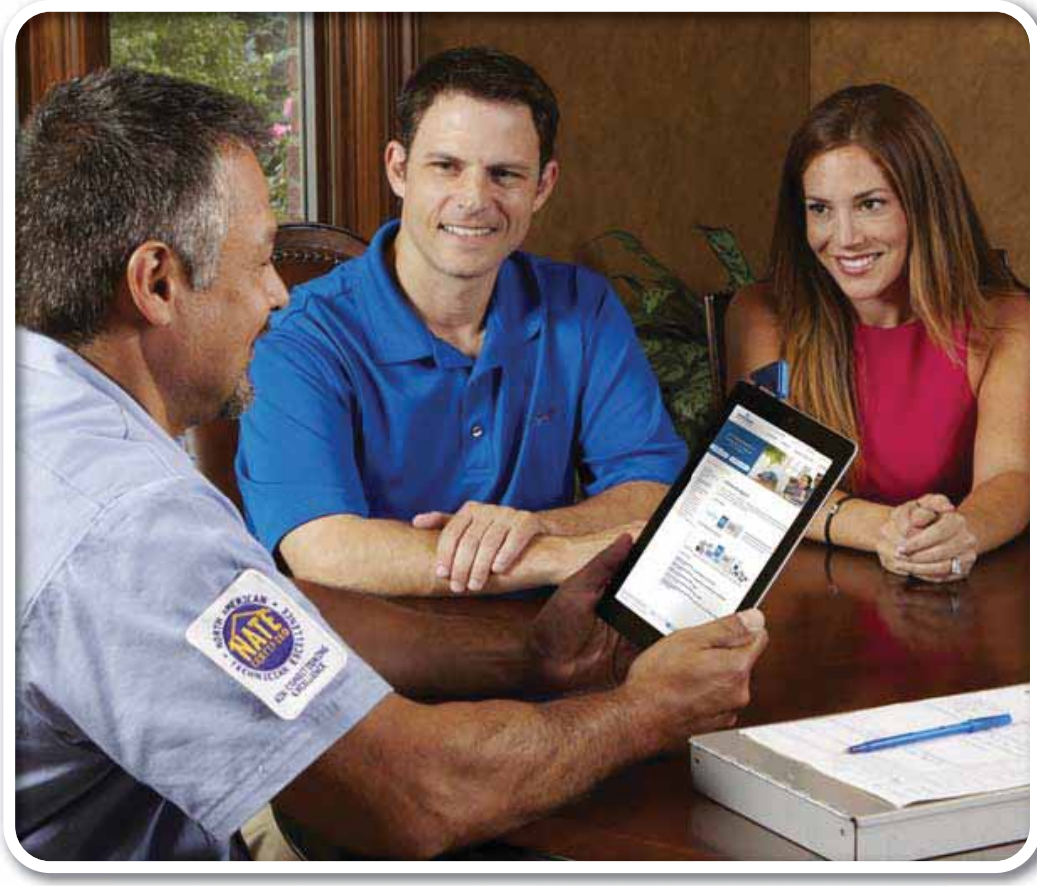
White-Rodgers™



Thermostats

Heating

Cooling / Refrigeration

Transformers / Relays

Hydronic / Appliance

IAQ / Zoning Systems

Technical Help

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simply | sensible.

Universal Wi-Fi Thermostat

Remote System Access from Smartphone, Tablet or PC

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R-4425

TABLE OF CONTENTS

WHITE-RODGERS MODEL NUMBER INDEX

White-Rodgers

🍁 Indicates Canadian Model Number: call 1-800-305-6953 to order

✱ Indicates Canadian Model Number: call 1-800-305-6953 to order

WHITE-RODGERS MODEL NUMBER INDEX

White-Rodgers

🍁 Indicates Canadian Model Number: call 1-800-305-6953 to order

TOP TEN Ways to catch the Wi-Fi wave with the Sensi™ thermostat & mobile app

10 INSTALLS LIKE A STANDARD THERMOSTAT
Connect it to the internet or simply install Sensi and let the homeowner connect it at their convenience.

9 CONNECTS WITH A SMARTPHONE
Step-by-step instructions make it easy to install and pair Sensi to the home router.

8 NO C WIRE NEEDED ON MOST SYSTEMS
Walk in the door knowing Sensi will work – even in most of the 60% of homes that don't have a common wire.

7 COMPLETE COMFORT CONTROL FOR ANY CUSTOMER
Sensi is priced to make Wi-Fi thermostats a reality for all customers not just the high-end homeowner.

6 NO FOLLOW UP CALL
Not only is Sensi easy to use, it meets Energy Aware™ standards for precision, reliability and accurate control.

5 MORE REPEAT BUSINESS
Be one touch away when your customer needs service with your company information stored in the Sensi mobile app.

4 PROMOTE YOUR BUSINESS
Get customer referrals when you register for the Sensi Branding Program. Visit SensiRegistration.com to sign up today.

3 ENHANCE YOUR REPUTATION
Consumers are looking for Wi-Fi thermostats. Offer them Sensi so they don't have to look any further.

2 GROW YOUR THERMOSTAT SALES
Three out of four homes have Wi-Fi. Now there's a thermostat simple enough for all of them.

1 EMPOWER YOUR CUSTOMER TO TAKE CONTROL OF THEIR HOME COMFORT. THEY WILL THANK YOU FOR IT!

EE542-1Z

PROGRAMMABLE THERMOSTAT AND WHOLE HOME ENERGY MONITOR

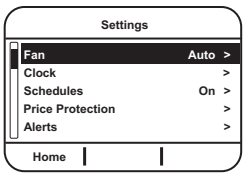
The Smart Energy Thermostat is Much More than a Thermostat. It Wirelessly Pairs with Your Customer's Smart Meter to Provide Unprecedented Insight into Whole Home Electricity Usage – which Enables Your Customers to Reduce Their Utility Bills by Making Better Decisions About how and when to Use Electricity

FEATURES

- Title 24 compliant per new residential building code in CA.
- Universal HVAC system compatibility (4 heat / 2 cool).
- 7 day programming flexibility.
- Patented sensor-less dual fuel capability.
- Large backlit dot-matrix display (5 sq.″) for optimal readability.
- +/- 1º temperature control accuracy ensures consistent comfort.
- One touch AWAY key instantly engages away mode to help save money.
- Energy monitor allows customer to set a monthly budget for whole home electricity use and then track daily usage costs against it to help reduce energy costs*.
- Current price of electricity presented on the home screen and tri-color LED lets customer know when the price of electricity is higher than normal*.
- Price Protection™ can be configured to automatically adjust the temperature in home when the price of electricity is high*.
- Month to date heating and cooling cost estimates*.
- Message Inbox enables customer to receive important information from utility provider (i.e. notification of potential disruption to power supply).
- Requires C-wire for power (no batteries required).

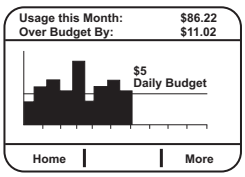
* Feature requires utility to push electricity pricing data through the smart meter (via ZigBee SE Price Cluster.

DISPLAY MENU

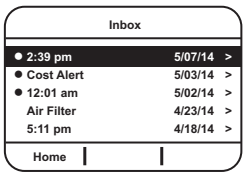


Intuitive menu design and familiar 5-way navigation pad make this one of the easiest to use energy management products on the market.

ENERGY MONITOR



Large, crisp, dot matrix display makes it easy for customers to track their energy use against a monthly budget.



Message inbox with unread mall notification provides an easy way for utilities to stay in touch with customers.

SPECIFICATIONS

Electrical Rating:
Hardwire ..... 20 to 30 VAC
Terminal Load ..... 1.5A per terminal, 2.0A maximum all terminals combined
Setpoint Range ..... 45 to 99°F (7 to 37°C)
Rated Differentials: ..... Heat 0.6°F; Cool 1.2°F
Operating Humidity ..... 90% non-condensing maximum

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

TECHNICAL HELP

Connections.....See page 130

TECH ? PAGES 130

Smart Energy 1.1

ZigBee Certified product

Single Stage	Multi-Stage	Heat Pump	Programs	Model	Applications			Interface Power Source*	Selectable Performance Features					Comfort and Convenience Features					Terminals
Stages Heat/Cool by System			Program Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Dual Fuel Control	Keypad Lockout	Display Size (Square inches)	Lighted Display	Audible Feedback	Ignition Module Reset	Permanent Memory	
1/1	2/2	4/2	7, Ø	EE542-1Z	✓			H	✓		✓	✓	✓	6.0	✓	✓	✓	✓	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L

* H = Hardwired (Requires Common)

INSPIRE™ UNIVERSAL 4-WIRE COLOR THERMOSTAT SYSTEM

Upgrade Single Stage Applications to Premium High-Efficiency Systems (Staging, Heat Pump or Heat Pump with Dual Fuel) – Using Existing 4 Wires

1HDEZ-1521
Includes User Interface and Equipment Control

FEATURES

- Reusable plug-in configuration tool – eliminates multiple trips up and down stairs during set up and system testing.
- USB port to quickly upload your favorite Installation Settings, Programs and personalized Company Contact Information.
- 5/8″ thin profile with vibrant color display.
- Color coded LEDs provide positive feedback for easy setup.
- Dehumidification, humidification.

DIMENSION

Interface ..... 3 1/4″H x 6 1/8″W x 5/8″D
Control ..... 5 1/2″H x 5 3/4″W x 1 1/2″D

SPECIFICATIONS

Electrical Rating:
Hardwire . . . . . 20-30 VAC, NEC Class II 50/60Hz or DC
Terminal Load . . . . . 1.5 A per terminal,
2.5 A maximum load (all terminals combined)
Setpoint Range . . . . . 45 to 99°F (7 to 37°C)
Rated Differential . . . . . Heat 0.6°F; Cool 1.2°F
Operating Ambient . . . . . 32 to +105°F (0 to +41°C) – Interface
-30 to +150°F (-34 to 66°C) – Control
Operating Humidity Range . . . . . 90% non-condensing maximum

PARTS AND ACCESSORIES See end of thermostats section for additional parts and accessories

- F4-1400 — Thermostat Plug-in Configuration Tool
- F145-1378 — Outdoor Remote Sensor
- F29-0198 — Locking Thermostat Guard - Clear Plastic
- F29-0220 — Locking Thermostat Guard - Metal, Solid Base
- F29-0222 — Locking Thermostat Guard - Metal, Ring Base

TECHNICAL HELP

Connections.....See page 127

TECH
PAGES
127

INSPIRE™ UNIVERSAL 4-WIRE COLOR THERMOSTAT SYSTEM

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications					Selectable Performance Features											Display Size (Square inches)	Terminals
Stages Heat/Cool by System			Program Options	Periods per day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dihumidity	Thermostat Power Source*	Auto Changeover	Programmable Fan	Energy Aware	Comfort Alert® A.C. System Protection (P)-Passive/(A)-Active§	Dual Fuel Heat Pump Control (L)-Logic/(O)-Outdoor Sensor	Dual Fuel Heat Stages HP/Gas	Aux. Heat Lockout with Outdoor Sensor♦	Keypad Lockout (T)-Total/(P)-Partial	Setpoint Temperature Limits Adjustable Max./Min.	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Remote Temperature Sensing		RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, +, S, -, DHM, DHM2, HM, HM2, R, 1, 2, C- Thermostat 1, 2, C, R
1/1	2/2	4/2	7, Ø	4, Ø	1HDEZ-1521	✓			H,D	H	✓		✓	A	0‡	2/2	✓		✓		1	5.5	

*H = Hardwired (Requires Common)

♦ When used with an outdoor sensor provides options to lock out auxiliary heat above selected outdoor temperature.

1F98EZ-1421
Includes User Interface and Equipment Control

1F98EZ-1441
Includes User Interface, Equipment Control and Outdoor Remote Sensor (F145-1378)

12″ TOUCHSCREEN UNIVERSAL 4-WIRE THERMOSTAT SOLUTION

Upgrade Single Stage Applications to Premium High-Efficiency Systems (Staging, Heat Pump or Heat Pump with Dual Fuel) – Using Existing 4 Wires Dual Fuel Heat Pump Control (Requires Outdoor Remote Sensor)

FEATURES

- Reusable plug-in configuration tool – eliminates multiple trips up and down stairs. during set up and system testing. (F4-1400 available separately)
- Color coded LEDs provide positive feedback for easy setup.
- Programmable fan.
- Dual fuel heat pump.
- Outdoor sensor included (1F98EZ-1441 only).

DIMENSION

Interface . . . . . 4 1/2″H x 3″W x 11/4″D
Control . . . . . 5 1/2″H x 5 3/4″W x 1 1/2″D

SPECIFICATIONS

Electrical Rating:
Hardwire . . . . . 20-30 VAC, NEC Class II 50/60Hz or DC
Terminal Load . . . . . 1.5 A per terminal,
2.5 A maximum load (all terminals combined)
Setpoint Range . . . . . 45 to 99°F (7 to 37°C)
Rated Differential . . . . . Heat 0.6°F; Cool 1.2°F
Operating Ambient . . . . . 32 to +105°F (0 to +41°C) – Interface
-30 to +150°F (-34 to 66°C) – Control
Operating Humidity Range . . . . . 90% non-condensing maximum

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F4-1400 — Thermostat Plug-in Configuration Tool
- F145-1378 — Outdoor Remote Sensor
- F61-2600 — Wallplate 8 1/8″W X 5 3/8″H
- F61-2634 — Wallplate 6 1/2″W x 5″H
- F29-0198 — Locking Thermostat Guard - Clear Plastic
- F29-0220 — Locking Thermostat Guard - Metal, Solid Base
- F29-0222 — Locking Thermostat Guard - Metal, Ring Base

12″ TOUCHSCREEN UNIVERSAL 4-WIRE THERMOSTAT SOLUTION

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications					Thermostat Power Source*	Selectable Performance Features											Display Size (Square inches)	Terminals
Stages Heat/Cool by System			Program Options	Periods per day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Outdoor Remote Sensing	Humidity Control (H)-Humidity / (D)-Dihumidity		Auto Changeover	Programmable Fan	Energy Aware	Comfort Alert® A.C. System Protection (P)-Passive/(A)-Active§	Dual Fuel Heat Pump Control (L)-Logic/(O)-Outdoor Sensor	Dual Fuel Heat Stages HP/Gas	Aux. Heat Lockout with Outdoor Sensor ♦	Keypad Lockout (T)-Total/(P)-Partial	Setpoint Temperature Limits Adjustable Max./Min.	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Remote Temperature Sensing		
1/1	2/2	4/2	7, Ø	4, Ø	**1HDEZ-1421 Easy Install™ 4-Wire**	✓			✓	H,D	H	✓	✓	✓	P	0‡	2/2	✓		✓		1	12	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6, +, S, -, DHM, DHM2, HM, HM2
1/1	2/2	4/2	7, Ø	4, Ø	**1HDEZ-1441 Easy Install™ 4-Wire**	✓			✓■	H,D	H	✓	✓	✓	P	0‡	2/2	✓		✓		1■	12	

*H = Hardwired (Requires Common)

■ One outdoor remote sensor can be used – F145-1378 included in kit

‡ With an outdoor sensor installed you can select an outdoor temperature to turn the heat pump off and switch to the gas furnace when it's too cold outside for the pump to be efficient.

1F98EZ-1621

Comfort Interface

Equipment Control Module

Return Air Sensor (RAS)

F145RF-1600
Wireless Remote Sensor

Sold Separately
See page 32

6 SQ. IN. DISPLAY WIRELESS UNIVERSAL WIRELESS THERMOSTAT SYSTEM

Universal – Compatible with Single and Multi-Stage, Heat Pump and Heat Pump with Dual Fuel Applications. Locate Comfort Interface and Remote Sensors for Optimum Temperature Sensing

FEATURES

- Choice of dual fuel control with wireless temperature sensor or by Dual Fuel Logic program in Comfort Interface.
- Color-coded LEDs on Equipment Control validates system wiring.
- Reduces hot and cold spots – add up to 4 wireless sensors (3 indoor and 1 outdoor).
- Meets California Building Code, Title 24.

DIMENSION

Comfort Interface . . . . . 4 1/2″H x 6 1/2″W x 1 1/4″D
Equipment Control . . . . . 6 1/2″H x 6 1/2″W x 1 1/2″D

SPECIFICATIONS

Electrical Rating:
Hardwire . . . . . 20-30 VAC, NEC Class II 50/60Hz or DC
Terminal Load . . . . . 1.5 A per terminal,
2.5 A maximum load (all terminals combined)
Setpoint Range . . . . . 45 to 99°F (7 to 37°C)
Rated Differential: . . . . . Heat 0.6°F; Cool 1.2°F
Operating Ambient . . . . . 32 to +105°F (0 to +41°C) – Interface
-30 to +150°F (-34 to 66°C) – Control
Operating Humidity Range . . . . . 90% non-condensing maximum

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F145RF-1600 — Wireless Remote Sensor. See page 32
- F61-2600 — Wallplate 8 1/8″W X 5 3/8″H
- F61-2634 — Wallplate 6 1/2″W x 5″H
- F29-0198 — Locking Thermostat Guard - Clear Plastic
- F29-0220 — Locking Thermostat Guard - Metal, Solid Base
- F29-0222 — Locking Thermostat Guard - Metal, Ring Base

UNIVERSAL WIRELESS STAGING/HEAT PUMP THERMOSTAT SYSTEM

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features											Display Size (Square inches)	Terminals
Stages Heat/Cool by System			Program Options	Periods per day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dihumidity		Auto Changeover	Programmable Fan	Energy Aware	Comfort Alert® A.C. System Protection (P)-Passive/(A)-Active§	Dual Fuel Heat Pump Control (L)-Logic/(O)-Outdoor Sensor	Dual Fuel Heat Stages HP/Gas	Aux. Heat Lockout with Outdoor Sensor◆	Keypad Lockout (T)-Total/(P)-Partial	Setpoint Temperature Limits Adjustable Max./Min.	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Remote Temperature Sensing		R, RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, DHM, DHM2, HM, HM2
1/1	2/2	4/2	7, Ø	4, 2, Ø	**1F98EZ-1621 Wireless Easy Install™**	✓			H,D	B	✓	★	✓	P	L, 0‡	2/2	✓	TP	✓	3+1	1●	6.0	

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired
B = Battery Powered
PA = Power Saving Battery Assist

◆ When used with an outdoor sensor provides option to lock out auxiliary heat above selected outdoor temperature.

★ Occupancy fan option with selectable pre-purge (1-3 hours)

● Up to three indoor and one outdoor wireless sensors can be used – order F145-1600 (sold separately)

‡ With an outdoor sensor installed you can select an outdoor temperature to turn the heat pump off and switch to the gas furnace when it's too cold outside for the pump to be efficient.

BLUE 12″ TOUCHSCREEN THERMOSTATS

White-Rodgers

24 VOLT

1F95-1291

1F95-1277

F145-1328
Indoor Remote Sensor

F145-1378
Outdoor Remote Sensor

BLUE 12″ TOUCHSCREEN - UNIVERSAL AND SINGLE STAGE THERMOSTATS - 12 SQ. IN. DISPLAY

Blue Models Offer the Ultimate in Comfort, Features, Performance and Visibility

FEATURES

- Universal models quickly configure for single stage, multi-stage or heat pump and heat pump dual fuel systems - programmable or non-programmable.
- **Humidity control** offers humidification/dehumidification.
- **Commercial** offers occupied damper or economizer control.
- **Staging** control for nearly all conventional and heat pump systems.
- **Single stage** model compatible with all single stage systems low voltage, 750 mV and 3-wire zone systems.
- Heat Pump dual fuel option eliminates the need for a fossil fuel kit.
- Automatic changeover option.
- Program fan options.
- Keypad lockout and setpoint temperature limit options.
- Indoor remote sensor for averaging option.
- Outdoor remote sensor option. Add to Universal models for outdoor temp reading or, on select models, dual fuel balance point and outdoor thermostat functions.
- Dual power – hardwire and/or battery or Tripower – hardwire and/or battery with system assist.

SPECIFICATIONS

Electrical Rating:			
Hardwire	20-30 VAC, NEC Class II 50/60Hz		
Battery Power	mV to 30 VAC, NEC Class II, 50/60 Hz or DC		
Terminal Load	1.5 A per terminal, 2.5 A maximum all terminals combined		
Setpoint Range	45 to 99°F (7 to 37°C)		
Rated Differentials:	Fast	Med.	Slow
Heat (Single Stage/Multi-Stage)	0.4°F	0.6°F	1.7°F
Cool (Single Stage/Multi-Stage)	0.9°F	1.2°F	1.7°F
Heat Pump	0.9°F	1.2°F	1.7°F
Emer. Heat	0.6°F		1.7°F
Operating Ambient	32 to +105°F (0 to +41°C)		
Operating Humidity	90% non-condensing max.		
Shipping Temperature Range	-4 to +150°F (-20 to 65°C)		
Dimension	$4^{9}/_{16}$″H x $5^{13}/_{16}$″W x $1^{13}/_{16}$″D		

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F145-1328 — Indoor remote sensor. See page 33
- F145-1378 — Outdoor remote sensor. See page 33
- F61-2600 — Wallplate $8^{1}/_{8}$″W x $5^{3}/_{8}$″H
- F61-2634 — Wallplate $6^{1}/_{2}$″W x 5″H (or order F61-2648 – 6 pack of F61-2634)
- F29-0198 — Locking Thermostat Guard - Clear Plastic
- F29-0220 — Locking Thermostat Guard - Metal, Solid Base
- Additional Thermostat Guards — see pages 34–35 for quick selection options

UNIVERSAL STAGING/HEAT PUMP THERMOSTATS – BLUE 12″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications					Thermostat Power Source*	Selectable Performance Features								Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Economizer	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Dual Fuel Heat Pump Control (L)-Logic / (O)-Outdoor Sensor	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1	2/2	4/2	7, 5+1+1, Ø	4, 2, Ø	**1F95-1291** Humidity Control	✓	✓	✓		H, D	B, H, PA	✓	✓	✓	L, O‡	T, P	✓	1+1	1▼	12.0	✓***	✓	P	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6, +, S, -, DHM, HM
1/1	2/2	4/2	7, 5+1+1, Ø	2, Ø	**1F95-1280** Commercial	✓	✓	✓	✓		B, H, PA	✓	✓	✓	L, O‡	T, P	✓	1+1	1▼	12.0	✓***	✓	P	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6, +, S, -, A1
1/1	2/2	3/2◙	7, 5+1+1, Ø	4, 2, Ø	**1F95-1277** Universal	✓	✓	✓			B, H	✓	✓	✓	L, O‡	T, P	✓	1+1	1▼	12.0	✓***	✓	P	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6, +, S, -

SINGLE STAGE THERMOSTAT – BLUE 12″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications					Thermostat Power Source*	Selectable Performance Features								Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Economizer	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Dual Fuel Heat Pump Control (L)-Logic / (O)-Outdoor Sensor	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1		2/1	7, 5+1+1, Ø	4, 2, Ø	**1F97-1277**	✓	✓	✓			B, H	✓	✓	✓	L, O‡	T, P	✓	1+1	1▼	12.0	✓***	✓	P	RC, RH, C, W/E, Y, O/B, G, L, 6, +, S, -

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired
B = Battery Powered
PA = Power Saving Battery Assist

‡ If F145-1378 outdoor remote sensor is not used, install manufacturers fossil fuel kit for Dual Fuel applications

*** Optional Continuous Display Light w/ Hardwire connection

▼ Only one (1) remote sensor may be used – either Indoor or Outdoor

◙ 4/2 on Dual Fuel using Outdoor Remote Sensor

TECH

PAGES 131–138

TECHNICAL HELP

1F95EZ-0671

1F95-0671

1F95-0680

F145-1328
Indoor Remote Sensor

F145-1378
Outdoor Remote Sensor

BLUE 6″ - UNIVERSAL COMMERCIAL AND EASY READER THERMOSTATS - 6 SQ. IN. DISPLAY

Blue 6″ Models Offer More Premium Features than Higher Priced Competitive Touchscreen Models

FEATURES

- Universal models quickly configure for single stage, multi-stage or heat pump and heat pump duel fuel systems - programmable or non-programmable
- **Easy Reader model is easy to read and easy to use.**
- **Commercial** offers occupied damper or economizer control and locking cover and subbase
- **Staging** control for nearly all conventional and heat pump systems
- **Single stage** model compatible with all single stage systems low voltage, 750 mV and 3-wire zone systems. 1F97-0671 not pictured.
- Heat Pump dual fuel option eliminates the need for a fossil fuel kit.
- Automatic changeover option.
- Program fan options.
- Keypad lockout and setpoint temperature limit options.
- Indoor remote sensor for averaging option.
- Outdoor remote sensor option on select Universal models for outdoor temperature reading and dual fuel balance point or outdoor thermostat function (select models)
- Dual power - hardwire and/or battery or Tripower - hardwire and/or battery with system assist.

SPECIFICATIONS

Electrical Rating:		
Hardwire	20-30 VAC, NEC Class II 50/60Hz	
Battery Power	mV to 30 VAC, NEC Class II, 50/60 Hz or DC	
Terminal Load	1.5 A per terminal, 2.5 A maximum all terminals combined	
Setpoint Range	45 to 99°F (7 to 37°C)	
Rated Differentials, Universal Models:	Fast	Slow
Heat(Single Stage/Multi-Stage)	0.6°F	1.2°F
Cool (Single Stage/Multi-Stage)	1.2°F	1.7°F
Pump	1.2°F	1.7°F
Emer. Heat	1.2°F	1.7°F
Rated Differentials - Single Stage Models:	Fast	Slow
Heat	0.6°F	1.2°F
Cool	1.2°F	1.7°F
Operating Ambient	32 to +105°F (0 to +41°C)	
Operating Humidity	90% non-condensing max.	
Shipping Temperature Range	-4 to +150°F (-20 to 65°C)	
Dimension	$4^{3}/_{16}$″H x $6^{1}/_{2}$″W x $1^{5}/_{8}$″D ($1^{7}/_{8}$″D – Commercial model)	

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F145-1328 — Indoor Remote Sensor
- F145-1378 — Outdoor Remote Sensor
- F61-2600 — Wallplate $8^{1}/_{8}$″W X $5^{3}/_{8}$″H
- F61-2634 — Wallplate $6^{1}/_{2}$″W x 5″H (or order F61-2648 – 6 pack of F61-2634)
- F29-0198 — Locking Thermostat Guard - Clear Plastic
- F29-0220 — Locking Thermostat Guard - Metal, Solid Base
- Additional Thermostat Guards — see pages 34–35 for quick selection options

±1° ACCURACY

UNIVERSAL STAGING/HEAT PUMP THERMOSTATS – BLUE 6″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features								Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Dual Fuel Heat Pump Control (L)-Logic / (O)-Outdoor Sensor	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1	2/2	4/2	7, 5+1+1, Ø	4, 2, Ø	**1F95-0680** Universal Commercial	✓	✓	✓		B, H, PA	✓	✓	✓	O‡	T, P	✓	1 + 1	1▼	6.0	✓***	✓	P	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6, +, S, -, A1
1/1	2/2	4/2	7, 5+1+1, Ø	4, 2, Ø	**1F95-0671** Universal	✓	✓	✓		B, H, PA	✓	✓	✓	O‡	T, P	✓	1 + 1	1▼	6.0	✓***	✓	P	RC, RH, C, G, Y, Y2, W/E, W2, O/B, L, 6, +, S, -
1/1	2/2	4/2	Ø, 7	2, 4	**1F95EZ-0671** Easy Reader	✓	✓	✓		B, H, PA	✓	✓	✓	L		✓			6.0	✓***	✓	P	RC, RH, C, W/E, W2, Y, Y2, O/B, G, L, 6,

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired
B = Battery Powered
PA = Power Saving Battery Assist

‡ If F145-1378 outdoor remote sensor is not used, install manufacturers fossil fuel kit for Dual Fuel applications

*** Optional Continuous Display Light w/ Hardwire connection

▼ Only one (1) remote sensor may be used – either Indoor or Outdoor

TECH

PAGES 139–146

TECHNICAL HELP

1F85-0422

1F80-0471

BLUE 4″ UNIVERSAL AND SINGLE STAGE THERMOSTATS – 4 SQ. IN. DISPLAY

Premium Features for Staging or Single Choices – for Optimum System Control

FEATURES

- Available in Universal (Single Stage, Multi-Stage, Heat pump) or Single Stage Models.
- Programmable 7-Day, 5/1/1 Day, 5/2 Day, 0-Day or Non-Programmable.
- Gas, Oil, Electric, mV and 2 or 3-Wire Zone compatible.
- Automatic Heat/Cool changeover option.
- Keypad lockout and temperature limit options.
- Dual power – hardwired and/or battery powered.
- Fits vertical or horizontal junction box.
- Air filter change indicator option.
- Spanish language display models available.

SPECIFICATIONS

Electrical Rating:			
Hardwire	20-30 VAC, NEC Class II 50/60Hz		
Battery Power	mV to 30 VAC, NEC Class II, 50/60 Hz or DC		
Terminal Load Staging Models	1.5 A per terminal, 2.5 A maximum all terminals combined		
Terminal Load Single Stage Models	1.0 A per terminal, 1.5 A maximum all terminals combined		
Setpoint Range	45 to 99°F (7 to 37°C)		
Rated Differentials, Universal Models:	Fast	Med.	Slow
Heat(Single Stage/Multi-Stage)	0.4°F	0.6°F	1.7°F
Cool (Single Stage/Multi-Stage)	0.9°F	1.2°F	1.7°F
Heat Pump	0.9°F	1.2°F	1.7°F
Emer. Heat	0.6°F		1.7°F
Rated Differentials - Single Stage Models:	Fast	Med.	Slow
Heat (Single Stage/Multi-Stage)	0.4°F	0.6°F	1.7°F
Cool (Single Stage/Multi-Stage)	1.2°F		1.7°F
Heat Pump	1.2°F		1.7°F
Operating Ambient	32 to +105°F (0 to +41°C)		
Operating Humidity	90% non-condensing max.		
Shipping Temperature Range	-4 to +150°F (-20 to 65°C)		
Dimension	$3\frac{7}{16}$″H x $4\frac{7}{16}$″W x $1\frac{1}{4}$″D $3\frac{7}{8}$″H x $5\frac{1}{8}$″W x $1\frac{1}{4}$″D – (Universal models)		

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F61-2634 — Wallplate 6½″W X 5″H, for use with or without horizontal junction box (included with thermostat)
- F61-2648 — Wallplate (6 pack of F61-2634 above)
- Thermostat Guards — see pages 34–35 for quick selection

UNIVERSAL STAGING/HEAT PUMP THERMOSTATS – BLUE 4″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods per day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidity		Auto Changeover	Programmable Fan	Energy Mgt. Aware	Keypad Lockout (T)-Total/(P)-Partial	Set-Point Temperature Limits Adjustable Max/Min.	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square Inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1	2/2	3/2	7, 5+1+1, 5+2, Ø	4, Ø	**1F85-0477** Universal	✓	✓	✓		B, H	✓		✓	T	✓			4.0	✓***	✓	P	RC, RH, C, W/E, W2,Y, Y2, O/B, G, L, 6
1/1	2/2	2/1	5+1+1, 5+2, Ø	4, Ø	**1F85-0422** Universal	✓	✓	✓		B, H	✓		✓	T	✓			4.0	✓***	✓	P	RC, RH, C, W/E,W2,Y,Y2, O/B, G, L, 6
1/1	2/2	2/1	5+1+1, 5+2, Ø	4, Ø	**1F85ST-0422** Universal**	✓	✓	✓		B, H	✓		✓		✓			4.0	✓***	✓	P	RC, RH, C, W/E, W2,Y, Y2, O/B, G, L, 6
1/1	2/2	3/2	Ø	Ø	**1F83-0471** Universal	✓	✓	✓		B, H	✓			T	✓			4.0	✓***	✓	P	RC, RH, C, W/E, W2,Y, Y2, O/B, G, L, 6
1/1	2/2	2/1	Ø	Ø	**1F83-0422** Universal	✓	✓	✓		B, H	✓			T	✓			4.0	✓***	✓	P	RC, RH, C, W/E, W2,Y, Y2, O/B, G, L, 6

** ST model is Spanish language display

SINGLE STAGE THERMOSTATS – BLUE 4″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods per day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidity		Auto Changeover	Programmable Fan	Energy Mgt. Aware	Keypad Lockout (T)-Total/(P)-Partial	Set-Point Temperature Limits Adjustable Max/Min.	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square Inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1		1/1	5+1+1, 5+2, Ø	4, Ø	**1F80-0471**	✓	✓	✓		B, H	✓		✓		✓			4.0	✓***	✓	P	RC, RH, C, W, Y, O/B, G
1/1		1/1	5+1+1, 5+2, Ø	4, Ø	**1F80ST-0471****	✓	✓	✓		B, H	✓		✓					4.0	✓***	✓	P	RC, RH, C, W, Y, O/B, G
1/1		1/1	Ø	Ø	**1F86-0471**	✓	✓	✓		B, H	✓		✓		✓			4.0	✓***	✓	P	RC, RH, C, W, Y, O/B, G
1/1		1/1	Ø	Ø	**1F86ST-0471****	✓	✓	✓		B, H	✓							4.0	✓***	✓	P	RC, RH, C, W, Y, O/B, G

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired
B = Battery Assist Powered

** ST models are Spanish language display
*** Optional Continuous Display Light w/ Hardwire connection

TECH

PAGES 147–154

TECHNICAL HELP

1F82-0261

1F86-0244

1F86EZ-0251
Easy Set Single Stage

BLUE 2″ HEAT PUMP AND SINGLE STAGE THERMOSTATS – 2 SQ. IN. DISPLAY

Heat Pump or Single Stage Models, Easy to See Display Characters
Offering a Step Up from 70 Series

FEATURES

- Heat Pump or Single Stage models.
- Easy set models feature simple **Home-Sleep-Away** preset buttons.
- Programmable, 5/1/1 Day, 24 Hour, 0-Day or Non-Programmable.
- Gas, Oil, Electric, mV.
- Cool Savings™ saves energy during peak A/C demand periods.
- Lighted display for easier low light viewing.
- Dual power – hardwired and/or battery powered.
- Fits horizontal junction box.
- Air filter change indicator option.

SPECIFICATIONS

Electrical Rating:			
Hardwire	20-30 VAC, NEC Class II 50/60Hz		
Battery Power	mV to 30 VAC, NEC Class II, 50/60 Hz or DC		
Terminal Load Staging Models	1.5 A per terminal, 2.5 A maximum all terminals combined		
Terminal Load Single Stage Models	1.0A per terminal 1.5A maximum all terminals combined		
Setpoint Range	45 to 90°F (7 to 32°C)		
Rated Differentials, Universal Models:	Fast	Med.	Slow
Heat (Single Stage)	0.8°F		1.2°F
Cool (Single Stage)	1.2°F		1.7°F
Heat Pump	1.2°F		1.7°F
Aux./Emer Heat	0.8°F		1.2°F
Rated Differentials, Single Stage Models:	Fast	Med.	Slow
Heat	0.6°F	0.8°F	1.2°F
Cool	1.2°F		1.7°F
Heat Pump	0.8°F		1.2°F
Operating Ambient	32 to +105°F (0 to +41°C)		
Operating Humidity	90% non-condensing max.		
Shipping Temperature Range	-4 to +150°F (-20 to +65°C)		
Dimension	3¾″H x 4¾″W x 1½″D		

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F61-2634 — Wallplate 6½″W X 5″H, for use with or without horizontal junction box
- F61-2648 — Wallplate (6 pack of F61-2634 above)
- Thermostat Guards — see pages 34–35 for quick selection

HEAT PUMP THERMOSTATS – BLUE 2″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features			Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Memory Back-Up (P)-Permanent / (B)-Battery	
		2/1	5+1+1	4	**1F82-0261**	✓		✓		B, H			✓					2.0	✓***	P	R, C, W2, Y, O/B, G, L
		2/1	**Easy Set** Non-Programmable – Home-Sleep-Away		**1F89EZ-0251**	✓		✓		B, H								2.0	✓***	P	R, C, W2, Y, O/B, G, L
		2/1	Ø	Ø	**1F89-0211**	✓		✓		B, H								2.0	✓***	P	R, C, W2, Y, O/B, G, L

SINGLE STAGE THERMOSTATS – BLUE 2″ THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features			Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1		1/1	5+1+1	4	**1F80-0261**	✓		✓		B, H			✓					2.0	✓***	P	R, C, W, Y, O/B, G
1/1		1/1	24 Hours	4	**1F80-0224**	✓		✓		B, H			✓					2.0	✓***	P	R, C, W, Y, O/B, G
1/1		1/1	**Easy Set** Non-Programmable – Home-Sleep-Away		**1F86EZ-0251**	✓		✓		B, H								2.0	✓***	P	R, C, W, Y, O/B, G
1/1		1/1	Ø	Ø	**1F86-0244**	✓		✓		B, H								2.0	✓***	P	R, C, W, Y, O/B, G

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired

B = Battery Powered
*** Optional Continuous Display Light w/ Hardwire connection

TECH

PAGES 155–158

TECHNICAL HELP

1F85-277

1F80-361

1F86-344

CLASSIC 80 SERIES UNIVERSAL / HEAT PUMP AND SINGLE STAGE THERMOSTATS

Residential and Light Commercial – Single Stage, Multi-Stage and Heat Pump Applications. Classic 80 Series Thermostats are Packed with Premium Features

FEATURES

- Choice of battery powered, dual power or hardwired models.
- Fossil fuel or electric heat compatible.
- Large LCD with backlight.
- Permanent program retention during power loss.
- Configuration menu allows keypad selection of options.
- Selectable Celsius or Fahrenheit temperature display.
- Selectable Energy Management Recovery (1F85-277 / 1F80-361 / 1F87-361 / 1F82-261).

SPECIFICATIONS

Electrical Rating Single Stage:	
Dual Power or Battery Power Model	mV to 30 VAC, NEC Class II, 50/60 Hz or DC
Input-Hardwire Model	20 to 30 VAC
Electrical Rating Staging	20 to 30 VAC, NEC Class II
Terminal Load	1.0 A per terminal, 1.5 A maximum all terminals combined
Setpoint Range	45 to 90°F (7 to 32°C)
Rated Differential (Single Stage)	Heat 0.6° or 1.5°F Cool 1.2°F
Rated Differential (Multi-Stage)	Heat 0.6° or 1.5°F Cool 1.2°F
Rated Differential (Heat Pump)	Heat & Cool 0.75° or 1.2°F
Operating Ambient	32 to +105°F (0 to +41°C)
Operating Humidity	90% non-condensing max.
Shipping Temperature Range	-4 to +150°F (-20 to +65°C)
Dimensions Thermostat	$3\frac{7}{8}$″H x 6″W x $1\frac{3}{16}$″D

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F61-2500 — Wallplate $4\frac{5}{8}$″H x $7\frac{5}{8}$″W for all 1F80's (except Blue)
  Includes adapter plate for mounting to horizontal or vertical junction box
- Thermostat Guards — see pages 34–35

UNIVERSAL STAGING/HEAT PUMP THERMOSTATS – CLASSIC 80 SERIES THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1	2/2	3/2	7, 5+1+1 Ø	4, 2, Ø	**1F85-277** Universal	✓		✓		B, H	✓		✓	T	✓			2.2	✓***		P	R, C, E/W1, W2, Y1, Y2, O/B, G, L
		2/1	5+1+1	4	**1F82-261** Heat Pump	✦				H			✓					1.8	✓***		P	R, C, W2, E, Y, O/B, G, L
		2/1	Ø	Ø	**1F89-0211** Heat Pump	✦				H								1.8	✓***		P	R, C, W2, E, Y, O/B, G, L

SINGLE STAGE THERMOSTATS – CLASSIC 80 SERIES THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features				Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Cool Savings	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1		1/1	7-day	4	**1F87-361**	✓		✓		B, H			✓					2.2	✓		P	RC,RH, C, W, Y,O, B, G
1/1		1/1	5+1+1	4	**1F80-361**	✓		✓		B, H			✓					2.2	✓		P	RC,RH, C, W, Y,O, B, G
1/1		1/1	Ø	Ø	**1F86-344**	✓		✓		B, H								2.2	✓		P	RC,RH, C, W, Y,O, B, G

* H = Hardwired (Requires Common)
B, H = Battery Powered or Hardwired
B = Battery Powered

✦ Heat Pump for Stage 1, and Gas / Oil / Electric for 2nd stage / Emergency
*** Optional Continuous Display Light w/ Hardwire connection

TECH
PAGES 159–161

TECHNICAL HELP

1F72-151

1F78-151

1E78-151

1E78-144

70 SERIES HEAT PUMP – SINGLE STAGE THERMOSTATS

Residential Single Stage and Heat Pump Applications.
70 Series are the Perfect Upgrade from Mechanical Thermostats.
Covers Wall Marks Left by Most Mechanical Thermostats the Need for an Extra Wall Plate

FEATURES

- Fossil fuel or electric compatible.
- Large LCD with backlight.
- Selectable Celsius or Fahrenheit temperature display.
- Includes B/O terminals.
- Electronic accuracy.

SPECIFICATIONS

Electrical Rating:		
Hardwire	20 to 30 VAC, NEC Class II, 50/60 Hz	
Battery Power	20 to 30 VAC, NEC Class II	
Terminal Load	1.0 A per terminal, 1.5 A maximum all terminals combined	
Setpoint Range	45 to 90°F (7 to 32°C)	
Rated Differentials - Single Stage Models:	Fast	Slow
Heat (Single Stage)	0.8°F	1.5°F
Cool (Single Stage) Fixed	1.2°F	
Heat Pump	1.2°F	1.5°F
Aux./Emer. Heat	0.8°F	1.2°F
Operating Ambient	32 to +105°F (0 to +41°C)	
Operating Humidity	90% non-condensing max.	
Shipping Temperature Range	-4 to +150°F (-20 to 65°C)	
Dimensions	$3^{13}/_{16}$″H x $5^{1}/_{8}$″W x $1^{1}/_{8}$″D – (1F78) $5^{5}/_{16}$″H x $3^{3}/_{16}$″W x $1^{1}/_{8}$″D – (1E78)	

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F61-2510 — Wallplate for 1F models with adaptor for horizontal or vertical junction box $6^{1}/_{2}$″W x $4^{1}/_{2}$″H
- F61-2593 — Wallplate for 1D70, 1E70 models with adaptor for horizontal or vertical junction box $4^{1}/_{2}$″W x $6^{19}/_{32}$″H
- Thermostat Guards — see pages 34–35

HEAT PUMP THERMOSTATS – 70 SERIES THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features			Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Memory Back-Up (P)-Permanent / (B)-Battery	
		2/1	5+2	4	**1F72-151**	✦				H			✓					1.2	✓***	P	R, C, W2, EY, O/B, G, L
		2/1	Ø	Ø	**1F79-111**	✦				H								1.2	✓***	P	R, C, W2, EY, O/B, G, L

SINGLE STAGE THERMOSTATS – 70 SERIES THERMOSTATS

Single Stage	Multi-Stage	Heat Pump	Programs		Model	Applications				Thermostat Power Source*	Selectable Performance Features							Comfort and Convenience Features			Terminals
Stages Heat/Cool by System			Program Options	Periods Per Day Options	Model Number	Gas / Oil / Electric	3 Wire Zone Valve	Millivolt Compatible	Humidity Control (H)-Humidity / (D)-Dehumidify		Auto Changeover	Programmable Fan	Energy Mgt. Recovery	Keypad Lockout (T)-Total / (P)-Partial	Set-Point Temperature Limits Adjustable Max/Min	Indoor Remote Sensors Max. Number + Thermostat Average and/or Weighted	Outdoor Remote Sensor	Display Size (Square inches)	Lighted Display	Memory Back-Up (P)-Permanent / (B)-Battery	
1/1		1/1	5+2	4	**1F78-151×**	✓		✓		B			✓					1.2	✓***	P	RC,RH, W, Y,O, B, G
1/1		1/1	Ø	Ø	**1F78-144×**	✓		✓		B								1.2	✓***	P	RC,RH, W, Y,O, B, G
1/1			Ø	Ø	**1E78-140**	✓		✓		B								1.2	✓***	P	RH, W

* H = Hardwired (Requires Common)
B = Battery Powered

✦ Heat Pump for Stage 1, and Gas / Oil / Electric for 2nd stage / Emergency
× Available in vertical style order 1E78-144/151
*** Optional Continuous Display Light w/ Hardwire connection

TECH

PAGES 162–164

TECHNICAL HELP

1E30N-910

1F56N-444

1F56N-361

MECHANICAL THERMOSTATS – MERCURY FREE

Replaces Hundreds of White-Rodgers and Competitive Models. Enclosed Snap Action Contacts for Reliable, Economical and Environmentally Friendly Control

FEATURES

- Mercury free snap-action contacts with dust cover.
- Resistant to vibration.
- Mounts to wall or junction box.
- Built in bimetal thermometer.
- Classic White color.
- Horizontal and Vertical models.
- 24 Volt, 750 mV and 3 - wire zone options. See table below.

SPECIFICATIONS

Electrical Rating	20-30 VAC, NEC Class II 50/60Hz
Heating	0.15 to 1.2 Amps
Cooling	0.15 to 1.2 Amps
Heat Anticipator	Adjustable from 0.15 to 1.2 Amps
Cool Anticipator	Fixed
Differential Heat	1°F
Differential Cool	1.5°F
Setpoint Range	50°F to 90°F (10°C to 32°C)
Operating Humidity Range	0-90% non-condensing
Dimensions	$4^1/_2$″H x $2^3/_4$″W x $1^1/_2$″D – 1E (Vertical) $4^1/_2$″H x $3^1/_4$″W x $1^5/_8$″D – 1E with Heat / Cool Subbase $2^3/_4$″H $4^1/_2$″W x $1^1/_2$″D – 1F (Horizontal) $3^1/_4$″H x $4^1/_2$″W x $1^5/_8$″D – 1F with Heat / Cool Subbase

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F61-2301 — Wallplate $5^5/_8$″W x $5^3/_4$″H with adapter plate to horizontal or vertical junction box
- Thermostat Guards — see pages 34–35

TECH PAGE 165

TECHNICAL HELP

Configuration/Wiring . . . . . See page 165

Model Number	Orientation Vertical, Horizontal	Applications: Heat Only	Cool Only	Heat-Cool	Conventional Gas / Oil / Electric	Electric Strip Heat	Heat Pump (No Aux.)	3-Wire Zone Valve	Millivolt Compatible	Options: Includes Optional F92-0563 Kit for Temperature Locking or Limiting	Includes Switched Subbase Heat-Off-Cool & Fan Auto-On	Includes Switched Subbase Heat-Off	Includes Wallplate Heat Only (No System or Off Switch)	Includes Wallplate Cool Only or 3-Wire Zone (No System or Off Switch)	Control Range	Terminals
1E30N-910	V	✓			✓				✓				✓		50 to 90°F	R, W
1E50N-301	V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	50 to 90°F	R, W
1E56N-444	V	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	50 to 90°F	RC, RH, W, Y, O, B, G, A
1F56N-444	H	✓			✓				✓				✓		50 to 90°F	RC, RH, W, Y, O, B, G, A
1E30N-311	V	✓			✓				✓				✓		50 to 90°F / 10 to 32°C	R, W
1E50N-303	V	✓			✓				✓	✓		✓	✓		50 to 90°F / 10 to 32°C	R, W
1E56N-361	V	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	50 to 90°F / 10 to 32°C	RC, RH, W, Y, O, B, G, A
1F56N-361	V	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	50 to 90°F / 10 to 32°C	RC, RH, W, Y, O, B, G, A

Indicates Canadian Model Number: call 1-800-305-6953 to order

1C20-101

1C26-101

ECONOMY MECHANICAL THERMOSTATS – MERCURY-FREE

Reliable Performance in an Attractive Design

FEATURES

- Rugged snap-action contacts.
- Adjustable heat anticipator.
- Bi-Metal thermometer.
- Heat / Cool model includes switching subbase.
- Heat / Cool model compatible with Electric Heat systems.

SPECIFICATIONS

Anticipation Rating, Heating	Adjustable from 0.15 to 1.2 Amps
Anticipation Rating, Cooling	Fixed
Differential, Heating	2°F (1.1°C)
Differential, Cooling	4°F (2.2°C)
Dimensions	$3\frac{3}{4}$″H x $2\frac{7}{8}$″W x $1\frac{1}{2}$″D
Dimensions, Switching Models	$3\frac{3}{4}$″H x $3\frac{1}{8}$″W x $1\frac{5}{8}$″D
Electrical Rating	mV to 30V, 50/60 Hz or DC

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- Wallplate F61-2499 — $5\frac{1}{8}$″H x 5″W
- Thermostat Guards — see pages 34–35

TECHNICAL HELP

Configuration/Wiring . . . . . See page 165

TECH PAGE 165

Model Number	Typical Application	Stages Heat / Cool	System Switch	Fan Switch	Contacts	Anticipation Heat / Cool	Range	Shape	Terminals
1C20-101	Heat Only ③	1	None ①	None	Snap-Action	Adjustable	50-90°F (10-32°C)	Vertical	R, W
1C20-102	Heat Only	1	None	None	Snap-Action	Adjustable	50-90°F (10-32°C)	Vertical	R, W
1C21-101	Cool Only	1	None	None	Snap-Action	Fixed	50-90°F (10-32°C)	Vertical	R, Y
1C26-101	Heat / Cool ② ③	1 / 1	Heat-Off-Cool	Auto-On	Snap-Action	Adjustable / Fixed	50-90°F (10-32°C)	Vertical	RC, RH, W, Y, O, B, G, A

① Lowest temperature setting is “OFF” position
② Includes optional “A” terminal connection for Electric Heat systems that require the thermostat to energize the Blower (G terminal) on a call for heat
③ Includes F61-2499 wall mounting plate to cover marks left by previous thermostat

	Range Max.	Range Min.	Differential Max.	Differential Min.	Model	Element	Capillary Length	Switch Action	Page Number
HEATING	80°F	40°F	2°F	2°F	**1G65-641**	Thermostat Snap Action		Open on Rise	28
	80°F	40°F	2°F	2°F	**1G66-641**	Thermostat Snap Action		Open on Rise	28
	85°F	40°F	1°F	1°F	**1A65-641**	Hydraulic Knob		Open on Rise	28
	85°F	40°F	1°F	1°F	**1A65W-641**	Hydraulic Knob		Open on Rise	28
	85°F	40°F	1°F	1°F	**1A66-641**	Hydraulic Knob		Open on Rise	28
	85°F	40°F	1°F	1°F	**1A66W-641**	Hydraulic Knob		Open on Rise	28
	85°F	55°F	2°F	2°F	**152-9**	Thermostat		Open on Rise	32
	95°F	55°F	2°F	2°F	**152-10**	Thermostat		Open on Rise	32
COOLING	90°F	20°F	20°F	3°F	**201-8**	Self Contained		Close on Rise	31
HEAT & COOL	90°F	36°F	1.5°F	1.5°F	**1A10-651**	Hydraulic Knob		SPDT	29
	90°F	36°F	1.5°F	1.5°F	**1A11-2**	Hydraulic Knob		SPDT	30
	90°F	36°F	1.5°F	1.5°F	**1A16-51**	Hydraulic Knob		SPDT	29
	95°F	55°F	3°F	3°F	**179-1**	Thermostat		SPDT	31

U.S. Models only

1E65-144

LINE VOLTAGE DIGITAL THERMOSTAT

Line Voltage Digital Thermostats for Applications Covering 150W Up to 4000W. Choice of Programmable or Non-programmable Models. For Electric Baseboard, Convectors and Fan-Forced Heater Applications. 1E65-144 will Also Cover Radiant Floor and Ceiling

FEATURES

- Large LCD with great contrast for greater viewing.
- 100% silent operation with optional proportional control feature.
- Selectable anticipation for ultimate performance.
- Celsius of Fahrenheit compatible.
- White color.
- Does not contain mercury.

SPECIFICATIONS

Display Resolution . . . . . 1°F (0.1°C)
Approval . . . . . C.S.A. approved

PARTS AND ACCESSORIES See end of thermostats section for additional parts and accessories

- F61-2642 – Adapter plate for universal mounting.

TECHNICAL HELP

TECH
PAGE 166

Configuration/Wiring Diagram . . . . . See page 166

Model Number	Programmable	Range	Differential	Switch Action	Display Back Light	Load
1E65-144		45° to 90°F (7°C to 32°C)	0.5˚C	Open on Rise	✓	2.0A, 120VAC, 250W 2.0A, 240VAC, 500W 16.7A, 120VAC, 2000W 16.7A, 240VAC, 4000W
1E65-151BL	✓	3˚ to 30˚C	Normal Mode: 0.05˚C Fan Mode: 0.5˚C	Open on Rise	✓	1.25A, 120VAC, 150W 1.25A, 240VAC, 300W 12.5A, 120VAC, 1500W 12.5A, 240VAC, 3000W
1E65-151	✓	3˚ to 30˚C	Normal Mode: 0.05˚C Fan Mode: 0.5˚C	Open on Rise		1.25A, 120VAC, 150W 1.25A, 240VAC, 300W 12.5A, 120VAC, 1500W 12.5A, 240VAC, 3000W
1E65-140BL		3˚ to 30˚C	Normal Mode: 0.05˚C Fan Mode: 0.5˚C	Open on Rise	✓	1.25A, 120VAC, 150W 1.25A, 240VAC, 300W 12.5A, 120VAC, 1500W 12.5A, 240VAC, 3000W
1E65-140		3˚ to 30˚C	Normal Mode: 0.05˚C Fan Mode: 0.5˚C	Open on Rise		1.25A, 120VAC, 150W 1.25A, 240VAC, 300W 12.5A, 120VAC, 1500W 12.5A, 240VAC, 3000W

Features and Benefits	Honeywell RLV310	Aube TH109	CMAC IT3000	WR 1E65
Backlight				✓
Menu-Driven Options			✓	✓
Large Display				✓
Large Characters				✓
Power @ 240 VAC	3 KW	3 KW	3 KW	4 KW
Consumption Indicator	20%	20%	10%	10%
Selectable Anticipation				✓
Adjustable Temperature Display				±3°C
Temperature Resolution	0.5°C	0.5°C	1°C	0.1°C
Warranty (yrs)	3	3	1	5

Indicates Canadian Model Number: call 1-800-305-6953 to order

1A65-641

LINE VOLTAGE BASEBOARD THERMOSTATS

Electric Heat Thermostats Used for Controlling Baseboards,Cable Heat, Glass Panels, etc.

FEATURES

- 1A66 types are a double-pole disconnect model with“OFF” position which mechanically breaks both sides of line.
- Classic White or Beige color.

SPECIFICATIONS

Dimensions. . . . . $4^{1}/_{2}$″H x $2^{3}/_{4}$″W x $1^{1}/_{4}$″D
Agency . . . . . U.L. listed and C.S.A. certified

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- F75-0176 – for locking or limiting temperatures at 66°, 69°, 72° or 75°F Temperatures limit can also be set at 60° or 63°
- Thermostat Guards — see pages 34–35

Model Number	Range	Switch Action	Load	Resistive (Non-Inductive)
1A65-641	40 to 85°F (4 to 29°C)	1.0°F	Open on Rise	22.0A, 120 VAC (2500W) 22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)
1A65W-641 ①				
1A66-641	40 to 85°F (4 to 29°C)	1.0°F	Open on Rise	22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)
1A66W-641 ①				

① **W** in model number denotes Classic White Color
REPLACES HONEYWELL T498A / B SERIES

1G65-641

1G66-633

LINE VOLTAGE BIMETAL WALL THERMOSTATS

Electric Heat Thermostats Used for Controlling Baseboards,Cable Heat, Glass Panels, etc.

FEATURES

- 1G66 types are a double-pole disconnect model with “OFF” position which mechanically breaks both sides of line.
- Classic white.

SPECIFICATIONS

Dimensions. . . . . $4^{13}/_{16}$″H x $3^{5}/_{16}$″W x $1^{7}/_{18}$″D
Agency . . . . . U.L. listed and C.S.A. certified

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- Thermostat Guards — see pages 34–35

	Model Number	Range	Switch Action	Load	Resistive (Non-Inductive)
🍁	**1G65-633**	4 to 26°C (40 to 80°F)	0.5°C	Open on Rise	22.0A, 120 VAC (2500W) 22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)
	1G65-641	40 to 80°F (4 to 26°C)	2.0°F	Open on Rise	22.0A, 120 VAC (2500W) 22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)
🍁	**1G66-633**	4 to 26°C (40 to 80°F)	0.5°C	Open on Rise	22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)
	1G66-641	40 to 80°F (4 to 26°C)	2.0°F	Open on Rise	22.0A, 240 VAC (5000W) 18.0A, 277 VAC (5000W)

1A10-651
with S29-21 subbase

1A10-651 LIGHT DUTY AND 1A16-51 HEAVY DUTY LINE VOLTAGE THERMOSTATS

For Direct Control of Fan Coils, Fans, Motor Starters, Circulator Motors, Contactors, Valves for Heating, Cooling and SPDT Applications

FEATURES

- Two dial stops for setting a maximum or minimum temperature. Minimum between 66 to 87°F. Maximum between 60 to 81°F.
- Thermostat mounts on 2″ x 4″ electrical box.
- Includes set point locking feature at 66°, 69°, 72°, 75°, 78° or 81°F
- Optional heating and cooling subbase S29-21 available.
- Beige color.
- Does not contain mercury.

SPECIFICATIONS

Dimensions without subbase, knob & case . . . . $4\frac{1}{2}$″H x $3\frac{7}{8}$″W x $1\frac{3}{4}$″D (Vertical)
Dimensions with subbase, knob & case. . . . . $5\frac{1}{8}$″H x $2\frac{7}{8}$″W x $2\frac{3}{4}$″D (Vertical)
Agency . . . . . U.L. listed and C.S.A. certified

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- Thermostats guards – see pages 34–35

Model Number	Range	Differential	Switch Action	A.C. Electrical Ratings						Pilot Duty
				Heat				Cool		
				Voltage	Full Load	Locked Rotor	Resistive (Non-Inductive)	Full Load	Locked Rotor	
1A10-651	36 to 90°F (2 to 32°C)	1.5˚F	SPDT	120	8.0A	48.0A	8.0A	8.0A	48.0A	125 VA
				240 / 277	4.0A	24.0A	8.0A	4.0A	24.0A	125 VA
1A16-51	36 to 90°F (2 to 32°C)	1.5˚F	SPDT	120	16.0A	96.0A	16.0A	8.0A	48.0A	125 VA
				240 / 277	8.0A	48.0A	16.0A	4.0A	24.0A	125 VA

Model Number	System Switching	Thermostat Used	Thermostat Style
S29-21	Cool – OFF – Heat	1A10-651, 1A16-51	Vertical

1A11-2

1A11-2 LIGHT DUTY FAN COIL THERMOSTAT

For Direct Control of Line Voltage Valves and/or Blower Motors on Fan Coil Units Featuring Manual Changeover from Heat to Cool and a 3-Speed Fan Switch, Subbase Included

FEATURES

- Mounts to a standard vertical outlet box or on a two-gang outlet box. May also be mounted on a 4″x 4″ junction box with an adapter (not provided).
- Wiring color coded for ease of installation.
- 3-speed manual fan switch: High – Medium – Low.
- System Switch: Heat – OFF – Cool. “OFF” breaks both valve and fan circuits.
- Beige color.

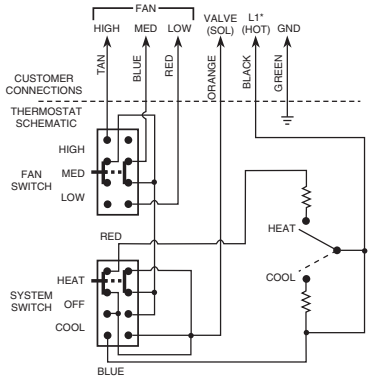
SPECIFICATIONS

Dimensions. . . . . 4½″H x 4½″W x 2¼″D
Agency . . . . . U.L. listed and C.S.A. approved

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- Thermostat Guards — see pages 34–35



*L1 is Power In
Note: Above FAN and SYSTEM switches shown in MED and HEAT positions respectively.

1A11-2
5-wire with ground, for single valve, manual heat/cool changeover

– Thermostat cycles both fan and valve
– Thermostat cycles fan only (if valve is not used tape orange lead)
– System "OFF" breaks both valve and fan circuits
– Thermostat cycles valve only with continuous fan (interchange valve and L1 leads)

Model Number	Range	Differential	Switch Action	Contact Ratings						Pilot Duty
				Motor Ratings (inductive) Full Load			Motor Ratings (inductive) Locked Rotor			120/240
				120 VAC	240 VAC	277 VAC	120 VAC	240 VAC	277 VAC	277 VAC
1A11-2	36 to 90°F (2 to 32°C)	1.5˚F	SPDT	5.5A	2.75A	2.3A	33.0A	16.5A	13.8A	120A

201-8

HEAVY DUTY SPACE THERMOSTATS FOR COOLING

Designed for Use in Garages, Factories, Warehouses and Similar Commercial and Industrial Installations

FEATURES

- Dust, moisture and vermin resistant heavy metal case.
- No leveling required – Mounts in any position.
- Quick response to temperature changes.
- Nickel plated element.
- Extra rugged switch mechanism.

SPECIFICATIONS

Dimensions. . . . . $5^{3}/_{8}$″H x $2^{1}/_{2}$″W x $2^{5}/_{16}$″D (Vertical)
Finish . . . . . Grey Color
Agency . . . . . U.L. listed and C.S.A. approved

Model Number	Range	Differential	System Action	Full Electrical Rating	Bulb Size	Capillary Length	Motor Rating (Full Load)		Resistive (Non-Inductive)	
							120 VAC	240 VAC	120 VAC	240 VAC
201-8	20 to 90°F (-7 to 32°C)	Adj. 3 to 20°F (2 to 11°C)	Close on Rise	FGH See page 222	16.0A	8.0A	5.6A	2.8A	25.0A	22.0A

179-1

LINE VOLTAGE THERMOSTAT FOR HEATING / COOLING

Control Suitable for Fans or Water Solenoids on Heating / Cooling Convectors or Any Similar Application that Requires a Heavy Duty Room Thermostat with Single Pole, Double Throw (SPDT) Switch Action

FEATURES

- Can handle many cooling installations without use of relay or motor starter.
- Heavy gauge steel case – Mounts on vertical 2″ x 4″ box or flus to wall.
- Hydraulic action element – Unaffected by motion – No leveling required.
- Dustproof case.

SPECIFICATIONS

Dimensions. . . . . 6″H x $2^{3}/_{4}$″W x $2^{1}/_{2}$″D
Finish . . . . . Grey Color
Agency . . . . . U.L. listed and C.S.A. approved

PARTS AND ACCESSORIES

See end of thermostats section for additional parts and accessories

- Thermostat Guards — see pages 34–35

Model Number	Range	Differential	Action	Full Electrical Rating	Motor Rating (Full Load)	
					120 VAC	240 VAC
179-1	55 to 95°F (13 to 35°C)	Fixed 3.0°F (1.6°C)	SPDT (Heat / Cool)	SPDT See page 222	7.4A	3.7

152-9

LINE VOLTAGE THERMOSTATS FOR HEATING

For Control of Most Line Voltage Heating Applications without Use of Relays or Motor Starters

FEATURES

- "Summer" dial position (152-9 model)
- Heavy gauge steel case – Mounts on vertical 2″ x 4″ box or flush to wall.
- Hydraulic action element – Unaffected by motion – No leveling required.
- Dustproof case.

SPECIFICATIONS

Dimensions. . . . . 4 1/2″H x 4 1/2″W x 2 1/4″D
Agency . . . . . U.L. listed and C.S.A. approved

PARTS AND ACCESSORIES See end of thermostats section for additional parts and accessories

- Thermostat Guards — see pages 34–35

Model Number	Range	Differential	Action	Full Electrical Rating	Motor Rating (Full Load)		Motor Rating (Non-Inductive)		
					120 VAC	240 VAC	120 VAC	240 VAC	277 VAC
159-9*	55 to 85°F (13 to 29°C)	Fixed 2°F (1.0°C)	Open on Rise	FG See page 222	14.0A	7.0A	25.0A	22.0A	18.0A
152-10**	40 to 90°F (4 to 32°C)	Fixed 3°F (1.6°C)	Open on Rise	FG See page 222	14.0A	7.0A	25.0A	20.0A	–

* Summer fan position control only has two terminals. It thermostatically cycles (based on temperature) unless set to the summer fan position in which case the contacts are closed.
**Locked case,concealed dial.

F145RF-1600
Wireless Remote Sensor

WIRELESS REMOTE SENSORS FOR 1F98EZ-1621 WIRELESS THERMOSTAT SYSTEM

Wireless Indoor and Outdoor Sensors for use with 1F98EZ-1621 Emerson Blue Wireless Easy Install Thermostat System

FEATURES

- Up to 3 indoor and 1 outdoor wireless remote sensors can be used on one 1F98EZ-1621 wireless thermostat system.
- Battery powered with 2 "AA" alkaline batteries

SPECIFICATIONS

Operating Temperature Range. . . . . 0° to 120°F (-18° to 49°C)
Battery . . . . . 2 "AA" Alkaline Batteries
Operating Humidity Range. . . . . 0 to 85% RH (non-condensing)
Color. . . . . Classic White
Weight . . . . . Weighs less than 0.25 lb
Dimension. . . . . 4 1/2″H x 3 1/4″W x 1 1/2″D
Maximum Distance from Interface . . . . 300′

PARTS AND ACCESSORIES See end of thermostats section for additional parts and accessories

- Thermostat Guards — see pages 34–35

WIRELESS REMOTE SENSOR (INDOOR OR OUTDOOR

Model Number	Color	Dimensions	Application
F145RF-1600	Classic White	4 1/2″ x 3 1/4″ x 1 1/2″	Compatible with Emerson Blue Wireless Easy Install Thermostat System

F145-1328
Indoor Remote Sensor

F145-1378
Outdoor Remote Sensor

WIRED REMOTE SENSORS FOR 24V THERMOSTATS

Indoor and Outdoor Sensors for Emerson Blue Digital Thermostats

FEATURES

- Digital signal output provides superior temperature control, even over long wire runs.
- No temperature variance caused by wire resistance.
- Perfect for securing the thermostat in one area or room while sensing temperature in the conditioned space.

