MOORE INDUSTRIES

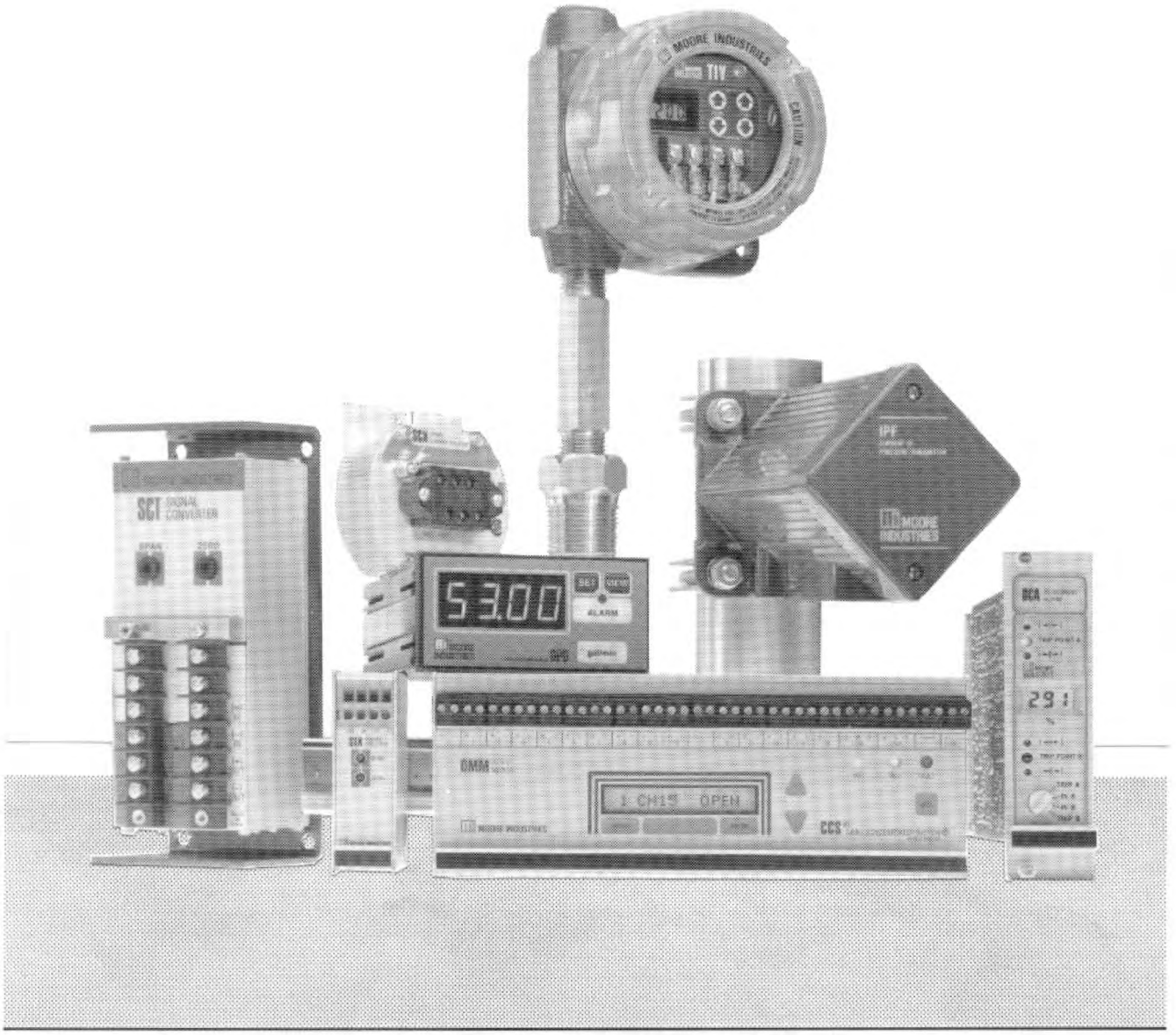
SMP

Surface-mount Power Supply

USER'S MANUAL

April 2016

No. 161-701-00C



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SMP

Introduction

Moore Industries' Surface-mount Power Supply (SMP) is a compact, precision regulated dc power supply. This supply is ideal for powering devices requiring a single dc power source of 5, 12, 15, or 24 Vdc.

