



INDUSTRIAL CONTROLS TRAINING SYSTEMS SERIES 8036



Industrial Controls Training Systems, Series 8036

GENERAL DESCRIPTION

The Lab-Volt Industrial Controls Training System, Series 8036, allows the student to select and mount control devices to form typical control circuits, and to troubleshoot them once a fault is inserted. The system has unique controls training capabilities, which are enhanced by its modularity and its instructor-inserted faults.

The Industrial Controls Training System is divided into four levels, each level being further divided into specific topics that deal with various aspects of industrial controls equipment operation. The Basic Controls system, Model 8036-1, provides the student with a complete basic training in motor controls. The Programmable Logic Controller system, Model 8036-2, introduces the use of PLCs to control the motor operation. The Motor Drives

system, Model 8036-3, introduces the use of the DC and AC drives. The Sensors system, Model 8036-4, introduces photoelectric and proximity switches.

The 8036 Series control devices and motors are of standard industrial quality, preset to fit the 0.2 kW machines in the Lab-Volt Electromechanical Training System. Device designations can be added to each module with magnetic labels.

Each module is equipped with up to four faults that can be inserted by the instructor using switches hidden behind the faceplate. Typical faults include open coils and contacts, dirty contacts, shorted connection, and crossed wires.

INDUSTRIAL CONTROLS TRAINING SYSTEMS

SERIES 8036

The 8036 Series modules are designed to be mounted in the Mobile Workstation, Model 3103-3, or in the Workstations, Models 3104-1 and 3105. The Mobile Workstation, Model 3103-3, is double-sided and can accommodate two student groups simultaneously.

The modules of the Industrial Controls Training System can be interconnected with those of other Lab-Volt training systems for interdisciplinary training applications. Connections are made using flexible PVC-connecting leads terminated with 4-mm safety plugs. These leads allow safe connection of components, since the live parts of their plugs are concealed and insulated so they cannot be contacted accidentally. Leads come in three different lengths, each identified by a distinctive color. For safety, smaller connection leads are also provided for the low-voltage applications running with 24 V dc. So cables under different voltage levels cannot be mixed accidentally.

Integration into 8001 and 8006 Electromechanical Training Systems

The 8036 Industrial Controls Training System can also be used with the 8001 and 8006 models using the environment workstation as long as its power supply. To have a complete Industrial Controls Training System, compatible with the 8001 and 8006 models, order the following models:

- 8036-E: Basic Controls
- 8036-2: Programmable Logic Controller
- 8036-B: Motor Drives
- 8036-4: Sensors

Courseware

The Industrial Controls Training System courseware consists of student manuals and instructor guides. The student manuals are divided into several units, each consisting of a series of hands-on exercises dealing with one of the fields of industrial controls. Each exercise provides a clearly stated objective, a discussion, an exercise procedure, a summary, and a set of review questions. An additional ten-question test at the end of each unit allows the student to verify what was learned in the unit.

Refer to the Table of Contents of the Student Manuals section of this datasheet for a list of the topics covered in each student manual. The instructor guides contain the practical results and the answers for each hands-on exercise in the student manuals. They also contain the answers to the unit test questions in the student manuals.

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TABLE OF CONTENTS OF THE STUDENT MANUALS

Basic Controls (39163-00 and 87774-00)

- **Basic Principles of Electric Motor Control**
 - Lockout/Tagout Procedure
 - Control Panel Devices
 - Manual Starters
 - Contactors and Control Relays
 - Current Protection Devices
- **Circuit Layout and Specifications**
 - Specifications Reading
 - Symbols, Designations, and Diagrams
- **Basic Control Circuits**
 - Motor Starters
 - Two-Wire and Three-Wire Controls
 - Manual Reversing Starters
 - Reversing Starters
 - Multiple Push Buttons
- **Jogging Control Circuits**
 - Friction Brakes
 - Motor Starter with Jogging
 - Reversing Starters with Jogging
- **Reduced AC Voltage Starters**
 - Primary Resistor Starters
 - Soft Starters
- **Time Relay Circuits**
 - Time Relays
 - Plugging with Time Relays
 - Primary Resistor Starters with Time Relays

TABLE OF CONTENTS OF THE STUDENT MANUALS (cont'd)

Programmable Logic Controller (39436-00)

• Programmable Logic Controller

- PLC Overview
- Control Relay Functions
- Boolean Logic and Markers
- Timing Relay Functions
- Counter and Comparator Functions

• PLC Control Circuits

- Interfacing Voltages
- Motor Starters with Jogging
- Reversing Motor Starters with Jogging

Motor Drives (87667-00, 87668-00 and 87669-00)

• AC Drive

- AC Drive Overview
- Volts per Hertz Characteristics
- Ramp and Torque Boost
- Protection
- Braking and Jogging
- Remote Controls

• DC Drive

- DC Drive Overview
- Current Limiting and IR Compensation

Sensors (39654-00)

- Introduction to Sensors
- Background Suppression Photoelectric Switch
- Polarized Retroreflective Photoelectric Switch

- Capacitive Proximity Switch
- Inductive Proximity Switch
- Limit Switch
- Motor-Operated Circuits Using Sensors (optional)¹
- PLC-Controlled Circuits Using Sensors (optional)¹

Troubleshooting (85082-00)

• Introduction to Troubleshooting

- Voltmeter Method of Troubleshooting
- Ohmmeter Method of Troubleshooting
- Troubleshooting a Basic Electrical Circuit

• Troubleshooting Basic Motor Control Circuits

- Troubleshooting a Manual Reversing Starter Circuit
- Troubleshooting a Motor Starter with Jogging Circuit
- Troubleshooting a Plugging with Time Relay Circuit

• Troubleshooting PLC Circuits

- Troubleshooting a PLC Circuit
- Troubleshooting a PLC Reversing Motor Starter with Jogging Circuit
- Troubleshooting a PLC Motor Starter with Jogging Circuit

• Troubleshooting AC and DC Drive Circuits

- Troubleshooting an AC Drive Circuit
- Troubleshooting an AC Drive Braking and Jogging Circuit
- Troubleshooting a DC Drive Circuit

LIST OF EQUIPMENT

BASIC CONTROLS – MODEL 8036-1

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Mobile Workstation	3103-30
2	Push Buttons	3110-20
1	Selector Switches	3111-20
1	Emergency Button	3114-00
2	Pilot Lights	3115-20
1	Dual Contactors	3119-00
1	Lockout Module	3125-10
1	Manual Starter	3126-00
1	Contactor	3127-20
1	Control Relay	3130-20
1	Overload Relay	3131-30
1	Time Relay	3132-30
1	Three-Pole Fuse Holder	3137-00
1	Control Transformer	3138-30
1	Cam Switch	3140-30

¹ Requires the optional Reversible AC Motor Model 3174-3.

² The ordering numbers shown apply to the English 120-V version. Other versions are available. Refer to the Ordering Numbers section.

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BASIC CONTROLS – MODEL 8036-1 (cont'd)

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Inertia Wheel	3147-10
1	Starting Resistors	3150-10
1	Brake Motor	3176-A0
1	Soft Starter	3186-00
1	AC Power Supply	3196-30
1	Connection Leads	8951-80
1	Fuses	37889-00
1	Magnetic Labels	38503-00
1	Basic Controls - Student Manual ³	39163-00
1	Basic Controls - Instructor Guide	39163-10
1	Rack (3103)	39352-00
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10

PROGRAMMABLE LOGIC CONTROLLER – MODEL 8036-2 (ADD-ON TO MODEL 8036-1 OR 8036-E)

QTY	DESCRIPTION	ORDERING NUMBER ²
2	Switches	3112-00
1	Pilot Lights	3115-A0
1	Programmable Logic Controller	3128-00
1	Interposing Relays	3129-00
1	DC Power Supply	3139-00
1	Connection Leads	8951-E0
1	Programmable Logic Controller - Student Manual	39436-00
1	Programmable Logic Controller - Instructor Guide	39436-10
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10

MOTOR DRIVES – MODEL 8036-3 (ADD-ON TO MODEL 8036-1 OR 8036-E IN CONJUNCTION WITH MODEL 8036-2)

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Power Diodes	3165-10
1	DC Motor	3179-20
1	AC Drive	3183-10
1	DC Drive	3184-00
1	Motor Drives - Student Manual	87669-00
1	Motor Drives - Instructor Guide	87669-10
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10

SENSORS – MODEL 8036-4 (ADD-ON TO MODEL 8036-1 OR 8036-E)

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Limit Switch	3149-00
1	Background Suppression Photoelectric Switch	6373-B0
1	Polarized Retroreflective Photoelectric Switch	6374-B0
1	Inductive Proximity Switch	6375-B0
1	Capacitive Proximity Switch	6376-B0
1	Reflective Block	6396-00
1	Sensors - Student Manual	39654-00
1	Sensors - Instructor Guide	39654-10
1	Filler Pot	76768-00

³ Includes the component datasheets on a CD-ROM.

DERIVED SYSTEMS

FUNDAMENTAL CONTROLS – MODEL 8036-0⁴ (SUBSET OF MODEL 8036-1)

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Workstation – Add-On to 8110	3104-10
2	Push Buttons	3110-20
1	Selector Switches	3111-20
1	Pilot Lights	3115-20
1	Dual Contactors	3119-00
1	Lockout Module	3125-10
1	Manual Starter	3126-00
1	Contactor	3127-20
1	Control Relay	3130-20
1	Overload Relay	3131-30
1	Control Transformer	3138-30
1	Cam Switch	3140-30
1	Inertia Wheel	3147-10
1	Starting Resistors	3150-10
1	Machine Mounting Plate	3170-20
1	Brake Motor	3176-A0
1	AC Power Supply	3196-30
1	Connection Leads	8951-J0
1	Magnetic Labels	38503-00
1	Basic Controls - Student Manual ³	39163-00
1	Basic Controls - Instructor Guide	39163-10
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10

MOTOR DRIVES – MODEL 8036-A (STAND-ALONE)

The Motor Drives, Model 8036-A, is a complete, stand-alone system that allows students to perform the same exercises as with the system 8036-3. The system stands on a tabletop.

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Single-Rail Workstation	3105-00
2	Switches	3112-00
1	Emergency Button	3114-00
1	Pilot Lights	3115-A0
1	Manual Starter	3126-00
1	Cam Switch	3140-30
1	Inertia Wheel	3147-10
1	Starting Resistors	3150-10
1	Power Diodes	3165-10
1	Machine Mounting Plate	3170-20
1	Brake Motor	3176-A0
1	DC Motor	3179-20
1	AC Drive	3183-10
1	DC Drive	3184-00
1	AC Power Supply	3196-30
1	Connection Leads	8951-H0
1	Magnetic Labels	38503-00
1	Motor Drives - Student Manual	87667-00
1	Motor Drives - Instructor Guide	87667-10

⁴ The Fundamentals Controls, Model 8036-0, does not allow all exercises in the Basic Controls manual (p/n 39163) to be performed.

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MOTOR DRIVES – MODEL 8036-B (ADD-ON TO MODEL 8001 OR 8006)

The Motor Drives, Model 8036-B, is an add-on to systems Model 8001 or 8006 that allows the students to perform the same exercises as with the system 8036-3 but using 8001 or 8006 motors and power supply.

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Single-Rail Workstation – Add-on to 8110	3105-A0
1	Switches	3112-00
1	Pilot Lights	3115-A0
1	Manual Starter	3126-00
1	AC Drive	3183-10
1	DC Drive	3184-00
1	Connection Leads	8951-I0
1	Magnetic Labels	38503-00
1	Motor Drives - Student Manual	87668-00
1	Motor Drives - Instructor Guide	87668-10

MOTOR DRIVES – MODEL 8036-C (STAND-ALONE)

The Motor Drives, Model 8036-C, is a 120 V 60 Hz version of Model 8036-A. Both AC and DC Drives are connected directly to a wall outlet. This system is only available for 120 V – 60 Hz network.

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Single-Rail Workstation	3105-00
2	Switches	3112-00
1	Emergency Button	3114-00
1	Pilot Lights	3115-A0
1	Manual Starter	3126-00
1	Cam Switch	3140-30
1	Inertia Wheel	3147-10
1	Starting Resistors	3150-10
1	Power Diodes	3165-10
1	Machine Mounting Plate	3170-20
1	Brake Motor	3176-A0
1	DC Motor	3179-20
1	AC Drive	3183-B0
1	DC Drive	3184-00
1	Connection Leads	8951-H0
1	Magnetic Labels	38503-00
2	Wall Cord Line	85360-00
1	Motor Drives - Student Manual	87667-00
1	Motor Drives - Instructor Guide	87667-10

BASIC CONTROLS – MODEL 8036-D (SECOND TEAM, ADD-ON TO MODEL 8036-1)

The Basic Controls, Model 8036-D, is designed to be used with the double-sided Mobile Workstation, Model 3103-3. It contains the same equipment as the Basic Controls, Model 8036-1, without the models that can be used simultaneously by the two student groups: Mobile Workstation - Model 3103-3, AC Power Supply - Model 3196-3, and Rack (3103) - Model 39352.