SPECIFICATIONS

Operating Range (based on thermostat range)
Indoor Models. . . . . 40 to 99°F
Outdoor Models . . . . . -40 to 140°F
Operating Humidity Range . . . . . 0 to 90% RH (non-condensing)
Maximum Distance from Thermostat . . 300′
Recommended Wire. . . . . 20 gauge, 3-conductor cable

TECHNICAL HELP

See end of thermostats section for additional parts and accessories

Remote Sensor Wiring / Troubleshooting . . . . . See page 167–170

TECH
PAGES
167–170

INDOOR SENSOR

Model Number	Color	Dimensions	Application
F145-1328	Classic White	$2^{1}/_{8}$″ x $3^{1}/_{2}$″ x $^{3}/_{4}$″	Compatible with all Emerson Emerson / White-Rodgers Thermostats with Indoor Remote Sensor

OUTDOOR SENSOR

Model Number	Color	Dimensions	Application
F145-1378	Classic White	$2^{1}/_{8}$″ x $3^{1}/_{2}$″ x $^{3}/_{4}$″	Compatible with all Emerson Emerson / White-Rodgers Thermostats with Outdoor Remote Sensing. 12 ft. sensor lead

CONNECTION CROSS REFERENCE - THERMOSTATS & SENSORS

Old Terminal (Thermostat or Remote)	New Terminal (Thermostat or Remote)
S1	+
S2	S
S3	-

CONTRACTOR TIP: REMOTE SENSOR TROUBLESHOOTING, WIRING AND AVERAGING INFORMATION IS ON PAGES 167–170.

REMOTE TERMINAL DESIGNATIONS

Model Number	Terminal Designation Cross Reference		
F145-1328 , F145-1378	+	S	–
	Sensor Positive	**Sensor Return Signal**	**Sensor Negative**

F29-0198

F29-0231

THERMOSTAT GUARDS – PLASTIC

These Durable Thermostat Guards are Designed for Use in Offices, Churches, Restaurants and Other Public Areas to Prevent Adjustment of the Temperature by Unauthorized Personnel

FEATURES

- F29-0198 fits ALL Emerson / White-Rodgers thermostats.
- Each model furnished with one key and can be mounted vertically or horizontally.
- Clear plastic models for applications that need the thermostat visible.
- Opaque plastic models for applications that require the thermostat be kept hidden from view.
- Each model furnished with a ring and/or solid wall mounting plate.

PARTS AND ACCESSORIES

- F145-0999 – Replacement key (1)

Model Number	Description	Horizontal (Ring) Inside Dimensions			Horizontal (Solid) Inside Dimensions			BEKO
		Length	Height	Depth	Length	Height	Depth	Number
F29-0143	Clear Plastic	6 1/4″	3 3/8″	3 1/4″	6 3/8″	3 1/2″	3″	BTG-RK
F29-0198	Clear Plastic	8 1/8″	4 5/8″	3 5/8″	8 1/4″	5 3/8″	3 1/2″	BTG-UK2
F29-0225	Clear Plastic	Mounting Plate, No Ring			3 7/8″	3 1/2″	2 1/2″	BTG-EK
F29-0227	Clear Plastic	5 1/4″	4 5/8″	3 1/4″	5 1/4″	4 5/8″	3″	BTG-K
F29-0231	Clear Plastic	7 1/16″	4 1/8″	2 1/4″	7 5/8″	4 1/4″	2 1/8″	TG-DK

TECHNICAL HELP

For a list of thermostat guard choices by thermostat model number . . See chart below

	Thermostat Guard Selection	Plastic								
		Clear Plastic		Clear Plastic		Clear Plastic	Clear Plastic		Clear Plastic	
	Thermostat Guard Model Number	F29-0143		F29-0198		F29-0225	F29-0227		F29-0231	
	Base Style	Ring	Solid	Ring	Solid	Solid	Ring	Solid	Ring	Solid
MECHANICAL	1C20 Series	√	√	√	√	√	√	√	√	√
	1C30 Series	√	√	√	√	NO	√	√	√	√
	1D30 / 36 / 56 Series	√	√	√	√	NO	√	√	√	√
	1E30 / 31 / 35 / 56 Series	√	√	√	√	NO	√	√	√	√
	1F30 Series	√	√	√	√	NO	√	√	√	√
	1F51 / 56 / 57 Series	√	√	√	√	NO	√	√	√	√
	1F58-58 / 1F58-72	√	√	√	√	NO	NO	NO	√	√
	1F58-77	√	√	√	√	NO	√	√	√	√
DIGITAL	1E78 Series	NO	NO	√	√	NO	√	√	√	√
	1F70 Series	NO	NO	√	√	NO	√	√	√	√
	1F80 BLUE	√	√	√	√	NO	√	√	√	√
	1F80 Classic Series	NO	NO	√	√	NO	NO	NO	√	√
	1F90 BLUE Series	NO	NO	√	√	NO	NO	NO	NO	NO
	1F90 Series (Obsolete)	NO	NO	√	√	NO	NO	NO	√	√

F29-0193

F29-0222

THERMOSTAT GUARDS – METAL

These Durable Metal Guards are Designed for Government, Military, Industrial and Educational Applications to Prevent Adjustment of the Temperature by Unauthorized Personnel

FEATURES

- Model F29-0220 fits ALL Emerson / White-Rodgers Thermostats.
- Each model furnished with one key and can be mounted vertically or horizontally.
- Tamper-resistant design. 18 gauge cover, 22 gauge frame.
- Beige enamel finish over heavy-duty steel enclosure.
- Models available in a ring or solid base.

PARTS AND ACCESSORIES

- F145-0999 – Replacement key (1)

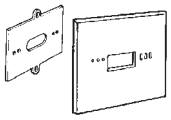
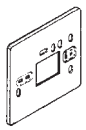
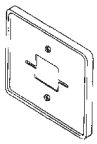
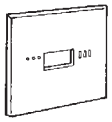
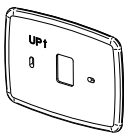
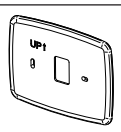
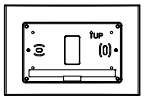
Model Number	Description	Horizontal (Ring) Inside Dimensions			Comments	BEKO Number
		Length	Height	Depth		
F29-0192	Solid base	$6^{1}/_{4}$″	$4^{3}/_{4}$″	3″	Hinged cover	BTG-54VL
F29-0193	Ring base	6″	$3^{13}/_{16}$″	$3^{1}/_{8}$″	Hinged cover	BTG-54VLW
F29-0220	Solid base	$7^{1}/_{8}$″	$4^{5}/_{8}$″	$3^{1}/_{4}$″	–	BTG-UM
F29-0222	Ring base	$6^{5}/_{8}$″	$4^{1}/_{2}$″	$3^{3}/_{8}$″	–	BTG-UWM

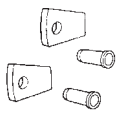
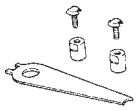
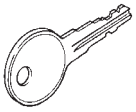
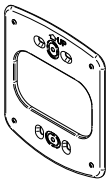
TECHNICAL HELP

For a list of thermostat guard choices by thermostat model number . . See chart below

	Thermostat Guard Selection	Metal			
		Hinged Cover		No Hinge	
	Thermostat Guard Model Number	F29-0192	F29-0193	F29-0220	F29-0222
	Base Style	Solid	Ring	Solid	Ring
MECHANICAL	1C20 Series	√	√	√	√
	1C30 Series	√	√	√	√
	1D30 / 36 / 56 Series	√	√	√	√
	1E30 / 31 / 35 / 56 Series	√	√	√	√
	1F30 Series	√	√	√	√
	1F51 / 56 / 57 Series	√	√	√	√
	1F58-58 / 1F58-72	√	√	√	√
	1F58-77	√	√	√	√
DIGITAL	1E78 Series	√	√	√	√
	1F70 Series	√	√	√	√
	1F80 BLUE	√	√	√	√
	1F80 Classic Series	NO	√	√	√
	1F90 BLUE Series	NO	NO	√	√
	1F90 Series (Obsolete)	NO	√	√	√

THERMOSTAT ACCESSORIES

Item Number	Model Number	Description
	**F16-8101**	Cover assembly for 1F78-151 programmable.
	**F61-2301**	Wallplate for low voltage standard thermostats (5⅝″H x 5¾″W). Beige. Includes adapter for mounting to vertical junction box. Same as F61-2068 except white.
	**F61-2300**	Wallplate for all 1F90 series thermostats (except Blue models), (7¼″W x 5½″H), Classic White color, includes adapter plate for mounting to horizontal or vertical junction box.
	**F61-2499**	Wallplate for 1C20-xxx/1C26-xxx (5⅝″H x 5″W)
	**F61-2500**	Wallplate for all 1F80 series thermostats (except Blue models), (7⅝″W x 4¾″H), Classic White color, includes adapter plate for mounting to horizontal or vertical junction box.
	**F61-2510**	Wallplate for all 1F70 series thermostats, 6½″W x 4½″H, Classic White color, Includes adapter plate for mounting to horizontal or vertical junction box.
	**F61-2550**	Wallplate for all 1F70 series thermostats, 6½″W x 4½″H, Classic White color, does not Include adapter plate for mounting to horizontal or vertical junction box.
	**F61-2593**	Wallplate for 1D70 or 1E70 series thermostats, 4½″W x 6$^{19}/_{32}$″H, Classic White color.
	**F61-2600**	Wallplate for 90 series Blue Touchscreen thermostats, 8⅛″W x 5⅜″H, Classic White color, for use with or without horizontal junction box.
	**F61-2634**	Wallplate for 90 and 80 series Blue thermostats, 6½″W x 5″H, Classic White color, for use with or without horizontal junction box.
	**F61-2663**	Wallplate for Sensi Wi-Fi Thermostat, white, 6¾″W x 4½″H for use with or without horizontal junction box

Item Number	Model Number	Description
	**F75-0176**	Temperature knob locking or limiting kit for 1A65-641, 1A65W-641, 1A66-641 and 1A66W-641.
	**F92-0563**	Temperature lever locking or temperature limiting kit for low voltage thermostats except 1C70, 1C20 and 1E26 series.
	**F145-1082**	Replacement door 1F90/1F97 (-51, -60, -71) 1F91-71, 1F92-71, 1F94-71, 1F95-71.
	**F145-0999**	Replacement key for all thermostat guards, F29 series.
	**F145-1328**	90 Series Wired Indoor Remote Sensor. Replaces all previous Indoor Remote Sensors.
	**F145-1378**	90 Series Wired Outdoor TemperatureSensor, For Models with Outdoor Sensor Option.
	**F61-2648**	Same as F61-2634 except 6 pack.
	**F61-2642**	Universal adapter plate for 1E65-144
	**F145RF-1600**	Wireless remote sensor for 1F98EZ-1621

36C Series

36C SERIES STANDING PILOT SNAP OPEN, STEP OPEN, HSI, DSI, AND INTERMITTENT IGNITION GAS VALVES

A Wide Range of Replacement Valves for the Professional Installer

SPECIFICATIONS

Electrical Rating . . . . . 0.23 amps
Ambient Operating Range . . . . . -40 to +175°F (-40 to 79°C)
Maximum Pressure Rating . . . . . 1/2 PSI (14.0″ W.C.)
Pilot Gas Connection . . . . . 1/4″ compression fitting
Pressure Tap . . . . . 1/8″ N.P.T.

Pipe Size	1" Pressure Drop Capacity BTU/HR		Rated Range of Regulation BTU/HR	
	STD. NAT GAS 1000 BTU/CU. FT.	LP GAS 2500 BTU/CU. FT.	STD. NAT GAS 1000 BTU/CU. FT.	LP GAS 2500 BTU/CU. FT.
1/2 X 3/8	100,000	162,000	15,000-100,000	15,000-162,000
1/2 X 1/2	230,000	372,600	30,000-290,000	30,000-469,000
1/2 X 3/4	230,000	372,600	30,000-290,000	30,000-469,000
3/4 X 3/4	280,000	453,600	50,000-400,000	50,000-648,000

TECH
WIRING
172–175

PARTS AND ACCESSORIES See end of this section for parts and accessories

SNAP OPEN, SINGLE FUNCTION, STANDING PILOT GAS VALVES

	Model Number	Typical App.	Coil Voltage	Gas Type	Pipe Size	Opening Characteristic	Regulator Setting	Regulator Adjustment Range	Convertible Nat. / LP	LP Conversion Kit Included	Line Interrupter	Flow Direction	Reducer Bushing Kit	Inlet Pressure Tap	Side Taps	Internal Wiring See Figure ①
	36C01-405	Snap Open	24VAC	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	No	Str. Thru	Yes	No	No	1
	36C01A-405	Snap Open	120VAC	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	No	Str. Thru	Yes	No	No	3
	36C03-300	Standing Pilot	24VAC	Natural or LP	1/2 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	No	No	1
	36C03-333	Standing Pilot	24VAC	Natural or LP	1/2 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	No	Yes	1
	36C03-400	Standing Pilot	24VAC	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	No	No	1
U	**36C03-433**	Standing Pilot	24VAC	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	Yes	Yes	1
	36C03A-410	Standing Pilot	120VAC	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	No	No	3
	36C03U-333	Standing Pilot	750mV	Natural or LP	1/2 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	Yes	Yes	2
U	**36C03U-433**	Standing Pilot	750mV	Natural or LP	3/4 x 3/4	Fast Open	3.5″	2.5″-5.0″	Yes	Yes	Yes	Str. Thru	Yes	Yes	Yes	2
	36C04U-438	Standing Pilot	750mV	Natural or LP	3/4 x 3/4	Step Open 0.7"	0.7 / 3.5″	2.5″-5.0″	No	No	Yes	Str. Thru	Yes	No	No	2
	36C53-418	Standing Pilot	24VAC	Natural or LP	3/4 x 3/4	Slow Open	3.5″	2.5″-5.0″	Yes	No	Yes	Str. Thru	Yes	No	No	1
🍁	**36C03-258**	Standing Pilot	24VAC	Natural or LP	1/2 x 1/2	Fast Open	3.5″	2.5″-5.0″	No	No	Yes	Str. Thru	No	Yes	No	1

HSI/DSI VALVES, INTERMITTANT IGNITION

36C74-913	Step Open	24VAC	Natural	3/4 x 3/4	Step	0.9″/3.5″	2.5″-5.0″	No	No	No	Str. Thru	Yes	Yes	No	5
36C94-303	Intermittent Ignition Systems	24VAC	Natural or LP	1/2 x 3/4	Delay Slow	3.5″	2.5″-5.0″ 7.0″-12.0″	Yes	Yes	No	Str. Thru	No	Yes	No	15

① Wiring diagrams – see pages 172–175 🍁 Indicates Canadian Model Number **U** = Universal

764-702

764 SERIES THERMOCOUPLE OPERATED GAS PILOT SAFETY/GAS FIREPLACE VALVES

In Line Appliance Control with 100% Shut Off

FEATURES / SPECIFICATIONS / PART AND ACCESSORIES

- Redesigned to include 100 PSI protection, inlet screen and inlet pipe stop.
- Optional rear inlet tapped and plugged.
- May be mounted horizontal, vertical and 90° from horizontal (multipoise).

Electrical Rating . . . . . 20 to 30 mV (Thermocouple)
Regulator Adjustment Range . . . . . Non-regulated
Maximum Pressure Rating . . . . . 1/2 PSI (14.0″ W.C.)
Ambient Operating Range . . . . . -40 to 250°F
Swing Radius . . . . . 2.5″
Agency . . . . . C.S.A. approved

- F42-0895 — Replacement knob

Model Number	Coil Voltage	Inlet-Outlet Size	Capacity A.G.A. Standard Gas ①	Electrical Connections
764-702	20 to 30 mV	3/8″ x 3/8″	132,000	Thermocouple
764-742	20 to 30 mV	1/2″ x 1/2″	142,000	Thermocouple

① See page 221 for capacities of other gases

36C84-912

36C CYCLE PILOT GAS VALVES

With Redundant Pilot Solenoid Main Gas Regulator, Integral Gas Pressure Switch and Electrical Connection on the Gas Valve for Mercury Flame Sensor Connection

SPECIFICATIONS

Electrical Rating . . . . . 0.6 amps
End to End Dimensions . . . . . 3 15/16″
Ambient Operating Range . . . . . -40 to +175°F (-40 to 79°C)
Maximum Pressure Rating . . . . . 1/2 PSI (14.0″ W.C.)
Agency . . . . . C.S.A. approved

Pipe Size	1" Pressure Drop Capacity BTU/HR STD. NAT GAS 1000 BTU/CU. FT.	1" Pressure Drop Capacity BTU/HR LP GAS 2500 BTU/CU. FT.	Rated Range of Regulation BTU/HR STD. NAT GAS 1000 BTU/CU. FT.	Rated Range of Regulation BTU/HR LP GAS 2500 BTU/CU. FT.
1/2 X 3/8	100,000	162,000	15,000-100,000	15,000-162,000
1/2 X 1/2	230,000	372,600	30,000-290,000	30,000-469,000
1/2 X 3/4	230,000	372,600	30,000-290,000	30,000-469,000
3/4 X 3/4	280,000	453,600	50,000-400,000	50,000-648,000

PARTS AND ACCESSORIES

See end of this section for parts and accessories

TECHNICAL HELP

TECH PAGES 172–175

Wiring Diagrams . . . . . See pages 172–175

Model Number	Coil Voltage	Gas Type	Pipe Size	Opening Characteristic	Regulator Setting	Regulator Adjustment Range	Convertible Nat. / LP	LP Conversion Kit Included	Line Interrupter	Flow Direction	Reducer Bushing Kit	Inlet Pressure Tap	Side Taps	Internal Wiring See Figure ①
36C84-912	24 VAC	Nat./LP	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	Yes	Yes	No	Str. Thru	Yes	Yes	No	7
36C84-913	24 VAC	Nat./LP	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	Yes	Yes	No	Str. Thru	Yes	Yes	No	12
36C84-921	24 VAC	Nat./LP	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	Yes	Yes	No	Str. Thru	Yes	Yes	No	7
36C84-923	24 VAC	Nat./LP	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	No	No	No	Str. Thru	No	Yes	No	14
36C84-926	24 VAC	Natural	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	No	No	No	Str. Thru	Yes	No	No	4
36C84-945	24 VAC	Nat./LP	3/4 x 3/4	Fast Open	3.5″	2.5″–5.0″	Yes	Yes	No	Str. Thru	Yes	Yes	No	8
36C94-906	24 VAC	Natural	3/4 x 3/4	Slow Open	3.5″	2.5″–5.0″	No	No	No	Str. Thru	Yes	No	No	7
36C94-907	24 VAC	Nat./LP	3/4 x 3/4	Slow Open	3.5″	2.5″–5.0″	Yes	Yes	No	Str. Thru	Yes	No	No	4

① Wiring diagrams – see pages 172–175

NOTE: -9XX series replaces -4XX series. Knob replaced with an ON-OFF switch.

36H32-423

36H64-463

36H SERIES GAS VALVES

Combination Multi-function Controls for a Wide Range of Applications. The 36H Combination Gas Control Valve is a Versatile Multifunction Control Designed to Meet the Requirements for Use with Intermittent Ignition Systems (Direct Ignition, Proven Pilot, HSI). 36H is Our Highest Capacity Combination Gas Valve

FEATURES

- Adjustable regulator.
- Quiet operation redundant design.
- Inlet/outlet screens.
- Tamper resistant screws.

SPECIFICATIONS

Electrical Rating (36H) . . . . . 0.41 amps (Single stage)
0.54 amps (Two-stage)
Ambient Temp. . . . . -40° to 175°F (-40° to 79°C)
Pressure Rating . . . . . 1/2 PSI (14.0″ W.C.)
Voltage . . . . . 24 VAC
Frequency. . . . . 50/60 Hz

Pipe Size (36 H)	1″ PD Capacity BTU/HR		Rated Range of Regulation BTU/HR	
	Std. Gas .64 Sp. Gr. (1000 BTU/CU FT)	LP Gas 1.53 Sp. Gr. (2500 BTU/CU FT)	Gas .64 Sp. Gr. (1000 BTU/CU FT)	Gas 1.53 Sp. Gr. (2500 BTU/CU FT)
3/4″ x 3/4″	300,000	486,000	50,000 to 400,000	81,000 to 648,000
1/2″ x 3/4″	230,000	372,600	50,000 to 300,000	80,000 to 500,000
1/2″ x 1/2″	170,000	275,500	40,000 to 240,000	40,000 to 400,000

Valve Stages	Regulator Adjustment Range
	Nat. Gas
Single	2.5″ to 5.0″
Two-Stage	1.0″-3.5″ Low 2.5″-5.0″ High

PARTS AND ACCESSORIES

See end of this section for parts and accessories

TECHNICAL HELP

Wiring Diagram. . . . . See page 177

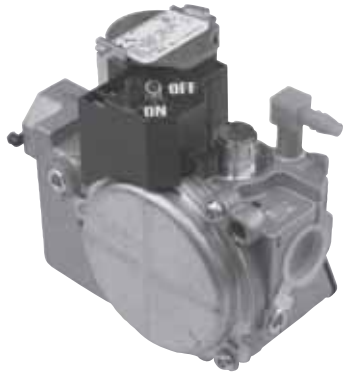
TECH
PAGE
177

	Model Number	Voltage	Type of Gas	Pipe Size	Opening Characteristic	Stages	HSI/DSI	Proven Pilot	Standing Pilot	Intermittent Pilot	Convertible Nat/LP Kit Included	Reducer Bushing Kit	Inlet & Outlet Pressure Tap	Side Taps
NEW U	**36H32-214**	24 Volt	Nat./LP	1/2 x 1/2	Fast	1	Yes	Yes	No	Yes	Yes	No	Yes*	No
	36H32-304	24 Volt	Nat./LP	1/2 x 3/4	Fast	1	Yes	Yes	No	Yes	Yes	Yes	Yes*	No
	36H32-423	24 Volt	Nat./LP	3/4 x 3/4	Fast	1	Yes	Yes	No	Yes	Yes	Yes	Yes*	No
	36H33-412	24 VAC	Nat./LP	3/4 x 3/4	Slow	1	Yes	Yes	No	Yes	Yes	Yes	Yes*	No
	36H64-463	24 VAC	Nat./LP	3/4 x 3/4	Fast	2	Yes	Yes	No	Yes	Yes	Yes	Yes*	No
	36H65-401	24 VAC	Nat./LP	3/4 x 3/4	Slow	2	Yes	Yes	No	Yes	Yes	Yes	Yes*	No

U = Universal

* To measure outlet pressure on valves, loosen outlet pressure tap screw one quarter turn and put manometerhose over the top of the outlet pressure tap.

Wiring diagrams – see page 177



36J Series

36G, 36J SERIES GAS VALVES

The 36G, 36J is a Combination Gas Control Valve Designed for Use with Non-Piloted Intermittent Ignition Systems. The Control is Designed to Meet Today's Maximum Capacity, Smaller Size and High Efficiency Gas Systems

FEATURES

- Inlet and outlet screens.
- Quiet redundant.
- Built-in pressure tap.
- Quick-connect terminals (1/4″).

SPECIFICATIONS

Ambient Temperature	-40 to 175°F
Maximum Pressure Rating	1/2″ PSI (14.0″ W.C.)
Capacity (1″ P.D.)	Natural 140,000 Btu/Hr. L.P. 226,800 Btu/Hr.
Electrical Rating	Single stage 24V, 50 / 60Hz at .3A Two stage at .43A
Swing Radius	2.75″
Mounting	Any position
Agency	C.S.A. approved

Valve (Stages)	Pipe Size	1″ Pressure Drop Capacity BTU/HR Std. Gas .64 Sp. Gr. (1000 BTU/CU. FT.)	1″ Pressure Drop Capacity BTU/HR LP Gas 1.53 Sp. Gr. (2500 BTU/FT.)	Range of Regulation BTU/HR Std Gas .64 Sp. Gr. (1000 BTU/CU. FT.)	Range of Regulation BTU/HR LP Gas 1.53 Sp. Gr. (2500 BTU/FT.)	Adjustment Range (Nat. IN. W.C.)	Adjustment Range (L.P. IN. W.C.)
Single	1/2″ x 1/2″NPT	140,000 BTU/HR	226,800 BTU/HR	40,000-210,000	60,000-340,000	2.5″-5.0″	7.0″-12.0″
Two	1/2″ x 1/2″NPT	140,000 BTU/HR	226,800 BTU/HR	20,000 Low- 210,000 High	32,000 Low- 340,000 High	1.0″-4.0″ Low 2.0″-5.0″ High	4.0″-10.0″ Low 6.0″-12.0″ High
Modulating	1/2″ x 1/2″NPT	140,000 BTU/HR	226,800 BTU/HR	20,000 - 210,000	32,600 - 340,000	0.40″-4.0″	1.3″-11.5″

PARTS AND ACCESSORIES

See end of this section for parts and accessories

TECHNICAL HELP

TECH PAGE 178

Wiring Diagrams . . . . . See page 178

Model Number	Coil Voltage	Gas Type	Pipe Size	Opening Characteristic	Regulator Setting	Regulator Adjustment Range	Convertible Nat. / LP	LP Conversion Kit Included	Flow Direction	Reducer Bushing Kit	Filter Screen	Inlet Pressure Tap	Outlet Pressure Tap	Internal Wiring See Figure ①
36G22-254	24 VAC	Natural or LP	1/2 x 1/2	Fast Opening Single Stage	3.5″	Nat. 2.5″- 5.0″ L.P. 7.0″- 12.0″	Yes	No**	Str. Thru	No	Yes	Yes	Yes*	1
36J22-214	24 VAC	Natural or LP	1/2 x 1/2	Fast Opening Single Stage	3.5″	Nat. 2.5″- 5.0″ L.P. 7.0″- 12.0″	Yes	Yes	Str. Thru	Yes	Yes	Yes	Yes	1
36J24-214	24 VAC	Natural or LP	1/2 x 1/2	Slow Opening Single Stage	3.5″	Nat. 2.5″- 5.0″ L.P. 7.0″- 12.0″	Yes	Yes	Str. Thru	Yes	Yes	Yes	Yes	1
36J54-214	24 VAC	Natural or LP	1/2 x 1/2	Two-Stage Fast Opening	LO 1.5″ HI 3.5”	Nat. 2.5″- 5.0″ L.P. 6.0″- 12.0″	Yes	Yes	Str. Thru	Yes	Yes	Yes	Yes*	2
36J55-214	24 VAC	Natural or LP	1/2 x 1/2	Two-Stage Slow Opening	3.5″	Nat. 2.5″- 5.0″ L.P. 6.0″- 12.0″	Yes	Yes	Str. Thru	Yes	Yes	Yes	Yes*	2
36J24-614	24 VAC	Natural or LP	1/2 x 1/2	Single Stage Slow Opening	3.5″	Nat. 2.5″- 5.0″ L.P. 7.0″- 12.0″	Yes	Yes	90° Bottom Outlet	No	Yes	Yes	Yes*	2
36J55-614	24 VAC	Natural or LP	1/2 x 1/2	Two-Stage Slow Opening	3.5″	Nat. 2.5″- 5.0″ L.P. 6.0″- 12.0″	Yes	Yes	90° Bottom Outlet	No	Yes	Yes	Yes*	2

* To measure outlet pressure on valves, loosen outlet pressure tap screw one quarter turn and put manometer hose over the top of the outlet pressure tap.
** Use F92-0659 to convert to regulated L.P. gas
① Wiring diagrams – see page 178

50A55-843 UNIVERSAL SILICON CARBIDE IGNITION INTEGRATED HSI FURNACE CONTROL KIT

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier and Air Cleaner.
Replaces Most Trane, York, ICP and Amana White-Rodgers Models

FEATURES

- Includes flash code diagnostics.
- Replaces 50A50 and 50A55 controls (consult Integrated Silicon Carbide Module Reference Chart below).
- Fused to protect low voltage system transformers.
- Includes mounting hole template.
- Adjustable blower relay.

SPECIFICATIONS

Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 25 VAC	0.45 amp
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz (resistive)
Inducer Relay	2.2 FLA – 3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA – 25.0 LRA @ 120 VAC
Operating Temperature Range	-40 to +175°F (-40 to +79°C)
Humidity Range	5% to 93% relative humidity (non-condensing)

TECHNICAL HELP

TECH
PAGES
183–184

Wiring / configuration / troubleshooting see pages 183–184

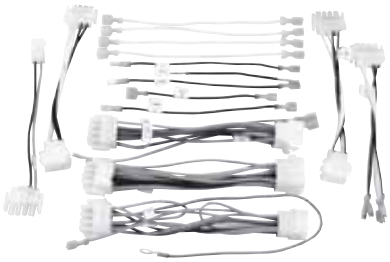
Model Number	Pre-Purge	Delay Heat		Delay Cool		Auto Reset
		ON	OFF	ON	OFF	
50A55-843	30 sec.	30 / 45	60 / 90 / 120 / 180	5	45 / 90	60 minutes

CROSS REFERENCE

50A55-843 Replaces:

031-00662-000	117284	50A50-131	50A50-405	50A55-843	D340035P01
031-00662-700	12L4201	50A50-142	50A50-406	52537074000	D340774P01
03101250000	1380686	50A50-143	50A50-408	52537077000	D341122P01
031-01250-000	1380698	50A50-205	50A50-438	56L8501	D341235P01
031-01250-700	1380699	50A50-206	50A50-471	75671	D341235P02
031-01266-000	14028	50A50-207	50A50-472	75672	D341235P03
031-01266-700	14029	50A50-208	50A50-473	78712	L38-798
031-01284-000	14030	50A50-209	50A50-474	8068142	L38-799
084141	14031	50A50-210	50A50-475	8068561	L38-800
1010806	194300330001	50A50-215	50A50-571	8068563	L38-801
102077-02	30757	50A50-216	50A55-143	83388	PCBBF117
102077-03	350486	50A50-229	50A55-241	99958174	X13120666010
10207704	3XA75	50A50-230	50A55-245	99958175	X13130436-01
102077-04	4DG53	50A50-240	50A55-250	CNT02789	X13130436010
10207706	4DG54	50A50-241	50A55-285	CNT02891	X13130436-02
102077-06	4DG55	50A50-245	50A55-286	CNT03799	X13130436-04
102077-09	4DG56	50A50-285	50A55-288	CNT1684	X13130436040
10207710	50A50-110	50A50-286	50A55-3797	CNT1686	X13640678040
102077-10	50A50-111	50A50-288	50A55-438	CNT1687	X13650597010
10207714	50A50-112	50A50-295	50A55-474	D330927P01	X4459
102077-14	50A50-113	50A50-296	50A55-476	D330930P01	X445901
10207719	50A50-130	50A50-298	50A55-571	D330934P01	

NOTE: Can also be replaced by 50M56U-843



50M56U-843

Includes:
- Module
- Wiring Harness
- HotRod Ignitor Kit

50M56U-843 UNIVERSAL INTEGRATED HSI FURNACE CONTROL KIT

Replaces Virtually All White-Rodgers and Competitive Single Stage Carbide and Nitride HSI Systems with 80V or 120V Ignitors.
Replaces More Models than Honeywell S9200U1000

FEATURES

- 3 Fan Speeds – cool, low heat & high heat speeds.
- Universal HotRod nitride ignitor kit – 21D64-2.
- 9 quick-select/quick-connect wiring harnesses.
- Red LED diagnostic flash codes with stored fault recall.
- Low voltage fuse protection, 3A replaceable automotive type.
- Humidifier & Electronic Air Cleaner connections (optional).

SPECIFICATIONS

Electrical Rating:
Input Voltage. . . . . 25 VAC 50/60 Hz
Max. Input Current . . . . . 25 VAC: 0.45 amp
Gas Valve Relays . . . . . 1.5 amp @ 25 VAC 50/60 Hz
Inducer Relay . . . . . 2.2 FLA–3.5 LRA @ 120 VAC
Circulator Relay . . . . . 14.5 FLA–25.0 LRA @ 120 VAC
Ignitor Relay . . . . . 6.0 amp @ 120 VAC 50/60 Hz (resistive)
Flame Current Requirements:
Minimum current to insure flame detection 1 µa DC*
Maximum current for non-detection . . 0.1 µa DC*
Maximum allowable leakage resistance 100 M ohms
*Measured with a DC microameter in the flame probe lead
Operating Temperature Range. . . . . -40° to 176°F (-40° to 80°C)
Flame Failure Response Time . . . . . 2.0 sec

PARTS AND ACCESSORIES See end of this section for parts and accessories

TECHNICAL HELP

Wiring Diagram. . . . . See pages 190–192

TECH
PAGES
190–192

Model Number	Pre-Purge	Ignitor Warm-Up	Retries	Heat Delay to Fan ON	Heat Delay to Fan OFF	Cool Delay to Fan ON	Cool Delay to Fan OFF	Automatic Reset Time
50M56U-843	30	17	2	30	100/150	6	45	60 minutes

CROSS REFERENCE

Consult online Cross Reference for other suggested replacements for this item.

50A65-843

50A65-843 UNIVERSAL NITRIDE IGNITION INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier and Air Cleaner. Replaces OEM, Trane, York, ICP and Amana Models

FEATURES

- Includes diagnostic indicator flash codes.
- Replaces 50A65-120, -143, -288, -474, -475 controls (consult Integrated Nitride Module Reference Chart below).
- Replaceable 3A fuse.
- 60 minute auto reset.
- Single channel flame sense.

SPECIFICATIONS

Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 25 VAC	0.45 amp
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz (resistive)
Inducer Relay	2.2 FLA – 3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA – 25.0 LRA @ 120 VAC
Electronic Air Cleaner and Humidifier	1 A @ 120 VAC
Operating Temperature Range	-40 to +175°F (-40 to +79°C)
Humidity Range	5% to 93% relative humidity (non-condensing)

TECHNICAL HELP

TECH PAGES 185–186

Wiring and configuration . . . . . see pages 185–186

Model Number	Pre-Purge	Delay Heat		Delay Cool		Auto Reset
		ON	OFF	ON	OFF	
50A65-843	30 sec.	30 / 45	60 / 90 / 120 / 180	5	45 / 90	60 minutes

CROSS REFERENCE

50A65-843 Replaces:

10207717	50A65-5165
102077-17	50A65-843
10M93	56L84
10M9301	56L8401
12L69	CNT03076
12L6901	CNT03742
32M88	CNT03798
32M8801	CNT05164
350836	CNT05165
4DG57	D341213P01
50A65-120	D341396P01
50A65-121	D341396P03
50A65-143	D341396P04
50A65-288	D341396P05
50A65-474	PCBBF118S
50A65-475	X13120667010
50A65-476	

21M51U-843 Kit
Includes:
- Module
- HotRod Ignitor Kit

TECH
PAGES
179–180

21M51U-843 UNIVERSAL INTEGRATED HSI FURNACE CONTROL KIT

Replaces White-Rodgers 50M51-242 and 50M61-XXX's Two-Stage HSI Systems with 80V or 120V Ignitors

FEATURES

- 120 VAC 3-speed PSC (Permanent Split Capacitor) circulator output, two-speed inducer output, two-stage gas valve output.
- Pushbutton fault history retrieval.
- Furnace status LED – tri-color (green, red and amber).
- Heat fan off delay (dipswitch selectable), fan on delay for cooling.
- Auto second stage delay (dipswitch selectable).
- 120 VAC humidifier output/120 VAC electronic air cleaner output.

SPECIFICATIONS

Electrical Rating:
Input Voltage. . . . . 24 VAC, 60 Hz (Class II transformer required)
Nom. Input Current @ 24 VAC . . . . . 530 mA + MV
Relay Load Ratings:
Gas Valve Relays . . . . . 1.5 amps @ 24 VAC, 60 Hz
Inducer Relays . . . . . 2.2 FLA – 3.5 LRA @ 120 VAC
Circulator Relays . . . . . 14.5 FLA – 25.0 LRA @ 120 VAC
Humidifier Load . . . . . 1.0 amp max. @ 120 VAC
Electronic Air Cleaner Load . . . . . 1.0 amp max. @ 120 VAC
Ignitor Relay . . . . . 4.0 amps max. @ 132 VAC, 60 Hz
Flame Current Requirements:
Minimum current to insure flame detection 0.3 µa DC*
Maximum current for non-detection . . 0.1 µa DC*
Maximum allowable leakage resistance 100 M ohms
*Measured with a DC microameter in the flame probe lead
Operating Temperature Range . . . . . -40° to 175°F (-40 to 80°C)
Humidity Range . . . . . 5% to 93% relative humidity (non-condensing)
Flame Failure Response Time . . . . . 2.0 sec. max. @ 60Hz

TECHNICAL HELP

Wiring Diagram/Operation . . . . . See pages 179–180

Model Number	Pre-Purge	Ignitor Warm-Up	Retries	Heat Delay to Fan ON	Heat Delay to Fan OFF	Cool Delay to Fan ON	Cool Delay to Fan OFF	Automatic Reset Time
21M51U-843	15	17	2	45	90/120/150/180	5	60	60 minutes

CROSS REFERENCE

21M51U-843 Replaces:

18M3401	50M61-495
20300001	50M61-843
20300003	83L9301
21M51U-843	CNT03077
46M9901	CNT6424
50M51-242	D344301P01
50M51-495	PCBBF120S
50M61-120	PCBBF125
50M61-288	X13650839010
50M61-289	

21V51U-843

Includes:
- Module
- HotRod Ignitor Kit
- Wiring Harness

TECH
PAGES
181–182

21V51U-843 UNIVERSAL INTEGRATED HSI FURNACE CONTROL KIT

Replaces White-Rodgers 50V51-XXX's and 50V61-XXX's
Two-Stage HSI Systems with 80V or 120V Ignitors

FEATURES

- 16-pin variable speed circulator output for ECM (Electronically Commutated Motor), dipswitch selectable for OEM applications two-speed inducer output, two-stage gas valve output.
- Pushbutton fault history retrieval.
- Furnace status LED – tri-color (green, red and amber).
- Heat fan off delay (dipswitch selectable), fan on delay for cooling.
- Auto second stage delay (dipswitch selectable).
- 120 VAC humidifier output/120 VAC electronic air cleaner output.

SPECIFICATIONS

Electrical Rating:
Input Voltage. . . . . 24 VAC, 60 Hz (Class II transformer required)
Nom. Input Current @ 24 VAC . . . . . 595 mA + MV
Relay Load Ratings:
Gas Valve Relays . . . . . 1.5 amps @ 24 VAC, 60 Hz
Inducer Relays . . . . . 2.2 FLA – 3.5 LRA @ 120 VAC
Humidifier Load . . . . . 1.0 amp max. @ 120 VAC
Electronic Air Cleaner Load . . . . . 1.0 amp max. @ 120 VAC
Ignitor Relay . . . . . 4.0 amps max. @ 132 VAC, 60 Hz
Flame Current Requirements:
Minimum current to insure flame detection 0.3 µa DC*
Maximum current for non-detection . . 0.1 µa DC*
Maximum allowable leakage resistance 100 M ohms
*Measured with a DC microameter in the flame probe lead
Operating Temperature Range . . . . . -40° to 175°F (-40 to 80°C)
Humidity Range . . . . . 5% to 93% relative humidity (non-condensing)
Flame Failure Response Time . . . . . 2.0 sec. max. @ 60Hz

TECHNICAL HELP

Wiring Diagram/Operation . . . . . See pages 181–182

Model Number	Pre-Purge	Ignitor Warm-Up	Retries	Heat Delay to Fan ON	Heat Delay to Fan OFF	Cool Delay to Fan ON	Cool Delay to Fan OFF	Automatic Reset Time
21V51U-843	15	17	2	45	90/120/150/180	5	60	60 minutes

CROSS REFERENCE

21V51U-843 Replaces:

18M9901	21V51U-843	50V51-507	21V51U-843	CNT 04018	21V51U-843
20300002	21V51U-843	50V61-120	21V51U-843	CNT 04352	21V51U-843
20300004	21V51U-843	50V61-143	21V51U-843	CNT03078	21V51U-843
20300006	21V51U-843	50V61-288	21V51U-843	D156245P01	21V51U-843
20300006S	21V51U-843	50V61-289	21V51U-843	D34142P01	21V51U-843
21V51U-843	21V51U-843	50V61-480	21V51U-843	PCB00106	21V51U-843
49M5901	21V51U-843	50V61-486	21V51U-843	PCB00106S	21V51U-843
50V51-243	21V51U-843	50V61-507	21V51U-843	PCBBF106	21V51U-843
50V51-288	21V51U-843	B1809925	21V51U-843	PCBBF106S	21V51U-843
50V51-289	21V51U-843	B1809927	21V51U-843	PCBBF107S	21V51U-843
50V51-290	21V51U-843	B1809927S	21V51U-843	X13650840010	21V51U-843

50M56U-751

Wiring adapters included for old style block and new style in-line harnesses

50M56U-751 CARRIER SINGLE STAGE INTEGRATED HSI FURNACE CONTROL KIT

Replaces White-Rodgers 50M56-751 and Virtually All Carrier Single Stage HSI Controls with 120V Ignitors. Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier (Both 120V & 24V), and Air Cleaner

FEATURES

- System Diagnostic LED with fault recall.
- Fused to protect low voltage system transformers.
- Low-speed continuous fan option.
- Self-test installation routine.

SPECIFICATIONS

Operating Temperature	-40 to 176°F (-40 to 80°C)
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Surface mount multipoise
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 25 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz (resistive)
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC*
Maximum current for non-detection	0.10 uA DC*
Maximum allowable leakage resistance	100 M ohms
*Measured with DC microammeter in the flame probe lead	
Timing Spec (@ 60 Hz)	maximum
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

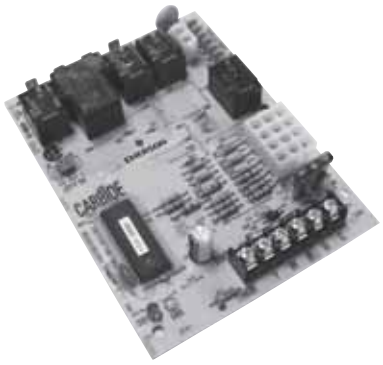
NOTE: At 50 Hz, all timing specifications should be increased by 20%.

	Model Number	Pre-Purge Time	Heat Delay-To-Fan-On	Heat Delay-To-Fan-Off	Cool Delay-To-Fan-On	Cool Delay-To-Fan-Off	Post Purge
NEW	**50M56U-751**	30 sec	25 / 60	90 / 120	2	5 / 90	25 sec

CROSS REFERENCE

50M56U-751 Replaces:

Carrier	White-Rodgers
325878-751	50M56-751
HK42FZ004	
HK42FZ007	
HK42FZ008	
HK42FZ009	**ICM**
HK42FZ011	ICM282A
HK42FZ013	
HK42FZ016	
HK42FZ034	



50A55-743

50A55-743 GOODMAN SILICON CARBIDE SINGLE STAGE INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier (Both 120V & 24V Input), and Air Cleaner. Replaces OEM Goodman and White-Rodgers Models

FEATURES

- Includes flash code diagnostics.
- Twinning connection.
- Fused to protect low voltage system transformer

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Snap in standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec (@ 60 Hz)	**maximum**
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

Model Number	Pre-Purge Time	Heat Delay On	Heat Delay Off Sec.	Cool Delay On Sec.	Cool Delay Off Sec.	Post Purge
50A55-743	15 seconds	30	90 / 120 / 150 /180	5	45	15 sec

CROSS REFERENCE

50A55-743 Replaces:

0130F00005	PCBBF110
0130F00005S	PCBBF110S
50A55-289	PCBBF112
50T55-289	PCBBF112S
B1809926	PCBBF123
B1809926S	PCBBF123S

NOTE: Can also use Universal Kit 50M56U-843

50T35-743

50T35-743 GOODMAN SILICON CARBIDE INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Two-Speed Blower Motor, Inducer, Humidifier (Both 120v & 24v Input), and Air Cleaner. Replaces OEM Goodman, UTEC and TI Models

FEATURES

- Includes flash code diagnostics.
- Twinning.
- Includes mounting hole template.
- Fused to protect low voltage system transformers.
- Adjustable blower relay.
- 90+ furnace option.

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	95% RH (non-condensing)
Mounting	Plastic standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	20-30 VAC RMS 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.35 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 30 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	5.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	4.0 FLA-8.0 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	75 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec @ 60 Hz	
Flame establishing time	n/a
Flame failure response time	2.0 seconds maximum

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

Model Number	Pre-Purge Time	Heat Delay On	Heat Delay Off Sec.	Cool Delay On Sec.	Cool Delay Off Sec.	Post Purge
50T35-743	15 seconds	30	90 / 120 / 150	5	60	25 sec (29 w/ 90+)

CROSS REFERENCE

50T35-743 Replaces:

Goodman	White-Rodgers
B18099-06	50T35-730
B18099-08	50T35-730-1
B18099-10	
B18099-13	
B18099-13S	
CNT04664	

50M56-743

50M56-743 GOODMAN NITRIDE IGNITION MULTI-SPEED INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer and Air Cleaner.
Replaces OEM Goodman and White-Rodgers Models

FEATURES

- System diagnostic LED with fault recall.
- Multi-speed circulator.
- One or two-stage gas valve.

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Snap in standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec (@ 60 Hz)	**maximum**
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

Model Number	Pre-Purge Time	Heat Delay On	Heat Delay Off Sec.	Cool Delay On Sec.	Cool Delay Off Sec.	Post Purge
50M56-743	30 seconds	30	100 / 150	6	45	25 sec

CROSS REFERENCE

50M56-743 Replaces:

Goodman		White-Rodgers
0130F00006	PCBBF122	50M56-289
0130F00006S	PCBBF122S	
PCB00109	PCBBF132	
PCBBF109	PCBBF132S	
PCBBF109S		

NOTE: Can also use Universal Kit 50M56U-843

50A66-743

50A66-743 LENNOX NITRIDE IGNITION INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier and Air Cleaner

FEATURES

- Includes diagnostic indicator flash codes.
- 3 fan speeds.
- Remote flame sense.
- Humidifier and electronic air cleaner connections (optional).

SPECIFICATIONS

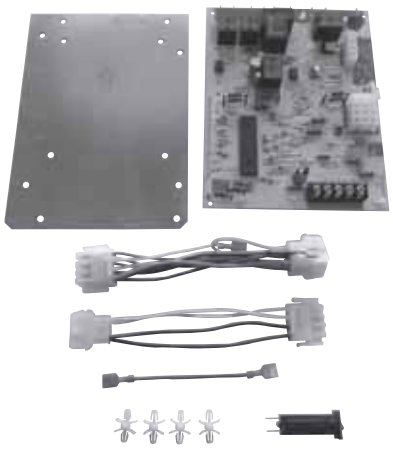
Input Voltage. . . . . 25 VAC 50 / 60 Hz
Maximum Input Current @ 25 VAC . . . 0.45 amp
Valve Relay. . . . . 1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay . . . . . 2.0 amp @ 120 VAC 50 / 60 Hz (resistive)
Inducer Relay . . . . . 2.2 FLA – 3.5 LRA @ 120 VAC
Circulator Relay . . . . . 14.5 FLA – 25.0 LRA @ 120 VAC
Operating Temperature Range. . . . . -40 to +175°F (-40 to +79°C)
Humidity Range . . . . . 5% to 93% relative humidity (non-condensing)

Model Number	Pre-Purge	Delay Heat		Delay Cool		Auto Reset
		ON	OFF	ON	OFF	
50A66-743	15	45	60 / 90 / 120 / 180	2	2/45	60 minutes

CROSS REFERENCE

50A66-743 Replaces:

Lennox		White-Rodgers
100925-01	30W25	50A66-122
100925-02	30W2501	50A66-123
100925-03	69M08	
17W92	69M0801	
17W9201	69M15	
23W51	69M1501	
23W5101		



21D83M-843

21D83M-843 LENNOX NITRIDE IGNITION INTEGRATED HSI FURNACE CONTROL KIT

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier and Air Cleaner

FEATURES

- Includes diagnostic indicator flash codes.
- 3 fan speeds.
- Remote flame sense.
- Humidifier and electronic air cleaner connections (optional).

SPECIFICATIONS

Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 25 VAC	0.45 amp
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	2.0 amp @ 120 VAC 50 / 60 Hz (resistive)
Inducer Relay	2.2 FLA – 3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA – 25.0 LRA @ 120 VAC
Operating Temperature Range	-40 to +175°F (-40 to +79°C)
Humidity Range	5% to 93% relative humidity (non-condensing)

Model Number	Pre-Purge	Delay Heat		Delay Cool		Auto Reset
		ON	OFF	ON	OFF	
21D83M-843	15	45	60 / 90 / 120 / 180	2	2/45	60 minutes

CROSS REFERENCE

21D83M-843 Replaces:

Lennox		White-Rodgers
100925-01	56L8301	50A62-120
100925-02	56L84	50A62-121
100925-03	56L8401	50A62-820
10M93	63K89	50A66-122
124110	63K8901	50A66-123
17W92	65867	50A66-743
17W9201	69M08	50A66-843
23W51	69M0801	
23W5101	69M15	
24L85	69M1501	
24L8501	83M00	
30W25	83M001	
30W2501	97L48	
32M88	97L4801	
56L83	L39-564	

50A55-3797

50A55-3797 TRANE SINGLE STAGE 120V IGNITION INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier (120V), and Air Cleaner. Replaces OEM Trane and White-Rodgers Models

FEATURES

- Includes flash code diagnostics.
- Fused to protect low voltage system transformers.

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Snap in standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec (@ 60 Hz)	maximum
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

	Model Number	Pre-Purge Time	Heat Delay-To-Fan-On	Heat Delay-To-Fan-Off	Cool Delay-To-Fan-On	Cool Delay-To-Fan-Off	Post Purge
NEW	**50A55-3797**	0 sec	45	60 / 100 / 140 / 180	2	0 / 180	5 sec

CROSS REFERENCE

50A55-3797 Replaces:

Trane	White-Rodgers
CNT02789	50A55-474
CNT02891	50A55-476
CNT03799	50A55-571
D341122P01	
D341235P01	
D341235P03	

NOTE: Can also use Universal Kit 50M56U-843

50A55-5165

50A65-5165 TRANE SINGLE STAGE 80V IGNITION INTEGRATED HSI FURNACE CONTROL

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier (120V), and Air Cleaner. Replaces OEM Trane and White-Rodgers Models

FEATURES

- Includes flash code diagnostics.
- Twinning connection.
- Fused to protect low voltage system transformers.

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Snap in standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	2.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec (@ 60 Hz)	**maximum**
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

	Model Number	Pre-Purge Time	Heat Delay-To-Fan-On	Heat Delay-To-Fan-Off	Cool Delay-To-Fan-On	Cool Delay-To-Fan-Off	Post Purge
NEW	**50A65-5165**	0 sec	45	60 / 100 / 140 / 180	2	0 / 80	5 sec

CROSS REFERENCE

50A55-5165 Replaces:

Trane	White-Rodgers
CNT03076	50A65-474
CNT03798	50A65-475
CNT05164	50A65-476
CNT05165	
D341213P01	
D341396P01	
D341396P03	
D341396P04	
D341396P05	

NOTE: Can also use Universal Kit 50M56U-843

50A56-956

50A56-956 YORK SINGLE STAGE INTEGRATED HSI FURNACE CONTROL KIT

Controls Gas Valve, Ignitor, Blower, Inducer, Humidifier (120V), and Air Cleaner. Replaces OEM York and White-Rodgers Models

FEATURES

- System Diagnostics LED with fault recall.
- Twinning connection.
- Fused to protect low voltage system transformers.
- Selectable continuous fan speed.
- Third fan speed.
- Two-stage cooling Y2 input.

SPECIFICATIONS

Operating Temperature	-40 to 176°F
Humidity Range	5% to 93% RH (non-condensing)
Mounting	Snap in standoffs
Electrical Ratings @ 77°F (25°C)	
Input Voltage	25 VAC 50 / 60 Hz
Maximum Input Current @ 30 VAC	0.45 amp
Relay Load Ratings	
Valve Relay	1.5 amp @ 25 VAC 50 / 60 Hz 0.6 pf
Ignitor Relay	6.0 amp @ 120 VAC 50 / 60 Hz
Inducer Relay	2.2 FLA-3.5 LRA @ 120 VAC
Circulator Relay	14.5 FLA-25.0 LRA @ 120 VAC
Flame Current Requirements	
Minimum current to insure flame detection	1 uA DC
Maximum current for non-detection	0.10 uA DC
Maximum allowable leakage resistance	100 M ohms
Timing Spec (@ 60 Hz)	maximum
Flame establishing time	0.8 sec
Flame failure response time	2.0 seconds

NOTE: At 50 Hz, all timing specifications should be increased by 20%.

	Model Number	Pre-Purge Time	Heat Delay-To-Fan-On	Heat Delay-To-Fan-Off	Cool Delay-To-Fan-On	Cool Delay-To-Fan-Off	Post Purge
NEW	**50A56-956**	0 sec	30	60 / 90 / 120 / 180	0	60	15 sec

CROSS REFERENCE

50A56-956 Replaces:

York		White-Rodgers
265901	S1-03101284000	50A56-242
265902	S1-03101933000	50A56-243
S1-03100662000	S1-03101972000	**ICM**
S1-03101250000	S1-03101973000	ICM2808
S1-03101266000	S1-03109167000	(PCB Only)
S1-03101267000	S1-33102956000	
S1-03101267001	S1-33103010000	

NOTE: Can also use Universal Kit 50M56U-843

50E47-843

50E47-843 UNIVERSAL SILICON CARBIDE IGNITION NON-INTEGRATED HSI IGNITION MODULE KIT

Replaces White-Rodgers 50E47 Modules and Many Competitive Silicon Carbide, Non-Integrated Modules. Includes a Complete Module Cross Reference and Program Keys for Fast and Accurate Replacement

FEATURES

- Program keys for multiple timing selections.
- Tri-colored LED indicator for diagnostics.
- Direct and indirect flame sense compatible.
- Universal design for maximum versatility.

SPECIFICATIONS

Dimensions	4.13″W x 4.13″H x 1.5″D
Electrical rating	Input 18 to 30 VAC, 25 VAC nominal, Max. input current @ 25 VAC; .250mA @ 28 VAC
Relay load settings	Valve relay: 1.5 amps @ 28 VAC, 50 / 60 Hz, .6 pf Ignitor relay: 1.52A, 120 VAC, 50 / 60 Hz resistive
Operating temperature	-40° to +175°F (-40° to +80°C)
Humidity range	95% RH (non-condensing) max.
Mounting	Surface mount or 4″ x 4 junction box
Applications	For use with all gases
Flame current requirements	Min. current to insure flame: 2 µADC Min. current for non-detection: 0.2 µADC Max. allowable leakage resistance: 100 M Ohms
Agency	A.G.A. and C.G.A. design certified

TECH
PAGES
187–188

TECHNICAL HELP

Wiring operation and troubleshooting . . . . . See pages 187–188

Model Number	PROGRAM KEY (COLOR)	TRIAL FOR IGNITION	RETRIES	PREPURGE	IGNITOR WARMUP
50E47-843	A (blue)	4 Sec.	0	30 Sec.	45 Sec.
	B (red)	4 Sec.	2	30 Sec.	45 Sec.
	C (green)	7 Sec.	0	30 Sec.	45 Sec.
	D (violet)	7 Sec.	2	30 Sec.	45 Sec.
	E (orange)	4 Sec.	2	30 Sec.	17 Sec.
	F (yellow)	7 Sec.	2	30 Sec.	17 Sec.

CROSS REFERENCE

50E47-843 Replaces:

025-25436-000	50D47-161	50E47-130	50F47-160	995395	HS780-17PL-304A	HS780-34PL-306A	S89C1087
02525436700	50D47-170	50E47-140	50F47-40	99796380	HS780-17PL-306A	HS780-34PL-308A	S89C1103
025-25436-700	50D47-20	50E47-150	50F47-60	99905232	HS780-17PL-308A	HS780-34PR-106A	S89D1002
1001346	50D47-260	50E47-160	50G47-1	C6411102	HS780-17PR-104A	HS780-34PR-108A	S89G1005
120-08027	50D47-270	50E47-161	50G47-130	CNT1316	HS780-17PR-108A	HS780-34PR-304A	S89G1013
1300-4928	50D47-40	50E47-170	50G47-140	CNT1690	HS780-17PR-306A	HS780-34PR-306A	S89G1021
1380694	50D47-50	50E47-20	50G47-150	CNT1691	HS780-34NL-106A	HS780-34PR-308A	S89G1047
2076-0184	50D47-60	50E47-260	50G47-160	HS780-17NL-104A	HS780-34NL-108A	S890C1007	S89H1003
2525436700	50D47-70	50E47-30	50G47-40	HS780-17NL-106A	HS780-34NL-304A	S890D1006	S89H1011
350760	50D47-905	50E47-40	50G47-60	HS780-17NL-108A	HS780-34NL-306A	S890G1003	S89H1029
3591-1306	50D47-915	50E47-50	780-780	HS780-17NL-304A	HS780-34NL-308A	S890G1011	S89J1008
3XA74	50D47-925	50E47-560	780-783	HS780-17NL-306A	HS780-34NL-312A	S890G1029	X13130193-04
4CZ50	50D47-935	50E47-60	780-784	HS780-17NL-308A	HS780-34NR-104A	S890G1037	X13130437-01
4E954	50D47-945	50E47-70	780-785	HS780-17NR-104A	HS780-34NR-106A	S890H1002	X13130437010
4E955	50D47-955	50E47-841	780-786	HS780-17NR-106A	HS780-34NR-304A	S890H1010	X13130437020
4E956	50D47-965	50E47-843	780-787	HS780-17NR-108A	HS780-34NR-306A	S890H1028	X13130437-03
50D47-1	50D47-975	50E47-851	780-788	HS780-17NR-304A	HS780-34NR-308A	S8910U	X13130437030
50D47-101	50E47-1	50E47-860	780-789	HS780-17NR-306A	HS780-34NR-312A	S8910U1000	X13130437040
50D47-120	50E47-10	50E47-861	780-790	HS780-17NR-308A	HS780-34PL-104A	S89C1004	X13130437060
50D47-140	50E47-101	50E47-870	780-910	HS780-17NR-312A	HS780-34PL-106A	S89C1012	X13130437080
50D47-150	50E47-110	50F47-101	832-002	HS780-17PL-106A	HS780-34PL-108A	S89C1046	X324601
50D47-160	50E47-120	50F47-140	832-005	HS780-17PL-108A	HS780-34PL-304A	S89C1079	

50D50-842

50D50-842 UNIVERSAL DIRECT SPARK IGNITION CONTROL KIT FOR ALL GASES

Microprocessor Based Gas Ignition Control for Heating Appliance Using Either Natural or LP Gas. Proof of Flames is Accomplished. The Unit is Designed as a Direct Spark Ignition Source

FEATURES

- Color LED indicator for diagnostics.
- 1/4″ and 3/16″ quick connect terminals.
- Program keys.
- Damper interface.

SPECIFICATIONS

Electrical Ratings . . . . . Input 18-30 VAC, 25 VAC nominal
Maximum Input Current @ 25 VAC . . . . 0.2A + MV @ 25°C
Ambient Operating Range . . . . . -40° to +175°F
Flame Establishment Time . . . . . .8 sec
Mounting. . . . . Multipoise
Agency Approvals. . . . . CSA USA / CANADA

TECH
PAGE
189

50D50-842 CONFIGURATION OPTIONS (All Times in Seconds)

Model Number	Key	Trial for Ignition	Prepurge	Retries	Interpurge
50D50-842	A	4	0	2	90 sec.
	B	4	30	2	90 sec.
	C	7	0	2	90 sec.
	D	7	30	2	90 sec.
	E	7	0	0	N/A
	F	7	30	0	N/A
	G	11	0	0	N/A
	H	11	30	0	N/A

50D50-843

50D50-843 UNIVERSAL PROVEN PILOT SPARK CONTROL KIT FOR ALL GASES

Microprocessor Based Gas Ignition and Primary Safety Control Designed for Interrupted Spark and Burner Supervision of All Gases Used in Gas Fired Appliance Applications

FEATURES

- Field service replacement for most Honeywell, Robertshaw, Johnson Controls and UTEC Intermittent Pilot Ignition Controls.
- Provides ignition, proof of ignition and precise timing.
- Works with single rod or dual rod remote sensor.
- Color LED indicator for diagnostics.

SPECIFICATIONS

Electrical Ratings . . . . . Input 18-30 VAC, 25 VAC nominal
Maximum Input Current @ 25 VAC . . . . 0.2A + MV + PV @ 25°C
Flame Out Recognition Time . . . . . 8 seconds
Ambient Operating Range . . . . . -40° to +176°F (-40° to +80°C)
Dimensions. . . . . 4.13″L x 4.13″W x 1.5″H
Agency Approvals. . . . . CSA USA/CANADA

TECH
PAGE
189

50D50-843 CONFIGURATION OPTIONS (All Times in Seconds)

Model Number	Key	Reset Time	Prepurge	Retries	Safety Time
50D50-843	A	300	0	Continuous	90
	B	300	30	Continuous	90
	C	300	0	Continuous	30
	D	300	30	Continuous	30
	E	300	0	2	60
	F	300	30	2	60
	G	300	0	Continuous	15
	H	N/A	30	N/A	Continuous
	I	300	0	Continuous	4
	J	300	30	Continuous	4

5059-23
Pilot Relite Control

5059 SERIES PILOT RELITE CONTROLS
Generates Spark Until a Pilot Flame is Sensed

FEATURES

- Generates spark pulse until flame is sensed through spark electrode.
- Begins sparking immediately if flame extinguishes.
- Rugged solid state module design.
- Spark plug or spike output configurations available.

SPECIFICATIONS

Agency . . . . . C.S.A. approved

Number Model	Input Voltage	Electrical Rating	Description
5059-23	24 VAC	0.03 amps	Spark plug and 1/4″ spade connectors
5059-134	24 VAC	0.03 amps	Spike connector

760-56

760-56 IGNITION ELECTRODE ASSEMBLIES
Use Type 760-56 to Replace Cycle-Pilot® Ignition Electrodes and Cable Assemblies

Number Model	Description
760-56	24″ lead with slip on bracket. Also includes perforated mounting strap for varying applications

760-401
Flame Sensor

760 SERIES FLAME SENSORS FOR HSI
Flame Sensors can be Mounted Remotely on Multiple Burners

FEATURES

- High quality Alumina ceramic insulator.
- High temperature Kanthal flame rod material that can withstand 1800°F.
- Teflon insulated (250°C rating) lead wire.
- Single screw, plated steel mounting bracket.

SPECIFICATIONS

Agency . . . . . C.S.A approved

Model Number	Lead Length	Electrical Connection
760-401	30″	1/4″ female spade terminal
760-802 ①	30″	1/4″ female spade terminal

① Exact replacement for O.E.M. model

21D64-2

21D64-5PK

21D64 SERIES HOTROD UNIVERSAL NITRIDE IGNITOR UPGRADE KIT

120V Nitride Upgrade Kit for Conversion of Silicon Carbide (Flat or Spiral)

FEATURES

- Robust Ignitor Design – for longer life and fewer callbacks – 5 year warranty
- Nitride Ignitor with 15.5″ leads
- “Universal” mounting bracket and screw and ceramic wire nuts

SPECIFICATIONS

Input Voltage. . . . . 102-132 VAC, 60 Hz
Max. Load Current . . . . . 3.0 A @ 132 VAC, 25°C
Timing Rating . . . . . 17 sec. minimum
Load Insulation Temp. Rating . . . . . 250°C

Model Number	Lead Length	Description
21D64-2	15.5″	Kit includes nitride ignitor, universal mounting bracket and connection harness
21D64-5PK	15.5″	HotRod 5-pack contains 5 single pack ignitor kits

768A SERIES NITRIDE IGNITORS

OEM Replacement for Nitride Ignitors

768A-815

768A-842

Model Number	Terminal Type	Replace OEM Models	
768A-815 New!	2 terminal AMP receptacle, .083 female sockets	Trane	A341947P01
			768A-015
			A341990P01
			IGN00117
768A-842	2 terminal AMP receptacle, .093 female sockets	Amana	11111701
			768A-2
			768A-842
768A-843	2 terminal AMP receptacle, .084 female sockets	Thermo Products	380650
			768A-843
			768A-843
768A-844	2 terminal AMP receptacle, .084 female sockets	Lennox Industries	41K5601
			768A-4
			768A-844
		Rheem	62-24134-02
768A-845	2 terminal AMP receptacle, .084 female sockets	Trane	768A-5
			768A-845
			IGN00104
			X13130524010

768A-844

768A-843

768A-845

767A-356

767A-357

767A-361

767A-365

767A-366

767A-369

767A-370

767A SERIES
SILICON CARBIDE HOT SURFACE IGNITORS
Highly Reliable Ignition Source

FEATURES

- Multiple mounting styles.
- Works with 15, 17 or 45 second HSI systems.