This manual contains descriptive, adjustment, and installation information for the SMP. The Notes, Cautions, and Warnings contained in this manual are provided to help you avoid minor inconveniences, equipment damage and personal injury while adjusting or installing the SMP.

Description

The SMP is a single-output, dc power source that is powered by an ac input. One-of-four factory-configured dc outputs are available with the SMP; 5, 12, 15, or 24 volts. The ac input to the SMP must be specified at the time of ordering to be one-of-five international voltages; 100, 117, 220, 230, or 240 Vac. Refer to table 1 for other equipment specifications.

Standard features of the SMP include short circuit and overload protection, and a fused input. These features protect the SMP from damage should electrical conditions change adversely.

An Over-voltage Protection (OVP) Option is available on all SMP's. SMP's equipped with the OVP Option self-monitor the dc output to ensure it does not exceed a predetermined level. Should the output exceed this predetermined level, it is clamped to approximately 1 volt to prevent damage to the SMP or its load.

The SMP electronics are enclosed in an all-aluminum housing that is vented (slotted) for heat dissipation. This housing is designed for surface mounting using four cutouts in the rear panel.

Serial Number. The SMP serial number uniquely identifies each unit. Moore Industries maintains a historical record, which is keyed to the serial number, for every product it sells and services. Should historical information be needed for an SMP, the requester must provide the factory with the unit's serial number. The SMP serial number is located on a label affixed to the right-side of the unit.

Model Number. The SMP model number identifies the unit type, functional characteristics, and configuration options. The model number may be used to determine the configuration in which the equipment was originally shipped from the factory. The model number is located on the same label as the serial number, which is affixed to the right-side of the unit.

The following example identifies the significance of each field of the SMP model number.

