input and output interfaces to connect with field input/output devices. To review, all input devices provide a signal to the PLC, and all output devices receive a signal from the PLC. All I/O devices, however, do not send and receive the same type of signal. There are two different types of I/O signals and two types of I/O devices that use them. The two types of I/O devices are discrete devices and analog devices.

At the end of this section, you will know:

- the difference between the two types of I/O devices
- which type works with the MicroLogix 1000

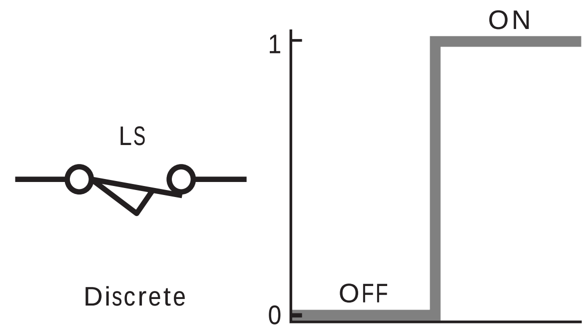


Figure 2-1. A limit switch sends a discrete digital signal to a PLC.

Discrete Devices

Discrete devices are input or output devices that provide or receive discrete digital signals. A discrete digital signal is one that can report only two states, such as ON/OFF or open/closed.

A limit switch is an example of a discrete input device because, at any given time, it is either open or closed. It sends a discrete digital signal to a PLC. This signal can have one of only two values, 0 or 1, indicating that the device is either OFF or ON, respectively (see Figure 2-1).

A pilot light is an example of a discrete output device (see Figure 2-2). It can only be ON or OFF. A discrete output device receives a discrete digital signal from a PLC telling it to be in either one state or the other. A discrete output can never be in a state in between ON and OFF.

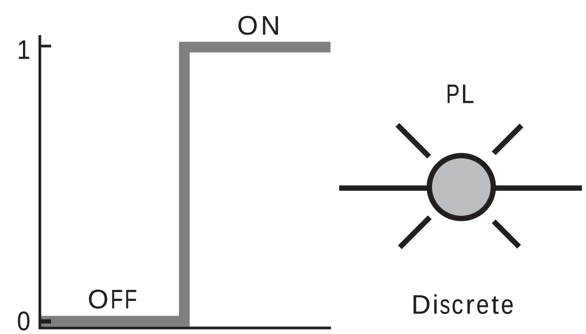


Figure 2-2. A pilot light receives a discrete signal from a PLC.

Analog Devices

In contrast to discrete devices, **analog devices** are input or output devices that provide or receive analog signals. Analog signals are continuous and can have any number of states—not just two, as with discrete digital signals.

A temperature transducer is an example of an analog input device. It sends a continuous stream of temperature data to a PLC (see Figure 2-3). This temperature data is expressed in varying degrees—not simply as hot or cold.

An analog control valve is an example of an analog output device. It receives a continuous analog signal from a PLC telling it how much to open or close (see Figure 2-4). If it was a discrete device, it could only be either totally open or closed, but never in between.

PLCs can interface with both discrete and analog devices. However, discrete devices are much more prevalent in PLC applications. The MicroLogix 1000 is designed to interface only with discrete I/O devices.

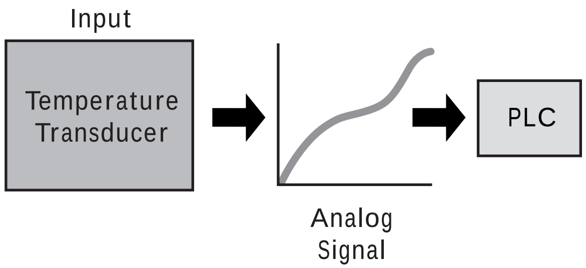


Figure 2-3. A temperature transducer sends a continuous stream of data to a PLC.

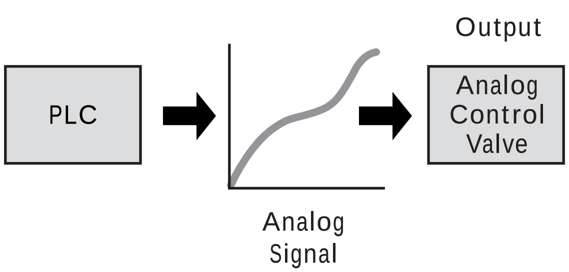


Figure 2-4. An analog control valve receives a continuous signal from a PLC.

2-2 Input Interfaces

A MicroLogix 1000 uses **input interfaces** to connect with discrete input devices. These interfaces contain all of the circuitry needed to allow the field input devices to communicate their status to the PLC.

The previous module explained that there are two versions of the MicroLogix 1000 PLC: a 16 I/O version and a 32 I/O version. The 16 I/O version has 10 input terminals, while the 32 I/O version has 20 input terminals.

All discrete input devices send an ON/OFF electrical signal to a programmable controller; however, not all discrete inputs send the same type of electrical signal. The two most common types of discrete signals are 120-volt AC and 24-volt DC signals. Accordingly, there are two input interface configurations available in the MicroLogix 1000: 120-volts AC and 24-volts DC.

At the end of this section, you will understand:

- the 120 VAC and 24 VDC input interface configurations
- the functional differences between the two types of input interfaces
- the wiring requirements of each input interface

120-Volt AC Input Interfaces

Three models of the MicroLogix 1000 come with a **120-volt AC input interface**, which converts the 120 VAC signal from the input devices into a low-level DC signal that the PLC's processor can read (see Figure 2-5). To understand this conversion, you need to be familiar with the interface's components and wiring.

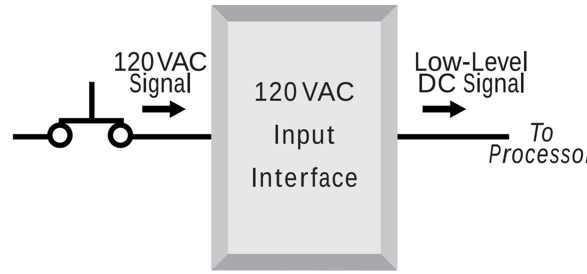


Figure 2-5. A 120 VAC input interface converts a 120 VAC signal into a low-level DC signal.