SPECIFICATIONS

Electrical Rating . . . . . 120 VAC, 60 Hz
Agency . . . . . C.S.A. approved

Model Number	Lead Length	Lead Insulation Temp. Rating	Electrical Connection	Ceramic Insulator & Electrical Connections (See Fig.)
767A-356	6″	200°C	Receptacle with .093″ Male Pins	A
767A-357	5.25″	200°C	Receptacle with .093″ Male Pins	B
767A-361	5.25″	200°C	Receptacle with .093″ Male Pins	C
767A-365	5.688″	200°C	1/4″ Female Spade Terminals	D
767A-366	5.313″	200°C	AMP 1-480699-0 Electrical Conn. Receptacle with .093″ Male Pins	E
767A-369	5.5″	200°C	Molex Internally Keyed Connector with .093″ Male Pins	F
767A-370	5.25″	200°C	Receptacle with .093″ Male Pins	G
767A-371	19.125″	200°C	Stripped Ends	H
767A-372	5.25″	200°C	Molex Side Lock Connector with .092″ Male Pins	I
767A-373	5.25″	200°C	Receptacle with .093″ Male Pins	J
767A-374	11″	200°C	Stripped Ends	K
767A-375	1.375″	200°C	1/4″ Female Spade Terminals	L
767A-376	4.5″	200°C	Molex Front Lock Connector with .092″ Male Pins	M
767A-377	4.5″	200°C	Molex Front Lock Connector with .092″ Male Pins	N
767A-378	5.125″	200°C	Electrical Connector matches AMANA #20165702	O
767A-379	7.5″	200°C	Electrical Connector matches YORK #025-33421-000	P
767A-380	6.125″	200°C	Electrical Connector matches ARMSTRONG #44744-2	Q
767A-381	7.5″	200°C	Electrical Connector matches YORK #473-20937-001	P
767A-382	5.25″	200°C	Receptacle with .093″ Male Pins	G
767A-383	5.25″	200°C	Molex Side Lock Connector with .092″ Male Pins	I
767A-384	5.25″	200°C	Receptacle with .093″ Male Pins	J

TECHNICAL HELP

Dimension drawings . . . . . see next page

767A-371

767A-372

767A-373

767A-374

767A-375

767A-376

767A-377

767A-378

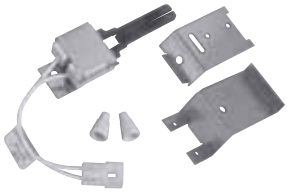
767A-379

767A-380

767A-381

767A-382

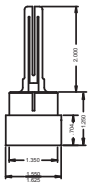
767A-383



767A-384

A

767A-356

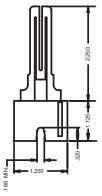


Lead Length 6.0

.093 Dia. Male Pin Terminals

B

767A-357

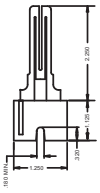


Lead Length 5.25

.093 Dia. Male Pin Terminals

C

767A-361

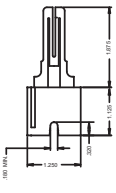


Lead Length 5.25

.093 Dia. Male Pin Terminals

D

767A-365

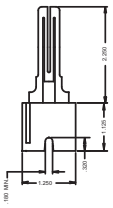


Lead Length 5.688

Uninsulated .250 Female Spade Terminals

E

767A-366

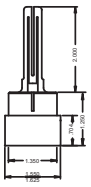


Lead Length 5.313

AMP Type 1-480699-0 .093 Dia. Male Pin Terminals

F

767A-369

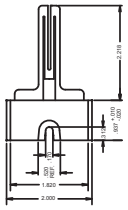


Lead Length 5.50

.093 Dia. Male Pin Terminals

G

767A-370/767A-382

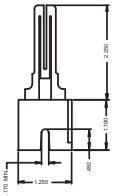


Lead Length 5.25

.093 Dia. Male Pin Terminals

H

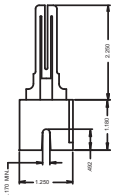
767A-371



Lead Length 19.125

I

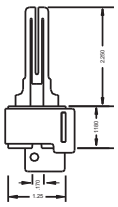
767A-372/767A-384



Lead Length 5.25

J

767A-373/767A-384

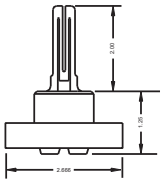


Lead Length 5.25

.093 DIA. MALE PIN TERMINALS

K

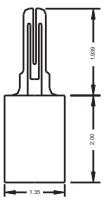
767A-374



Lead Length 11.00

L

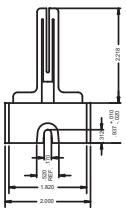
767A-375



Lead Length 1.375

M

767A-376

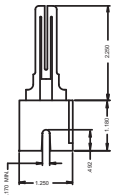


Lead Length 5.00

MOLEX CONNECTOR

N

767A-377

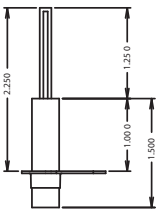


Lead Length 5.25

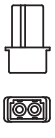
MOLEX CONNECTOR

O

767A-378

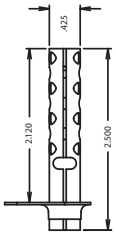


Lead Length 5.125

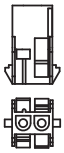


P

767-379/ 767A-381

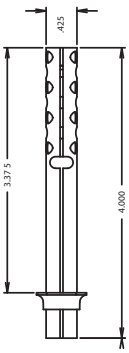


Lead Length 7.500

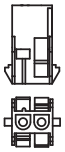


Q

767A-380



Lead Length 6.125



H06E / F SERIES UNIVERSAL REPLACEMENT THERMOCOUPLES

Specially Designed for Universal Replacement.
Thermocouples are Priced Individually, Order Only in Multiples of 10

FEATURES

- Stainless steel element construction for prolonged thermocouple life.
- Each kit individually enclosed in plastic.
- Universal adapter fittings included with each kit for replacing thermocouple in most types of pilot burners.
- Visible instructions for quick, easy installation.
- Available in a variety of 10-packs in desired thermocouple lengths.
- Standard thermocouple 11 / 32″ double lead thread.
- Replaces Honeywell Q34A, Johnson K19, Robershaw 1980 and White-Rodgers H06E.

H06E

THERMOCOUPLES

Model Number Standard ①	Description
H06E-18	18″ thermocouple
H06E-24	18″ thermocouple
H06E-30	30″ thermocouple
H06E-36	36″ thermocouple
H06E-48	48″ thermocouple

① Hot junction maximum temperature rating: 1450°F

JUNCTION BOX THERMOCOUPLE WITH ENERGY CUT-OFF (ECO)

Model Number	Description
H06F-36	36″ Coiled Thermocouple

G01A-332

G01A-501

750 MILLIVOLT POWER GENERATORS

Provides Power for 750 Millivolt Self-Generation Control Systems

FEATURES

- For replacement of similar screw-in type generators now in field or for use with type E31-12 pilot burner.
- G01A-332 has 36 inch armored cable leads with split-spade terminals.
- PG9 adapter included with each G01A-332. PG9 adapter also offered individually.
- 101934F32 / 101934R32 designed for use with PG9.

750 MV

Model Number	MV Output	Length	Fiberglass Cable Leads	Armored Cable Leads	PG9 Adapter	Clip	Connector Type
101934R32	750	32	X				R Bushing
G01A-332	750	36		X	X	X	F Spade Terminal
G01A-502	750	36		X		X	F Spade Terminal
G01A-512	750	36	X		X	X	F Spade Terminal
🍁 **G01A-132**	750	36		X	X	X	F Spade Terminal

750 MV

Model Number	MV Output	Length	Fiberglass Cable Leads	Connector Type
101934F32	750	32	X	F Spade Terminal
G01A-501	750	36	X	F Spade Terminal

PG9A41JT20

PG9 PILOT GENERATORS

Provides a Pilot Flame for Igniting Gas Burners while Generating Millivolt Output to Operate Gas Valves and Relays

FEATURES

- Single blue flame burner for quiet operation and maximum flame stability.
- “Snorkel” primary air path incinerates dust eliminating linting problems.
- All models provided with orifice base fittings for Natural and LP.
- Flame ring surrounding generator ensures high output and extended generator life.
- High temperature stainless steel generator cover.

SPECIFICATIONS

Output Voltage . . . . . 750 millivolts nominal, open circuit
Agency . . . . . IAS certified

Model Number	Head Type	Porting	Orifice
PG9A27JTL22 ①	Channel Type	90° right & 90° left, 3/4″ head width	.022
PG9A41JTL20 ①	Cobra	90° left	.020
PG9A42JTL20 ①	Cobra	90° right	.020

① Universal replacement includes extra base fitting for LP gas application (less ferrule and nut)

🍁 Indicates Canadian Model Number: call 1-800-305-6953 to order

3046-5

3046-5 MERCURY FLAME SENSOR

Prevent Gas Flow to Main Burner if Pilot Flame is Not Burning or is Insufficient to Properly Ignite Main Burner

FEATURES

- Sensor combines a rugged Snap-Action switch and powerful mercury actuated thermal element.
- May be used with natural, manufactured or mixed gases and with LP gases where means are provided for obtaining automatic pilot gas shut-off.
- Switch may be conveniently mounted in any position.
- Cover is easily removed, making switch terminals readily accessible.
- No button to depress – Sensor is recycling type which requires relighting or possible restoration of proper gas pressure to return to operation.

SPECIFICATIONS

Timing . . . . . Contacts close approximately 60 seconds after pilot is ignited; open approximately 40 seconds after flame is extinguished

Agency . . . . . U.L. recognized and C.S.A. approved

Dimension . . . . . $2^{3}/_{4}$″H x $2^{1}/_{16}$″ W x $1^{7}/_{8}$″D

Model Number	Element Length	Electrical Rating		
		120 VAC	240 VAC	30 VAC
3046-5	48″	125 VA	125 VA	90 VA

30A46-5

30A46 SERIES
PLUG-IN TYPE MERCURY FLAME SENSORS

Designed for Use with White-Rodgers Diaphragm, “Cushioned Power” or “Silent Knight” Gas Valves Having Plug-In Receptacle

FEATURES

- Plug-in feature requires no additional electrical connections or mounting devices.
- Sensor combines a rugged Snap-Action SPDT switch and powerful mercury actuated thermal element.
- May be used with natural, manufactured or mixed gases and with LP gases where means are provided for obtaining automatic pilot gas shut-off.
- No button to depress – Sensors are recycling type which require relighting or possible restoration of proper gas pressure to return to operation.
- The SPDT switch can energize ignitor circuit to relight pilot (as with roof top units).

SPECIFICATIONS

Timing . . . . . Contacts close approximately 60 seconds after pilot is ignited; open approximately 40 seconds after flame is extinguished

Agency . . . . . C.S.A. approved

Model Number	Element Length	Electrical Rating			
		120 VAC	240 VAC	30 VAC	
30A46-5	48″	125 VA	125 VA	90 VA	stud mount element
30A46-105	12″	125 VA	125 VA	90 VA	sleeve over element, no stud mount

3098-134

3049 / 3098 SERIES MERCURY FLAME SENSORS

For Proving Pilot Flame and Controlling Main Valve in Cycle Pilot Applications

FEATURES

- Bulb styles are designed to fit with various OEM applications.
- See Cross Reference to OEM control type numbers on next page.
- Adapter fittings to allow use of these mercury flame sensors with competitive burners are packed with controls identified with ①.

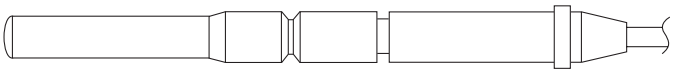
SPECIFICATIONS

Agency . . . . . C.S.A. approved
Maximum temperature . . . . . 1450°F at bulb tip

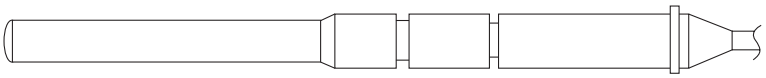
Model Number	Element Length	Panel Type	Bulb Style	Description
3049-115 ①	48″	D	#20	Replaces bulb styles #17 or #18
3098-134 ①	48″	E	#19	Replaces bulb styles #9 or #13
3098-156 ①	48″	E	#20	Replaces bulb styles #17 or #18

① Includes adapter fittings.

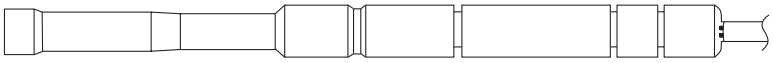
CONTRACTOR TIP: Mercury flame sensors can only be replaced by cross referencing the original mercury flame sensor model number. They can not be replaced by gas valve model number. See next page.



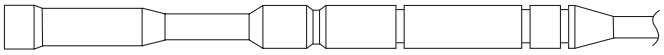
Bulb Style #9



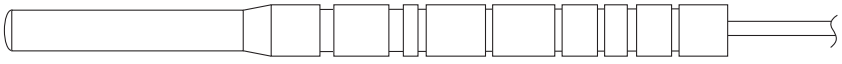
Bulb Style #13



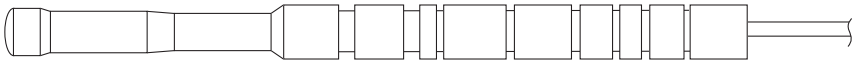
Bulb Style #17



Bulb Style #18



Bulb Style #19

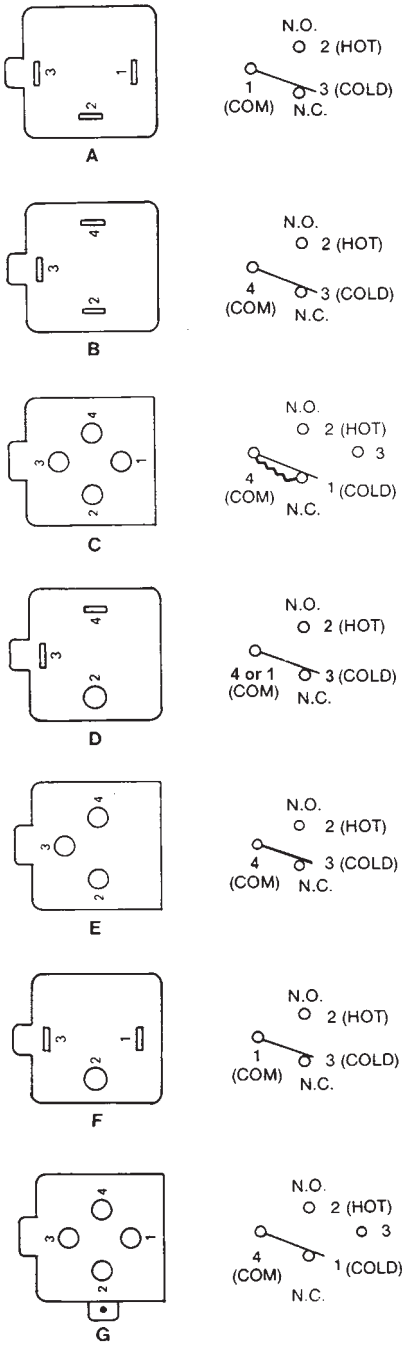


Bulb Style #20

MERCURY FLAME SENSOR CROSS REFERENCE

White-Rodgers

TERMINAL PANELS CONFIGURATIONS



TYPES WITH SPADE TERMINALS

O.E.M. Number	Original Capillary Length	Original Panel Types②	Suggested Replacement
3049-1	30 or 48″	A	None
3049-3	26″	A	None
3049-4	33″	A	None
3049-5	48″	B	None
3049-6	12″	B	None
3049-7	24″	B	None
3049-11	24″	B	None ①
3049-15	33″	A	None
3049-18	30 or 33″	D	None
3049-20	42″	B	None ①
3049-29	20″	B	None
3049-31	12″	B	None
3049-32	12″	B	None
3049-33	24″	B	None
3049-36	48″	B	None
3049-37	30″	B	None
3049-41	24 or 48″	B	None
3049-49	42″	B	None
3049-52	30″	B, D	3049-115
3049-54	30″	B	3049-115
3049-55	30″	A, D	3049-115
3049-58	30″	B	None

O.E.M. Number	Original Capillary Length	Original Panel Types②	Suggested Replacement
3049-59	30″	B	None ①
3049-61	24″	B	None
3049-62	18″	B	None ①
3049-64	48″	D	None
3049-66	30″	B	3049-115
3049-68	30″	B	3049-115
3049-70	30″	B	None ①
3049-71	30″	B	None
3049-72	30″	E	None ①
3049-101	24″	B	None ①
3049-105	42″	B	3049-115
3049-106	24″	D	3049-115
3049-107	12″	B, D	3049-115
3049-111	24″	B, D	3049-115
3049-112	18″	B, D	3049-115
3049-114	30″	D	3049-115
3049-115	48″	D	3049-115
3049-119	24″	B	3049-115
3049-120	30″	B	3049-115
3049-121	18 or 42″	B	3049-115
3049-537	30″	B	None ①
3049-561	24″	B	None ①

PLUG-IN TYPES

O.E.M. Number	Original Capillary Length	Original Panel Types②	Suggested Replacement Type Number
3094-102	30″	C ③	None
3094-111	30″	C ③	None ①
3094-118	48″	C ③	None
3094-122	30″	C ③	None ①
3094-123	30″	G	None
3094-127	48″	C ③	None
3094-131	22″	C ③	None ①
3098-111	30″	E	3098-134
3098-117	24″	E	None ①
3098-120	30″	E	None ①
3098-122	30″	E	3098-156
3098-126	30″	E	3098-156
3098-127	24″	E	3098-156
3098-130	24″	E	3098-156
3098-131	30″	E	3098-156
3098-134	48″	E	3098-134
3098-135	48″	E	None ①
3098-136	30″	E	3098-134
3098-137	12″	E	None ①
3098-139	36″	E	None ①

O.E.M. Number	Original Capillary Length	Original Panel Types②	Suggested Replacement Type Number
3098-141	48″	E	3098-134
3098-142	30″	E	3098-156
3098-143	36″	E	3098-156
3098-147	18″	E	3098-134
3098-148	48″	E	None ①
3098-149	24 or 42″	E	3098-156
3098-151	26 or 33″	E	None ①
3098-153	24″	E	3098-156
3098-156	48″	E	3098-156
3098-161	24 or 30″	E	3098-134
3098-165	48″	E	3098-134
3098-168	48″	E	3098-156
3098-169	27″	E	3098-134
3098-171	30 or 42″	E	3098-156
3094-174	36″	E	3098-156
3098-175	18″	E	3098-156
3098-177	24″	E	None ①
3098-178	30″	E	None ①
3098-182	24 or 42″	E	3098-156
3098-183	12″	E	None ①
3098-184	42″	E	3098-134
3098-522	30″	E	None
3098-536	30″	E	None ①

① Consult the O.E.M. for replacement or retrofit.
② Suggested replacement type may have different panel configuration. Some controls experienced modification. Determine proper wiring with the aid of panel diagrams A through G.
③ Note: Panel type C featured an Electrical Quick Shut-Off Resistor (see diagram)

CONTRACTOR TIP: Mercury flame sensors can only be replaced by cross referencing the original mercury flame sensor model number. They can not be replaced by gas valve model number.

775-1

775-1 ATTIC FAN CONTROL

Ideal for Replacement of Similar Type Controls

FEATURES

- For use where space is limited.
- Small bimetal sensing element.
- Snap-Action switch.
- Fan control has adjustable range with direct reading temperature dial.

SPECIFICATIONS

Dimensions for 775. . . . . 2.8″H x 3.59″W x 2.02″D

Model Number	Description	Range	Differential	Switch Action	Motor Rating – Full Load		Pilot Duty
					120 VAC	240 VAC	
775-1	Attic Fan Control with Thermal Limiter	60 to 120°F ① (15 to 49°C)	Fixed 10°F (6°C)	Close on Rise	9.0 A	—	—

① Thermal limiter opens at 183°F (84°C)

230-22

230-22 TEMPERATURE CONTROL FOR HEATING

Provide Regulation of Duct Temperatures in Conjunction with Air Handling Units or Control of Circulator for Indoor-Outdoor Regulation from a Remote Point

FEATURES

- Hydraulic action element – Unaffected by vibration.
- Switch case mounts in any position – No leveling required. Includes bulb mounting clip.
- High electrical rating permits operation of most equipment without use of relays or motor starters.
- Dustproof steel case – Dial visible and can be adjusted through cover. Case has knockouts on top and bottom.
- Temperature dial graduated in °F and °C.

SPECIFICATIONS

Dimensions. . . . . $5^{3}/_{4}$″H x $2^{5}/_{16}$″ W x $2^{9}/_{16}$″D
Finish . . . . . Grey
Agency . . . . . U.L. listed and C.S.A. approved

Model Number	Range	Differential	Capillary Length	Bulb Size	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Resistive (Non-inductive)	
							120 VAC	240 VAC	120 VAC	240 VAC
230-22 ①	20 to 120°F (-6 to +49°C)	Adj. 4 to 30°F (2.2 to 17°C)	8 ft.	$6^{1}/_{4}$ x $^{3}/_{8}$″	Open on Rise	FG See page 222	14.0A	7.0A	25.0A	22.0A

① U.L. approved adjustable dial stop, factory set at 90°F maximum.

5D51-35

5D51 SERIES
UNIVERSAL FAN AND LIMIT CONTROLS

Single Element Type for Applications with Narrow Space Limitations. Regulates Fan or Blower Operation and Acts as High Limit Safety Control

FEATURES

- Slotted mounting holes for easy installation.
- Long terminal screws for wiring — Junctions can be made on terminal block.
- Dial has individual pointers for fan cut-in and cut-out settings.
- Removable solid copper jumper between fan and limit switches.
- Summer fan switch for ventilation without changing control settings. Has same fan and limit switch mechanism.

SPECIFICATIONS

Agency . . . . . U.L. recognized and C.S.A. approved
Dimensions. . . . . 2.9″W x 4.3″H x 1.6″D

Model Number	Element Length	Description	Range	Differential	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Valves and Relays	
							120 VAC	240 VAC	24 VAC	0.3-12V DC
5D51-35	5″	Fan	50 to 265°F (10 to 129°C)	Adjustable 15°F minimum Fixed 25°F	Close on Rise	HT See page 222	14.0A	7.0A	5.6A	—
5D51-90	8″	Limit	100 to 300°F (38 to 149°C)		Open on Rise	HTV See page 222	10.0A	6.0A	6.0A	1.0A
5D51-78	11″									

3L09 SERIES BOARD MOUNT LIMIT CONTROLS

1/2″ Bimetal Disc with Ranges for Your System Needs

FEATURES

- Proven reliability in a compact, versatile, cost-effective design.
- Provides high-speed contact separation.
- OEM replacement for competitive models.

TECH
PAGES 194–196

SPECIFICATIONS

Dimension drawings and specifications . . . . . See pages 194–196

Model Number	Figure (pages 194-196)	Construction (pages 194-196)	Opens/ Closes (°F)	Length (in inches)	TOD Type	TOD Style
3L09-1	1		140/100	1.87	36T	612700
3L09-2	1		170/130	1.87	36T	612708
3L09-3	2	A	140/110	3.12	36T	612701
3L09-4	2	C	150/130	3.12	36T	612703
3L09-5	2	C	160/140	3.12	36T	612706
3L09-6	2	B	170/130	3.12	36T	612710
3L09-7	2	A	175/145	3.12	36T	612711
3L09-8	2	B	180/140	3.12	36T	612714
3L09-9	2	C	190/170	3.12	36T	612715
3L09-10	2	B	200/160	3.12	36T	612718
3L09-11	2	B	210/170	3.12	36T	612719
3L09-12	2	B	220/180	3.12	36T	612722
3L09-13	2	A	240/210	3.12	36T	612723
3L09-14	2	B	250/210	3.12	36T	612725

Model Number	Figure (pages 194-196)	Construction (pages 194-196)	Opens/ Closes (°F)	Length (in inches)	TOD Type	TOD Style
3L09-15	2	A	260/230	3.12	36T	612727
3L09-16	3	A	150/130	3.12	36T	612704
3L09-17	3	A	250/225	3.12	36T	612726
3L09-18	3	B	155/125	7.12	36T	612705
3L09-19	3	B	175/145	7.12	36T	612712
3L09-20	3	B	240/210	7.12	36T	612724
3L09-22	4	A	160/140	3.12	36T	612707
3L09-23	4	A	170/150	3.12	36T	612709
3L09-24	4	B	190/170	3.12	36T	612716
3L09-25	4	B	200/180	3.12	36T	612717
3L09-26	5		180/160	1.87	36T	612713
3L09-27	5		220/200	1.87	36T	612721
3L09-28	6		210/180	3.12	36T	612720

3F01-140

F6-1798 (1 per pack)

3F01 SERIES SNAP DISC FAN CONTROLS

For Regulation of Fan or Blower Control

FEATURES

- Designed for quick on-job replacement.
- Easy to remember type numbers — “L” for Limit — “F” for Fan.
- Last three numbers indicate cut-out temperatures on limits and cut-in temperatures on fan controls.
- Mounting holes match standard ¾″ snap discs.
- Tab-to-screw terminal adapters furnished.

SPECIFICATIONS

Maximum ambient . . . . . 350°F

ELECTRICAL RATINGS

Model Number	Motor Rating (Full Load)		Resistive (Non-Inductive)		Pilot Duty
	120 VAC	240 VAC	120/240 VAC	277 VAC	120/240/277 VAC
3F01, 3F02	10.0A	5.0A	25.0A	21.6A	125 VA

PARTS AND ACCESSORIES

- F6-1798 Adapter plates (Order separately) — 1 per pack

FAN CONTROLS

Model Number	Fixed Temperature Settings		Switch Action	Therm-O-Disc	
	Cut-in	Cut-out		Style	Type
3F01-110	110°F (43°C)	90°F (32°C)	Close on Rise	60T12	610044
3F01-120	120°F (49°C)	110°F (43°C)	Close on Rise	60T12	610046
3F01-130	130°F (54°C)	115°F (46°C)	Close on Rise	60T12	610047
3F01-140	140°F (60°C)	120°F (49°C)	Close on Rise	60T12	610049
3F01-150	150°F (66°C)	130°F (54°C)	Close on Rise	60T12	610050
3F01-160	160°F (71°C)	140°F (60°C)	Close on Rise	60T12	610064
3F01-180	180°F (82°C)	160°F (71°C)	Close on Rise	60T12	610065
3F01-200	200°F (93°C)	180°F (82°C)	Close on Rise	60T12	610066
3F01-350	350°F (177°C)	320°F (160°C)	Close on Rise	60T12	610067

3L01-180

3L02-190

3L03-140

3L SERIES SNAP DISC FAN OR LIMIT CONTROLS

For Regulation of Fan, Blower or High Limit Safety Control

SPECIFICATIONS

ELECTRICAL RATINGS

Electrical Rating (AC) for Model Numbers	Motor Rating (Full Load)		Resistive (Non-Inductive)		Pilot Duty
	120 VAC	240 VAC	120/240 VAC	277 VAC	120/240/277 VAC
3L01	10.0A	5.0A	25.0A	21.6A	125 VA
3L02	10.0A	5.0A	25.0A	21.6A	125 VA
3L03: 1 & 2 Close on Rise	5.8A	2.9A	—	—	125 VA
3L03: 1 & 3 Open on Rise	10.0A	5.0A	25.0A	21.6A	125 VA

Model Number	Fixed Temperature Settings		Switch Action	Therm-O-Disc	
	Cut-in	Cut-out		Style	Type
3L01-120	110°F (43°C)	120°F (49°C)	Open on Rise	60T11	610000
3L01-130*	115°F (46°C)	130°F (54°C)	Open on Rise	60T11	610002
3L01-140	100°F (38°C)	140°F (60°C)	Open on Rise	60T11	610006
3L01-150	110°F (43°C)	150°F (66°C)	Open on Rise	60T11	610009
3L01-165	125°F (52°C)	165°F (74°C)	Open on Rise	60T11	610069
3L01-170	130°F (54°C)	170°F (77°C)	Open on Rise	60T11	610012
3L01-180	140°F (60°C)	180°F (82°C)	Open on Rise	60T11	610013
3L01-190	150°F (66°C)	190°F (88°C)	Open on Rise	60T11	610015
3L01-200	160°F (71°C)	200°F (93°C)	Open on Rise	60T11	610016
3L01-230	190°F (88°C)	230°F (110°C)	Open on Rise	60T11	610021
3L01-250**	210°F (99°C)	250°F (121°C)	Open on Rise	60T11	610023
3L01-300*	250°F (121°C)	300°F (149°C)	Open on Rise	60T11	610026
3L01-350	310°F (154°C)	350°F (177°C)	Open on Rise	60T11	610068

*3L01-130 and -300 terminals at 45° angle
**3L01-250 terminals horizontal to bracket

LIMIT CONTROLS – MANUAL RESET

Model Number	Fixed Temperature Settings		Switch Action	Therm-O-Disc	
	Cut-in	Cut-out		Style	Type
3L02-160	Manual Reset	160°F (71°C)	Open on Rise	60T15	330534
3L02-170		170°F (77°C)	Open on Rise	60T15	330535
3L02-180		180°F (82°C)	Open on Rise	60T15	330536
3L02-190		190°F (88°C)	Open on Rise	60T15	330537
3L02-200		200°F (93°C)	Open on Rise	60T15	330538

SPDT CONTROLS

Model Number	Fixed Temperature Settings				Switch Action	Therm-O-Disc	
	Terminal 1 & 3		Terminal 1 & 2				
	Cut-in	Cut-out	Cut-in	Cut-out		Style	Type
3L03-140	140°F (60°C)	120°F (49°C)	190°F (88°C)	170°F (77°C)	SPDT	60T13	611015
3L03-190	190°F (88°C)	170°F (77°C)	140°F (60°C)	120°F (49°C)	SPDT	60T13	611014

3F05-1

3L05-1

F6-1798 (1 per pack)

3F05 / 3L05 SERIES
ADJUSTABLE SNAP DISC FAN & LIMIT CONTROLS

Adjustable Snap Disc Thermostat Allows You to Set the Temperature Set Point to Match Your Specific Needs which Simplifies Inventory

FEATURES

- ¼″ quick connect terminals are standard.
- Reduces inventory while providing coverage for a wide range of temperature applications.
- Replaces the majority of fixed disc thermostats now on heating equipment and various appliances.
- 2 adjustable fan control models replace 7 fixed snap disc models.
- 5 adjustable limit control models replace 10 fixed snap disc models.

SPECIFICATIONS

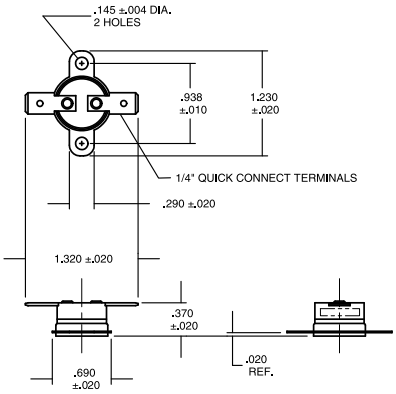
ELECTRICAL RATINGS

VAC	Resistive (Non-Inductive)	Motor Rating (Inductive)		
	120 VAC	Full Load	Locked Rotor	Pilot Duty
120	25.0A	14.0A	72.0A	125 VA
240	25.0A	10.0A	60.0A	125 VA

PARTS AND ACCESSORIES

- F6-1798 Adapter plates (Order separately) — 1 per pack

Model Number	Temperature Range	Differential	Switch Action	Function	Accessories	Therm-O-Disc	
						Style	Type
3F05-1	90 to 130°F	20°F	SPST	Fan Controls (Close on Rise)	Includes thermostat and tab-to-screw terminals	74T12	310708
3F05-2	140 to 180°F	20°F	SPST			74T12	310709
3L05-1	135 to 175°F	40°F	SPST	Limit Controls (Open on Rise)		74T11	310710
3L05-2	175 to 215°F	40°F	SPST			74T11	310711
3L05-3	210 to 250°F	40°F	SPST			74T11	310712
3L05-10	135 to 175°F	20°F	SPST			74T11	310724
3L05-13	250 to 290°F	40°F	SPST			74T11	310730



3L11 / 3F11 SERIES
1/2″ BIMETAL DISC THERMOSTATS
Bimetal Disc Thermostats for Appliance and HVAC

FEATURES

- Loose ring, stainless steel mounting brackets.
- 1/4″ quick connect terminations.
- Automatic reset.
- Aluminum disc cup.

SPECIFICATIONS

Single pole, single throw
Available in either open or close on temperature rise
Electrical Ratings
Resistive . . . . . 15A @ 120 VAC, 10A @ 240 VAC
Inductive . . . . . 3.0FLA, 12.0LRA @ 120 VAC; 1.5FLA, 6.0LRA @ 240 VAC
Pilot Duty . . . . . 125 VA
Dimensions. . . . . Length (1.23″), case width (1.32″), height (.37″)
Weight . . . . . 0.2 oz.
Agency . . . . . UL Recognized File #E19279
CSA Certified File Number LR77886/LR109556
VDE Lic. 118631

Model Number	Description	Temperature °F / °C	Differential °F / °C	Therm-O-Disc Type	Therm-O-Disc Style
3L11-60	Open on rise	55 to 65 (°F), 13 to 18 (°C)	20 (°F), 12 (°C)	36T21	10842
3L11-85	Open on rise	80 to 90 (°F), 27 to 32 (°C)	15 (°F), 8 (°C)	36T21	10843
3F11-100	Close on rise	93 to 107 (°F), 34 to 42 (°C)	30 (°F), 17 (°C)	36T22	10844
3L11-110	Open on rise	105 to 115 (°F), 41 to 46 (°C)	30 (°F), 17 (°C)	36T21	10845
3L11-120	Open on rise	115 to 125 (°F), 46 to 52 (°C)	30 (°F), 17 (°C)	36T21	10846
3F11-120	Close on rise	113 to 127 (°F), 45 to 53 (°C)	30 (°F), 17 (°C)	36T22	10847
3L11-140	Open on rise	135 to 145 (°F), 57 to 63 (°C)	30 (°F), 17 (°C)	36T21	10848
3F11-140	Close on rise	133 to 147 (°F), 56 to 64 (°C)	30 (°F), 17 (°C)	36T22	10849
3L11-150	Open on rise	145 to 155 (°F), 63 to 68 (°C)	30 (°F), 17 (°C)	36T21	10850
3L11-160	Open on rise	155 to 165 (°F), 68 to 74 (°C)	30 (°F), 17 (°C)	36T21	10851
3L11-170	Open on rise	165 to 175 (°F), 74 to 79 (°C)	30 (°F), 17 (°C)	36T21	10852
3F11-170	Close on rise	162 to 178 (°F), 72 to 81 (°C)	30 (°F), 17 (°C)	36T22	10853
3L11-175	Open on rise	170 to 180 (°F), 77 to 82 (°C)	15 (°F), 8 (°C)	36T21	10854
3L11-180	Open on rise	175 to 185 (°F), 79 to 85 (°C)	30 (°F), 17 (°C)	36T21	10855
3F11-180	Close on rise	172 to 188 (°F), 78 to 87 (°C)	30 (°F), 17 (°C)	36T22	10856
3L11-190	Open on rise	185 to 195 (°F), 85 to 91 (°C)	30 (°F), 17 (°C)	36T21	10857
3L11-210	Open on rise	204 to 216 (°F), 96 to 102 (°C)	30 (°F), 17 (°C)	36T21	10858
3L11-220	Open on rise	214 to 226 (°F), 101 to 108 (°C)	30 (°F), 17 (°C)	36T21	10859
3F11-225	Close on rise	217 to 232 (°F), 103 to 111 (°C)	30 (°F), 17 (°C)	36T22	10860
3L11-230	Open on rise	224 to 236 (°F), 107 to 113 (°C)	30 (°F), 17 (°C)	36T21	10861
3F11-240	Close on rise	229 to 251 (°F), 109 to 122 (°C)	100 (°F), 56 (°C)	36T22	10862
3L11-250	Open on rise	224 to 256 (°F), 118 to 124(°C)	30 (°F), 17 (°C)	36T21	10863
3L11-325	Open on rise	315 to 335 (°F), 157 to 169 (°C)	50 (°F), 28 (°C)	36T21	10864

3L12 SERIES 1/2″ DISC MANUAL RESET ROLLOUT LIMIT CONTROLS

Manual Reset Flame Rollout Limit Switches Designed for Safety in Gas Fired Furnaces, Unit Heater and Roof-Top Units

FEATURES

- Loose ring, stainless steel mounting brackets.
- 1/4″ quick connect terminations. 90° orientation to mounting holes.
- Manual reset.
- Stainless steel disc cup (A1 disc cup for 3L12-301).

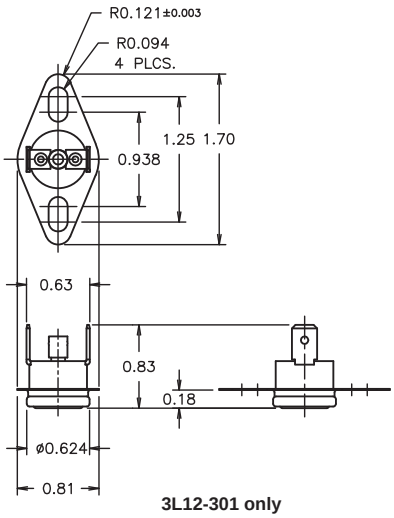
SPECIFICATIONS

Single pole, single throw
Open on temperature rise
Electrical Ratings
Resistive . . . . . 15A @ 120 VAC, 10A @ 240 VAC
Inductive . . . . . 3.0 FLA, 12.0 LRA @ 120 VAC; 1.5 FLA, 6.0LRA @ 240 VAC
Pilot Duty . . . . . 125 VA
Dimensions
3L12-301 . . . . . Length (1.18″), case width (.81″), height (.83″)
Others . . . . . Length (1.70″), case width (.81″), height (.83″)
Weight . . . . . 0.2 oz.
Agency . . . . . UL Recognized File #E19279
CSA Certified File Number LR77886/LR109556
VDE Lic. 118631

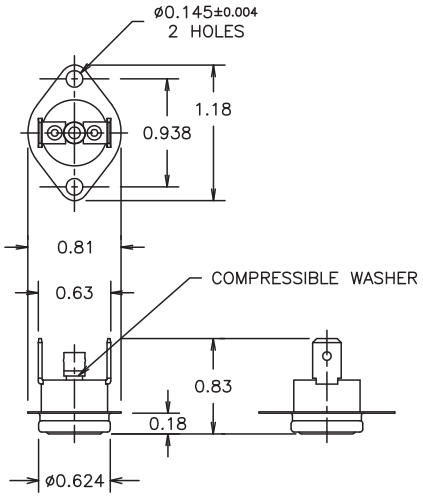
NEW SERIES!

Model Number	Fixed Temperature Settings		Switch	Therm-O-Disc	
	Cut-in	Cut-out	Action	Style	Type
3L12-130	Manual Reset	130	Open on Rise	36TX16	611863
3L12-135		135	Open on Rise	36TX16	611864
3L12-220		220	Open on Rise	36TX16	611865
3L12-230		230	Open on Rise	36TX16	611686
3L12-240		240	Open on Rise	36TX16	611687
3L12-250		250	Open on Rise	36TX16	611868
3L12-260		260	Open on Rise	36TX16	611869
3L12-300		300	Open on Rise	36TX16	611870
3L12-350		350	Open on Rise	36TX16	611871
3L12-301*		300	Open on Rise	36TX16	611971

*Specifically designed for ICP part #1013102



3L12-301 only



3L12-130 – 350

24A01G-3

24A06G-1

24A SERIES LEVEL-TEMP LOW VOLTAGE CONTROL SYSTEMS FOR ELECTRIC HEAT

Provides Silent Operation and Narrow Differential Control for Heating or Cooling Installations for Use with a 2-Wire 24 Volt Thermostat

FEATURES

- Level-Temp allows low voltage 2-wire thermostat to control line voltage loads such as baseboard heaters.
- Conduit hub or screw mounting.
- Ideal for all types of electrical heat.
- Non-critical mounting angle. Universal break-off mounting tabs.
- Dual Level-Temp capable of controlling two separate loads.

SPECIFICATIONS

Dimensions Models 24A01 / 05 . . . . . $1^{7}/_{8}$″H x $4^{1}/_{2}$″W x $2^{7}/_{16}$″D
Dimensions Model 24A06. . . . . $3^{13}/_{16}$″H x $4^{13}/_{16}$″W x $2^{1}/_{8}$″D
Dimensions Model 24A07. . . . . $1^{7}/_{8}$″H x $4^{9}/_{16}$″W x $1^{29}/_{32}$″D

Single Level Temp

Switch Action . . . . . SPST normally open
Average Time Delay . . . . . 45 seconds
Lead length. . . . . 18 inches
Ambient temperature range . . . . . -20 to +140°F

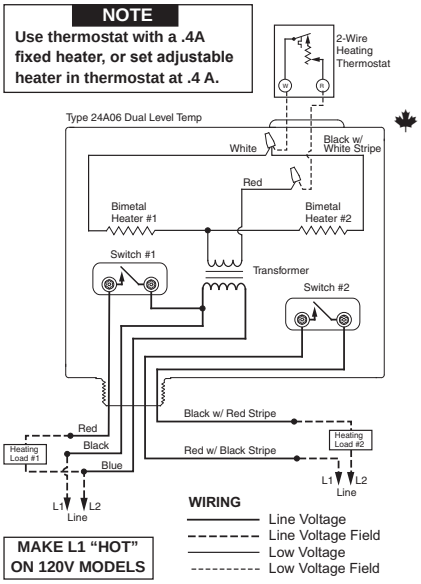
Dual Level Temp

Switch Action . . . . . Two independent: SPST normally open
Average Time Delay . . . . . 45 seconds
Lead length. . . . . 18 inches
Ambient temperature range . . . . . -20 to +120°F
Agency . . . . . U.L. listed and C.S.A. approved. Design complies with U.L. 873 T.I.R.E. standard (Temperature Indicating & Regulating Equipment)

TECHNICAL HELP

Wiring and Dimension Drawing, 24A01 / 24A05 . . . page 193

NOTE
Use thermostat with a .4A fixed heater, or set adjustable heater in thermostat at .4 A.



Using Two-wire Heating Thermostat to Operate Two Separate Heating Loads

SINGLE LEVEL TEMPS – Normally Open

Model Number	Input Voltage / Frequency	Thermostat Current	A.C. Resistive (Non-inductive)	A.C. Motor Rating (Inductive)	
				Full Load	Locked Rotor
24A01G-3	240 VAC / 60 Hz	0.2A	25A, 6000W, 240v	12A, 240v	72A, 240v
24A01Z-10	347 VAC / 60 Hz	0.2A	17A, 5900W, 347v	–	–
24A05A-1	120 VAC / 60 Hz	0.2A	25A, 3000W, 120v	16A, 120v	96A, 120v
24A05E-1	208 VAC / 60 Hz	0.2A	22A, 5200W, 208v	12A, 208v	72A, 208v

DUAL LEVEL TEMPS – Controls Two Independent Loads – Normally Open

Model Number	Input Voltage / Frequency	Thermostat Current	A.C. Resistive (Non-inductive)	A.C. Motor Rating (Inductive)	
				Full Load	Locked Rotor
24A06G-1	240 VAC / 60 Hz	0.2A per switch	25A, 6000W, 240v	12A, 240v	72A, 240v

① Electrical ratings apply to each switch load

NOTE: Delay approximately 30 seconds opening and 60 seconds closing

REPLACES HONEYWELL R841 SERIES

Indicates Canadian Model Number: call 1-800-305-6953 to order

24A34-3

24A34 SERIES ELECTRIC HEAT SEQUENCERS

Direct Replacement for Most Fan / Heat Sequencing Functions.
Terminal Markings are Equivalent to Competitive Types

FEATURES

- Replaces Honeywell, MARS, TOD, GEMLINE, Klixon (Texas Instruments).
- 24V input control.
- Multi-poise mounting.
- Any contacts (except M1 & M2) can be used as auxiliary contacts.
- Double quick-connect terminals for combination loads.

SPECIFICATIONS

Ambient Temperature Rating . . . . . -50 to +165°F
Agency . . . . . U.L. component recognized

ELECTRICAL RATINGS – SINGLE LOAD CONTACT RATINGS (ALL MODELS)

VAC	Resistive (Non-Inductive)		Motor Ratings (Inductive)		Pilot Duty
	Watts	Amps	Full Load	Locked Rotor	
120	3000	25.0	14.0A	72.0A	125 VA
240	6000	25.0	7.0A	42.0A	125 VA
480	6000	12.5	–	–	480 VA

COMBINED LOAD RATING TABLE (ALL MODELS)

30A @ 240 VAC – TOTAL,
23A Non-Inductive + 7 FLA / 42 LRA Inductive,
ON Time: Elapsed time to make contacts after heater is energized (min. to max.)
OFF Time: Elapsed time to break contacts after heater is de-energized (min. to max.)

TABLE NOTES:
① M1-M2 and M3-M4 are always first switches to turn ON and last to turn OFF. All other switches are random ON and random OFF
② 24A34-14 Switch contacts designated F_1 - F_2 instead of M_1 - M_2
③ 24A34-28 is 2 pole double throw
♦ These contacts switch simultaneously

NOTE: Underwriters Laboratories requires a fan interlock circuit to insure the blower remains operating whenever more than one sequencer is used. The fan interlock should be the M_1 / M_2 contacts of the second or third sequencer.

All M_1 / M_2 contacts are wired to the blower motor so that any sequencer that is energized will keep the blower ON.

Model Number	Timings	Switches	Timings – ON					Timings – OFF				
			M1-M2	M3-M4	M5-M6	M7-M8	M9-M10	M1-M2	M3-M4	M5-M6	M7-M8	M9-M10
24A34-1	1	1	1-20	–	–	–	–	40-110	–	–	–	–
24A34-2	1	1	–	–	30-90	–	–	–	–	1-30	–	–
24A34-3 ①	1	2	1-20 ♦	1-20	–	–	–	40-110 ♦	40-110	–	–	–
24A34-4	1	2	–	–	30-90 ♦	30-90	–	–	–	1-30 ♦	1-30	–
24A34-5 ①	2	3	1-110 ♦	1-110	1-110	–	–	1-110 ♦	1-110	1-110	–	–
24A34-6 ①	2	4	1-110 ♦	1-110	1-110 ♦	1-110	–	1-110 ♦	1-110	1-110 ♦	1-110	–
24A34-14①②	4	5	1-160 ♦	1-160	1-160	1-160	1-160	1-160 ♦	1-160	1-160	1-160	1-160
24A34-21	1	1	1-20	–	–	–	–	1-50	–	–	–	–
24A34-22	1	1	15-45	–	–	–	–	1-30	–	–	–	–
24A34-23	1	1	25-55	–	–	–	–	15-45	–	–	–	–
24A34-24	1	1	30-75	–	–	–	–	1-40	–	–	–	–
24A34-25	1	1	40-90	–	–	–	–	1-30	–	–	–	–
24A34-26	2	2	1-20	30-90	–	–	–	40-90	1-30	–	–	–
24A34-27	2	2	1-160	1-160	–	–	–	1-160	1-160	–	–	–
24A34-28 ③	2	2	1-160	1-160	–	–	–	1-160	1-160	–	–	–
24A34-29	1	1	15-35	–	–	–	–	25-55	–	–	–	–
24A34-36	2	2	1-20	30-45	–	–	–	45-110	1-30	–	–	–
24A34-37	1	1	1-110	–	–	–	–	1-110	–	–	–	–

24A34-15 HEAT PUMP CONTROL

FEATURES

- Used in heat pump air handler applications.
- Provides a delay off to the blower motor in cooling mode.
- Single pole double throw.

Model Number	Timings	Switches	Timings	
			ON 1-3	OFF 1-3
24A34-15	1	1	1-60	75-95

ELECTRICAL RATINGS – NORMALLY OPEN CONTACTS 1-3

VAC	Resistive (Non-Inductive)		Motor Ratings (Inductive)		Pilot Duty
	Watts	Amps	Full Load	Locked Rotor	
120	3000	25.0	14.0A	72.0A	125 VA
240	6000	25.0	7.0A	42.0A	125 VA

ELECTRICAL RATINGS – NORMALLY CLOSED CONTACTS 1-2

VAC	Resistive (Non-Inductive)		Pilot Duty
	Watts	Amps	
120	1200	10.0	125 VA
240	1200	5.0	125 VA

Indicates Canadian Model Number: call 1-800-305-6953 to order

770-1

770 SERIES DUAL PURPOSE AIR SWITCH

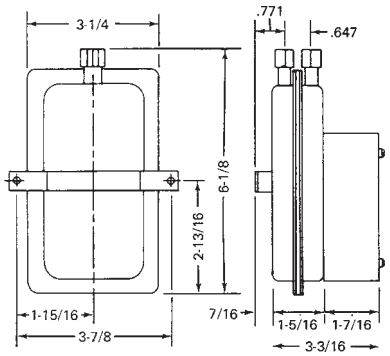
Responds to Positive, Negative or Differential Air Pressure

FEATURES

- Design eliminates “fluttering” or malfunction due to shock or vibration normally encountered with “sail switches”.
- Wide operating range.
- Furnished with one 12″ piece 1/4″ O.D. flexible tubing, nuts and ferrules.
- Can be mounted in any position except upside down.
- Enclosed diaphragm.

SPECIFICATIONS

Ambient Temperature . . . . . -40 to +180°F
Maximum Pressure. . . . . 1/2 PSI
Agency . . . . . U.L. listed and C.S.A. approved
1/2 HP @ 125 VAC

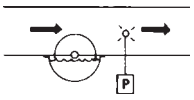


Model Number	Adjustable Operating Range	Switch Action	Electrical Ratings			
			Resistive (Non-Inductive)			
			120 VAC	240 VAC	277 VAC	125-277 VAC
770-1	0.05 to 12.0 W.C.	SPDT	15.0A	15.0A	15.0A	300 VA
770-3	0.05 to 12.0 W.C.	SPDT	15.0A	15.0A	15.0A	300 VA

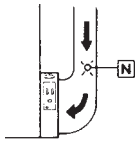
AIR SWITCH APPLICATIONS

LEGEND

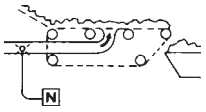
N Negative Pressure
D Pressure Differential
P Positive Pressure
Pressure Sample Line



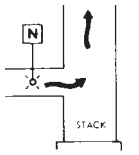
POWER HUMIDIFIERS
Switch permits unit to operate whenever there is proper air movement.



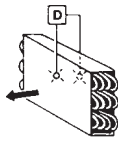
ELECTRONIC AIR CLEANERS
Switch permits power to cleaner whenever blower of system is operating.



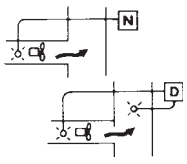
PROCESS DRYING
Switch monitors negative pressure to stop conveyor or process and provides alarm signal on fan failure. Ideal for bulk chemicals, food processing, grain drying.



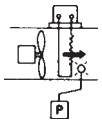
NATURAL DRAFT BURNERS
Switch signals insufficient draft, provides safety limit to stop firing on lack of draft, starts again on sufficient draft.



REFRIGERATION EQUIPMENT
Switch responds to pressure drop across refrigeration coils to signal alarm condition or automatically initiate or terminate defrost cycle.



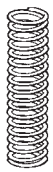
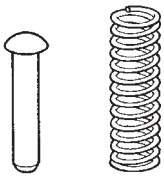
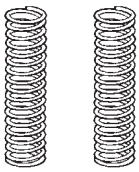
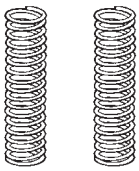
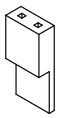
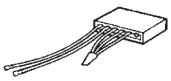
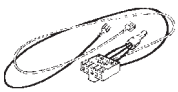
INDUCED DRAFT BURNERS
Proves operation of I.D. fan by sampling draft or air flow. Shuts off firing equipment on fan failure.



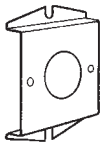
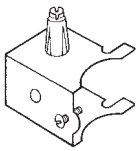
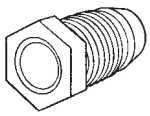
DUCT STRIP HEATERS
Switch proves air movement across heaters by positive pressure to prevent burn-out on insufficient air flow.

Indicates Canadian Model Number: call 1-800-305-6953 to order

COMBINATION GAS MANIFOLD VALVES – 3600 SERIES

Item Number	Model Number	Description
	**F92-0656**	L.P. to natural gas conversion kit for 36C, 36D, 36E, 36F and 36G gas valves with regulation range of 2.5 to 5″ W.C.
	**F92-0659**	Natural to regulated L.P. gas conversion kit for 36C, 36D, 36E, 36F and 36G gas valves with regulation range of 7.5 to 12.0″ W.C.
	**F92-0737**	Natural to unregulated L.P. gas conversion kit for 36C gas valves.
	**F92-1008**	**NEW**-natural to regulated L.P. gas conversion kit for use on two stage 36G, H, J valves. Regulation range 4.0” to 10.0” W.C. low fi re, 6.0” to 12.0” W.C. high fire.
	**F92-1011**	**NEW**-regulated L.P. to natural gas conversion kit for use on two stage 36G, H, J valves. Regulation range 1.0” to 4.0” W.C. low fire, 2.0” to 5.0” W.C. high fire.
 JUMPER	**F92-1021**	Natural to L.P., gas conversion kit for 36J27 Series Modulating gas valves.
	**F115-0064**	36″ replacement harness assembly for connection of 5059-23 to 36C84-426 in the 21D18-3 Cycle-Pilot® retrofit kit.
	**F115-0087**	36″ replacement harness assembly for connection of 5059-23 to 36E86-302 in the 21D18-14 Cycle-Pilot® retrofit kit.
	**F115-0100**	Harness assembly for HSI systems with 36E gas valves; connects the 767A ignitor with the 50E47 or the 50F47 ignition module.

FAN OR LIMITS — 300 SERIES

Item Number	Model Number	Description
	**F6-1798**	Mounting adapter for 3F01 / 3L01 / 3L02 / 3F02 / 3L03 / 3F05 / 3L05 series controls.
	**F6-1794**	Bracket for Bryant pilots when retrofitting with Cycle-Pilot®.
	**F69-0727**	1/4″ brass compression fitting for pilot line connections.
	**F92-1003**	Adapter kit for the 36G / 36J gas valves. Kit includes: connector (5/16″ to 1/4″ hose barb), tube (5/16″ O.D.) and hex wrench (3/32″).

764 KNOB

Item Number	Model Number	Description
	**F42-0895**	Replacement Knob for 764 series valve.

REFRIGERATION CONTROLS INDEXED BY RANGE

Range Max.	Range Min.	Differential Max.	Differential Min.	Model	Electrical Rating *	Element	Capillary Length	Switch Action	Page Number
50°F	-20°F	25°F	3°F	**1609-90**	HH2C	Remote Bulb	8 feet	Close on Rise	87
50°F	-20°F	Manual Reset	Manual Reset	**16A60-9**	HH	Remote Bulb	10 feet	Close on Rise	88
90°F	-30°F	40°F	3.5°F	**1609-101**	FGH	Remote Bulb	5 feet	Close on Rise	87
90°F	-30°F	40°F	3.5°F	**1609-103**	FGH	Remote Bulb	10 feet	Close on Rise	87
90°F	-30°F	40°F	3.5°F	**1609-104**	FGH	Remote Bulb	20 feet	Close on Rise	87
90°F	-30°F	40°F	3.5°F	**1609-105**	FGH	Remote Bulb	5 feet	Close on Rise	87
90°F	-30°F	40°F	4.5°F	**1687-9**	SPDT	Remote Bulb	8 feet	SPDT	87
90°F	-30°F	20°F	3°F	**201-20**	FGH	Self Contained		Close on Rise	88
90°F	20°F	20°F	3°F	**201-8**	FGH	Self Contained		Close on Rise	88
200°F	-40°F	30°F	1°F	**16E09-101**	See Catalog page 86	Remote Bulb	7.5 feet extendable to 400 feet	SPDT	86

* See page 222 for full electrical ratings **U.S. Models only**

SureSwitch™

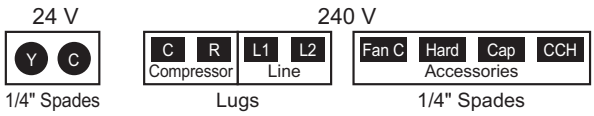
49P11-843 SURESWITCH™

Universal Electronic Upgrade for Mechanical Compressor Contactors.
5x Contactor Life, Sealed to Keep Out Ants and Debris

FEATURES

- Microprocessor controlled sealed compressor switching.
- Line voltage brownout protection, short cycle protection, tricolor LED displays.
- Heavy-duty lug connectors, zero chatter latching relay.
- Four-hole mounting matches mechanical contactors.
- Random start delay on power up and brownout recovery.
- Compressor test and cycle count by push-button.

TERMINAL DESIGNATIONS



SPECIFICATIONS

Electrical Ratings

Line Voltage Input . . . . . 240 VAC, 50/60 Hz
Full Load Amperes (FLA) 40A
Locked Rotor Amperes (LRA) 200A
Control (Coil) Voltage (Y,C) . . . . . 24 VAC, 50/60 Hz

Recommended Terminal Torque – C, R, L1 and L2

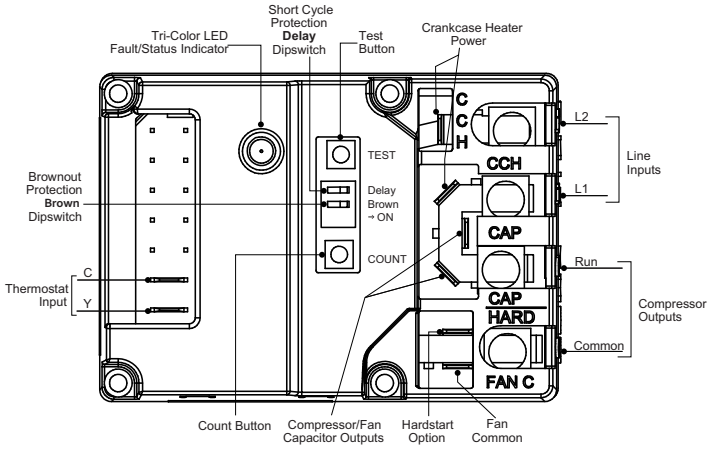
#4 – 6 AWG . . . . . 45 in-lbs
#8 AWG . . . . . 40 in-lbs
#10 - 14 AWG . . . . . 35 in-lbs
24 VAC (Y, C) Terminals are 1/4" Male QC's accepting #12-24 AWG wire

Timings

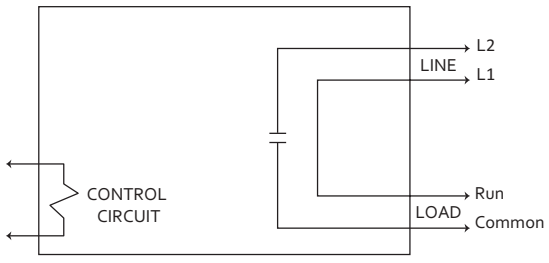
Anti-Short-Cycle Delay . . . . . 0s or 180s (selectable) at 60 Hz
0s or 216s (selectable) at 50 Hz
Compressor Test . . . . . 5s at 60 Hz, 6s at 50 Hz
Dimensions . . . . . $2^{3}/_{4}$″W x $2^{3}/_{8}$″H x $3^{7}/_{8}$″L
Operating Temperature Range . . . . . -40° to 158°F (-40 to 70°C)
Humidity Range . . . . . 5 to 95% relative Humidity (non-condensing)

TECH
PAGES
197–198

Model Number	Coil	Line Voltage Input	Amp Rating	Poles
49P11-843	24 VAC	240 VAC	40 FLA, 200 LRA	1 or 1.5



49P11-843 Terminals and Switches



Electrical Diagram

40 Amp Model
(with cover)

Approximate Overall Dimensions
3¼″ x 2″ x 2½″

94-388 THRU 94-395 CONTACTORS – WR/RBM TYPE 121

Straight-Through Wiring, Replaces 1½ Pole Devices Used Primarily in Residential Central Air Conditioning

FEATURES

- Replaces many contactors used by OEM's.
- Universal style mounting bracket fits existing mounting holes.
- Screw terminals and ¼″ quick connect terminals for easy installation.

SPECIFICATIONS

Temperature Range	-40°F to 150°F
Mechanical Life (no load)	Conforms to UL and ARI specifications
Electrical Life	Conforms to ARI specifications **94-388 thru 94-389** achieve 200,000 cycles, make LRA at .5 pf, break 125% of FLA at .75 pf at rated voltage, 10,000 cycles make and break LRA at .5 pf rated voltage **94-394 thru 94-395** achieve 100,000 cycles, make LRA at .5 pf, break 125% of FLA at .75 pf at rated voltage, 6,000 cycles make and break LRA at .5 pf rated voltage
Weight (approximate)	7 oz.
Agency	U.L. file number E12139
Coils Frequency	50 / 60 Hz
Coil Insulation	Class B (130°C)
Termination	Screw and Double ¼″ Q.C.
Operate	85% of nominal coil voltage; 110% maximum safe operate
Duty Cycle	Continuous

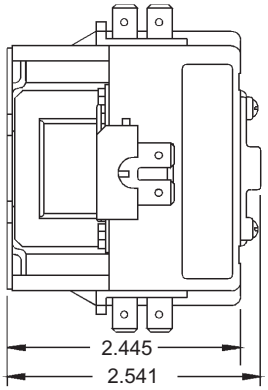
COIL DATA

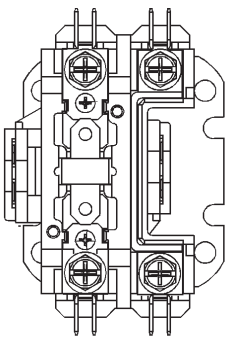
Model Number		Voltage AC	Res DC OHMS	Current MA	Nominal VA	Max. Inrush VA
* 30 Amp	** 40 Amp					
94-388	94-394	24	16.5	208	5	20
94-389	94-395	120	420	42	5	20

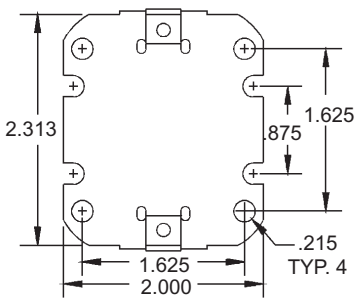
* 30 amp models have no cover on top as in line drawing below
** 40 amp models have cover on top as in picture above

CONTACT RATINGS

Type	Voltage	FLA	LRA	RES
94-388 thru 94-390	277	30	150	40
	480	30	125	40
	600	30	100	40
94-394 thru 94-396	277	40	200	50
	480	40	160	50
	600	40	120	50







30 Amp Model (No Cover)

40 Amp Model
(with cover)

Approximate Overall Dimensions
3¼″ x 2″ x 2⅝″

TECH
PAGE
201

90-244 THRU 90-249 CONTACTORS – WR/RBM TYPE 122

Designed for Air Conditioning and Heating Equipment

FEATURES

- Low VA coil for cooler operation and increased life.
- Quiet operation.
- Universal style mounting bracket fits existing mounting holes.
- Double break contacts ensure positive make and break.
- Screw terminals or pressure connectors and double ¼″ quick connects provided on all models for easy installation.

SPECIFICATIONS

Insulating Material	Contact block and carrier are high quality electrical-grade thermosetting resin
Temperature Range	-40°F to 150°F
Mechanical Life	Conforms to UL and ARI specifications
Electrical Life	Conforms to UL and ARI specifications
Weight (approximate)	9.5 oz.
Agency	U.L. file number E12139
Coils Frequency	50 / 60 Hz
Coil Insulation	Class B (130°C)
Termination	Pressure Connectors and Double ¼″ Q.C.
Operate	85% of nominal coil voltage; 110% maximum safe operate
Duty Cycle	Continuous

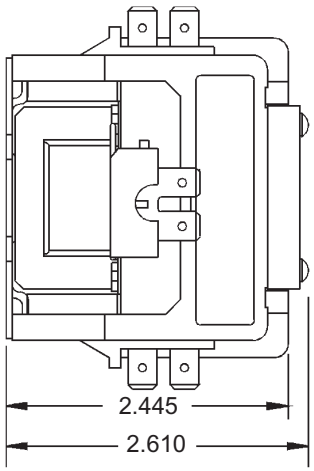
COIL DATA

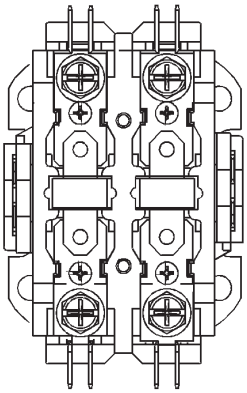
Model Number		Voltage AC	Res DC OHMS	Current MA	Nominal VA	Max. Inrush VA
* 30 Amp	** 40 Amp					
90-244	90-247	24	11	250	6	32
90-245	90-248	120	224	50	6	32
90-246	90-249	208 / 240	997	25	6	32

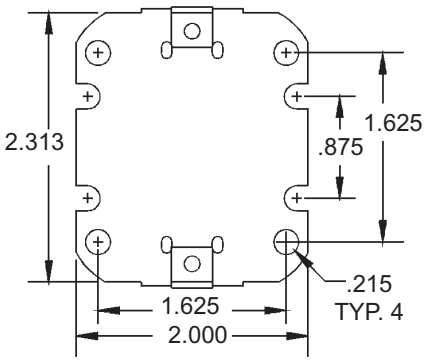
* 30 amp models have no cover on top as in line drawing below
** 40 amp models have cover on top as in picture above

CONTACT RATINGS

Type	Voltage	FLA	LRA	RES
94-244 thru 94-246	277	30	150	40
	480	30	125	40
	600	30	100	40
94-247 thru 94-249	277	40	200	50
	480	40	160	50
	600	40	120	50







30 Amp Model (No Cover)

40 Amp with Cover

Approximate Overall Dimensions
3 3/4″ x 2 3/8″ x 3″

Pressure Connectors line and load sides for #14 thru #4 wire. 1/4″ Double Quick Connect auxiliary and coil terminals.

TECH PAGE 201

90-163 THRU 90-172 CONTACTORS – WR/RBM TYPE 154

Designed for Central Air Conditioning and Heating Equipment

FEATURES

- Any position mounting.
- Interchangeable mounting plate.
- Low wattage coil.
- Double break contacts ensure positive make and break.

SPECIFICATIONS

Insulating Material	Contact block and carrier are high quality electrical-grade thermosetting resin
Temperature Range	-40°F to 150°F
Mechanical Life	Conforms to UL and ARI specifications
Electrical Life	Conforms to UL and ARI specifications
Weight (approximate)	16 oz.
Agency	U.L. file number E12139
Coils Frequency	50 / 60 Hz
Coil Insulation	Class B (130°C)
	24 through 208 / 240 Volts AC
Termination	Pressure connector and Double 1/4″ Q.C.
Operate	85% of nominal coil voltage; 110% maximum safe operate
Duty Cycle	Continuous

COIL DATA – 30 and 40 Amp, 600 Volt Three Pole Normally Open (3 P.N.O.)

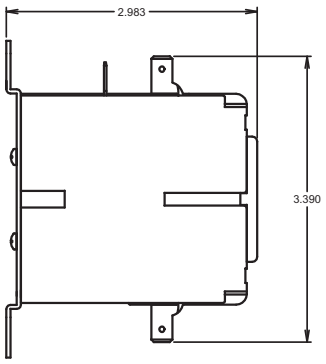
Model Number		Voltage AC	Res DC OHMS	Current MA	Nominal VA	Max. Inrush VA
30 Amp	40 Amp					
90-163	90-170	24	7.2	187	4.5	52
90-164	90-171	120	180	37	4.5	52
90-165	90-172	208/240	720	19	4.5	52

CONTACT RATINGS – 30 Amp, 600 Volt Three Pole Normally Open (3 P.N.O.)

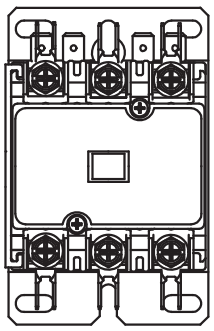
Type	Voltage	277 VAC	LRA	RES
90-163 thru 90-165	Full Load	30 A.	30 A.	30 A.
	Lock Rotor	180 A.	150 A.	120 A.
	Resistive	40 A.	40 A.	40 A.