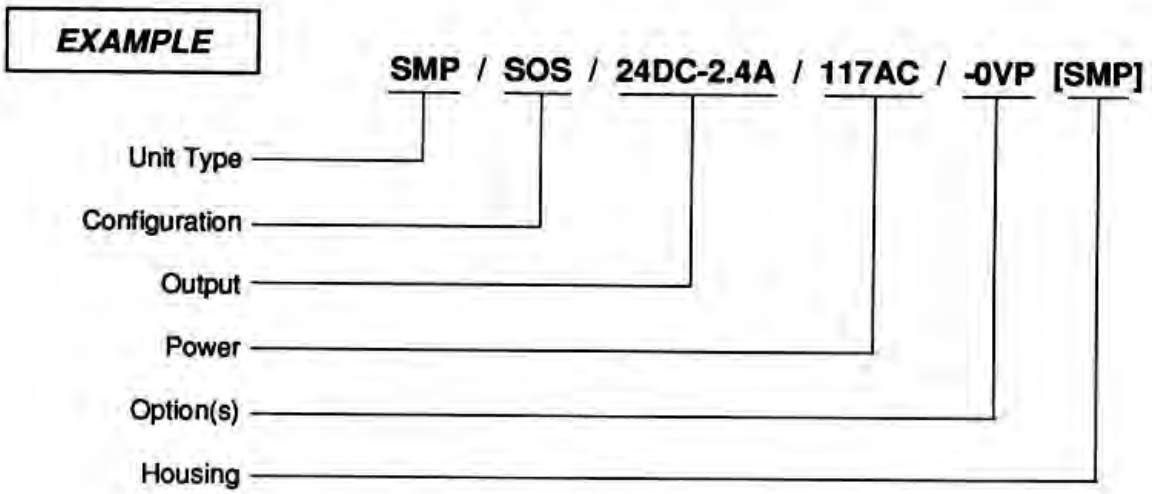


Table 1. SMP Operational and Performance Specifications

Characteristic	Specification
Input	*Factory-configured for (one only):* **100 Vac,** +10%/–13% **117 Vac,** +10%/–13% **220 Vac,** +10%/–13% **230 Vac,** +15%/–10% **240 Vac,** +10%/–13% (output de-rated 10% for 50 Hz operation)
Output	*Factory-configured for (one only):* **5 Vdc,** 6.0 A **12 Vdc,** 3.4 A **15 Vdc,** 3.0 A **24 Vdc,** 2.4 A **24 Vdc,** 3.6 A
Adjustments	**Voltage Output:** Adjustable to ±5% of output rating, minimum (OVP adjustment, optional)
Performance	**Line Regulation:** ±0.05% for a 10% input change **Load:** ±0.1% for a 50% load change **Output Ripple:** 5 mV P/P, maximum **Short Circuit/Overload Protection:** Auto-limiting **Temperature Coefficient:** ±0.03%/°C (±0.017%/°F), maximum **Stability:** ±0.3% over 24 hours after warm-up
Environmental Ratings	**Ambient Operating Temperature:** 0 to 50 °C (32 to 122 °F)
Weight	2.27 kg (5 lbs)
NOTE: Refer to the Installation Section of this manual for the unit's outline dimensions.	

SMP Adjustments

The standard model SMP has two internal adjustments; the Current Limit Adjustment and Voltage Adjustment. The Current Limit Adjustment is factory-set and requires no field adjustment. The Voltage Adjustment, however, is field adjustable.

Two versions of the power supply board (PC1) exist. The specifications are identical for both versions. The physical location of the adjustments and board layout are different. Figures 1 and 2 show the locations of the adjustments for both versions of PC1.

The Voltage Adjustment (R8 or R9) provides adjustibility of the output voltage to within ±5 percent of the rated output of the unit. The model number of the unit contains its dc output rating.

To access PC1, the vented, U-shaped panel that covers the power supply electronics must be removed. Two slotted-head screws on the left-side of the front panel (see figure 5) secure the panel to the chassis of the unit.

To perform the voltage adjustment under 100-percent load, a load resistor and dc voltmeter are required. Table 2 contains load resistor values and their power ratings required to check the SMP output at 100-percent load.

