

Refrigeration System Demonstrator 582190 (3400-30)

FESTO

LabVolt Series

Datasheet

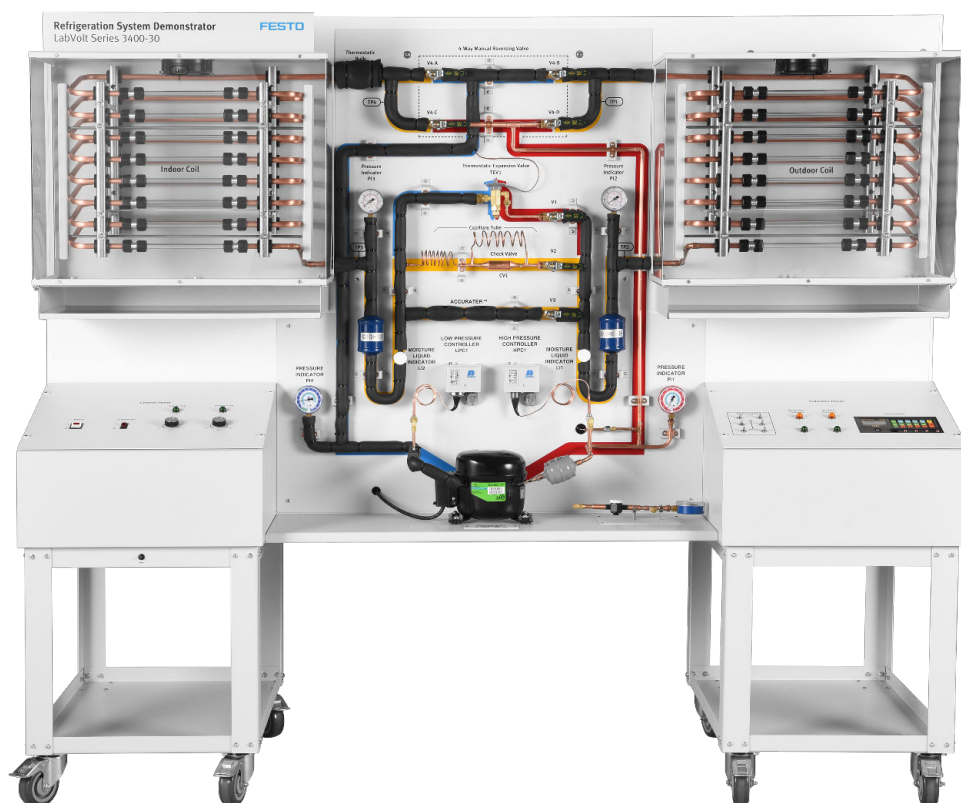


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General Description

The Refrigeration System Demonstrator is an integrated training system for instructor demonstration and hands-on student experimentation in the fundamental principles and components of typical refrigeration systems and heat pumps. The demonstrator is designed to clearly show the different refrigerant stages within the cycles of the most common refrigeration system configurations. The Refrigeration System Demonstrator includes all the equipment required to perform the exercises contained in the courseware. Available optional equipment adds to the efficiency of the refrigeration, air conditioning, and heating training exercises.

The training system is supported by correlated courseware employing a competency-based, individualized approach to the study of refrigeration fundamentals. The courseware consists of a training manual organized in a unit/exercise format with clearly stated objectives, and a companion instructor's lesson planning guide.

Topic Coverage

- Physics Applied to Refrigeration
- Introduction to Refrigeration
- The Compressor
- The Evaporator and Condenser
- Metering Devices
- System Control Devices
- Introduction to Heat Pump Systems
- Refrigeration Faults
- Estimated program duration: 46 hours

Features & Benefits

- Shatterproof, clear tubing sections within the evaporator and condenser coils to allow students to view refrigerant flows and changes of state
- Clear evaporator and condenser coil enclosures
- Four manual valves enabling reversal of refrigerant flow for heat pump demonstrations
- Variable-speed fans and adjustable dampers to simulate changing environmental conditions
- A multicolored, silk-screened functional panel for identification of refrigerant flow and change of state within the system
- Six fault-insertion switches enabling demonstration of typical refrigeration system malfunctions
- Elementary refrigeration demonstrator to identify refrigerant change of state
- Heavy-duty steel mobile stand
- Instrumentation including temperature meter, compound gauges, pressure gauges, circuit breakers, and indicator lamps

- Circuit breakers and a safety pressure switch to protect the system
- R-134a refrigerant

List of Manuals

Description	Manual number
Refrigeration System Setup (User Guide) _____	580301 (30788-E0)
Refrigeration Fundamentals (Student Manual) _____	580318 (30862-00)
Refrigeration Fundamentals (Instructor Guide) _____	580323 (30862-10)
Refrigeration System Demonstrator (Instruction Manual) _____	580325 (30862-D0)

Table of Contents of the Manual(s)

Refrigeration Fundamentals (Student Manual) (580318 (30862-00))

- 1-1 Heat and Heat Transfer
- 1-2 Matter, Molecules, and Energy
- 1-3 Pressures and Temperatures
- 2-1 The Basic Refrigeration System
- 2-2 Additional Refrigeration Devices
- 3-1 Operation of a Compressor
- 3-2 Types of Compressors
- 4-1 The Evaporator
- 4-2 Types of Evaporators
- 4-3 The Condenser
- 4-4 Types of Condensers
- 5-1 Capillary Tube Control
- 5-2 Thermostatic Expansion Valve Control
- 6-1 Low Pressure Controllers
- 6-2 High Pressure Controllers
- 7-1 The Basic Heat Pump System
- 7-2 Reversing Refrigerant Flow
- 7-3 Heat Pump Control
- 8-1 Electrical Faults
- 8-2 Compressor and Pressure Controller Faults