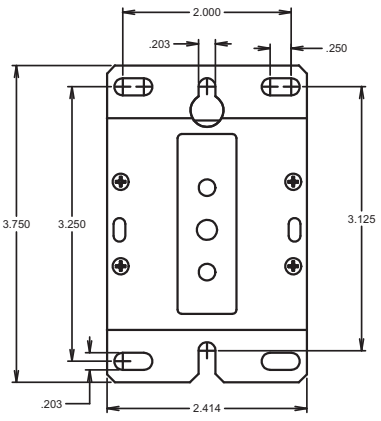
CONTACT RATINGS – 40 Amp, 600 Volt Three Pole Normally Open (3 P.N.O.)

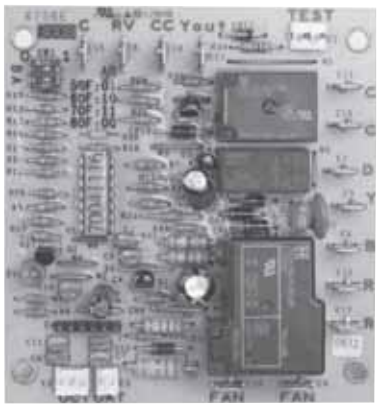
Type	Voltage	277 VAC	LRA	RES
90-170 thru 90-172	Full Load	40 A.	40 A.	40 A.
	Lock Rotor	240 A.	200 A.	160 A.
	Resistive	50 A.	50 A.	50 A.



90-160 thru 90-172







47D Series

47D SERIES DEMAND DEFROST CONTROL

Microprocessor-Based Controls Designed to Detect Ice Build-Up on the Outdoor Coil in a Heat Pump System and Defrost the Coil by Reversing the Direction of Refrigerant Flow. Replaces Rheem Models

FEATURES

- Demand defrost algorithm “self-calibrates” to the heat pump system.
- Compressor contactor relay control for short-cycle protection, and noise reduction while reversing valve shifts.
- Dipswitch-selectable defrost termination temperature (50/60/70/80ºF).
- Kits Include replaceable ambient and coil temperature sensors.
- LED diagnostic display.

SPECIFICATIONS

Electrical Ratings [@ 77ºF (25ºC)]:

Rated Voltage	24 VAC
Rated Voltage Range	18-30 VAC
Max. Power Consumption @ 24 VAC	4.08 VA
Nominal Frequency	50/60 Hz

Relay Load Ratings:

Compressor Contactor Relay (CC, only used in 47D40-801)	20 VA in rush, 6 VA holding
Reversing Valve Relay (RV)	24 VA
Auxiliary Heat Relay (D)	1 Amp. 0.6 P.F.
Operating Temperature Range	-40º to 150ºF (-40o to 65ºC)
Humidity Range	5% to 95% relative humidity (non-condensing)

Timing Specifications @ 60Hz*	Nom.	Units
Defrost Lockout Time	34	Mins
Maximum Defrost Time	15	Mins.
Maximum Frosting Time	6	Hrs.
Short Cycle Lockout Time	5	Mins.
Noise Abatement Time	5	Sec.

NOTE: 50Hz Timings are 20% longer

Model Number	Hi/Lo Pressure Switch Inputs	Outdoor Fan Relay	Mounting	Dimensions
47D40-801	No	PSC 1-speed	Metal Standoffs	3.375″ x 3.625″
47D43-811	Yes	PSC or ECM, 1-speed	Plastic Standoffs	3.5″ x 5.5″

57T01-843

57T01-843 BLOWER TIME DELAY RELAY

The 57T01-843 Time Delay Relay is for Use in Air Handlers Installed in Compressor-Run Air Conditioning and Heat Pump Systems to Delay the Blower Shut-Off After the Compressor has Shut Off.
Replaces Trane Part Numbers D155079P01 and RLY 2807

FEATURES

- Allows residual cooled air to be blown into the controlled space, increasing the efficiency of the system in cooling.
- Depending on electrical hookup in a heat pump system, delay of blower shut-off could also occur in heating.

SPECIFICATIONS

Electrical Ratings:

Model Number	Contact Ratings: Power Pole (Amperes per pole)-	
57T01-843		208/240/277 VAC
	Full Load	7
	Locked Rotor	36
	Resistive	15
	U.L. Approved Horsepower	3/4 HP

Pilot Duty Pole . . . . . 3 VA at 24 VAC (Minimum)
25V at 24 VAC (Maximum)
Input Voltage. . . . . 24 VAC nominal
Total Power Consumption. . . . . 0.5 VA (relay de-energized)
4.0 VA (relay energized)

21D28-6

EVAPORATIVE COOLING THERMOSTAT & CONTROL BOX

Functions as a Switching Device for the Thermostat to Provide an Even Level of Cooling Plus a Choice of High and Low Speed Control of the Fan on Evaporative Coolers

FEATURES

- Grey plastic case is lightweight, weather-resistant and meets all code requirements.
- Fully automatic, system designed with a fan delay (approximately 60 seconds) to pre-wet the cooler pads before the fan starts.
- Separate fan and pump relays. High or low fan speed selection.
- Relay panel is removable from enclosure to facilitate field wiring.
- Integral transformer 120 / 240 VAC to 24 VAC 60 Hz.

SPECIFICATIONS

Dimensions 1F51N-619 . . . . . 3 1/4″H x 4 1/2″W x 1 5/8″D
Dimensions 8A18Z-2 . . . . . 8″H x 6″W x 3″D
Electrical Rating 1F51N-619 . . . . . 24 VAC (30 VAC maximum)
Fixed anticipator

Model Number	Package Consists of:
21D28-6	1F51N-619 / 8A18Z-2

Model Number	Color	Range	Differential	System Switch Positions	
				System	Fan
1F51N-619	Classic White	Scale 1-2-3-4-5 (55 to 95°F) ①	1°F	Off – Cool – Vent	Hi – Lo

① No thermometer

CONTACT RATINGS

Model Number	Input Voltage	Combined Relay Loads		Pump Relay		Fan Relay	
		Full Load	Locked Rotor	Full Load	Locked Rotor	Full Load	Locked Rotor
8A18Z-2 ①	120 VAC	16.0A	96.0A	10.0A	60.0A	12.0A	72.0A
	240 VAC	8.0A	48.0A	5.0A	30.0A	6.0A	36.0A

① U.L. listed

16E09-101

ELECTRONIC TEMPERATURE CONTROL

Superior Temperature Control and Accuracy for Both Refrigeration and Heating Applications

FEATURES

- Multiple Input Voltages (24/120/208/240 volts).
- No common wire required (electrical load must be greater than 2.5 amps and uninterrupted).
- Electronic temperature accuracy/digital display.
- Alarm output (with selectable delay - up to 99 minutes).
- Adjustable anti-short cycle delay.
- Setpoint locking function.
- Reduces inventory - replaces most competitive mechanical and electronic refrigeration controls.
- Multiple sensor option can be used with 1 or 4 sensors.

SPECIFICATIONS

Electrical Rating (Contacts):			
*Voltage	120 VAC	208VAC	240 VAC
*Full Load Amps	16 Amps	9.2 Amps	8 Amps
*Locked Rotor Amps	96 Amps	55.2 Amps	48 Amps
*Non-inductive Amps	16 Amps	16 Amps	16 Amps
*Horsepower	1 HP	1 HP	1 HP
*24 VAC	100 VA, 30 VAC Max. (Class 2)		
*Pilot Duty	125 VA, 24 to 240 VAC		
*Minimum Load	1 Amp @ 24 VAC		
Alarm Relay (N.O. Contacts)	1 Amp (5 to 24 volts AC or DC)		
Setpoint Range	-40° to 220°F (-40° to 104° C)		
Differential Range	1° to 30°F (1° to 30° C)		
Operating Temperature	-29°F to 140°F (-34° to 60°C)		
Storage Temperature	-40°F to 185° (-40° to 85°F)		
Operating Humidity	0 to 95% Relative Humidity, Non-Condensing		
Maximum Dew Point	85°F (29°C)		
Switch Action	SPDT		

NCT sensor, with a cable length of 7.5 can be extended up to 400 feet by splicing and adding cable wire (22 AWG or larger diameter) as needed.
Can be connected to an existing PTC (positive temperature coefficient) sensor.

Finish	Grey
Cover and Case	NEMA 1 enclosure
Flammability Rating	UL94VO
Dimension	$6\frac{3}{4}$″H x 3″W x $2\frac{9}{16}$D″

* For use on single phase circuits only

Model Number	Range	Differential	Switch Action
16E09-101	-40° to 220°F	1° to 30°F	SPDT

PARTS AND ACCESSORIES See end of this section for additional parts and accessories

- F136-0114 — Replacement 7.5-ft NTC remote sensor

TECHNICAL HELP

TECH
PAGES 199–200

Wiring and Operation . . . . . See pages 199–200

1609-101

REFRIGERATION TEMPERATURE CONTROL

Provide Positive Control of Refrigeration Applications where Remote Control is Desired

FEATURES

- Hydraulic action element.
- Dustproof steel case with top and bottom knockouts.
- Temperature dial graduated in °F and °C and can be adjusted through cover.
- High electrical ratings allow operation of most equipment without use of relays or motor starters.
- Model 1609-90 — For use in zoning systems where all thermostats control a common compressor & a separate solenoid refrigerant valve in each zone.

SPECIFICATIONS

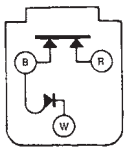
Dimensions	$5^{3}/_{8}$″H + $2^{5}/_{16}$″W x $2^{9}/_{16}$″D
Finish	Grey
Bulb Mounting	Clamp included with all models except 1609-90
Agency	U.L. listed and C.S.A. approved

PARTS AND ACCESSORIES

- F89-0027 Refrigeration Well
- F55-0088 Packing Nut

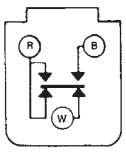
Model Number	Range	Differential	Capillary Length	Bulb Size	Switch Action	Full Electrical Rating	Motor Rating (Full Load) 120 VAC	Motor Rating (Full Load) 240 VAC
1609-90	-20 to +50°F (-29 to +10°C)	Adj. 3 to 25°F (2 to 14°C)	8 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	Close on Rise	HH2C see page 222	7.4A	3.7A
1609-101	-30 to +90°F (-34 to +32°C)	Adj. 3.5 to 40°F (2 to 22°C)	5 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	Close on Rise	FGH see page 222	16.0A	8.0A
1609-103	-30 to +90°F (-34 to +32°C)	Adj. 3.5 to 40°F (2 to 22°C)	10 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	Close on Rise	FGH see page 222	16.0A	8.0A
1609-104	-30 to +90°F (-34 to +32°C)	Adj. 3.5 to 40°F (2 to 22°C)	20 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	Close on Rise	FGH see page 222	16.0A	8.0A
1609-105 ①	-30 to +90°F (-34 to +32°C)	Adj. 3.5 to 40°F (2 to 22°C)	5 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	Close on Rise	FGH see page 222	16.0A	8.0A
1687-9	-30 to +90°F (-34 to +32°C)	Adj. 4.5 to 40°F (2.5 to 22°C)	8 ft.	$5^{1}/_{4}$″ x $^{3}/_{8}$″	SPDT	SPDT see page 222	7.4A	3.7A

① Knob adjustment



HH2C Contact Structure
HH2C Rated Controls

Switch Action
Double pole, single throw.
B terminal is common.
B-R and B-W contacts both close on a rise of temperature.



SPDT Contact Structure
SPDT Rated Controls

Switch Action
R-B Open on Rise
R-W Close on Rise

201-8

REFRIGERATION TEMPERATURE CONTROLS FOR WALK-IN BOXES

Designed for Use in Garages, Factories, Warehouses and Similar Commercial and Industrial Installations

FEATURES

- Dust, moisture and vermin resistant heavy metal case.
- Handles inductive and non-inductive loads.
- No leveling required — Mounts in any position.
- Quick response to temperature changes.
- Nickel plated element.

SPECIFICATIONS

Dimensions . . . . . $5^{3}/_{8}$″H + $2^{1}/_{2}$″coil x $2^{5}/_{16}$″W x $2^{9}/_{16}$″D
Finish . . . . . Grey
Agency . . . . . U.L. listed and C.S.A. approved

Model Number	Range	Differential	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Resistive (Non-Inductive)	
					120 VAC	240 VAC	120 VAC	240 VAC
201-8	20 to 90°F (-6 to 32°C)	Adj. 3 to 20°F (2 to 11°C)	Close on Rise	FGH See page 222	16.0A	8.0A	25.0A	22.0A
201-20	-30 to 90°F (-34 to 32°C)	Adj. 3 to 20°F (2 to 11°C)	Close on Rise	FGH See page 222	16.0A	8.0A	25.0A	22.0A

16A60-9

MANUAL RESET FREEZE PROTECTION CONTROL

Designed to Shut Down Cooling Equipment Before Undesirably Low Temperatures are Reached

FEATURES

- Temperature dial graduated in °F and °C scales.
- Adjustable dial stop to limit minimum setting — Shipped at 36°F (2°C).
- Dustproof steel case with top and bottom knockouts.
- Hydraulic action element — Unaffected by vibration — No leveling required.
- Equipped with special $^{1}/_{2}$″ packing nut assembly.

SPECIFICATIONS

Dimensions . . . . . $5^{3}/_{8}$″H x $2^{5}/_{16}$″W x $2^{9}/_{16}$″D
Finish . . . . . Grey
Thread Size (packing nut) . . . . . $^{1}/_{2}$″NPT
Agency . . . . . U.L. listed and C.S.A. approved

Model Number	Range	Differential	Capillary Length	Bulb Size	Switch Action	Full Electrical Rating	Motor Rating (Full Load)	
							120 VAC	240 VAC
16A60-9	-30 to 50°F (-34 to 10°C)	Manual Reset	10 ft.	$5^{3}/_{4}$″ x $^{3}/_{8}$″	Open on Fall	HH see page 222	7.4A	3.7A

96-TD

96-TD LIQUID LINE FILTER-DRIERS

Filter-Driers Designed to Offer Complete Protection to Your Refrigerant System. The 96-TD Series Removes Moisture, Acid and Foreign Materials to Protect the Compressor, Solenoid Valves, Expansion Valves, Capillary Tubes and Other Close Tolerance Parts of Your Refrigeration System

FEATURES

- Solid block desiccant core: a composite of molecular sieve and activated alumina.
- Provides high moisture, organic and inorganic acid removal.
- For use with HCFCs, CFCs and the lubricants that go with them.
- Nickel plated SAE flare and solid copper ODF fittings.
- Corrosion resistant paint.

SPECIFICATIONS

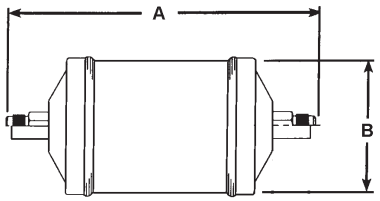
Maximum Working Pressure . . . . . 680 psig
Agency . . . . . UL / CUL file number SA11002

INSTALLATION NOTE: The 96-TD liquid line filter-drier may be installed in any position. Best results are achieved when located as close as possible to the inlet of the expansion device. If using a liquid line solenoid or moisture indicator, locate the filter-drier upstream. This will provide protection to the solenoid valve and allow the moisture indicator to measure the drier effectiveness. Install the drier in as cold a location as possible in the direction of the flow arrow on the unit.

SELECTION NOTE: Given the proper liquid line size and connection type, the correct drier may be selected using the charts below. Choosing a unit size with sufficient water capacity to reduce moisture content of the system to a safe level should be considered.

COOLING / REFRIGERATION

96-TD Series
Dimensional Drawing



① All ratings in accordance with ARI standard 710-86:
86°F Liquid Refrigerant Temperature,
5°F Saturated Temperature,
4.0 lbs./min./ton for R-134a,
2.9 lbs./min./ton for R-22,
4.4 lbs./min./ton for R-404A/R-507

SELECTION

Model Number	Connection	Flow Capacity in Tons Refrigerant[1] @ psi (For kW, Multiply Tons By 3.5)[2]			
		R-134a	R-22	R-410A	R-404A/R507
96-TD032	1/4 SAE	1.7	1.9	1.9	1.2
96-TD032S	1/4 ODF	2.1	2.2	2.2	1.5
96-TD052	1/4 SAE	1.8	2.0	2.0	1.3
96-TD052S	1/4 ODF	2.6	2.8	2.9	1.9
96-TD053S	3/8 ODF	4.1	4.4	4.5	2.9
96-TD082S	1/4 ODF	2.8	3.0	3.1	2.0
96-TD083S	3/8 ODF	3.8	4.1	4.2	2.7
96-TD084S	1/2 ODF	7.0	7.6	7.6	5.1
96-TD163	3/8 SAE	4.0	4.3	4.4	2.9
96-TD163S	3/8 ODF	4.4	4.8	4.9	3.2
96-TD164S	1/2 ODF	7.7	8.4	8.6	5.6
96-TD165S	5/8 ODF	11.8	12.8	13.1	8.5
96-TD303S	3/8 ODF	5.7	6.1	6.2	4.1
96-TD304S	1/2 ODF	7.9	8.6	8.8	5.7
96-TD305S	5/8 ODF	13.1	14.1	14.4	9.5

[1] All Ratings in accordance with ARI standard 710-04 liquid refrigerant Temperature
5°F Saturated vapor temperature
3.1 lbs/min/ton R134a
2.9 lbs/min/ton R22 and R407C
4.0 lbs/min/ton R404A/507 and R-12
4.4 lbs/min/ton R502
2.7 lbs/min/ton R410A
[2] Example: 1.0 tons x 3.5 = 3.5 KW

CONNECTIONS, DIMENSIONS, FLOW CAPACITORS

Model Number	Connection	Dimension		Refrigeration Low Temperature & -Commercial Installations			Air Conditioning Field Replacement & Field Installations		Air Conditioning OEM Self Contained	
		A	B	R-134a	R-22	R-404A/R507	R-134a	R-22/R-407C/R-410A	R-134a	R-22/R-407C/R-410A
96-TD032	1/4 SAE	4.32	1.63	1/2	1/2	1/2	1	1 1/2	3/4	1
96-TD032S	1/4 ODF	3.76	1.63							
96-TD052	1/4 SAE	4.88	2.50	3/4	3/4				1	1 1/2
96-TD052S	1/4 ODF	4.33	2.50							
96-TD053S	3/8 ODF	4.53	2.50	1 1/2	2	1 1/2	3	4	2	3
96-TD082S	1/4 ODF	5.24	2.50	1	1	3/4	1 1/2	2	2	4
96-TD083S	3/8 ODF	5.43	2.50	2	3	2	4	5	3	4
96-TD163	3/8 SAE	6.89	2.50	3	5	3	4	5	4	7 1/2
96-TD163S	3/8 ODF	6.22	2.50							
96-TD164S	1/2 ODF	6.27	2.50				5	10	5	7 1/2
96-TD165S	5/8 ODF	6.54	2.50		7 1/2		7 1/2	12	7 1/2	10
96-TD303S	3/8 ODF	8.90	3.00	4	5		4	6	4	5
96-TD304S	1/2 ODF	8.94	3.00		7 1/2	4	7 1/2	10	7 1/2	9
96-TD305S	5/8 ODF	9.21	3.00	7 1/2	10	5	10	15	10	14

[1] All Ratings in accordance with ARI standard 710-04 liquid refrigerant Temperature
5°F Saturated vapor temperature
[2] Example: 1.0 tons x 3.5 = 3.5 KW
2.9 lbs/min/ton R22 and R407C
4.0 lbs/min/ton R404A/507 and R-12
3.1 lbs/min/ton R134A
4.4 lbs/min/ton R502
2.7 lbs/min/ton R410A

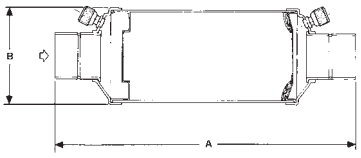
96-TS

96-TS SUCTION LINE DRIERS

Driers Designed to Clean Up Your Refrigerant System After a Compressor Burnout has Occurred. Removes Solid Contaminants and Harmful Acids that are Created During a Motor Burnout. Another Application: The 96-TS Installed as a Suction Line Filter-Drier in Remote Systems with Long Refrigerant Lines. The Filter-Drier will Collect and Hold Any Dirt that is in the Evaporator or Suction Line at Start-Up

FEATURES

- Dual access valve on each end of the drier for accurate pressure drop readings across the drier.
- Solid block desiccant core effectively removes and holds a maximum amount of contaminants with minimal pressure drop.
- Provides high moisture, organic and inorganic acid removal.
- Binding material within the core protects the core from acid decomposition and allows the core to collect and hold the acids from a motor burnout.
- Inlet deflector spreads the refrigerant flow evenly across the molded core to provide full filtration capacity and to prevent erosion of the core.
- For use with HCFCs, CFCs and the lubricants that go with them.
- Nickel plated SAE flare and solid copper ODF fittings.
- Corrosion resistant paint.



96-TS Series
Dimensional Drawing

SPECIFICATIONS

Maximum Working Pressure . . . . . 500 psig
Minimum Burst Pressure . . . . . 2500 psig
Agency . . . . . UL/CUL file number SA11002

INSTALLATION NOTE: The 96-TS suction line filter-drier may be installed in any position in the suction line as close to the compressor as possible, ahead of the accumulator if there is one in the system.

In low temperature applications, the drier should be installed in a vertical position with the flow in a downward direction to prevent oil accumulation.

SELECTION NOTE: Given the proper suction line size, connection type and tonnage of the refrigerant system, the correct drier may be selected using the chart below.

SELECTION:
CONNECTIONS, DIMENSIONS, FLOW CAPACITIES① IN REFRIGERANT TONS AT SELECTED EVAPORATOR TEMPERATURES

				Flow Capacity in Tons Refrigerant[1] (For kW, Multiply Tons By 3.5)[2]																	
				R-134a				R-22					R-410A					R502				
				Evaporator Temperature (ºF)				Evaporator Temperature (ºF)					Evaporator Temperature (ºF)					Evaporator Temperature (ºF)				
				40	20	0	-20	40	20	0	-20	-40	40	20	0	-20	-40	40	20	0	-20	-40
		Dimension		Pressure Drop (PSI)				Pressure Drop (PSI)					Pressure Drop (PSI)					Pressure Drop (PSI)				
Model Number	Connection	A	B	2	1.5	1	0.5	3	2	1.5	1	0.5	3	2	1.5	1	0.5	3	2	1.5	1	0.5
96-TS085S	5/8 ODF	5.74	2.5	2.4	1.6	1.0	0.5	3.8	2.5	1.7	1.1	0.6	3.9	2.6	1.7	1.1	0.6	2.5	1.6	1.1	0.7	0.4
96-TS164S	1/2 ODF	6.27	2.5	1.7	1.2	0.7	0.4	2.7	1.8	1.2	0.8	0.4	2.8	1.8	1.2	0.8	0.4	1.8	1.2	0.8	0.5	0.3
96-TS165S	5/8 ODF	6.54	2.5	2.2	1.5	0.9	0.5	3.4	2.2	1.5	1.0	0.5	3.5	2.2	1.5	1.0	0.5	2.2	1.4	1.0	0.6	0.3
96-TS166S	3/4 ODF	6.95	2.5	2.6	1.8	1.1	0.6	4.1	2.7	1.8	1.2	0.6	4.2	2.8	1.8	1.2	0.6	2.7	1.8	1.2	0.8	0.4
96-TS167S	7/8 ODF	7.13	2.5	2.6	1.8	1.1	0.6	4.1	2.7	1.8	1.2	0.6	4.2	2.8	1.8	1.2	0.6	2.7	1.8	1.2	0.8	0.4
96-TS306S	3/4 ODF	9.63	3.0	3.4	2.3	1.4	0.8	5.4	3.5	2.4	1.5	0.8	5.5	3.6	2.4	1.5	0.8	3.5	2.3	1.6	1.0	0.5
96-TS307S	7/8 ODF	9.80	3.0	3.8	2.5	1.6	0.8	5.9	3.9	2.6	1.7	0.9	6.0	4.0	2.6	1.7	0.9	3.8	2.5	1.7	1.1	0.6
96-TS309S	9/8 ODF	9.80	3.0	3.9	2.6	1.6	0.8	6.1	4.0	2.7	1.7	0.9	6.2	4.1	2.8	1.7	0.9	4.0	2.6	1.8	1.1	0.6

[1] All Ratings in accordance with ARI standard 700-04
[2] Example: 1.0 tons x 3.5 = 3.5 KW

96-TSC

96-TSC COMPACT SUCTION LINE DRIERS

96-TSC Suction Line Filter-Driers are Designed for Use in Air-Conditioning, Heat Pump, and Refrigeration Systems in which the Available Space in the Suction Line is Limited. Especially Useful in Heat Pump Systems where the Drier Must be Placed Between the Reversing Valve and the Compressor

FEATURES

- High organic and inorganic acid removal.
- Dual access valves.
- Solid block desiccant core.
- For use with HCFCs, CFCs and the lubricants that go with them.
- Solid copper ODF fittings.
- Corrosion resistant paint.

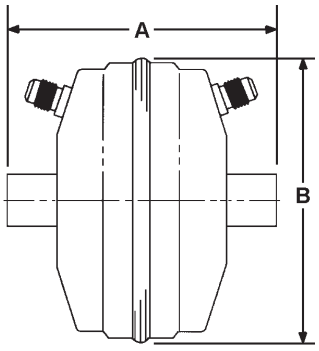
SPECIFICATIONS

Maximum working pressure . . . . . 400 psig
Minimum burst pressure. . . . . 2000 psig
Agency . . . . . UL/cUL listed file number SA11002

CONNECTIONS, DIMENSIONS, FLOW CAPACITIES① IN REFRIGERANT TONS AT SELECTED EVAPORATOR TEMPERATURES

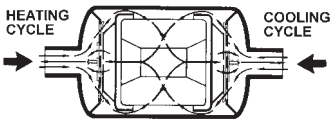
				Flow Capacity in Tons Refrigerant[1] (For kW, Multiply Tons By 3.5)[2]																	
				R-134a				R-22					R-410A					R502				
				Evaporator Temperature (°F)				Evaporator Temperature (°F)					Evaporator Temperature (°F)					Evaporator Temperature (°F)				
				40	20	0	-20	40	20	0	-20	-40	40	20	0	-20	-40	40	20	0	-20	-40
		Dimension		Pressure Drop (PSI)				Pressure Drop (PSI)					Pressure Drop (PSI)					Pressure Drop (PSI)				
Model Number	Connection	A	B	2	1.5	1	0.5	3	2	1.5	1	0.5	3	2	1.5	1	0.5	3	2	1.5	1	0.5
96-TSC146S	5/8 ODF	4.49	4.57	2.3	1.5	0.9	0.5	3.6	2.5	2.4	1.0	0.5	3.7	2.4	1.6	1.0	0.5	2.6	1.7	1.1	0.7	0.3
96-TSC147S	1/2 ODF	4.55	4.57	3.3	2.2	1.4	0.7	5.2	3.4	2.3	1.5	0.8	5.3	3.5	2.3	1.5	0.8	3.6	2.3	1.5	0.9	0.5

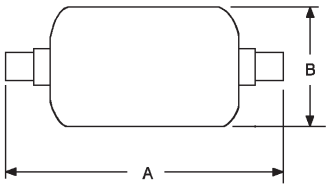
[1] All Ratings in accordance with ARI standard 730-04
[2] Example: 1.0 tons x 3.5 = 3.5 KW



96-TSC
Dimensional Drawing

96-TBF





96-TBF Series
Dimensional Drawing

96-TBF BI-DIRECTIONAL HEAT PUMP DRIERS

Bi-Directional Driers Designed to Provide Complete Protection to Your Heat Pump or Reverse Cycle System. This Compact Design Filters Contaminants, Removes Moisture and Acids During the Cooling and Heating Cycles During Winter and Summer. Internal Check Valves Prevent the Release of Collected Contaminants when the Heat Pump Cycles from the Heating to Cooling Modes

FEATURES

- Proven, nylon internal check valves.
- Solid block desiccant core: a composite of molecular sieve and activated alumina.
- Provides high moisture, organic and inorganic acid removal.
- The addition of charcoal to the desiccant core allows for the removal of wax that may occur at low evaporator temperatures.
- Solid copper ODF fittings.
- Corrosion resistant paint.

SPECIFICATIONS

Maximum Working Pressure . . . . . 680 psig
Minimum Burst Pressure . . . . . 2500 psig
Agency . . . . . U.L. file number SA11002
C.S.A. file number LR100624

INSTALLATION NOTE: The drier may be installed in any position in the reversing liquid line.

SELECTION NOTE: Given the proper liquid line size, connection type and tonnage of the refrigerant system, the correct drier may be selected using the chart below. Choosing a unit size with sufficient water capacity to reduce moisture content of the system to a safe level should be considered.

SELECTION: CONNECTIONS, DIMENSIONS, FLOW CAPACITIES

Model Number	Connection	Dimension		Flow Capacity in Tons @ 1 PSI ΔP#$ (for kW, Multiply Tons By 3.5)		
		A	B	R-22	R-410A	R-407C
96-TBF083S	3/8 ODF	5.29	2.31	4.0	4.1	3.9
96-TBF163S	3/8 ODF	6.08	3.06	4.5	4.6	4.4
96-TBF164S	1/2 ODF	6.17	3.17	5.2	5.3	5.1
96-TBF165S	5/8 ODF	6.39	3.17	6.0	6.1	5.9

All ratings in accordance with ARI standard 710-86. 86°F liquid refrigerant temperature
5°F Saturated vapor temperature
3.1 lbs/min./ton R-134a
2.9 lbs/min./ton R-22 and R-407C
4.0 lbs/min./ton R-404A/507 and R-12
4.4 lbs/min./ton R-502
2.7 lbs/min./ton R-410A

$ for 2 PSI ΔP, multiply values by 1.4

CLASS 2 TRANSFORMERS AND FAN CENTERS 94 – 98

RELAYS 99 – 100

DC POWER (CONTACTORS) 101 – 102

90-T40F1

90-T40S1 THRU 90-T75C3 24 VOLT SECONDARY CLASS 2 TRANSFORMERS ENERGY LIMITING

For Industrial, Heating and Air Conditioning Controls Applications

FEATURES

- Color coded primary leads.
- Multi-mount styles available.

SPECIFICATIONS

Agency . . . . . U.L. file number c UL us E33334

MULTI-MOUNT (CLOSED CONSTRUCTION) UNIVERSAL MOUNTING WITH PLATE

Model Number	Mars Part No.	Jard Part No.	VA	Hz	Primary	Connections	Sec.	Connections
90-T40M1	50302	4011M	40	50/60	120V	Leads	24V	Leads
90-T40M2	50303	4021M	40	50 / 60	208 / 240V	Leads	24V	Leads
90-T40M3	50304	4031M	40	60	120 / 208 / 240V	Leads	24V	Leads
90-T50M3	50314	5031M	50	60	120 / 208 / 240V	Leads	24V	Leads

90-T75C3

FOOT-MOUNT (OPEN CONSTRUCTION)

Model Number	Mars Part No.	Jard Part No.	VA	Hz	Primary	Connections	Sec.	Connections
90-T40F1	50352	4011F	40	50/60	120V	Leads	24V	Leads
90-T40F2	50353	4021F	40	50 / 60	208 / 240V	Leads	24V	Leads
90-T40F3	50354	4031F	40	60	120 / 208 / 240V	Leads	24V	Leads
90-T50F3	50308*	5031F	50	60	120 / 208 / 240V	Leads	24V	Leads

* 50308 is 50/60 Hz

FOOT-MOUNT (MANUAL RESET, OPEN CONSTRUCTION)

Model Number	Mars Part No.	Jard Part No.	VA	Hz	Primary	Connections	Sec.	Connections
90-T50C3	50327	5041C	50	50 / 60	120 / 208 / 240V	Leads	24V	Leads
90-T60C3	50327	6041C	60	50 / 60	120 / 208 / 240V	Leads	24V	Leads
90-T75C3	50321	7541C	75	50 / 60	120 / 208 / 240V	Leads	24V	Leads
90-T100C4	50540	10041C	100	50/60	120 / 208 / 240 / 480	Leads	24V	Leads

TRANSFORMER LEAD COLOR CODING

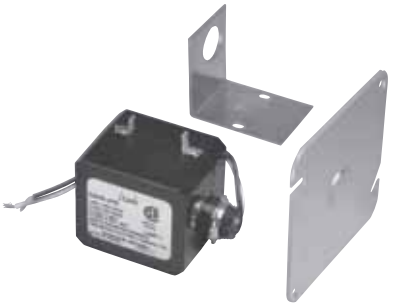
Primary Side				Secondary Side	
Common	**120V**	**208V**	**240V**	**Common**	**24V**
* Black	White	Red	Orange	Blue	Yellow

* Black is common with respect to the transformer winding, not the external circuit.

S84Z-90

S84A-410

S82A-310



S84A-310

CLASS 2 TRANSFORMERS – ENERGY LIMITING

Various Standard Configurations of Step Down Transformers Designed to Power 24 VAC Control Systems

FEATURES

- Energy limiting design, unaffected by momentary short circuit.
- Continued short circuit of secondary will cause primary winding to open in 1 to 2 minutes without creating a fire hazard.
- Maximum ambient temperature is 150°F.

SPECIFICATIONS

Agency . . . . . U.L. file number E33334

UNIVERSAL MOUNTED TYPES (Plate, Foot or Hub Mount)

Model Number	Primary to Secondary Voltages	Output Rating	Terminations	
			Line	Load
S84-11	120v to 25v 60Hz	40 VA	10″ leads	Screw terminals
S84Z-90	120 / 208 / 240v to 25v 60Hz	40 VA	10″ leads	Screw terminals

PLATE MOUNTED TYPE

Model Number	Primary to Secondary Voltages	Output Rating	Terminations	
			Line	Load
S84A-410	120v to 25v 60Hz	40 VA	10″ leads	Screw terminals

HUB MOUNT Class 2 Not Wet / Class 3 Wet (C.S.A. Certified and U.L. Listed)

Model Number	Primary to Secondary Voltages	Output Rating	Terminations	
			Line	Load
S82A-310	120v to 25v	20 VA	10″ leads	Screw / spade terminals

UNIVERSAL MOUNTED TYPES (Plate, Foot or Hub Mount)
Class 2 Not Wet / Class 3 Wet (C.S.A. Certified and U.L. Listed)

Model Number	Primary to Secondary Voltages	Output Rating	Terminations	
			Line	Load
S84A-310	120v to 25v	40 VA	10″ leads	Screw / spade terminals

Indicates Canadian Model Number: call 1-800-305-6953 to order

90-112 THRU 90-130
U.L. Recognized

90-340
Approximate Overall Dimensions
$2^{1}/_{8}$" x $1^{7}/_{8}$" x $2^{1}/_{4}$"

90-112 THRU 90-130
FAN CONTROL CENTER

Transformer and Relay Combination for Easy Installation on a 4"x 4"Junction Box

FEATURES

- Line voltage connections pre-wired.
- Energy limiting class II transformer design.
- Color coded pre-stripped leads.
- Low voltage connections on terminal board.

SPECIFICATIONS

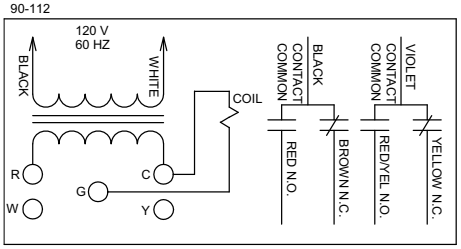
Agency . . . . . U.L. file fan center E73641

REPLACEMENT RELAY FOR FAN CONTROL CENTER

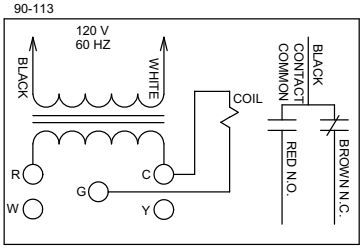
Model Number	Replaces Relay On	Description
90-340	90-112, 90-113, 90-117 90-118E, 90-119, 90-130	DPDT Universal Plug-in Relay

Model Number	Mars Number	Transformer						Relay	Contact Ratings			
		Primary			Secondary				120 VAC (amps)		240 VAC (amps)	
		Voltage	Hz	Connections	Voltage	VA	Connections		Full Load	Locked Rotor	Full Load	Locked Rotor
90-112	24010	120	60	Color coded leads, pre-stripped	24V	40	Terminal board with 5 screw terminals	DPDT	13.8	82.8	6.9	41.4
90-113	24013	120	60	Color coded leads, pre-stripped	24V	40	Terminal board with 5 screw terminals	SPDT	13.8	82.8	6.9	41.4
90-118E	24012	120	60	Color coded leads, pre-stripped	24V	40	Terminal board with 5 screw terminals	SPNO / SPNC	13.8	82.8	6.9	41.4
90-130	24010	120 / 208 / 240	50 / 60	Color coded leads, pre-stripped	24V	40	Terminal board with 5 screw terminals	DPDT	13.8	82.8	6.9	41.4

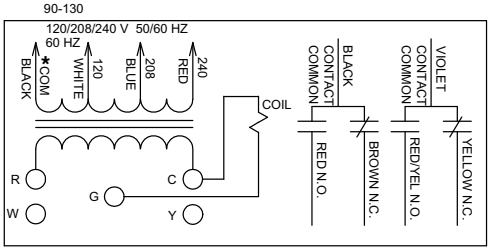
90-112



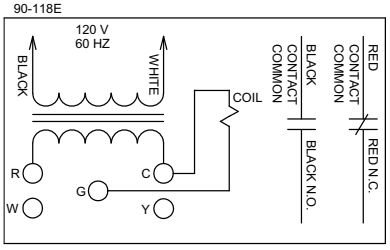
90-113



90-130



90-118E



When the fan relay transformer is energized and the thermostat completes the connection from R to G the fan relay coil energizes. Line voltage power applied to contact common path travels to selected blower speed tap. Additional terminal Y and W are isolated tie point terminals to connect thermostat wiring to compressor and furnace (if required).

Note: Record the lead wire color with it's corresponding terminal for future reference. Unused transformer input leads must be insulated.

* Black is common with respect to transformer winding, not external circuit.

90-340
Approximate Overall Dimensions
2 1/8″ x 1 7/8″ x 2 1/4″

TECH
PAGE
202

90-340 THRU 90-342 RELAYS – WR/RBM TYPE 91

A Two Pole Double Throw Semi-Enclosed Relay

90-340 Fits Fan Control Centers 90-112, 90-113, 90-118E and 90-119

FEATURES

- Easy to install.
- Suited for use in vending machines, appliances, heating and air conditioning applications and general purpose switching.

SPECIFICATIONS

Temperature Range	-40°F to 130°F
Mechanical Life (no load)	1,000,000 operations, 120 operations/min.
Electrical Life (rated load)	100,000 operations, 6 operations/min. Load test making inrush ratings (0.4 to 0.5 P.F.); breaking 100% continuous rating (0.65 to 0.8 P.F.)
Weight (approximate)	6 oz
Agency	U.L. file number E12139 C.S.A. file number LR13360
Coils, Frequency	50 / 60 Hz
Coils, Insulation	Class B
Coils, Termination	1/4″ Quick Connect
Coils, Operate	85% of nominal coil voltage; 110% maximum safe operate
Coils, Duty Cycle	Continuous

TWO POLE DOUBLE THROW (2PDT) Fits Fan Control Center Receptacles

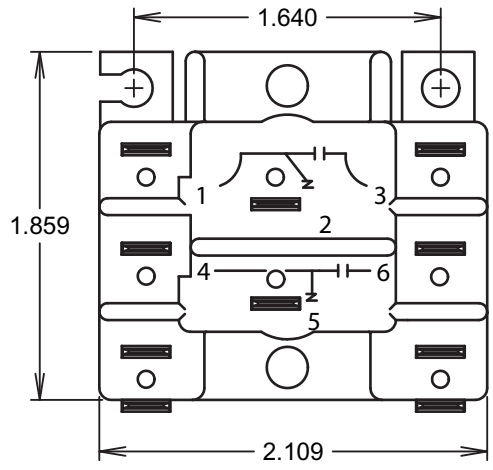
Model Number	Coil Voltage (50 / 60 Hz)	Terminals 1-2-3	Terminals 4-5-6	COIL DATA			
				DC Res.	MA	Nom. VA	Inrush VA
90-340	24	Power	Power	17.5	334	9.5	22
90-341	115 / 120	Power	Power	420	66	9.5	22
90-342	208 / 240	Power	Power	1600	38	9.5	22

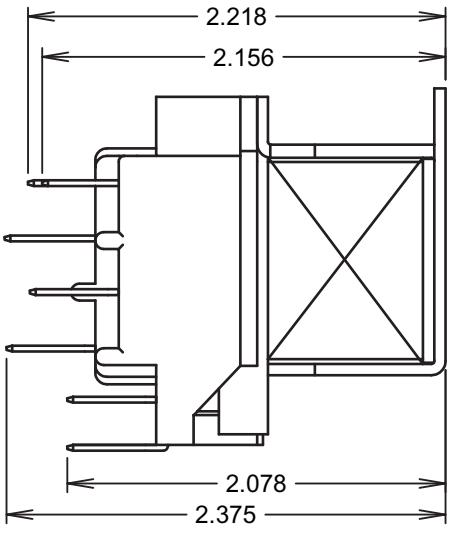
COIL RATING

Voltage: 24 VAC
Cycle: 50 / 60 Hz
Volt: Amps
Inrush: 21.5
Sealed: 9.5
Resistance: 17.5Ω ± 10%

CONTACT RATINGS

12FLA / 60LRA
125 VAC
6FLA 35LRA
250 / 277 VAC
15A 277 VAC RES
1/2HP 125 / 250 VAC





8A04-1

FAN RELAYS SPDT

For 24V AC Control of Blowers and Other Line Voltage Loads on Heating, Cooling or Heating/Cooling Systems where 24V Power Supply is Already Available

FEATURES

- Compact size – 1/2″ conduit hub permits mounting to standard junction box.
- Provisions for mounting to flat surface.
- Permits control of single or two speed fan motor.
- 5 color coded, end stripped leads for easy wiring.

SPECIFICATIONS

Dimensions . . . . . 2 11/16″H x 2 15/16″W x 1 1/2″D
Finish . . . . . Grey
Mounting . . . . . Mounting tabs or 1/2″ conduit hub
Agency . . . . . U.L. listed and C.S.A. approved

Model Number	Coil Input Voltage	Switch Action	Coil Current	Contact Ratings			
				N.O. (Black-Red)		N.C. (Black-Brown)	
				120 VAC	240 VAC	120 VAC	240 VAC
8A04-1	24 VAC, 60 Hz	SPDT	0.28A	16.0 FLA/96.0 LRA	8.0 FLA/48.0 LRA	9.8 FLA/58.8 LRA	6.9 FLA/41.4 LRA

RELAY/TRANSFORMER COMBINATIONS

DPST Relay Models Enclosed with a Transformer Capable of Powering External Loads up to 35VA. Ideal for Use on Boilers without Domestic Coil. Equally Adaptable for Zoned and Unzoned Systems

FEATURES

- Low voltage screw terminals – color coded, end stripped line voltage leads.
- Internal transformer can power up to 35VA external loads.
- Mounts to 4″ x 4″ junction box.
- Dustproof steel case.

SPECIFICATIONS

Dimensions . . . . . 4 1/4″H x 2 3/4″W x 2 3/4″D
Finish . . . . . Grey
Mounting . . . . . To 4″ x 4″ junction box
Transformer . . . . . 35 VA maximum connected external load
Agency . . . . . U.L. recognized and C.S.A. approved

Model Number	Input Voltage	Switch Action	Thermostat Current	Contact Ratings			
				Motor Rating 120 VAC		Valves & Relays Terminals V1 & V2	
				Full Load	Locked Rotor	30 VAC	0.3-12v DC
8A05A-4	120 VAC, 60 Hz	DPST	0.28A	10.0A/16.0A	60.0A/96.0A	–	–
8A05A-101	120 VAC, 60 Hz	DPST	0.13A	8.0A/14.0A	48.0/84.0A	–	–

Indicates Canadian Model Number: call 1-800-305-6953 to order

Approximate Overall Dimensions
$2^{3}/_{8}$″ x $1^{5}/_{8}$″ x $1^{1}/_{2}$″

90-290Q THRU 90-295Q RELAYS – WR/RBM TYPE 84

Used for Switching Single or Two Speed Fan Motors, Solenoids, Relays, Resistive Loads and General Purpose Switching

FEATURES

- Compact, totally enclosed design.
- For heating and cooling applications and general switching.
- Quiet, reliable and economical.

SPECIFICATIONS

Temperature Range	-40°F to 150°F
Mechanical Life (no load)	1,000,000 operations, 60 operations/min.
Electrical Life (rated load)	100,000 operations, 6 operations/min. Load test making inrush rating (0.4 to 0.5 P.F.); breaking 100% continuous rating (0.64 to 0.8 P.F.)
Weight (approximate)	2.5 oz.
Agency	U.L. file number E12139 or E22381 C.S.A. file number LR13360
Coils, Frequency	50 / 60 Hz
Coils, Insulation	Class B
Coils, Termination	$^{1}/_{4}$″ Quick Connect
Coils, Operate	85% of nominal coil voltage; 110% maximum safe operate
Coils, Duty Cycle	Continuous

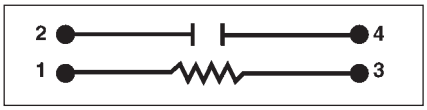
SINGLE POLE NORMALLY OPEN (SPNO), SINGLE POLE DOUBLE THROW (SPDT)

Model Number		Coil Voltage AC (50/60 Hz)	Res DC OHMS	Coil Data		Inrush VA
SPNO	SPDT			Nom. Current MA	Nominal VA Sealed	
90-290Q	**90-293Q**	24	90	125	3	4
90-291Q	**90-294Q**	120	2,000	25	3	4
90-292Q	**90-295Q**	240	7,000	12.5	3	4

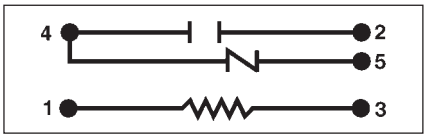
CONTACT RATING 125 / 250 VAC

Inductive	Resistive
8 Amps Continuous 25 Amps. Inrush	16 Amps Continuous

WIRING DIAGRAMS



SPNO



SPDT

Totally Enclosed Relay
Operates in Any Position
Isolated Coil and Mounting Bracket

90-360 THRU 90-486 RELAYS – WR/RBM TYPE 184

Heavy-Duty General Purpose Relay Operates in Any Position

FEATURES

- Compact, totally enclosed design.
- For heating and cooling applications and general switching.
- Quiet, reliable and economical.

SPECIFICATIONS

Temperature Range	-40°F to 150°F
Mechanical Life (no load)	1,000,000 operations, 120 operations/min.
Electrical Life (rated load)	100,000 operations, 6 operations/min. Load test making inrush rating (0.4 to 0.5 P.F.); breaking 100% continuous rating (0.65 to 0.8 P.F.)
Weight (approximate)	2.3 oz.
Agency	U.L. file number E12139 or E22381 C.S.A. file number LR13360
Coils, Frequency	50 / 60 Hz
Coils, Insulation	Class B
Coils, Termination	1/4″ Quick Connect
Coils, Operate	85% of nominal coil voltage; 110% maximum safe operate
Coils, Duty Cycle	Continuous

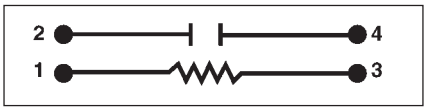
SINGLE POLE NORMALLY OPEN, SINGLE POLE DOUBLE THROW (SPDT) ISOLATED CONTACTS (SPNO / SPNC)

Model Number			Coil Voltage AC (50/60 Hz)	Res DC OHMS	Coil Data		Inrush VA
SPNO	SPDT	SPNO/SPNC			Nom. Current MA	Nominal VA Sealed	
90-360	90-370	90-380	24	77	125	3	4
90-362	90-372	90-382	120	2,000	25	3	4
—	90-374	90-384	240	6,050	12.5	3	4
90-466	90-476	90-486	277	10,300	10.8	3	4

CONTACT RATING

Inductive	Resistive
12 Amps. Continuous 60 Amps. Inrush @ 125 VAC	18 Amps. Continuous @ 277 VAC
8 Amps. Continuous 48 Amps. Inrush @ 250 VAC	

WIRING DIAGRAMS



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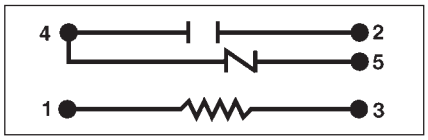
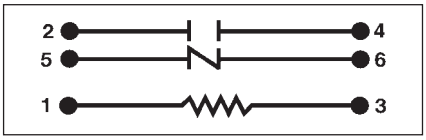
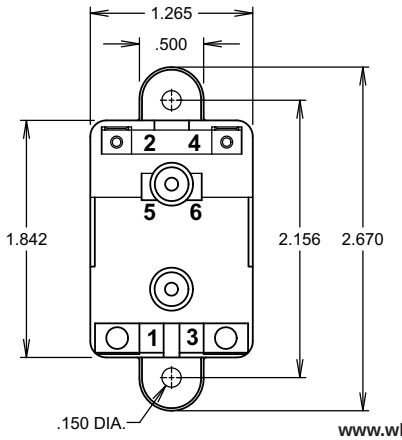
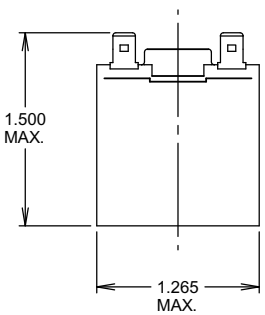


SPDT



SPNO / SPNC





Type 70 SPNO

WARNING – FIRE HAZARD
Must be installed in a dry and protected place. Failure to protect solenoid from water and other contaminants could result in Fire, Property Damage, Serious Personal Injury, or Death.

TYPE 70 CONTACTORS – SPNO

Single Pole Normally Open Contact, Case is Dust Resistant and Isolated from Ground

SPECIFICATIONS

Dimensions . . . . . 2.47″L x 3.48″W x 2.40″H
Weight . . . . . 14 oz.
Temperature Range . . . . . -40° to +122°F
Terminations, Contacts . . . . . 5/16″-24 UNF-2A thread
Terminations, Coil . . . . . #10-32 UNF-2A thread
Recommended Mounting . . . . . Plunger vertical with cap down
Hardware Torque, Contact Terminal . . . . . 45-55 in. lbs.
Hardware Torque, Coil Terminal . . . . . 12-18 in. lbs.
Caution: A back-up wrench must be used to hold the bottom nut stationary.
Agency . . . . . U.L. 538 Recognized, File AU2138

Model Number	Duty Cycle ③	Terminal Type ①	Pole Form	Bracket Style	Coil Voltage D.C.	Coil Resistance (Ohms) ②	Contact Material	Contact Rating (Amps) – Inductive Load		
								Voltage	Normally Open	
								D.C.	Continuous	Inrush
70-111225	Continuous	3A	SPNO	Standard	12	16	Copper	12	80	150
70-111224	Continuous	4	SPNO	Standard	12	16	Copper	12	80	150
70-117224	Continuous	4	SPNO	Standard	24	60	Copper	24	50	50
70-120224	Continuous	4	SPNO	Standard	36	114	Copper	36	50	50

① "3A" = Coil Grounded to Case
"4" = Isolated Coil
② Coil resistance in Ohms @ 25°C
③ Intermittent duty designs available.

Type 120 SPNO

TYPE 120 CONTACTORS – SPNO

Single Pole Normally Open Contact, Dust Resistant, Water Resistant and Case is Isolated from Bracket

SPECIFICATIONS

Dimensions . . . . . 2.13″L x 2.88″W x 3.09″H (Std. Bracket)
Dimensions . . . . . 2.50″L x 3.00″W x 3.03″H (L-Shaped Bracket)
Weight . . . . . 6.0 oz.
Temperature Range, Intermittent Duty . . . . . -20° to +150°F
Temperature Range, Continuous Duty . . . . . -20° to +120°F
Terminations, Contacts . . . . . 5/16″-24 studs, .495″ min. length
Terminations, Coil . . . . . #10-32, .451″ min. length
Recommended Mounting . . . . . Coil terminals up or horizontal
Hardware Torque, Contact Terminal . . . . . 45-55 in. lbs.
Hardware Torque, Coil Terminal . . . . . 12-18 in. lbs.
Caution: A back-up wrench must be used to hold the bottom nut stationary.

Model Number	Duty Cycle ①	Terminal Type ②	Pole Form	Bracket Style	Coil Voltage D.C.	Coil Resistance (Ohms) ③	Contact Material	Contact Rating (Amps) – Inductive Load		
								Voltage	Normally Open	
								D.C.	Continuous	Inrush ④
120-105711	Continuous	4	SPNO	Standard	12	16	Silver Alloy	12	100	400
120-105851	Continuous	3A	SPNO	Standard	12 ⑤	16	Silver Alloy	12	100	400
120-106131	Intermittent	4	SPNO	Standard	12	6.0	Copper	12	80	400
120-106132	Intermittent	4	SPNO	L	12	6.0	Copper	12	80	400
120-107112	Continuous	4	SPNO	L	14	26.0	Silver Alloy	14	100	400

① Intermittent Duty Cycle = 30 seconds "ON" maximum and 6 minutes "OFF"
② "4" = Isolated Coil
③ Coil resistance in Ohms @ 25°C
④ Inrush Current: Current applied within the first 1/2 second of contact closure
⑤ Coil grounded to bracket

NOTE: CAUTION must be used in coil selection for use in 12 volt systems where battery charging may expose coil to continuous, higher-than-rated voltage. 14 volt coils are recommended. White-Rodgers will not be responsible for consequences of misapplied solenoids.

Type 124

TYPE 124 CONTACTORS

Single Pole Normally Open, or Single Pole Double Throw Contacts.
Dust Resistant and Endcaps are Isolated from Bracket

SPECIFICATIONS

Dimensions, 124-105111,-114111,-117111 . . . . . 3.56″L x 3.13″W x 2.19″H
Dimensions, 124-305111,-314111 . . . . . 4.69″L x 3.13″W x 2.19″H
Weight, 124-105111,-114111,-117111 . . . . . 16.0 oz.
Weight, 124-305111,-314111 . . . . . 19.0 oz.
Temperature Range . . . . . -40° to +149°F
Terminations, Contacts . . . . . 5/16″-24 UNF-2A thread
Terminations, Coil . . . . . #10-32 UNF-2A thread
Recommended Mounting . . . . . Vertical plane with coil terminals up
Hardware Torque, Contact Terminal . . . . . 60 in. lbs. max.
Hardware Torque, Coil Terminal . . . . . 12-18 in. lbs.

Caution: A back-up wrench must be used to hold the bottom nut stationary.

Model Number	Duty Cycle	Terminal Type ①	Bracket Style	Coil Voltage D.C.	Coil Resistance (Ohms) ②	Contact Material	Contact Rating (Amps) – Inductive Load				
							Voltage	Normally Open		Normally Closed	
							D.C.	Continuous	Inrush ③	Continuous	Inrush ③
124-105111	Continuous	4	Standard	12	13.2	Silver Alloy	12	150	400	–	–
124-305111	Continuous	6	Standard	12	13.2	Silver Alloy	12	150	400	50	100
124-114111	Continuous	4	Standard	24	53.0	Silver Alloy	24	150	400	–	–
124-314111	Continuous	6	Standard	24	53.0	Silver Alloy	24	150	400	50	100
124-117111	Continuous	4	Standard	36	120.0	Silver Alloy	36	100	400	–	–
124-317111	Continuous	6	Standard	36	120.0	Silver Alloy	36	100	400	50	100

① "4" = Isolated Coil, SPNO
"6" = Isolated Coil, SPDT
② Coil resistance in Ohms @ 25°C
③ Inrush Current: Current applied within the first 1/2 second of contact closure

Type 586 SPNO

TYPE 586 CONTACTORS

Single Pole Normally Open, or Single Pole Double Throw Contacts.
Water Resistant and Case is Isolated from Bracket

SPECIFICATIONS

Dimensions, 586-114111,-117111 . . . . . 3.69″L x 3.30″W x 2.90″H
Dimensions, 586-317111 . . . . . 4.61″L x 3.30″W x 2.90″H
Weight, 586-114111,-117111 . . . . . 24.0 oz.
Weight, 586-317111 . . . . . 26.0 oz.
Temperature Range . . . . . -40° to +149°F
Terminations, Contacts . . . . . 5/16″-24 UNF-2A thread
Terminations, Coil . . . . . #10-32 UNF-2A thread
Recommended Mounting . . . . . Vertical plane with coil terminals up
Hardware Torque, Contact Terminal . . . . . 60 in. lbs. max.
Hardware Torque, Coil Terminal . . . . . 12-18 in. lbs.

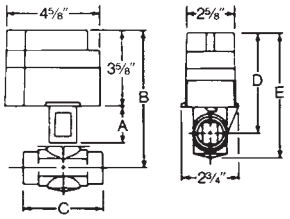
Model Number	Duty Cycle	Terminal Type ①	Bracket Style	Coil Voltage D.C.	Coil Resistance (Ohms) ②	Contact Material	Contact Rating (Amps) – Inductive Load				
							Voltage	Normally Open		Normally Closed	
							D.C.	Continuous	Inrush ③	Continuous	Inrush ③
586-105111	Continuous	4	Standard	12	21.0	Silver Alloy	12	200	600	–	–
586-108111 ④	Continuous	4	Standard	15	32.8	Silver Alloy	15	200	600	–	–
586-114111	Continuous	4	Standard	24	84.0	Silver Alloy	24	200	600	–	–
586-117111	Continuous	4	Standard	36	189.0	Silver Alloy	36	200	600	–	–
586-120111	Continuous	4	Standard	48	336.0	Silver Alloy	36	200	600	–	–
586-314111	Continuous	6	Standard	24	53	Silver Alloy	24	200	600	100	200
586-317111	Continuous	6	Standard	36	120	Silver Alloy	36	200	600	100	200

① "4" = Isolated Coil, SPNO
"6" = Isolated Coil, SPDT
② Coil resistance in Ohms @ 25°C
③ Inrush Current: Current applied within the first 1/2 second of contact closure
④ Ideal for 12V charging systems

NOTE: CAUTION must be used in coil selection for use in 12 volt systems where battery charging may expose coil to continuous, higher-than-rated voltage. 15 volt coils are recommended. White-Rodgers will not be responsible for consequences of misapplied solenoids.

HYDRONIC CONTROLS INDEXED BY RANGE

Range Max.	Range Min.	Differential Max.	Differential Min.	Model	Element	Switch Action	Page Number
240°F	100°F	10°F Fixed	10°F Fixed	**1127-2**	Surface Mount	SPDT	109
240°F	100°F	45°F	7°F	**1131-102**	Well Immersion	SPDT	107
240°F	100°F	45°F	5°F	**11B18-101**	Well Immersion	Open on Rise	107
240°F	100°F	45°F	5°F	**11D18-1**	Well Immersion	Open on Rise	107
240°F	100°F	45°F	7°F	**11D31-1**	Well Immersion	SPDT	107



VALVE SIZE	DIMENSIONS (inches)				
	A	B	C	D	E
¾″	1 3/4	6 1/2	2 7/8	4 11/16	5 5/8
1″	1 15/16	6 3/4	3 1/8	4 13/16	5 7/8
1¼″	2 1/8	7 1/8	3 11/16	5	6 1/4

HYDRONIC ZONE VALVES

Two Types of Valves, 2-Wire or 3-Wire, for Zoning Hydronic Systems Up to 50 PSI

FEATURES

- Quiet operation.
- Valve stem made of stainless steel.
- Automatic recycling manual operator shows valve position at all times.
- Built-in auxiliary contacts to control burner or circulator relay.
- Motor can be removed from valve assembly without draining system.

SPECIFICATIONS

Electric rating of auxiliary switch. . . . . 2.0A at 24VAC
Four zone valves operate with one 40 VA transformer

CONTRACTOR TIP: FOR HEAT / COOL APPLICATIONS, SEE 752-1 CONTROL ON PAGE 106.

DO NOT CHANGE VALVE ASSEMBLY WITHOUT DRAINING BOILER OR WHILE BOILER WATER IS HOT. FAILURE TO RELIEVE WATER PRESSURE OR WAIT UNTIL WATER COOLS COULD RESULT IN SCALDING INJURIES

PARTS AND ACCESSORIES See end of this section for additional parts and accessories

- F19-0097 — Motor assembly for 3-wire zone valves
- F19-0104 — Motor assembly for 2-wire zone valves
- F84-0433 — Valve assembly for ¾″ (both series)
- F84-0434 — Valve assembly for 1″ (both series)
- F84-0435 — Valve assembly for 1¼″ (both series)
- F92-0227 — Water seal kits for ¾″ (both series)
- F92-0228 — Water seal kits for 1″ (both series)
- F92-0229 — Water seal kits for 1¼″ (both series)

TECH ? PAGES 204–205

TECHNICAL HELP

Zone Valve Troubleshooting. . . . . See pages 204–205

3-WIRE, 24V VALVES WITH SCREW TERMINAL WIRING PANEL AND AUXILIARY SWITCH (SEE TABLE AT BOTTOM FOR COMPATIBLE THERMOSTATS)

Model Number	Tubing Size (I.D.)	24 VAC Thermostat Circuit Rating	Time Cycle	Maximum Differential Across Valve	Maximum Water Temp.	Maximum System Pressure	Flow Capacity Cv	Friction Loss Equivalents Ft. of Tubing
1311-102	¾″	0.4A ①	Open: 45 seconds Close: 45 seconds	15 PSI	240°F (116°C)	50 PSI	23.5 ③	2 1/2
1311-103	1″	0.4A ①	Open: 45 seconds Close: 45 seconds	15 PSI	240°F (116°C)	50 PSI	37.0 ③	3.5
1311-104	1¼″	0.4A ①	Open: 45 seconds Close: 45 seconds	15 PSI	240°F (116°C)	50 PSI	42.2 ③	6.5

2-WIRE, 24V VALVES WITH SCREW TERMINAL WIRING PANEL AND AUXILIARY SWITCH

Model Number	Tubing Size (I.D.)	24 VAC Thermostat Circuit Rating	Time Cycle	Maximum Differential Across Valve	Maximum Water Temp.	Maximum System Pressure	Flow Capacity Cv	Friction Loss Equivalents Ft. of Tubing
1361-102	¾″	0.2A ②	Open: 45 seconds Close: 60 seconds	15 PSI	240°F (116°C)	50 PSI	23.5 ③	2 1/2
1361-103	1″	0.2A ②	Open: 45 seconds Close: 60 seconds	15 PSI	240°F (116°C)	50 PSI	37.0 ③	3.5
1361-104	1¼″	0.2A ②	Open: 45 seconds Close: 60 seconds	15 PSI	240°F (116°C)	50 PSI	42.2 ③	6.5

① Valve current is 0.4A only during opening or closing. For proper anticipation, select thermostat designed for use with a 3-wire zone valve.
② Valve current is 0.52A when opening but 0.2A when fully open: therefore set anticipator for 0.2A. ③ GPM @ 1 PSI drop.

1311 COMPATIBLE THERMOSTATS TABLE

Model Number	Mechanical/ Digital	Display	Upgrade Model Choices/Upgrade Size	Mechanical Digital	Display
1F56N-444	Mechanical	Analog	1F95-0671	Digital	Blue Universal 6″ Display
1F80-0471	Digital	Blue Single 4″ Display	1F95-0680	Digital	Blue Commercial 6″ Display
1F83-0422	Digital	Blue Universal 4″ Display	1F95-1280	Digital	Big Blue Commercial 12″ Touchscreen
1F83-0471	Digital	Blue Universal 4″ Display	1F95-1291	Digital	Big Blue Humidity 12″ Touchscreen
1F85-0422	Digital	Blue Universal 4″ Display	1F95EZ-0671	Digital	Blue Easy Reader 6″ Display
1F86-0471	Digital	Blue Single 4″ Display	1F97-1277	Digital	Big Blue Single 12″ Touchscreen

ZSW34NCA

DIRECT-CONNECT ZONE VALVES – FLARE, SWEAT AND NPT MODELS

FEATURES

- Lever for manual open (normally closed valves only).
- Auxiliary switch (optional).
- Return spring design – stainless steel for long life.
- Plastic molded cover provides extra protection from moisture.
- Swing-type ball valve made from EPDM (Ethylene Propylene Polymer).
  – Rotating design results in less wear on valve.
  – Raised ball design ensures positive valve closure and even surface wear.
- Valve body and crank arm assemblies each made from one-piece cast brass construction.
- Gears made from heavy 14 gauge brass for durable long life.
- Valve assembly design includes a recessed "O" ring for positive sealing.
- Not for steam systems.

SPECIFICATIONS

Voltage . . . . . 24 VAC
Frequency. . . . . 50 / 60 Hz
Connection . . . . . 18″ leads
Motor . . . . . Electric synchronous, spring return
Positioning . . . . . 2-way, straight through

Canada Model Number	Pipe Size	Pipe Connection	Flow Capacity Cv	Auxiliary Switch	De-Energized Position	ΔP	Max. System Pressure	Max. Water Temp.
Z Series								
ZINV12NCA	1/2″	Inv. Flare	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZINV12NOA	1/2″	Inv. Flare	3.5	Yes	NO	20 PSI	142 PSI	110°C
ZFL38NO	3/8″	Flare	3.5	No	NO	20 PSI	142 PSI	110°C
ZFL38NO-34AD*	3/8″	Flare	3.5	No	NO	20 PSI	142 PSI	110°C
ZFL38NC	3/8″	Flare	3.5	No	NC	20 PSI	142 PSI	110°C
ZFL38NC-34AD*	3/8″	Flare	3.5	No	NC	20 PSI	142 PSI	110°C
ZFL38NCA	3/8″	Flare	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZSW12NCA	1/2″	Sweat	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZSW34NCA	3/4″	Sweat	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZSW34NO	3/4″	Sweat	3.5	No	NO	20 PSI	142 PSI	110°C
ZSW1NCA	1″	Sweat	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZSW1NCA7C	1″	Sweat	7.0	Yes	NC	20 PSI	142 PSI	110°C
ZNPT12NCA	1/2″	NPT	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZNPT12NO	1/2″	NPT	3.5	No	NO	20 PSI	142 PSI	110°C
ZNPT34NCA	3/4″	NPT	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZNPT1NCA	1″	NPT	3.5	Yes	NC	20 PSI	142 PSI	110°C
ZNPT1NCA7C	1″	NPT	3.5	Yes	NC	20 PSI	142 PSI	110°C
Z Series EZ-top								
13FL38NCA	3/8″	Flare	3.5	Yes	NC	20 PSI	142 PSI	110°C
13ZINV12NCA	1/2″	Inv. Flare	3.5	Yes	NC	20 PSI	142 PSI	110°C

*With (2) 3/4″ sweat adaptors

Indicates Canadian Model Number: call 1-800-305-6953 to order

752-1

CONTRACTOR TIP: USE WITH ZONE VALVES ON PAGE 104 FOR HEAT / COOL APPLICATIONS.