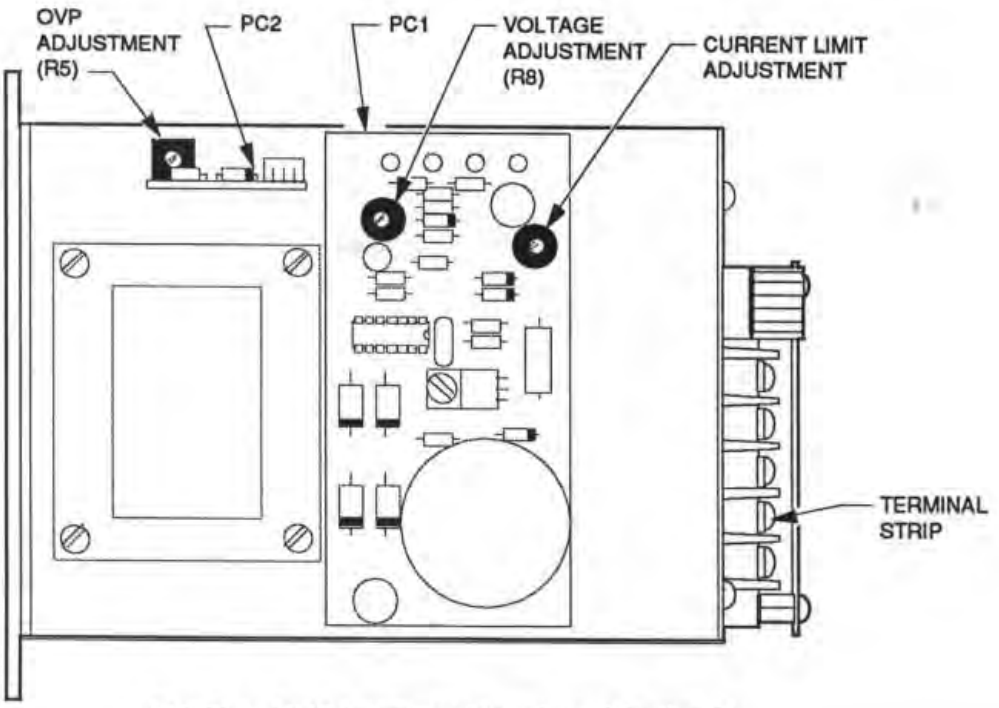


Figure 1. *SMP Adjustment Locations (Version A)*

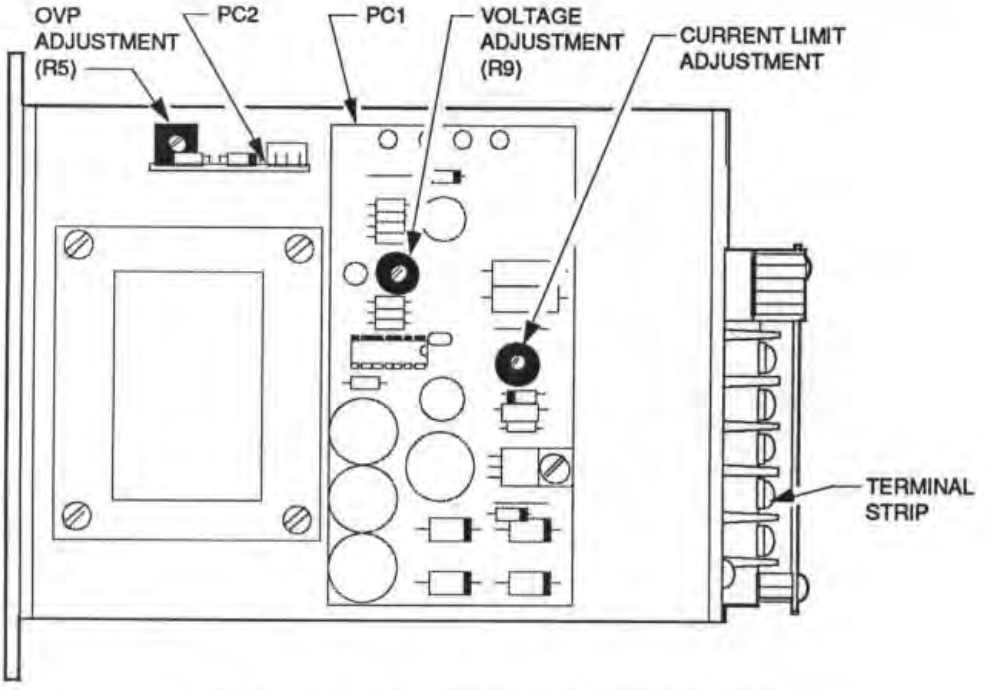


Figure 2. *SMP Adjustment Locations (Version B)*

Table 2. Output Load (100%)

SMP Output	Load Resistance
5 V (6 A)	0.84Ω, 40 W
12 v (3.4 A)	3.5Ω, 50 W
15 V (3 A)	5Ω, 50 W
24 V (2.4)	10Ω, 60 W

Figure 3 shows the equipment setup required to perform the voltage adjustment. The safety cover concealing the terminal strip on the SMP must be removed to make the necessary electrical connections.