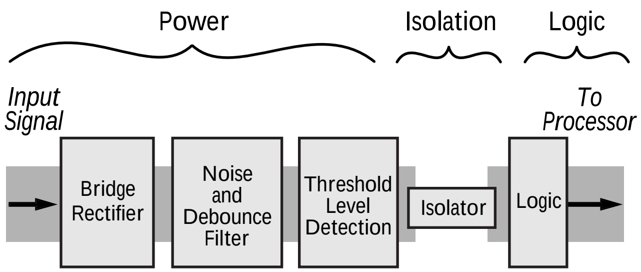


Figure 2-6. The three components of a 120 VAC input interface.

Components. The 120 VAC input interface of a MicroLogix 1000 has three components (see Figure 2-6):

- the power section
- the isolation section
- the logic section

Power Section. The **power section** receives the input signal from the field device and converts it into a low-level DC signal using a **bridge rectifier circuit**. It then passes the signal through a filter to eliminate noise and bouncing. Finally, it uses a threshold detection circuit to check that the signal is valid.

Isolation Section. After the signal is converted by the power section, it goes through the **isolation section**. This section uses an optical coupler to electrically isolate the power and logic sections. This prevents high-voltage spikes in the I/O signal from reaching the PLC and damaging it.

Logic Section. After the isolation section, the signal enters the **logic section** of the input interface. This section sends the newly converted and isolated input signal to the PLC's processor.

The MicroLogix 1000's 120 VAC input interface also includes a power **LED indicator**. This LED indicates whether the interface is receiving a valid signal from the input device. If both the input device and the LED are ON, then everything is working properly. However, if the input device is ON but the LED is OFF, then a problem exists somewhere between the input device and the MicroLogix's input terminal.

Wiring. To grasp the wiring requirements of the MicroLogix 1000's 120 VAC input interface, you must understand the three types of wiring associated with it. These are:

- the PLC wiring
- the device wiring
- the common (or return) wiring

PLC Wiring. The MicroLogix has built-in input interfaces in both the 16 and 32 I/O models. Since the input interface is already wired to the PLC, input wiring is easy and quick.

Device Wiring. Input devices can be wired to a 120 VAC input interface in one of two ways:

- they can be wired directly to the interface
- they can be wired to a terminal block that is wired to the interface

If an input device is wired directly to a MicroLogix 1000's input interface (see Figure 2-7), then one side of the device should be wired to the L1 hot line of the incoming AC power source. The other side should be wired to an input terminal on the PLC.

If an input device is wired to a terminal block instead of directly to the PLC (see Figure 2-8), then the line going out of the input device should be wired to the terminal block. The block, in turn, should be wired to the PLC. In MicroLogix 1000 applications, the wiring of devices through a terminal block is more common than wiring them directly to the PLC.

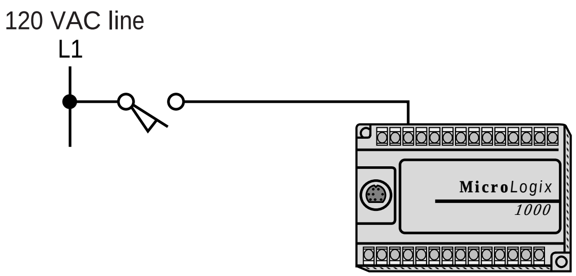


Figure 2-7. An input device wired directly to a MicroLogix 1000's input interface.

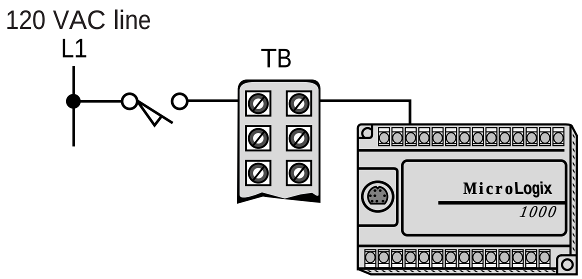


Figure 2-8. An input device wired to a MicroLogix 1000 via a terminal block.

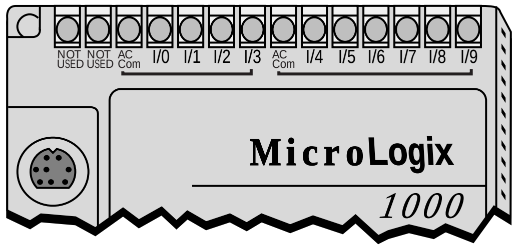


Figure 2-9. In a 16 I/O MicroLogix, input terminals I/0–I/3 share a common, as do input terminal I/4–I/9.

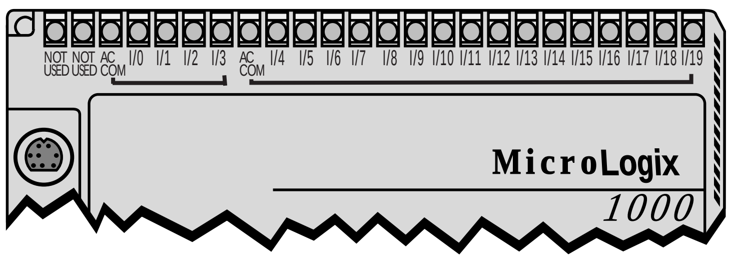


Figure 2-10. In a 32 I/O MicroLogix, input terminals I/0–I/3 share a common, as do input terminal I/4–I/19.

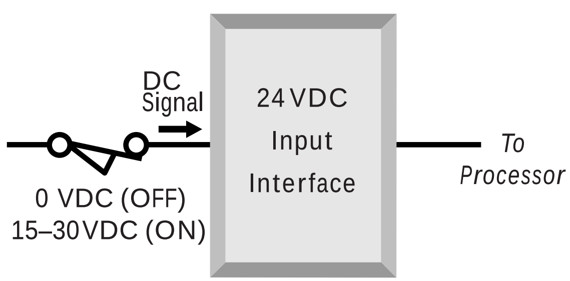


Figure 2-11. A 24 VDC input interface.