AUTOMATIC CHANGE-OVER SWITCH

SPDT Control Provides Automatic Change-Over of Thermostat to Operate Zone Valve on Combination Hot and Chilled Water Systems

FEATURES

- Epoxy resin seal protects bimetallic disc and Snap-Action contacts from dust, dirt and corrosion.
- Furnished with removable spring clip to attach control to tubing.
- SPDT switch connects heating side of thermostat to two-wire zone valve when hot water is circulated through tubing.
- SPDT switch connects cooling side of thermostat to two-wire zone valve when chilled water is circulated through tubing.
- Curved sensing element provides maximum contact with tubing.

SPECIFICATIONS

Electrical Connections	12″ red, brown and black leads, 105°C insulated, No. 18 wire
Temperature Settings	Red-Black: open on rise @ 85°F, close @ 70°F Red-Brown: close on rise @ 85°F, open @ 70°F
Ambient Temperature	221°F maximum

TYPES FOR USE WITH ½″ TUBING (⅝″ O.D.)

Model Number without conduit connector	Model Number with conduit connector	Switch Action	Motor Rating				Pilot Duty 120 / 240 / 277 VAC	Resistive (non-inductive) 120 / 240 / 277 VAC
			Full Load		Lock Rotor			
			120 VAC	240 VAC	120 VAC	240 VAC		
752-1	752-2	SPDT	7.5A	3.75A	45.0A	22.5A	125 VA	15A

TYPES FOR USE WITH 1/2" TUBING (5/8" O.D.)

TYPES		SWITCH ACTION	A.C MOTOR RATING				PILOT DUTY (120V or 240V)	NON-IN-DUCTIVE (120 or 240V)
WITHOUT CONDUIT CONNECTOR	WITH CONDUIT CONNECTOR		FULL LOAD		LOCKED ROTOR			
			120V	240V	120V	240V		
752-1	752-2	SPDT	7.5A	3.75A	45.0A	22.5A	125 VA	15.0A

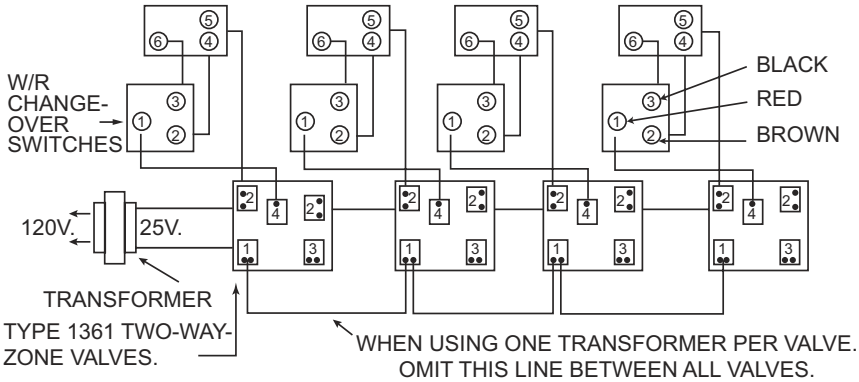
TYPES FOR USE WITH 3/4" TUBING (7/8" O.D.)

752-1	SPDT	7.5A	3.75A	45.0A	22.5A	125 VA	15.0A

SPECIFICATIONS

Electrical Connections – 12" red, brown, and black leads, 105ºC insulated, No. 18 wire.
Temperature Settings – Red-Black, open at 85ºF ± 6º
Red-Brown, open 70ºF ± 6º
Ambient Temp. – 220ºF Max.

Typical diagram using Type 1361 valves (25 volts)with Changeover Switch. Boiler, chiller, and circulator operation are independent of thermostat demand.



HYDRONIC / APPLIANCE

11D18-1

WELL IMMERSION SINGLE CONTROL

Types for Use as High Limit, Reverse Action or SPDT Switching Action: May be Mounted Either Horizontal or Vertical

FEATURES

- Extra capillary length for extended shank wells.
- Special screw terminals with “ears” securely hold solid and stranded wires.
- Screwdriver-adjustable differential with direct-read indicator.
- Knockouts on top and bottom and plenty of wiring room.
- Hydraulic action element – fast acting.

SPECIFICATIONS

Dimensions. . . . . $5^{3}/_{8}$″H + $2^{5}/_{16}$″ coil x $2^{9}/_{16}$″D
Finish . . . . . Grey
Agency . . . . . U.L. listed and C.S.A. approved

PARTS AND ACCESSORIES

See end of this section for additional parts and accessories

- F145-0163 — Tube heat conductive compound
- Immersion wells — see page 108

TYPES WITH BULBS DIRECTLY INTERCHANGEABLE WITH HONEYWELL ($3^{9}/_{16}$″ x $^{3}/_{8}$″) **No wells included.**

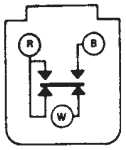
Model Number	Range	Differential	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Valves and Relays	
					120 VAC	240 VAC	24 VAC	0.3-12v DC
11D18-1 ①	100 to 240°F (38 to 116°C)	5 to 45°F (3 to 25°C)	Open on Rise	HTV See page 222	10.0A	6.0A	6.0A	1.0A
11D31-1	100 to 240°F (38 to 116°C)	7 to 45°F (4 to 25°C)	SPDT	HH See page 222	7.4A	3.7A	2.9A	—

① Has U.L. approved adjustable dial stop, factory set at 150°F maximum.

TYPES WITH TAPERED BULBS ($2^{7}/_{16}$″ x $^{7}/_{16}$″) **All types include $^{1}/_{2}$″ standard shank well, unless otherwise specified.**

Model Number	Range	Differential	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Valves and Relays	
					120 VAC	240 VAC	24 VAC	0.3-12v DC
1131-102 ①	100 to 240°F (38 to 116°C)	7 to 45°F (4 to 25°C)	SPDT	HH See page 222	7.4A	3.7A	2.9A	—
11B18-101 ①	100 to 240°F (38 to 116°C)	5 to 45°F (3 to 25°C)	Open on Rise	HTV See page 222	10.0A	6.0A	6.0A	1.0A

① Has U.L. approved adjustable dial stop, factory set at 150°F maximum.



SPDT Contact Structure
HH Rated Controls

Switch Action
R-B Open on Rise
R-W Close on Rise

CONTRACTOR TIP: **TESTING AUTOMATIC TEMPERATURE CONTROLS** To verify a control is opening and closing properly, disconnect all power before testing. Testing must be performed with the sensing element at a temperature within the setting range of the control. For most hydronic controls with a range of 100 to 240°F, a pan of hot water is sufficient to reach the control range.

Attach an ohmmeter or continuity tester across the Open on Rise contacts. Lower the temperature setting dial to the lowest setting. If the lowest setting is below the temperature of the sensing element minus the differential of the control, the contacts should be open. Raise the temperature dial slowly. When the setting is raised above the temperature of the sensor, the contacts should close.

IMMERSION WELLS AND PACKING NUT

½″ and ¾″ NPT Sizes for Hydronic Element Insertion

FEATURES

- Wells are used where it is desired that the control operates from the temperature of a liquid in a closed system.
- The bulb of the control can be removed from an immersion well in the tank wall without draining the boiler tank.
- The packing nut can be used with any of the remote bulb types listed.
- Packing nuts permit closer control than wells because the bulb is directly immersed in the liquid.

SPECIFICATIONS

Compatibility . . . . . For use in liquids that are not corrosive to brass and copper. Not recommended for use above 100 psi, 250°F (120°C)

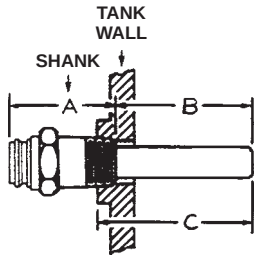
PACKING NUT

Fig. 1

Model Number	Description	Figure Number
F55-0088	Packing nut with ½″ threads	1

INTERCHANGEABLE WELLS

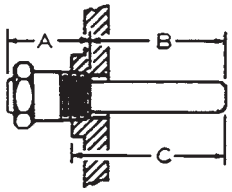
Fig. 2



Model Number	Basic Types Well is Used With	Bulb Size of Control Used	Well Description		Figure Number	Dimensions		
			Pipe Size NPT	Shank		A	B	C
F89-0211	11DXX	3 1/2 x 3/8″	1/2″	Standard	2	1 13/16″	3″	3 5/16″
F89-0212	11DXX	3 1/2 x 3/8″	1/2″	Std. Extended	2	3 5/16″	3″	3 5/16″
F89-0213	11DXX	3 1/2 x 3/8″	3/4″	Standard	2	1 13/16″	3″	3 5/16″
F89-0214	11DXX	3 1/2 x 3/8″	3/4″	Std. Extended	2	3 5/16″	3″	3 5/16″
F89-0215	11DXX	3 1/2 x 3/8″	3/4″	Extra Extended	2	4 13/16″	3″	3 5/16″

INTERCHANGEABLE WELLS

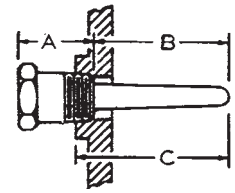
Fig. 3



Model Number	Basic Types Well is Used With	Bulb Size of Control Used	Well Description		Figure Number	Dimensions		
			Pipe Size NPT	Shank		A	B	C
F89-0027	1609, 1629, 2A23	5 3/4 x 3/8″	1/2″	Standard	3	1 5/8″	6″	6 5/16″
F89-0033	11B06, 11B37, 1182	3 1/2 x 7/16″	3/4″	Standard	3	1 5/8″	2 13/16″	3 1/8″
F89-0036	11B06, 11B37, 1182	3 1/2 x 7/16″	1/2″	Standard	3	1 5/8″	2 13/16″	3 1/8″
F89-0148	1050-1	2 15/16 x 7/16″	1/2″	Standard	3	1 5/8″	2 13/16″	3 1/2″

INTERCHANGEABLE WELLS

Fig. 4



Model Number	Basic Types Well Is Used With	Bulb Size of Control Used	Well Description		Figure Number	Dimensions		
			Pipe Size NPT	Shank		A	B	C
F89-0062	11B18, 11B05, 11B55, 1131	—	1/2″	Standard	4	1 5/8″	2 13/16″	3 1/8″
F89-0063	11B18, 11B05, 11B55, 1131	—	3/4″	Standard	4	1 5/8″	2 13/16″	3 1/8″

1127-2

SURFACE (STRAP-ON) TYPE HYDRONIC CONTROL

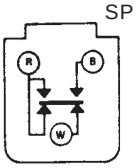
Attach Directly to Surface of Pipe. Types for Use as High Limit, Reverse Acting or SPDT Switching Action Control

FEATURES

- Sensing element has twice the contact area of competitive models.
- Hydraulic action element can be mounted in any position – no leveling required.
- Dustproof steel case.
- Special screw terminals with “ears” securely hold solid and stranded wires.
- Includes pipe strap and mounting screws.

SPECIFICATIONS

Dimensions. . . . . $6^{7}/_{8}$″H (includes plate) x $2^{5}/_{16}$″ W x $3^{3}/_{16}$″D
Finish . . . . . Grey
Agency . . . . . U.L. listed and C.S.A. approved



SPDT Contact Structure
HH Rated Controls

Switch Action
R-B Open on Rise
R-W Close on Rise

Model Number	Range	Differential	Switch Action	Full Electrical Rating	Motor Rating (Full Load)		Valves and Relays	
					120 VAC	240 VAC	24 VAC	0.3-12v DC
1127-2 ①	100 to 240°F (38 to 116°C)	Fixed 10°F (5.5°C)	SPDT	HH See page 222	7.4A	3.7A	2.9A	—

① Has U.L. approved adjustable dial stop, factory set at 150°F maximum.

8A05A-101

RELAY / TRANSFORMER COMBINATIONS

DPST Relay Models Enclosed with a Transformer Capable of Powering External Loads Up to 35VA. Ideal for Use on Boilers without Domestic Coil. Equally Adaptable for Zoned and Unzoned Systems

FEATURES

- Low voltage screw terminals — 3 color coded, end stripped line voltage leads.
- Internal transformer can power up to 35VA external loads.
- Mounts to 4″x 4″ junction box.
- Dustproof steel case.

SPECIFICATIONS

Dimensions. . . . . $4^{1}/_{4}$″H x $2^{3}/_{4}$″W x $2^{3}/_{4}$″D
Finish . . . . . Grey
Mounting. . . . . To 4″ x 4″ junction box
Lead length. . . . . 8 inches
Transformer . . . . . 35 VA maximum connected external load
Agency . . . . . U.L. recognized and C.S.A. approved

Model Number	Input Voltage	Switch Action	Thermostat Current	Contact Ratings			
				Motor Rating 120 VAC		Valves & Relays Terminals V1 & V2	
				Full Load	Locked Rotor	30 VAC	0.3-12v DC
8A05A-4	120 VAC, 60 Hz	DPST	0.28A	10.0A / 16.0A	60.0A / 96.0A	–	–
8A05A-101	120 VAC, 60 Hz	SPDT	0.13A	8.0A / 14.0A	48.0 / 84.0A	–	–

Indicates Canadian Model Number: call 1-800-305-6953 to order

25M01A-101

25M01A-100 AND 25M01A-101

25M01A Series Gas Valves Combine a Gas Pressure Regulator with Redundant and Main Solenoid Valves for Hot Surface Ignition (HSI) Residential Gas Clothes Dryers. Two Models to Replace Virtually All Whirlpool, Maytag, GE, Frigidaire, Electrolux, or Speed Queen Gas Dryer Valves

FEATURES

- Compact split coil design.
- Inlet/outlet screen.
- Field-adjustable regulator.
- Replaceable operating coils (no gas interruption).
- Outlet pressure tap.
- Both models packaged with the most popular main burner orifices to replace many OEM models.

SPECIFICATIONS

Type of Gas	Natural or LP gas (conversion kit included)
Pressure Regulator Setting	Nat. Gas: 2.8″ to 5.4″ W.C.
	LP Gas: 8.5″ to 12.0″ W.C.
Operating Ambient	Temperature: 32° to 155°F
Max. Pressure Rating	14″ W.C. (½ PSI) max.
Electrical	120 VAC, 60 Hz, .06 amps
1″ P.D. Capacity	40,000 BTU/HR

PARTS AND ACCESSORIES

- F91-3889 — Replacement Coil (Secondary)
- F91-3890 — Replacement Coil (Boost/Hold)

Model Number	Coil Voltage	Outlet Flow Direction	Inlet/Outlet Size	Regulator Adjustment Range
25M01A-100	120 VAC	Right Angle Left	$^{3}/_{8}$″ NPT X $^{11}/_{32}$″	Nat. Gas: 2.8″ to 5.4″ W.C.
25M01A-101	120 VAC	Right Angle Right	$^{3}/_{8}$″ NPT X $^{1}/_{32}$″	LP Gas: 8.5″ to 12.0″ W.C. (Conversion Kit Included)

Mounting Position – Control may be mounted in the following positions: horizontal, vertical or 90° of horizontal. **Do not mount upside down**.

F91-3889

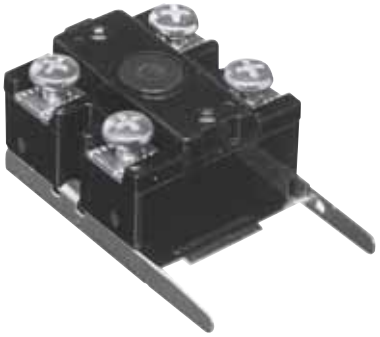
F91-3890

2500 SERIES REPLACEMENT GAS VALVE COILS

FEATURES

- Easy installation of replacement coil assemblies.
- Available for most popular models.
- Single or complete coil sets

Model Number	Application	Description	OEM
F91-3889	25M01A-xxx	120V Coil Replacement for 25M valve individual pack secondary coil	Used on Whirlpool, Electrolux, GE, Maytag, Speed Queen
F91-3890	25M01A-xxx	120V Coil Replacement for 25M valve individual pack booster and holding coil	Used on Whirlpool, Electrolux, GE, Maytag, Speed Queen
F91-4241	25M01A-xxx	Boost/host coil and secondary coil (120V, 60 Hz) for 25M dryer gas valve (includes F91-3889 plus F91-3890 combined)	Used on Whirlpool, Electrolux, GE, Maytag, Speed Queen



754-1

ELECTRIC WATER HEATER THERMOSTATS AND LIMITS – UNIVERSAL REPLACEMENTS

Surface Mount Temperature Sensing Controls

FEATURES

- High electrical capacity.
- Snap-Action contact.
- Long life-proven reliability.
- Adjustable control or manual reset styles.

SPECIFICATIONS

Agency . . . . . U.L. and C.S.A. approved

Model Number	Description	Switch Action	Range	A.C. Electrical Ratings (Non-Inductive) 120 / 240 VAC	277 VAC	480 VAC
754-1	DPST limit (manual reset)	Open on Rise	170°F fixed (77°C)	–	40.0A	25.0A
755-1	SPST thermostat	Open on Rise	90 to 150°F(32 to 66°C)	30.0A	25.0A	12.5A
755-50	754-1 + 755-1	–	–	30.0A	25.0A	12.5A
756-1	SPDT thermostat	Open 1-2 on Rise	90 to 150°F(32 to 66°C)	30.0A	25.0A	12.5A
756-50	754-1 + 756-1	–	–	30.0A	25.0A	12.5A

755-1

755-50

756-50

756-1

HYDRONIC / APPLIANCE

37E73A SERIES INTELLI-VENT CONTROLS FOR POWER VENTED WATER HEATERS

Combination Gas, Ignition and Thermostat Controls

FEATURES

- Intelli-vent combines gas, ignition and thermostat into one control.
- Right angle with 1/2" N.P.T. inlet and 1/2" inverted flare outlet.
- 70° to 160° range.
- Regulation range 20,000 to 150,000 BTU's.
- Natural gas only.

Model Number	Replaces OEM Model Number	Original Equipment Manufacturer
37E73A-903	184960	A.O. Smith
37E73A-903	9003691005	State Industries
37E73A-906	9005964005	State Industries
37E73A-918	56000152A	Giant
37E73A-921	GSW 64020	GSW
37E73A-922	37E73A-322	GSW (White-Rodgers Model Number)
37E73A-922	GSW 64021	GSW
37E73A-927	SP13845D	Rheem

11E79-901

11E79-901 INTEGRATED WATER HEATER CONTROL

Solid State Thermostat Control for Gas Fired Commercial Water Heater Applications

FEATURES

- Provides relay switched output for damper or inducer fan applications and a "Call for Heat" signal and power to energize a gas valve.
- Receives input signals from a temperature probe and Electric Cutoff (ECO).
- Controls temperature with an integrated temperature control knob.
- Provides diagnostic LED's to trouble shoot system faults and issues.

SPECIFICATIONS

Electrical Ratings:

Input & Frequency . . . . . 120 VAC, 60 Hz
XFMR Sec. Current . . . . . 1.5 A @ 24 VAC
Field Output (DD4, DD2) . . . . . 1.5A @ 24 VAC

Temperature Range

Setpoint Range . . . . . 120°F-180°F

11E79-901 Model Number Replacement Cross Reference Table

	Model Number	Replaces OEM Model	Temperature Range
NEW	**11E79-901**	11E79-101 11E79-301	120°F to 180°F

37C73U-168

37C SERIES GAS WATER HEATER CONTROLS

For Replacement of Standard Gas Water Heater Controls with Built-In E.C.O. (Energy Cut Off)

FEATURES

- Automatic shut-off of main and pilot gas in the event of pilot failure.
- Pilot gas cock with safe lighting feature and filter.
- Temperature adjustment.
- Manifold pressure tap.
- Built-In E.C.O. (Energy Cut Off) non-cycling high limit.

SPECIFICATIONS

Inlet Size	1/2″ NPT
Outlet Size	1/2″ inverted flare
Outlet Adapter Fittings (furnished with controls noted below)	1/2″ inverted flare x 3/8″ NPT reducer adapter. 1/2″ x 1/2″ inverted flare outlet extension adapter
Mounting	3/4″ NPT, 4 1/2″ bulb insertion length
Pilot Connection	1/4″ compression fitting

Model Number	Pressure Regulation		Temperature Range	Shank Length	Gas Type
	Main Burner	Pilot			
37C73U-168 ①	3.5″ W.C. (A.O. Smith Style)	4.0″ W.C.	70 to 160°F (21 to 71°C)	1 1/4″	Natural Gas (Right hand threads)
37C72U-185 ②	10.0″ W.C.	10.0″ W.C.	70 to 160°F (21 to 71°C)	1 1/4″	L.P. Gas (Left hand threads)

① Outlet adapter fittings included.
② Includes Left Hand outlet extension fittings: 1/2″ LH x 1/2″ LH inverted flare and 1/2″ LH x 3/8″ LH inverted flare

Replacement Gas Water Heater Controls

Model Number	Replaces OEM Model Number	Main Burner	Pilot	Temperature Range	Shank Length	OEM
37C73U-171	37C73U-274	4.0″ W.C. Nat. Gas	4.0″ W.C. Nat. Gas	70° - 160°F	2 1/2″	A. O. Smith
37C73U-173	37C73U-640	4.0″ W.C. Nat. Gas	4.0″ W.C. Nat. Gas	70° - 160°F	1 1/4″	A. O. Smith
37C73U-172	37C73U-641	4.0″ W.C. Nat. Gas	4.0″ W.C. Nat. Gas	70° - 160°F	2 1/4″	A. O. Smith
37C73U-174	37C73U-652	5.0″ W.C. Nat. Gas	5.0″ W.C. Nat. Gas	70° - 160°F	1 1/4″	A. O. Smith
37C73U-170	37C73U-836	4.0″ W.C. Nat. Gas	4.9″ W.C. Nat. Gas	70° - 160°F	1″	Rheem

11B79-3

11B79-3 GAS WATER HEATER CONTROL

Commercial Gas Water Heater Control with Built-In ECO (Energy Cut-Off) is a Direct Replacement for A.O. Smith Part # 192828-000

FEATURES

- All bulbs are full direct immersion – no immersion well required.
- Case element has a bulb for the ECO and thermostat.
- Thermostat has a remote build with an integral to remote bulb volume ratio of 3:1.
- Terminal insulator on thermostat.
- Remote capillary routed through immersion nut for strain relief.
- Dial has both °F and °C scale.
- Temperature regulating device for use in applications not exceeding 180°F (82°C)
- ECO contacts gold plated with special adjustments.
- 1/4" male spade terminals on thermostat.
- Ground screw.
- Center bottom knockout removed.

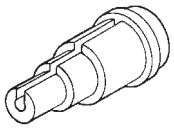
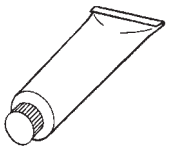
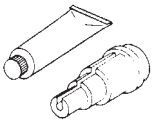
SPECIFICATIONS

Case Element . . . . . ¾″ NPT
2¾″ shank, 4⅝″ beyond thread

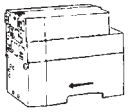
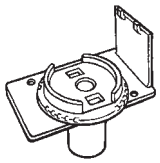
Remote Element . . . . . ¾″NPT
Compression fitting on 1-1/2" stud
5¼″ beyond stud

	Model Number	Thermostat		E.C.O.	
		Electrical Rating	Switch Action	Electrical Rating	Switch Action
NEW	11B79-3	24 VAC - 0.75 Amp 0.25 to 1.0 VDC - 0.25 Amp 10 F.L.A., 60 L.R.A., 120 VAC	Open on Rise Differential: Fixed 4°F (2.2°C)	24 VAC - 0.75 Amp 0.25 to 1.0 VDC - 0.25 Amp	Open on Rise @ 205°F (96°C) Differential: Non-Cyling, Manual Reset

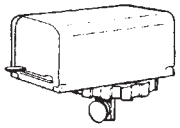
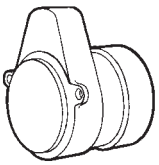
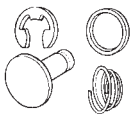
TEMPERATURE AND HOT WATER CONTROLS 1000–1100 SERIES

Item Number	Model Number	Description
	**F71-0924**	Well adapter for 1100 series bulbs
	**F145-0163**	Heat transfer compound
	**F145-0650**	F71-0924 and F145-0163 packed together

ZONE VALVES – 1300 SERIES

Item Number	Model Number	Description
	**F19-0097** **F19-0104**	**MOTOR ASSEMBLIES** For 1311-102, -103, -104 For 1361-102, -103, -104 Water seal replacement kit not included
	**F84-0433** **F84-0434** **F84-0435**	**VALVE ASSEMBLIES** 1311-102 and 1361-102 (3/4″) 1311-103 and 1361-103 (1″) 1311-104 and 1361-104 (1 1/4″)
	**F92-0227** **F92-0228** **F92-0229**	**WATER SEAL REPLACEMENT KIT** (Quad ring. “O” ring, Tru-arc ring and cotter pin) 1311-102 and 1361-102 (3/4″) 1311-103 and 1361-103 (1″) 1311-104 and 1361-104 (1 1/4″)

COMPACT ZONE VALVES 13A00 SERIES

Item Number	Model Number	Description
	**F19-0181** **F19-0187**	**POWER HEAD** (includes seal ring) For 2-way zone valves 25v with conduit hub 25v with plug-in panel that includes an auxiliary switch
	**F19-0190**	**MOTOR** 24v motor
	**F84-1215**	**VALVE DISC** Contains one disc, spring, E-ring and body seal ring

HYDRONIC / APPLIANCE

NOTE

See **Technical Help Section** for:

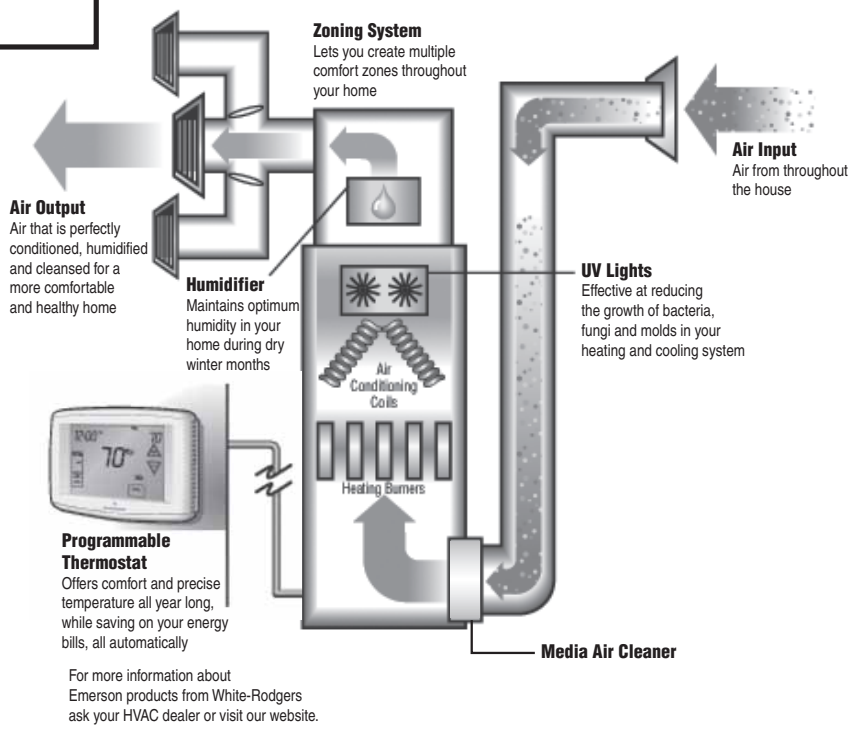
- Exploded Parts Lists
- Sizing Guidelines
- Programming Options
- Air Cleaner Parts Cross Reference

TECH PAGES 207–219

Comfort Complete

Emerson premium home comfort components all have their individual merits, but it's the system as a whole that creates **environmental perfection**. Temperature and humidity, of course, are easy to appreciate because our bodies are very much attuned to these environmental conditions. Judging the quality of the air we breathe, however, requires substantially more sensitive equipment, and in most cases, people simply aren't aware that the air in their homes is unhealthy. With that in mind, Emerson incorporates different technologies that combine to create ideal climatic conditions. After all, comfort is really just part of being **healthy**.

TYPICAL FORCED-AIR SYSTEM



For more information about Emerson products from White-Rodgers ask your HVAC dealer or visit our website.

UV SERIES GERMICIDAL LIGHT

Multi-Purpose UV Lights are Remarkably Effective at Arresting Bacterial Growth

UV200

UV100

Powerful 60 Watt Bulb!

FEATURES

- High-output, long-life UV-C lamps.
- Multi-voltage electronic ballast (120 / 240V).
- Straight and angle-mount (tilt bracket) design.
- Power switch and external fuse.

SPECIFICATIONS

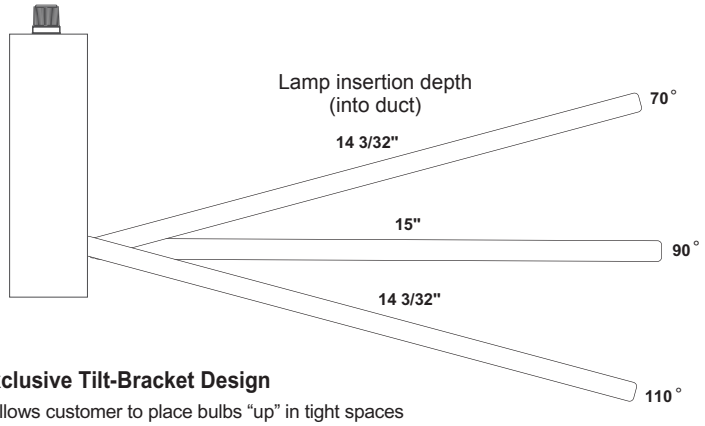
Electrical	120V / 240V, 50 / 60Hz, 1PH; 3 amp-250V fuse, single lamp 60W, dual lamp 120W, 9000 hour life
Agency	FIFRA – File #73316 (Federal Insecticide Fungicide Rodenticide Act) UL Safety Agency – File #E213952 FDA Class II Medical Device
Dimensions	UV100: $6^{7}/_{8}$″L x $11^{1}/_{8}$″W x $2^{1}/_{16}$″H UV200: $6^{7}/_{8}$″L x $14^{3}/_{16}$″W x $2^{1}/_{16}$″H
Temperature	45°F - 150°F (outside of duct)
Weight	UV100: $4^{1}/_{2}$ lbs. UV200: $5^{3}/_{4}$ lbs.

PARTS AND ACCESSORIES

- UVP-06207 – UV-C lamp
- UVP-06212 – Electronic ballast (UV100)
- UVP-06213 – Electronic ballast (UV200)
- UVP-212261-00 – Power cord (120V)
- UVP-212107-00 – Power cord (240V)
- UVP-212106-00 – Power cord receptacle
- UVP-212108-00 – Cover interlock switch
- UVP-750-0026-002 – Lighted on/off switch
- UVP-212225-00 – Fuseholder
- UVP-750-0108-001 – Fuse

Model Number	Application
UV100	Slab Coil Applications 3 Tons or Less Up to 1200 CFM
UV200	Slab Coil, A-Coil and Return Air Applications Where Space Permits Dual Lamps

Lamp Placement



Exclusive Tilt-Bracket Design

- Allows customer to place bulbs “up” in tight spaces
- Allows the bulb to be placed “down” over the coil to get a better angle over the coil
- In return air applications, tilting one bulb “up” and the other “down” enables more of the air stream to be covered

ACM Series

PREMIUM WHOLE HOUSE AIR CLEANING SOLUTION 4″ MEDIA AIR CLEANER

FEATURES

- Slim profile for easy installation and easy stocking.
- Heavy-duty, 20 gauge galvanized steel cabinet construction – assembles using toggle locks.
- Factory-punched screw and drill-access holes in cabinet for fast and simple installation.
- Snap-on, ABS plastic cabinet door for easy filter replacement without tools.
- Private label program available

Model Number	CFM	Nominal Size	Cabinet Dimensions	Recommended CFM Range	Shipping Weight
ACM1000M-108	1000	16″ x 20″	18 1/8″H x 19 7/8″W x 5 1/2″D	600-1200	14 lbs.
ACM1400M-108	1400	16″ x 25″	18 1/8″H x 24 7/8″W x 5 1/2″D	1000-1600	15.75 lbs.
ACM1600M-108	1600	20″ x 20″	22 1/4″H x 19 7/8″W x 5 1/2″D	1200-1800	15 lbs.
ACM2000M-108	2000	20″ x 25″	22 1/4″H x 24 7/8″W x 5 1/2″D	1600-2200	17.25 lbs.

Each ACM includes a MERV 8 media filter.
Shipping specifications meets National Safety Transit Test (NSTT) standards.

FILTER REPLACEMENTS FOR 4″ MEDIA AIR CLEANERS

FEATURES

- Available in MERV 8 and MERV 11 ratings.
- Includes installation arrow to indicate airflow direction.

STANDARD MERV 8 FILTER REPLACEMENT OR UPGRADE TO A PREMIUM MERV 11 FILTER

Model Number	Rating	CFM	Nominal Size	Actual Filter Size	Shipping Weight
FR1000M-108	MERV 8	1000	16″ x 20″ x 4″	15 1/2″H x 19 1/2″W x 3 3/4″D	4.5 lbs.
FR1000M-111	MERV 11				6 lbs.
FR1400M-108	MERV 8	1400	16″ x 25″ x 4″	15 1/2″H x 19 1/2″W x 3 3/4″D	6.25 lbs.
FR1400M-111	MERV 11				7 lbs.
FR1600M-108	MERV 8	1600	20″ x 20″ x 4″	19 1/2″H x 19 1/2″W x 3 3/4″D	5.5 lbs.
FR1600M-111	MERV 11				6.25 lbs.
FR2000M-108	MERV 8	2000	20″ x 25″ x 4″	19 1/2″H x 24 1/2″W x 3 3/4″D	7 lbs.
FR2000M-111	MERV 11				8 lbs.

FR1400-100

FILTER REPLACEMENTS FOR 5″ MEDIA AIR CLEANERS

FEATURES

- Four standard sizes.
- MERV 8 media.

REPLACEMENT MEDIA FILTERS

For Models	Model Number	CFM	Recommended CFM	A/C Tonnage	BTU Input Range
ACB1000-101	**FR1000-100**	1000	600-1200	up to 3.0	up to 120,000
ACB1400-101	**FR1400-100**	1400	1000-1600	up to 4.0	up to 160,000
ACB1600-101	**FR1600-100**	1600	1200-1800	up to 4.5	up to 180,000
ACB2000-101	**FR2000-100**	2000	1600-2200	up to 5.5	up to 220,000

UNIVERSAL MEDIA FILTER REPLACEMENTS

FR – FILTER REPLACEMENTS

Filter Model	CFM	Recommended CFM	A/C Tonnage	Input Range	MERV	Dimension
FR1400U-108	1400	1000-1600	up to 4.0	up to 160,000	8	20″ x 24″ x 4 3/8″
FR2000U-108	2000	1600-2200	up to 5.5	up to 220,000	8	20″ x 24 1/2″ x 4 3/8″

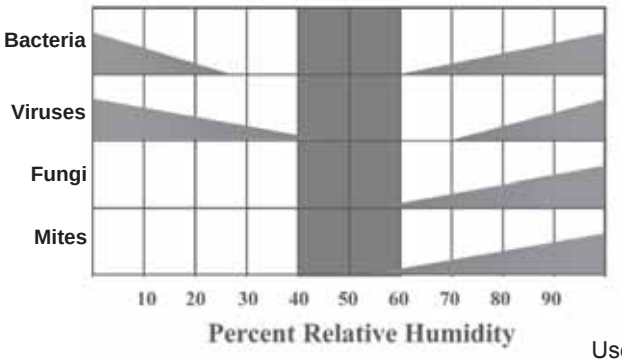
Nominal Size	CFM	Filter Manufacturer	Filter Model	Suggested Cabinet	MERV 8 Suggested Replacement
16″ x 25″ x 5″	1400	Aprilaire (Space-Gard)	401		FR1400U-108
16″ x 25″ x 5″	1400	Aprilaire (Space-Gard)		2400	FR1400U-108
16″ x 25″ x 5″	1400	Carrier	ACBCM1		FR1400U-108
16″ x 25″ x 5″	1400	Carrier		FILBBFTC0016	FR1400U-108
16″ x 25″ x 5″	1400	Carrier		FILCCFTC0016	FR1400U-108
16″ x 25″ x 5″	1400	Carrier		FILBBCAR0016	FR1400U-108
16″ x 25″ x 5″	1400	Carrier		FILCCCAR0016	FR1400U-108
16″ x 25″ x 5″	1400	Honeywell	FC100A1029		FR1400U-108
16″ x 25″ x 5″	1400	Honeywell	FC100C1009		FR1400U-108
16″ x 25″ x 5″	1400	Honeywell	FC200E1029		FR1400U-108
16″ x 25″ x 5″	1400	Honeywell		F100F2002	FR1400U-108
16″ x 25″ x 5″	1400	Honeywell		F100F1012	FR1400U-108
16″ x 25″ x 5″	1400	Honeywell		F100B1016	FR1400U-108
16″ x 25″ x 5″	1400	Honeywell		F150E1026	FR1400U-108
16″ x 25″ x 5″	1400	Honeywell		F200E1029	FR1400U-108
16″ x 25″ x 5″	1400	Lennox	X0582		FR1400U-108
16″ x 25″ x 5″	1400	Lennox	X0583		FR1400U-108
16″ x 25″ x 5″	1400	Lennox	X0584		FR1400U-108
16″ x 25″ x 5″	1400	Lennox		BMAC-14C	FR1400U-108
16″ x 25″ x 5″	1400	Trion	255649-102		FR1400U-108
16″ x 25″ x 5″	1400	Trion		455602-119	FR1400U-108
16″ x 25″ x 5″	1400	White-Rodgers	FR1400U-108		FR1400U-108
16″ x 25″ x 5″	1400	White-Rodgers		ACM1400U-108	FR1400U-108
16″ x 25″ x 5″	1400	White-Rodgers	FR1400-100		FR1400U-108
16″ x 25″ x 5″	1400	White-Rodgers		ACM1400-101	FR1400U-108
16″ x 25″ x 5″	1400	White-Rodgers		ACB1400-101	FR1400U-108
20″ x 25″ x 5″	2000	Aprilaire (Space-Gard)	201		FR2000U-108
20″ x 25″ x 5″	2000	Aprilaire (Space-Gard)		2250	FR2000U-108
20″ x 25″ x 5″	2000	Carrier	ACBCM2		FR2000U-108
20″ x 25″ x 5″	2000	Carrier		FILBBFTC0020	FR2000U-108
20″ x 25″ x 5″	2000	Carrier		FILBBCAR0020	FR2000U-108
20″ x 25″ x 5″	2000	Carrier		FILCCFTC0020	FR2000U-108
20″ x 25″ x 5″	2000	Carrier		FILCCCAR0020	FR2000U-108
20″ x 25″ x 5″	2000	Honeywell	FC100A1037		FR2000U-108
20″ x 25″ x 5″	2000	Honeywell	FC200E1037		FR2000U-108
20″ x 25″ x 5″	2000	Honeywell		F100F2010	FR2000U-108
20″ x 25″ x 5″	2000	Honeywell		F100F1038	FR2000U-108
20″ x 25″ x 5″	2000	Honeywell		F100B1024	FR2000U-108
20″ x 25″ x 5″	2000	Honeywell		F150E1034	FR2000U-108
20″ x 25″ x 5″	2000	Honeywell		F200E1037	FR2000U-108
20″ x 25″ x 5″	2000	Lennox	X0586		FR2000U-108
20″ x 25″ x 5″	2000	Lennox	X0587		FR2000U-108
20″ x 25″ x 5″	2000	Lennox		BMAC-20C	FR2000U-108
20″ x 25″ x 5″	2000	Trion	255649-102		FR2000U-108
20″ x 25″ x 5″	2000	Trion		455602-019	FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers	FR2000U-108		FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers	FR2000U-110		FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers		ACM2000U-108	FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers		ACM2000U-110	FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers	FR2000-100		FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers		ACM2000-101	FR2000U-108
20″ x 25″ x 5″	2000	White-Rodgers		ACB2000-101	FR2000U-108

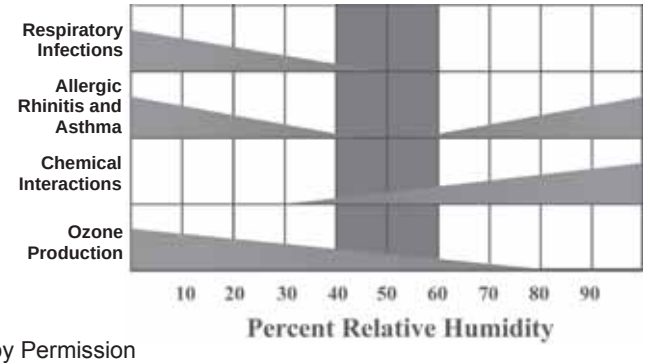
WHY HUMIDIFY?

More and more homeowners today realize that, during the winter months, they live in a “sick” house. Family members suffer from dry, itchy skin, parched throats and annoying coughs. Furniture creaks, floors moan, the piano slips out of tune and static buildup zaps the cat. In general, everyone feels miserable because they’re living with dry air, a condition often worse than living in the Sahara Desert!

Proper home humidification, on the other hand, reduces static electricity, revitalizes dry skin and soothes scratchy throats. It adds moisture to dry, cracked furniture and wilting houseplants. It protects valuable artwork, antiques and musical instruments. It even saves money on winter heating bills because properly humidified air feels warmer, allowing homeowners to turn their thermostats down a few degrees.

IMPACT OF RELATIVE HUMIDITY ON AIR QUALITY





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HSP SERIES

INSTALLATION PACKAGE
includes all adapters and mounting components for typical installation, plus flushing timer (inset) and chlorine removal filter (not shown). Relay sometimes required for independent fan operation is not supplied. Comes complete with universal electronic (not shown) humidistat, which can be wall or duct mounted.

HSP SERIES HIGH-CAPACITY STEAM POWER HUMIDIFIERS

An Excellent Choice for Heat Pumps and High-Efficiency Heating Systems

FEATURES

- Includes flushing timer and chlorine removal filter.
- Thermal fan interlock control allows unit to humidify air without furnace heat.
- Uses minimal water.
- Corrosion-resistant, low water, safety cut-off switch and built-in overflow protection provide peace of mind.
- Compact size makes unit ideal where space is at a premium.
- Automatic humidistat.
- S- clips for easy install and maintenance.
- Overflow shut-off.
- Longer lasting element.

SPECIFICATIONS

Duct Opening, HSP2000/2600 . . . . . $10\frac{1}{2}$″H x 8″W
Overall Dimensions, HSP2000/2600 . . . . $7\frac{5}{8}$″H x $12\frac{1}{2}$″D (including flange) x $12\frac{5}{8}$″W

TECH
PAGES 210–211

TECHNICAL HELP See pages 210–211 for parts and accessories

- Replacement Chlorine Removal Filter – WF-10
- Relay for Systems with Multi-Speed Blowers – A50

Type	Model Number	Voltage	Amps	Rated Output Gallons per Day	Evaporation Rate Gallons per Hour	Typical Application		
						Sq. Ft. Avg. House	Sq. Ft. Tight House	Sq. Ft. Loose House
High Capacity Steam Power	**HSP2000**	120 VAC	12.5	13.0	0.54	1,970	3,095	1,415
High Capacity Steam Power	**HSP2600**	240 VAC	8.3	17.0	0.71	2,575	4,045	1,845

Table calculations based on ARI 630

HFT2100 / 2700

INSTALLATION PACKAGE
Includes universal humidistat, self-piercing saddle valve, 24 volt transformer, mounting template, mounting hardware and homeowner's manual / installation instructions.

HFT2100 / 2700 HIGH-CAPACITY BYPASS FLOW-THRU HUMIDIFIER WITH SIDE ENTRY

An Excellent Choice for Warm Air Heating Systems

FEATURES

- Designed to fit today's narrower plenums – as narrow as 10″ (HFT2100) or 14″ (HFT2700).
- Reversible side panels with unique snap-lock fittings permit easy-change left-side or right-side bypass installation.
- New, improved wicking and water distribution system allows for non-level plenums.
- Durable thermoplastic cabinet resists rust, corrosion and warpage.
- Low profile makes unit ideal where space is limited.

SPECIFICATIONS

Overall Dimensions, HFT2100 . . . . . 13½″H x 9⅝″D x 12½″W
Overall Dimensions, HFT2700 . . . . . 18⅝″H x 9⅝″D x 13¾″W
Plenum Opening, HFT2100 . . . . . 10″H x 9″W
Plenum Opening, HFT2700 . . . . . 16⅝″H x 10⅝″W
Bypass Opening . . . . . 6″diameter

TECH PAGES 212–213

TECHNICAL HELP See pages 212–213 for parts and accessories

HFT2900FP

INSTALLATION PACKAGE
Includes universal humidistat, self-piercing saddle valve, 24 volt transformer, mounting template, mounting hardware and homeowner's manual / installation instructions.

HFT2900FP HIGH-CAPACITY FAN-POWERED FLOW-THRU HUMIDIFIER

A Premium Choice for Warm Air Heating Systems

FEATURES

- Designed to fit today's narrower plenums – as narrow as 14″.
- Ideal for installations where the return air plenum is not easily accessible.
- New, improved wicking and water distribution system allows for non-level plenums.
- Durable thermoplastic cabinet resists rust, corrosion and warpage.
- Low profile makes unit ideal where space is limited.

SPECIFICATIONS

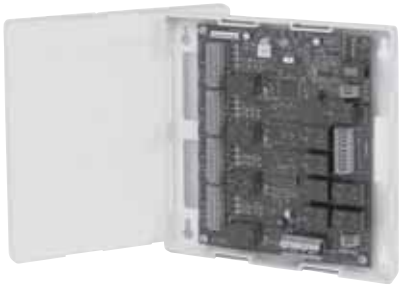
Overall Dimensions, HFT2900FP. . . . . 18⅝″H x 9⅝″D x 13¾″W
Plenum Opening. . . . . 16⅝″H x 13⅛″W

TECH PAGE 214

TECHNICAL HELP See page 214 for parts and accessories

Type	Model Number	Rated Output Gallons per Day	Evaporation Rate Gallons per Hour	Typical Application		
				Sq. Ft. Avg. House	Sq. Ft. Tight House	Sq. Ft. Loose House
Bypass Flow-Thru	**HFT2100**	14.0	0.58	2,121	3,333	1,627
Bypass Flow-Thru	**HFT2700**	18.0	0.75	2,725	4,285	1,955
Fan Powered Flow-Thru	**HFT2900FP**	19.0	0.79	2,880	4,525	2,065

Table calculations based on ARI 630



CZ-4

CMM-3

CZ-4 MASTER ZONE CONTROL PANEL, CMM-3 MINI ZONING PANEL, CAZ-2 ZONE PLUS PANEL

Master and Zone Plus Panels Control Zone Thermostats and Zone Dampers

FEATURES

- Select models compatible with Single Stage, Multi-Stage and Heat Pump systems.
- CZ-4 panel accepts up to 4 Zones, Zone Plus provides for an unlimited number of zones in increments of 2.
- Individual zone indication lights.
- Indicator LED's monitor system operation.
- Dip switch settings and built-in stage timer to quickly customize system control functions.

SPECIFICATIONS

Dimensions	$7\frac{5}{8}$″ x $7\frac{1}{4}$″ x $1\frac{3}{8}$″
Connections	Push-in terminal blocks
Operating Temperature Rating	0°F to 120°F
Humidity	5 to 95% non-condensing
Voltage	24 Volts, 50 / 60 Hz

TECH
PAGES
215–217

TECHNICAL HELP

Model Number	Description
CZ-4K	Master Zone Control Panel - up to 4 Zones and use with single stage, multi-stage and heat pumps applications - includes leaving air sensor (CLAS) and transformer (use CAZ-2 for additional zones)
CZ-4	Master Zone Control Panel Controls up to 4 Thermostats and SPST or SPDT Zone Dampers
CAZ-2	Zone Plus Connects to Master Zone (and Adds up to 2 Thermostats and Zone Dampers)
CMM-3K	2 and 3 Zone Single Stage Zone Panel, includes 24V transformer and CLAS
CMM-3U	2 Heat / 1 Cool Heat Pump and Multi-Stage, 1 Heat / 1 Cool Single Stage
CMM-3UK	2 Heat / 1 Cool Heat Pump and Multi-Stage, 1 Heat / 1 Cool Single Stage, includes 24V transformer and CLAS
CMM-3	2 and 3 Zone Single Stage Zoning Panel
CLAS	Leaving Air Sensor for CZ-4
COAS	Optional Outdoor Air Sensor for CMM-3U and CMM-3UK. Measures outdoor temperature and switches the heat from heat pump to fossil fuel furnace when the outdoor temperature falls below the balance point.

Model Number	Description
CAFC	The CAFC prevents the air conditioning coil from freezing due to low air flow, dirty filters, low refrigerant pressure, etc. The CAFC snaps onto the suction line close to the evaporator coil as possible and breaks the compressor circuit when the suction line drops below 36ºF and re-make the circuit at 46ºF. Recommended when by-passing air into the return duct.

CRDS12

CRDS ROUND DAMPER SPRING RETURN

Single Blade Round Spring Return Dampers

FEATURES

- Single blade dampers with 24 volt spring return motor.
- Mounts in any position.
- Rated for any duct system 1″ W.C. or less.
- Field convertible from Power Close to Power Open.
- Minimum position screw, direct drive linkage.

SPECIFICATIONS

Construction	22 gauge galvanized steel
Dimensions	5″, 6″, 8″, 9″, 10″, 12″, 14″, 16″, 18″ 20″ diameters
Connections	4″ wire leads
Operating Temperature Rating	0°F to 120°F
Humidity	5 to 95% non-condensing
Static Pressure	Maximum 0.5″ W.C.
Damper Timing	Nominal 30 sec. powered, 8 sec spring return

TECHNICAL HELP

Installation Wiring and Dimensions . . . . . see page 219

Model Number	Size
CRDS05	5″
CRDS06	6″
CRDS08	8″
CRDS09	9″
CRDS10	10″
CRDS12	12″
CRDS14	14″
CRDS16	16″
CRDS18	18″
CRDS20	20″

Model Number	Description
CMSR	Replacement Spring Return Damper Motor for CZD and CRDS Models

CZDS

CZDB

CZDS / CZDB DAMPER PANELS

Sturdy Aluminum Framed Construction with Side Mounted Motor (CZDS) or Bottom Mounted Motor (CZDB)

FEATURES

- Aluminum frame with 3″ blades for long life and silent operation.
- Nylon bushing for smooth operation.
- Includes 24 volt spring return damper motor.
- Power closed, spring return.
- Dampers are 1/8″ undersized from listed dimensions to assure proper fit.

SPECIFICATIONS

Electrical Rating . . . . . 6.5 Watts, 7VA
Motor Voltage . . . . . 24 Volts A.C. 50 / 60 Hz
Output. . . . . Direct Drive 15/16″ Deep Coupler for 15/16″ shaft

Torque Ratings	0°	45°	84°	Time
Motor Driven .	55 in. oz.	45 in. oz.	35 in. oz.	27 seconds
Spring Return	35 in. oz.	45 in. oz.	55 in. oz.	8 seconds

Connections . . . . . 4″ wire leads
Temperature Limits. . . . . 0-120°F (49°C) ambient
Humidity . . . . . 5 to 95% non-condensing
Static Pressure . . . . . 1″ W.C. max.
Agency Listing UL (Motor) . . . . . File #E37601

CZDS ZONING SYSTEM PANELS

Side Mounted Motor, Sturdy Aluminum Framed Construction (Model Number shaded below)

	# Blades	2	3	4	4	5	6	6	7	8
		Height								
	Inches	8″	10″	12″	14″	16″	18″	20″	22″	24″
width	8″	CZDS0808								
	10″	–	CZDS1010							
	12″	CZDS1208	CZDS1210	CZDS1212						
	14″	CZDS1408	CZDS1410	CZDS1412	CZDS1414					
	16″	CZDS1608	CZDS1610	CZDS1612	CZDS1614	CZDS1616				
	18″	CZDS1808	CZDS1810	–	CZDS1814	–	CZDS1818			
	20″	CZDS2008	CZDS2010	CZDS2012	CZDS2014	–	–	–		
	22″	CZDS2208	CZDS2210	CZDS2212	–	–	–	–	–	
	24″	CZDS2408	CZDS2410	CZDS2412	–	–	–	–	CZDS2422	CZDS2424
	26″	CZDS2608	CZDS2610	CZDS2612	CZDS2614	CZDS2616	CZDS2618	CZDS2620	–	–
	28″	CZDS2808	CZDS2810	CZDS2812		–	–	–	–	–
	30″	–	–	–	–	–	–	–	–	–

CZDB PANELS

Bottom Mounted Motor, Sturdy Aluminum Framed Construction (Model Number shaded below)

	# Blades	2	3	4	4	5	6	6	7	8
		Height								
	Inches	8″	10″	12″	14″	16″	18″	20″	22″	24″
width	8″	–								
	10″	CZDB0810	–							
	12″	CZDB0812	CZDB1012	–						
	14″	CZDB0814	CZDB1014	CZDB1214	–					
	16″	CZDB0816	CZDB1016	CZDB1216	CZDB1416	–				
	18″	CZDB0818	CZDB1018	–	CZDB1418	–	–			
	20″	–	CZDB1020	CZDB1220	CZDB1420	–	–	–		
	22″	CZDB0822	CZDB1022	–	–	–	–	–	–	
	24″	CZDB0824	CZDB1024	–	–	CZDB1624	–	–	–	–
	26″	–	CZDB1026	–	–	–	–	–	–	–
	28″	CZDB0828	–	–	–	–	–	–	–	–
	30″	–	–	–	–	–	–	–	–	–

Model Number	Description
CMSR	Replacement Spring Return Damper Motor for CZD and CRD Models

CSPRD2010

CSPRD12

CSPRD STATIC PRESSURE REGULATING DAMPERS

Barometric Relief Dampers to Bypass Excess Air Pressure on Zoned Systems

FEATURES

- Reduces air pressure in the system as zones close.
- Reduces noise.
- Automatically compensates by opening or closing as needed.
- Maintains constant pressure in duct system.

SPECIFICATIONS

Round Models

Construction	22 gauge galvanized steel
Dimensions	5″, 6″, 7″, 8″, 9″, 10″, 12″, 14″, 16″ diameters
Operating Temperature Rating	0°F to 180°F
Humidity	5 to 95% non-condensing
Static Pressure	Maximum 0.5″ W.C.

Square and Rectangular Models

Construction	22 gauge zinc plated steel
Dimensions	12″x 8″, 12″x 10″, 12″x 12″, 20″x 8″, 20″x 10″, 20″x 12″
Operating Temperature Rating	0°F to 180°F
Humidity	5 to 95% non-condensing
Static Pressure	Maximum 0.5″ W.C.

TECHNICAL HELP

Installation Instructions . . . . . see page 218

SQUARE AND RECTANGULAR

Model Number	Size	CFM
CSPRD1208	12″ x 8″	800
CSPRD1210	12″ x 10″	1000
CSPRD1212	12″ x 12″	1200
CSPRD2010	20″ x 10″	2000
CSPRD2012	20″ x 12″	2400

ROUND

Model Number	Size	CFM
CSPRD07	7″	200
CSPRD08	8″	400
CSPRD10	10″	750
CSPRD12	12″	1000
CSPRD14	14″	1600
CSPRD16	16″	2400

THERMOSTATS 127

HEATING 171

COOLING / REFRIGERATION 197

TRANSFORMERS and RELAYS 202

HYDRONIC and APPLIANCE 203

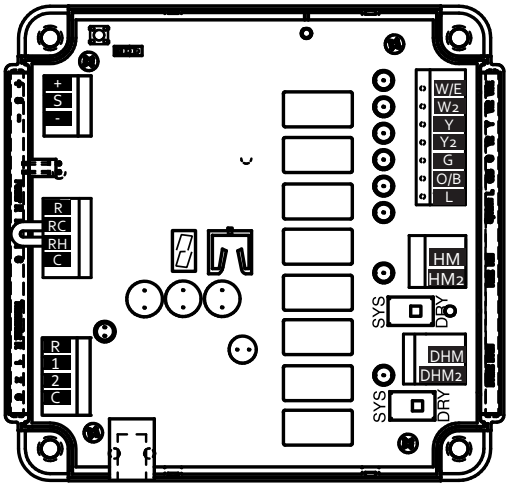
INDOOR AIR QUALITY and ZONING SYSTEMS 206

GENERAL INFORMATION 220

Equipment Control Terminals	Operation / Function
R	24 VAC Transformer
RC	24 VAC Cooling Transformer*
RH	24 VAC Heating Transformer*
C	24V Transformer Common
W/E	Heating Stage 1 HP Aux/Em Heat Stage 1
W2	Heating Stage 2 HP Aux/Em Heat Stage 2
Y	Compressor Stage 1
Y2	Compressor Stage 2
G	Fan Relay
L Terminal	System Monitor Compatible with Comfort Alert Diagnostics
O/B Terminal	Changeover Relay Heat Pump
DHM	Dehumidification Relay / Connection
DHM2	Dehumidification Relay / Connection
HM	Humidification Relay / Connection
HM2	Humidification Relay / Connection
R	Data to/from Interface
1	Data to/from Interface
2	Data to/from Interface
C	24 VAC Common to Interface
RJ11	Field configuration hook-up with RJ11 equipped configuration tool
+	Voltage to Outdoor Sensor
S	Outdoor Sensor Temperature Signal
-	Voltage to Outdoor Sensor

*For 2 transformer systems, cut and tape off one transformer. If transformer safety circuits are only in one of the systems, remove the transformer of the system with NO safety circuits. If required, replace remaining transformer with a 75 VA Class II transformer. After disconnecting one transformer, the two commons must be jumpered together.

To configure thermostat properly, go to **www.white-rodgers.com** for full Installation Instructions.



A. Press Menu to enter configuration menu.

B. Press Next to step through menu items.

C. Use Up/Down Arrows to change settings. Press Next to continue through menu items listed in the table below.

D. Press exit when you're finished.

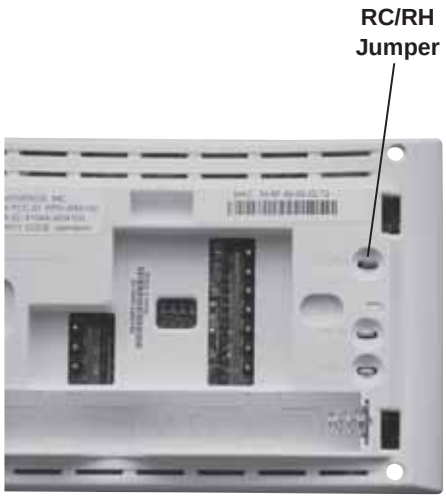
Configuration Menu Items Reference

No.	Menu Item	Default	Options
1	**Wireless Setup (Connects Thermostat to Wi-Fi network)**	—	Connect
2	**Fahrenheit or Celsius**	F	F/C
3	**Outdoor Equipment Configuration (For Cooling or Heat Pumps)**	AC2	AC1 - Conventional Cooling 1 (Single Stage) AC2 - Conventional Cooling 2 (Two Stage) HP1 - Heat Pump 1 (Single Stage) HP2 - Heat Pump 2 (Two Stage AC0 - No Cooling
4	**Indoor Equipment Configuration (For Gas or Electric Heat)**	EL2	GA1 - Gas 1 (Single Stage) GA2 - Gas 2 (Two Stage) EL1 - Electric 1 (Single Stage) EL2 - Electric 2 (Two Stage) FAN - Fan (No Heat)
5	**Reversing Value Position (Selects "O" or "B" setting for heat pumps only**	O	O/B
6	**Wireless Radio (Turns Wi-Fi radio On/Off**	ON	On/Off

Terminal Connections

Sensi Thermostat	Conventional	Heat Pump
RC*	Power for Cooling	Power for Cooling
RH*	Power for Heating	Power for Heating
C	Common Wire	Common Wire
W/E	1st Stage Indoor Heat	1st stage Aux/Emergency Heat
W2	2nd Stage Indoor Heat	2nd stage Aux/Emergency Heat
Y	1st Stage Outdoor Cool	1st Stage Compressor
Y2	2nd Stage Outdoor Cool	2nd Stage Compressor
G	Fan	Fan
O/B	Heat pump changeover valve	Heat Pump Changeover Valve
L	Heat pump diagnostic	Heat Pump Diagnostic

* If you have separate RC and RH wires, clip the RC/RH jumper on the back of the thermostat.

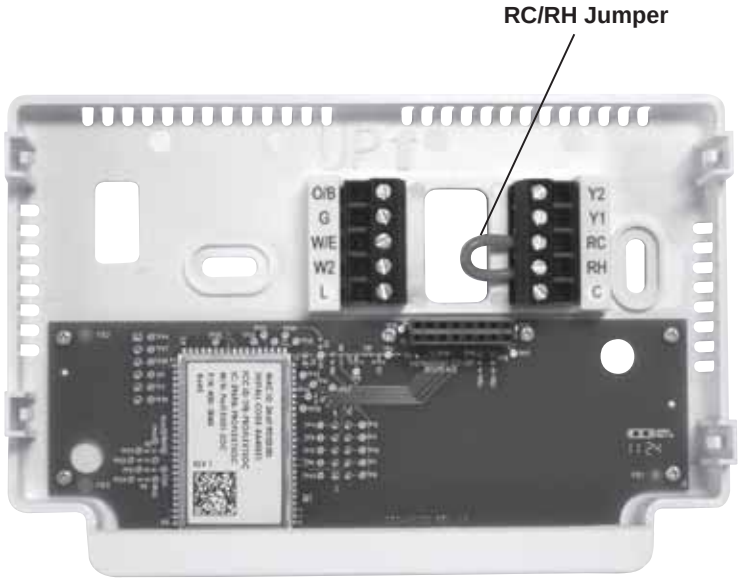


Terminal Connections

EE542-1Z Smart Energy Thermostat	Conventional	Heat Pump
RC*	Power for Cooling	Power for Cooling
RH*	Power for Heating	Power for Heating
C	Common Wire	Common Wire
W/E	1st Stage Indoor Heat	1st stage Aux/Emergency Heat
W2	2nd Stage Indoor Heat	2nd stage Aux/Emergency Heat
Y2	2nd Stage Outdoor Cool	2nd Stage Compressor
G	Fan	Fan
O/B	Heat pump changeover valve	Heat Pump Changeover Valve
L	Heat pump diagnostic	Heat Pump Diagnostic

* If the you have separate RC and RH wires, remove the RC/RH jumper.

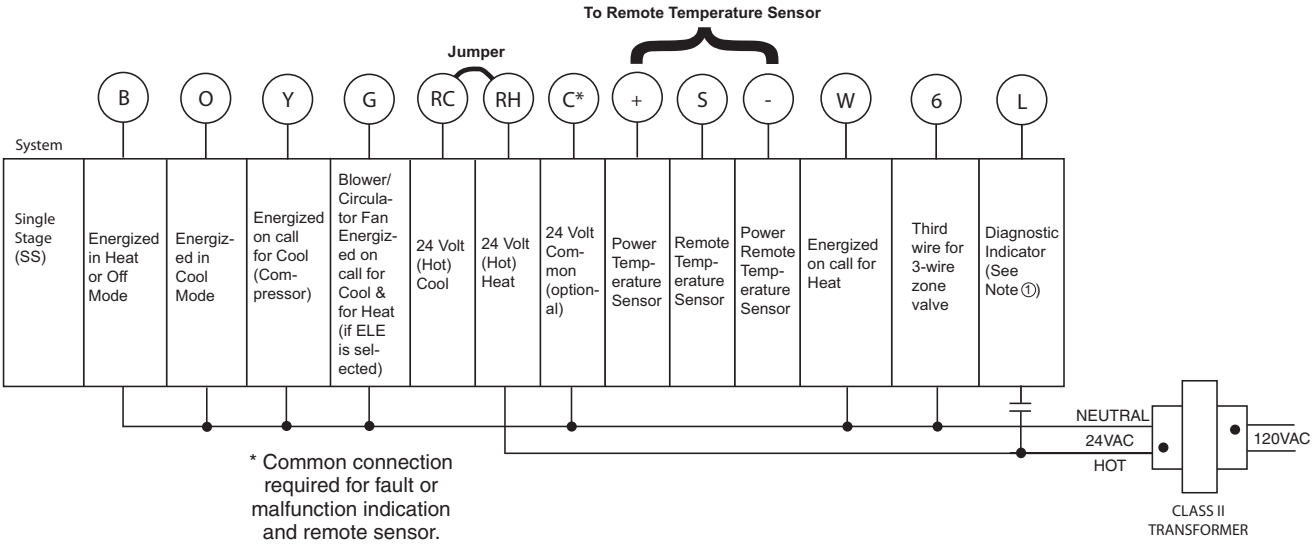
NOTE: This product requires 24V power supply via C terminal to operate.



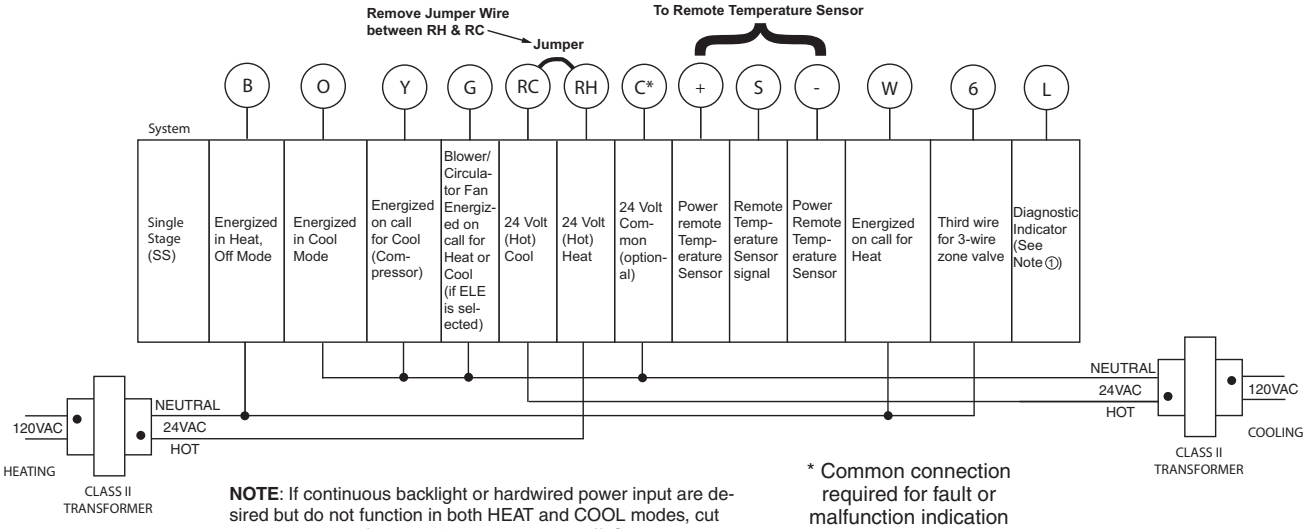
For complete configuring options, go to www.white-rodgers.com for full Installation Instructions.