QTY	DESCRIPTION	ORDERING NUMBER ²
2	Push Buttons	3110-20
1	Selector Switches	3111-20
1	Emergency Button	3114-00
2	Pilot Lights	3115-20
1	Dual Contactors	3119-00
1	Lockout Module	3125-10

BASIC CONTROLS – MODEL 8036-D (SECOND TEAM, ADD-ON TO MODEL 8036-1) (cont'd)

QTY	DESCRIPTION	ORDERING NUMBER ²
1	Manual Starter	3126-00
1	Contactors	3127-20
1	Control Relay	3130-20
1	Overload Relay	3131-30
1	Time Relay	3132-30
1	Three-Pole Fuse Holder	3137-00
1	Control Transformer	3138-30
1	Cam Switch	3140-30
1	Inertia Wheel	3147-10
1	Starting Resistors	3150-10
1	Brake Motor	3176-A0
1	Soft Starter	3186-00
1	Connection Leads	8951-80
1	Fuses	37889-00
1	Magnetic Labels	38503-00
1	Basic Controls - Student Manual ³	39163-00
1	Basic Controls - Instructor Guide	39163-10
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10
1	Lead Holder	88471-00

BASIC CONTROLS – MODEL 8036-E (ADD-ON TO MODEL 8001 OR 8006)

The Basic Controls, Model 8036-E, is an add-on to system Model 8001 or 8006 that allows the students to perform the same exercises as with the system 8036-1 but using the 8001 or 8006 environment.

QTY	DESCRIPTION	ORDERING NUMBER ²
2	Single-Rail Workstation – Add-on to 8110	3105-A0
2	Push Buttons	3110-20
1	Selector Switches	3111-20
1	Emergency Button	3114-00
2	Pilot Lights	3115-20
1	Dual Contactors	3119-00
1	Lockout Module	3125-10
1	Manual Starter	3126-00
1	Contactors	3127-20
1	Control Relay	3130-20
1	Overload Relay	3131-30
1	Time Relay	3132-30
1	Three-Pole Fuse Holder	3137-00
1	Control Transformer	3138-30
1	Cam Switch	3140-30
1	Starting Resistors	3150-10
1	Brake Motor (EMS Version)	3176-B0
1	Soft Starter	3186-00
1	Connection Leads	8951-M0
1	Zero Friction Machine	8969-00
1	Inertia Wheel	9126-00
1	Fuses	37889-00
1	Magnetic Labels	38503-00
1	Basic Controls - Student Manual ³	87774-00
1	Basic Controls - Instructor Guide	87774-10
1	Troubleshooting - Student Manual	85082-00
1	Troubleshooting - Instructor Guide	85082-10
1	Brackets (3105-A)	85282-00

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ADDITIONAL EQUIPMENT REQUIRED TO PERFORM THE EXERCISES

DESCRIPTION	ORDERING NUMBER ²
Digital Tachometer	8920-40
Multimeter	72676-00
Stopwatch	77660-00

OPTIONAL EQUIPMENT

DESCRIPTION	ORDERING NUMBER ²
Manual Starter	3121-20
Solid-State Relay	3133-20
Electronic Overload Relay	3136-00
Speed Switch	3146-20
Field Rheostat	3151-10
Prony Brake	3154-10
Universal Motor	3167-10
Dahlander Two-Speed Induction Motor	3168-20
Two-Value Capacitor Motor	3169-10
Machine Mounting Plate	3170-20
Motor Terminal Module	3171-20
Single-Phase Motor	3172-20
Reversible AC Motor	3174-30
Two-Speed Motor	3175-00
Polyphase Motor	3176-20
Three-Phase Wound-Rotor Induction Motor	3177-10
Three-Phase Synchronous Motor/Generator	3178-10
DC Motor (EMS Version)	3179-A0
DC Control Relay	3180-10
DC Contactor	3181-10
DC Time-Delay Relay	3182-10
Manual DC Motor Starter	3187-10
Three-Phase Rheostat	3188-10
Connection Leads	3191-10
Rail Package	3195-10
AC/DC Power Supply	3197-30
Blank Module (15 cm)	3198-00
Blank Module (23 cm)	3198-10
Blank Module (30 cm)	3198-20
Diffuse Reflective Photoelectric Switch	6377-B0
Phase Converter	8896-00
Personal Computer	8990-00
Manuals on CD-ROM	39436-A0
Clamp-On Meter	38707-00
Back Cover (15 cm)	85283-00
Back Cover (23 cm)	85283-10
Back Cover (30 cm)	85283-20

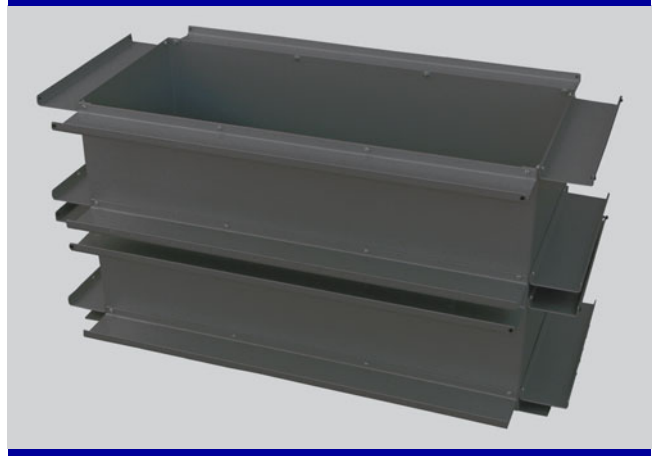
MODULE DESCRIPTION

Model 3103-3 – Mobile Workstation



The Mobile Workstation is a double-sided, mobile workstation on casters. The workstation has an A-frame configuration, is constructed of steel, and can accommodate two student groups simultaneously. Four pairs of mounting rails hold the control modules firmly in place. The storage shelf and the work surface are protected against scratches by a rubber carpet.

Model 3104-1 – Workstation – Add-On to 8110



The Workstation consists of mounting rails configured to allow module mounting space on all four sides of the workstation. The unit is constructed of heavy-gauge steel and finished with a durable baked enamel. It can be mounted on top of an EMS Workstation, such as 8110 or 8134, or of a table.

Model 3105-A – Single-Rail Workstation – Add-on to 8110



The Single-Rail Workstation consists of a one-piece set of mounting rails. It is designed to be mounted on top of the Mobile Workstation, Model 8110 (or 8134), to facilitate interconnection between the 8036 system control modules and the 8000 Series motors. A second Single-Rail Workstation, Model 3105-A, can be mounted on top of the first one with an optional set of brackets, Model 85282. The figure shows the Single-Rail Workstation mounted on top of a Mobile Workstation.

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Model 3105 – Single-Rail Workstation



The Single-Rail Workstation consists of an inclined one-piece set of mounting rails. It is designed to be placed atop a regular work table.

Model 3110-2 – Push Buttons



The Push Buttons module consists of two general-purpose push buttons, one green and one red, with two sets of contacts, one normally-closed and one normally-open.

Model 3111-2 – Selector Switches



The Selector Switches module consists of a 3-position, 2-pole selector switch, and a single-pole double-throw toggle switch.

Model 3112 – Switches



The Switches module consists of two general-purpose push buttons, one green with a normally-open contact and one red with a normally-closed contact, and a three-position, single-pole selector switch. Electrical connections can be made using either the banana jacks or the terminal block.

Model 3114 – Emergency Button



The Emergency Button module consists of an emergency push button with two sets of contacts, both normally-closed, to control devices on low and high control voltages. Electrical connections for the low-voltage contact can be made using either the banana jacks or the terminal block.

Model 3115-A – Pilot Lights



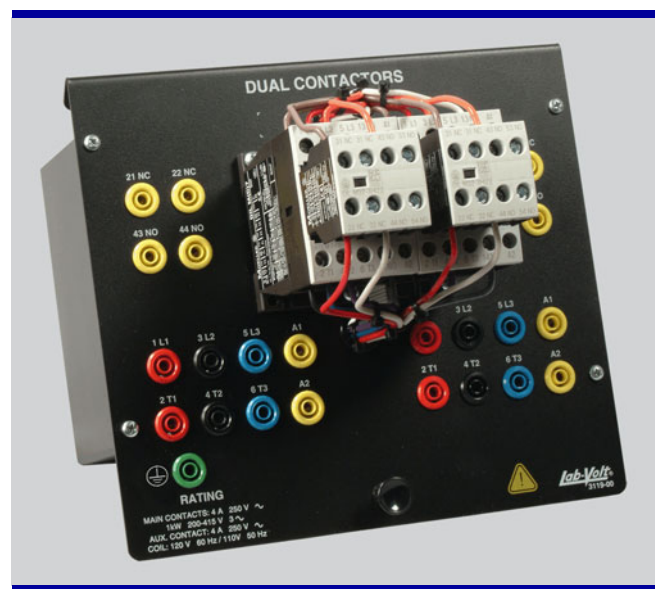
The Pilot Lights module consists of two pilot lights, one green and one red, rated for 24 V dc. Electrical connections can be made using either the banana jacks or the terminal block.

Model 3115-2 – Pilot Lights



The Pilot Lights module consists of two pilot lights, one green and one red, rated for 110/120 V ac.

Model 3119 – Dual Contactors



The Dual Contactors module consists of two mechanically interlocked, three-pole contactors with two auxiliary contacts. Each contactor also comes with three additional auxiliary contacts, not wired to the front panel, for direct connection with other devices.

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Model 3125-1 – Lockout Module



The Lockout Module consists of a lockable three-phase disconnect switch. The lockout device is a six-lock scissor type and the disconnect is a three-pole unit. Three padlocks and three identification tags are also included. OSHA regulations in the United States and Canada require lockouts to protect the workers. One should be used with a single-sided station, and two are required for double-sided stations.

Model 3126 – Manual Starter



The Manual Starter module consists of a three-phase circuit breaker with thermal overload protection.

Model 3127-2 – Contactor



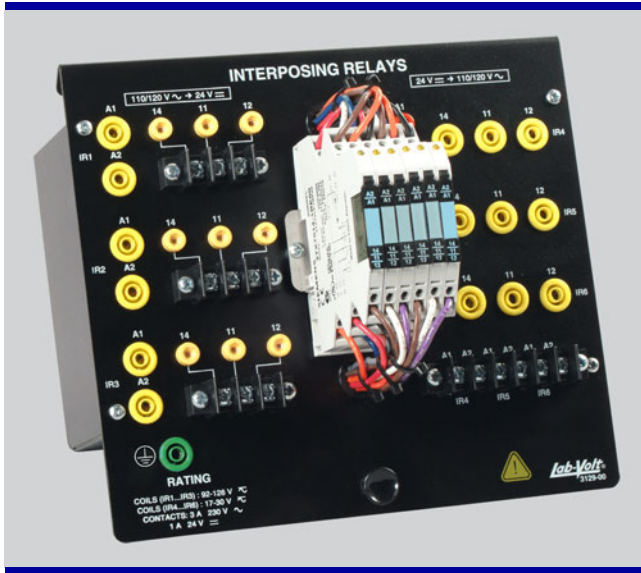
The Contactor module consists of a three-pole contactor with a normally-open auxiliary contact.

Model 3128 – Programmable Logic Controller



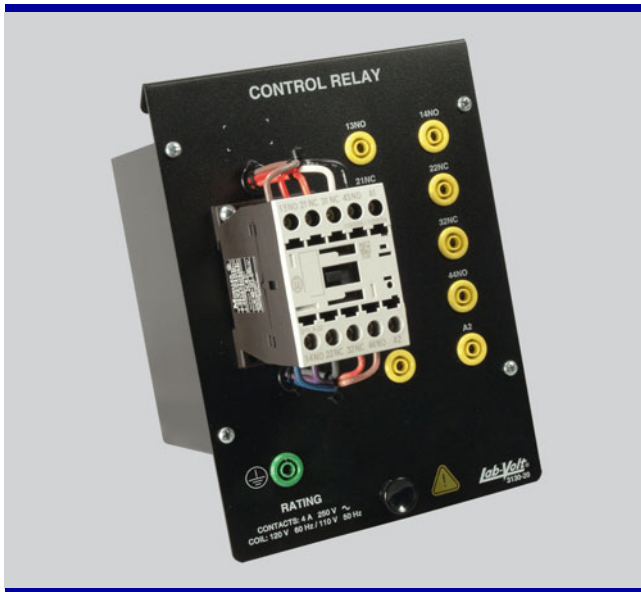
The Programmable Logic Controller module consists of a small controller programmed in ladder logic with eight inputs (24 V dc) and four relay outputs. The programming is done using the LCD screen and the keypad on the controller or using the programming software (Easy-Soft) and cable included in this model. Electrical connections can be made using either the banana jacks or the terminal blocks.

Model 3129 – Interposing Relays



The Interposing Relays module consists of a bidirectional voltage converter for high and low control voltages. This model is equipped with three relays with 24 V dc coils and three relays with 110/120 V ac coils. Electrical connections for the low-voltage coils and contacts can be made using either the banana jacks or the terminal block.