Common Wiring. Each input device connected to a MicroLogix's 120 VAC input interface must also be connected to the AC return line, called the L2 common line. The device must have this common connection for its electrical circuit to be complete.

The input terminals on a 120 VAC interface are arranged in two groups with each group sharing a connection to the common line. In a 10-input MicroLogix, the first four input terminals share one common connection, and the last six share another (see Figure 2-9). In a 20-input model, the first four inputs again share one common connection, while the last sixteen share another (see Figure 2-10).

24-Volt DC Input Interfaces

A **24-volt DC input interface** is used with field devices that provide a DC input signal to the PLC (see Figure 2-11). This input signal can range from 0 VDC when the device is OFF to between 15 and 30 VDC when the device is ON.

Six models of the MicroLogix 1000 have DC input interfaces. Two of these come with an AC power supply, as well as a built-in 24 VDC power source. This power source can be used to power the DC inputs, but it should not be used to power the PLC's DC outputs. The other four MicroLogix models do not provide a built-in DC power source. These models require an external DC power supply to power the inputs.

Two types of DC input devices are used with PLCs:

- sourcing devices
- sinking devices

Sourcing devices *provide* current when they are ON, while **sinking devices** *receive* current when they are ON. Some devices, like DC sensors, can have either a sinking or a sourcing configuration. A MicroLogix 1000 with a DC interface can connect with either sinking or sourcing DC inputs, but the wiring is different for each.

Sourcing DC Inputs. Sourcing input devices provide current when they are ON (see Figure 2-12). For a sourcing input, one side of the input device is wired to the positive DC voltage line, and the other side is wired to the PLC's input interface. The interface is then connected to the common line, which is the negative DC voltage line. In a MicroLogix, the negative DC voltage line is grounded; thus, the common line is grounded. This wiring configuration causes power to flow from the positive line, through the field device, through the PLC's input interface, and return to ground through the common line. Thus, as the input device sources (provides) current, the PLC sinks (receives) it.

The wiring connections for a MicroLogix 1000 with sourcing DC inputs depend on whether the PLC uses an external DC power source or provides its own DC power source. If the PLC uses an external power source, the wiring diagram will look like the one shown in Figure 2-13. One side of each device will be connected to the incoming positive DC voltage line, while the other side of each device will be connected to the input terminal. The common lines for each group of input terminals will be connected to the grounded negative line.

If the MicroLogix provides its own DC power source, the wiring diagram will look like the one shown in Figure 2-14. One side of each device will be connected to the PLC's positive DC voltage terminal instead of to a positive line coming from an external DC power supply. The other side of each device will be connected to the input terminal. The common lines for each group of inputs will then be connected to the PLC's negative DC terminal, which is grounded.

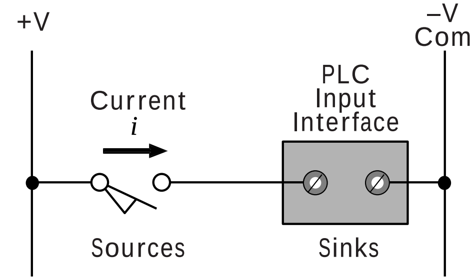


Figure 2-12. A sourcing input device connected to a PLC's input interface.

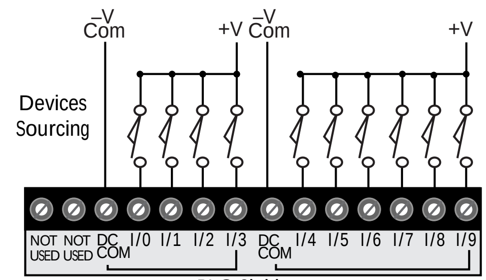


Figure 2-13. Sourcing input device wiring for a MicroLogix that uses an external DC power supply.

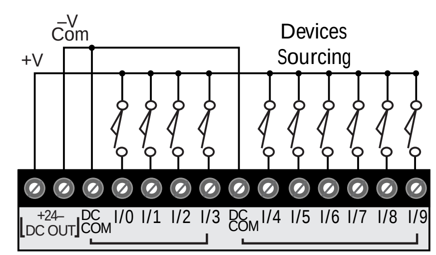


Figure 2-14. Sourcing input device wiring for a MicroLogix with a built-in DC power supply.

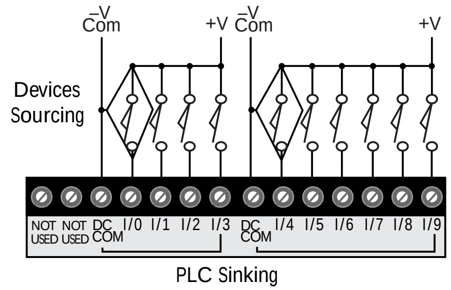


Figure 2-15. A MicroLogix with sourcing three-wire input devices.

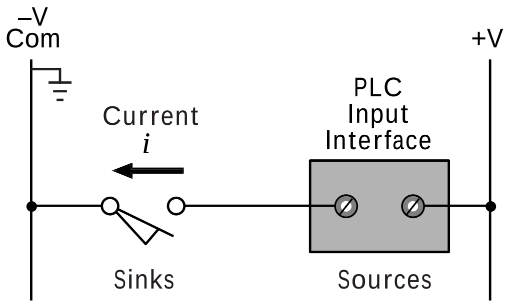


Figure 2-16. A sinking input device connected to a PLC's input interface.

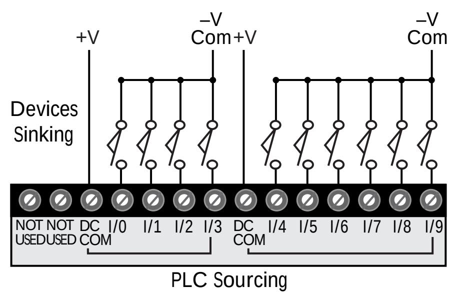


Figure 2-17. Sinking input device wiring to a MicroLogix that uses an external DC power supply.

The previous examples of sourcing input wiring connections are for two-wire devices. These are devices that have just two electrical connections—one that goes to the supply power line and one that goes to the PLC input terminal. Some PLCs, however, use three-wire devices (see Figure 2-15). These devices have three electrical connections—one to the supply power line, one to the PLC input terminal, and one to the common return line. The connection to the common return line gives the device the power to perform its required function when it is not switching power to the PLC.