TYPICAL WIRING DIAGRAMS

Single Stage System with Single Transformer



Single Stage with Two Transformers



NOTE: If continuous backlight or hardwired power input are desired but do not function in both HEAT and COOL modes, cut the heating transformer 24V wires and tape off. Connect the neutral circuit disconnected from the heating transformer to the neutral circuit of the cooling transformer. Disconnect the wire to the RH terminal and install a jumper between RH and RC. Depending on the system requirements, replace the cooling transformer with a 75VA class II transformer if needed.

NOTE: Connection for Call for Service diagnostic indicator compatible with mechanical or electronic condenser control with Comfort Alert™.

INSTALLER/CONFIGURATION MENU

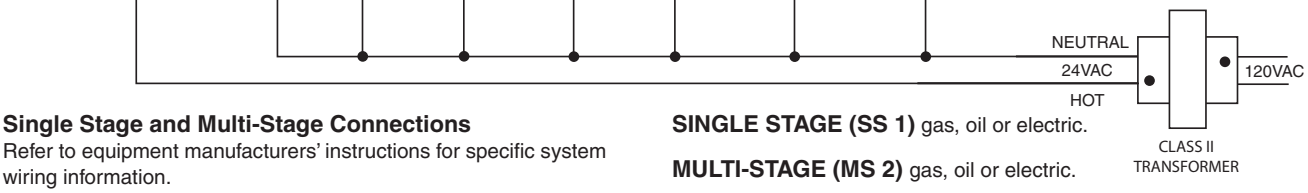
To enter the menu: Press the **Menu** touch key. Press and hold for 5 seconds the **Installer Config** touch key. This displays menu item #1 in the table below. Press ⚠ to advance to the next menu item or ▽ to return to a previous menu item. Press ▷ or ◁ to change a menu item.

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Pro-grammable**	**Press key**	**Displayed Factory (Default)**	**Press ▷ or ◁ to select from listed options**	**COMMENTS**
1	1	1	⚠	(ELE)	GAS	GAS setting: furnace controls blower. ELE setting: thermostat controls blower.
2	2	2	⚠	(**7**) Days, **P**	**5**-1-1 or **0**	Programs per week. (0 = non-programmable)
3	3	NA	⚠	(**4**) **PS**	**2**	Program periods per day. 4 = Morning, Day, Evening, Night 2 = Day, Night
4	4	3	⚠	Cool-Off-Heat-Auto	Cool-Off-Heat, Off-Heat, Cool-Off	System switch configuration.
5	5	NA	⚠	(On) **E**	**OFF**	Selects Energy Management Recovery, E (with programming option on)
6	6	4	⚠	(FA) Heat, Cr	SL	Selects Adjustable Anticipation, cycle rate, Heat
7	7	5	⚠	(FA) Cool, Cr	SL	Selects Adjustable Anticipation, cycle rate, Cool
8	8	6	⚠	(OFF) **CL**	On	Selects Compressor Lockout.
9	9	7	⚠	(On) **dL**	OFF	Selects Continuous Display backlight & intensity.
10	10	8	⚠	(LO) **dL**	HI	Selects Backlight Intensity.
11	11	9	⚠	0 (temperature)	4, LO to 4, HI	Selects Adjustable Ambient Temperature Display [range -4 (LO) to +4 (HI)].
12	12	10	⚠	°**F**	°**C**	Selects °F/°C Display (temperature units in Fahrenheit or Celsius).
13	13	11	⚠	(On) **b**	OFF	Selects audible Beeper On/Off.
14	14	12	⚠	(On) **dS**	OFF	Selects Daylight Saving Time calculation.
15	15	13	⚠	(On) Heat, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, heat mode.
16	16	14	⚠	(On) Cool, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, cool mode.
17	17	15	⚠	(OFF) **CS**, Cool Savings	1-2-3-4-5-6	Selects Cool Saving Feature & amount.
18	18	16	⚠	(99) Heat, **HL**	62-98	TEMPERATURE LIMIT, HEAT (max. heat set point).
19	19	17	⚠	(45) Cool, **LL**	46-82	TEMPERATURE LIMIT, COOL (min. cool set point).
20	20	18	⚠	OFF, 🔒 **Keypad Lockout**	**L** (total), **P** (partial), **Temperature Limit** (limited temperature range)	Selects Keypad Lockout.
			⚠	000	001-999	Selects Keypad Lockout Combination (active only if keypad Lockout is selected).
21	21	19	⚠	(OFF) Remote	On	Remote temperature sensor, enable/disable.
			⚠	Remote, In	Outdoor Remote	Remote temperature sensor (Indoor/Outdoor).
			⚠	(On) LS	OFF	Local temp. Sensor enable/disable (only when Indoor Remote is selected On).
22	22	20	⚠	Change Filter (OFF)	On	Selects Change filter feature
			⚠	200 Hours	25-1975 (in increments of 25 hours)	Change filter, duration hours.

TYPICAL WIRING DIAGRAMS

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer

System	RC	RH	C	Y	Y2	W/E	W2	G	O/B	6	L
Single Stage 1 (SS1)	24 volt power for cooling	24 volt power for heating	24 volt common (optional for system operation, required for remote sensor)	Call for cool	No Output	Call for heat	No output	Blower/Circulator fan energized on a call for cool or Fan On (also energized in heating if configured for Electric Heat)	Installer Configuration Menu selects "O" or "B" for changeover function. Set to "O" terminal energized in Cool & Off mode. Set to "B" terminal energized in Heat & emergency mode	Power closed connection for SPDT 3-wire zone valve	"Call for Service" (malfunction indicator) for Heat Pumps with "L" terminal connection. Original production 1F95-1291's do not have this connection
Multi Stage 2 (MS2)				Cool mode-1st stage	Cool mode-2nd stage	Heat mode-1st stage	Heat mode-2nd stage				



Single Stage and Multi-Stage Connections

Refer to equipment manufacturers' instructions for specific system wiring information.

This thermostat is designed to operate a single-transformer or two-transformer system.

You can configure the thermostat for use with the following fossil fuel systems:

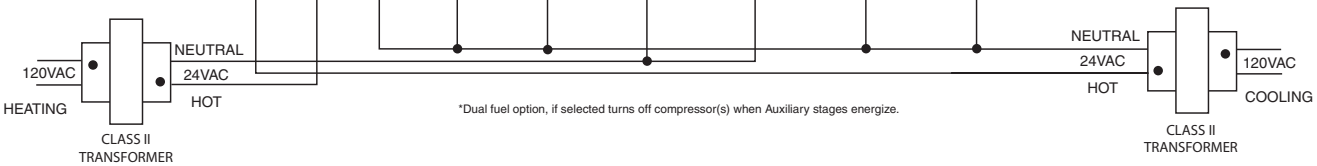
SINGLE STAGE (SS 1) gas, oil or electric.

MULTI-STAGE (MS 2) gas, oil or electric.

After wiring, see INSTALLER CONFIGURATION section for proper thermostat configuration.

Heat Pump Systems

System	RC	RH	C	Y	Y2	*W/E	*W2	G	O	6	L
Heat Pump 1 (HP1)	24 volt power for cooling	24 volt power for heating	24 volt common (optional for system operation, required for remote sensor)	Heat mode-1st stage, Cool mode-1st stage, (Compressor)	No Output	Heat mode-2nd stage, Emergency Mode-1st stage ***Note: Dual Fuel option de-energizes Heat mode stage 1 (compressor) when auxiliary heat is energized**	Heat mode-3rd stage, Emergency Mode-2nd stage ***Note: Dual Fuel option de-energizes Heat mode stage 1 (compressor) when auxiliary heat is energized**	Blower/Circulator fan energized on a call for cool or Fan On (also energized in heating if configured for Electric Heat)	Installer Configuration Menu selects "O" or "B" for changeover function. Set to "O" terminal energized in Cool mode. Set to "B" terminal energized in Heat & emergency mode	Power closed connection for SPDT 3-wire zone valve	"Call for Service" (malfunction indicator) for Heat Pumps with "L" terminal connection. Original production 1F95-1291's do not have this connection
Heat Pump 2 (HP2)					Heat mode-2nd stage, Cool mode-2nd stage, (Compressor)	Heat mode-3rd stage, Emergency Mode-1st stage ***Note: Dual Fuel option de-energizes Heat mode stages 1 and 2 (both compressors) when auxiliary heat is energized**	Heat mode-4th stage, Emergency Mode-2nd stage ***Note: Dual Fuel option de-energizes Heat mode stages 1 and 2 (both compressors) when auxiliary heat is energized**				



*Dual fuel option, if selected turns off compressor(s) when Auxiliary stages energize.

Heat Pump Connections

Refer to equipment manufacturers' instructions for specific system wiring information.

You can configure the thermostat for use with the following heat pump systems.

HEAT PUMP TYPE 1 (HP 1). Single stage compressor system; gas or electric backup.

HEAT PUMP TYPE 2 (HP 2). Multi-stage compressor or two compressor system with gas or electric backup.

After wiring, see INSTALLER CONFIGURATION section for proper thermostat configuration.

Remote Sensor Terminals

+	S	-
Supply voltage to remote temperature sensor	Remote temperature sensor signal	Supply voltage to remote temperature sensor

1F95-1280 Damper Terminal

A1
Damper or Economizer Operation (see configuration menu item 31)

1F95-1291 Humidification/De-humidification Terminals

HM	DHM
Humidification Terminal, Energizes on call for heat if Humidity setpoint is above room humidity. Can also be used to provide humidification independent of a call for heat and/or in cooling mode if Automatic Humidification is selected in Configuration Menu item #34	De-energizes on call for Dehumidification to lower the fan speed. The DHM terminal is only used on systems with a compatible dehumidification feature that have the required terminal connection on the contol module or have a relay installed to lower the fan speed

INSTALLER/CONFIGURATION MENU

To enter the menu: Press the **Menu** touch key. Press and hold for 5 seconds the **Installer Config** touch key. This displays menu item #1 in the table below. Press ⚠ to advance to the next menu item or ▽ to return to a previous menu item. Press ▷ or ◁ to change a menu item option.

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Program-mable**	**Press key**	**Displayed Factory (Default)**	**Press ▷ or ◁ to select from listed options**	**COMMENTS**
1	1	1		MS 2	HP 1, HP 2, SS 1	Selects Multi-Stage (MS2, No Heat Pump), Heat Pump 1 (HP1, 1 compressor), Heat Pump 2 (HP2, 2 compressor or 2 speed compressor), or Single Stage.
2	2	2	⚠	GAS	(ELE)	GAS setting: furnace controls blower. ELE setting: thermostat controls blower.
3	3	3	⚠	OB (O)	b	Selects Reversing Valve (This item is only to appear if HP1 or HP2 is selected above.)
4	4	3	⚠	**(7)** Days, **P**	**5** or **0**	Programs per week. (5=5-1-1 or 0 = non-programmable)
5	5	4	⚠	Cool-Off-Heat-Auto	Cool-Off-Heat, Heat Off, Heat, Coof-Off, Auto Off	System switch configuration in non heat pump mode.
			⚠	Cool-Off-Heat-Em-Auto	Cool-Off-Heat-Em, Off-Emer-Auto	System switch configuration, heat pump mode.
6	6	NA	⚠	(On) **E**	**OFF**	Selects Energy Management Recovery, E (with programming option on)
7	7	5	⚠	(FA) Heat, Cr	SL	Selects Adjustable Anticipation, cycle rate, Heat
8	8	6	⚠	(FA) Cool, Cr	SL	Selects Adjustable Anticipation, cycle rate, Cool
9	9	7	⚠	Cr/AU, Em (FA)	SL	Selects Adjustable Anticipation, cycle rate auxiliary, (This item is only to appear if HP1 or HP2 is selected above).
10	10	8	⚠	(OFF) **CL**	On	Selects Compressor Lockout.
11	11	9	⚠	(On) **dL**	OFF	Selects Continuous Display backlight.
12	12	10	⚠	(LO) **dL**	HI	Selects Backlight Intensity.
13	13	11	⚠	0 (Temperature)	5, LO to 5, HI	Selects Adjustable Ambient Temperature Display [range -5 (LO) to +5 (HI)].
14	14	12	⚠	**°F**	**°C**	Selects °F/°C Display (temperature units in Fahrenheit or Celsius).
15	15	13	⚠	(On) **b**	OFF	Selects audible Beeper On/Off.
16	16	14	⚠	(On) **dS**	OFF	Selects Daylight Saving Time calculation.
17	17	15	⚠	(On) Heat, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, heat mode.
18	18	16	⚠	(On) Cool, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, cool mode.
19	19	17	⚠	(OFF) **CS**	On	Selects Cool Savings Feature On of Off.
				(3) Cool Savings, **CS**	1-2-3-4-5-6	Selects amount of Cool Savings adjustment.
20	20	18	⚠	(OFF) CO	On	Select Compressor Optimization (not available on earlier models)
21	21	19	⚠	(99) Heat, **HL**	62-98	TEMPERATURE LIMIT, HEAT (max. heat set point).
22	22	20	⚠	(45) Cool, **LL**	46-82	TEMPERATURE LIMIT, COOL (min. cool set point).
23	23	21	⚠	OFF, 🔒 **Keypad Lockout**	**L** (total), **P** (partial), **Temperature Limit** (limited temperature range)	Selects Keypad Lockout.
			⚠	000	001-999	Selects Keypad Lockout Combination (active only if keypad Lockout is selected).
24	24	22	⚠	(On) Heat, FS	OFF	Fast second stage of heat (not available if SS1 is selected above).
25	25	23	⚠	(On) Cool, FS	OFF	Fast second stage of cool (not available if SS1 or HP1 is selectedabove).
26	26	24	⚠	Remote (OFF)	On	Remote temperature sensor, enable/disable.
			⚠	Remote, In	Outdoor Remote	Remote temperature sensor (Indoor/Outdoor).
			⚠	(On) LS	OFF	Local temp. Sensor enable/disable (only when Indoor Remote is selected On).
27	27	25	⚠	(OFF) dF	On	Selects Dual Fuel feature using software logic On or OFF (This item appears if HP1 or HP2 is selected above and no outdoor sensor.
			⚠	(05) dF	0-09	Selects Dual Fuel setpoint (°F) with no outdoor sensor.
			⚠	(60) Cd	0-99	Selects compressor delay in seconds.

1F95-1280 INSTALLER/CONFIGURATION MENU (cont.)

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Program-mable**	**Press key**	**Displayed Factory (Default)**	**Press + or − to select from listed options**	**COMMENTS**
28 (cont.)	28 (cont.)	26 (cont.)	⚠	(OFF) dF	On	Selects Dual Fuel feature using outdoor sensor On or OFF (This item appears if HP1 or HP2 is selected and outdoor sensor is installed and enabled.
28	28	26	⚠	(35) dF	5-50	Selects Dual Fuel setpoint (°F) with outdoor sensor available.
			⚠	(60) Cd	0-99	Selects compressor delay in seconds.
29	29	27	⚠	(80) AO	35-74	Selects Auxiliary Heat cut out temperature. This item appears if HP1 or HP2 is selected and outdoor sensor is installed and enabled.
30	30	28	⚠	(80) bP	79-20	Not used
31	31	NA	⚠	(o) PP	1, 2, 3	Select Pre-occupancy purge.
32	32	NA	⚠	(OFF) EC	ON	Select Economizer or Damper Operation (default)
33	33	29	⚠	(OFF) Change UV Lamp	On	Selects Change UV Lamp feature.
			⚠	350 Days	25-1975	Change UV Lamp duration days.
34	34	30	⚠	OFF Change Filter	On	Selects Change Filter feature.
			⚠	200 Hrs	25-1975	Change Filter duration hours.

1F95-1291 INSTALLER/CONFIGURATION MENU

To enter the menu: Press the **Menu** touch key. Press and hold for 5 seconds the **Installer Config** touch key. This displays menu item #1 in the table below. Press ⚠ to advance to the next menu item or ▽ to return to a previous menu item. Press + or − to change a menu item option.

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Program-mable**	**Press key**	**Displayed Factory (Default)**	**Press + or − to select from listed options**	**COMMENTS**
1	1	1		MS 2	HP 1, HP 2, SS 1	Selects Multi-Stage (MS2, No Heat Pump), Heat Pump 1 (HP1, 1 compressor), Heat Pump 2 (HP2, 2 compressor or 2 speed compressor), or Single Stage.
2	2	2	⚠	GAS	(ELE)	GAS setting: furnace controls blower. ELE setting: thermostat controls blower.
3	3	3	⚠	ob (O)	b	Selects Reversing Valve (This item is only to appear if HP1 or HP2 is selected above.)
4	4	3	⚠	**(7)** Days, **P**	**5** or **0**	Programs per week. (5=5-1-1 or 0 = non-programmable)
5	5	NA	⚠	**(4) PS**	**2**	Programs per day. 4 = Morning, Day, Evening, Night 2 = Day, Night
6	6	4	⚠	Cool-Off-Heat-Auto	Cool-Off-Heat, Heat Off, Heat, Cool-Off, Auto Off	System switch configuration in non heat pump mode.
			⚠	Cool-Off-Heat-Em-Auto	Cool-Off-Heat-Em, Off-Em-Auto	System switch configuration, heat pump mode.
7	7	NA	⚠	(On) **E**	**OFF**	Selects Energy Management Recovery, E (with programming option on)
8	8	5	⚠	(FA) Heat, Cr	SL	Selects Adjustable Anticipation, cycle rate, Heat
9	9	6	⚠	(FA) Cool, Cr	SL	Selects Adjustable Anticipation, cycle rate, Cool
10	10	7	⚠	Cr/AU, Em (FA)	SL	Selects Adjustable Anticipation, cycle rate auxiliary, (This item is only to appear if HP1 or HP2 is selected above).
11	11	8	⚠	(OFF) **CL**	On	Selects Compressor Lockout.
12	12	9	⚠	(On) **dL**	OFF	Selects Continuous Display backlight.
13	13	10	⚠	(LO) **dL**	HI	Selects Backlight Intensity.
14	14	11	⚠	0 (temperature)	5, LO to 5, HI	Selects Adjustable Ambient Temperature Display [range -5 (LO) to +5 (HI)].
15	15	12	⚠	**°F** (temperature)	**°C**	Selects °F/°C Display (temperature units in Fahrenheit or Celsius).
16	16	13	⚠	(On) **b**	OFF	Selects audible Beeper On/Off.

1F95-1291 INSTALLER/CONFIGURATION MENU (cont.)

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Program-mable**	**Press key**	**Displayed Factory (Default)**	**Press ⊳ or ⊲ to select from listed options**	**COMMENTS**
17	17	14	⚠	(On) **dS**	OFF	Selects Daylight Saving Time calculation.
18	18	15	⚠	(Off) Heat, **AS**	On	Selects Automatic Schedule for comfort temperature Programming, heat mode.
19	19	16	⚠	(On) Cool, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, cool mode.
20	20	17	⚠	(OFF) **CS**	On	Selects Cool Savings Feature On of Off.
				CS Cool Savings (3)	1-2-3-4-5-6	Selects amount of Cool Savings adjustment.
21	21	18	⚠	(Off) **CO**	On	Select Compressor Optimization (not available on earlier models)
22	22	19	⚠	(99) Heat, **HL**	62-98	TEMPERATURE LIMIT, HEAT (max. heat set point).
23	23	20	⚠	(45) Cool, **LL**	46-82	TEMPERATURE LIMIT, COOL (min. cool set point).
24	24	21	⚠	OFF, 🔒 **Keypad Lockout**	**L** (total), **P** (partial), **Temperature Limit** (limited temperature range)	Selects Keypad Lockout.
			⚠	000	001-999	Selects Keypad Lockout Combination (active only if keypad Lockout is selected).
25	25	22	⚠	(On) Heat, FS	OFF	Fast second stage of heat (not available if SS1 is selected above).
26	26	23	⚠	(On) Cool, FS	OFF	Fast second stage of cool (not available if SS1 or HP1 is selected above).
27	27	24	⚠	Remote (OFF)	On	Remote temperature sensor, enable/disable.
			⚠	Remote, In	Outdoor Remote	Remote temperature sensor (Indoor/Outdoor).
			⚠	(On) LS	OFF	Local temp. Sensor enable/disable (only when Indoor Remote is selected On).
28	28	25	⚠	(OFF) dF	On	Selects Dual Fuel feature using software logic On or OFF (This item appears if HP1 or HP2 is selected above and no outdoor sensor.
			⚠	(05) dF	0-09	Selects Dual Fuel setpoint (°F) with no outdoor sensor.
			⚠	(60) Cd	0-99	Selects compressor delay in seconds.
29	29	26	⚠	(OFF) dF	On	Selects Dual Fuel feature using outdoor sensor On or OFF (This item appears if HP1 or HP2 is selected and outdoor sensor is installed and enabled.
			⚠	dF (35)	5-50	Selects Dual Fuel setpoint (°F) with outdoor sensor available.
			⚠	Cd (60)	0-99	Selects compressor delay in seconds.
30	30	27	⚠	AO (80)	35-74	Selects Auxiliary Heat cut out temperature. This item appears if HP1 or HP2 is selected and outdoor sensor is installed and enabled.
31	31	28	⚠	bP (80)	79-20	Selects Blower balance point. Selection of 80 disables this feature. This item appears if HP1 or HP2 is selected and outdoor sensor is installed and enabled.
32	32	29	⚠	Hd (OFF)	On	Selects Humidity Display alternate with time.
33	33	30	⚠	Humidity H1, OD	-20-20-18	Selects Humidity Display adjustment.
34	34	31	⚠	HR (OFF)	LO, HI	Selects Auto Humidity reduction.
35	35	32	⚠	AH (OFF)	H, C, A	Selects Automatic Humidification.
36	36	33	⚠	CH (OFF)	On	Selects Cycle Humidifier.
37	37	34	⚠	OC (o)	od, OFF	Selects Optimum Comfort or Optimum Dehumidification.
38	38	35	⚠	Change UV Lamp (OFF)	On	Selects Change UV Lamp feature.
			⚠	350 Days	25-1975	Change UV Lamp duration days.
39	39	36	⚠	Change Pad (OFF)	On	Selects Change Humidifier Pad feature.
			⚠	1000 Hrs	25-1975	Change Humidifier Pad duration hours.
40	40	37	⚠	OFF Change Filter	On	Selects Change Filter feature.
			⚠	200 Hrs	25-1975	Change Filter duration hours.

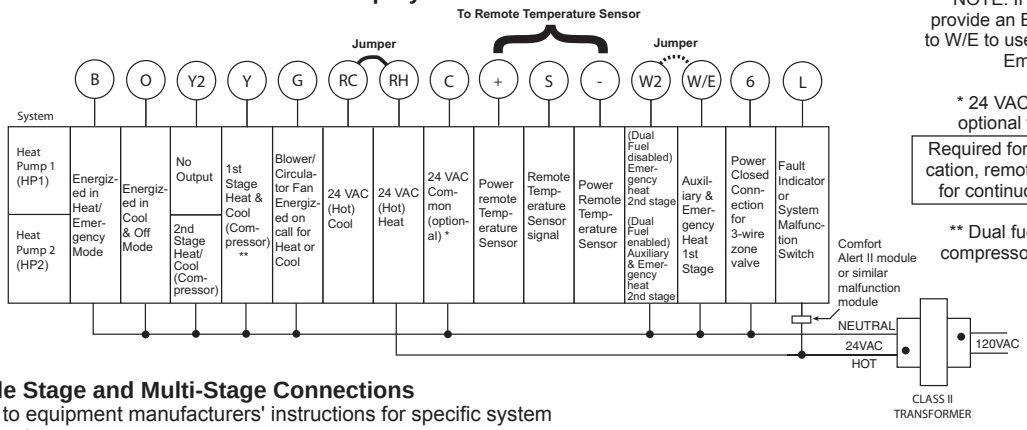
TYPICAL WIRING DIAGRAMS

Heat Pump Connections

If you do not have a heat pump system, refer to figures 2 & 3.
Refer to equipment manufacturers' instructions for specific system wiring information.
You can configure the thermostat for use with the following heat pump systems.

HEAT PUMP TYPE 1 (HP 1). Single stage compressor system; gas or electric backup.
HEAT PUMP TYPE 2 (HP 2). Multi-stage compressor or two compressor system with gas or electric backup.
After wiring, see INSTALLER CONFIGURATION section for proper thermostat configuration.

Heat Pump Systems



NOTE: If your system does not provide an E connection, jumper W2 to W/E to use the Auxiliary Heat in the Emergency Mode.

* 24 VAC common connection optional for system operation.

Required for fault or malfunction indication, remote temperature sensor, or for continuous backlight operation.

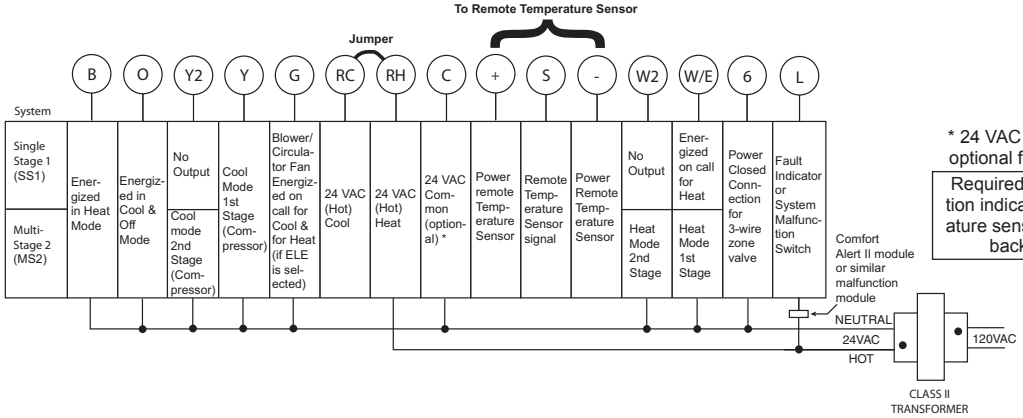
** Dual fuel option de-energizes compressor when auxiliary heat is energized.

Single Stage and Multi-Stage Connections

Refer to equipment manufacturers' instructions for specific system wiring information.
This thermostat is designed to operate a single-transformer or two-transformer system.
You can configure the thermostat for use with the following fossil fuel systems:

SINGLE STAGE (SS 1) gas, oil or electric.
MULTI-STAGE (MS 2) gas, oil or electric.
After wiring, see INSTALLER CONFIGURATION section for proper thermostat configuration.

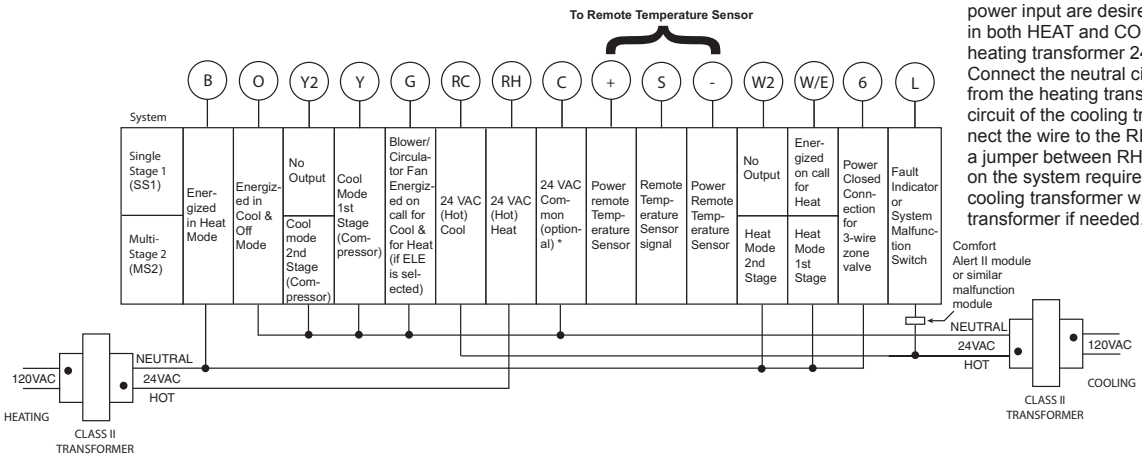
Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer



* 24 VAC common connection optional for system operation.

Required for fault or malfunction indication, remote temperature sensor, or for continuous backlight operation.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



NOTE: If continuous backlight or hardwired power input are desired but do not function in both HEAT and COOL modes, cut the heating transformer 24V wires and tape off. Connect the neutral circuit disconnected from the heating transformer to the neutral circuit of the cooling transformer. Disconnect the wire to the RH terminal and install a jumper between RH and RC. Depending on the system requirements, replace the cooling transformer with a 75VA class II transformer if needed.

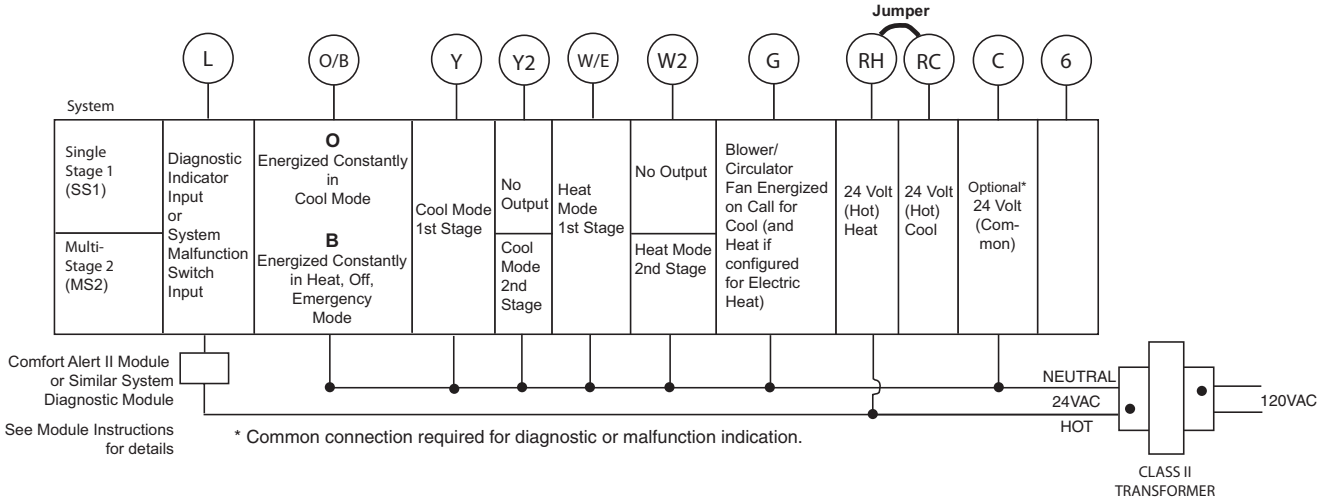
INSTALLER/CONFIGURATION MENU

To enter the menu: Press the **Menu** touch key. Press and hold for 5 seconds the **Installer Config** touch key. This displays menu item #1 in the table below. Press ⚠ to advance to the next menu item or ▽ to return to a previous menu item. Press ▷ or ◁ to change a menu item option.

CONFIGURATION MENU						
Menu Reference Number	**Program-mable**	**Non-Program-mable**	**Press key**	**Displayed Factory (Default)**	**Press ▷ or ◁ to select from listed options**	**COMMENTS**
1	1	1		MS 2	HP 1, HP 2, SS 1	Selects Multi-Stage (MS2, No Heat Pump), Heat Pump 1 (HP1, 1 compressor), Heat Pump 2 (HP2, 2 compressor or 2 speed compressor), or Single Stage.
2	2	2	⚠	(ELE)	GAS	GAS setting: furnace controls blower. ELE setting: thermostat controls blower.
3	3	3	⚠	**(7)** Days, **P**	**5-1-1** or **0**	Programs per week. (0 = non-programmable)
4	4	NA	⚠	(4) **PS**	**2**	Programs periods per day. 4 = Morning, Day, Evening, Night 2 = Day, Night
5	5	4	⚠	Cool-Off-Heat-Auto	Cool-Off-Heat, Heat Off, Cool	System switch configuration in non heat pump mode.
			⚠	Cool-Off-Heat-Emer-Auto	Cool-Off-Heat-Emer, Off-Heat-Emer, Cool-Off	System switch configuration, heat pump mode.
6	6	NA	⚠	(On) **E**	**OFF**	Selects Energy Management Recovery, E (with programming option on)
7	7	5	⚠	(FA) Heat, Cr	SL	Selects Adjustable Anticipation, cycle rate, Heat
8	8	6	⚠	(FA) Cool, Cr	SL	Selects Adjustable Anticipation, cycle rate, Cool
9	9	7	⚠	(FA) Em, Cr/AU	SL	Selects Adjustable Anticipation, cycle rate auxiliary, (This item is only to appear if HP1 or HP2 is selected above).
10	10	8	⚠	(OFF) **CL**	On	Selects Compressor Lockout.
11	11	9	⚠	(On) **dL**	OFF	Selects Continuous Display backlight and intensity.
12	12	10	⚠	(LO) **dL**	HI	Selects Backlight Intensity.
13	13	11	⚠	0 (temperature)	4, LO to 4, HI	Selects Adjustable Ambient Temperature Display [range -4 (LO) to +4 (HI)].
14	14	12	⚠	**°F**	**°C**	Selects °F/°C Display (temperature units in Fahrenheit or Celsius).
15	15	13	⚠	(On) **b**	OFF	Selects audible Beeper On/Off.
16	16	14	⚠	(On) **dS**	OFF	Selects Daylight Saving Time calculation.
17	17	15	⚠	(On) Heat, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, heat mode.
18	18	16	⚠	(On) Cool, **AS**	OFF	Selects Automatic Schedule for comfort temperature Programming, cool mode.
19	19	17	⚠	(OFF) **CS**, Cool Savings	1-2-3-4-5-6	Selects Cool Saving Feature and amount.
20	20	18	⚠	(99) Heat, **HL**	62-98	TEMPERATURE LIMIT, HEAT (max. heat set point).
21	21	19	⚠	(45) Cool, **LL**	46-82	TEMPERATURE LIMIT, COOL (min. cool set point).
22	22	20	⚠	OFF, 🔒 **Keypad Lockout**	**L** (total), **P** (partial), **Temperature Limit** (limited temperature range)	Selects Keypad Lockout.
			⚠	000	001-999	Selects Keypad Lockout Combination (active only if keypad Lockout is selected).
23	23	21	⚠	(On) Heat, FS	OFF	Fast second stage of heat (not available if SS1 is selected above).
24	24	22	⚠	(On) Cool, FS	OFF	Fast second stage of cool (not available if SS1 or HP1 is selected above).
25	25	23	⚠	Remote (OFF)	On	Remote temperature sensor, enable/disable.
			⚠	Remote, In	Outdoor Remote	Remote temperature sensor (Indoor/Outdoor).
			⚠	(On) LS	OFF	Local temp. Sensor enable/disable (only when Indoor Remote is selected On).
26	26	24	⚠	(05) dF	5-50	Selects Dual Fuel Feature and set point (in Fahrenheit) (applicable only when HP1 or HP2 is selected).
			⚠	(60) Cd	0-99	Selects Compressor delay in seconds (only when **dF** is selected >5).
27	27	25	⚠	(OFF) Change Filter	On	Selects Change filter feature.
			⚠	200 Hours	25-1975 (in increments of 25 hours)	Change filter, duration hours.

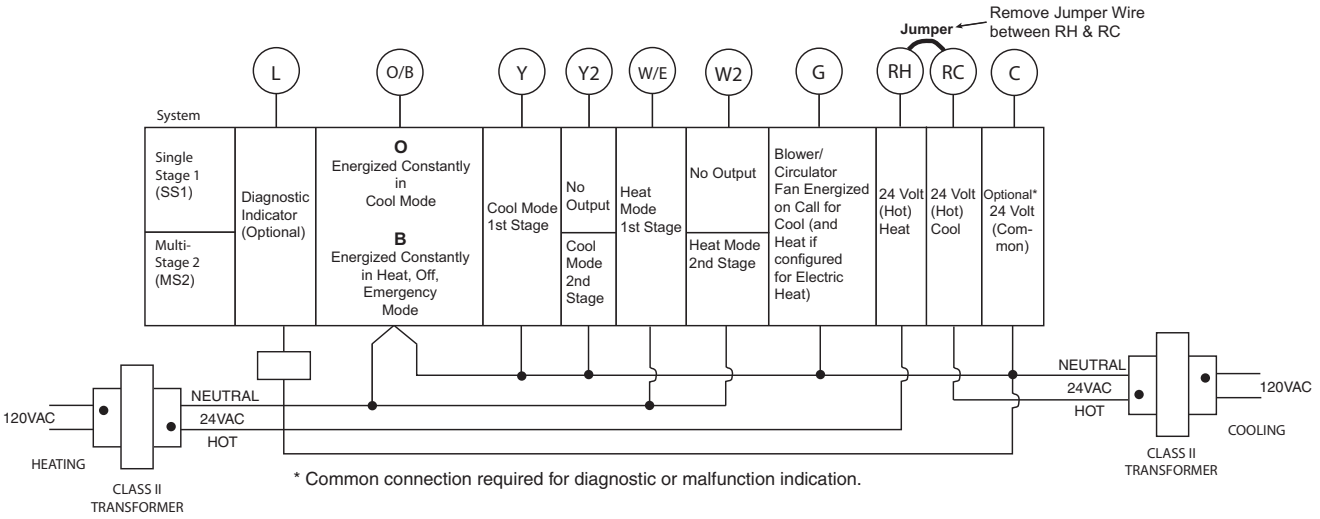
TYPICAL WIRING DIAGRAMS

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer



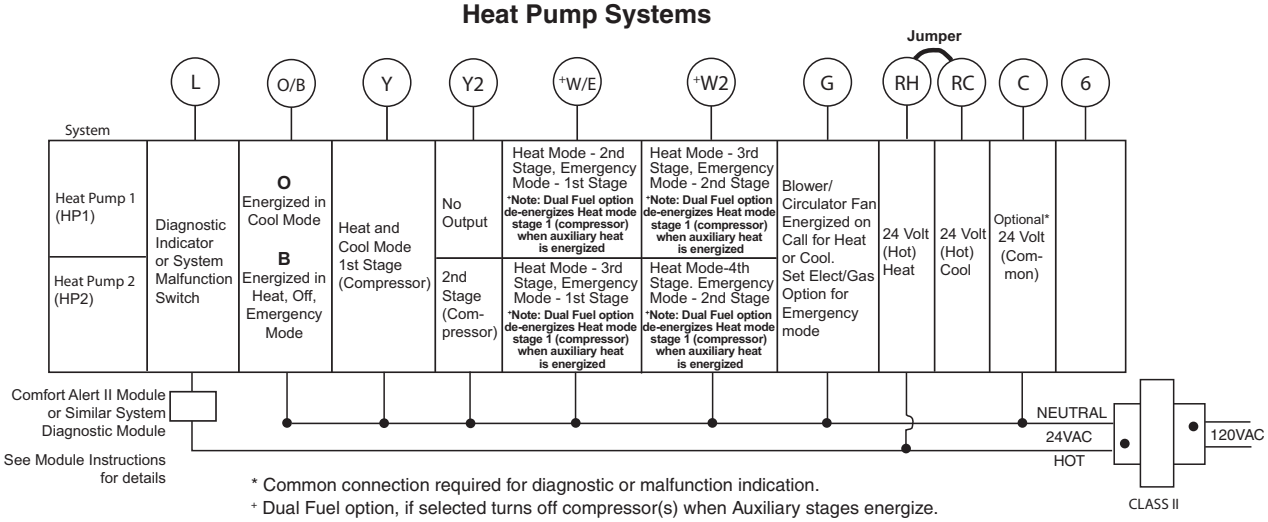
* Common connection required for diagnostic or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



* Common connection required for diagnostic or malfunction indication.

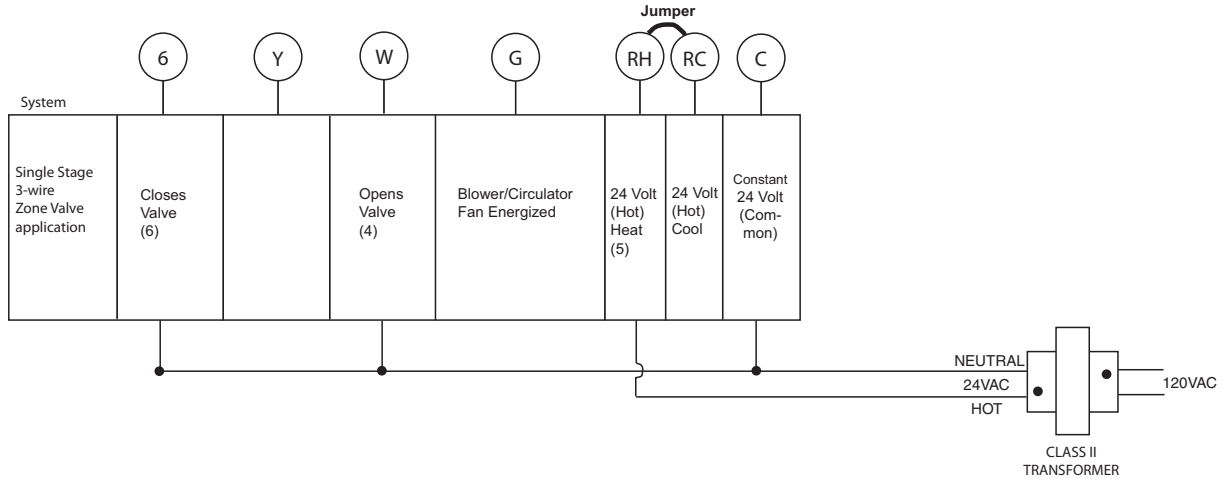
Heat Pump Systems



* Common connection required for diagnostic or malfunction indication.

\+ Dual Fuel option, if selected turns off compressor(s) when Auxiliary stages energize.

3-Wire (SPDT) Heat Only Zone Valve Wiring



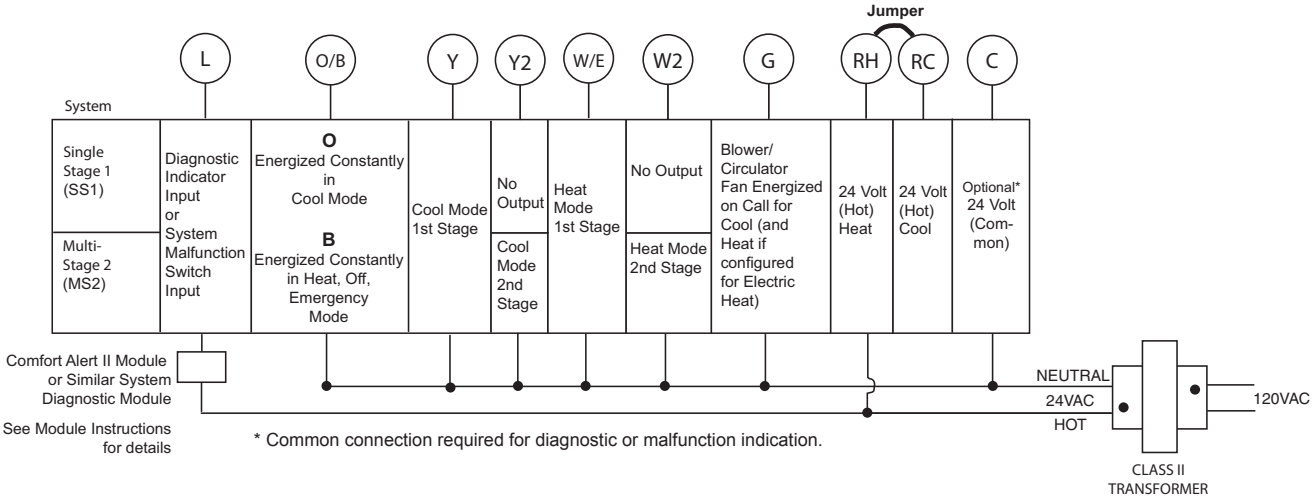
INSTALLER/CONFIGURATION MENU

With Heat or A/C selected, press and hold the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu to advance to the next menu item. Press ⌃ or ⌄ to change a menu item options.

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**PRESS BUTTON**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1	1	MENU	(MS 2)	HP 1, HP 2, SS 1	Selects Multi-Stage (MS 2 No Heat Pump), Heat Pump 1 (HP 1, 1 compressor), Heat Pump 2 (HP 2, 2 compressor or 2 speed compressor), or Single Stage (SS 1)
2	2	2	MENU	(GAS) for SS or MS	ELE	GAS setting: furnace controls the blower ELE setting: thermostat controls the blower
3	3	3	MENU	(On) E	OFF	Selects Energy Management Recovery (EMR) On or OFF. (Not available in -non-programmable mode)
4	–	4	MENU	(ME) CR Heat	SL, FA	Selects Adjustable Anticipation, cycle rate, Heat (This item only appears when MS 2 or SS 1 is selected above)
5	4	–	MENU	(ME) CR Heat A/C	SL, FA	Selects Adjustable Compressor Anticipation (Heat Pump). This item only appears when HP 1, HP 2 is selected above
6	5	5	MENU	(ME) CR A/C or (FA) CR Aux Heat	SL, FA SL	Selects Adjustable Anticipation, cycle rate, cool (when MS 2 or SS 1 is selected above.) or Selects the cycle rate for Auxiliary stage (when HP 1 or HP 2 is selected above)
7	6	6	MENU	(OFF) CL	CL On	Compressor Lockout Time
8	7	7	MENU	Heat A/C Off or Aux Heat A/C Off	Heat A/C Off, Heat Off with Fan icon, Heat Off without Fan icon A/C Off	System Mode Configuration
9	8	8	MENU	(OFF) CO	CO On	Selects Compressor Optimization
10	9	9	MENU	(On) dL	dL OFF	Selects Display Light On or OFF
11	10	10	MENU	0 HI (current temperature)	1 HI, 2 HI, 3HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
12	11	11	MENU	°F	°C	Selects Fahrenheit/Celsius Temperature Display
13	12	12	MENU	(0) P	7	Defaults to P (0) non-programmable P (7) is 7-day programming
14	13	13	MENU	PS (2)	4	Selects Program periods per day: 4 = Morn, Day, Eve, Night 2 = Day, Night
15	14	–	MENU	(On) FA Heat	OFF	Fast Heat option may be disabled by selecting OFF. NA to SS or HP1 config.
16	15	14	MENU	(On) FA A/C	OFF	Fast Cool option may be disabled by selecting OFF. NA to SS or HP1 config.
17	16	15	MENU	(On) dS	Off	Selects Automatic Daylight Saving Time option
18	17	16	MENU	(99) HL Heat	62 to 98	Select's Limited HEAT Range
19	18	17	MENU	(45) LL A/C	46 to 82	Select's Limited A/C Range
20	19	–	MENU	(0) dF	1 to 9	Selects dF (dual Fuel) setting. 0 is Off (If dual Fuel option is required, a selection of 5 is recommended)
			MENU	(60) Cd	0 to 99	Selects compressor delay in seconds when dF is greater than 0
21	20	18	MENU	(o) On A/C	Heat On (b)	Selects operation of the reversing valve terminal (O/B) output as an O or B terminal
22	21	19	MENU			Returns to Normal Operation

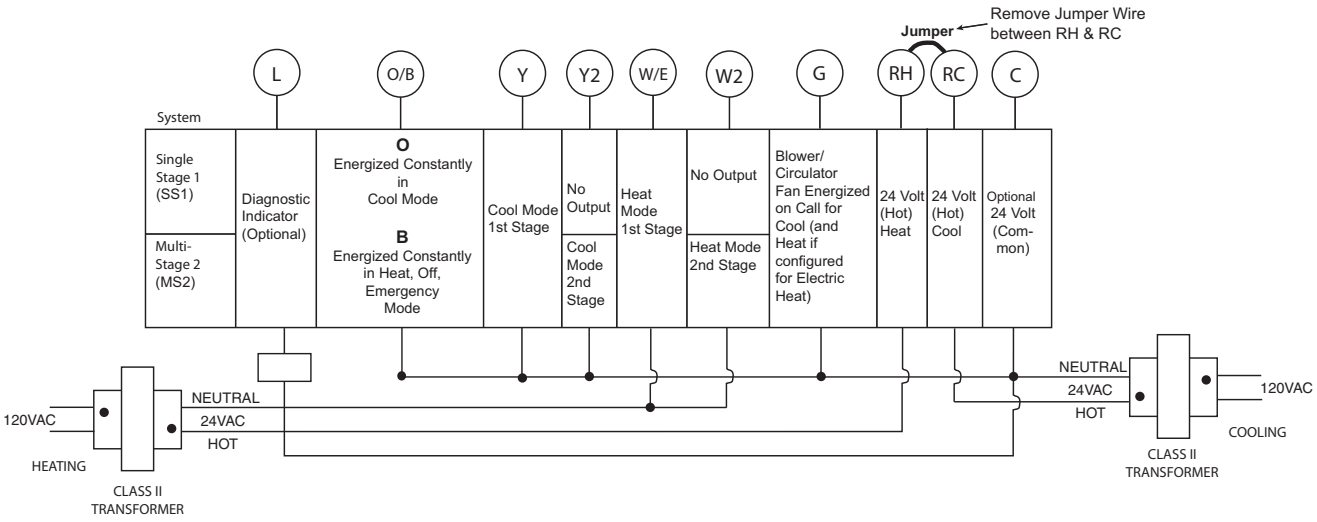
TYPICAL WIRING DIAGRAMS

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer

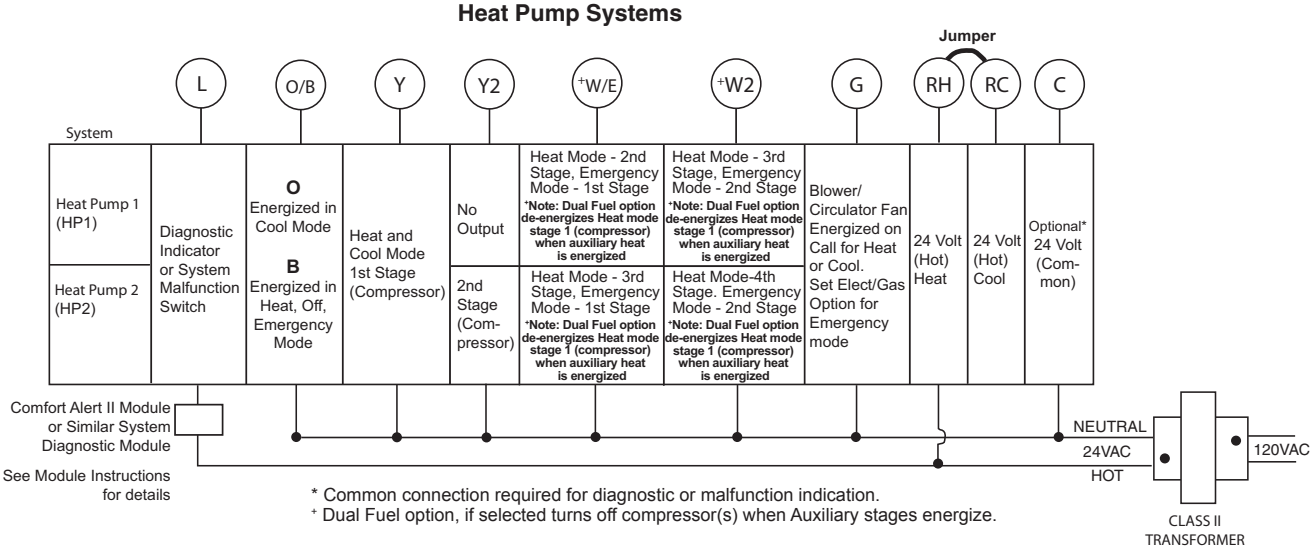


* Common connection required for diagnostic or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



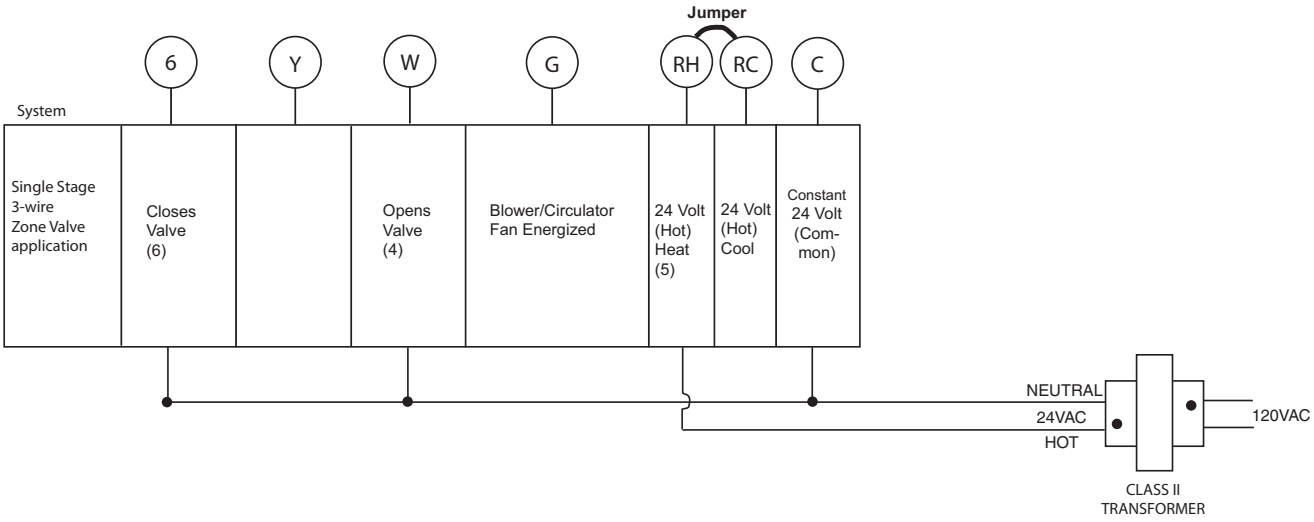
Heat Pump Systems



* Common connection required for diagnostic or malfunction indication.
\+ Dual Fuel option, if selected turns off compressor(s) when Auxiliary stages energize.

TYPICAL WIRING DIAGRAMS

3-Wire (SPDT) Heat Only Zone Valve Wiring



INSTALLER/CONFIGURATION MENU

Thermostat must be in Heat, Cool or Auto. Press RUN SCHEDULE and then press hold the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu to advance to the next menu item. Press ⌃ or ⌄ to change a menu item options.

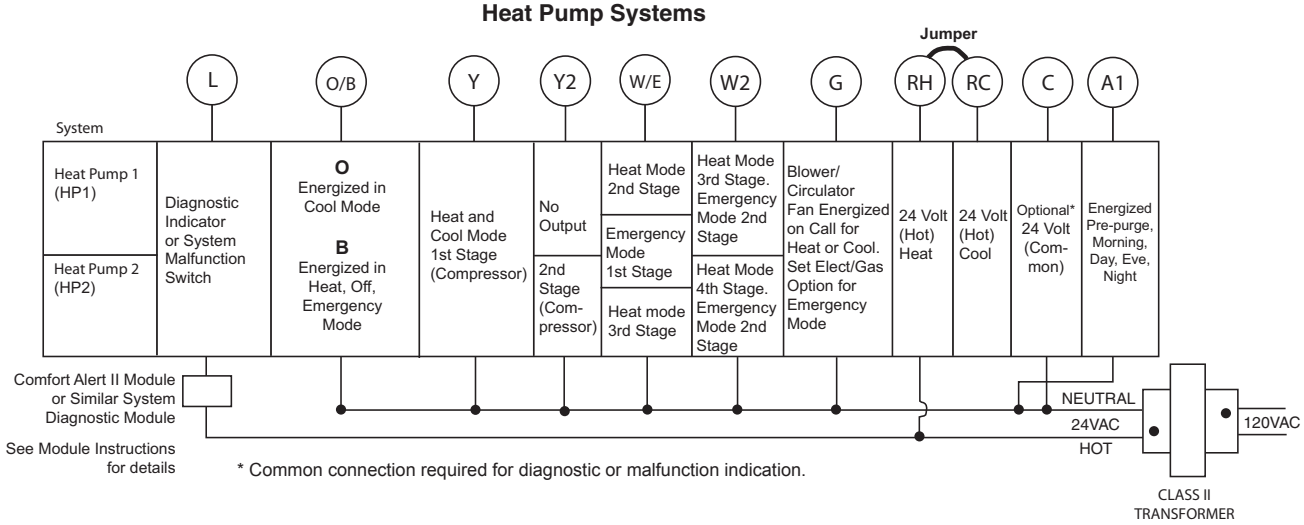
CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1	1	MENU	(MS 2)	HP 1, HP 2, SS 1	Selects Multi-Stage (MS 2 No Heat Pump), Heat Pump 1 (HP 1, 1 compressor), Heat Pump 2 (HP 2, 2 compressor or 2 speed compressor), or Single Stage (SS 1)
2	2	2	MENU	(GAS) for SS or MS (ELE) for HP	ELE	GAS setting: furnace controls the blower ELE setting: thermostat controls the blower
3	3	3	MENU	(3) CS	0, 1, 2, 4, 5, 6	Selects Cool Savings Value 1 (low) to 6 (high), Value 0 disables feature
4	4	4	MENU	(On) E	OFF	Selects Energy Management Recovery (EMR) On or OFF.
5	–	5	MENU	(ME) CR Heat	SL, FA	Selects Adjustable Anticipation, cycle rate, Heat (This item only appears when MS 2 or SS 1 is selected above)
6	5	–	MENU	CR Heat Pump (ME)	SL, FA	Selects Adjustable Compressor Anticipation (Heat Pump) This item only appears when HP 1, HP 2 is selected above
7	6	6	MENU	(ME) CR Cool or (FA) CR AU	SL, FA SL	Selects Adjustable Anticipation, cycle rate, cool (when MS 2 or SS 1 is selected above.) or Selects the cycle rate for Auxiliary stage (when HP 1 or HP 2 is selected above)
8	7	7	MENU	(OFF) CL	CL On	Compressor Lockout Time
9	8	8	MENU	Em Heat, Auto Cool Off or Heat, Auto, Cool Off	Heat Cool Off, Heat Off with Fan icon, Heat Off without Fan icon Cool Off, Auto Off	System Mode Configuration with Automatic Changeover capability
10	9	9	MENU	(On) dL	dL OFF	Selects Display Light On or OFF
11	10	10	MENU	0 (current temperature)	1 HI, 2 HI, 3HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
12	11	11	MENU	°F	°C	Selects Fahrenheit/Celsius Temperature Display

INSTALLER/CONFIGURATION MENU (cont.)

CONFIGURATION MENU						
Menu Ref.	HP	SS	Press Button	Displayed Factory (Default)	Press ▲ or ▼ to select from listed options	COMMENTS
13	12	12	MENU	(On) b	OFF	May select Beeper OFF to stop audible key feedback
14	13	13	MENU	(7) P	3, 0	Defaults 7-day programming (P7) but non-programmable (0) or 5/1/1 programming (P3) is available on most models.
15	14	14	MENU	(4) PS	2	Selects Program periods per day: 4 = Morn, Day, Eve, Night 2 = Day, Night
16	15	15	MENU	(On) Heat AS	OFF	Automatic Schedule for heat mode
17	16	16	MENU	(On) Cool AS	OFF	Automatic Schedule for cool mode
18	17	–	MENU	(On) Heat FA	OFF	Fast Heat option may be disabled by selecting OFF. NA to SS or HP1 config.
19	18	–	MENU	(On) Cool FA	OFF	Fast Cool option may be disabled by selecting OFF. NA to SS or HP1 config.
20	19	17	MENU	Remote (OFF)	On	Selects Remote Sensor On/OFF
			MENU	Remote (In)	Outdoor	Selects Remote Sensor to outdoor NA is Remote Sensor OFF
			MENU	Indoor Loc (On)	OFF	Selects Local Sensor (in thermostat) to OFF. N/A if Remote is selected to Outdoor
21	20	18	MENU	(On) dS	Off	Selects Automatic Daylight Saving Time option
22	21	19	MENU	(OFF) Keypad Lockout	L, P, Limit	Selects one of 3 Keypad Lockout configurations L - Total Keypad Lockout P - Partial Keypad Lockout (Up and Keys still work) Limit - Limited Temperature Range
			MENU	(000) Keypad Lockout	1-999	Selects personal lockout code. 000 is NOT A VALID CODE.
23	22	20	MENU	(99) L Heat	L 62 to L 98	Select Limited HEAT Range Temperature
24	23	21	MENU	(45) L Cool	L 46 to L 82	Select Limited COOL Range Temperature
25	24	–	MENU	CO (05)	06-50	Selects outdoor Compressor OFF temperature (Balance Point temperature). 05 disables feature. Outdoor Remote required
			MENU	(dF)	EA	Selects between dF (dual Fuel) or EA (Electric Aux) only available if CO is greater than 05
			MENU	(60) Cd		Selects Compressor delay OFF time in seconds (only if dF is selected)
26	25	–	MENU	AO (80)		Selects AO (Auxiliary OFF) temperature. Feature disabled if 80 is selected. Outdoor Remote required
27	26	22	MENU	(OFF) Change Filter	On	Selects Filter Change-out Indicator On or OFF.
			MENU	Change Filter (200 h)	25-1975 h	Change Filter time in 25 hour increments. This menu only appears if On is selected in above.
28	27	23	MENU	(OFF) Change UV Lamp	On	Selects UV Lamp Timer: On/OFF
			MENU	(350) Change UV Lamp	25-1975	Selects number of Days between changing UV Lamp
29	28	24	MENU	(o) Cool On	Heat On (b)	Selects operation of the reversing valve terminal (O/B) output as an O or B terminal
30	29	27	MENU			Returns to Normal Operation

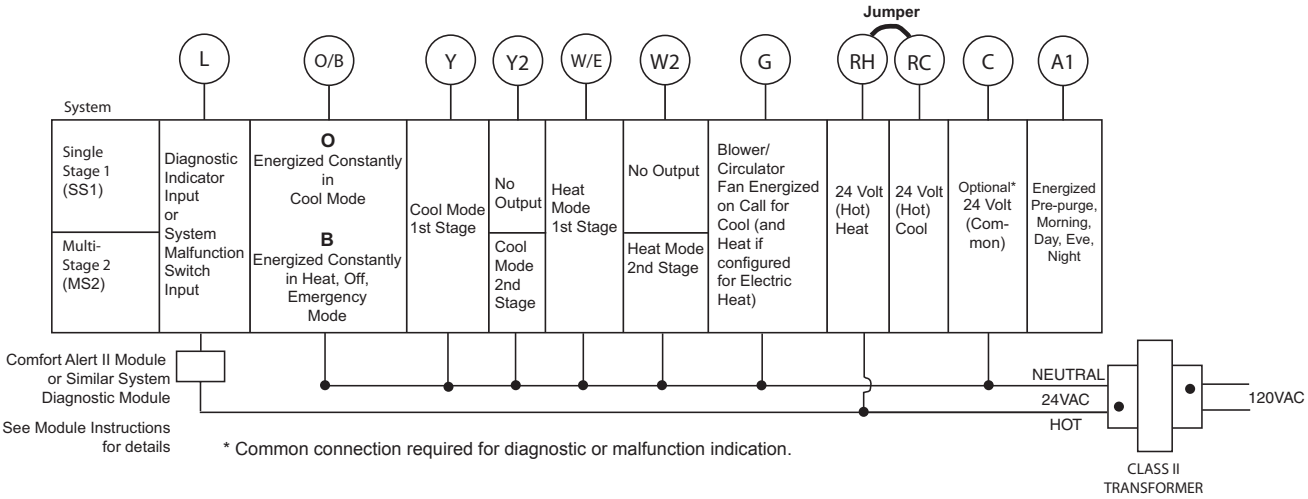
TYPICAL WIRING DIAGRAMS

Heat Pump Systems



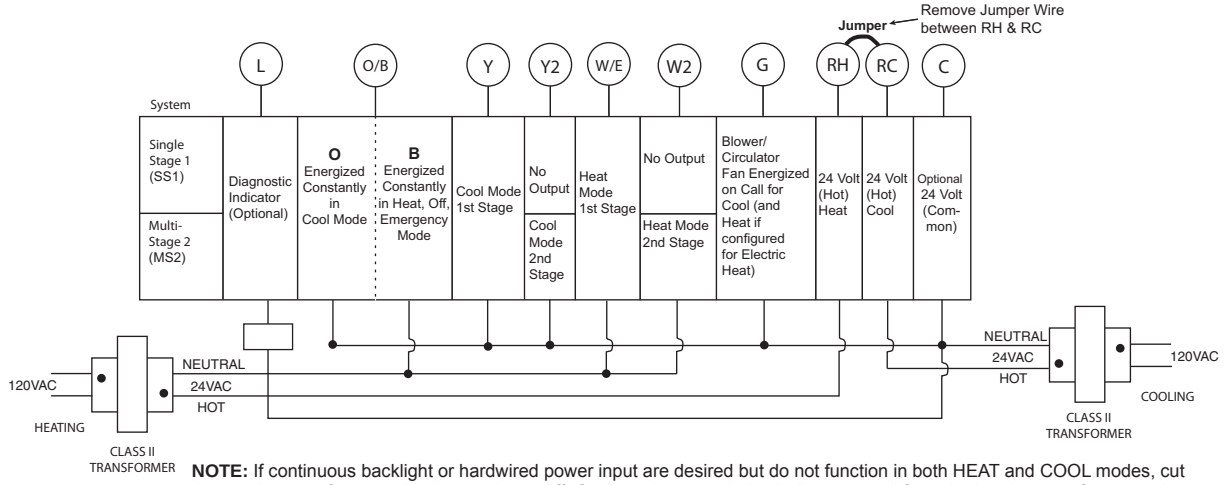
* Common connection required for diagnostic or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer



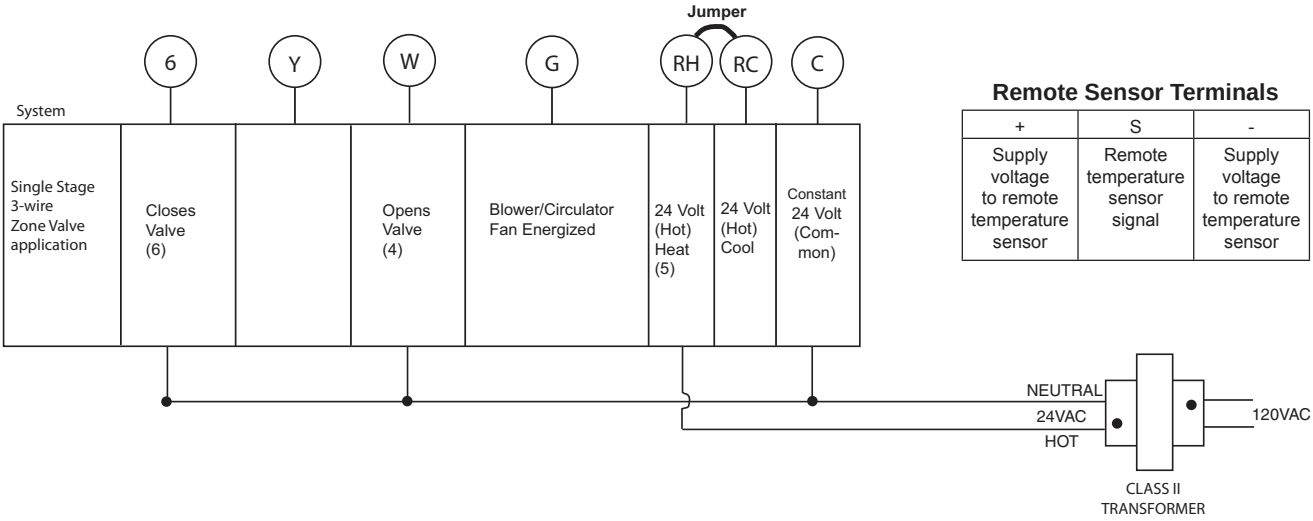
* Common connection required for diagnostic or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



NOTE: If continuous backlight or hardwired power input are desired but do not function in both HEAT and COOL modes, cut the heating transformer 24V wires and tape off. Connect the neutral circuit disconnected from the heating transformer to the neutral circuit of the cooling transformer. Disconnect the wire to the RH terminal and install a jumper between RH and RC. Depending on the system requirements, replace the cooling transformer with a 75VA class II transformer if needed.

