Vector Part Number 202V517

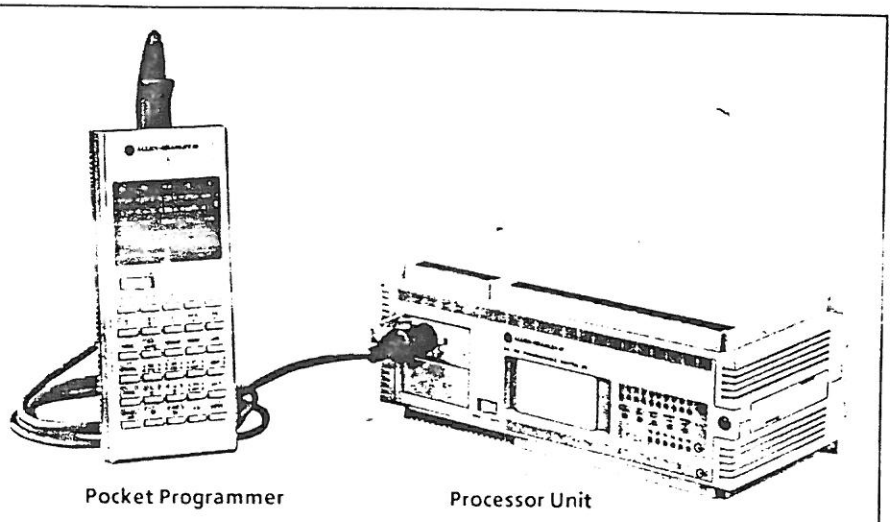
SLC™ 100 Programmable Controller

Processor Unit – Catalog Nos. 1745-LP101, -LP102, -LP103, -LP104

The SLC 100 Programmable Controller

The SLC 100 Programmable Controller allows you to program relay logic, timers, counters, sequencers, and shift registers. It can be used in a wide variety of applications, including:

- Machine tools
- Material handling
- Assembly machines
- Molding and casting machines
- Robotics
- Energy management



SLC 100 Programmable Controller. Consists of the processor unit, pocket programmer, and interconnect cable. Added I/O capacity is obtained by interconnecting expansion units with the processor unit. An optional EEPROM plugs into the processor unit.

The Processor Unit

The heart of the controller is the processor unit, which integrates processor, CMOS RAM memory (with battery back-up), and I/O circuitry for 10 inputs and 6 outputs. An optional EEPROM memory module can be plugged into the processor unit for program loading and storage.

Up to three expansion units can be connected to the processor unit. Each unit adds 10 inputs and 6 outputs to the controller I/O capacity. The processor unit and expansion units are available in several voltage versions. Different versions can be mixed to meet your application requirements.

Programming is done with the pocket programmer, which you connect to the processor unit via cable. The ladder diagram programming format is used.

Nine processor operating modes can be selected. These are:

Mode 1: Clear Memory
Mode 2: Program
Mode 3: Run
Mode 4: Test–Single Scan
Mode 5: Test–Continuous Scan
Mode 6: Store Program in EEPROM
Mode 7: Load Program from EEPROM
Mode 8: Enter/Change Access Code
Mode 9: Diagnostic Test–Programmer

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Important Features

The processor unit features described below are pointed out in the illustration on Page 3.

1. Incoming line wiring terminals. Self-lifting pressure plates allow for easy insertion of wires and secure connections. Terminals accept one or two #14 AWG wires. A protective cover is provided.
2. Input circuit wiring terminals. Same construction as line terminals. The protective cover has write-on areas for identification of external circuits. Cover is color-coded to identify the circuit voltage level.
3. Output circuit wiring terminals. Same construction as line terminals. The protective cover has write-on areas for identification of external circuits.
4. Diagnostic indicators: These 5 LED diagnostic indicators indicate the following:

   DC POWER (green) – Indicates that the processor unit is energized and DC power is being supplied.

   PC RUN (green) – Indicates that the processor unit is operating in the Run mode.