Model 3130-2 – Control Relay



The Control Relay module consists of a control relay with two normally-open and two normally-closed contacts.

Model 3131-3 – Overload Relay



The Overload Relay module consists of a three-phase, bimetallic overload relay with one normally-closed and one normally-open contact with an adjustable setting range.

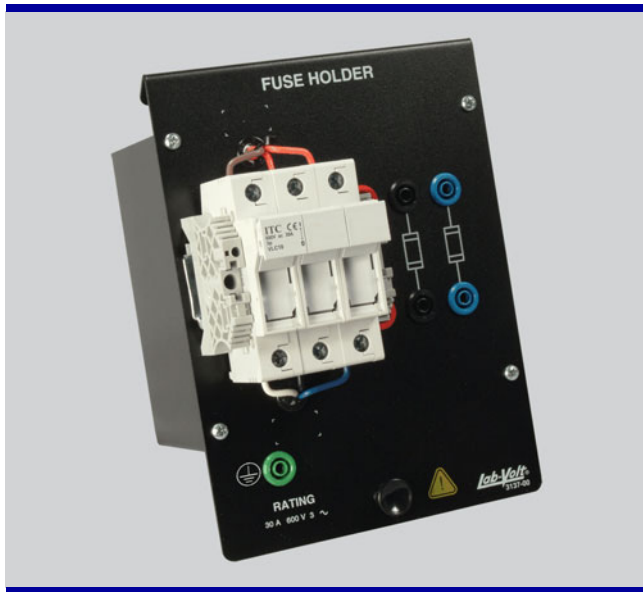
Model 3132-3 – Time Relay



The Time Relay module consists of a multifunction time relay with multiple ranges, one normally-closed and one normally-open contact. The functions includes: on-delay, off-delay, pulse forming, falling edge pulse, rising edge pulse.

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Mode 3137 – Three-Pole Fuse Holder



The Fuse Holder module consists of a three-phase fuse holder. Instead of fault switches, this module includes three blown-out fuses to be used as faults.

Model 3139 – DC Power Supply



The DC Power Supply module provides 24 V dc for low-voltage controls. Some electrical connections can be made using either the banana jacks or the terminal block.

Model 3138-3 – Control Transformer



The Control Transformer module converts the power voltage (208 V ac, 380 V ac or 415 V ac) to the control voltage 110/120 V ac.

Model 3140-3 – Cam Switch



The Cam Switch module consists of a manual reversing starter switch for single-phase and three-phase AC motors.

Model 3147-1 – Inertia Wheel



The Inertia Wheel module consists of a flywheel with sufficient inertia to increase the acceleration time of the 8036 System machines to over 1.3 seconds. The flywheel can replace a standard coupling when coupling two machines in series.

Model 3149 – Limit Switch



The Limit Switch module consists of a limit switch with two contacts, one normally-open and one normally-closed. This model can be used directly with the Reversible AC Motor, Model 3174-3, and be part of the mechanism.

Model 3150-1 – Starting Resistors



The Starting Resistors module consists of three power resistors with a 50% tap, suitable for reduced-voltage starting of motors.

Model 3165-1 – Power Diodes



The Power Diodes, Model 3165-1, consists of six silicon rectifier diodes, each rated at 6 A, 500 V (peak reverse voltage). The diodes may be connected in any rectifier configuration.

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Model 3170-2 – Machine Mounting Plate



The Machine Mounting Plate consists of a motor work surface designed to be used on top of a table (without Workstation Model 3103-3). The motors fix to the work surface using screws and knurled nuts. The protective guard which comes with it can also be fixed as well as the different sensors of the system.

Model 3176-A – Brake Motor



The Brake Motor module consists of a four-pole, squirrel-cage induction motor equipped with a spring set brake for holding and stopping (fail-safe). It also has an inverter duty capability.

Model 3176-B – Brake Motor (EMS Version)



The Brake Motor module consists of a four-pole, squirrel-cage induction motor equipped with a spring-set brake for holding and stopping (fail-safe). It also has an inverter duty capability.

Model 3176-B uses the same motor as the model 3176-A but in a standard EMS full-size module.

Motor 3179-2 – DC Motor



The DC Motor module consists of a 90 V dc motor that can be used with the DC Drive, Model 3184.

Model 3183-1 – AC Drive



The AC Drive module consists of a variable frequency speed drive with V/Hz control. The AC Drive has programmable inputs and outputs, digital and analog (for PID Control). Some electrical connections can be made using either the banana jacks or the terminal block.

The AC Drive is available in two versions. Model 3183-1 requires three-phase supply (208, 380, or 415 V). Model 3183-B requires a single-phase supply (120 V - 60 Hz) and connects directly to any standard wall outlet with a separate cord line equipped with a 5 A fuse (Model 85360). The 3183-B is not available for 220, 240 V - 50 Hz line supplies.

Model 3184 – DC Drive



The DC Drive module consists of a pulse-width modulated (PWM) DC motor speed control with maximum and minimum speed, current limitation, and IR compensation

adjustments. Some electrical connections can be made using either the banana jacks or the terminal block.

Model 3186 – Soft Starter



The Soft Starter module consists of a three-phase soft starter for small motors with starting and stopping ramp adjustments.

Model 3196-3 – AC Power Supply



The AC Power Supply module can simultaneously supply AC power to student groups working on both sides of the Mobile Workstation, Model 3103-3. The service outlet contains input and output pilot lamps, two switches, two AC power receptacles, and dual sets of four color-coded banana jacks for three-phase voltage. Outputs are circuit-breaker protected.

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Model 6373-B – Background Suppression Photoelectric Switch



The Background Suppression Photoelectric Switch uses an invisible light source and a receiver module (enclosed in the same casing) to detect the presence of objects. It features one normally-open and one normally-closed contact set rated for 24 V dc. The sensor is mounted on a flexible support for easy positioning. Electrical connections can be made using either the banana jacks or the terminal block.

Model 6374-B – Polarized Retroreflective Photoelectric Switch



The Polarized Retroreflective Photoelectric Switch uses a visible light source and a receiver module (enclosed in the same casing) to detect the presence of objects. It features one normally-open and one normally-closed contact set rated for 24 V dc. The sensor is mounted on

a flexible support for easy positioning. Electrical connections can be made using either the banana jacks or the terminal block.

Model 6375-B – Inductive Proximity Switch



The Inductive Proximity Switch is sensitive to ferrous metals. It features one normally-open and one normally-closed contact set rated for 24 V dc. The sensor is mounted on a flexible support for easy positioning. Electrical connections can be made using either the banana jacks or the terminal block.

Model 6376-B – Capacitive Proximity Switch



The Capacitive Proximity Switch is sensitive to every material. It features one normally-open and one normally-closed contact set rated for 24 V dc. The sensor is mounted on a flexible support for easy positioning. Electrical connections can be made using either the banana jacks or the terminal block.

Model 8951-8 – Connection Leads
Model 8951-E – Connection Leads
Model 8951-H – Connection Leads
Model 8951-I – Connection Leads
Model 8951-J – Connection Leads
Model 8951-M – Connection Leads

For more information, refer to the following datasheet: ACCESSORIES MODELS 8920, 8931, 8942, 8951, AND 8957.

Model 37889 – Fuses



The Fuses kit consists of three Class CC fuses to be used with the Three-Pole Fuse Holder, Model 3137.

Model 38503 – Magnetic Labels



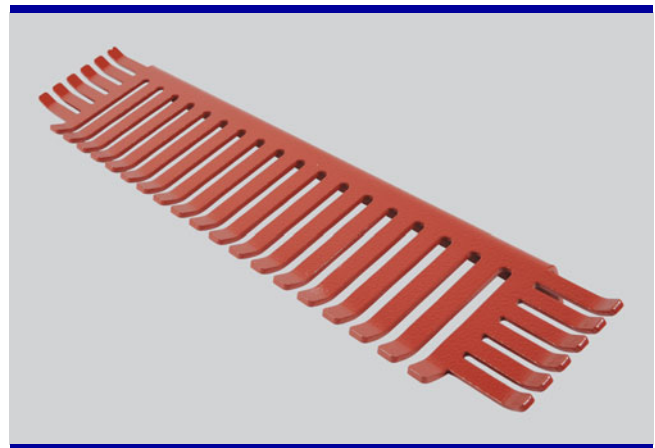
The Magnetic Labels kit consists of 10 x 20 mm white labels used to identify the components, as is done on an actual control panel.

Model 39352 – Rack (3103)



The Rack (3103) mounts under the main shelf of the Mobile Workstation, Model 3103-3, to hold the 8036 modules.

Model 88471 – Lead Holder



The Lead Holder, Model 88471, is an additional lead holder for the Mobile Workstation, Model 3103-3. This model is supplied with the Basic Controls (Second Team Add-On), Model 8036-D.

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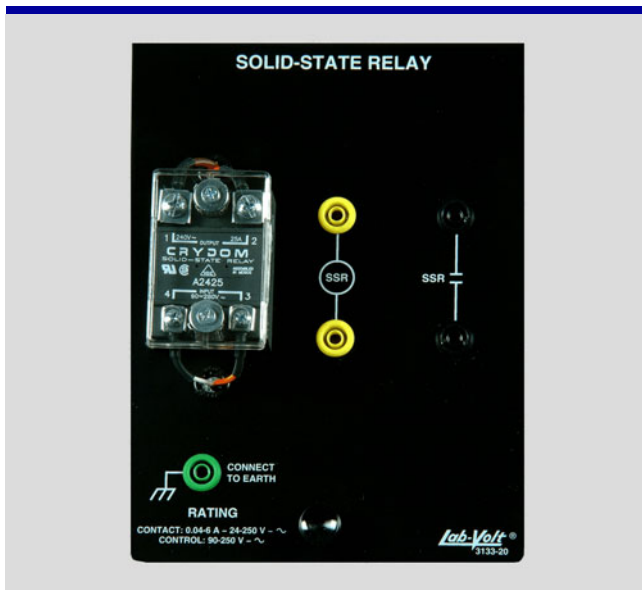
OPTIONAL EQUIPMENT DESCRIPTION

Model 3121-2 – Manual Starter



The Manual Starter module consists of a single-phase circuit breaker with thermal overload protection.

Model 3133-2 – Solid-State Relay



The Solid-State Relay module consists of an AC-actuated, solid-state relay with power triac and control circuit including optoisolators, and zero-crossing synchronization.

Model 3136 – Electronic Overload Relay



The Electronic Overload Relay module consists of a three-phase electronic overload relay with one set of normally-closed and normally-open contacts for the overload tripping and for configurable functions. Class and current of the overload relay can be fully adjusted using the LCD screen and keypad. Controls can be used with low and high control voltages.

Model 3146-2 – Speed Switch



The Speed Switch module consists of a low-r/min sensing switch for use in motor control systems, such as plugging and reversing circuits. The switch is supplied with coupling and mounting bracket.

Model 3151-1 – Field Rheostat



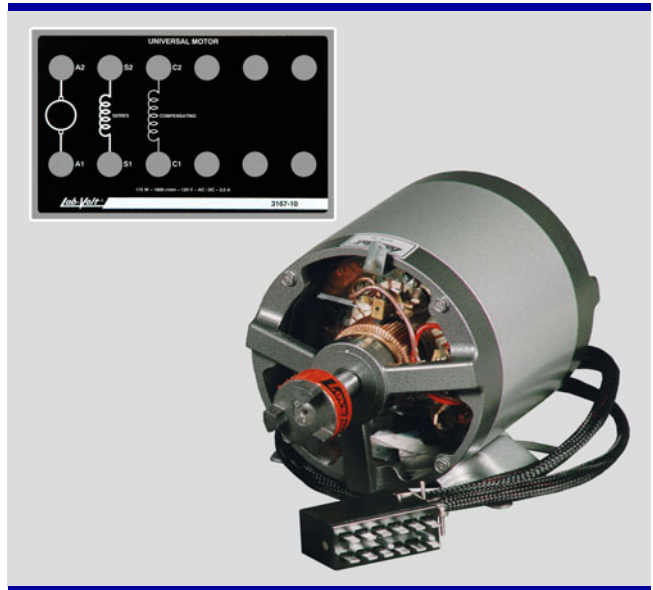
The Field Rheostat module consists of a 100-watt, fuse-protected rheostat, rated to operate with the AC and DC machines.

Model 3154-1 – Prony Brake



The Prony Brake module consists of a Prony brake capable of loading motors. The brake is complete with scales and a pulley. The torque is determined from the lever arm length, and the value indicated by the scales.

Model 3167-1 – Universal Motor



The Universal Motor module has exposed commutator bars and adjustable brushes to allow students to study the effect of armature reactions and commutation while the machine is running under load. The armature winding, the series field winding, and the compensation winding are terminated independently. Students can observe the effects of both inductive and conductive compensation on motor speed and torque for both AC and DC input voltage sources.

The motor is supplied with a silk-screened faceplate showing the motor connections and a 12-pin connector to fit with the Motor Terminal Module, Model 3171-2.