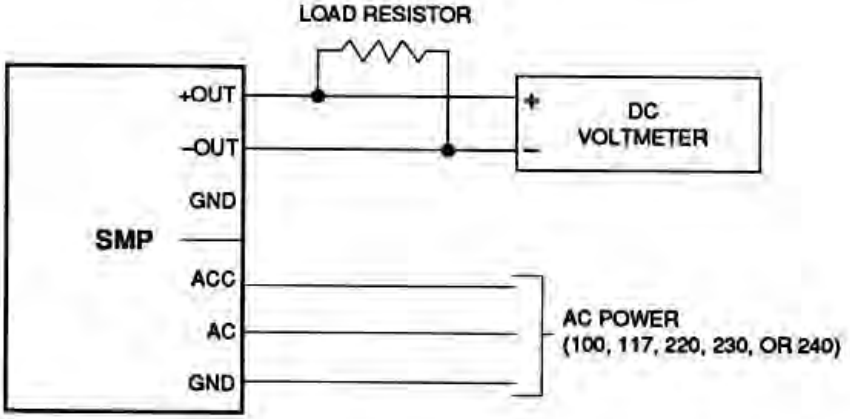


***Figure 3.** Output Check/Adjustment Setup*

Voltage Adjustment Procedures

Check the unit's model number for its input and output configuration. Refer to table 2 and figure 3 before attempting this procedure

WARNING
With power applied and the vented, U-shaped panel and terminal-strip cover removed, ac voltages are exposed. Use caution when handling the SMP in this condition and avoid contact with any electrical connections.

1. Using a slotted-tip screwdriver, remove U-shaped panel and terminal-strip safety cover.
2. Connect voltmeter, load resistor, and ac power cord as shown in figure 3.
3. Apply ac power.
4. While monitoring the output, adjust Voltage Adjustment, R8 or R9 (see figure 1 or 2) on PC1 until output is at appropriate level.
5. Remove ac power.
6. Disconnect voltmeter, load resistor, and ac power cord.
7. Position U-shaped panel as originally found and secure with slotted-head screws provided. Secure terminal-strip safety cover as originally found if SMP is not being placed into service immediately.

Adjusting the OVP Option

Units equipped with the Over-voltage Protection (OVP) Option are factory-set to predetermined over-voltage levels. After the voltage is set to the optimum level, the potentiometer is sealed. If you wish to verify or change the OVP setting, follow the procedure presented later in this section.

The OVP Option causes the output of the SMP to clamp to approximately 1 volt should the output rise above a pre-set voltage. Table 3 contains the factory-set over-voltage settings for each power output rating. This setting is adjustable with the OVP Adjustment, R5 on PC2. See figures 1 and 2 for the location of PC2 and the OVP Adjustment, R5.

To perform the OVP adjustment, an adjustable power supply with an adjustable current limiting feature and a DC voltmeter are needed. The adjustable supply must be capable of exceeding the factory over-voltage settings shown in table 3 for the particular type SMP being checked/adjusted. For instance, a 0-30 Vdc adjustable power supply could be used to trigger the over-voltage protection in any SMP, including the 24-Vdc version.

The following procedure is to be followed when checking or adjusting the OVP Option. Figure 4 shows the setup required to perform the OVP adjustment.

Table 3. *Factory Over-voltage Settings*

Output Rating	Setting
5 Vdc	6.0 Vdc
12 Vdc	13.2 Vdc
15 VDC	16.5 Vdc
24 Vdc	26.4 Vdc

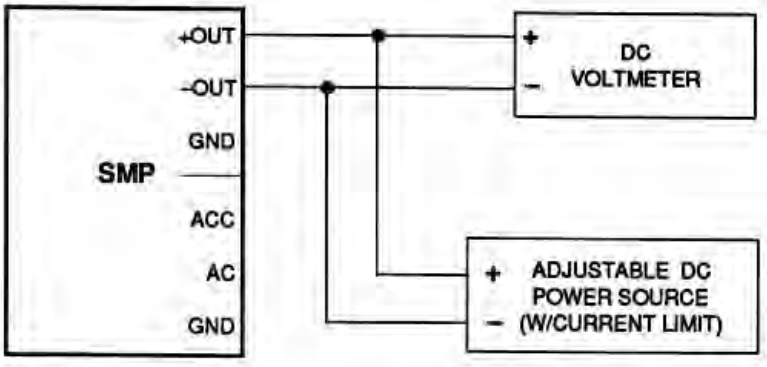
WARNING

DO NOT apply ac power to the SMP when checking or adjusting the OVP setting.