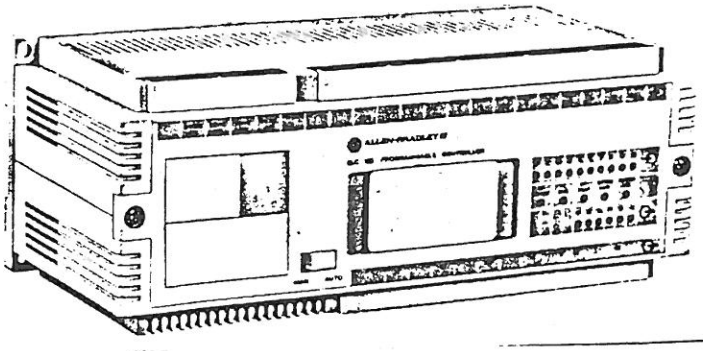
   CPU FAULT (red) – Indicates that the processor has detected an error in either the CPU or memory. Operation is automatically stopped.

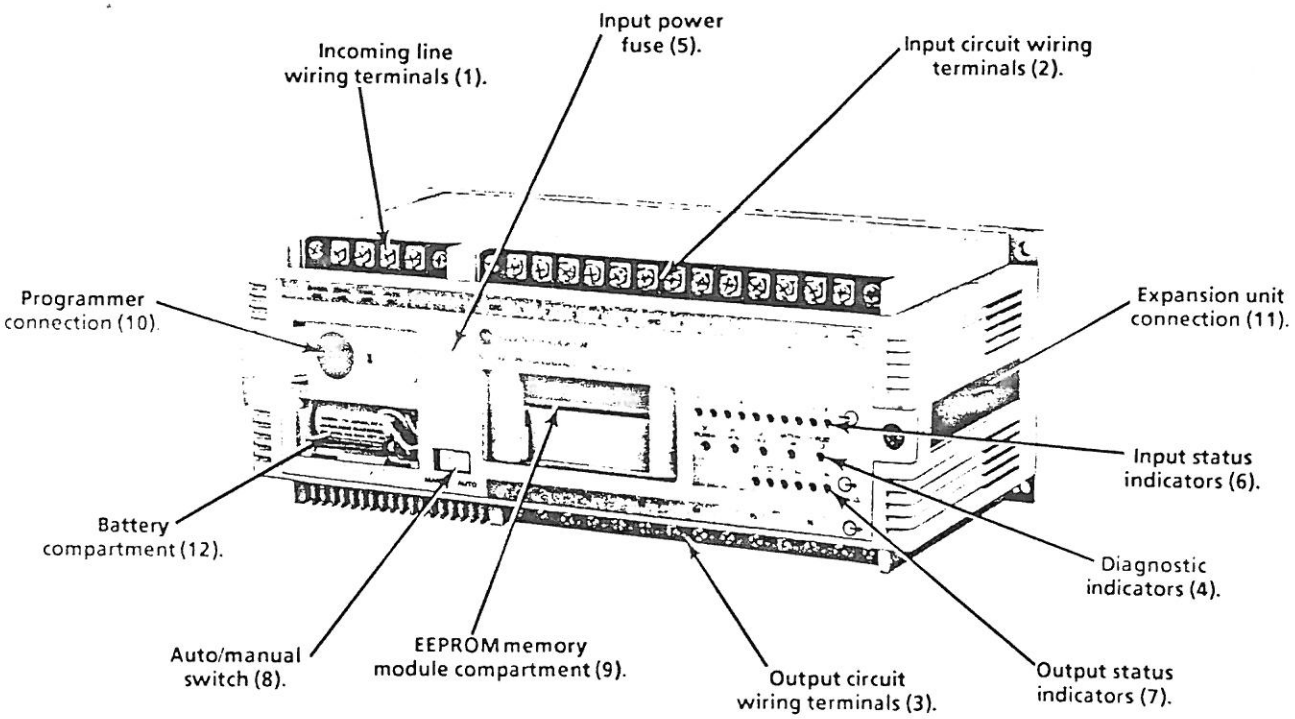
   BATTERY LOW (red) – Indicates that the voltage level of the battery providing back-up power for the memory has fallen below a threshold level. Battery should be replaced.