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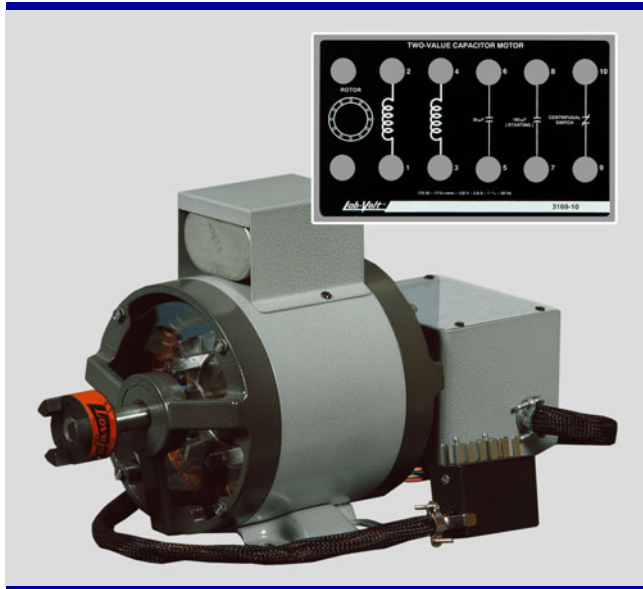
Model 3168-2 – Dahlander Two-Speed Induction Motor



The Dahlander Two-Speed Induction Motor module uses the method of pole changing based on the consequent pole principally known as the Lindström-Dahlander winding. By the insertion of the special interconnection jumper, this motor can be configured to obtain three different types of motors. Students can obtain a two-speed constant power motor, a two-speed variable torque motor, and a two-speed constant torque motor using the same motor and different interconnection jumpers.

The motor is supplied with three silk-screened faceplates showing the motor connections and a 12-pin connector to fit with the Motor Terminal Module, Model 3171-2.

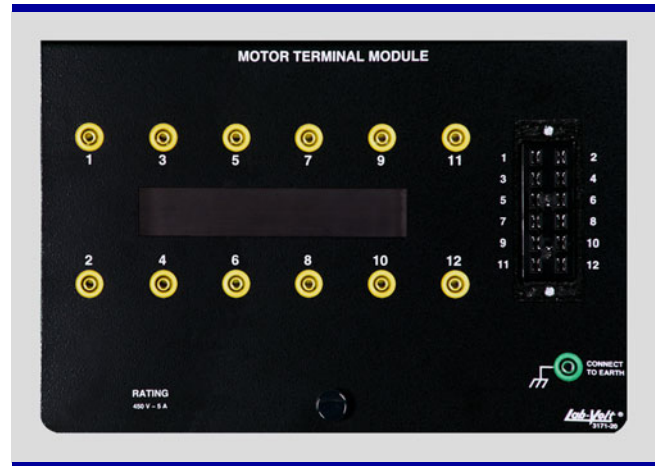
Model 3169-1 – Two-Value Capacitor Motor



The running capacitor and both running windings of the Two-Value Capacitor Motor module are independently terminated to facilitate experimentation of various machine connections, including operation from a two-phase source of power. The design of this machine has been optimized so that the machine operates like a two-phase motor at full load when connected to a single-phase source.

The motor is supplied with a silk-screened faceplate showing the motor connections and a 12-pin connector to fit with the Motor Terminal Module, Model 3171-2.

Model 3171-2 – Motor Terminal Module



The Motor Terminal Module consists of a 12-terminal module with connection points for the 8036 Series rotating machines.

Model 3172-2 – Single-Phase Motor



The Single-Phase Motor module consists of a single-phase, squirrel-cage induction motor. The capacitor allows the motor to develop a starting torque.

Model 3174-3 – Reversible AC Motor



The Reversible AC Motor module consists of a reversible, single-phase gear motor having an output speed of 30 r/min. It is supplied with three perforated disks (a metallic disk, a transparent plastic disk, and a fiber disk). The disks are used to learn the characteristics of sensors. The sensors can be mounted on the motor chassis or on the work surface.

Model 3175 – Two-Speed Motor



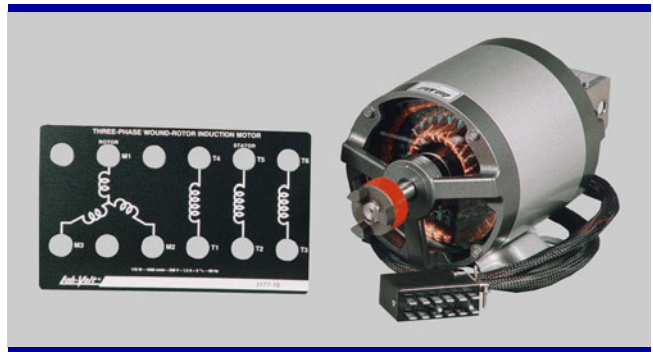
The Two-Speed Motor module consists of a three-phase, squirrel-cage two-winding induction motor, each one with a different nominal speed.

Model 3176-2 – Polyphase Motor



The Polyphase Motor module consists of a three-phase, squirrel-cage induction motor with an inverter duty capability.

Model 3177-1 – Three-Phase Wound-Rotor Induction Motor



Each phase of the stator windings of the Three-Phase Wound-Rotor Induction Motor is independently terminated to permit operation in either delta or star (wye) configuration. The rotor windings are brought out to the faceplate via external slip rings and brushes. This machine can be used as a wound-rotor induction motor, phase shifter, single-phase variable coupling transformer, three-phase transformer, selsyn control, frequency converter, or asynchronous induction generator. The speed of this machine can be controlled by the Three-Phase Rheostat, Model 3188-1.

The motor is supplied with a silk-screened faceplate showing the motor connections and a 12-pin connector to fit with the Motor Terminal Module, Model 3171-2.

INDUSTRIAL CONTROLS TRAINING SYSTEMS SERIES 8036

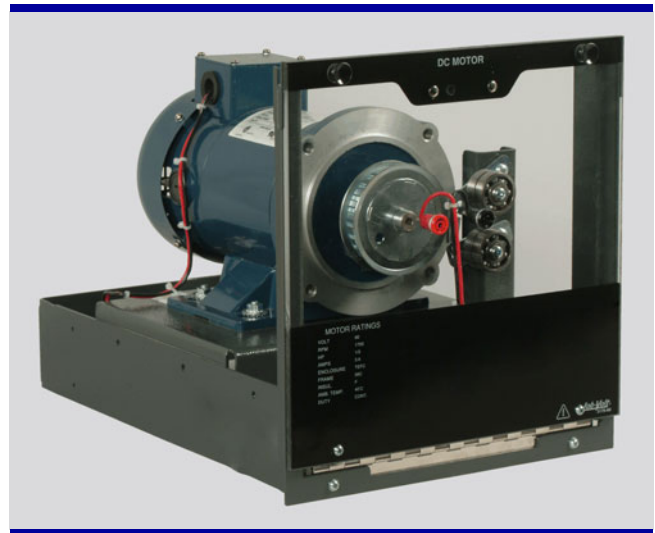
Model 3178-1 – Three-Phase Synchronous Motor/Generator



Each phase of the stator windings of the Three-Phase Synchronous Motor/Generator is independently terminated to permit operation in either delta or star (wye) configuration. The rotor of this machine is equipped with a squirrel-cage damper and salient pole windings to exhibit properties of industrial, high-power synchronous machines. Variable DC excitation to the salient pole windings is fed through the externally mounted slip rings and brushes. This machine can also be operated as a three-phase synchronous condenser or generator.

The motor is supplied with a silk-screened faceplate showing the motor connections and a 12-pin connector to fit with the Motor Terminal Module, Model 3171-2.

Model 3179-A – DC Motor (EMS Version)



The DC Motor module consists of a permanent magnet 90 V DC motor that can be used with the DC Drive, Model 3184.

Model 3179-A uses the same motor as the model 3179-2 but in a standard EMS full-size module.

Model 3180-1 – DC Control Relay



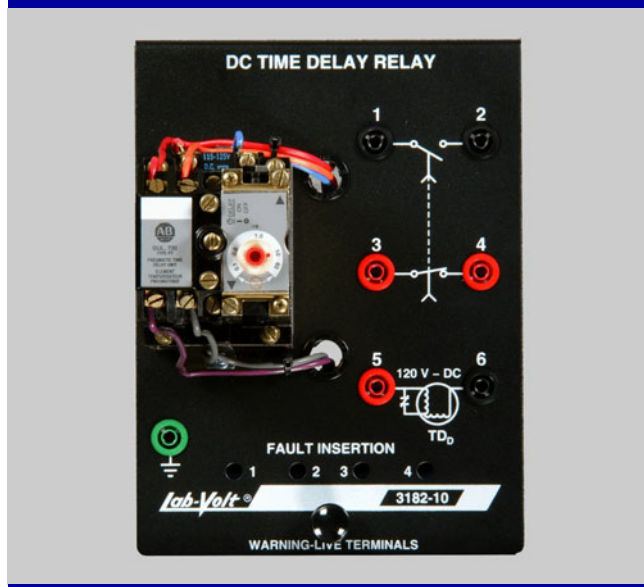
The DC Control Relay module consists of a control relay with two normally-open and two normally-closed contacts.

Model 3181-1 – DC Contactor



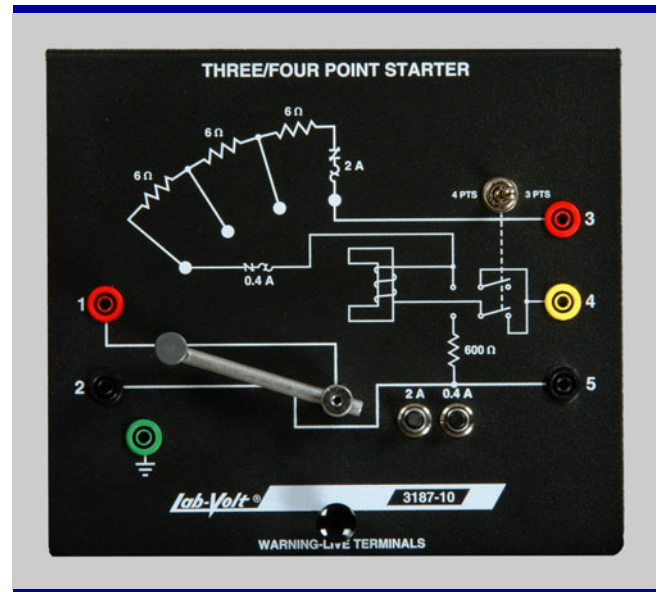
The DC Contactor module consists of a DC contactor with two normally-open contacts in series and one auxiliary contact.

Model 3182-1 – DC Time-Delay Relay



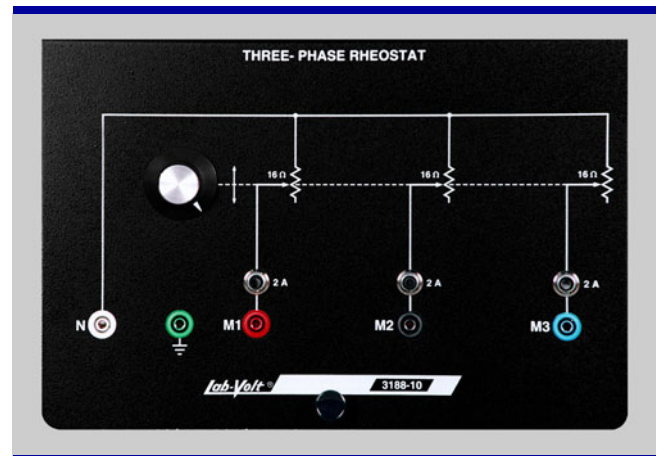
The DC Time-Delay Relay module consists of a DC relay with pneumatic time-delay attachment. Delay attachment can provide on-delay or off-delay for one normally-open and one normally-closed contact.

Model 3187-1 – Manual DC Motor Starter



The DC Manual Starter module consists of a manually operated variable-resistance starter. The starter can be wired as either a three- or four-point DC starter, to be used with the DC Motor/Generator, Model 3179-2.

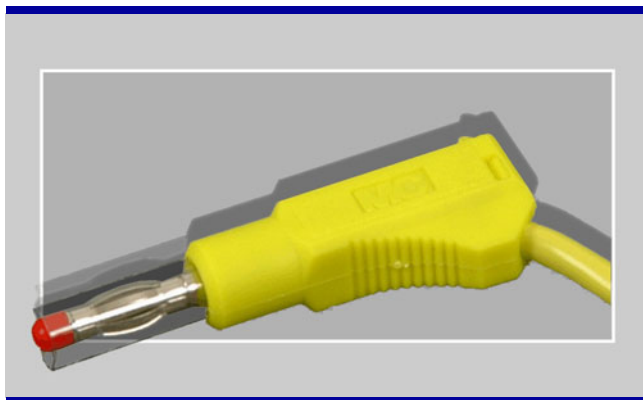
Model 3188-1 – Three-Phase Rheostat



The Three-Phase Rheostat module provides the mechanism for controlling motor starting and speed by varying the resistance in the motor circuit of the wound rotor motor. One knob adjusts the three rheostats, each of which is protected by a circuit breaker.