1. Using a slotted-tip screwdriver, remove U-shaped panel and terminal-strip safety cover.
2. Locate OVP Adjustment, R5 (see figure 1 or 2), and set it fully clockwise.

NOTE

The OVP Adjustment is sealed with an enamel-based, air-drying liquid to prevent inadvertent movement of the setting. This seal can be overcome by using slightly more turning force than is normally used. Re-seal this pot when the procedure is complete.



NOTE: Connect adjustable dc power source to each power supply separately.

Figure 4. *OVP Adjustment Setup*

3. Set external power supply to applicable voltage shown in table 3 and limit the output current to 1 A (for all voltage outputs).
4. Connect dc voltmeter and external power supply to SMP as shown in figure 4.
5. Note dc reading at output terminals of SMP (refer to table 3 for factory settings).
6. Slowly turn OVP Adjustment, R5, counterclockwise just enough to cause output to drop to approximately 1 volt.
7. To change OVP setting, remove external power supply and adjust it to desired OVP voltage. Set OVP Adjustment, R5 of SMP, fully clockwise and repeat steps 4 through 6.
8. Disconnect dc voltmeter and external power supply from SMP.
9. Position U-shaped panel as originally found and secure with slotted-head screws provided. Secure terminal-strip safety cover as originally found if SMP is not being placed into service immediately.

Installation

Installing the SMP consists of physically mounting the unit and completing the electrical connections. Both of these tasks are discussed separately in the following subsections. Installation is usually easier when the unit is mounted before making the final electrical connections.

Mounting the SMP

The SMP is designed for mounting on a flat, sturdy surface. It may be mounted on a vertical or horizontal plane. The four cutouts in the rear panel of the unit are used to secure the SMP to an appropriate surface with user-provided hardware.

Figure 5 contains the outline dimensions for mounting the SMP.

The SMP can be operated in environments with high ambient temperatures (see table 1 for specifications). However, the unit should be installed in an area free of excessive moisture and corrosive elements.

Electrical Connections

All electrical connections for the SMP are made at the terminal strip on the front panel of the unit. These six terminals are used to connect the ac input and access the dc output.

To access the terminals, the safety cover must be removed. A slotted-tip screwdriver is needed to loosen the two screws holding the safety cover to the terminal strip. After the screws are loosened, the safety cover can be slid away.

The ac input terminals are labeled ACC, AC and GND. This grouping of terminals is used for the ac input only.

CAUTION

Before applying ac power to the SMP, check the model number of the unit to ensure it is configured for the ac power that you intend to apply.

The dc output terminals are labeled +OUT, –OUT and GND. This grouping of terminals is used for the dc output only.

Figure 6 illustrates a typical installation hookup. The ac power required to safely and properly operate the SMP depends on the configuration of the unit. Both the input and output configuration of a unit are contained in the unit's model number.