   FORCED I/O (amber) – Indicates that one or more input or output addresses have been forced to an ON or OFF state.
5. Input power fuse. Located behind processor unit cover. If voltage is present at the incoming line terminals, but the DC POWER LED is not lit, the fuse may be blown. Refer to Section 6 of the User's Manual for fuse replacement procedure.
6. Input status indicators. Ten red LEDs, identified with address numbers 1 thru 10, corresponding to numbers 1 thru 10 on the input device wiring terminals. When an input circuit is energized, the corresponding status indicator will be lit.
7. Output status indicators. Six red LEDs, identified with address numbers 11 thru 16, corresponding to numbers 11 thru 16 on the output contact wiring terminals. When a programmed output instruction is TRUE, the corresponding output status indicator will be lit, and the corresponding output contact will close.
8. Auto/Manual switch. This switch controls restarting of the processor unit after a power loss or brown-out.

   Auto position– On power-up, the processor runs thru its normal diagnostic tests and then automatically enters the Run mode (if it was in the Run mode at the last power-down).

   Manual position– On power-up, the processor runs thru its normal diagnostic tests but will not enter the Run mode. To enter the Run mode, you must move the switch to the auto position or use the pocket programmer.
9. EEPROM memory module compartment. The optional memory module can be plugged into the processor. Mode 6 allows you to store your program (RAM to EEPROM). Mode 7 allows you to load a program in the processor unit (EEPROM to RAM).





Refer to adjoining Paragraphs 1 -12 for explanations.

10. Programmer connection. Plug the pocket programmer interconnect cable into the processor unit when you want to program, edit, or monitor controller operation. The cable is provided with the programmer.

11. Expansion unit connection. The expansion unit cable is plugged in this socket. Up to 3 expansion units can be interconnected to increase the I/O capacity of the controller.

    Refer to the User's Manual or the expansion unit product data sheet (Pub. 1745-2.2) for further information.

12. Battery compartment. Back-up power for the CMOS RAM is provided by a replaceable battery assembly, accessible from the front of the processor unit. The lithium battery provides back-up power for approximately 2-3 years.

    Battery replacement: Refer to Section 6 of the User's Manual.

Important Installation Considerations

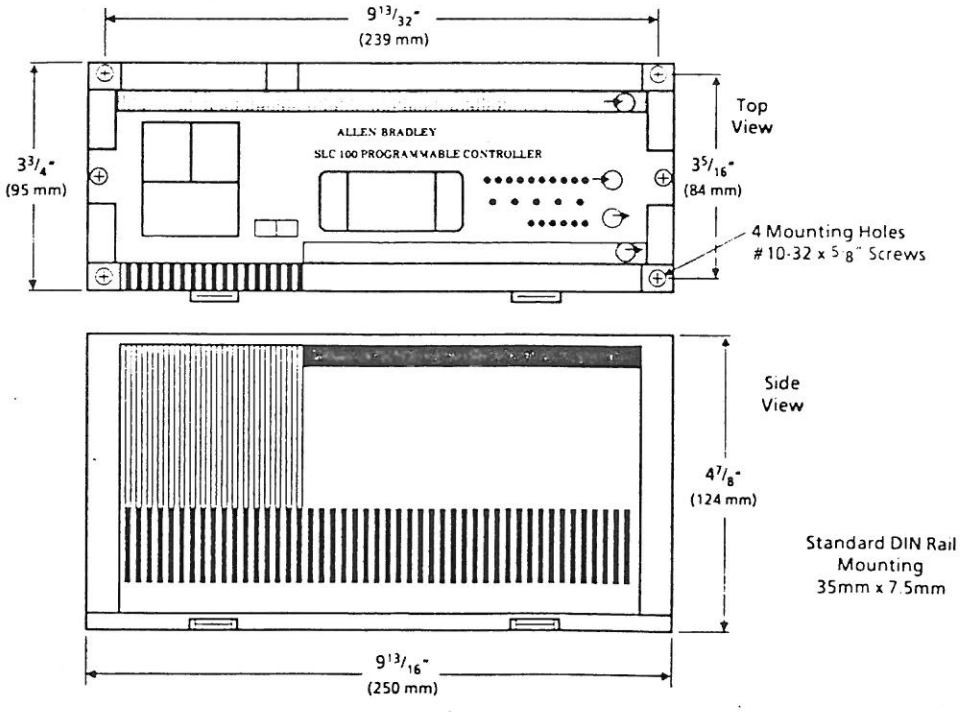
Refer to the User's Manual for details on the following important installation considerations:

- The enclosure should be adequate (NEMA approved) for the environmental conditions of the particular application.
- The processor unit, expansion units, and input/output device circuits should have the same power source. The processor and expansion units should be properly grounded.
- Include an electrical disconnect in the enclosure. An isolation transformer may also be required.
- A master control relay circuit should be included to permit disabling of the I/O devices independent of the processor and expansion unit power supply circuit. One or more emergency-stop switches should also be included.
- Follow the recommendations for component spacing within the enclosure, to help keep the controller temperature within the specified limits.
- Wiring should be routed to minimize electrical noise effects. Surge suppressors should be used for inductive loads in series with hard contacts and for other noise-generating equipment.
- Fusing should be provided to protect loads and wiring from short circuits or overloading.

Mounting

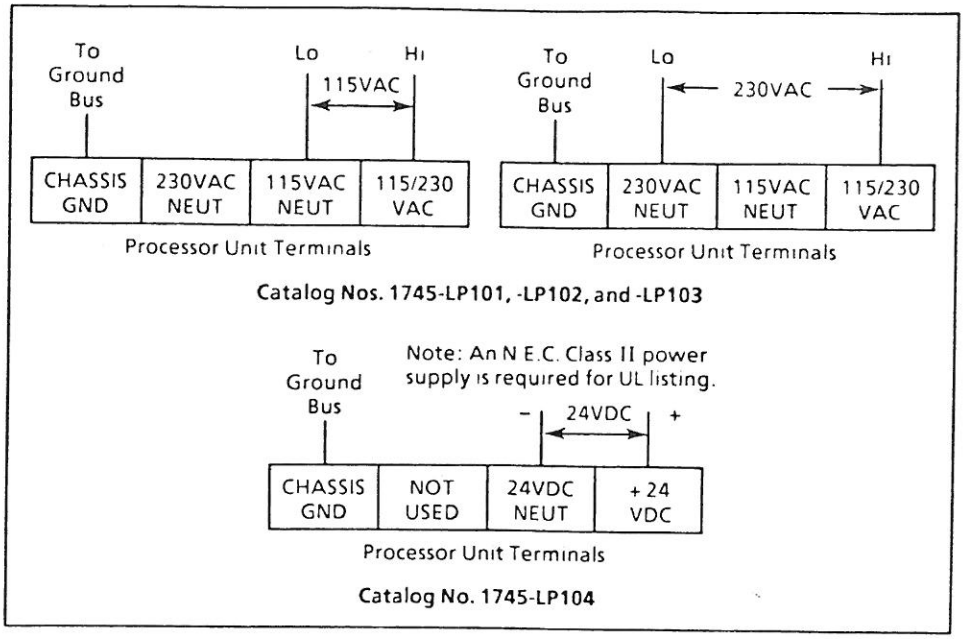
1. Screw mounting: The processor unit can be mounted directly to the back panel of your enclosure using four #10 screws. Hole locations are shown in the dimension drawing below.
2. DIN rail mounting: The processor unit can be mounted in your enclosure on a 35 mm by 7.5 mm DIN mounting rail (Catalog No. 199-1DR). Two DIN rail fasteners are provided on the processor unit.