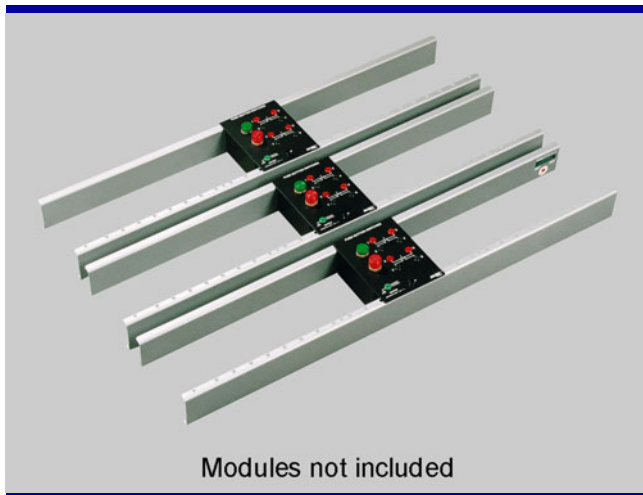
INDUSTRIAL CONTROLS TRAINING SYSTEMS SERIES 8036

Model 3191-1– Connection Leads



The Connection Leads, Model 3191-1, should only be used to connect old modules that are not equipped with safety banana jacks. On new modules (with safety banana jacks), use the Connection Leads, Model 8951-8, which offer a better protection. The Connection Leads package consists of PVC covered, extra-flexible leads terminated with stacking 4-mm banana plugs. Each banana plug is terminated with a transparent sleeve over a multi-lam plug. The transparent sleeve is spring-loaded and retracts when the plug is connected into universal 4-mm sockets. The leads are supplied in four different lengths and are color-coded according to length.

Model 3195-1 – Rail Package



The Rail Package consists of three pairs of 112 cm (44 in.) steel channel sections. The rails can be used for circuit setups, or component storage.

Model 3197-3 – AC/DC Power Supply



The AC/DC Power Supply module consists of both AC and DC power for the Industrial Controls Training System. The outlet is fed from a three-phase, four-wire breaker panel supplied elsewhere. The power supply contains input and output pilot lamps, two "on-off" switches, two AC power receptacles, dual sets of four color-coded banana jacks for three-phase voltage, and dual sets of two color-coded banana jacks for fixed DC output. All outputs are circuit-breaker protected. Power supply mounts on the upper shelf of the Mobile Workstation, Model 3103-3, to provide power to both sides.

Model 3198-0 – Blank Module (15 cm)

Model 3198-1 – Blank Module (23 cm)

Model 3198-2 – Blank Module (30 cm)

Three different blank modules can be used by the customers for mounting their own controls.

Model 6377-B – Diffuse Reflective Photoelectric Switch



The Diffuse Reflective Photoelectric Switch is designed to detect the light directly reflected by a target object. It features one normally-open and one normally-closed contact set rated for 24 V dc. The sensor is mounted on a flexible support for easy positioning. Electrical connections can be made using either the banana jacks or the terminal block.

Model 8920-40 – Digital Tachometer

For more information, refer to the datasheet: ACCESSORIES MODELS 8920, 8931, 8942, 8951, AND 8957.

Model 8896-0 – Phase Converter



The Phase Converter converts a 120 V single-phase supply into a 5 wires (wye configuration including neutral and ground) 208 V three-phase supply. This converter recreates a true three-phase supply (with a phase voltage difference of less than 10%) for three-phase motor control circuits. The phase converter can supply power to two teams working on the same workstation for the 8036 Industrial Controls Training System (most of the exercises can be performed simultaneously using only one converter). This converter is not recommended for the EMS (8000) motors and controls.

Model 38707 – Clamp-On Meter

The Clamp-On Meter can measure alternative voltage and current, resistance, and can perform continuity tests. Two probes are provided with the meter.

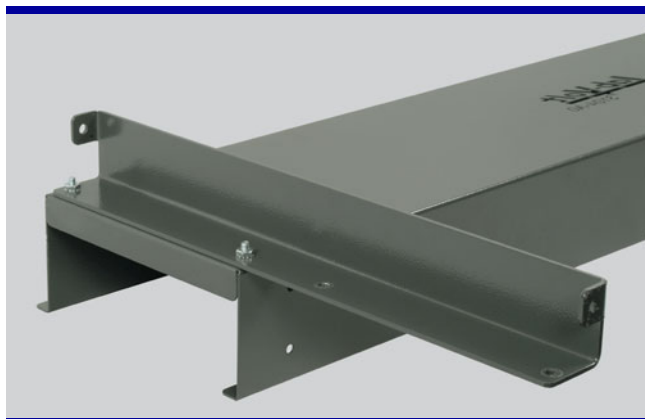
Model 72676 – Multimeter



The Multimeter is a precise digital meter that allows measurement of resistance, current, and voltage. Autoranging and manual selection.

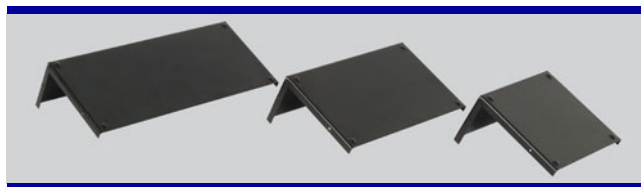
INDUSTRIAL CONTROLS TRAINING SYSTEMS SERIES 8036

Model 85282 – Brackets (3105-A)



This set of brackets is required to fix two Single-Rail Workstations, Model 3105-A, on top of an EMS Mobile Workstation, such as Models 8110 and 8134. The figure shows one bracket fixed to a Single-Rail Workstation.

Model 85283 – Back Cover



The Back Covers are used to safely close the modules when used out of the Mobile Workstation, Model 3103-30.

Model 85283-00 – Back Cover (15 cm)

Model 85283-01 – Back Cover (23 cm)

Model 85283-02 – Back Cover (30 cm)

SPECIFICATIONS

Model 8036 System – Industrial Controls Training System		120/208 V - 60 Hz	220-380 V - 50 Hz	240/415 V - 50 Hz
Power Requirements	Current	15 A	10 A	
	Electrical Distribution	3-phase, 5 wires, star (wye) connected, including neutral and ground		
Model 3103-3 – Mobile Workstation				
Physical Characteristics	Dimensions (H x W x D)	193 x 117 x 71 cm (76 x 46 x 28 in)		
	Net Weight	98.9 kg (218.0 lb)		
Model 3104-1 – Workstation – Add-On to 8110				
Physical Characteristics	Dimensions (H x W x D)	457 x 950 x 495 cm (18 x 37.4 x 19.5 in)		
	Net Weight	22.7 kg (50.0 lb)		
Model 3105-A – Single-Rail Workstation – Add-on to 8110				
Physical Characteristics	Dimensions (H x W x D)	200 x 935 x 85 mm (7.9 x 37.4 x 3.3 in)		
	Net Weight	3.9 kg (8.6 lb)		
Model 3105 – Single-Rail Workstation				
Physical Characteristics	Dimensions (H x W x D)	200 x 935 x 195 mm (7.9 x 37.4 x 7.7 in)		
	Net Weight	4.8 kg (10.6 lb)		
Model 3110-2 – Push Buttons				
Contacts (Green Push Button)	Type	NO, NC contact sets		
	Rating	4 A - 240 V ac		
Contacts (Red Push Button)	Type	NO, NC contact sets		
	Rating	4 A - 240 V ac		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 100 mm (8 x 6 x 3.9 in)		
	Net Weight	0.9 kg (2 lb)		

SPECIFICATIONS

Model 3111-2 – Selector Switches		
Contacts (Selector Switch)	Type	4 NO contact sets
	Rating	4 A - 240 V ac
Contacts (Toggle Switch)	Type	SPDT
	Rating	4 A - 240 V ac
Fault Switches		4
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 105 mm (8 x 6 x 4.1 in)
	Net Weight	0.9 kg (2 lb)
Model 3112 – Switches		
Contact (Green Push Button)	Type	NO contact set
	Rating	1 A - 24 V dc
Contact (Red Push Button)	Type	NC contact set
	Rating	1 A - 24 V dc
Contacts (Selector Switch)	Type	2 NO contact sets
	Rating	1 A - 24 V dc
Fault Switches		4
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 105 mm (8 x 6 x 4.1 in)
	Net Weight	0.9 kg (2 lb)
Model 3114 – Emergency Button		
Contacts	Type	2 NC contact sets
	Rating	3 A - 240 V ac / 1 A - 24 V dc
Fault Switches		2
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 110 mm (8 x 6 x 4.3 in)
	Net Weight	0.9 kg (2.0 lb)
Model 3115-2 – Pilot Lights		
Lights	Color	green, red
	Rating	110/120 V - 2.6 W
Fault Switches		2
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 95 mm (8 x 6 x 3.7 in)
	Net Weight	0.9 kg (2 lb)
Model 3115-A – Pilot Lights		
Lights	Type	green, red
	Rating	24 V - 2.6 W
Fault Switches		2
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 95 mm (8 x 6 x 3.7 in)
	Net Weight	0.9 kg (2 lb)
Model 3119 – Dual Contactors		
Coils		120 V - 60 Hz / 110 V - 50 Hz
Main Contacts	Type	3 NO contact sets (x2)
	Rating	1 kW at 200-415 V ac
Auxiliary Contacts	Type	NO, NC contact sets
	Rating	2.9 A - 250 V ac
Fault Switches		4
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 200 mm (8 x 9 x 7.9 in)
	Net Weight	1.7 kg (3.8 lb)

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SPECIFICATIONS

Model 3121-2 – Manual Starter		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Contacts	Type	SPST		
	Rating	11 A - 250 V ac		
Overload		4.5 A	2.4 A	TBE
Fault Switches		2		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 140 mm (8 x 6 x 5.5 in)		
	Net Weight	0.9 kg (2 lb)		
Model 3125-1 – Lockout Module				
Contacts	Type	TPST		
	Rating	5 A - 450 V ac		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 155 mm (8 x 6 x 6.1 in)		
	Net Weight	1.4 kg (3.1 lb)		
Model 3126 – Manual Starter		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Contacts	Type	TPST		
	Rating (AC)	370 W	250 W	
	Rating	5 A - 250 V dc		
Overload Release		1.6 - 2.5 A	0.63 - 1.0 A	
Short Circuit Release		35 A	14 A	
Fault Switches		3		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 160 mm (8 x 6 x 6.3 in)		
	Net Weight	1.1 kg (2.4 lb)		
Model 3127-2 – Contactor				
Coil		120 V - 60 Hz / 110 V - 50 Hz		
Main Contacts	Type	3 NO contact sets		
	Rating	1 kW at 200-415 V ac		
Auxiliary Contact	Type	NO contact set		
	Rating	2.9 A - 250 V ac		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 155 mm (8 x 6 x 6.1 in)		
	Net Weight	1 kg (2.3 lb)		
Model 3128 – Programmable Logic Controller				
Controller Type		Moeller EASY-512-DC-R (identical to 1760-L12BWB Allen-Bradley Pico Controller)		
Power Requirement		2 W - 24 V dc		
Inputs (8)	Digital (I1 to I8)	24 V dc		
	Analog (I7, I8)	0-10 V dc		
Contacts (4)	Type	4 NO contact sets		
	Rating	4 A - 24 V dc		
Accessories		cable for PC		
		Easy-Soft programming software		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 140 mm (8 x 9 x 5.5 in)		
	Net Weight	1.5 kg (3.3 lb)		
Model 3129 – Interposing Relays				
Coils	Low-Voltage (3)	17-30 V		
	High-Voltage (3)	92-126 V		
Contacts	Rating	3 A - 230 V ac		
		1 A - 24 V dc		

SPECIFICATIONS

Model 3129 – Interposing Relays (cont'd)				
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 174 mm (8 x 9 x 6.9 in)		
	Net Weight	1.5 kg (3.2 lb)		
Model 3130-2 – Control Relay				
Coil		120 V - 60 Hz / 110 V - 50 Hz		
Contacts	Type	2 NO and 2 NC contact sets		
	Rating	4 A - 250 V ac		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 155 mm (8 x 6 x 6.1 in)		
	Net Weight	1 kg (2.3 lb)		
Model 3131-3 – Overload Relay		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Overload (3 ~)		1.6 - 2.4 A	0.63 - 1.0 A	
Contacts	Type	NO, NC contact set		
	Rating	1.5 A - 250 V ac		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 180 mm (8 x 6 x 7.1 in)		
	Net Weight	1 kg (2.3 lb)		
Model 3132-3 – Time Relay				
Coils		100-127 V ac, 24 V dc		
Range		0.05 s - 100 h (multiple ranges)		
Functions (8)	On-delay			
	Off-delay			
	On- and off-delay			
	Flashing, starting with interval			
	Rising edge pulse			
	Falling edge pulse			
	Pulse forming			
	Cumulative on-delay			
Contacts	Type	NO, NC contact set		
	Rating	3 A - 230 V ac		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 180 mm (8 x 6 x 7.1 in)		
	Net Weight	1 kg (2.1 lb)		
Model 3133-2 – Solid-State Relay		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Control	Type	optoisolated with zero-cross turn-on		
	Voltage Range	90-250 V ac		
	Impedance	60 kΩ		
Contact	Type	back-to-back SCR		
	Voltage Range	24-250 V ac	48-250 V ac	
	Current Range	0.04-6 A ac		
Frequency Range		47-63 Hz		
Fault Switches		3		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 108 mm (8 x 6 x 4.25 in)		
	Net Weight	0.36 kg (0.79 lb)		
Model 3136 – Electronic Overload Relay				
Overload (3 ~)		0.5-12.5 A		
Power Requirements		24-240 V		
Overload Classes		5, 10, 15, 20, 25, 30, 35, 40		
Contacts (4)	Type	NO, NC contact sets for free configurable auxiliary switches		
		NO, NC contact sets for overload and thermistor tripping		