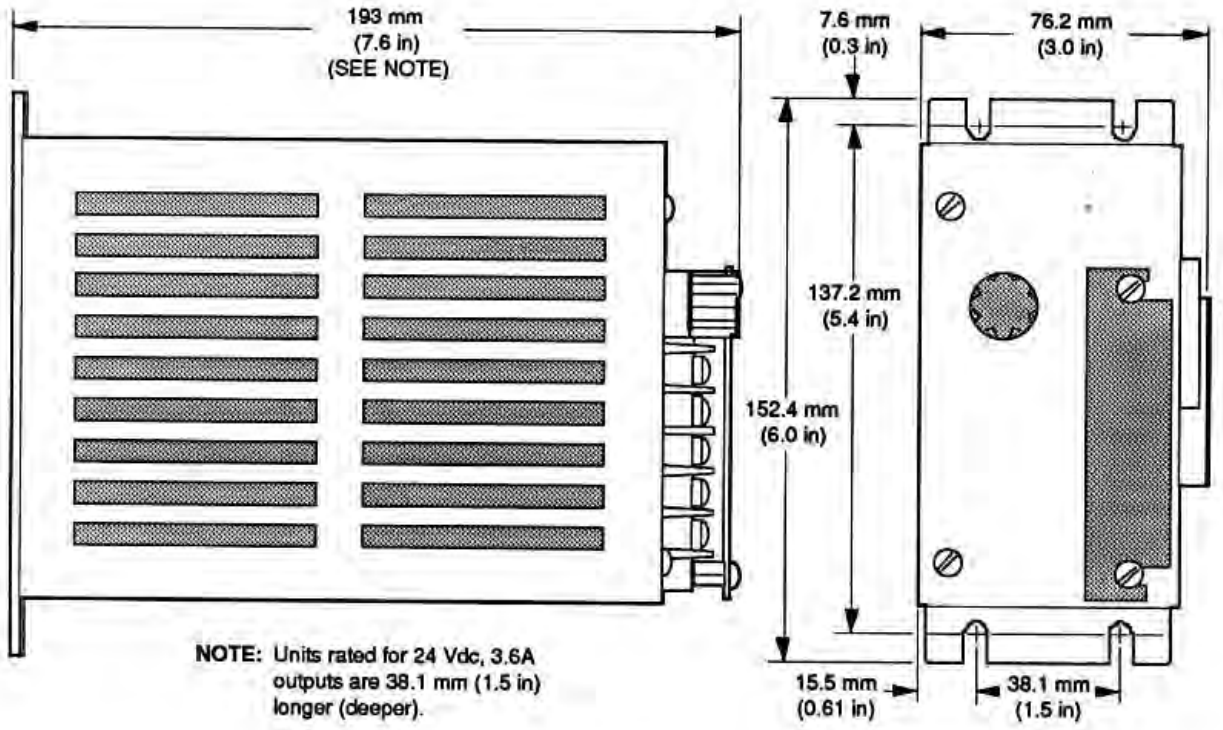


Figure 5. *SMP Outline Dimensions*

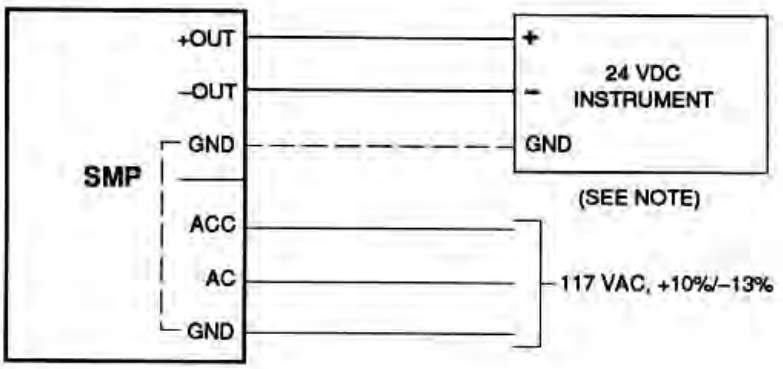


Figure 6. *Typical Installation Hookup Diagram*

Maintenance

The SMP is a highly reliable power supply requiring minimal user maintenance. Once the SMP is placed into service, it will operate maintenance-free for extended periods of time.

Periodically, the SMP should be visually inspected to check its external condition. The electrical connections should be kept especially clean and free of oxidation. If operated in moderate environments, a visual inspection should be performed at least once every six months.

At your discretion, the adjustments described in the SMP Adjustment Section of this manual may be performed. However, if there is no indication of malfunction of a system the SMP is powering, then adjustment is probably not required.

If you have questions regarding the SMP, or any of our products, contact Moore Industries' Customer Service Department at 1-800-999-2900.

Supplement

Low Voltage Directive

The following guidelines must be followed in order to comply with EN 61010-1 (Low Voltage Directive). These items affect the AC versions of the following products: DCA, DPS-240, DPS1200, ECA, ECS, ECT, FCA, FDT, IST, PIT-4W, PWT, RBA, SCT, SMP, SPA-CE. If these products are to be used in a non-CE environment, this supplement may be disregarded.