   The DIN rail can be screwed, bolted, or welded to the enclosure back panel. Install the processor unit by hanging the unit on the top edge of the DIN rail, then pressing the unit toward the rail until it snaps into place. To remove the processor unit, pry open the fasteners.



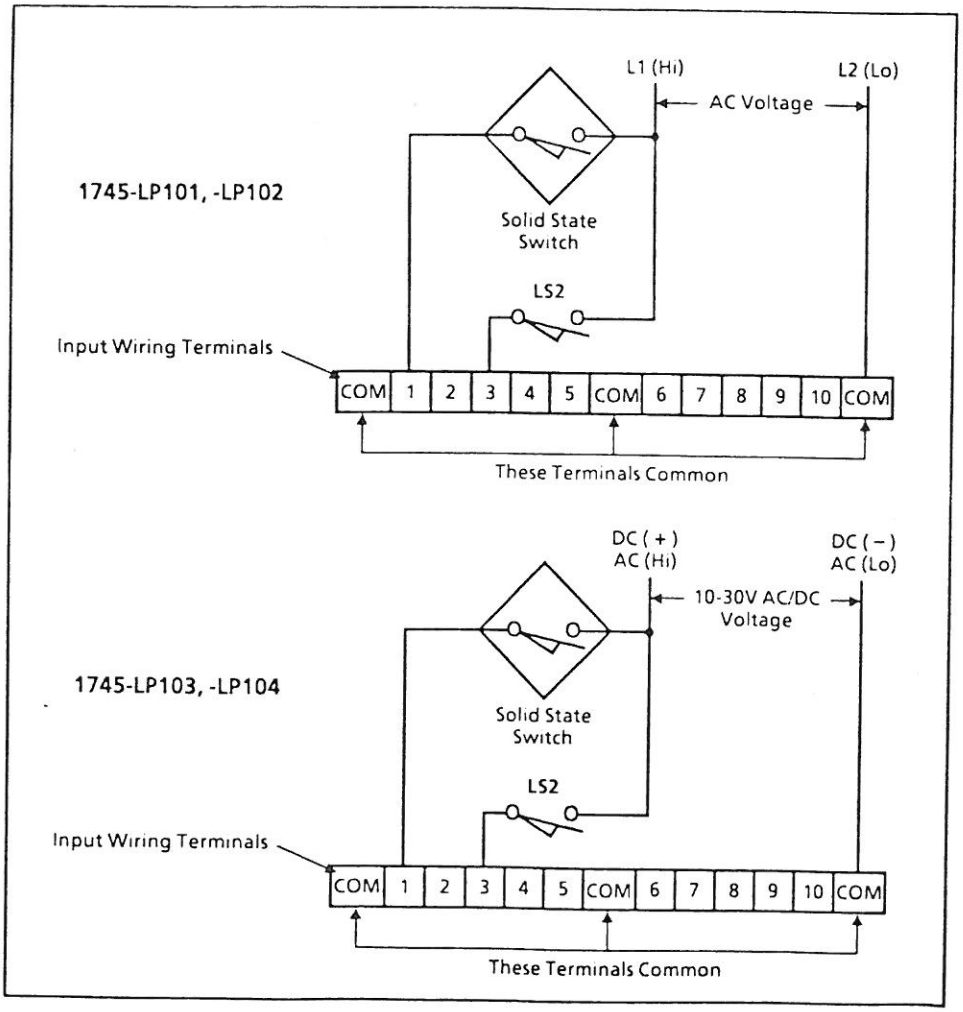
Line Wiring Connections

Make line connections to the processor unit as follows:



Input Device Wiring Connections

Wiring connections for input devices are shown below. Note that input ground terminals are common to each other.