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SPECIFICATIONS

Model 3136 – Electronic Overload Relay (cont'd)				
		Rating	1.5 A - 240 V ac 1 A - 24 V dc	
Fault Switches			4	
Physical Characteristics		Dimensions (H x W x D)	203 x 153 x 198 mm (8 x 6 x 7.8 in)	
		Net Weight	1.7 kg (3.8 lb)	
Model 3137 – Three-Pole Fuse Holder				
Rating		30 A - 600 V ac, 3 ~		
Fuse Type		class CC		
Fuses		supplied with 3 blown fuses (good fuses included in model 37889)		
Physical Characteristics		Dimensions (H x W x D)	203 x 153 x 152 mm (8 x 6 x 6 in)	
		Net Weight	1 kg (2.3 lb)	
Model 3138-3 – Control Transformer			120/208 V - 60 Hz	220/380 V - 50 Hz 240/415 V - 50 Hz
Power			150 VA	130 VA 130 VA
Primary Winding		Voltage	208 V	380 V 415 V
		Current	0.72 A	0.34 A 0.31 A
Secondary Winding		Voltage	120 V	110 V 110 V
		Current	1.25 A	1.18 A 1.18 A
Fault Switches		2		
Physical Characteristics		Dimensions (H x W x D)	203 x 228 x 172 mm (8 x 9.1 x 6.8 in)	
		Net Weight	3.8 kg (8.4 lb)	
Model 3139 – DC Power Supply				
Power Requirements		Current	0.35-0.7 A	
		Voltage	100-240 V	
		Frequency	47-63 Hz	
Power Output		1.3 A - 24 V dc		
Fault Switches		2		
Physical Characteristics		Dimensions (H x W x D)	203 x 153 x 140 mm (8 x 6 x 5.5 in)	
		Net Weight	1.0 kg (2.1 lb)	
Model 3140-3 – Cam Switch			120/208 V - 50/60 Hz	220/380 V - 50/60 Hz 240/415 V - 50/60 Hz
Contacts		Type	reversing switch with OFF position	
		Rating	5 A - 230 V ac 1.1 A - 125 V dc	5 A - 380 V ac 0.55 A - 250 V dc
				5 A - 415 V ac 0.55 A - 250 V dc
Fault Switches		3		
Physical Characteristics		Dimensions (H x W x D)	203 x 153 x 115 mm (8 x 6 x 4.5 in)	
		Net Weight	0.9 kg (2 lb)	
Model 3142-2 – Float Switch				
Contacts		Type	2 NO contact sets	
		Rating	5 A - 250 V ac	
Fault Switches		2		
Physical Characteristics		Dimensions (H x W x D)	203 x 153 x 165 mm (8 x 6 x 6.5 in)	
		Net Weight	1.2 kg (2.6 lb)	
Model 3146-2 – Speed Switch				
Running Speed		30-2000 r/min		
Approximate Trip Point		25-70 r/min		
Contacts		Forward Direction	SPDT	
		Reverse Direction	SPDT	
		Rating	10 A - 480 V ac	

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Model 3146-2 – Speed Switch (cont'd)				
Physical Characteristics	Dimensions (H x W x D)	137 x 205 x 165 mm (5.4 x 8 x 6.5 in)		
	Net Weight	2.5 kg (4.9 lb)		
Model 3147-1 – Inertia Wheel				
Moment of Inertia		0.018 kg-m² (0.423 lbf-ft²)		
Physical Characteristics	Dimensions (H x W x D)	55 x 150 x 153 mm (2.2 x 5.9 x 6 in)		
	Net Weight	6.4 kg (14.1 lb)		
Model 3149 – Limit Switch				
Contacts	Type	NO, NC contact sets		
	Rating	2.8 A - 24 V dc		
Physical Characteristics	Dimensions (H x W x D)	127 x 216 x 229 mm (5.0 x 8.5 x 9 in)		
	Net Weight	0.8 kg (1.8 lb)		
Model 3150-1 – Starting Resistors		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Resistors (3)	Power	100 W		
	Value	10 Ω	40 Ω	
	Maximum Current	3.16 A	1.58 A	
	Tap	50%		
	Accuracy	±5%		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 92 mm (8 x 9 x 3.6 in)		
	Net Weight	0.9 kg (2 lb)		
Model 3151-1 – Field Rheostat		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Rheostat	Power	100 W	100 W	TBE
	Total Resistance	500 Ω	1000 Ω	TBE
Circuit Breaker	Current	0.5 A	0.25 A	TBE
Fault Switches		2		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 90 mm (8 x 6 x 3.5 in)		
	Net Weight	0.9 kg (2.0 lb)		
Model 3154-1 – Prony Brake				
Torque Range		0 to 6 N-m (0 to 53 lbf-in)		
Physical Characteristics	Dimensions (H x W x D)	280 x 305 x 100 mm (11 x 12 x 3.9 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3165-1 – Power Diodes				
Diodes (6)	Peak Reverse Voltage	1000 V		
	Average Rectified Forward	6 A		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 43 mm (8 x 9 x 1.7 in)		
	Net Weight	0.9 kg (2 lb)		
Model 3167-1 – Universal Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Voltage	120 V ac/dc	220 V ac/dc	240 V ac/dc
	Output Power	175 W		
	Full Load Speed	1800 r/min	1500 r/min	1550 r/min
	Full Load Current	3 A	1.4 A	1.5 A
Physical Characteristics	Dimensions (H x W x D)	175 x 320 x 165 mm (6.9 x 12.6 x 6.5 in)		
	Net Weight	8.2 kg (18 lb)		
Model 3168-2 – Dahlander Two-Speed Induction Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Two-Speed Constant Power Motor Configuration				
Ratings	Output Power	175 W		
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	415 V - 50 Hz
	Full Load Speed	3200/1740 r/min	2600/1415 r/min	
	Full Load Current	1.1/1.4 A	0.5/0.54 A	0.47/0.64 A

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Model 3168-2 – Dahlander Two-Speed Induction Motor (cont'd)		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Two-Speed Variable Torque Motor Configuration				
Ratings	Output Power	175/44 W		
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	415 V - 50 Hz
	Full Load Speed	3325/1670 r/min	2710/1415 r/min	
	Full Load Current	1.4/0.5 A	0.52/0.18 A	0.48/0.16 A
Two-Speed Constant Torque Motor Configuration				
Ratings	Output Power	175 W		
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	415 V - 50 Hz
	Full Load Speed	3350/1750 r/min	2710/1400 r/min	
	Full Load Current	1.3/1 A	0.54/0.41 A	0.48/0.42 A
Physical Characteristics	Dimensions (H x W x D)	175 x 335 x 165 mm (6.9 x 13.2 x 6.5 in)		
	Net Weight	8.2 kg (18 lb)		
Model 3169-1 – Two-Value Capacitor Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Line Voltage	120 V ac	220 V ac	240 V ac
	Output Power	175 W		
	Full Load Speed	1715 r/min	1415 r/min	
	Full Load Current	2.8 A	1.3 A	1.15 A
Physical Characteristics	Dimensions (H x W x D)	175 x 335 x 165 mm (6.9 x 13.2 x 6.5 in)		
	Net Weight	8.2 kg (18 lb)		
Model 3170-2 – Machine Mounting Plate				
Physical Characteristics	Dimensions (H x W x D)	38 x 559 x 216 mm (1.5 x 22 x 8.5 in)		
	Net Weight	3.6 kg (7.9 lb)		
Model 3171-2 – Motor Terminal Module				
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 303 x 75 mm (8 x 11.9 x 3 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3172-2 – Single-Phase Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Output Power	249 W	TBE	TBE
	Stator Voltage	115/230 V - 60 Hz	TBE	TBE
	Full Load Speed	1725 r/min	TBE	TBE
	Full Load Current	6/3 A	TBE	TBE
Physical Characteristics	Dimensions (H x W x D)	200 x 241 x 224 mm (7.9 x 9.5 x 8.8 in)		
	Net Weight	TBE		
Model 3174-3 – Reversible AC Motor				
Input Voltage		110/120 V - 50/60 Hz		
Speed		30 r/min		
Full Load Current		0.28 A		
Accessories		3 detection disks: metallic, transparent, and fiber		
Physical Characteristics	Dimensions (H x W x D)	150 x 170 x 254 mm (5.9 x 6.7 x 10 in)		
	Net Weight	TBE		
Model 3175 – Two-Speed Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Motor Ratings	Output Power	560/249 W	TBE	TBE
	Stator Voltage	230 V - 60 Hz	TBE	TBE
	Full Load Speed	1725/1140 r/min	TBE	TBE
	Full Load Current	2.8/1.6 A	TBE	TBE
Physical Characteristics	Dimensions (H x W x D)	173 x 279 x 254 mm (6.8 x 11 x 10 in)		
	Net Weight	TBE		

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Model 3176-2 – Polyphase Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Motor Ratings	Output Power	249 W	187 W	
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	
	Full Load Speed	1725 r/min	1450 r/min	
	Full Load Current	1.4 A	0.7 A	
Inverter Duty	Variable Torque Ratio	10:1		
	Constant Torque Ratio	10:1		
Physical Characteristics	Dimensions (H x W x D)	170 x 323 x 175 mm (6.7 x 12.7 x 6.9 in)		
	Net Weight	TBE		
Model 3176-A – Brake Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Motor Ratings	Output Power	249 W	187 W	
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	
	Full Load Speed	1725 r/min	1425 r/min	
	Full Load Current	1.8 A	0.7 A	
Brake Ratings	Voltage	208 V - 60 Hz	380 V - 50 Hz	TBE
	Inrush Current	1.8 A	0.9 A	TBE
	Holding Current	0.2 A	0.08 A	TBE
Inverter Duty	Variable Torque Ratio	10:1		
	Constant Torque Ratio	10:1		
Physical Characteristics	Dimensions (H x W x D)	200 x 235 x 415 mm (7.9 x 9.3 x 16.3 in)		
	Net Weight	13 kg (28 lb)		
Model 3176-B – Brake Motor (EMS Version)		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Motor Ratings	Output Power	249 W	187 W	
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	
	Full Load Speed	1725 r/min	1425 r/min	
	Full Load Current	1.8 A	0.7 A	
Brake Ratings	Voltage	208 V - 60 Hz	380 V - 50 Hz	TBE
	Inrush Current	1.8 A	0.9 A	TBE
	Holding Current	0.2 A	0.08 A	TBE
Inverter Duty	Variable Torque Ratio	10:1		
	Constant Torque Ratio	10:1		
Physical Characteristics	Dimensions (H x W x D)	308 x 291 x 440 mm (12.1 x 11.5 x 17.3 in)		
	Net Weight	TBE		
Model 3177-1 – Three-Phase Wound-Rotor Induction Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Output Power	175 W		
	Stator Voltage (3 ~)	120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
	Rotor Voltage (3 ~)	60/104 V - 60 Hz	110/190 V - 50 Hz	120/208 V - 50 Hz
	Full Load Speed	1500 r/min	1240 r/min	1315 r/min
	Full Load Current	1.3 A	0.53 A	0.48 A
Physical Characteristics	Dimensions (H x W x D)	175 x 335 x 165 mm (6.9 x 13.2 x 6.5 in)		
	Net Weight	8.2 kg (18 lb)		
Model 3178-1 – Three-Phase Synchronous Motor/Generator		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Motor Ratings	Output Power	175 W		
	Stator Voltage (3 ~)	208 V - 60 Hz	380 V - 50 Hz	415 V - 50 Hz
	Rotor Induction Voltage	120 V dc	220 V dc	240 V dc
	Full Load Speed	1800 r/min	1500 r/min	1500 r/min
	Full Load Current	0.33 A	0.17 A	0.17 A
Physical Characteristics	Dimensions (H x W x D)	175 x 335 x 165 mm (6.9 x 13.2 x 6.5 in)		
	Net Weight	8.2 kg (18 lb)		

