Power Supply

Model 8525-2X

Electric Power Technology

User Guide

Festo Didactic
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Electricity and New Energy

Power Supply
Model 8525-2X

Instruction Manual
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By the staff of Festo Didactic

Internet: www.festo-didactic.com
e-mail: did@de.festo.com

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Safety and Common Symbols

The following safety and common symbols may be used in this manual and on the equipment:

Symbol	Description
⚠ DANGER	**DANGER** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
⚠ WARNING	**WARNING** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ CAUTION	**CAUTION** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
CAUTION	**CAUTION** used without the *Caution, risk of danger* sign ⚠, indicates a hazard with a potentially hazardous situation which, if not avoided, may result in property damage.
	Caution, risk of electric shock
	Caution, hot surface
	Caution, risk of danger
	Caution, lifting hazard
	Caution, hand entanglement hazard
	Notice, non-ionizing radiation
	Direct current
	Alternating current
	Both direct and alternating current
	Three-phase alternating current
	Earth (ground) terminal

Safety and Common Symbols

Symbol	Description
	Protective conductor terminal
	Frame or chassis terminal
	Equipotentiality
	On (supply)
	Off (supply)
	Equipment protected throughout by double insulation or reinforced insulation
	In position of a bi-stable push control
	Out position of a bi-stable push control

INTRODUCTION

The Lab-Volt Model 8525-2X Power Supply is manufactured and tested under strict quality control. If the Power Supply requires repair or adjustment, contact your field representative to obtain instructions for forwarding the module to the nearest authorized Lab-Volt Service Centre.

> **Note:** *The technical information in this instruction manual was up to date at the time of publication. It is possible, however, that modifications have been made in order to improve the product. To have the most up-to-date information, contact your field representative and state both the model and serial numbers.*

> **Note:** *This equipment is for use only in industry and school laboratories where qualified supervision is provided.*

WARRANTY

Lab-Volt warrants all equipment against defects in material and workmanship for a period of one year from the date of installation and/or acceptance by the customer. This warranty covers only the intended use of the equipment and does not cover damage due to alteration, negligent use or normal wear.

We assume no liability for damage, injury or expense claimed to have been incurred through the installation or use of our products.

Questions concerning this warranty and all requests for repairs should be directed to the Lab-Volt field representative in your area or one of the following manufacturing divisions.

LAB-VOLT (Quebec) LTD.
675, rue du Carbone
Charlesbourg, Quebec, CANADA,
G2N 2K7
Tel.: (418) 849-1000
Fax: (418) 849-1666
E-Mail: ca@labvolt.com

LAB-VOLT SYSTEMS
P.O. Box 686
Farmingdale, New Jersey,
USA 07727
Tel.: (732) 938-2000
Fax: (732) 774-8573
E-Mail: us@labvolt.com

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SECTION 1

DESCRIPTION

The Power Supply module, Model 8525-2X, provides the necessary ac/dc power, both fixed and variable, single-phase and three-phase, to perform all of the laboratory experiments in the Lab-Volt training program in electrical power technology.

The Power Supply module is a rugged piece of equipment designed to take a lot of abuse. It incorporates features that protect it against damage from overloads and accidental short-circuits. Most important, these features include safety measures to adequately protect the student against accidental shock. Besides the main, 3-phase, on-off circuit breaker on the front panel, all of the outputs have their own circuit breakers. They can be reset by a common reset button located on the front panel.

The Power Supply module has five outputs:

1. A fixed-voltage, 3-phase, 4-wire output (terminals 1, 2, 3, and N on the front panel)

2. A fixed-voltage dc output (terminals 8 and N on the front panel)

3. A variable-voltage, 3-phase, 4-wire output (terminals 4, 5, 6, and N on the front panel)

4. A variable-voltage dc output (terminals 7 and N on the front panel)

5. A fixed-voltage, low power ac output

Section 2 of this manual provides the nominal voltage, current, and frequency of each output.