Sinking Input Devices. Sinking input devices receive current from the PLC when they are on. Sinking inputs operate just like sourcing inputs, but in reverse. Figure 2-16 shows a sinking device connected to a PLC's input interface. The supply side of the input device is connected to the negative DC common line, and the other side of the device is connected to the MicroLogix's input interface. The interface, in turn, is connected to the positive DC voltage line. When the device closes, power from the positive DC power line flows through the PLC's input terminal, through the input device, and out to the common line, thereby closing the circuit. Thus, as the PLC sources (provides) current, the input device sinks (receives) it.

Figure 2-17 shows the wiring of sinking input devices to a MicroLogix that uses an external DC power supply. The wiring connections here are similar to those for sourcing inputs, except that the power line connections are reversed. In a sinking configuration, the input devices are connected to the negative voltage line, and the MicroLogix's DC common terminals are connected to the positive voltage line.

Figure 2-18 shows the wiring of sinking input devices to a MicroLogix 1000 with a built-in DC power supply. Again, the wiring is similar to that of sourcing devices connected to a MicroLogix with a built-in power supply with one exception—the power line connections are reversed.

Just as sourcing inputs can be either two-wire or three-wire devices, so can sinking input devices. The wiring for three-wire sinking inputs differs from the wiring for two-wire sinking inputs. A three-wire sinking device has an extra connection to the positive DC voltage line that allows the device to operate when it is not switching power to the PLC (see Figure 2-19).

Job Aid 2-1, located at the end of this module, provides detailed diagrams of two-wire and three-wire sinking/sourcing wiring configurations.

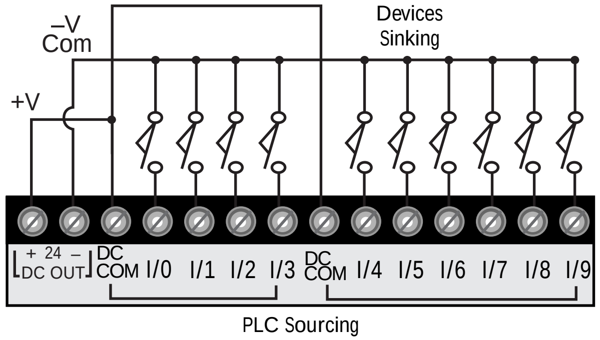


Figure 2-18. Sinking input device wiring to a MicroLogix with a built-in DC power supply.

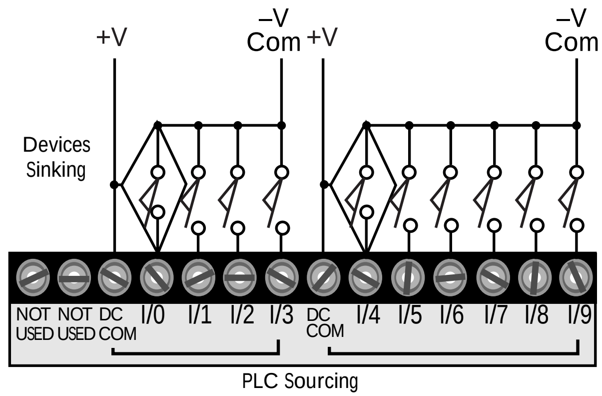


Figure 2-19. A MicroLogix with sinking three-wire input devices.

2-3 Output Interfaces

The MicroLogix 1000 has several different output interface configurations, and each of these configurations is geared toward a specific type of output device.

At the end of this section, you will know:

- the components of an output interface
- the types of outputs used with a MicroLogix 1000
- the wiring requirements for the different output interface configurations

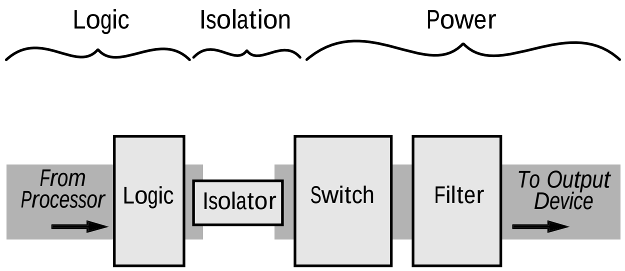


Figure 2-20. The components of an output interface.

Output Interface Components

Figure 2-20 illustrates the components of the MicroLogix's **output interface**. They are:

- the logic section
- the isolation section
- the power section

These are the same components found in an input interface; however, the logic and power sections are reversed.

Logic Section. The logic section of an output interface receives the control signal, which is either a 1 or 0, from the processor. A 1 means that the interface should turn on the output device. A 0 means that it should turn off the output device.

Isolation Section. After being received by the logic section, the control signal is then passed through the isolation section. Just as it does for input interfaces, this section provides an electrical barrier between the logic section and the power section.

Power Section. After the isolation section, the control signal enters the power section. In this section, the switching mechanism sends the PLC's control signal to the output device. The control signal, however, passes through a filter before it actually reaches the device. This filter eliminates the electrical noise in the power lines and the electrical noise generated by the output load.

The MicroLogix's output interface also has an LED in its power section. When this light is ON, it indicates that the interface is receiving a control signal from the PLC and switching power to the output device.

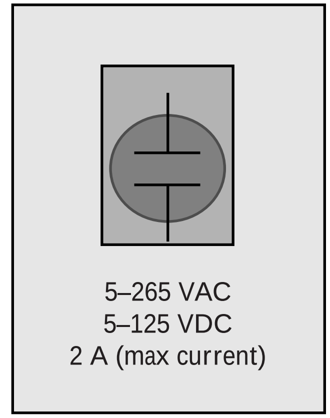


Figure 2-21. Relay output.

Types of Output Interfaces

A MicroLogix 1000 can have three different types of outputs:

- relay
- transistor
- triac

Each of these outputs is used to communicate with a different type of output device.

Relay Outputs. Relay outputs (see Figure 2-21) are used in applications in which the PLC's output devices require a control signal of either 5–265 VAC or 5–125 VDC. The maximum current at each output is 2 A (amps) for both AC and DC devices.