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Model 3179-2 – DC Motor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Output Power	249 W	187 W	
	Armature Voltage	90 V dc	180 V dc	
	Full Load Speed	1750 r/min	1750 r/min	
	Full Load Current	3.6 A	1.45 A	
Physical Characteristics	Dimensions (H x W x D)	191 x 295 x 171 mm (7.5 x 11.6 x 6.7 in)		
	Net Weight	8.9 kg (19.6 lb)		
Model 3179-A– DC Motor (EMS Version)		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Ratings	Output Power	249 W	187 W	
	Armature Voltage	90 V dc	180 V dc	
	Full Load Speed	1750 r/min	1750 r/min	
	Full Load Current	3.6 A	1.45 A	
Physical Characteristics	Dimensions (H x W x D)	308 x 291 x 440 mm (12.1 x 11.5 x 17.3 in)		
	Net Weight	TBE		
Model 3180-1 – DC Control Relay		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Coil	Nominal Voltage	120 V dc	240 V dc	
Contacts	Type	2 NO, 2 NC contact sets		
	Rating	1 A - 120 V dc	0.5 A - 240 V dc	
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 175 mm (8 x 6 x 6.9 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3181-1 – DC Contactor		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Coil	Nominal Voltage	120 V dc	240 V dc	
Contacts	Type	2 NO contact sets		
	Rating	2 A - 250 V ac		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 145 mm (8 x 9 x 5.7 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3182-1 – DC Time-Delay Relay		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Coil	Nominal Voltage	120 V dc	240 V dc	
Contacts	Type	NO, NC contact sets		
	Rating	1 A - 120 V dc	0.5 A - 240 V dc	
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 203 mm (8 x 6 x 8 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3183-1 – AC Drive		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Power Requirements	Three Phase	3.4 A - 170-264 V ac	3.0 A - 342-528 V ac	
	Single Phase	5.8 A - 180-264 V ac	N/A	
	Frequency Range	47-63 Hz		
Power Output (3 ~)	Power	373 W		
	Voltage	0-240 V	0-460 V	
	Frequency	0-400 Hz		
Inputs	Digital (5)	24 V dc		
	Analog (2)	0-10 V dc (1), 4-20 mA (1)		
Contacts (Configurable)	Type	SPDT		
	Rating	0.2 A - 250 V ac		
Outputs	Analog (1)	1 mA - 0-10 V dc		
	Transistor (1)	50 mA - 27 V dc		
Fault Switches		4		

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Model 3183-1 – AC Drive (cont'd)		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 187 mm (8 x 9 x 7.4 in)		
	Net Weight	TBE		
Model 3183-B – AC Drive				
Power Requirements	Single Phase	4.8 A - 120 V ac		
Power Output (3 ~)	Power	373 W		
	Voltage	0-240 V		
	Frequency	0-400 Hz		
Inputs	Digital (5)	24 V dc		
	Analog (2)	0-10 V dc (1), 4-20 mA (1)		
Contacts (Configurable)	Type	SPDT		
	Rating	0.2 A - 250 V ac		
Outputs	Analog (1)	1 mA - 0-10 V dc		
	Transistor (1)	50 mA - 27 V dc		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 187 mm (8 x 9 x 7.4 in)		
	Net Weight	TBE		
Model 3184 – DC Drive		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Power Requirements		4.1 A - 115 V ac	4.0 A - 230 V ac	
Power Output		250 W - 0-130 V dc	373 W - 0-220 V dc	
Speed Range		50:1		
Trimpot Adjustments		minimum and maximum speeds, current limit, IR compensation		
Analog Input		0-5 V dc		
Potentiometer		4.7 kΩ - 0.5 W		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 97 mm (8 x 9 x 5.8 in)		
	Net Weight	1.5 kg (3.4 lb)		
Model 3186 – Soft Starter				
Control Electronics Requirements	Voltage	24-230 V		
	Current	4-25 mA		
Power Electronics Requirements	Voltage	200-230 V ac		
	Input Current	2.2 A		
	Output Power	373 W		
Starting and Stopping	Starting Time	0.1-20 s		
	Starting Voltage	40-100%		
	Down-ramp Time	0-20 s		
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 203 mm (8 x 6 x 8 in)		
	Net Weight	1 kg (2.3 lb)		
Model 3187-1 – Manual DC Motor Starter		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Power Input		120 V dc	220 V dc	TBE
Output	Maximum Field Current	0.4 A dc	0.3 A dc	TBE
	Maximum Armature Current	3 A dc	1.5 A dc	TBE
Physical Characteristics	Dimensions (H x W x D)	203 x 328 x 75 mm (8 x 12 x 3 in)		
	Net Weight	1.8 kg (4 lb)		
Model 3188-1 – Three-Phase Rheostat		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Rheostat (3)	Power	75 W		TBE
	Total Resistance	16 Ω	75 Ω	TBE
Physical Characteristics	Dimensions (H x W x D)	203 x 305 x 75 mm (8 x 12 x 3 in)		

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Model 3191-1 – Connection Leads				
Lead Characteristics	Type	4 mm, banana plug		
	Cross Section	2.5 mm² (3875 mil²)		
	Strands per Lead	651		
	Rated Current	32 A		
	Rated Voltage	1000 V		
	Contact Resistance	1.8 mΩ		
	Length, Color, Quantity	30 cm (12 in), yellow, 8		
		60 cm (24 in), red, 20		
90 cm (36 in), blue, 4				
150 cm (60 in), black, 12				
Physical Characteristics	Dimensions (H x W x D)	90 x 315 x 80 mm (3.5 x 12.4 x 3.1 in)		
	Net Weight	2.5 kg (5.4 lb)		
Model 3195-1 – Rail Package				
Physical Characteristics	Dimensions (H x W x D)	20 x 1120 x 80 mm (2 x 44 x 3 in)		
	Net Weight	14.3 kg (15 lb)		
Model 3196-3 – AC Power Supply		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Power Requirement	Line Voltage (3 ~)	120/208 V - 60 Hz	220/380 V - 50 Hz	TBE
	Line Current	10 A	5 A	TBE
	Service Installation	3-phase, 5 wires, star (wye) connected, including neutral and ground		
Output	Voltage (3 ~)	120/208 V - 60 Hz	220/380 V - 50 Hz	TBE
	Current	10 A	5 A	TBE
Physical Characteristics	Dimensions (H x W x D)	185 x 155 x 310 mm (7.3 x 6.1 x 12.2 in)		
	Net Weight	4.5 kg (9.9 lb)		
Model 3197-3 – AC/DC Power Supply		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Power requirement	Line Voltage (3 ~)	120/208 V - 60 Hz	220/380 V - 50 Hz	TBE
	Line Current	15 A	7.5 A	TBE
	Service Installation	3-phase, 5 wires, star (wye) connected, including neutral and ground		
AC Output	Voltage (3 ~)	120/208 V - 60 Hz	220/380 V - 50 Hz	TBE
	Current	10 A	5 A	TBE
DC Output	Voltage	120 V dc	220 V dc	TBE
	Current	5 A	2.5 A	TBE
Physical Characteristics	Dimensions (H x W x D)	185 x 155 x 310 mm (7.3 x 6.1 x 12.2 in)		
	Net Weight	6.8 kg (15 lb)		
Model 3198 – Blank Module (15 cm)				
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 153 x 75 mm (8 x 6 x 3 in)		
	Net Weight	0.5 kg (1.1 lb)		
Model 3198-1 – Blank Module (23 cm)				
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 228 x 75 mm (8 x 9 x 3 in)		
	Net Weight	0.7 kg (1.5 lb)		
Model 3198-2 – Blank Module (30 cm)				
Fault Switches		4		
Physical Characteristics	Dimensions (H x W x D)	203 x 305 x 75 mm (8 x 12 x 3 in)		
	Net Weight	0.9 kg (2.0 lb)		
Model 6373-B – Background Suppression Photoelectric Switch				
Maximum Range		100 mm (3.9 in)		
Supply Voltage		24 V dc		
Contacts		SPDT, 24 V dc, 3 A		

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Model 6373-B – Background Suppression Photoelectric Switch (cont'd)				
Physical Characteristics		Dimensions (H x W x D)	400 x 127 x 127 mm (16 x 5 x 5 in)	
		Net Weight	0.8 kg (1.9 lb)	
Model 6374-B – Polarized Retroreflective Photoelectric Switch				
Light Source		visible red LED, 880 nm		
Maximum Range		3000 mm (120 in)		
Supply Voltage		24 V dc		
Contacts		SPDT, 24 V dc, 3 A		
Physical Characteristics		Dimensions (H x W x D)	400 x 127 x 127 mm (16 x 5 x 5 in)	
		Net Weight	0.8 kg (1.9 lb)	
Model 6375-B – Inductive Proximity Switch				
Maximum Range		10 mm (0.4 in)		
Supply Voltage		24 V dc		
Contacts		SPDT, 24 V dc, 3 A		
Physical Characteristics		Dimensions (H x W x D)	400 x 127 x 127 mm (16 x 5 x 5 in)	
		Net Weight	0.9 kg (2.0 lb)	
Model 6376-B – Capacitive Proximity Switch				
Maximum Range		25 mm (1 in)		
Supply Voltage		24 V dc		
Contacts		SPDT, 24 V dc, 3 A		
Physical Characteristics		Dimensions (H x W x D)	400 x 127 x 127 mm (16 x 5 x 5 in)	
		Net Weight	0.9 kg (2.0 lb)	
Model 6377-B – Diffuse Reflective Photoelectric Switch				
Light Source		visible red LED, 700 nm		
Maximum Range		200 mm (8 in)		
Supply Voltage		24 V dc		
Contacts		SPDT, 24 V dc, 3 A		
Physical Characteristics		Dimensions (H x W x D)	400 x 127 x 127 mm (16 x 5 x 5 in)	
		Net Weight	0.8 kg (1.9 lb)	
Model 6396 – Reflective Block				
Surfaces		white, black, shiny metallic, matte black metallic, retroreflective		
Physical Characteristics		Dimensions (H x W x D)	75 x 75 x 75 mm (3 x 3 x 3 in)	
		Net Weight	300 g (0.7 lb)	
Model 8896 – Phase Converter		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Input Current		7 A (1 ~)	TBE	TBE
Output Current		1.5 A (3 ~)	TBE	TBE
Maximum Error on Phase Voltage		10%	TBE	TBE
Physical Characteristics		Dimensions (H x W x D)	305 x 540 x 275 mm (12 x 21.2 x 10.8 in)	
		Net Weight	38.1 kg (84 lb)	
Model 37889 – Fuses		120/208 V - 60 Hz	220/380 V - 50 Hz	240/415 V - 50 Hz
Fuse		Type	class CC - time delayed	
		Rating	3 A	TBE
Model 38503 – Magnetic Labels				
Size		10 x 20 mm (0.4 x 0.8 in)		
Quantity		46 identified labels, 34 blank labels		
Model 38707 – Clamp-On Meter				
Current		Range	0-600 A	
		Accuracy	2% at 50-60 Hz	
		Resolution	0.1 A at 200 A	

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Model 38707 – Clamp-On Meter (cont'd)		
Voltage	Range	0-600 V
	Accuracy	1.5% at 50-60 Hz
	Resolution	0.1 V at 200 V
Resistance	Range	0-200 Ω
	Accuracy	1.9%
	Resolution	0.1 Ω
Physical Characteristics	Dimensions (H x W x D)	29 x 50 x 187 mm (1.1 x 2.0 x 7.1 in)
	Net Weight	0.2 kg (0.44 lb)
Model 39352 – Rack (3103)		
Physical Characteristics	Dimensions (H x W x D)	775 x 1048 x 165 mm (30.5 x 41.25 x 6.5 in)
	Net Weight	TBE
Model 72676 – Multimeter		
Current	Range	0-10 A
	Accuracy	1.5% in DC mode, 2.5% in AC mode
	Resolution	0.1 A at 200 A
Voltage	Range	0-1000 V
	Accuracy	0.3% in DC mode, 2.0% in AC mode
	Resolution	0.1 mV in DC mode, 1.0 mV in AC mode
Resistance	Range	0-32 M Ω
	Accuracy	0.5%
	Resolution	0.1 Ω
Physical Characteristics	Dimensions (H x W x D)	37 x 90 x 190 mm (1.5 x 3.5 x 7.5 in)
	Net Weight	0.36 kg (0.8 lb)
Model 76768 – Filler Pot		
Material		translucid plastic
Capacity		4730 ml (160 oz)
Physical Characteristics	Dimensions (H x W x D)	280 x 135 x 135 mm (11 x 5.3 x 5.3 in)
	Net Weight	0.36 kg (0.8 lb)
Model 85282 – Brackets (3105-A)		
Physical Characteristics	Dimensions (H x W x D)	405 x 48 x 43 mm (15.9 x 1.9 x 1.7 in)
	Net Weight	1.5 kg (3.3 lb)
Model 85283-00 – Back Cover (15 cm)		
Physical Characteristics	Dimensions (H x W x D)	143 x 131 x 76 mm (5.6 x 5.2 x 3.0 in)
	Net Weight	0.27 kg (0.6 lb)
Model 85283-1 – Back Cover (23 cm)		
Physical Characteristics	Dimensions (H x W x D)	219 x 131 x 76 mm (8.6 x 5.2 x 3.0 in)
	Net Weight	0.41 kg (0.9 lb)
Model 85283-2 – Back Cover (30 cm)		
Physical Characteristics	Dimensions (H x W x D)	295 x 131 x 76 mm (11.6 x 5.2 x 3.0 in)
	Net Weight	0.54 kg (1.2 lb)
Model 85360 – Cord Line		
	Input	120 V - 60 Hz
	Fuse	5 A
	Length	2 m

PERSONAL COMPUTER REQUIREMENTS

A currently available personal computer Pentium type with USB port, running under one of the Microsoft® operating systems, Windows® XP or Windows® 7, is required to use the Easy-Soft, and Drives-Soft applications.