3-Wire (SPDT) Heat Only Zone Valve Wiring



Remote Sensor Terminals

+	S	-
Supply voltage to remote temperature sensor	Remote temperature sensor signal	Supply voltage to remote temperature sensor

INSTALLER/CONFIGURATION MENU

Press and hold the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu to advance to the next menu item. Press ⌃ or ⌄ to change a menu item options.

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1	1	MENU	(MS 2)	HP 1, HP 2, SS 1	Selects Multi-Stage (MS 2 No Heat Pump), Heat Pump 1 (HP 1, 1 compressor), Heat Pump 2 (HP 2, 2 compressor or 2 speed compressor), or Single Stage (SS 1)
2	2	2	MENU	(GAS) for SS or MS	ELE	GAS setting: furnace controls the blower ELE setting: thermostat controls the blower
3	3	3	MENU	(3) CS	0, 1, 2, 4, 5, 6	Selects Cool Savings Value 1 (low) to 6 (high), Value 0 disables feature
4	4	4	MENU	(On) E	OFF	Selects Energy Management Recovery (EMR) On or OFF.
5	–	5	MENU	(ME) Heat CR	SL, FA	Adjustable Anticipation: Selects heating cycle rate for MS or SS in #1 only
6	5	–	MENU	(ME) Heat Pump CR	SL, FA	Adjustable Compressor Anticipation (Heat Pump) [only when HP1 or HP2 is selected in #1]
7	6	6	MENU	(ME) Cool CR or (FA) AU CR	SL, FA SL	Adjustable Anticipation: Selects the cycle rate for cooling (only when MS 2 or SS 1 is selected in item 1.) or Selects the cycle rate for Emergency mode and Auxiliary stage if HP1 or HP2 is selected in item 1.
8	7	7	MENU	(OFF) CL	CL On	Compressor Lockout Time
9	8	8	MENU	Cool Off, Em Heat Auto	Heat Auto Cool Off, Heat Off with Fan icon, Heat Off without Fan icon, Cool Off, Auto Off	System Mode Configuration with Automatic Changeover capability
10	9	9	MENU	(On) dL	dL OFF	Selects Display Light On or OFF
11	10	10	MENU	0 (current temperature)	1 HI, 2 HI, 3HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
12	11	11	MENU	°F	°C	Selects Fahrenheit/Celsius Temperature Display
13	12	12	MENU	(On) b	OFF	May select Beeper OFF to stop audible key feedback
14	13	13	MENU	(7) P	3, 0	Defaults 7-day programming (P7) but non-programmable (0) or 5/1/1 programming (P3) is available on most models.
15	14	14	MENU	(2) PS	4	Selects Program periods per day: 4 = Morn, Day, Eve, Night 2 = Day, Night
16	15	15	MENU	(OFF) Heat AS	On	Automatic Schedule for heat mode
17	16	16	MENU	(On) Cool AS	OFF	Automatic Schedule for cool mode

INSTALLER/CONFIGURATION MENU (cont.)

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ▲ or ▼ to select from listed options**	**COMMENTS**
18	17	–	MENU	(On) Heat FA	OFF	Fast Heat option may be disabled by selecting OFF. NA to SS or HP1 config.
19	18	–	MENU	(On) Cool FA	OFF	Fast Cool option may be disabled by selecting OFF. NA to SS or HP1 config.
20	19	17	MENU	Remote (OFF)	On	Selects Remote Sensor On/OFF
			MENU	Remote (In)	Outdoor	Selects Remote Sensor to outdoor NA is Remote Sensor OFF
			MENU	Indoor Loc (On)	OFF	Selects Local Sensor (in thermostat) to OFF. N/A if Remote is selected to Outdoor
21	20	18	MENU	(On) dS	Off	Selects Automatic Daylight Saving Time option
22	21	19	MENU	(OFF) Keypad Lockout	L, P, Limit	Selects one of 3 Keypad Lockout configurations L - Total Keypad Lockout P - Partial Keypad Lockout (Up and Keys still work) Limit - Limited Temperature Range
			MENU	(000) Keypad Lockout	1-999	Selects personal lockout code. 000 is NOT A VALID CODE.
23	22	20	MENU	(99) L Heat	L 62 to L 98	Select's Limited HEAT Range
24	23	21	MENU	(45) L Cool	L 46 to L 82	Select's Limited COOL Range
25	24	–	MENU	(05) CO	6-50	Selects outdoor Compressor OFF temperature (Balance Point temperature). 05 disables feature. Outdoor Remote required
			MENU	(dF)	EA	Selects between dF (dual Fuel) or EA (Electric Aux) only available if CO ≥ 6
			MENU	(60) Cd		Selects Compressor delay OFF time in seconds
26	25	–	MENU	(80) AO		Selects AO (Auxiliary OFF) temperature. Feature disabled if 80 is selected. Outdoor Remote required
27	26	22	MENU	(OFF) EC	On	Selects Economizer On/OFF.
28	27	23	MENU	(O) pp	1-3	Selects no. of hours of preoccupancy purge time (hours the Fan runs (C an A1 energized) prior to occupied period)
29	28	24	MENU	(OFF) Change Filter	On	Selects Filter Change-out Indicator On or OFF.
			MENU	Change Filter (200 h)	25-1975 h	Change Filter time in 25 hour increments. This menu only appears if On is selected in above.
30	29	25	MENU	(OFF) Change UV Lamp	On	Selects UV Lamp Timer: On/OFF
			MENU	(350) Change UV Lamp	25-1975	Selects no. of Days between changing UV Lamp
31	30	26	MENU	(o) Cool On	Heat On (b)	Selects operation of the reversing valve terminal (O/B) output as an O or B terminal
32	31	27	MENU			Return to Normal Operation

INSTALLER/CONFIGURATION MENU

With thermostat in Heat, Cool or Auto, in normal operation, press the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu to advance to the next menu item. Press ⌃ or ⌄ to change a menu item option. Shaded items are not available on 1F86.

CONFIGURATION MENU						
Menu Reference Number	**HP**	**SS**	**Press Button**	**Displayed (Factory Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1		MENU	(O) On	b On	Reversing Valve Output (SS/HP switch must be in the Heat Pump HP position)*
2	2	1	MENU	P (2)	P 3, P 0	Selectable Programs Per Week (For programmable thermostat only)
3	3	2	MENU	(OFF) CS	On CS	Select Cool Savings on or off
			MENU	(3)	6, 5, 4, 2, 1	Selects Cool Savings value 1 (low) to 6 (high)
4	4	3	MENU	(On) E	(OFF) E	Selects Energy Management Recovery (EMR) on or off
5		4	MENU	(ME) CR Heat	FA, SL	Adjustable Anticipation (Heat) (only when SS/HP switch is at the SS position)
6		5	MENU	(FA) CR Cool	SL	Adjustable Anticipation (Cool) (only when SS/HP switch is at the SS position)
7	5		MENU	(FA) CR Heat Pump	SL	Adjustable Anticipation (Heat Pump) (only when SS/HP switch is at the HP position)
8	6	6	MENU	(OFF) CL	On CL	Compressor Lockout Time
9	7	7	MENU	Auto Heat Cool Off	Heat Cool Off, Heat Off with Fan icon, Heat Off without Fan icon, Cool Off, Auto Off	System Mode Configuration with Automatic Changeover
10	8	8	MENU	(On) L	OFF L	Selects Display Light on or off
11	9	9	MENU	0 (temperature)	1 HI, 2 HI, 3 HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
12	10	10	MENU	F	C	Selects Fahrenheit/Celsius Temperature Display
13	11	11	MENU	(OFF) Change Filter	On Change Filter	Selects Filter Change-out Indicator
			MENU	Change Filter 200 h	25 h to 1975 h in 25-hour increment	When on, selects time in 25 hour increments 25-hour increment
14	12	12	RUN			Returns to Normal Operation

*__NOTE:__ To switch thermostat to Heat Pump, place the SS/HP switch to HP and reset thermostat by pressing FAN button, up and down arrows at the same time.

Single Stage (Gas, Oil, Electric)

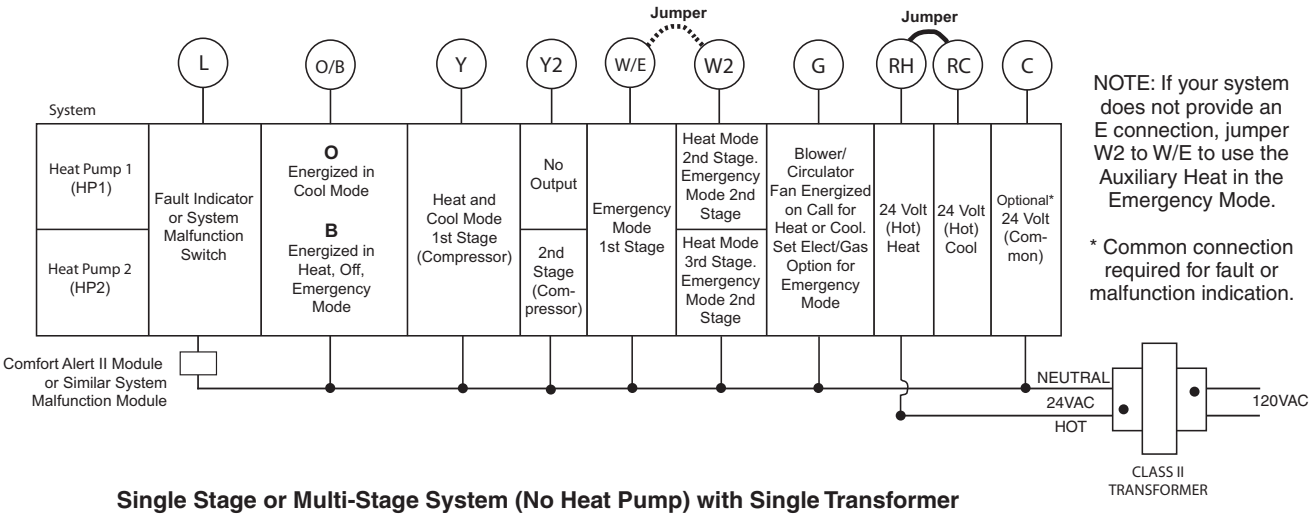
RH	RC	W	G	Y	O/B	C
24 V for Heat	24 V for Cool	Heat Relay	Fan Relay	Compressor Relay	3-wire zone valve	24 V Common

Single Stage Heat Pump (No Auxiliary Heat)

RH	RC	W	G	Y	O/B	C
24 V for Heat	24 V for Cool	Heat Relay (with jumper to Y)	Fan Relay	Compressor Relay (with jumper to W)	Changeover Relay “O” for Cool, “B” for Heat	24 V Common

TYPICAL WIRING DIAGRAMS

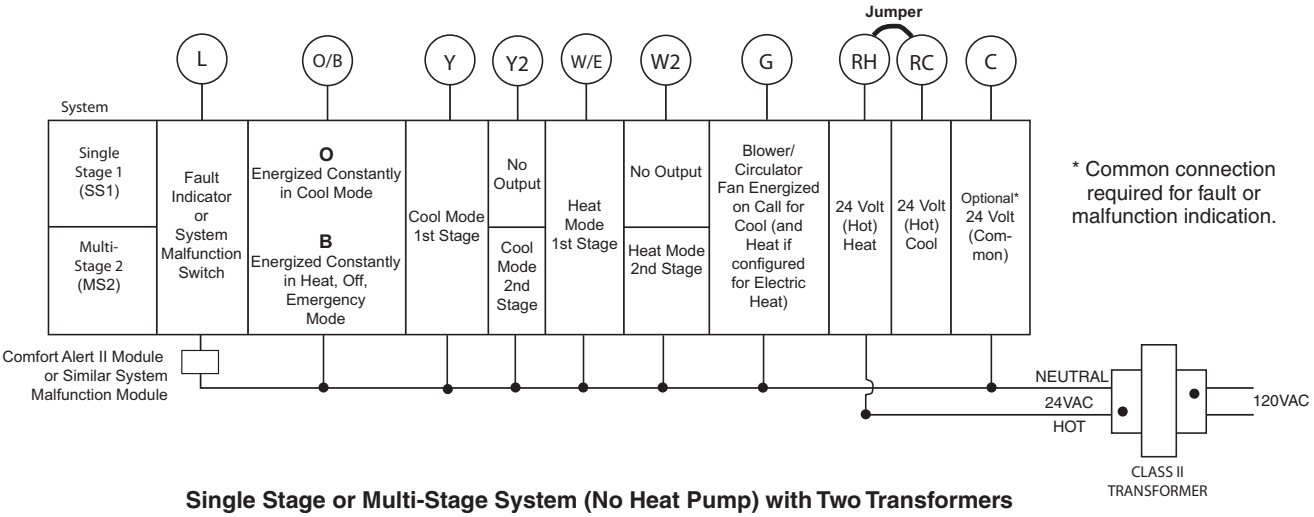
Heat Pump Systems



NOTE: If your system does not provide an E connection, jumper W2 to W/E to use the Auxiliary Heat in the Emergency Mode.

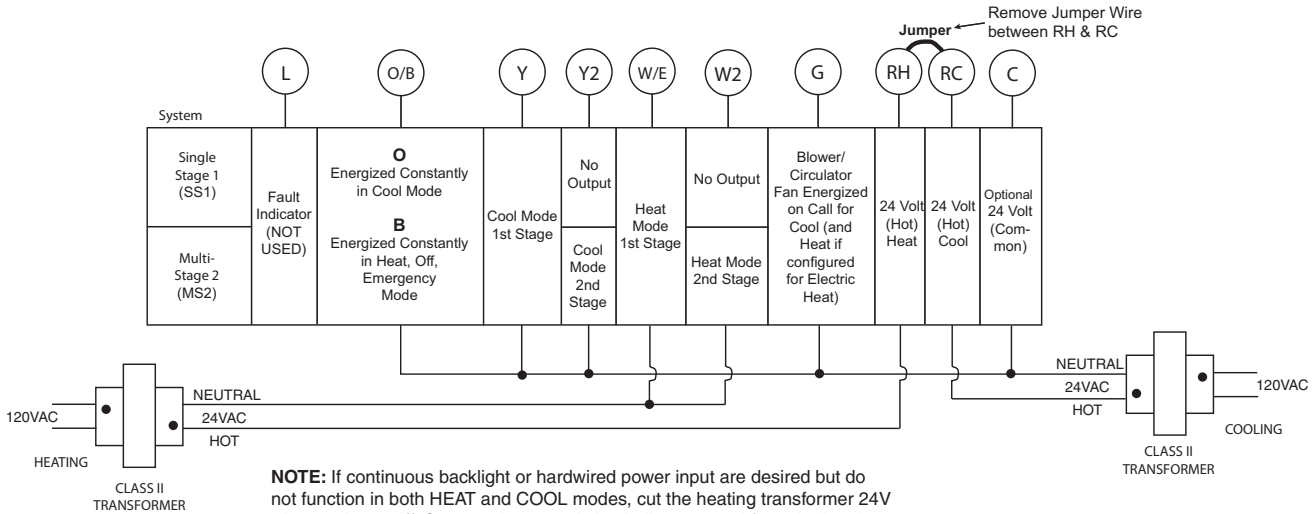
* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer



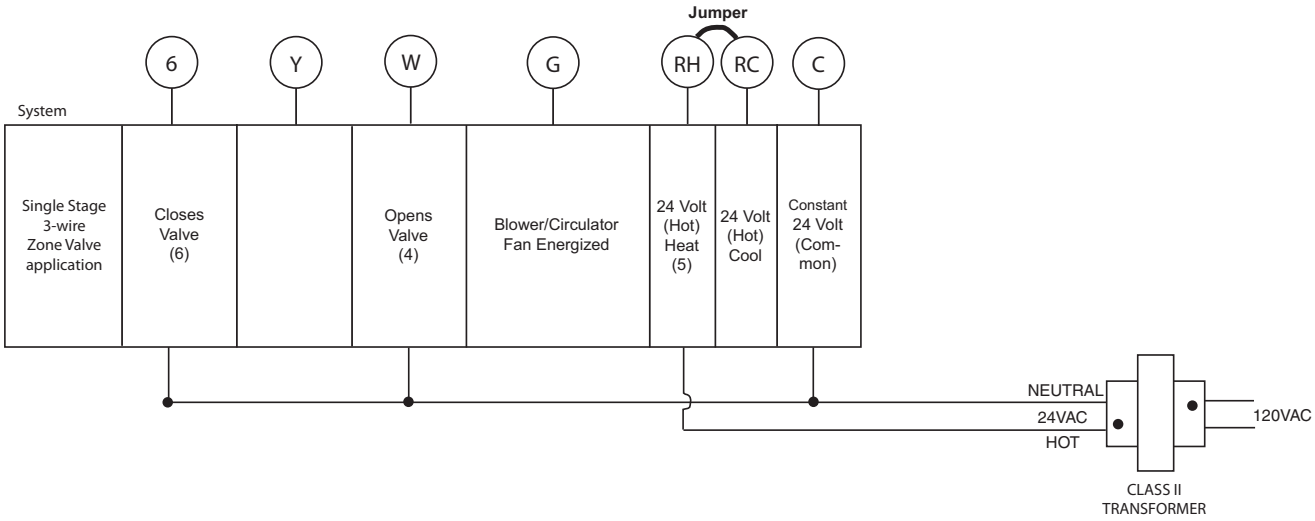
* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



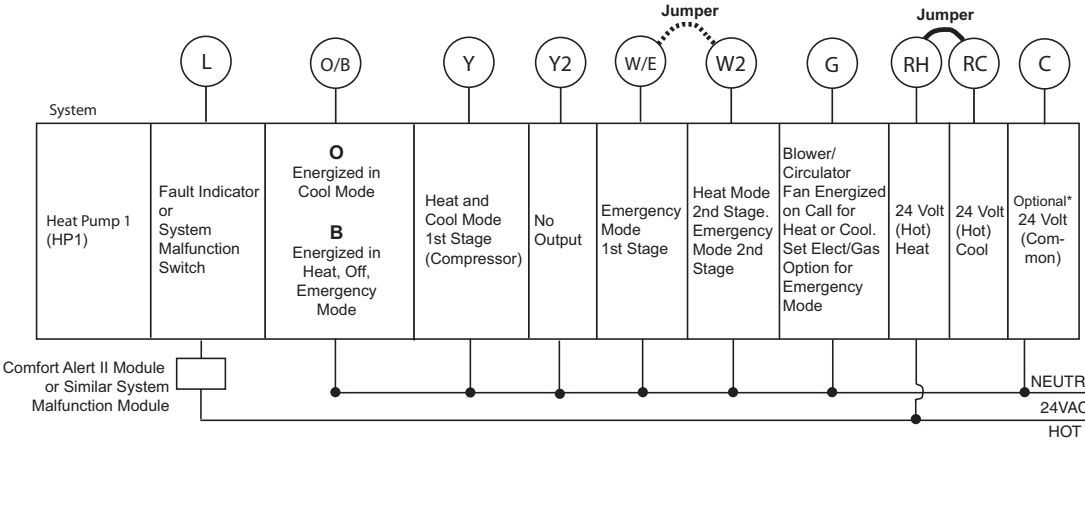
NOTE: If continuous backlight or hardwired power input are desired but do not function in both HEAT and COOL modes, cut the heating transformer 24V wires and tape off. Connect the neutral circuit disconnected from the heating transformer to the neutral circuit of the cooling transformer. Disconnect the wire to the RH terminal and install a jumper between RH and RC. Depending on the system requirements, replace the cooling transformer with a 75VA class II transformer if needed.

3-Wire (SPDT) Heat Only Zone Valve Wiring



TYPICAL WIRING DIAGRAMS

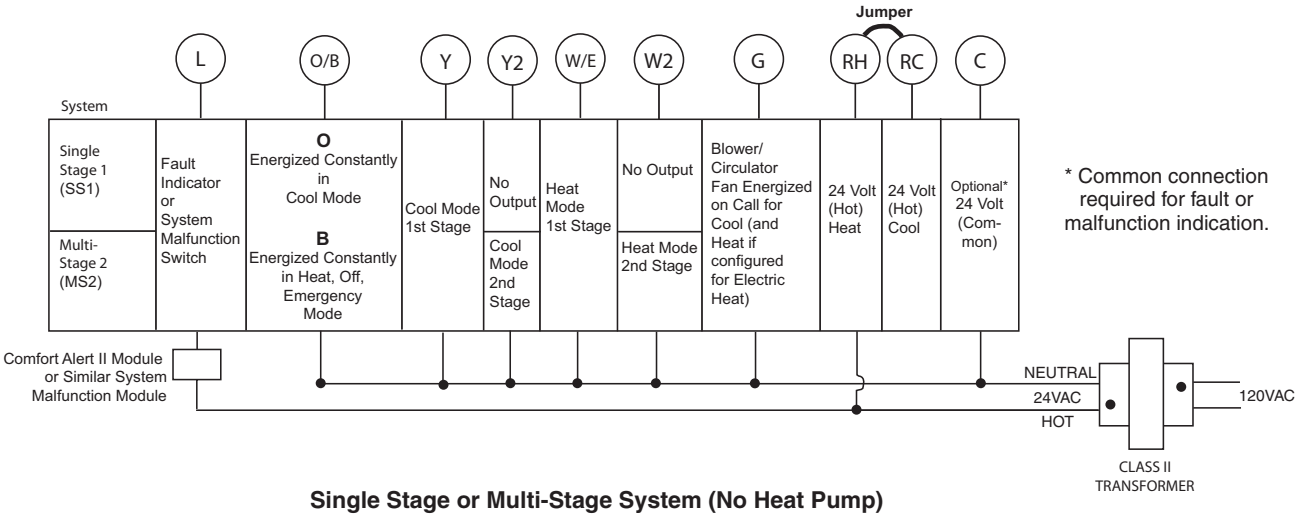
Heat Pump Systems



NOTE: If your system does not provide an E connection, jumper W2 to W/E to use the Auxiliary Heat in the Emergency Mode.

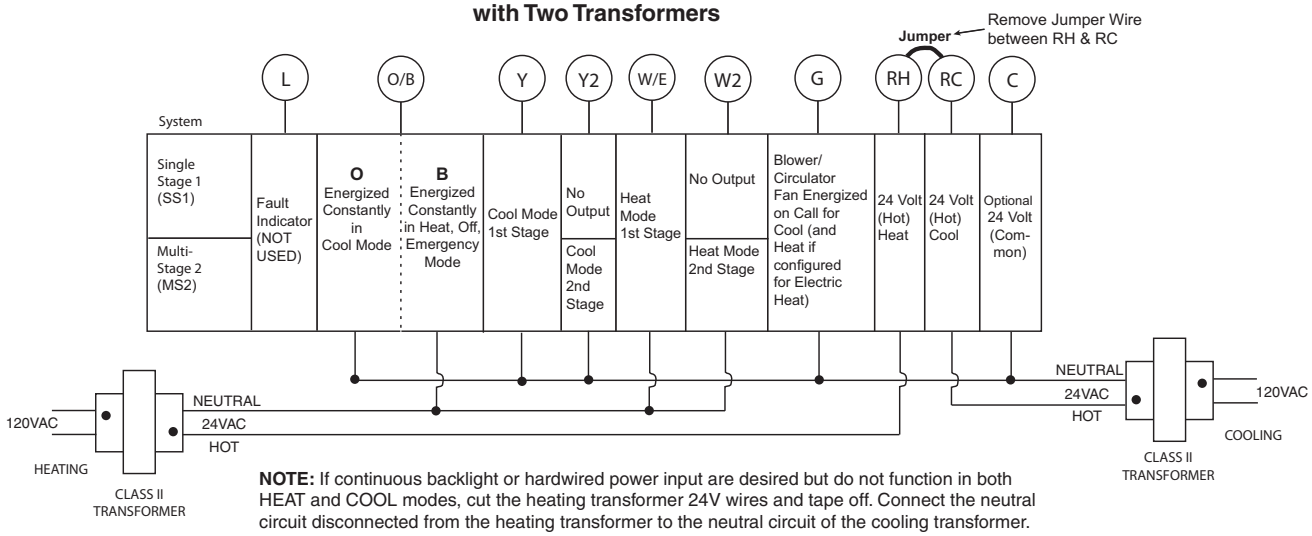
* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer



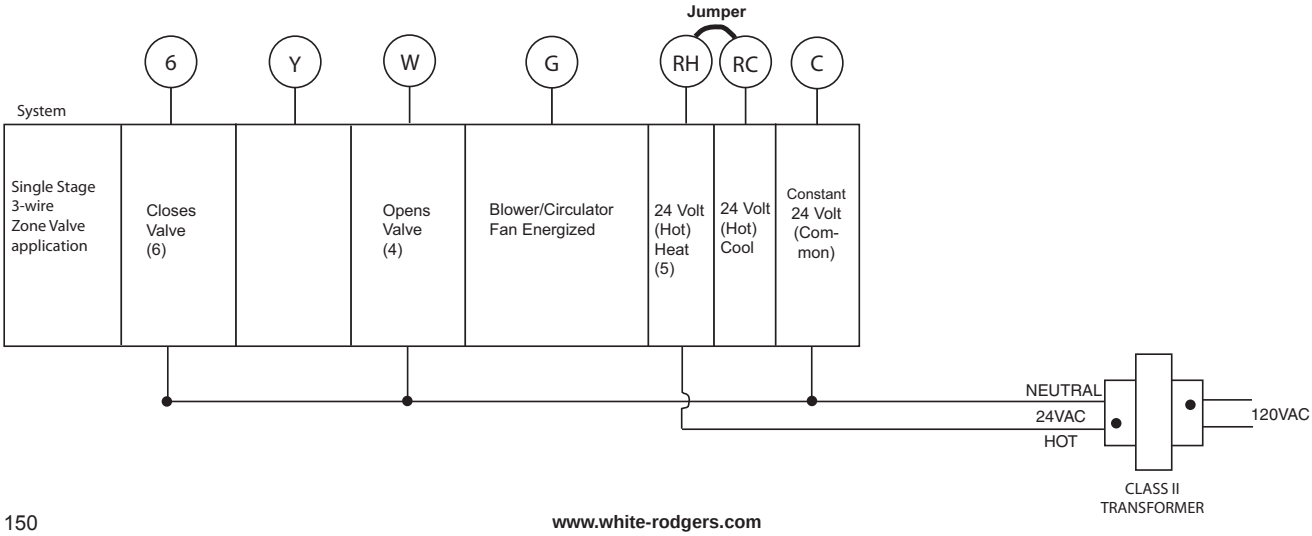
* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



NOTE: If continuous backlight or hardwired power input are desired but do not function in both HEAT and COOL modes, cut the heating transformer 24V wires and tape off. Connect the neutral circuit disconnected from the heating transformer to the neutral circuit of the cooling transformer. Disconnect the wire to the RH terminal and install a jumper between RH and RC. Depending on the system requirements, replace the cooling transformer with a 75VA class II transformer if needed.

3-Wire (SPDT) Heat Only Zone Valve Wiring



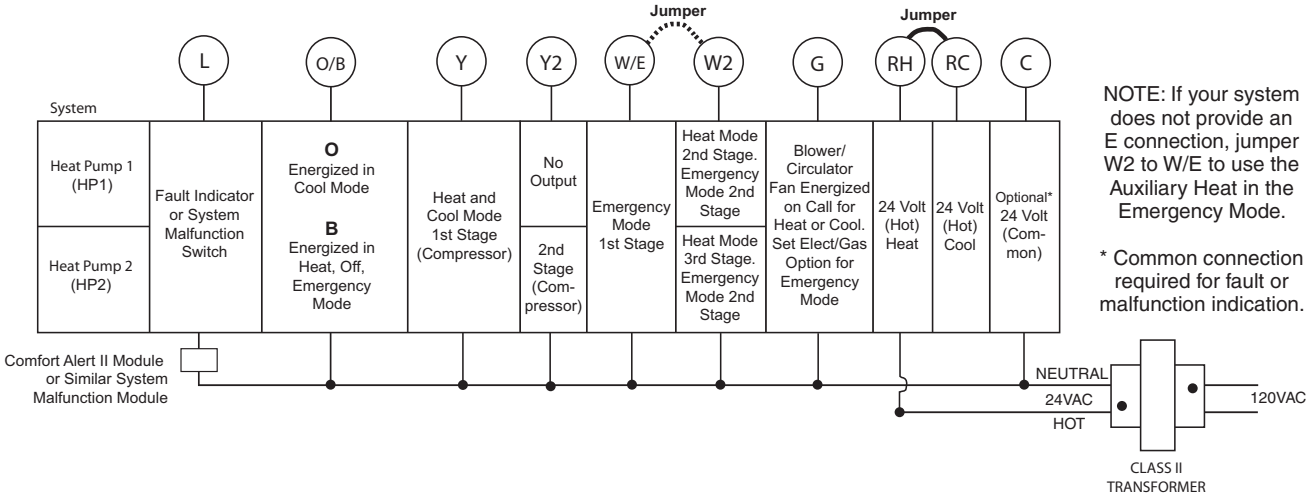
INSTALLER/CONFIGURATION MENU

With thermostat in Heat, Cool or Auto, in normal operation, press the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu to advance to the next menu, Press ⌃ or ⌄ to change an item option. Shaded items are not available to 1F83.

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1	1	MENU	Lk (OFF)	L	Selects Keypad Lockout. (Not available on earlier models)
			MENU	0	001 to 999	Selects Keypad lockout combination number
2	2	2	MENU	(MS 2)	HP 1, SS 1	Selects Multi-Stage (MS 2 No Heat Pump), Heat Pump 1 (HP 1, 1 compressor), or Single Stage (SS 1)
3	3	3	MENU	(GAS) for SS or MS (ELE) for HP	ELE	GAS setting: furnace controls the blower ELE setting: thermostat controls the blower
4	4	4	MENU	CS (0) (Disabled)	1, 2, 4, 5, 6	Selects Cool Savings Value 1 (low) to 6 (high), Value 0 Disables Feature
5	5	5	MENU	E (On)	OFF	Selects Energy Management Recovery (EMR) On or OFF. **1F85 only**
6	–	6	MENU	CR Heat (ME)	SL, FA	Adjustable Anticipation: Selects heating cycle rate for MS or SS
7	6	–	MENU	CR Heat Pump (ME)	SL, FA	Adjustable Anticipation (Heat Pump) (only when heat pump selected in #1)
8	7	7	MENU	CR Cool (ME) or CR Emer (FA)	SL, FA SL	Adjustable Anticipation: Selects the cycle rate for cooling (only when MS 2 or SS 1 is selected in item 1.) or Selects the cycle rate for Emergency mode and Auxiliary stage if Heat Pump is selected in item 1.
9	8	8	MENU	CL (OFF)	CL On	Compressor Lockout Time
10	9	9	MENU	Heat Auto Cool Off	Heat Cool Off, Heat Off with Fan icon, Heat Off without Fan icon Cool Off, Auto Off	System Mode Configuration with Automatic Changeover capability
11	10	10	MENU	dL (On)	dL OFF	Selects Display Light On or OFF
12	11	11	MENU	0 (current temperature)	1 HI, 2 HI, 3 HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
13	12	12	MENU	°F	°C	Selects Fahrenheit/Celsius Temperature Display
14	13	13	MENU	L Heat (90)	L 62 to L 89	Selects Limited HEAT Range
15	14	14	MENU	L Cool (45)	L 46 to L 82	Selects Limited COOL Range
16	15	15	MENU	P3	P0, P2	Defaults for 5-1-1 programming (P3) but non-programmable (PO) or 5-2 programming (P2) is available on most models. **1F85 only**
17	16	16	MENU	Heat AS (On)	OFF	Automatic Schedule for heat mode. 1F85 only. NA to Cool only system.
18	17	17	MENU	Cool AS (On)	OFF	Automatic Schedule for cool mode. **1F85 only**. NA to Heat only system.
19	18	–	MENU	Heat FA (On)	OFF	Fast Heat option may be disabled by selecting OFF. NA to SS config. NA to Cool only system.
20	19	–	MENU	Cool FA (On)	OFF	Fast Cool option may be disabled by selecting OFF. NA to SS config. NA to Heat only system.
21	20		MENU	CA (OFF)	On	Selects active Comfort Alert On or OFF. Require CA II Module. (Not available on earlier models)
22	21	18	MENU	dS (On)	OFF	Selects Automatic **d**aylight **S**avings Time option On or OFF. **1F85 only**
23	22	19	MENU	Change Filter (OFF)	On	Selects Filter Change-out Indicator On or OFF.
			MENU	Change Filter (200 h)	25-1975 h	Change Filter time in 25 hour increments. This menu only appears if On is selected in above.
24	23	20	MENU	Cool On (o)	Heat On (b)	Selects operation of the reversing valve terminal (O/B) output as an O or B terminal.
	24	21	RUN SCHED			Returns to Normal Operation

TYPICAL WIRING DIAGRAMS

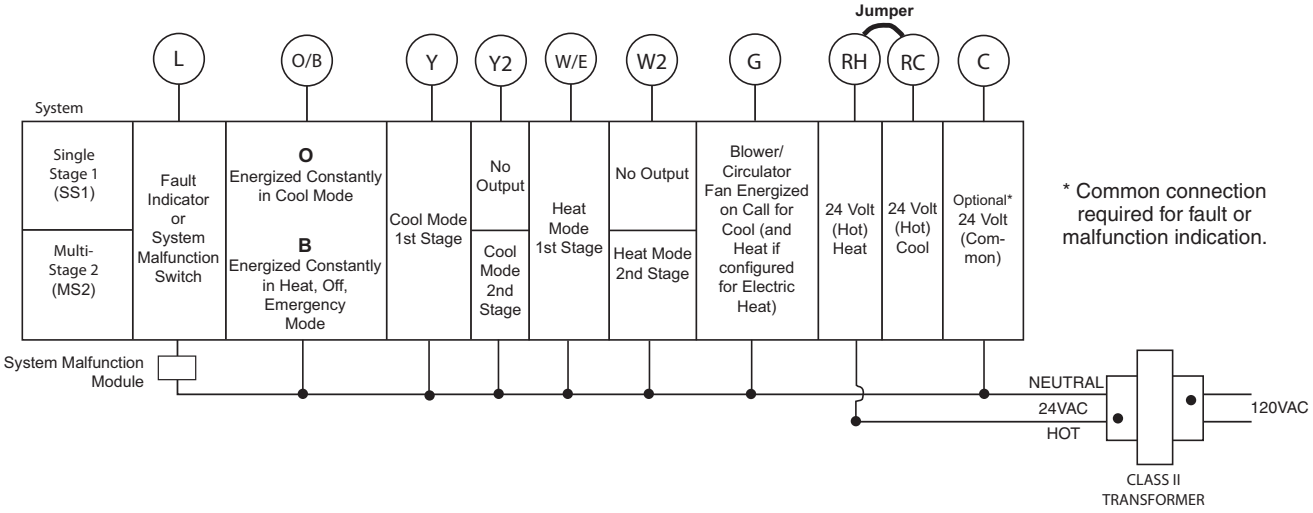
Heat Pump Systems



NOTE: If your system does not provide an E connection, jumper W2 to W/E to use the Auxiliary Heat in the Emergency Mode.

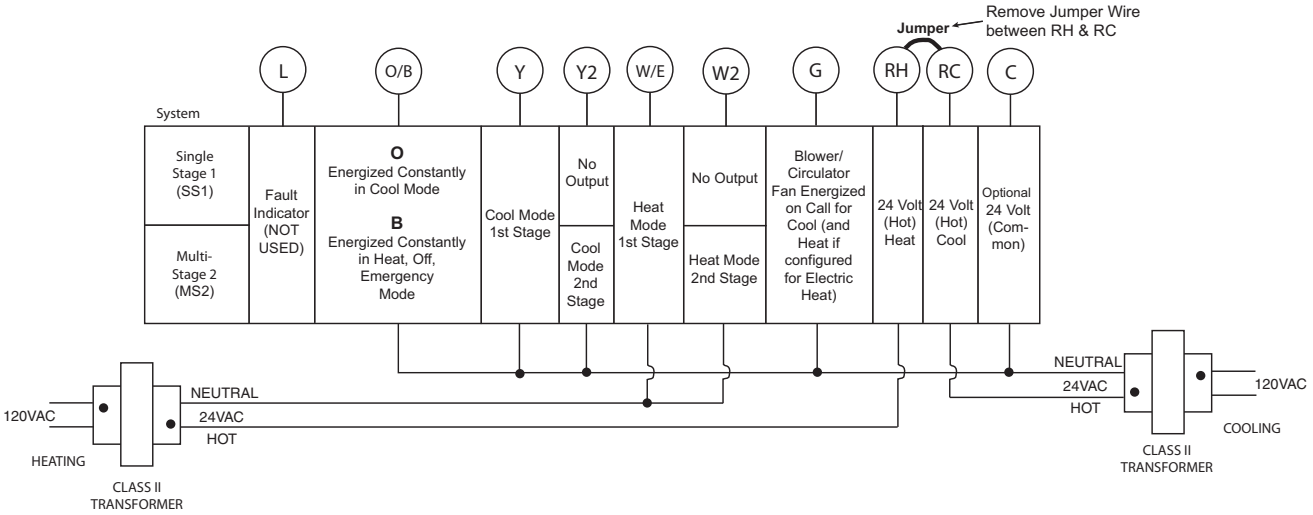
* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Single Transformer

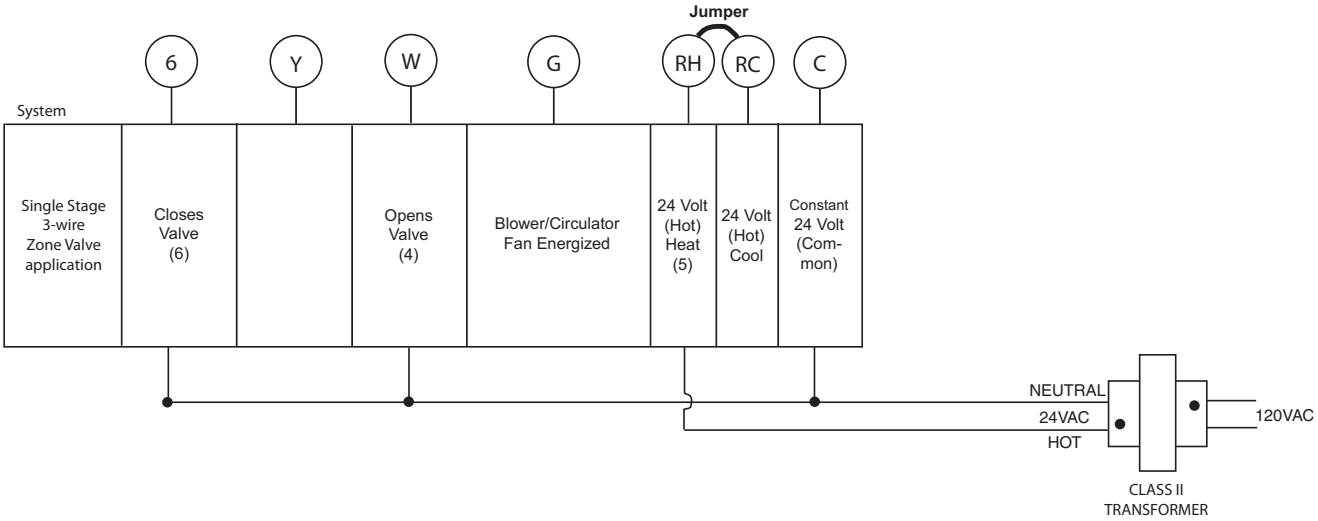


* Common connection required for fault or malfunction indication.

Single Stage or Multi-Stage System (No Heat Pump) with Two Transformers



3-Wire (SPDT) Heat Only Zone Valve Wiring



INSTALLER/CONFIGURATION MENU

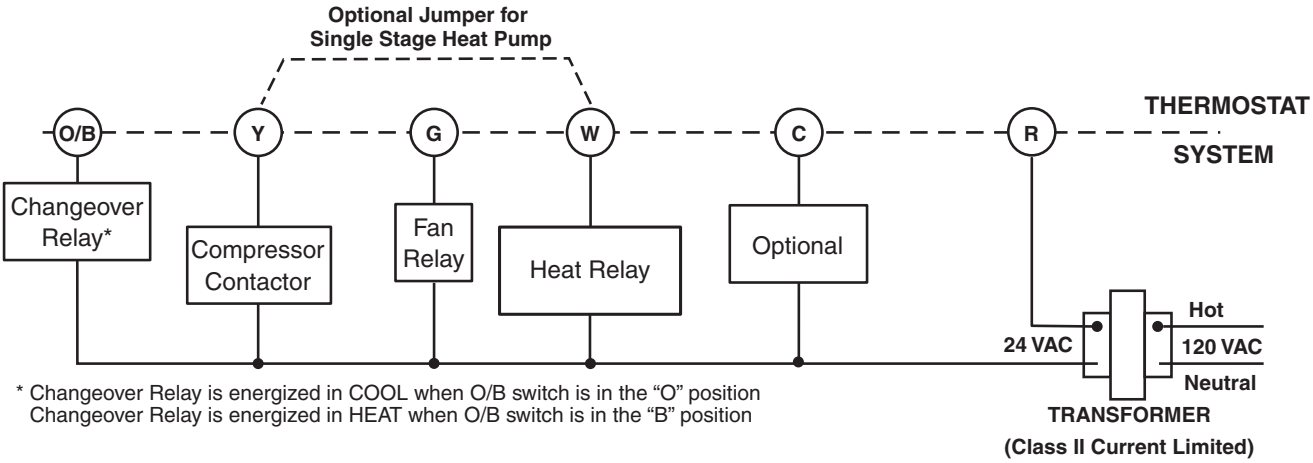
With thermostat in Heat, Cool or Auto, in normal operation, press the Menu button for at least 5 seconds. The display will show item #1 in the table below. Press Menu button to advance to the next menu item. Press ⌃ or ⌄ to change an item option.

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	1	1	MENU	Lk (OFF)	L	Selects Keypad Lockout. (Not available on earlier models)
			MENU	0	001 to 999	Selects Keypad lockout combination number
2	2	2	MENU	(MS 2)	HP 1, HP 2, SS 1	Selects Multi-Stage (MS 2 No Heat Pump), Heat Pump 1 (HP 1, 1 compressor), or Single Stage (SS 1), Heat Pump 2 (HP 2, 2 compressor or 2 speed compressor)
3	3	3	MENU	(GAS) for SS or MS (ELE) for HP	ELE	GAS setting: furnace controls the blower ELE setting: thermostat controls the blower
4	4	4	MENU	CS (0) (Disabled)	1, 2, 3, 4, 5, 6	Selects Cool Savings Value 1 (low) to 6 (high), Value 0 Disables Feature
5	5	5	MENU	E (On)	OFF	Selects Energy Management Recovery (EMR) On or OFF.
6	–	6	MENU	CR Heat (ME)	SL, FA	Adjustable Anticipation: Selects heating cycle rate for MS or SS
7	6	–	MENU	CR Heat Pump (ME)	SL, FA	Adjustable Anticipation (Heat Pump) (only when heat pump is selected in #1)
8	7	7	MENU	CR Cool (ME) or CR Emer (FA)	SL, FA SL	Adjustable Anticipation: Selects the cycle rate for cooling (only when MS 2 or SS 1 is selected in item 1.) or Selects the cycle rate for Emergency mode and Auxiliary stage if Heat Pump is selected in item 1.
9	8	8	MENU	CL (OFF)	CL On	Compressor Lockout Time
10	9	9	MENU	Heat Auto Cool Off	Heat Cool Off, Heat Off with Fan icon, Heat Off without Fan icon Cool Off, Auto Off	System Mode Configuration with Automatic Changeover capability
11	10	10	MENU	dL (On)	dL OFF	Selects Display Light On or OFF
12	11	11	MENU	0 (current temperature)	1 HI, 2 HI, 3 HI, 4 HI, 1 LO, 2 LO, 3 LO, 4 LO	Adjustable Ambient Temperature Display
13	12	12	MENU	°F	°C	Selects Fahrenheit/Celsius Temperature Display

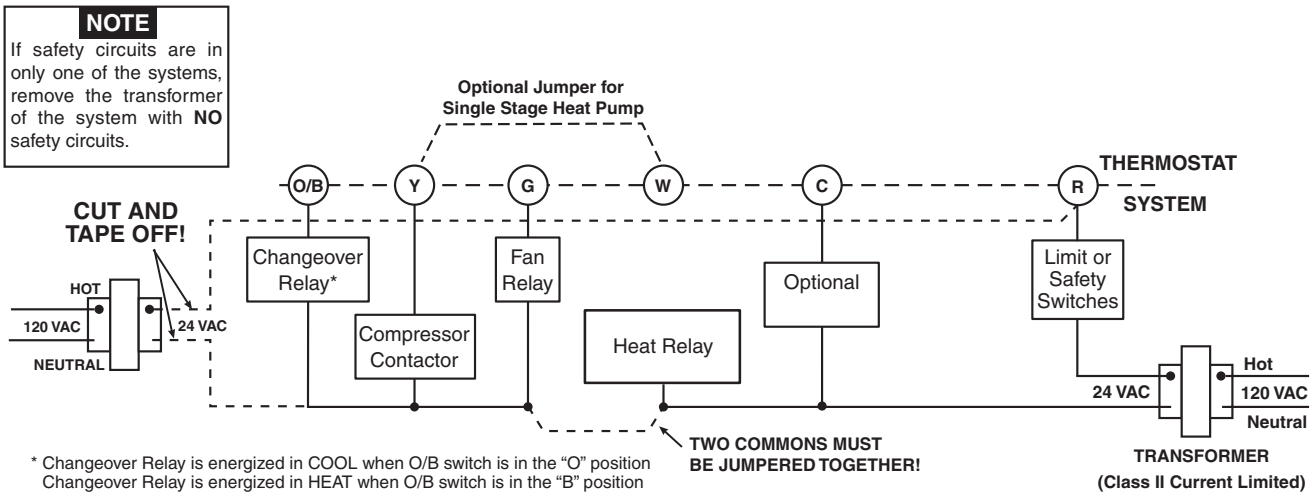
INSTALLER/CONFIGURATION MENU (cont.)

CONFIGURATION MENU						
Menu Ref.	**HP**	**SS**	**Press Button**	**Displayed Factory (Default)**	**Press ▲ or ▼ to select from listed options**	**COMMENTS**
14	13	13	MENU	L Heat (90)	L 62 to L 89	Selects Limited HEAT Range
15	14	14	MENU	L Cool (45)	L 46 to L 82	Selects Limited COOL Range
16	15	15	MENU	P7	P3	Defaults for 7 day programming (P7) or 5/1/1 day programming (P3) is available
17	16	16	MENU	Heat AS (On)	OFF	Automatic Schedule for heat mode.
18	17	17	MENU	Cool AS (On)	OFF	Automatic Schedule for cool mode.
19	18	–	MENU	Heat FA (On)	OFF	Fast Heat option may be disabled by selecting OFF. NA to SS config.
20	19	–	MENU	Cool FA (On)	OFF	Fast Cool option may be disabled by selecting OFF. NA to SS config. NA to Heat only system.
21	20	18	MENU	CA (OFF)	On	Selects active Comfort Alert On or OFF. Require CA II Module. (Not available on earlier models)
22	21	19	MENU	dS (On)	OFF	Selects Automatic **d**aylight **S**avings Time option On or OFF.
23	22	20	MENU	Change Filter (OFF)	On	Selects Filter Change-out Indicator On or OFF.
			MENU	Change Filter (200 h)	25-1975 h	Change Filter time in 25 hour increments. This menu only appears if On is selected in above.
24	23	21	MENU	Cool On (o)	Heat On (b)	Selects operation of the reversing valve terminal (O/B) output as an O or B terminal.
25	24	22	RUN			Returns to Normal Operation

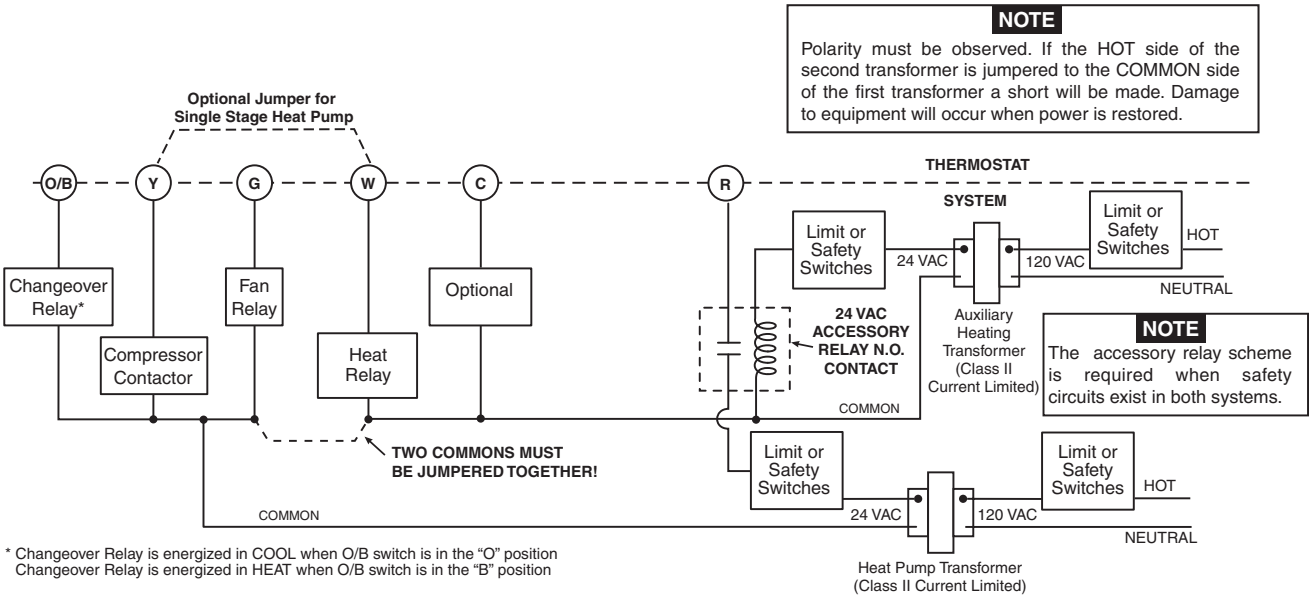
TYPICAL WIRING DIAGRAMS



Typical wiring diagram for single transformer single stage systems



Typical wiring diagram for two transformer single stage systems with NO safety circuits



Typical wiring diagram for two transformer single stage systems with safety circuits in BOTH systems

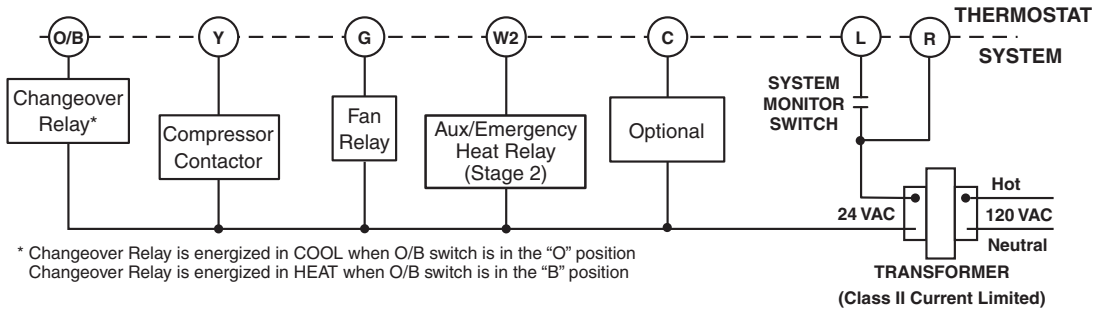
INSTALLER/CONFIGURATION MENU

The configuration menu allows you to set certain thermostat operating characteristics to your system or personal requirements. To enter the menu: Set your thermostat to OFF and press the ⌃ and ⌄ buttons simultaneously. The display will show the first item in the configuration menu. Press RUN/HOLD to change to the next menu item or press TIME to go backwards to the previous item in the menu. To exit the menu and return to the program operation, press PRGM. If no keys are pressed within fifteen minutes, the thermostat will revert to normal operation.

CONFIGURATION MENU				
Menu Reference Number	**Press Key**	**Displayed Factory (Default)**	**Press ⌃ or ⌄ to select from listed options**	**COMMENTS**
1	⌃ and ⌄	SS	HP	Select Single Stage (SS) or Heat Pump (HP, 1 compressor)
2	RUN/HOLD*	(OFF) CS	On	Select Cool Savings Feature On or OFF
	RUN/HOLD*	(3) CS	1, 2, 3, 4, 5, 6	If CS selected On, selects Cool Savings value
3	RUN/HOLD*	(On) E	OFF	Select Energy Management Recovery On or OFF
4	RUN/HOLD*	(ME) CR (🔥)	FA, SL	Select Adjustable Anticipation, cycle rate, Heat Single Stage
5	RUN/HOLD*	(FA) CR (❄)	SL	Select Adjustable Anticipation, cycle rate, Cool Single Stage
6	RUN/HOLD*	(OFF) CL	On	Select Compressor lockout OFF or On
7	RUN/HOLD*	(On) L	OFF	Select Display Light On or OFF
8	RUN/HOLD*	Temp (0 HI)	4 LO to 4 HI	Select temperature display adjustment higher or lower
9	RUN/HOLD*	°F	°C	Select °F / °C Display (temperature units in Fahrenheit or Celsius)
10	RUN/HOLD*	(OFF) Change Filter	On	Select filter replacement indicator OFF or On
	RUN/HOLD*	Change Filter (200 h)	25 to 1975	If Change Filter selected On, selects time interval for Change Filter Indicator. (in 25 hour increments)
11	RUN/HOLD*			Returns to normal operation

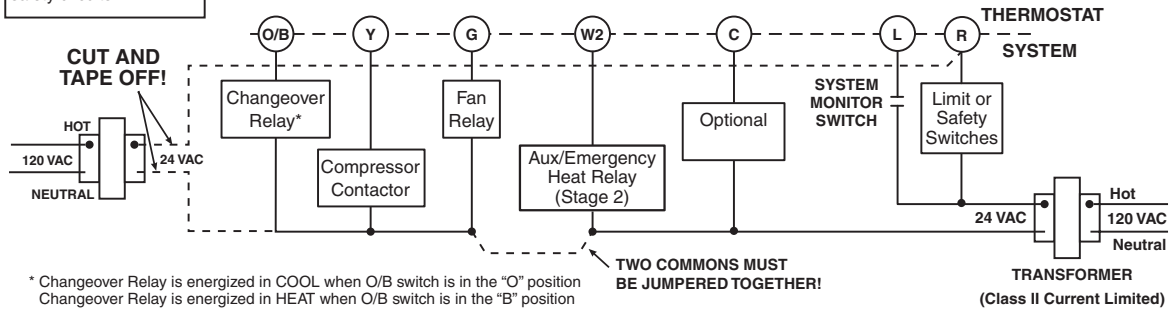
*Press **RUN/HOLD** to advance to next item or **TIME** to move backwards to previous item

TYPICAL WIRING DIAGRAMS



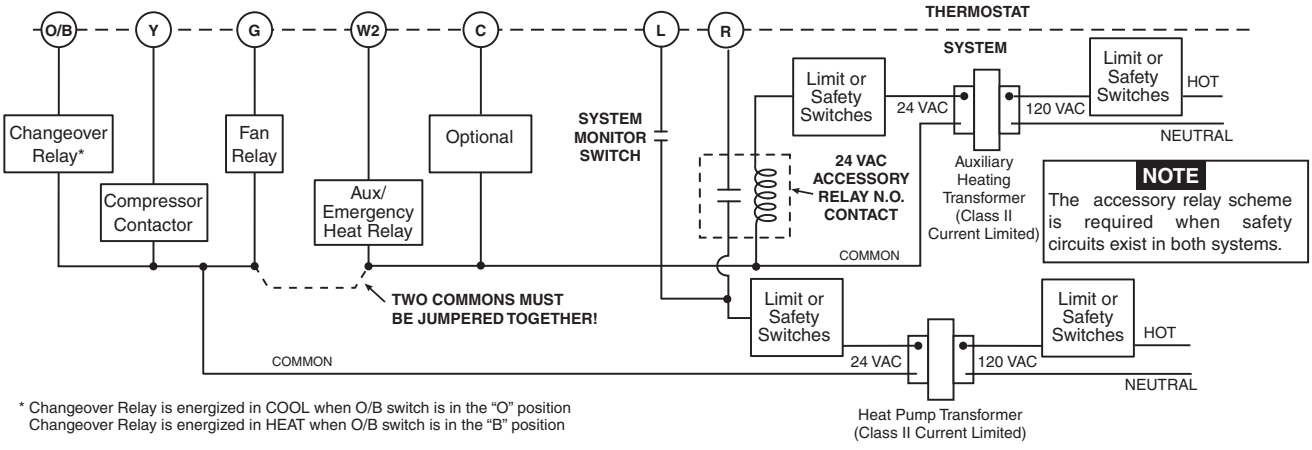
Typical wiring diagram for single transformer systems

NOTE
If safety circuits are in only one of the systems, remove the transformer of the system with **NO** safety circuits.



Typical wiring diagram for two transformer systems with NO safety circuits

NOTE
Polarity must be observed. If the HOT side of the second transformer is jumpered to the COMMON side of the first transformer a short will be made. Damage to equipment will occur when power is restored.



NOTE
The accessory relay scheme is required when safety circuits exist in both systems.

Typical wiring diagram for two transformer systems with safety circuits in BOTH systems

1F82-0261 INSTALLER/CONFIGURATION MENU

The configuration menu allows you to set certain thermostat operating characteristics to your system or personal requirements. To enter the menu: Set your thermostat to OFF and press the ∧ and ∨ buttons simultaneously. The display will show the first item in the configuration menu. Press RUN/HOLD to change to the next menu item or press TIME to go backwards to the previous item in the menu. To exit the menu and return to the program operation, press PRGM. If no keys are pressed within fifteen minutes, the thermostat will revert to normal operation.

CONFIGURATION MENU						
Menu Reference Number	**Heat Pump**	**Single Stage**	**Press Key**	**Displayed (Factory Default)**	**Press ∧ or ∨ to select from listed options**	**COMMENTS**
1	1	1	∧ and ∨	HP	SS	Select Heat Pump (HP, 1 compressor) or Single Stage (SS)
2	2	2	**RUN/HOLD***	CS (OFF)	On	Select Cool Savings Feature On or OFF
			RUN/HOLD*	CS (3)	1, 2, 3, 4, 5, 6	If CS selected On, selects Cool Savings value
3	3	3	**RUN/HOLD***	E (On)	OFF	Select Energy Management Recovery On or OFF
4	4		**RUN/HOLD***	CR HE-PU (FA)	SL	Select Adjustable Anticipation, cycle rate, Heat Pump, Heat and Cool
		4	**RUN/HOLD***	CR Heat (FA)	SL	Select Adjustable Anticipation, cycle rate, Heat Single Stage
5	5		**RUN/HOLD***	CR Aux (FA)	SL	Select Adjustable Anticipation, cycle rate, Heat Pump Aux Stage
		5	**RUN/HOLD***	CR Cool (FA)	SL	Select Adjustable Anticipation, cycle rate, Cool Single Stage
6	6	6	**RUN/HOLD***	CL (OFF)	On	Select Compressor lockout OFF or On
7	7	7	**RUN/HOLD***	L (On)	OFF	Select Display Light On or OFF
8	8	8	**RUN/HOLD***	Temp (0 HI)	4 LO to 4 HI	Select temperature display adjustment higher or lower
9	9	9	**RUN/HOLD***	°F	°C	Select °F / °C Display (temperature units in Fahrenheit or Celsius)
10	10		**RUN/HOLD***	FH (On)	OFF	Select fast second stage On or OFF
11	11	10	**RUN/HOLD***	Change Filter (OFF)	On	Select filter replacement indicator OFF or On
			RUN/HOLD*	Change Filter (200 h)	25 to 1975	If Change Filter selected On, selects time interval for Change Filter Indicator. (in 25 hour increments)
12			**RUN/HOLD***			Returns to normal operation

*Press **RUN/HOLD** to advance to next item or **TIME** to move backwards to previous item

1F89-0211 INSTALLER/CONFIGURATION MENU

CONFIGURATION MENU				
Menu Reference Number	**Press Key**	**Displayed (Factory Default)**	**Press ∧ or ∨ to select from listed options**	**COMMENTS**
1	∧ and ∨	CS (OFF)	On	Select Cool Savings Feature On or OFF
	∧ and ∨	CS (3)	1, 2, 3, 4, 5, 6	If CS selected On, selects Cool Savings value
2	∧ and ∨	CR HE-PU (FA)	SL	Select Adjustable Anticipation, cycle rate, Heat Pump, Heat and Cool
3	∧ and ∨	CR Aux (FA)	SL	Select Adjustable Anticipation, cycle rate, Heat Pump Aux Stage
4	∧ and ∨	CL (OFF)	On	Select Compressor lockout OFF or On
5	∧ and ∨	L (On)	OFF	Select Display Light On or OFF
6	∧ and ∨	Temp (0 HI)	4 LO to 4 HI	Select temperature display adjustment higher or lower
7	∧ and ∨	°F	°C	Select °F / °C Display (temperature units in Fahrenheit or Celsius)
8	∧ and ∨	FH (On)	OFF	Select fast second stage On or OFF
9	∧ and ∨	Change Filter (OFF)	On	Select filter replacement indicator OFF or On
	∧ and ∨	Change Filter (200 h)	25 to 1975	If Change Filter selected On, selects time interval for Change Filter Indicator. (in 25 hour increments)
10	∧ and ∨			Returns to normal operation

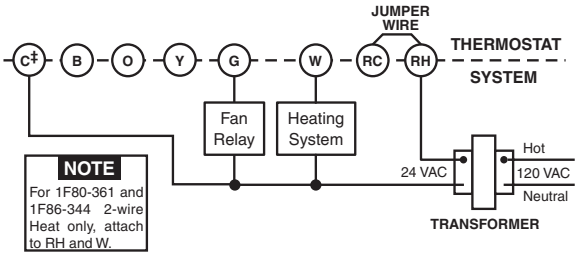
CONFIGURATION

The following table allows you to customize the options on your Comfort-Set thermostat.