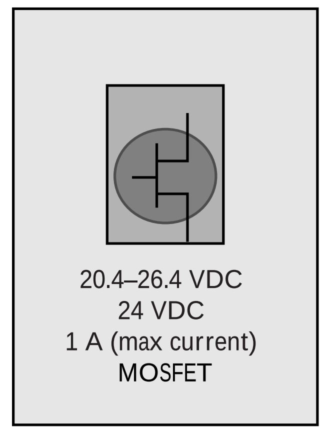


Figure 2-22. Transistor output.

Transistor Outputs. Transistor outputs (see Figure 2-22) are used only with output devices that require a 20.4–26.4 VDC control signal from the PLC. A transistor output is most commonly used with 24 VDC devices. A transistor's maximum current at the output is 1 A. In a MicroLogix 1000, a transistor output is sometimes called a MOSFET, which is an acronym for metal-oxide semiconductor field effect transistor.

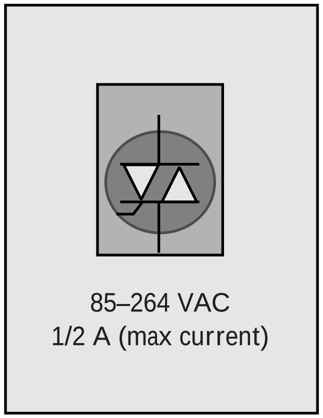


Figure 2-23. Triac output.

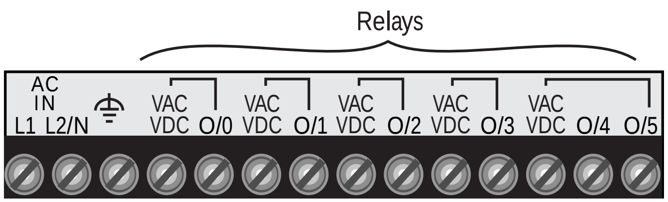


Figure 2-24. A 16 I/O all-relay output interface.

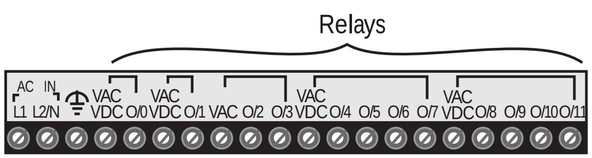


Figure 2-25. A 32 I/O all-relay output interface.

Triac Outputs. **Triac outputs** (see Figure 2-23) work with output devices that must receive a 85–264 VAC control signal. For a triac, the maximum output current to each device is 0.5 A.

Output Interface Configurations and Wiring

The MicroLogix 1000 can have three types of outputs: relay, transistor, and triac. However, the MicroLogix does not have just one type of output or the other; rather, it can have a combination of outputs. Specifically, a MicroLogix 1000 PLC is available with three output interface configurations:

- all-relay
- transistor/relay
- triac/relay

All-Relay Output Interfaces. Six models of the MicroLogix 1000 have **all-relay output interfaces**. Three of the six are 16 I/O models, and three are 32 I/O models.

In the 16 I/O models (see Figure 2-24), two of the relay output terminals, terminal 4 and 5, share a common power source. These terminals also share a connection to the common line. Each of the other four relay output terminals, terminals 0 through 3, has its own separate power source and common connections. These four terminals are called **isolated output terminals**, since their power and return lines are separated, or isolated, from each other. Because this is an all-relay configuration, all of the power sources can be either AC or DC.

In 32 I/O all-relay MicroLogix models (see Figure 2-25), only the first two output terminals, 0 and 1, are isolated, meaning that they have their own power and common lines. The rest of the terminals, 2 through 11, share power source and common line connections in groups of two, four, and four.

Transistor/Relay Output Interfaces. Two MicroLogix models have **transistor/relay output interfaces**. These include a 16 I/O and a 32 I/O model.

In the 16 I/O transistor/relay model (see Figure 2-26), outputs 0 and 1 are isolated relay outputs. Thus, they each have a separate AC/DC power supply connection and a separate common. Outputs 2 through 5 are transistor output terminals that share a common 24 VDC power source. They also share a common connection to the return line, which is connected to the negative 24 VDC terminal. This terminal is grounded.

The 32 I/O transistor/relay model has two isolated relay output terminals and a group of ten shared transistor outputs (see Figure 2-27). This 32 I/O model also has a negative DC voltage terminal, which is where the return lines from the transistor output field devices are connected to the PLC. This negative terminal is grounded.

Triac/Relay Output Interfaces. Only one MicroLogix model has a **triac/relay output interface**. This 32 I/O PLC has two isolated relay outputs at terminals 0 and 1 (see Figure 2-28). The remaining ten outputs are triacs. These triacs are arranged in groups of two, four, and four, with each group sharing an AC power supply connection and a common return line.

Job Aid 2-2 lists the input and output interface specifications for each model of the MicroLogix 1000, along with a chart explaining how to interpret the model numbers.

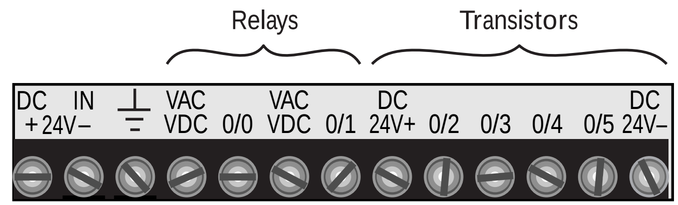


Figure 2-26. A 16 I/O transistor/relay output interface.

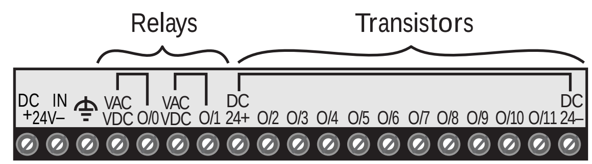


Figure 2-27. A 32 I/O transistor/relay output interface.