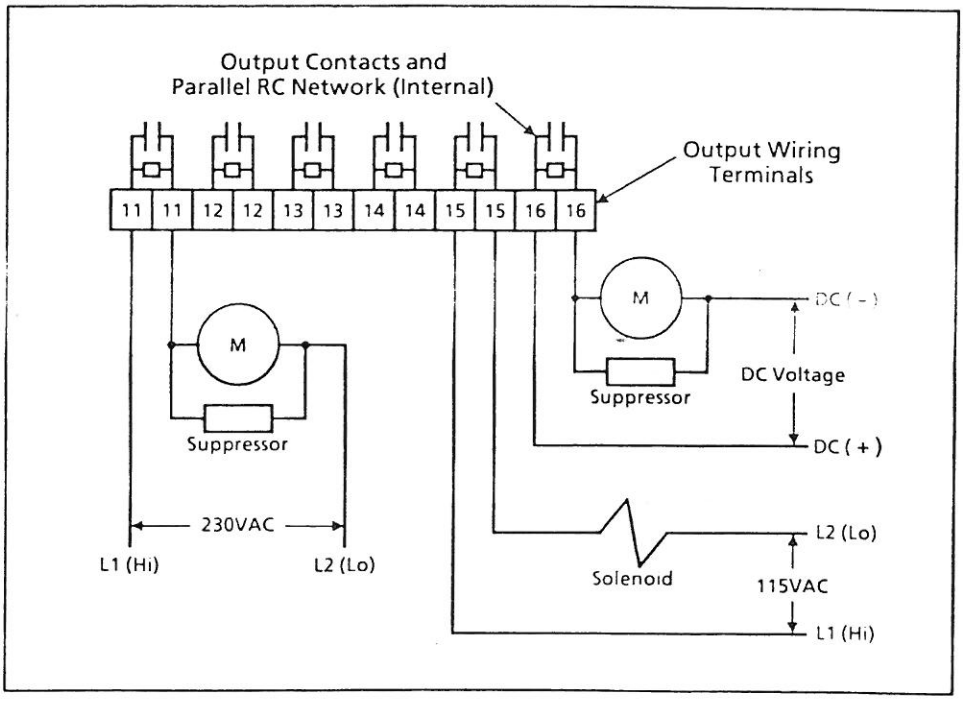
Output Device Wiring Connections

Wiring connections for output devices are shown below. Note that the diagram shows the internally-connected output contacts and parallel RC networks. The RC networks guard against possible damage by transients from external output devices.

External connections are shown for outputs 11, 15, and 16. We've added a suppressor in parallel with two of the external devices for the purpose of contact protection. Contact protection is discussed on Page 7.

Since the processor unit output contacts are isolated from each other, each output circuit can be wired independently, with its own ground return. You can apply a different voltage in each output circuit, as your application might require. Power or ground wires can be jumpered between sets of terminals if desired.

You should provide appropriate fusing to protect the output devices and wiring from short circuits and overload conditions.



Output Contact Protection

Inductive output devices such as motor starters and solenoids may require that you use some type of surge suppression to protect the output contacts. Examples are shown below.