ORDERING NUMBERS

120/208 V - 60 Hz			220/380 V - 50 Hz			240/415 V - 50 Hz
ENGLISH	FRENCH	SPANISH	ENGLISH	FRENCH	SPANISH	ENGLISH
3103-30	3103-30	3103-30	3103-30	3103-30	3103-30	3103-30
3104-10	3104-10	3104-10	3104-10	3104-10	3104-10	3104-10
3105-A0	3105-A0	3105-A0	3105-A0	3105-A0	3105-A0	3105-A0
3105-00	3105-00	3105-00	3105-00	3105-00	3105-00	3105-00
3110-20	3110-21	3110-22	3110-20	3110-21	3110-22	3110-20
3111-20	3111-21	3111-22	3111-20	3111-21	3111-22	3111-20
3112-00	3112-01	3112-02	3112-00	3112-01	3112-02	3112-00
3114-00	3114-01	3114-02	3114-00	3114-01	3114-02	3114-00
3115-20	3115-21	3115-22	3115-20	3115-21	3115-22	3115-20
3115-A0	3115-A1	3115-A2	3115-A0	3115-A1	3115-A2	3115-A0
3119-00	3119-01	3119-02	3119-00	3119-01	3119-02	3119-0A
3121-20	3121-21	3121-22	3121-25	3121-26	3121-27	TBE
3125-10	3125-11	3125-12	3125-10	3125-11	3125-12	3125-1A
3126-00	3126-01	3126-02	3126-05	3126-06	3126-07	3126-0A
3127-20	3127-21	3127-22	3127-20	3127-21	3127-22	3127-2A
3128-00	3128-01	3128-02	3128-00	3128-01	3128-02	3128-00
3129-00	3129-01	3129-02	3129-00	3129-01	3129-02	3129-00
3130-20	3130-21	3130-22	3130-20	3130-21	3130-22	3130-20
3131-30	3131-31	3131-32	3131-35	3131-36	3131-37	3131-3A
3132-30	3132-31	3132-32	3132-30	3132-31	3132-32	3132-30
3133-20	3133-21	3133-22	3133-25	3133-26	3133-27	TBE
3136-00	3136-01	3136-02	3136-00	3136-01	3136-02	3136-0A
3137-00	3137-01	3137-02	3137-00	3137-01	3137-02	3137-0A
3138-30	3138-31	3138-32	3138-35	3138-36	3138-37	3138-3A
3139-00	3139-01	3139-02	3139-00	3139-01	3139-02	3139-00
3140-30	3140-31	3140-32	3140-35	3140-36	3140-37	3140-3A
3142-20	3142-21	3142-22	3142-20	3142-21	3142-22	3142-20
3146-20	3146-20	3146-20	3146-20	3146-20	3146-20	3146-20
3147-10	3147-10	3147-10	3147-10	3147-10	3147-10	3147-10
3149-00	3149-00	3149-00	3149-00	3149-00	3149-00	3149-00
3150-10	3150-11	3150-12	3150-15	3150-16	3150-17	3150-1A
3151-10	3151-11	3151-12	3151-15	3151-16	3151-17	TBE
3154-10	3154-10	3154-10	3154-10	3154-10	3154-10	3154-10
3165-10	3165-11	3165-12	3165-10	3165-11	3165-12	3165-10
3167-10	3167-11	3167-12	3167-15	3167-16	3167-17	3167-1A
3168-20	3168-21	3168-22	3168-25	3168-26	3168-27	3168-2A
3169-10	3169-11	3169-12	3169-15	3169-16	3169-17	TBE
3170-20	3170-20	3170-20	3170-20	3170-20	3170-20	3170-20
3171-20	3171-21	3171-22	3171-20	3171-21	3171-22	3171-20
3172-20	3172-20	3172-20	3172-25	3172-25	3172-25	3172-25
3174-30	3174-31	3174-32	3174-30	3174-31	3174-32	3174-30
3175-00	3175-00	3175-00	3175-05	3175-05	3175-05	3175-0A
3176-20	3176-20	3176-20	3176-20	3176-20	3176-20	3176-20
3176-A0	3176-A0	3176-A0	3176-A0	3176-A0	3176-A0	3176-AA
3176-B0	3176-B1	3176-B2	3176-B0	3176-B1	3176-B2	3176-BA
3177-10	3177-11	3177-12	3177-15	3177-16	3177-17	3177-1A

Table 1. Equipment Ordering Numbers

INDUSTRIAL CONTROLS TRAINING SYSTEMS

SERIES 8036

120/208 V - 60 Hz			220/380 V - 50 Hz			240/415 V - 50 Hz
ENGLISH	FRENCH	SPANISH	ENGLISH	FRENCH	SPANISH	ENGLISH
3178-10	3178-11	3178-12	3178-15	3178-16	3178-17	3178-1A
3179-20	3179-20	3179-20	3179-25	3179-25	3179-25	3179-25
3179-A0	3179-A1	3179-A2	3179-A5	3179-A6	3179-A7	3179-A5
3180-10	3180-11	3180-12	3180-15	3180-16	3180-17	3180-15
3181-10	3181-11	3181-12	3181-15	3181-16	3181-17	3181-15
3182-10	3182-11	3182-12	3182-15	3182-16	3182-17	3182-15
3183-10	3183-11	3183-12	3183-15	3183-16	3183-17	3183-1A
3183-B0	3183-B1	3183-B2	N/A	N/A	N/A	N/A
3184-00	3184-01	3184-02	3184-05	3184-06	3184-07	3184-05
3186-00	3186-01	3186-02	3186-00	3186-01	3186-02	3186-0A
3187-10	3187-11	3187-12	3187-15	3187-16	3187-17	TBE
3188-10	3188-11	3188-12	3188-15	3188-16	3188-17	TBE
3191-10	3191-10	3191-10	3191-10	3191-10	3191-10	3191-10
3195-10	3195-10	3195-10	3195-10	3195-10	3195-10	3195-10
3196-30	3196-31	3196-32	3196-35	3196-36	3196-37	TBE
3197-30	3197-31	3197-32	3197-35	3197-36	3197-37	TBE
3198-00	3198-00	3198-00	3198-00	3198-00	3198-00	3198-00
3198-10	3198-10	3198-10	3198-10	3198-10	3198-10	3198-10
3198-20	3198-20	3198-20	3198-20	3198-20	3198-20	3198-20
6373-B0	6373-B0	6373-B0	6373-B0	6373-B0	6373-B0	6373-B0
6374-B0	6374-B0	6374-B0	6374-B0	6374-B0	6374-B0	6374-B0
6375-B0	6375-B0	6375-B0	6375-B0	6375-B0	6375-B0	6375-B0
6376-B0	6376-B0	6376-B0	6376-B0	6376-B0	6376-B0	6376-B0
6377-B0	6377-B0	6377-B0	6377-B0	6377-B0	6377-B0	6377-B0
6396-00	6396-00	6396-00	6396-00	6396-00	6396-00	6396-00
8036-00	8036-01	8036-02	8036-05	8036-06	8036-07	8036-1A
8036-10	8036-11	8036-12	8036-15	8036-16	8036-17	8036-1A
8036-20	8036-21	8036-22	8036-20	8036-21	8036-22	8036-20
8036-30	8036-31	8036-32	8036-35	8036-36	8036-37	8036-3A
8036-40	8036-41	8036-42	8036-40	8036-41	8036-42	8036-40
8036-A0	8036-A1	8036-A2	8036-A5	8036-A6	8036-A7	8036-AA
8036-B0	8036-B1	8036-B2	8036-B5	8036-B6	8036-B7	8036-BA
8036-C0	8036-C1	8036-C2	N/A	N/A	N/A	N/A
8036-D0	8036-D1	8036-D2	8036-D5	8036-D6	8036-D7	8036-DA
8036-E0	8036-E1	8036-E2	8036-E5	8036-E6	8036-E7	8036-EA
8896-00	8896-01	8896-02	TBE	TBE	TBE	TBE
8920-40	8920-40	8920-40	8920-40	8920-40	8920-40	8920-40
8951-80	8951-80	8951-80	8951-80	8951-80	8951-80	8951-80
8951-E0	8951-E0	8951-E0	8951-E0	8951-E0	8951-E0	8951-E0
8951-H0	8951-H0	8951-H0	8951-H0	8951-H0	8951-H0	8951-H0
8951-I0	8951-I0	8951-I0	8951-I0	8951-I0	8951-I0	8951-I0
8951-J0	8951-J0	8951-J0	8951-J0	8951-J0	8951-J0	8951-J0
8951-M0	8951-M0	8951-M0	8951-M0	8951-M0	8951-M0	8951-M0
8969-00	8969-01	8969-02	8969-00	8969-01	8969-02	8969-00
8990-00	8990-00	8990-00	8990-05	8990-05	8990-05	8990-0A
9126-00	9126-00	9126-00	9126-00	9126-00	9126-00	9126-00
37889-00	37889-00	37889-00	37889-05	37889-05	37889-05	37889-05
38503-00	38503-00	38503-00	38503-00	38503-00	38503-00	38503-00
38707-00	38707-00	38707-00	38707-00	38707-00	38707-00	38707-00
39163-00	TBE	39163-02	39163-00	TBE	39163-02	39163-00
39163-10	TBE	39163-12	39163-10	TBE	39163-12	39163-10
39352-00	39352-00	39352-00	39352-00	39352-00	39352-00	39352-00
39436-00	TBE	39436-02	39436-00	TBE	39436-02	39436-00
39436-10	TBE	39436-12	39436-10	TBE	39436-12	39436-10
39436-A0	TBE	39436-A2	39436-A0	TBE	39436-A2	39436-A0

Table 1. Equipment Ordering Numbers (cont'd)

120/208 V - 60 Hz			220/380 V - 50 Hz			240/415 V - 50 Hz
ENGLISH	FRENCH	SPANISH	ENGLISH	FRENCH	SPANISH	ENGLISH
39653-00	TBE	39653-02	39653-00	TBE	39653-02	39653-00
39653-10	TBE	39653-12	39653-10	TBE	39653-12	39653-10
39654-00	TBE	39654-02	39654-00	TBE	39654-02	39654-00
39654-10	TBE	39654-12	39654-10	TBE	39654-12	39654-10
72676-00	72676-00	72676-00	72676-00	72676-00	72676-00	72676-00
76768-00	76768-00	76768-00	76768-00	76768-00	76768-00	76768-00
77660-00	77660-00	77660-00	77660-00	77660-00	77660-00	77660-00
85082-00	TBE	85082-02	85082-00	TBE	85082-02	85082-00
85082-10	TBE	85082-12	85082-10	TBE	85082-12	85082-10
85282-00	85282-00	85282-00	85282-00	85282-00	85282-00	85282-00
85283-00	85283-00	85283-00	85283-00	85283-00	85283-00	85283-00
85283-01	85283-01	85283-01	85283-01	85283-01	85283-01	85283-01
85283-02	85283-02	85283-02	85283-02	85283-02	85283-02	85283-02
85360-00	85360-00	85360-00	N/A ⁵	N/A	N/A	N/A
85626-00	TBE ⁶	TBE	85626-00	TBE	TBE	85626-00
85626-10	TBE	TBE	85626-10	TBE	TBE	85626-10
85725-00	TBE	TBE	85725-00	TBE	TBE	85725-00
85725-10	TBE	TBE	85725-10	TBE	TBE	85725-10
87667-00	TBE	TBE	87667-00	TBE	TBE	87667-00
87667-10	TBE	TBE	87667-10	TBE	TBE	87667-10
87668-00	TBE	TBE	87668-00	TBE	TBE	87668-00
87668-10	TBE	TBE	87668-10	TBE	TBE	87668-10
87669-00	TBE	TBE	87669-00	TBE	TBE	87669-00
87669-10	TBE	TBE	87669-10	TBE	TBE	87669-10
87774-00	TBE	TBE	87774-00	TBE	TBE	87774-00
87774-10	TBE	TBE	87774-10	TBE	TBE	87774-10
88471-00	88471-00	88471-00	88471-00	88471-00	88471-00	88471-00

Table 1. Equipment Ordering Numbers (cont'd)

⁵ N/A = Not available

⁶ TBE == To be established (Contact your Lab-Volt representative for additional information)

Reflecting Lab-Volt's commitment to high quality standards in product, design, development, production, installation, and service, our manufacturing and distribution facility has received the ISO 9001 certification.

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