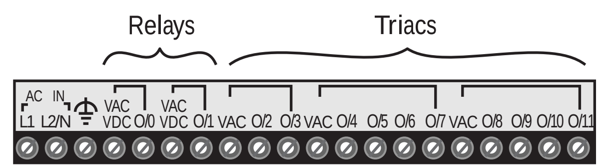


Figure 2-28. A 32 I/O triac/relay output interface.

2-4 System And I/O Power Distribution Wiring

This section provides an overview of how power is distributed to a MicroLogix 1000 and its I/O devices. At the end of this section, you will understand:

- how power is distributed to a MicroLogix 1000
- how I/O devices connect to an incoming power source

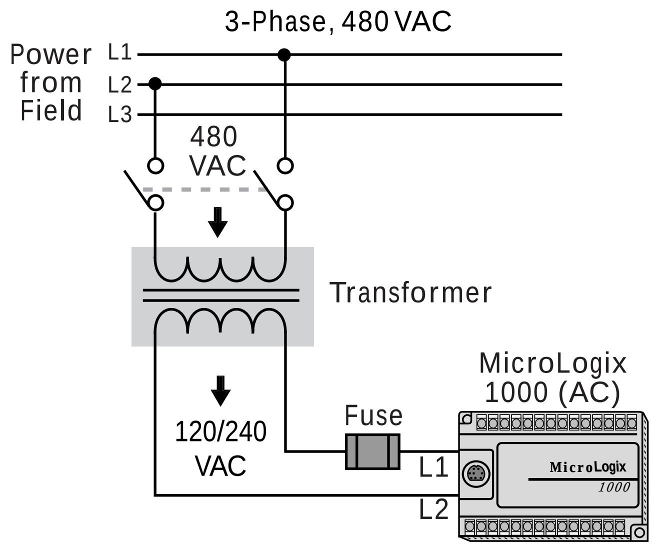


Figure 2-29. AC source power wiring to a MicroLogix 1000.

System Power Distribution

The MicroLogix 1000 PLC can be directly mounted in a panel or enclosure. It also comes ready to be mounted on a DIN rail in an enclosure. These features make the wiring and the power distribution to the PLC very simple.

As explained in the previous module, some MicroLogix 1000s require a 120/240 VAC power supply, while others require a 24 VDC power supply. These two types of MicroLogix controllers have different wiring requirements.

AC Source Power Wiring. The AC power coming into a plant or factory is usually at a higher voltage than is needed by an AC MicroLogix 1000. Therefore, the power signal coming from the field must be converted, or stepped down, to the right voltage level using a transformer.

For example, the source power coming into a plant may be three-phase 480 VAC (see Figure 2-29). However, an AC Micro-Logix only needs a two-phase 120/240 VAC power signal. Thus, the following steps are required to use the incoming power to power the PLC:

1. Tap off the L1 and L2 lines of the source power supply.
2. Bring the L1 and L2 lines to a transformer that converts the power from 480 VAC to 120/240 VAC.

3. Wire the hot L1 line from the transformer to the controller's L1 terminal.
4. Wire the neutral L2 line from the transformer to the controller's L2 terminal.
5. Connect the L2 line to ground to protect the system.
6. Wire the MicroLogix's ground terminal to the system ground bus for added protection.

For further protection, connect the power lines to an accessible disconnect switch inside the panel. This will allow for the quick, easy removal of power to the PLC, if necessary. Also, add a fuse to the hot L1 line to protect the system from overloads.

DC Source Power Wiring. With only a few detailed exceptions, DC systems use the same wiring configurations as AC systems. In a DC system, the power from the transformer is brought through a fuse to a DC power supply instead of to the PLC (see Figure 2-30). From there, the DC power supply sends out a 24 VDC signal through its positive and negative lines. These lines connect to the positive and negative terminals of the DC MicroLogix 1000, just as the L1 and L2 lines connect to the L1 and L2 terminals of the AC model. A DC MicroLogix's power wiring should also include a disconnect switch located between the DC power supply and the PLC.

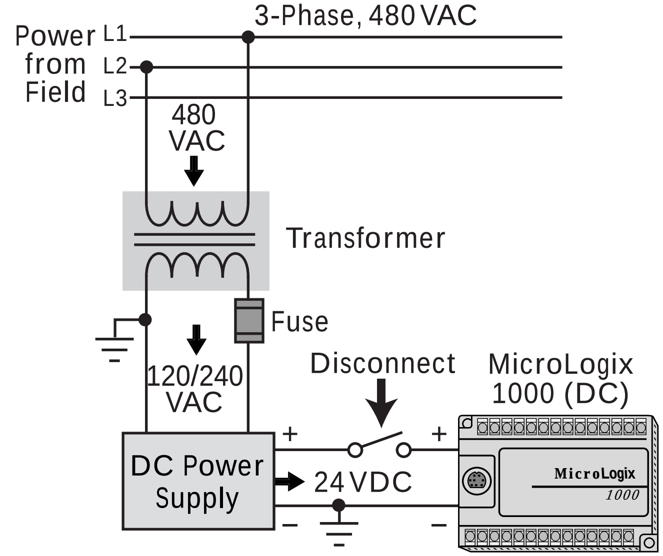


Figure 2-30. DC source power wiring to a MicroLogix 1000.

I/O Power Distribution

Like system power distribution, I/O power distribution can be broken down into two parts:

- AC I/O power distribution
- DC I/O power distribution

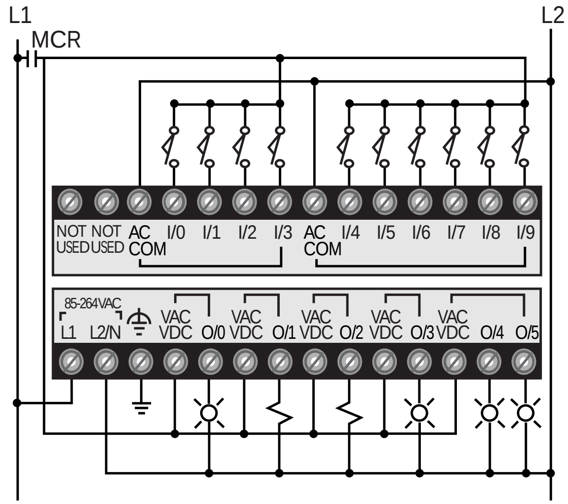


Figure 2-31. AC I/O power distribution wiring.