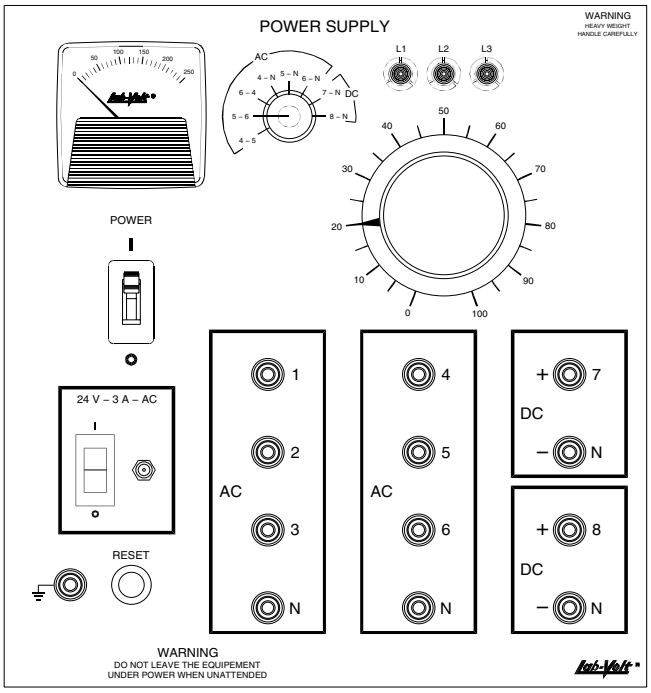

Figure 1. Front Panel of the Model 8525-20 Power Supply (120/208 V – 60 Hz).

The variable-voltage ac and dc outputs are controlled by the single control knob on the module front panel. A built-in ac/dc voltmeter indicates all the variable ac and the variable and fixed dc output voltages according to the position of the voltmeter selector switch.

The rated current of each output may be exceeded considerably for short periods of time without harming the power supply or tripping the circuit breakers. This feature is particularly useful in the study of dc motors under overload or starting conditions where high currents may be drawn.

All of the power sources may be used simultaneously providing that the total current drawn does not make the main, 3-phase, on-off circuit breaker trips. Your power supply, if handled properly, will provide years of reliable operation and will present no danger to you.

SECTION 2

SPECIFICATIONS

Model 8525-20

Power Requirement	120/208 V – 15 A – 60 Hz, 3 phases (4 wires plus ground)
Fixed Outputs	120/208 V – 15 A – 60 Hz, 3 phases 120 V – 15 A – 60 Hz, 1 phase 24 V – 3 A – 60 Hz, 1 phase 120 V – 5 A – DC
Variable Outputs	0-120/208 V – 15 A – 60 Hz, 3 phases 0-120 V – 15 A – 60 Hz, 1 phase 0-120 V – 25 A – DC
AC/DC Voltmeter	0-250 V

Model 8525-25

Power Requirement	220/380 V – 10 A – 50 Hz, 3 phases (4 wires plus ground)
Fixed Outputs	220/380 V – 10 A – 50 Hz, 3 phases 220 V – 10 A – 50 Hz, 1 phase 24 V – 3 A – 50 Hz 220 V – 3 A – DC
Variable Outputs	0-220/380 V – 7 A – 50 Hz, 3 phases 0-220 V – 7 A – 50 Hz, 1 phase 0-220 V – 12 A – DC
AC/DC Voltmeter	0-500 V

Model 8525-2A

Power Requirement	240/415 V – 10 A – 50 Hz, 3 phases (4 wires plus ground)
Fixed Outputs	240/415 V – 10 A – 50 Hz, 3 phases 240 V – 10 A – 50 Hz, 1 phase 24 V – 3 A – 50 Hz 240 V – 3 A – DC
Variable Outputs	0-240/415 V – 7 A – 50 Hz, 3 phases 0-240 V – 7 A – 50 Hz, 1 phase 0-240 V – 12 A – DC
AC/DC Voltmeter	0-500 V

SECTION 3

INSTALLATION

3.1 Initial Installation

The proper installation of your power supply is of vital importance and must be carried out in accordance with the following instructions:

1. Make sure the distribution panel feeding the power supply module provides a 3-phase, **4-wire** distribution system. In such a system, three of the wires are the **live** lines, and the fourth wire is the **neutral**. The system must also provide a **ground** wire, so that the laboratory equipment can be grounded. The ground wire is a safety feature to reduce the danger of electric shock.

2. Do not use a distribution system having only 3 wires: it has a ground wire but **no neutral wire**. When the system neutral is absent, the line-to-neutral voltages of the Power Supply module become unpredictable. Furthermore, many single-phase experiments cannot be carried out. However, a 3-phase, 3-wire system can be converted into a 3-phase, 4-wire system by installing a special Lab-Volt transformer. The capacity of the transformer depends on the number of work stations. You should consult your Lab-Volt representative to determine the rating of the transformer that will best serve your needs.