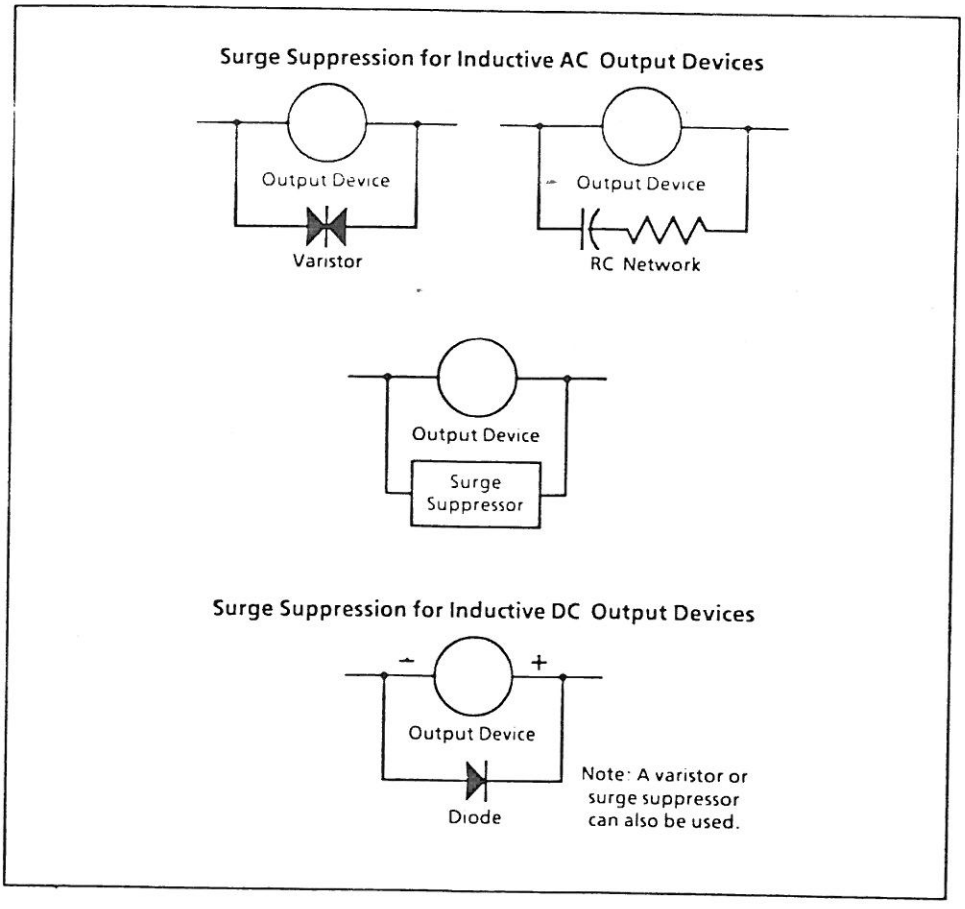
These surge suppression circuits are connected directly across the output device. The effect is to reduce arcing of the output contacts (arcing can be caused by the high transient voltage which occurs when an inductive device is switched off).

Suitable surge suppression methods for inductive AC output devices include a varistor, an RC network, and an Allen-Bradley surge suppressor. These components must be appropriately rated to suppress the switching transient characteristic of the particular inductive device.

For inductive DC output devices, a diode or a varistor is suitable. A 1N4004 diode is acceptable for most applications. A surge suppressor can also be used (Figure 4.4 in the User's Manual).

We recommend that you locate the suppression device as close as possible to the output device.

Suppressors recommended for use with Allen-Bradley relays, contactors, and motor starters are listed in Figure 4.4 of the User's Manual.



General Specifications

General specifications for the processor unit versions are shown below.

Voltage Ranges (Incoming Power, Input Circuits, Output Circuits):

Catalog Number	Voltage Ranges (Incoming Power Connections)	External I/O	
		Input Circuits	Output Circuits
1745-LP101	85-132/170-265 VAC 50/60 Hz	85-132 VAC 50/60 Hz	10-250VAC/10-125VDC
1745-LP102	85-132/170-265 VAC 50/60 Hz	170-265 VAC 50/60 Hz	
1745-LP103	85-132/170-265 VAC 50/60 Hz	10-30V AC/DC	
1745-LP104	18-30 VDC	10-30V AC/DC	
	Full wave rectified AC voltage 18 volts RMS ± 20%, 30 volts peak		

Maximum Power Requirement:
1745-LP101, -LP102, -LP103: 20VA.
1745-LP104: 15VA.

Input Power Fuse Protection:
1745-LP101, -LP102, -LP103: 315mA/250V.
1745-LP104: 1.6 A/250V.
Fuse Types: SAN-O: SOC SD4. Bussman: MDL, or GDC1 (miniature).

Specifications applying to all Catalog Numbers:

Memory Type:
CMOS RAM with battery back-up. Provision for optional EEPROM Module (Cat. No. 1745-M1).