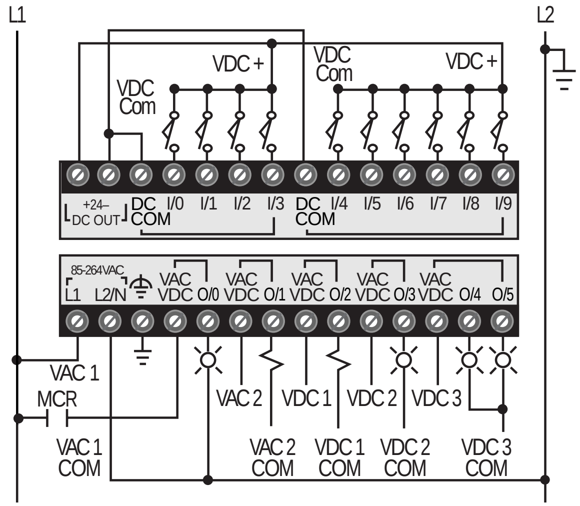


Figure 2-32. DC I/O power distribution wiring for MicroLogix models that provide a built-in DC power supply. Other supply output voltages are shown after the MCR.

AC I/O Power Distribution. If a MicroLogix uses AC inputs and outputs, then the same 120 VAC line that powers the PLC can also power the I/O devices. Figure 2-31 shows an example of AC I/O power wiring. In this situation, the L1 line going to the PLC provides power to the inputs. The inputs' common lines connect to the L2 line to complete the circuit. The L1 and L2 lines provide power and return to the output devices as well.

When using the same AC power source for the PLC and its I/O devices, remember to install a **master control relay** (MCR) circuit between the L1 line and the I/O devices. This MCR circuit will allow the power to the I/O devices to be shut off in the event of a PLC malfunction.

DC I/O Power Distribution. With DC devices, there are two wiring schemes to consider: one for MicroLogix models that provide a built-in DC power supply and another for those models that rely on an outside DC power supply.

If a MicroLogix has a built-in DC power supply, it can be used to power the DC input devices with up to 200 mA (milliamps) of current (see Figure 2-32). To do this, the input devices and their return lines are connected to the appropriate DC power terminals. While the built-in DC power supply can provide power to the DC inputs, it cannot provide power to the DC output devices. DC output devices must be connected to an external DC power supply. This is necessary because the negative terminal of the built-in power supply is connected to chassis ground and, thus, cannot be connected to the common line of any other DC power source.

The I/O power wiring for DC MicroLogix models that use an external power supply is similar to the wiring for those with built-in power supplies. The main difference is that both the input and output devices are wired to an external power supply (see Figure 2-33).

An MCR circuit is required in DC I/O power wiring, just as it is in AC I/O power wiring. The MCR provides a safety mechanism that allows the I/O devices to be turned off in emergencies.

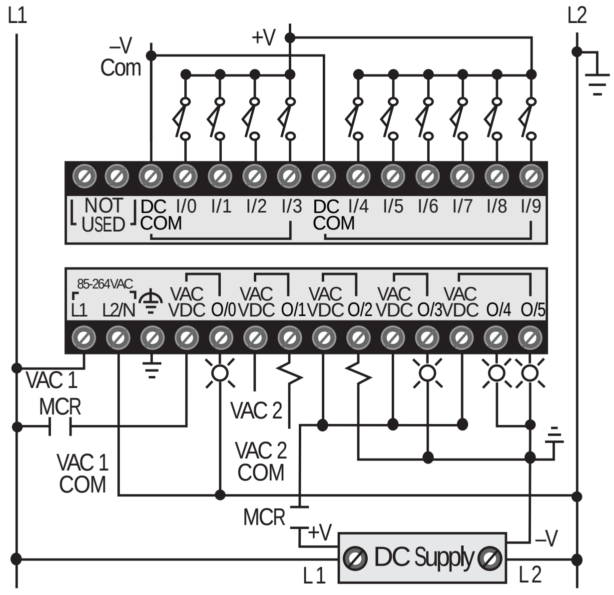


Figure 2-33. DC I/O power distribution wiring for MicroLogix models that use an external DC power supply. Positive voltage supply to inputs and the secondary AC supply to outputs are shown after the MCR.

2-5 Review

- There are two types of I/O devices: discrete devices and analog devices.
- The MicroLogix 1000 is designed to work with discrete devices only.
- A discrete signal has only two possible states—ON and OFF—while an analog signal can have an infinite number of possible states.
- There are two types of input interfaces available with the MicroLogix 1000: 120 VAC and 24 VDC.
- A 120 VAC input interface has three components: the power section, the isolation section, and the logic section.
- Devices can be wired to a 120 VAC input interface either directly or via a terminal block.
- A 24 VDC interface can connect with input devices in either a sourcing or sinking configuration.
- Sourcing devices provide current when they are on; sinking devices receive current when they are on.
- Sourcing and sinking input devices can be either two-wire or three-wire devices.
- The MicroLogix 1000's output interface consists of three components: the logic section, the isolation section, and the power section.
- The MicroLogix 1000 can interface with three types of outputs: relay, transistor, and triac.
- A MicroLogix 1000 comes with three possible output interface configurations: all-relay, transistor/relay, and triac/relay.
- The power wiring for a MicroLogix 1000 depends on whether the controller requires a 120/240 VAC power source or a 24 VDC power source.
- AC and DC I/O devices require different power wiring schemes, which depend on whether the devices are being powered by an internal or external source.
- Both AC and DC devices require an MCR in their power wiring circuitry.