3. The circuit breakers or fuses of the distribution panel must never have a rating in excess of 20 A.

4. The wall outlets in your laboratory must be connected so that they all have the same phase sequence. One easy way to test the phase sequence is to use a Lab-Volt Resistive Load module (model 8509) and a Capacitive Load module (model 8511). The modules are connected to the Power Supply terminals 1, 2, and 3, as shown in Figure 2.

   The resistance of resistors R1 and R2 as well as the reactance of the capacitor C are set to the value given in Table 1. Notice that this value changes with the Power Supply model number. The common connection of the resistive and capacitive components is left floating.

Power Supply Model Number	Resistance of R1 and R2	Reactance of C
8525-20	240 Ω	240 Ω
8525-25	880 Ω	880 Ω
8525-2A	960 Ω	960 Ω

Table 1. Value of the resistive and capacitive components used in Figure 2.

   The phase sequence is 1-2-3- if the voltage E_1 across R_1 is about 180 V ac. This is the recommended phase sequence.

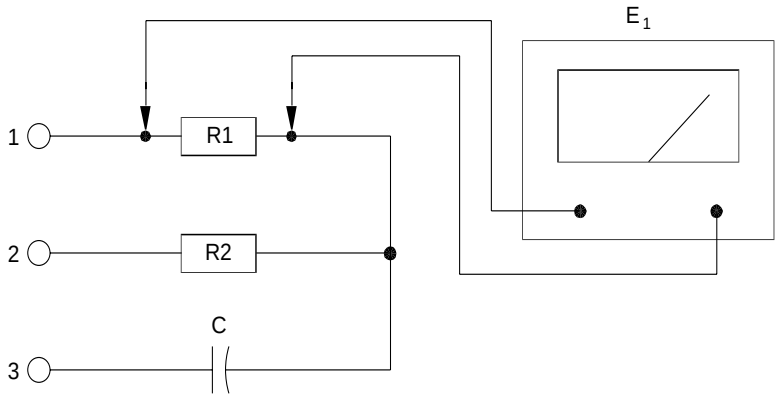

Figure 2. Circuit used to test the phase sequence of the wall outlets in the laboratory.

The phase sequence is 1-2-3 if the voltage E1 across resistor R1 is approximately equal to the value given in Table 2 when the Power Supply is turned on. This is the recommended phase sequence. Notice that the value of the voltage E1 obtained with the recommended 1-2-3 phase sequence changes with the Power Supply model number.

Power Supply Model Number	Voltage E1
8525-20	180 V
8525-25	330 V
8525-2A	360 V

Table 2. Value of voltage E1 when the phase sequence is 1-2-3 (recommended sequence).

If, however, voltage E1 is approximately equal to the value given in Table 3 when the Power Supply is turned on, the phase sequence is 1-3-2. This phase sequence is not recommended, because it is contrary to the standard 1-2-3 sequence.

Power Supply Model Number	Voltage E1
8525-20	50 V
8525-25	90 V
8525-2A	95 V

Table 3. Value of voltage E1 when the phase sequence is 1-3-2 (non-recommended sequence).

If you determined that the phase sequence is 1-3-2, you can change it to 1-2-3 by reversing any two of the three live lines (live wires) that feed the wall outlet.

5. The Power Supply module has a 5-prong male receptacle that must be connected to a 3-phase, 4-wire wall outlet that also has a ground conductor. The connection is made using the flexible cable that is provided with the Power Supply module.

3.2 Distribution System Confirmation Check

The following test must be performed to confirm that your Power Supply module is connected to a proper 3-phase, 4-wire distribution system:

1. Turn on the main circuit breaker (ON-OFF switch) of the Power Supply module and observe that the three neon lamps are on.

2. Turn the control knob of the Power Supply so that the output voltage between terminals 4 and N is zero (fully counterclockwise position).

3. Turn off the main circuit breaker (ON-OFF switch). Connect an ac ammeter having a range of at least 5 A between terminals 4 and N.

4. Turn on the main circuit breaker and gradually rotate the control knob of the Power Supply until the ac ammeter reads exactly 5 A.

Measure the voltage between terminals 5 and N as well as between terminals 6 and N. In both cases, the voltage indicated by an ac voltmeter should not exceed 10 V. If so, there is something wrong with the distribution system. It probably has no neutral. Check the distribution system and correct the problem before proceeding any further.