User Memory Size:
885 words maximum. (Most instructions require 1 word.)

Typical Scan Time: 15 msec (depends on program length).

I/O Capacity:
16 I/O (10 inputs, 6 outputs). Expandable to 64 I/O.
Input specifications: Page 9. Output specifications: Page 10.

Internal Relay-Type Instructions: 181 max, regular or latched.

Timers/Counters/Sequencers: 32 max, any combination. Retentive.

Time Base: 0.1 sec. Fine time bases to 0.01 sec can be selected.

Timer Range: 0.1 to 999.9 seconds.

Counter Capacity: 9999 counts.

Sequencer Capacity: 8 bits x 100 steps.

Shift Register: 8-bit groups.

Noise Immunity: NEMA Standard ICS 2-230.

Vibration:
DIN Rail Mounting: 0.006 inch peak to peak displacement, 1.0g peak (max) acceleration, 1 Hr/axis. Screw Fastener Mounting: 0.015 inch peak to peak displacement, 2.5g peak(max) acceleration, 1 Hr/axis.

Ambient Temperature Rating:
0° to 60° C (operating). – 40° to 85° C (storage).

Humidity Rating: 5 to 95% (without condensation).

Wiring: #14 AWG stranded (max). 3/64" insulation (max).

Input Specifications

Input specifications for the various processor unit versions are shown below. The 2 mA OFF state leakage current specification allows direct interface to solid state sensing devices and SLC 100 controller output circuits.

Note that the 2 mA OFF state leakage current for 24VAC and 230VAC circuits applies to inputs 1 and 2 only. When required, you can also achieve a 2 mA OFF state leakage current for inputs 3 thru 10, as indicated in the specifications.

All input circuits include optical isolation as well as filtering and surge suppression to guard against damage by transients from external input devices.

ON State Voltage Range and Frequency:
- 1745-LP101: 85-132 VAC, 50/60 Hz.
- 1745-LP102: 170-265 VAC, 50/60 Hz.
- 1745-LP103, -LP104: 10-30V, AC/DC.

Maximum OFF State Voltage:
- 1745-LP101: 35V.
- 1745-LP102: 50V.
- 1745-LP103, -LP104: 5V.

Maximum OFF State Leakage Current:
- 1745-LP101: 2 mA.
- 1745-LP102, -LP103, -LP104: 2mA, inputs 1 and 2 only. To achieve a 2 mA OFF state leakage current for inputs 3 thru 10:

. Connect a resistor from the input terminal to the ground terminal. Size: 240VAC inputs: 39KΩ, 2-watt (min). 24VAC inputs: 5.6KΩ, 1/2 watt (min).

Nominal Input Current:
- 1745-LP101: 8 mA.
- 1745-LP102: 16 mA.
- 1745-LP103, -LP104: 6 mA at 12V, 14 mA at 24V.

Specifications applying to all Catalog Numbers:

Input Filter Time Delay: 10-25 msec.

Electrical-Optical Isolation:
1500 volts between input voltage and control logic.

Output Specifications

Output specifications for all versions of the processor unit are shown below.

Output circuitry includes surge suppression (RC networks) to guard against possible damage by transients from external output devices. We recommend that you also use some type of contact protection when switching inductive load devices. Refer to Pages 6 and 7.

Specifications apply to all catalog numbers

Voltage Range and Frequency:
10-250 VAC (50/60 Hz), 10-125 VDC.

Contact Ratings:

Maximum Volts	Amperes		Amperes Continuous	Voltamperes	
	Make	Break		Make	Break
240VAC 120VAC	7.5A 15A	0.75A 1.5A	2.5A	1800VA	180VA
125VDC	0.22A		1.0A	28VA	
24VDC	1.2A		2.5A	28VA	

Contact Resistance: 20 mΩ (typical).

Electrical Isolation: 2000 volts.

OFF State Leakage Current: 2 mA (AC voltage only).