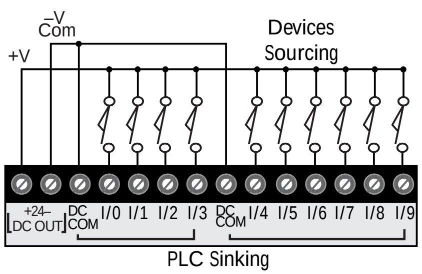
2-6 Job Aids

Job Aid 2-1: Two-Wire and Three-Wire Sinking and Sourcing Wiring Diagrams

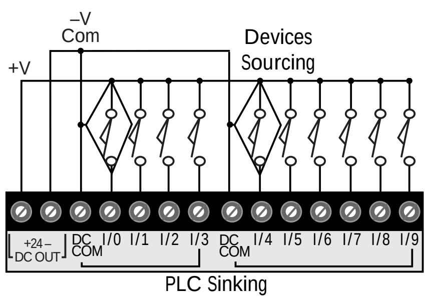
The following examples provide detailed diagrams of both two-wire and three-wire sinking and sourcing input configurations.

Sourcing Inputs/Sinking MicroLogix—*Internal DC Power*

Two-Wire

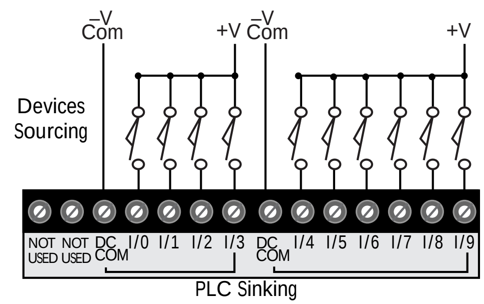


Three-Wire

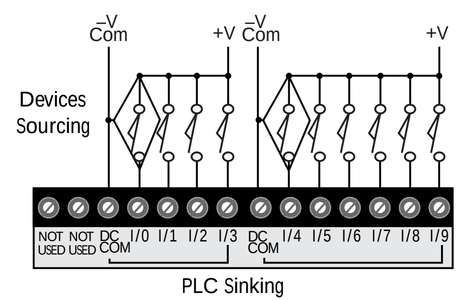


Sourcing Inputs/Sinking MicroLogix—*External DC Power*

Two-Wire

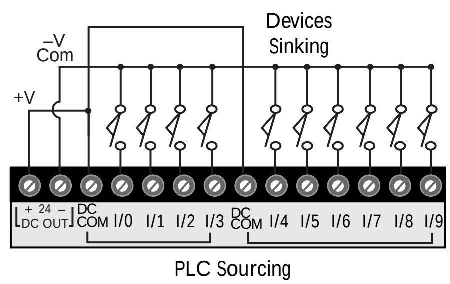


Three-Wire

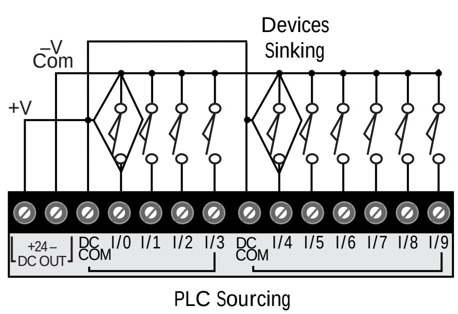


Sinking Inputs/Sourcing MicroLogix—*Internal DC Power*

Two-Wire

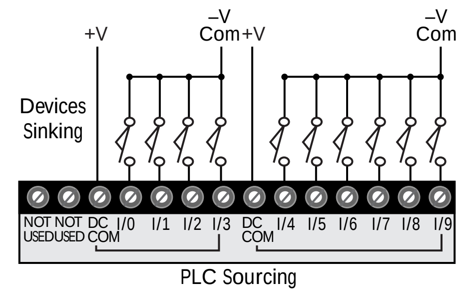


Three-Wire

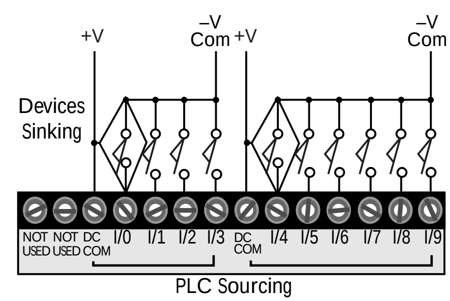


Sinking Inputs/Sourcing MicroLogix—*External DC Power*

Two-Wire



Three-Wire



Job Aid 2-2: MicroLogix Model Specifications

A MicroLogix is available in different models each with a unique identifying model number, such as 1761-L16BBB. To interpret the model number, refer to the following chart:

Bulletin Number	Base Unit	I/O Count	Input Type	Output Type	Power Supply
1761	L	16 32	A = 120 VAC B = 24 VDC	W = relays B = 24 VDC MOSFET (transistor) and relays A = 120/240 VAC triacs and relays	A = 120/240 VAC B = 24 VDC

Therefore, the example model number shown above (1761-L16BBB) refers to a 16 I/O MicroLogix 1000 with a 24 VDC input interface. This model has an output interface with both 24 VDC MOSFET (transistor) outputs and relay outputs. It also requires a 24 VDC power source.

Following is a list of the nine different MicroLogix models, along with their specifications:

Model Number	Number/Type of Inputs	Number/Type of Outputs	Power Supply
1761-L16AWA	10 inputs—120/240 VAC	6 outputs—4 isolated relays/2 shared relays	120 VAC
1761-L32AWA	20 inputs—120/240 VAC	12 outputs—2 isolated relays/2 shared relays/4 shared relays/4 shared relays	120 VAC
1761-L16BWA	10 inputs—24 VDC	6 outputs—4 isolated relays/2 shared relays	120 VAC
1761-L32BWA	20 inputs—24 VDC	12 outputs—2 isolated relays/2 shared relays/4 shared relays/4 shared relays	120 VAC
1761-L16BWB	10 inputs—24 VDC	6 outputs—4 isolated relays/2 shared relays	24 VDC
1761-L32BWB	20 inputs—24 VDC	12 outputs—2 isolated relays/2 shared relays/4 shared relays/4 shared relays	24 VDC
1761-L16BBB	10 inputs—24 VDC	6 outputs—2 isolated relays/4 shared transistors (MOSFET)	24 VDC
1761-L32BBB	20 inputs—24 VDC	12 outputs—2 isolated relays/10 shared transistors (MOSFET)	24 VDC
1761-L32AAA	20 inputs—120/240 VAC	12 outputs—2 isolated relays/2 shared triacs/4 shared triacs/4 shared triacs	120 VAC