3.3 Multiple Wall Outlets Installation

If your laboratory has more than one wall outlet, they must be wired so as to provide identical voltages to each of the Lab-Volt Power Supply modules. To verify that the wiring of the wall outlets is correct, proceed as follows (see Figure 3):

1. Select a wall outlet (R) which has been checked for correct voltage and correct phase sequence, as per the initial installation (section 3.1). It will serve as a reference.

2. Connect a Power Supply module (MR) to the reference wall outlet R.

3. Connect another Power Supply module (MS) to any other wall outlet (S).

4. Turn on the main circuit breakers of both Power Supplies. Check that the neon lamps glow with equal brightness.

5. Measure the voltage between terminal 1 of MR and terminal 1 of MS, using an ac voltmeter. The voltage should be zero.

6. Measure the voltage between terminal 2 of MR and terminal 2 of MS, using an ac voltmeter. The voltage should be zero.

7. Measure the voltage between terminal 3 of MR and terminal 3 of MS, using a voltmeter. The voltage should be zero.

8. If the voltage in step 5, 6, or 7 is not zero, wall outlet S is incorrectly wired. To resolve this problem, at least two of the three lines feeding wall outlet S (live wires)

must be interchanged. The connections must be made so that the voltage between terminals 1-1, 2-2, and 3-3 is zero (Figure 3).

9. Repeat steps 3 to 8 for each wall outlet in your laboratory.

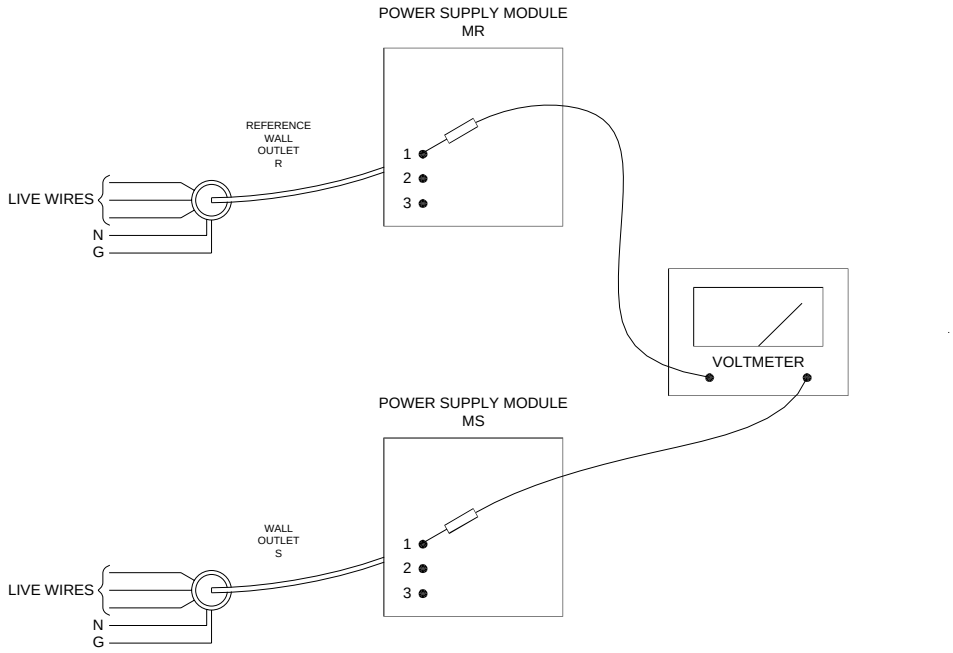

Figure 3. Circuit used to test the wiring of the wall outlets in a laboratory with multiple wall outlets.

CE Importer:
Festo Didactic SE
Rechbergstr. 3
73770 Denkendorf
Germany
Tel.: +49 711 3467-0
did@festo.com

US Importer:
Festo Didactic Inc.
607 Industrial Way West
Eatontown, NJ 07724
United States
Tel.: +1 732 938-2000
Toll Free: +1-800-522-8658
services.didactic@festo.com

CA Manufacturer:
Festo Didactic Ltée/Ltd
675, rue du Carbone
Québec (Québec) G2N 2K7
Canada
Tel.: +1 418 849-1000
Toll Free: +1-800-522-8658
services.didactic@festo.com

UK Importer:
Festo Ltd
Applied Automation Centre
Brackmills
Northampton, NN4 7PY
United Kingdom
T +44 800 626 422
info_gb@festo.com

www.festo-didactic.com