WARNING:

If this unit is used in a manner not specified by Moore Industries, the protection provided by the equipment may be impaired.

Switches and Circuit Breakers

A switch or circuit breaker must be wired in series with the AC power conductors. This switch or circuit breaker must be located within three meters of the unit.

WARNING:

Terminals on this unit may be connected to hazardous voltages. Before making ANY connections to this unit, ALL hazardous voltages must be de-energized.

The circuit breaker or switch will only remove power to the unit, hazardous voltages may still be connected to other terminals on the unit.

Installation Category

All terminals are rated CAT II, except for terminals with the -RF option. These terminals are rated CAT I.

Equipment Ratings

Moore Industries transmitters do not generate hazardous voltages. They measure voltage or current inputs, and generate low voltages and currents (<42Vdc and <50mAdc). Products connected to Moore Industries transmitters should be designed to receive these inputs.

Moore Industries alarms do not generate any hazardous voltages. Alarm contacts are wired in series with power sources and their intended loads. The correct load should be selected for the power source.

Supply Wiring

All power connections shall be made with 14 or 16 AWG (.083mm or .064mm) wire.

The end of each conductor should be stripped no more than 8mm. The end of the stripped wire should be tinned with solder or inserted into a ferrule and crimped before being placed into a terminal block.

Conductors connected to screw type connections must have a ring or spade lug crimped on the end of the wire.

Protective Earth Conductor

The Protective Earth Conductor shall be of equal or larger size wire than the other two power conductors.

The Protective Earth Conductor shall be the first conductor connected to the unit when the unit is being wired. It shall be the last conductor removed when the unit is being un-wired.

Supplement

Maximum Working Voltage

Table 1-s shows the maximum working voltage for Moore Industries' low voltage products.

Table 1-s. Maximum Working Voltage

Input Type	Maximum Working Voltage
Millivolt, Thermocouple, and RTD	48Vdc
DC Voltage Inputs	48Vdc
AC Voltage Inputs	264Vac
Analog Outputs	48Vdc
Relay Contacts	264Vac
117Vac Power Terminals	129Vac
240Vac Power Terminals	264Vac
Contact Closure Outputs	30Vdc

Accessories

Contact Moore Industries for information on suitable accessories for our products.

Mounting

When mounting the unit or installing it into an application, ensure that the unit can be easily removed for maintenance or repairs.

Cleaning and Maintenance

Maintenance on Moore Industries' products is limited to keeping the unit clean and the wire terminals free of oxidation. This is best accomplished by installing the unit in an area protected from dust, heat, moisture, and corrosive atmospheres. Yearly visual inspections should be performed to ensure that the unit is clean and the electrical connections are in good repair.

Replacement of Consumable Materials

No consumable materials are used in the Moore Industries products covered by EN 61010-1.

Symbols

Table 2-s shows the symbols used on Moore Industries' products, the corresponding IEC/ISO symbol, and its definition.

Table 2-s. Symbols on Moore Industries' Products

IEC/ISO Symbol	Symbol on Moore Industries Product	Definition
	+PS -PS DCC	Direct Current
	AC ACC	Alternating Current
	AC or DC	Direct and Alternating Current
	GND 	Protected Earth Terminal
		Protective Conductor Terminal
		Equipment protected throughout by double insulation or reinforced insulation (equivalent to Class II of IEC 536)
		Caution (See manual for information)
Not Specified	+IN -IN	Positive Input Negative Input
Not Specified	+OUT -OUT	Positive Output Negative Output
Not Specified	NO NC CM	Normally Open Normally Closed Common
Not Specified	UNO UNC	Upper Normally Open Upper Normally Closed
Not Specified	LNO LNC	Lower Normally Open Lower Normally Closed
Not Specified	TX	Transmitter Excitation

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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