Optional Equipment

Qty	Description	Model number
1	Refrigeration Charging Equipment _____	587636 (3440-50)
1	Refrigerant Recovery Unit _____	587640 (3445-10)
1	Refrigeration System Demonstrator (Manuals on CD-ROM) _____	580324 (30862-A0)

Specifications

Parameter	Value
Power Requirements	
Current	3 A
Service Installation	Standard single-phase ac outlet
Compressor	
Type	Hermetically sealed
Power Rating	170 W (0.25 hp)
Refrigerant	R-134a. The help of a refrigeration technician is required to fill the training system with refrigerant.

Parameter	Value
Indoor Coil (Evaporator)	Copper and clear tubing enclosed in a thermoplastic chamber, with variable-speed fan and adjustable damper
Outdoor Coil (Condenser)	Copper and clear tubing enclosed in a thermoplastic chamber, with variable-speed fan and adjustable damper
Control Devices	High-pressure switch, low-pressure switch, thermostatic expansion valve, capillary tube, heat pump-type expansion device, and four manual heat pump reversing valves
Instrumentation	Temperature meter, compound gauges, pressure gauges, and indicator lamps
Protection	Safety pressure switch, main breaker
Fault-Insertion Switches	6
Physical Characteristics	
Intended Location	On the floor (stands on casters)
Dimensions (H x W x D)	1900 x 2100 x 800 mm (74.8 x 83 x 31.5 in)
Net Weight	140 kg (308 lb)

Module Options Description

Refrigeration Charging Equipment 587636 (3440-50)



The Refrigeration Charging Equipment is an accessory kit in refrigeration and air conditioning. The Refrigeration Charging Equipment is designed to enable students to evacuate and charge refrigeration training systems. It consists of a manifold, a charging hose kit, a vacuum pump, an automatic refrigerant charging meter, and a heater blanket.

Features & Benefits

- Easy-to-read gauges
- Forged-brass body with metal valve handles
- Color-coded hoses
- Hose cover pin-pricked to resist bubbling and bursting
- Two-stage vacuum pump for great efficiency
- Refrigerant charging meter automatically shuts off when charging is completed
- Compatible with refrigerants R-12, R-134a, R-404A, R-502, and R-507

Specifications

Parameter	Value
Refrigeration Charging Equipment	
Includes:	Manifold
	Charging hose kit
	Vacuum pump
	Automatic refrigerant charging meter
	Heater blanket

Refrigerant Recovery Unit 587640 (3445-10)



The Refrigerant Recovery Unit enables students to recover refrigerant for storage or recycling. A low-pressure indicator on the unit monitors the pressure condition on the suction side of the recovery system. A filter dryer and an oil separator are used to condition the refrigerant before it enters the recovery system compressor. At the high-pressure side of the recovery system compressor, a second oil separator ensures good lubrication by returning the oil at the

suction side of the compressor, thus avoiding oil migration to the storage tank. A high-pressure indicator is also provided to monitor the pressure conditions on the discharge side of the compressor. A high-pressure controller will automatically shut off the compressor if the discharge pressure exceeds a preset limit. A forced-air condenser is used to transform the high-pressure refrigerant vapor to a high-pressure liquid refrigerant.

List of Manuals

Description	Manual number
Refrigeration System Setup (User Guide)	580301 (30788-E0)
Refrigerant Recovery Unit (Instruction Manual)	590056 (32064-DO)

Features & Benefits

- Hermetically sealed compressor
- Compressor oil drain conveniently located at the bottom of the unit
- Easy access to filter at the back of the unit, after removal of the access door
- Forced-air coil condenser
- Low-and high-pressure gauges
- High-pressure safety device
- Compatible with refrigerants R-134a

Specifications

Parameter	Value
Power Requirements	
Current	2.5 A
Service Installation	Standard single-phase ac outlet
Compressor	
Type	Hermetically sealed
Nominal Power	186 W (1/4 hp)
Oil	Polyolester, 280 ml (9.5 oz)
Condenser Type	Forced-air coil
Refrigerant Compatibility	R134a
Filter/Dryer Type	82 ml (5 in ³), 6.35 mm (0.25 in) flare x 6.35 mm (0.25 in) flare
Instrumentation	Low- and high-pressure gauges
Safety Device	High pressure
Physical Characteristics	

Parameter	Value
Intended Location	On a table able to support the weight of the equipment
Required Floor Space (H x W x D)	345 x 490 x 255 mm (13.6 x 19.3 x 10 in)
Net Weight	50 kg (110 lb)

Refrigeration System Demonstrator (Manuals on CD-ROM) 580324 (30862-A0)

List of Manuals

Description	Manual number
Refrigeration System Setup (User Guide) _____	590612 (30788-E0)
Refrigeration Fundamentals (Student Manual) _____	590640 (30862-00)
Refrigeration Fundamentals (Instructor Guide) _____	590641 (30862-10)
Refrigeration System Demonstrator (Job Sheets - Student) _____	590642 (30862-D0)

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