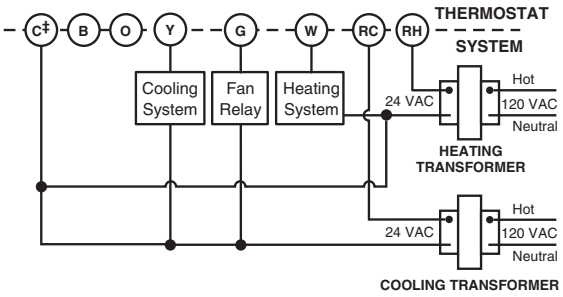
1F80-224	*1F80-240	1F80-241	1F80-361	1F86-241	1F86-344	1F87-361	Configuration Menu			
Step	Step	Step	Step	Step	Step	Step	Press Button(s)	Displayed (Factory Default)	Press ▲ or ▼ to select:	COMMENTS
1	1	1	1	N/A	N/A	1	**PRGM** and **RUN**	HOLD (0:00)	0 to 8 hrs (in 15 minute increments)	Select temporary Hold time
N/A	N/A	N/A	N/A	1	1	N/A	Set SYSTEM switch to OFF			SYSTEM switch must be OFF to configure thermostat options
2	2	2	2	2	2	2	*	ϕ (FA)	SL	Select FA or SL (Fast or Slow) heating cycle rate
3	3	3	3	3	3	3	*	d-L (ON)	OFF	Select display backlight OFF or ON
N/A	4	4	4	N/A	N/A	4	*	E (ON)	OFF	Select Energy Management Recovery OFF or ON
N/A	5	N/A	5	N/A	4	5	*	Filter (000)	0 to 1950 hours (in 50 hour increments)	Select filter replacement run time
4	N/A	5	6	4	5	6	*	LOC (OFF)	ON	Select Compressor lockout OFF or ON
5	6	6	7	5	6	7	*	0 HI (0)	4 LO to 4 HI	Select temperature display adjustment higher or lower
6	7	7	8	6	7	8	*	°(F)	°C	Select temperature display to °F or °C
7	8	8	9	N/A	N/A	9	**RUN**			Returns to normal operation
8	*9	N/A	N/A	7	8		Set SYSTEM switch to HEAT or COOL			Returns to normal operation

* 1F80/1F87 - Press **HOLD** to advance to next item or **TIME** to move backwards to previous item
1F86 - Press ▲ and ▼ to advance to next item
1F80-240 is HEAT only

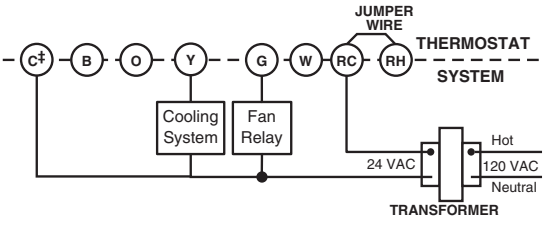
TYPICAL WIRING DIAGRAMS



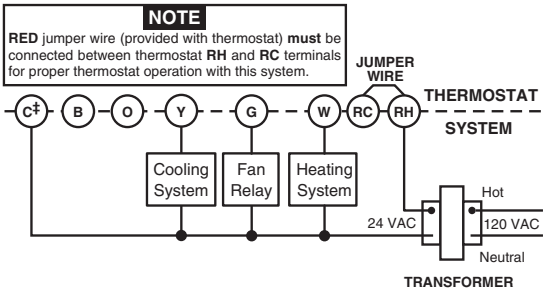
Heat only, 3-wire, single transformer systems



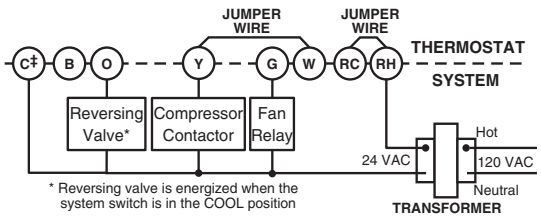
Heat/cool, 5-wire, two-transformer systems



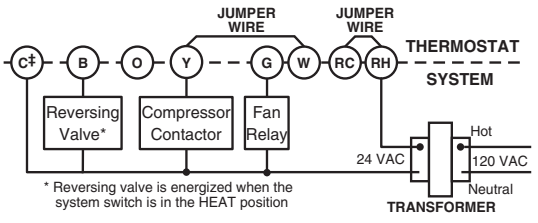
Cool only, 3-wire, single transformer systems



Heat/cool, 4-wire, single transformer systems



Heat pump with reversing valve energized in COOL



Heat pump with reversing valve energized in HEAT

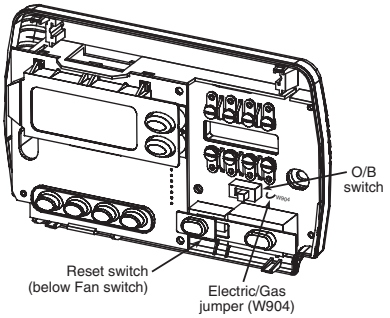
CONFIGURATION

The following table allows you to customize the options on your Comfort-Set thermostat. Begin by pressing simultaneously the two buttons in step 1.

Configuration Menu

Step	1F82-261 Press Button(s)	1F89-211 Press Button(s)	Displayed (Factory Default)	Press ⌃ or ⌄ to select:	COMMENTS
1	**PRGM** and **RUN**	Set **SYSTEM** switch to OFF	HOLD (0:00)	0 to 8 hrs (in 15 minute increments)	Select temporary Hold time
2	**HOLD***	⌃ or ⌄	✳ (SL)	FA	Select FA or SL (Fast or Slow) pump cycle rate
3	**HOLD***	⌃ or ⌄	EMER (FA)	SL	Select FA or SL (Fast or Slow) Auxiliary and Emergency Aux heating cycle rate
4	**HOLD***	⌃ or ⌄	d-L (on)	OFF	Select display backlight OFF or ON
5	**HOLD***	⌃ or ⌄	E (on)	OFF	Select Energy Management Recovery OFF or ON
6	**HOLD***	⌃ or ⌄	Filter (000)	0 to 1950 hours (in 50 hour increments)	Select filter replacement run time
7	**HOLD***	⌃ or ⌄	LOC (OFF)	on	Select Compressor lockout OFF or ON
8	**HOLD***	⌃ or ⌄	0 HI (0)	4 LO to 4 HI	Select temperature display adjustment higher or lower
9	**HOLD***	⌃ or ⌄	°(F)	°C	Select temperature display to °F or °C
10	**HOLD***	⌃ or ⌄	FA (ON)	OFF	Selects fast second stage ON or OFF
11	**RUN**				Returns to normal operation

* Press **HOLD** to advance to next item or **TIME** to move backwards to previous item



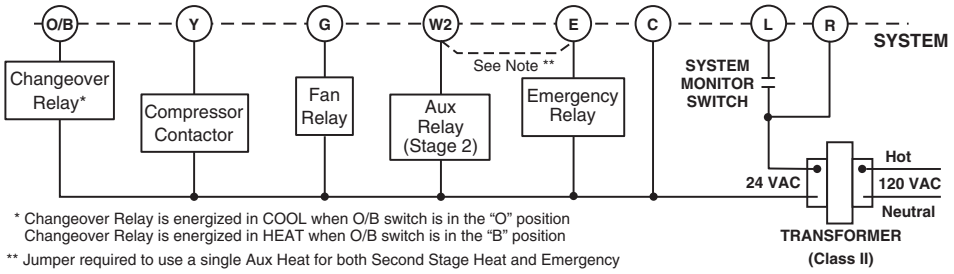
Electric / Gas Jumper (Fan Option)

If your emergency or auxiliary system will energize the blower, then jumper W904, on the thermostat base, must be cut (see figure at left). If your emergency or auxiliary heat system requires that the thermostat energize the fan circuit, do not cut jumper W904.

O/B Terminal Switch Selection

The O/B switch on this thermostat is factory set to the "O" position. This will accommodate the majority of heat pump applications, which require the changeover relay to be energized in COOL. If the thermostat you are replacing or the heat pump being installed with this thermostat requires a "B" terminal, to energize the changeover relay in HEAT, the O/B switch must be moved to the "B" position.

TYPICAL WIRING DIAGRAMS

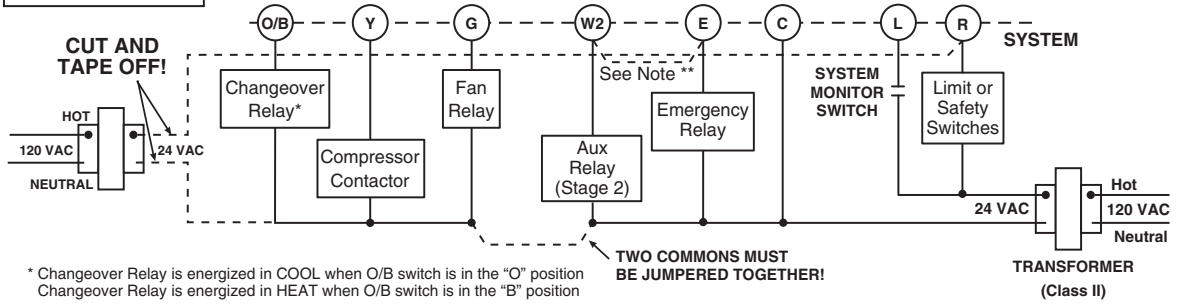


* Changeover Relay is energized in COOL when O/B switch is in the "O" position
Changeover Relay is energized in HEAT when O/B switch is in the "B" position

** Jumper required to use a single Aux Heat for both Second Stage Heat and Emergency

Single transformer systems

NOTE
If safety circuits are in only one of the systems, remove the transformer of the system with **NO** safety circuits.



* Changeover Relay is energized in COOL when O/B switch is in the "O" position
Changeover Relay is energized in HEAT when O/B switch is in the "B" position

** Jumper required to use a single Aux Heat for both Second Stage Heat and Emergency

Two transformer systems with NO safety circuits

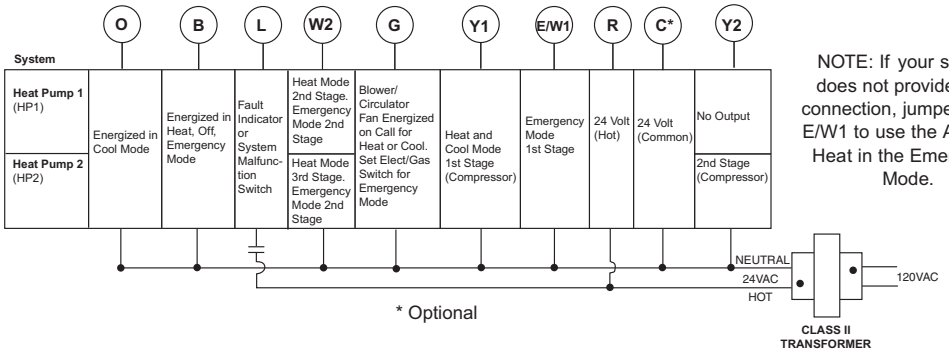
INSTALLER/CONFIGURATION MENU

To enter the menu: Press the **System** button until **OFF** is displayed, then press ▲ and ▼ simultaneously. This displays menu item #1 in the table below.

	Check Box For Your Model Number			CONFIGURATION MENU			
	☐ 1F83-277	☐ 1F85-275	☐ 1F85-277				
Menu Reference Number	Step	Step	Step	Press Button	Displayed (Factory Default)	Press ▲ or ▼ to select from listed options	Comments
1	1	1	1	SYSTEM	MS 2	HP1, HP2, SS1	Selects Multi-Stage, Heat Pump 1 (1 Compressor), Heat Pump 2 (2 Compressor or 2 Speed Compressor), or Single Stage
2	N/A	N/A	2	SYSTEM	(7)	5d, 0d	Selects Number of Programs per Week
3	N/A	2	3	SYSTEM	PRG 4	PRG 2, PRG 0	Selects Programmable Periods
4	N/A	3	4	SYSTEM	4:00 HOLD	0:15 to 8:00 (increments of 15 minutes)	Selects Temporary Program Override Time NOTE: Maximum setting is 4:00 hours for 1F85-277
5	N/A	4	5	SYSTEM	EMR (on)	OFF	Selects Energy Management Recovery OFF or ON
6	2	5	6	SYSTEM	FA ❄ 🔥	SL	Selects Fast or Slow Cycle Selection
7	3	6	7	SYSTEM	CL (OFF)	CL on	Selects Compressor Lockout CL OFF or ON
8	4	7	8	SYSTEM	CdL (on)	CdL OFF	Selects Backlight Display
9	5	8	9	SYSTEM	FA (on) ❄ 🔥	FA OFF	Selects Fast Second Stage ON or OFF
10	6	9	10	SYSTEM	0 FLTR	50-1950	Selects filter replacement run time
11	7	10	11	SYSTEM	0 (Room Temp)	4 LO to 4 HI Selects	Selects Temperature Display Adjustment 4 LO to 4 HI
12	8	11	12	SYSTEM	F	C	For Centigrade selection
13	9	12	13	SYSTEM	AU (on)	AU OFF	Selects Auto Mode ON or OFF
14	10	13	14	SYSTEM	LR (90) 🔥	LR 62 to LR 89	Selects Limited HEAT range
15	11	14	15	SYSTEM	LR (45) ❄	LR 46 to LR 82	Selects Limited COOL range
16	12	15	16	SYSTEM	(OFF) 🔒	on	Selects Keypad Lockout
17	13	16	17		000 If L/O	001 to 999	Selects Keypad Lockout combination number. Press System to set code
18	14	17	18	* RUN ** SYSTEM			Returns to the OFF position

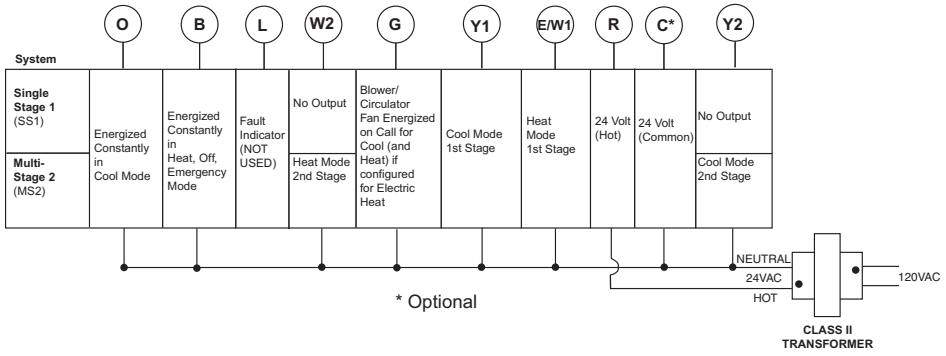
* Programmable Models
** Non-Programmable Models

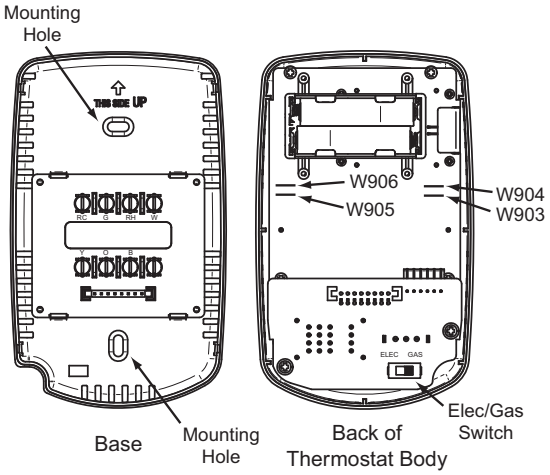
Figure 2 – Heat Pump Systems



NOTE: If your system does not provide an E connection, jumper W2 to E/W1 to use the Auxiliary Heat in the Emergency Mode.

Figure 3 – Single Stage or Multi-Stage System (No Heat Pump)





W903 - clip to disable EMR feature
W904 - clip for Celcius display
W905 - clip for hydronic system
W906 - clip for 5/1/1 day programming

Figure 1

Reset Operation
If a voltage spike or static discharge blanks out the display or causes erratic thermostat operation you can reset the thermostat by pressing , and TIME at the same time. This also resets the factory defaults. If the thermostat has power, has been reset and still does not function correctly contact your heating/ cooling service person or place of purchase.

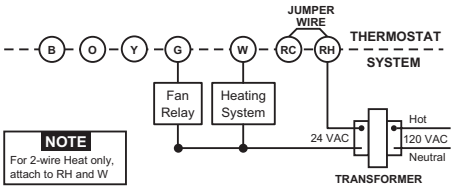


Figure 2. Typical wiring diagram for heat only, 3-wire, single transformer systems

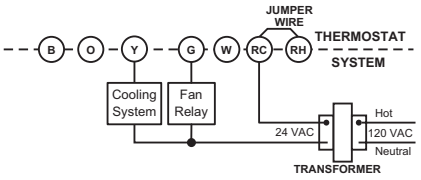


Figure 3. Typical wiring diagram for cool only, 3-wire, single transformer systems

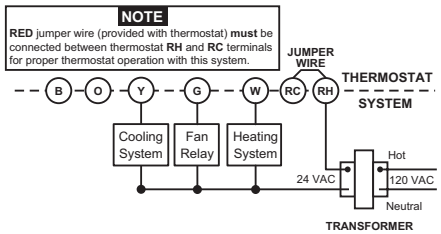


Figure 4. Typical wiring diagram for heat/cool, 4-wire, single transformer systems

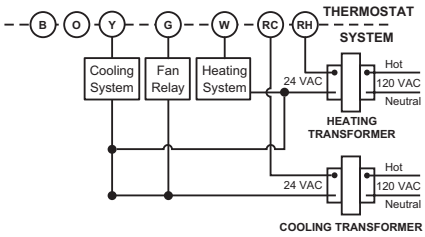


Figure 5. Typical wiring diagram for heat/cool, 5-wire, two-transformer systems

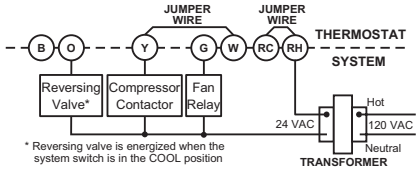


Figure 6. Typical wiring diagram for heat pump with reversing valve energized in COOL

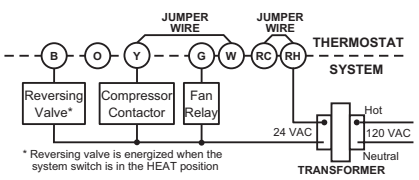
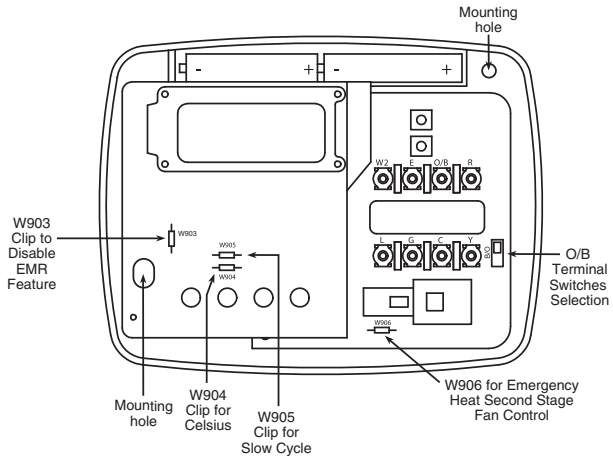


Figure 7. Typical wiring diagram for heat pump with reversing valve energized in HEAT



Thermostat base

Reset Operation 1F72-151

If a voltage spike or static discharge blanks out the display or causes erratic thermostat operation, you can reset the thermostat by pressing ▲, ▼ and TIME at the same time.

Reset Operation 1F79-111

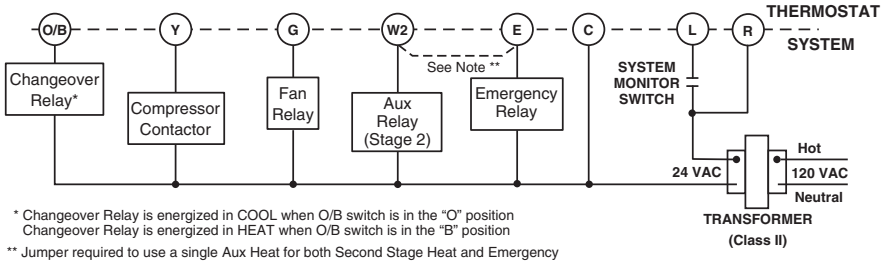
If a voltage spike or static discharge blanks out the display or causes erratic thermostat operation, you can reset the thermostat by pressing ▲, ▼ and at the same time when system is switched from "OFF" to "HEAT" position.

Configuration Menu

1F79-111 Step	1F72-151 Step	1F79-111 Press Button(s)	1F72-151 Press Button(s)	Displayed (Factory Default)	Press ▼ or ▲ to select:	COMMENTS
1		Set SYSTEM switch to OFF				
2	1	▼ and ▲ for at least 2 seconds	**PRGM** and **RUN**	FA (ON)	OFF	Select Fast (on) or slow (off) Second Stage Heat
3	2	▼ and ▲ momentarily	**HOLD** *	CL (OFF)	ON	Select Compressor lockout OFF or ON
4	3	▼ and ▲ momentarily	**HOLD** *	0 HI (0)	3 LO TO 3 HI	Select temperature display adjustment higher or lower
5*	4*	▼ and ▲ momentarily	**HOLD** **	dL (ON)	OFF	Select display backlight OFF or ON
6	5	Move SYSTEM switch from OFF	**RUN**			Return to normal operation

* Not available on earlier models

** Press **HOLD** to advance to next item or **TIME** to move backwards to previous item

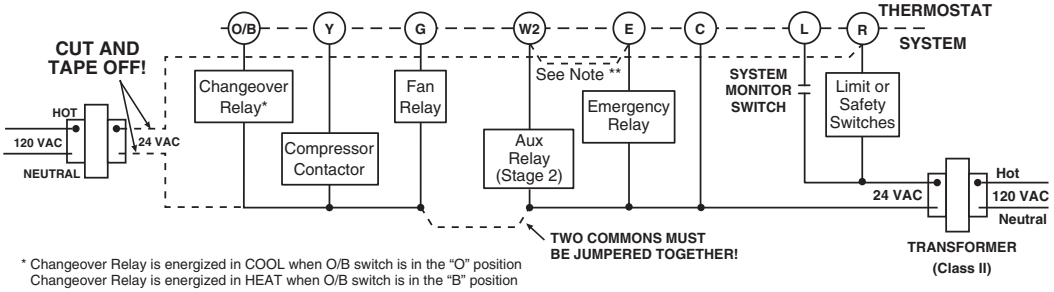


* Changeover Relay is energized in COOL when O/B switch is in the "O" position
Changeover Relay is energized in HEAT when O/B switch is in the "B" position

** Jumper required to use a single Aux Heat for both Second Stage Heat and Emergency

Typical wiring diagram for single transformer systems

NOTE
If safety circuits are in only one of the systems, remove the transformer of the system with **NO** safety circuits.

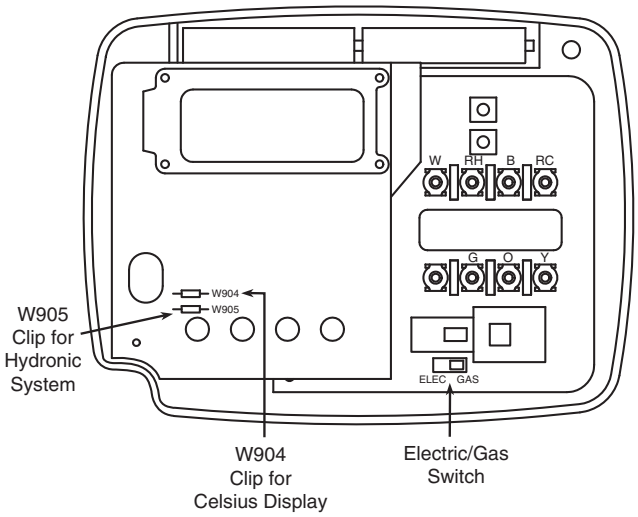


* Changeover Relay is energized in COOL when O/B switch is in the "O" position
Changeover Relay is energized in HEAT when O/B switch is in the "B" position

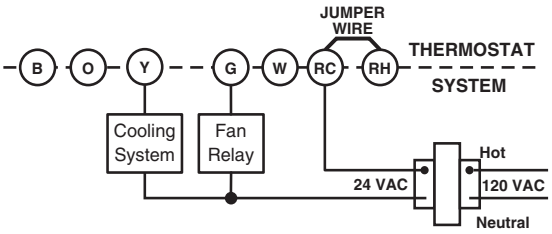
** Jumper required to use a single Aux Heat for both Second Stage Heat and Emergency

Typical wiring diagram for two transformer systems with NO safety circuits

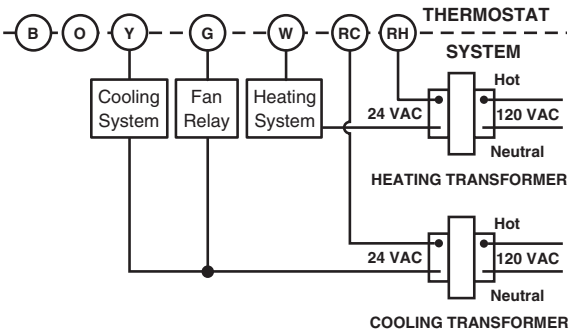
CONFIGURATION



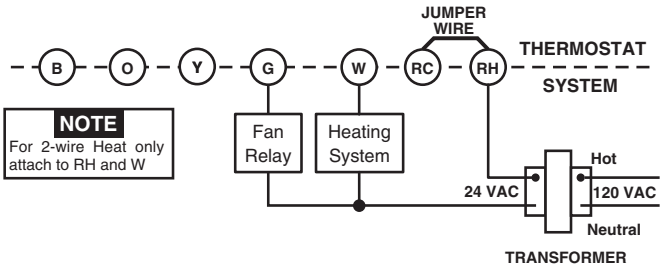
TYPICAL WIRING DIAGRAMS



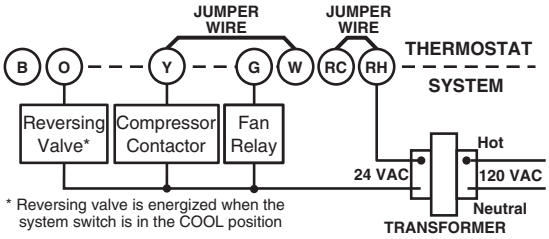
Cool only, 3-wire, single transformer systems



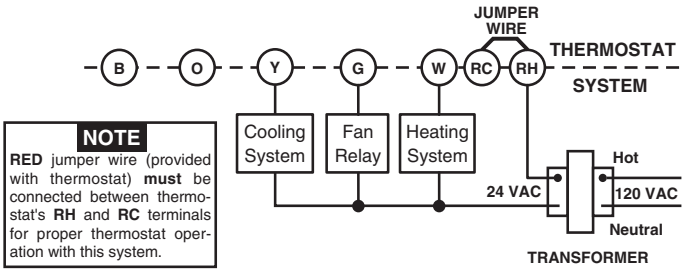
Heat/cool, 5-wire, two-transformer systems



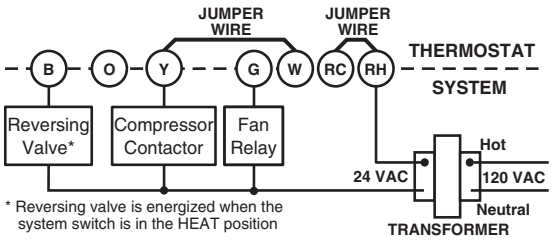
Heat only, 3-wire, single transformer systems



Heat pump with cool active reversing valve



Heat/cool, 4-wire, single transformer systems



Heat pump with heat active reversing valve

CONFIGURATION

Electric Heat Furnaces (Single Transformer Systems Only)

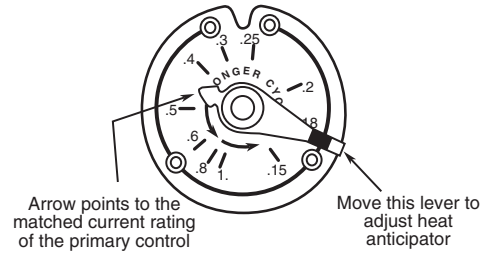
The thermostat as shipped may not operate the fan correctly. If both the heating and cooling system must operate the fan relay, remove the yellow factory-installed jumper wire from the Y terminal and connect it to the A terminal. The fan should now cycle when the thermostat calls for either heat or cool.

Heat Pump Applications

This thermostat WILL NOT provide multi-stage heating or cooling operation. For single-stage heat pump applications, install a short jumper wire across terminals W and Y. If the old thermostat has a terminal that is continuously energized, disconnect the wire from the old thermostat's terminal and connect it either to the: 1) B terminal, if the reversing valve is energized on a call for heat: or to the 2) O terminal, if the reversing valve is energized on a call for cool. If the system heats on a call for cool, or vice versa, this wire has been connected to the wrong terminal.

Special Application Terminals

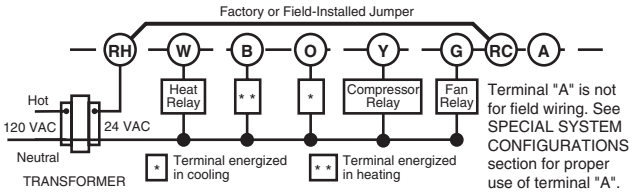
The B and O terminals can provide switching for special functions other than heat pump operation. When the system switch is in the HEAT position, the B terminal is energized. When the system switch is in the COOL position, the O terminal is energized.



Anticipator adjustment

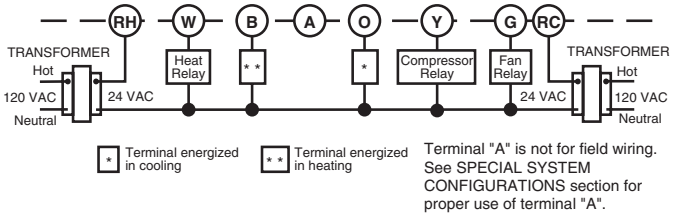
TYPICAL WIRING DIAGRAMS

NOTE: Some thermostat models don't include all terminals as shown here. Heat only models use terminals R and W.

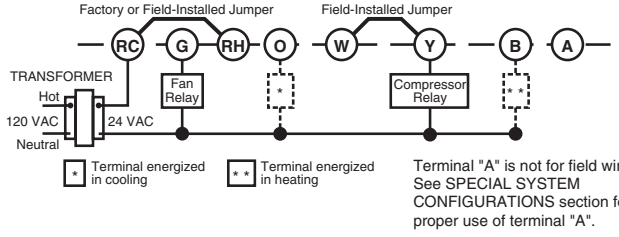


Single transformer heating/cooling system

NOTE: Remove factory-installed jumper between **RC** and **RH** terminals for this application.



Two-transformer heating/cooling system



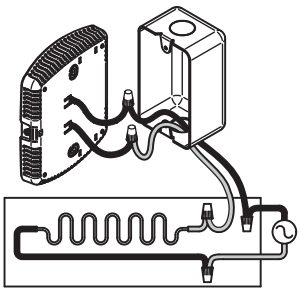
Single transformer, single stage heat pump system

NOTE

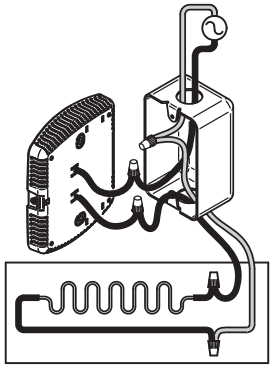
Use with copper conductors only. Use wire connectors approved for 12 AWG only.

Make the appropriate connections to the thermostat as per diagram below. The wires are non-polarized so either wire can be connected to either terminal.

2 Wire Installation



4 Wire Installation



Slide thermostat switch to ● position. The thermostat normally displays the actual ambient temperature.

The thermostat displays the percentage of power usage (in "PC" mode only) required to maintain the desired temperature. For example:

100% power usage

70% power usage

30% power usage

To view the setpoint temperature, press the ⌃ or ⌄ button once. The ☚ icon appears and the thermostat displays the setpoint temperature. To change the setpoint, press the ⌃ or ⌄ button to raise or lower the temperature until the desired setpoint is reached.

To turn the backlight on, press the ⓜ button, or the ⌃ or ⌄ button once.

To change the thermostat installer configuration, press and hold the ⓜ button for 5 seconds. The features and (defaults) are selected by pressing the ⓜ button once to scan the installer configuration selections. The defaults are changed with the ⌃ or ⌄ button. (Please refer to the following table for the selections of your choice.)

	Default	Options
Backlight	LO (On)	LF (Off)
Display Reading Adjustment*	H0.0	L3.0 to H3.0
Proportional Control**	PO (On)	PF (Off)
Anticipation***	AL(2000-4000 W)	AS (500-2000 W)
Temperature Scale	SC (Celsius)	SF (Fahrenheit)

* Adjusts room temperature display higher or lower to agree with a previous thermostat.

** Proportional Control allows the thermostat to modulate depending on power usage.

***Adjusts your thermostat anticipation based on the room and baseboard heater size, e.g., in a room with a 3500 W baseboard heater, set your thermostat anticipation to AL.

The thermostat will save the setpoint temperature and installer configuration selections permanently, even after power outages.

To reset the thermostat, press the ⌃, ⌄, and ⓜ buttons simultaneously.

To suspend the thermostat operation, slide the thermostat switch to the ⏻ position. In this position, the thermostat still has power but the display is turned off.

MAXIMUM SENSING LOCATIONS PER THERMOSTAT								
	Thermostat Model Number	Indoor Sensing Locations				Remote Sensor Priority Assignment (LO/AVG/HI)	Allows Outdoor Remote Sensor	Sensor Set Up
		Total (Max.)	Thermostat Onboard Sensor		Remote Sensor			
Single Stage	1F90-371	1	OFF*	With	1*	-	-	Clip Jumper W922 and Enable Sensor in Menu
	1F96-344	1	OFF*	With	1*	-	-	Clip Jumper W922 and Enable Sensor in Menu
	1F97-1277, -0671	2	ON or OFF	+	1	Yes	Yes***	Enable Sensor in Menu
	1F97-371	1	OFF*	With	1*	-	-	Clip Jumper W922 and Enable Sensor in Menu
	1F97-391	1	OFF*	With	1*	-	-	Clip Jumper W922 and Enable Sensor in Menu
Staging	1F93-380	4	ON or OFF	+	Up to 3	Yes**	Yes	Enable Sensor in Menu
	1F94-371	4	ON or OFF	+	Up to 3	Yes**	Yes	Enable Sensor in Menu
	1F95-1277, -0671	2	ON or OFF	+	1	Yes	Yes***	Enable Sensor in Menu
	1F95-371	4	ON or OFF	+	Up to 3	Yes**	Yes	Enable Sensor in Menu
	1F95-377	4	ON or OFF	+	Up to 3	Yes**	Yes	Enable Sensor in Menu
	1F95-391	4	ON or OFF	+	Up to 3	Yes**	Yes	Enable Sensor in Menu

*Using a Remote Sensor On This Model Requires the Onboard Thermostat Sensor To Be Off.
**Allows A Sensor Priority of LO, AVG., or HI To Be Assigned To The Onboard Thermostat Sensor In Addition Remote Sensors.
***Accepts One Remote Sensor, Indoor or Outdoor.

REMOTE SENSOR CALCULATED PRIORITY AVERAGE

Consult Maximum Sensing Locations Per Thermostat chart above to determine how many sensors a thermostat will accept.

Tables 1-3 show how priority (LO, AVG, HI) effects the room temperature calculation. The example below table three shows the calculation of each remote sensor and how it uses them to arrive at room temperature average.

Table 1: Remote Sensor A configured as a LO priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SA	LO	1	70°F (Sensor Temp.)	1 x 70 = 70 (Priority Multiplier x Room Temp.)

Table 2: Remote Sensor B configured as a AVG priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SB	AVERAGE	2	75°F (Sensor Temp.)	2 x 75 = 150 (Priority Multiplier x Room Temp.)

Table 3: Remote Sensor C configured as a HI priority sensor

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SC	HI	4	80°F (Sensor Temp.)	4 x 80 = 320 (Priority Multiplier x Room Temp.)

The example below lists three sensors each with a different priority and room temperature. All three sensors are combined in the calculation to display the average temperature. The priority multiplier shown in the tables above causes a sensor with low priority to carry less weight in the calculated average. A sensor with a HI priority setting contributes more to the calculated average. Assume that the building in which the thermostat is located has three indoor remote sensors (SA, SB, SC) that have different room temperatures (70, 75, 80). The calculated average will be displayed as the room temperature shown in the example below.

Example: Remote Sensors A, B, and C configured as a LO, AVG, and HI priority sensors

Remote Sensor	Sensor Priority	Priority Multiplier	Room Temperature	Averaging Calculation
SA	LO	1	70°F (Sensor Temp.)	1 x 70 = 70 (Priority Multiplier x Room Temp.)
SB	AVERAGE	2	75°F (Sensor Temp.)	2 x 75 = 150 (Priority Multiplier x Room Temp.)
SC	HI	4	80°F (Sensor Temp.)	4 x 80 = 320 (Priority Multiplier x Room Temp.)
				Avg. Calc. (540)/Sum Priority Mult. (7)
				540/7 = 77°F (Calculated Displayed Temp.)

Troubleshooting Chart

To function correctly and read temperature accurately, the thermostat must have constant 24-volt power. If the thermostat temperature is steadily dropping, reading low, or reads **08°**, or displays – – – (3 dashes) when a remote sensor is installed, it can be traced to one of the three following conditions.

Condition	Test	Comments
1. Loss of 24-volt power.	On models with batteries, remove the batteries and re-install thermostat. If the display is blank, check heating and cooling system to determine why 24-volt power is absent.	For the sensor to read correctly, the 24-volt system power ***must*** be present. Some systems may require an isolation relay* to provide constant power to the thermostat. Limit or safety devices in the equipment can also cause a power interruption.
2. A broken wire on S1, S2 and S3 or (+, SA, -) from the thermostat to the remote.	Disconnect sensor wires at thermostat. Attach a short piece (2') of three-wire shielded cable to S1, S2 and S3 or (+, SA, -) on the subbase. Bring the remote sensor to the thermostat location and attach S1, S2 and S3 or (+, S, -) respectively. Reattach thermostat. If the temperature begins to climb (slowly), it is reading correctly. If it reads correctly with the 2' length but improperly when attached to the wire run, it indicates a fault in the wire run.	Repair or replace the 3 wire shielded cable. Be sure the remote wire run is not parallel to line voltage wires that carry heavy inductive loads, or across fluorescent light ballasts that may cause an inductance to be transmitted to the thermostat.
3. A shorted or damaged remote sensor.	Because it is an electronic sensor, there are no Ohm values to test. If correct conditions as listed in 1 & 2 above and the temperature stays at or near **08°**, it indicates a shorted or damaged remote sensor.	Replace remote sensor.

Note: Digital thermostats and remote sensors acclimate very slowly to temperature change. It may take an hour or more for the temperature to acclimate to the room temperature from a low temperature reading as outlined above. To expedite the room temperature display use the reset instructions listed in the installation instructions for the thermostat model you are working with. When reset, the thermostat will default to a room temperature of 70° and begin sensing room temperature. Be sure to reconfigure the installer menu for a remote sensor because the reset function may cancel remote sensing.

* Isolation Relay Wiring

Note: The diagram below shows how to attach an isolation relay to the “W” or “Y” circuit to provide constant power on power stealing thermostats. This willl allow the thermostat to operate properly with a remote sensor.

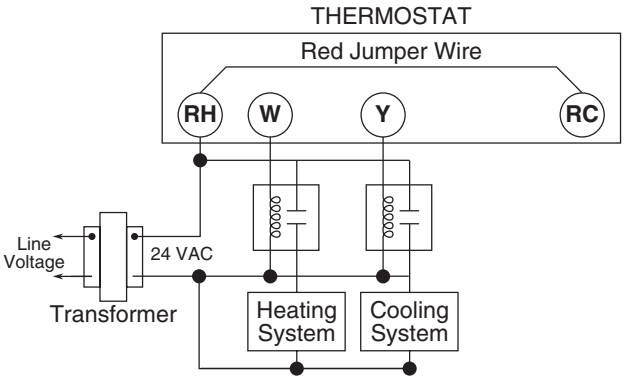
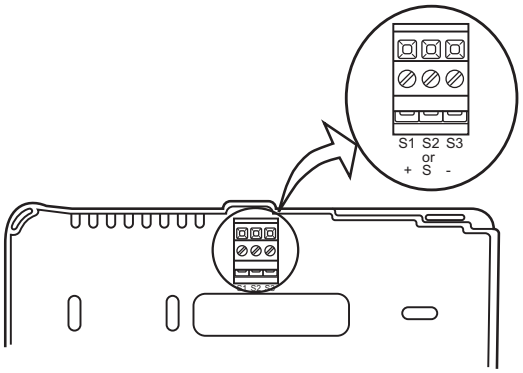


Figure 1. Wiring for single transformer systems

Figure 1 shows a single transformer heating/cooling system, with isolation relays installed in the heating (**W**) and cooling (**Y**) circuits. To simplify the diagram, limit and safety switches are not shown here, although they will be found either in the low or high voltage circuit. Limit and safety switches **must be retained**. Refer to the equipment manufacturer’s system wiring diagram for the location of limit and safety switches.

⚠ WARNING

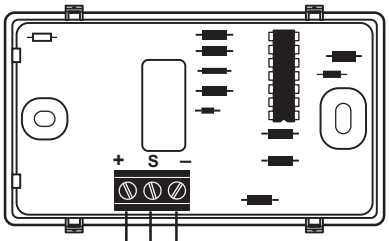
DO NOT REMOVE OR WIRE AROUND LIMIT AND SAFETY SWITCHES WHEN INSTALLING ISOLATION RELAYS.



Thermostat Subbase

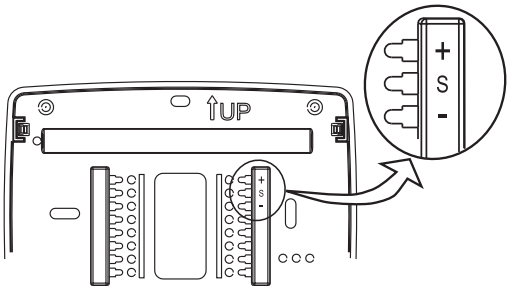
Note: When using shielded cable, connect shield of 18 or 20 gauge 3 connector cable to - or S3 on thermostat subbase.

Remote Sensor



To + or S1
To S or S2
To - or S3

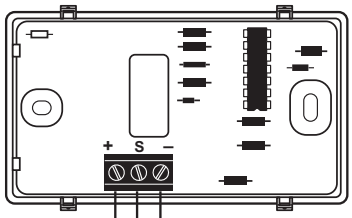
Single Stage Thermostat Remote Sensor Wiring (F145-1328)



Thermostat Subbase

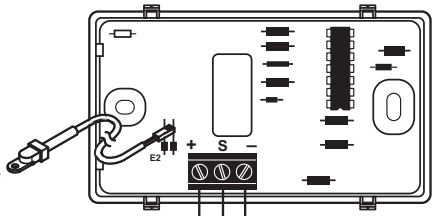
Note: When using shielded cable, connect shield of 18 or 20 gauge 3 connector cable to - or S3 on thermostat subbase.

Remote Sensor



To + or S1
To S or S2
To - or S3

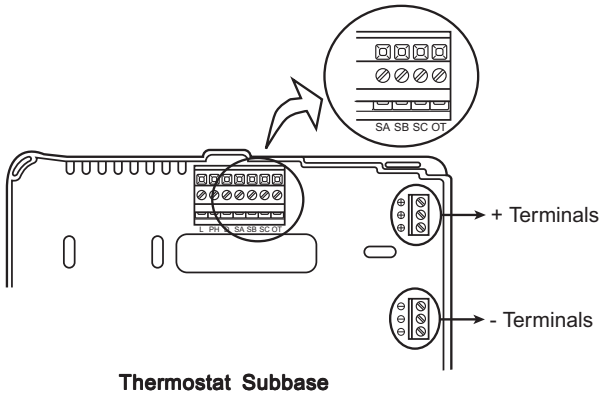
Remote Outoor Sensor



Outdoor Probe
If connecting
outdoor service

To +
To OT
To -

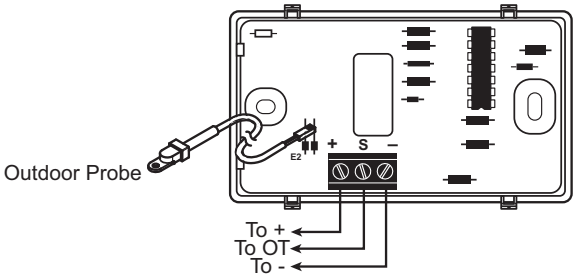
Staging Multi-Stage or Heat Pump Touchscreen Thermostat (1F95-1277) Indoor/Outdoor Remote Sensor Wiring (F145-1328/F145-1378)



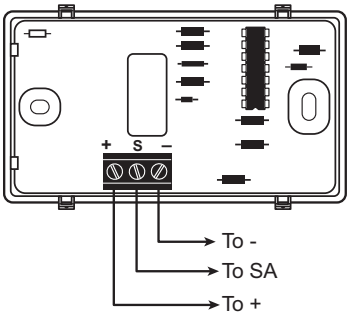
Thermostat Subbase

Note: When using shielded cable, connect shield of 18 or 20 gauge 3 connector cable to - or S3 on thermostat subbase.

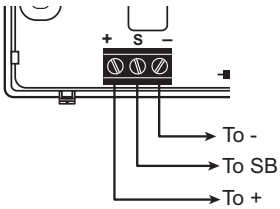
Remote Outdoor Sensor Base



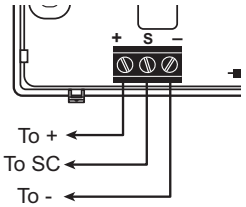
Remote Indoor Sensor A



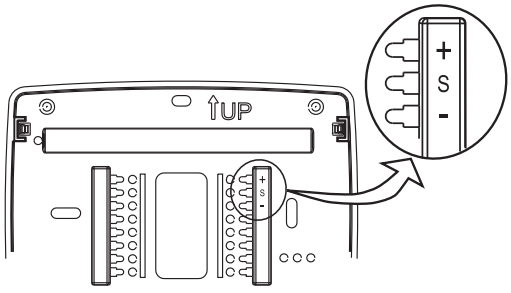
Remote Indoor Sensor B



Remote Indoor Sensor C



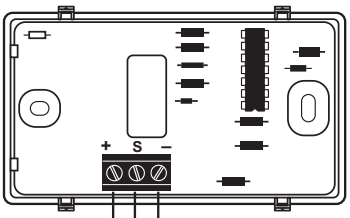
Staging Thermostat Multi-Stage or Heat Pump Indoor/Outdoor Remote Sensor Wiring (F145-1328/F145-1378)



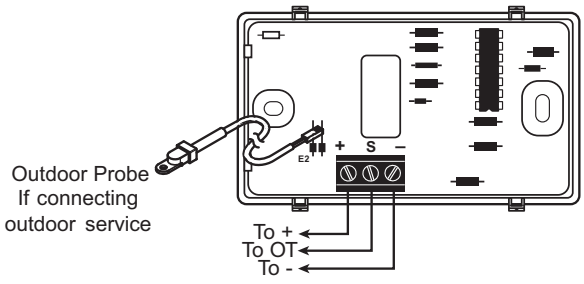
Thermostat Subbase

Note: When using shielded cable, connect shield of 18 or 20 gauge 3 connector cable to - or S3 on thermostat subbase.

Remote Sensor



Remote Sensor



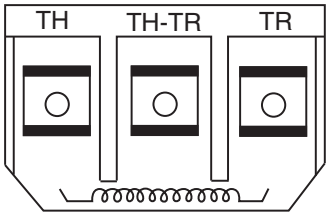
Single Stage (1F97-1277) TouchscreenThermostat Indoor/Outdoor Remote Sensor Wiring (F145-1328/F145-1378)

Commonly Used Furnace Control Terms

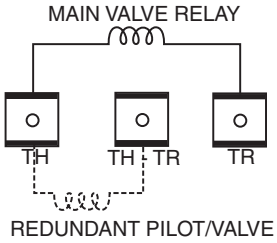
Auto Reset: If shutoff occurs, the control delays for a specific recycle delay period before beginning another trial for ignition (models with retries only).
Continuous: An ignition source which, once placed in operation, is intended to remain ignited or energized continuously until manually interrupted.
Cool Delay to Fan Off: Timing to allow the fan to run after the call for cool ends. This allows residual cooling capacity to be removed from the cooling coils and distributed to the conditioned space.
Cool Delay to Fan On: Timing to allow the cooling coils to cool off before turning on the fan.
Flame Failure Re-ignition Time: "The period of time between loss of the supervised ignition source or the supervised main burner flame and a re-ignition attempt. During this time period the main burner gas supply is not shut off."
Flame Failure Response Time: "The period of time between loss of the supervised ignition source or the supervised main burner flame and the action to shut off the gas supply."
Flame-Establishing Period: "The period of time between initiation of gas flow and proof of the supervised flame or between the proof of supervised flame and initiation of gas flow. This may be applicable to proof of the ignition source or main burner flame, or both."
Heat Delay to Fan Off: Timing to allow the fan to run after the call for heat ends. This allows residual heat to be removed from the heat exchanger and distributed to the conditioned space.
Heat Delay to Fan On: Timing to allow the heat to build up in the plenum before turning on the fan.
Ignition Activation Period: The period of time between energizing the main gas valve and deactivation of the ignition means prior to the lockout time.
Initial Ignitor Warm-Up: Duration of ignitor warm-up time on the first 64 attempts.
Integrated: Has a microprocessor which monitors and analysis the operation of the continually MV, ignitor, inducer, fan, flame sensor, but it also turns on the humidifier, and air cleaner if those are available in the house. In other words it incorporates the all operations connected to the furnace from one power source.
Intermittent: "An ignition source which is automatically ignited or energized when the equipment is called on to operate and which remains continuously ignited or energized during each period of main burner operation. The ignition source is automatically extinguished or deenergized when each main burner operating cycle is completed."
Intermittent/Continuous: "An ignition source which is ignited or energized upon equipment user initiation of the operation cycle and which remains continuously ignited or energized during the equipment use cycle. The ignition source is extinguished or de-energized when the equipment use cycle is completed."
Intermittent/Interrupted: "An ignition source which is ignited or energized upon equipment user initiation of the operational cycle and which is extinguished or de-energized after the equipment use cycle has been initiated."
Inter-Purge: Period between trials for ignition when both the gas valve and ignition source are deactivated to allow unburned gas to escape before the next trial.
Interrupted: "An ignition source which is automatically ignited or energized when the equipment is called on to operate and which remains ignited or energized during the main burner Flame-Establishing Period. The ignition source is automatically extinguished or deenergized when each main burner Flame-Establishing Period is completed."
Lockout Time: The period of time between initiation of gas flow and the action to shut off the gas flow in the event of failure to establish proof of the supervised ignition source or the supervised main burner flame. Reinitiating the lighting sequence requires a manual operation.
Non-Integrated: Only controls or sends a signal to the ignitor and the mv and monitor the flame sensor
Post-Purge: "After all ignition cycles are complete, the control will enter post-purge. The combustion fan will remain on to allow unburned gas to escape. After post-purge is complete, the combustion fan will turn off. "
Pre-Purge: Initial time delay between thermostat contact closure and trial for ignition.
Re-cycle: Flame is sensed and then lost causing the control to re-cycle.
Recycle Time: "The period of time between shutoff of the gas supply following loss of the supervised ignition source or the supervised main burner flame and reactivation of the ignition source."
Retries: Additional ignition attempts if the original ignition attempt is unsuccessful.
Retry Ignitor Warm-Up: Duration of ignitor warm-up time if the control retries.
Trial for Ignition: Period during which the valve and ignition source is activated, attempting to ignite gas at the burner.
Valve Sequence Period: Valve sequence period is the cumulative total amount of time that the gas valve is energized before entering lockout.

3 terminal panel

Fig. 1



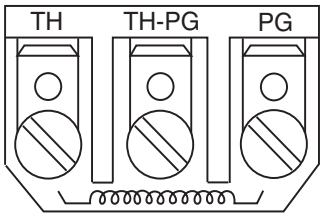
Some models have screw terminals instead of spade terminals shown



Some models may not have redundant valve

Fig. 2

Milivolt 3 Terminal Panel



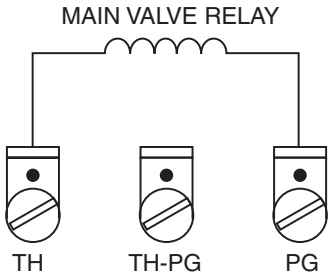
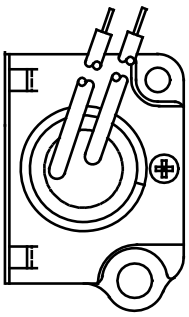


Fig.3



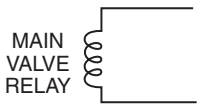
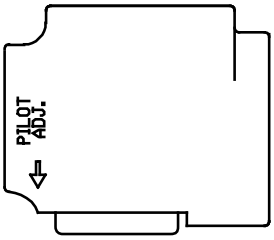
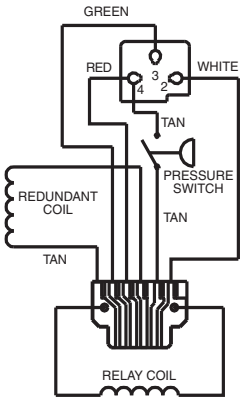


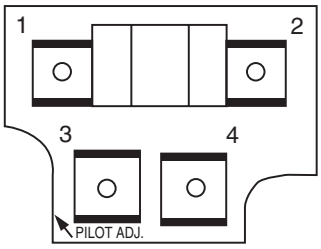
Fig. 4

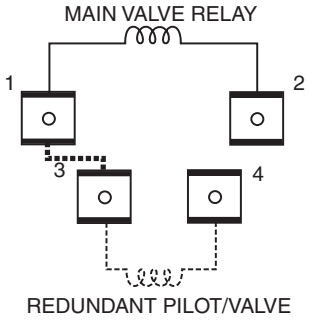




4 terminal panel

Fig. 5

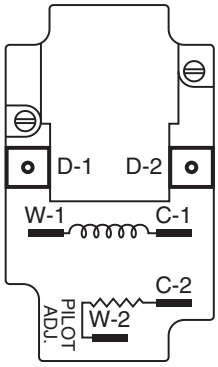


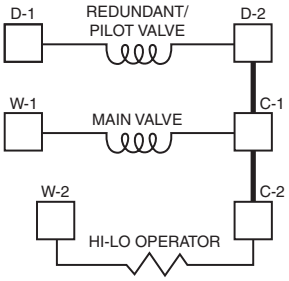


Jumper between 1 and 3 may be moved to 2 and 4 on some models

Bi-metal two stage

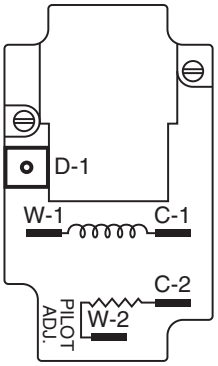
Fig. 6A



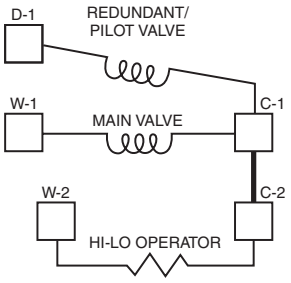


Bi-metal two stage

Fig. 6B

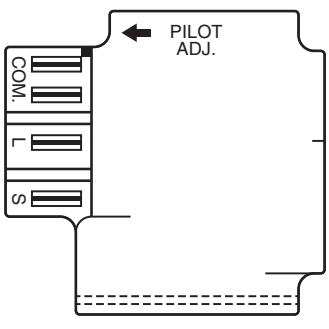


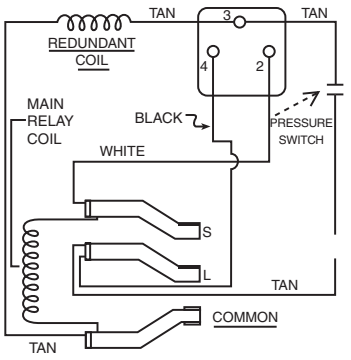
On some models, W1 and W2 are designated GV1 and GV2



Cycle pilot Plug-in

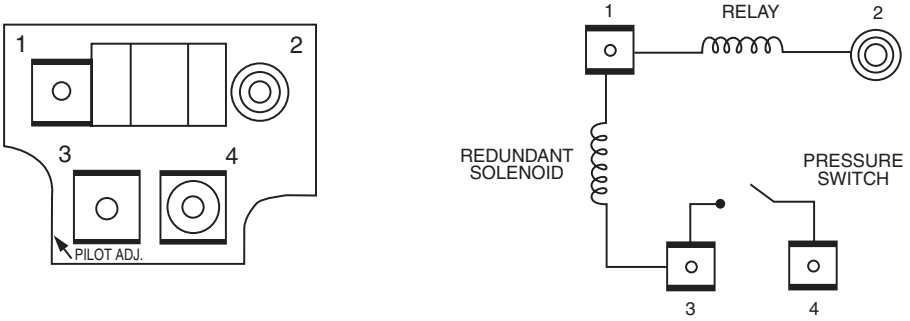
Fig. 7





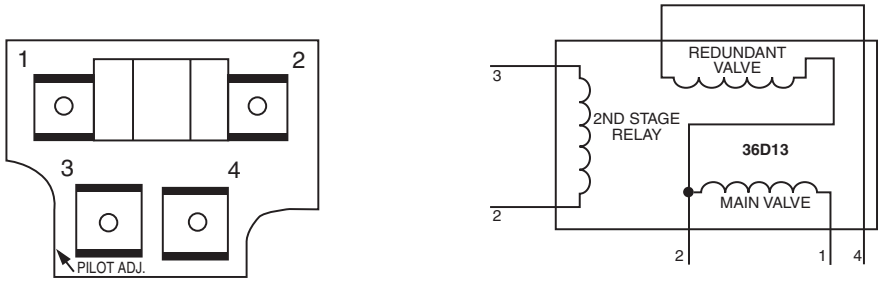
Cycle pilot with 4 terminal panel

Fig. 8



Relay two stage

Fig. 9



2 terminal panel

Fig.10

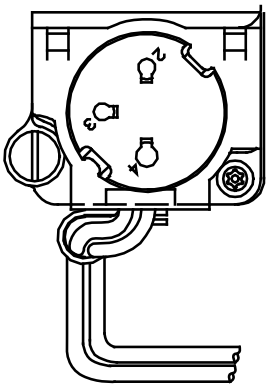


Fig.11

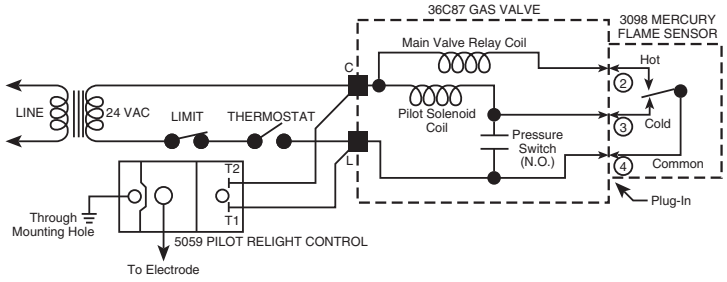


Fig 12

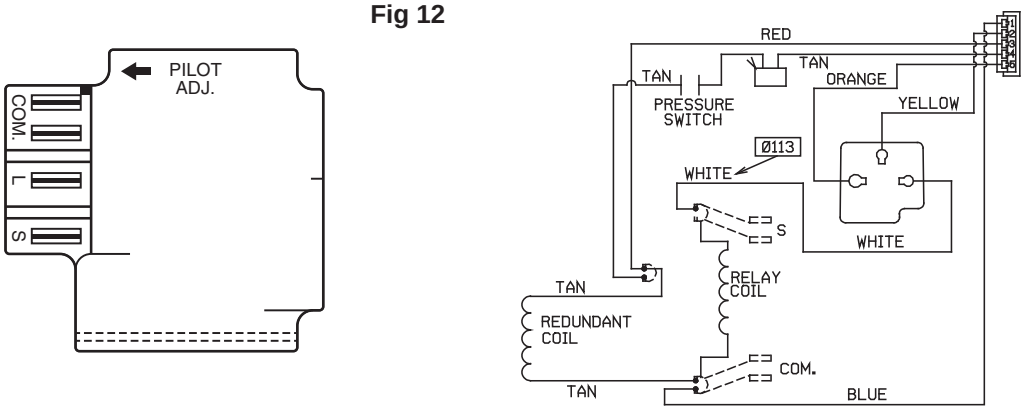


Fig 13

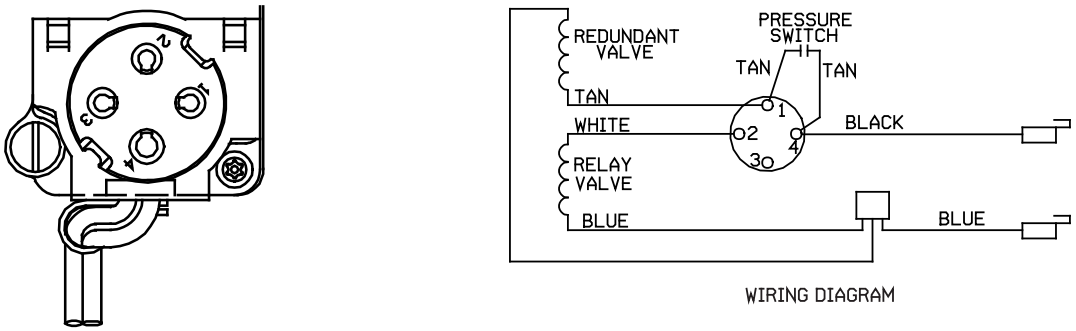


Fig 14

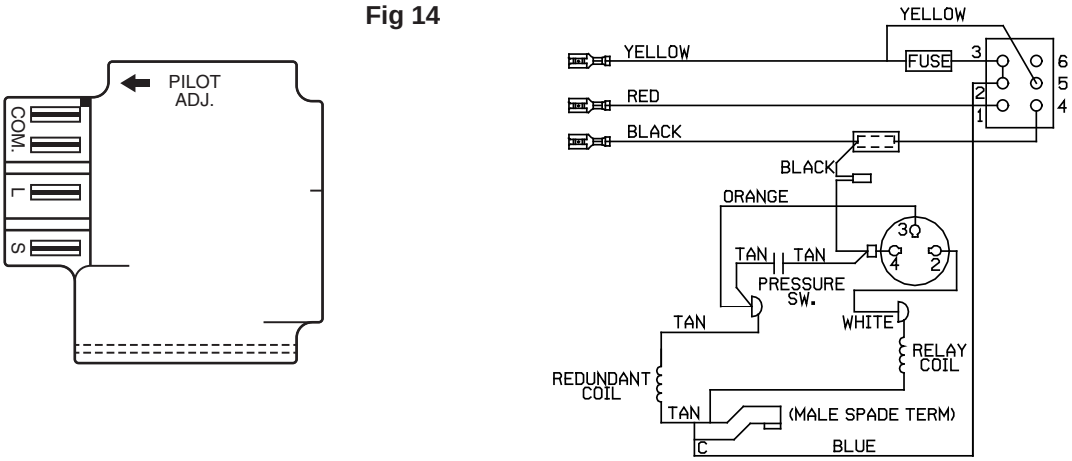
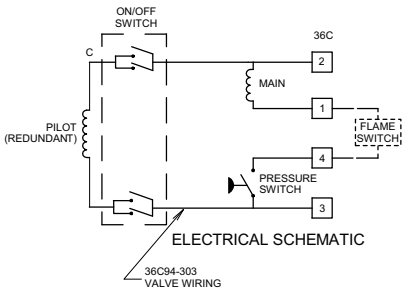
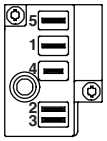
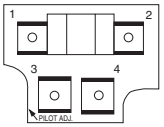


Fig 15





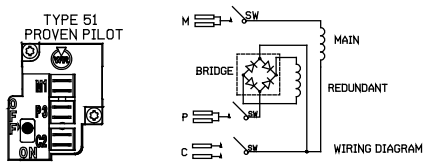
36E93 Terminal Panel



36C94 Terminal Panel

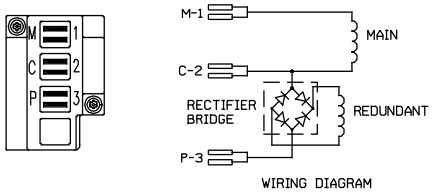
36E93-301 36E93-302 36E93-303 36E93-304 Old Terminals	Description	Term and Size	36C94-303 36C94-302 New Terminals
5	Pilot (Redundant) Coil	1/4" Male Spade	3
1	Main Coil	1/4" Male Spade	1
4	Pressure Switch	1/4" Male Spade with 1/4" x 3/16" adapter installed	4
2 3	Common	1/4" Male Spade	2

Figure 1



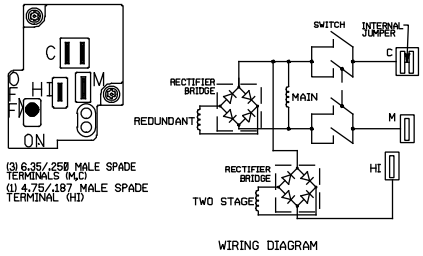
Type 51

Figure 2



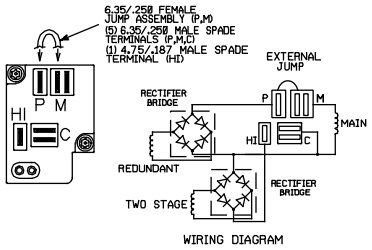
Type 21A

Figure 3



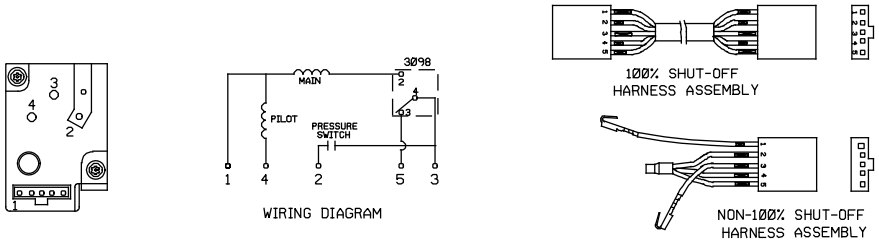
Type 12B

Figure 4



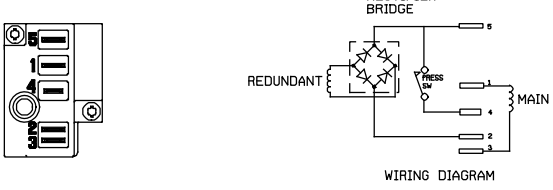
Type 12A

Figure 5



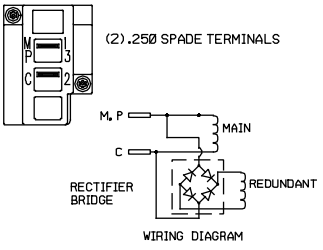
Type 30

Figure 6

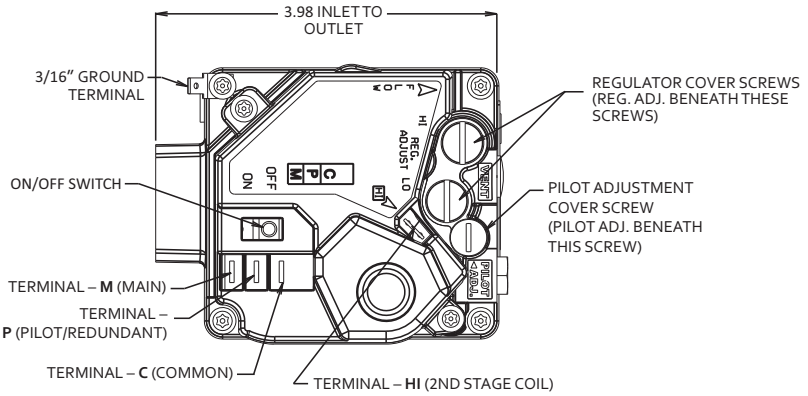


Type 24

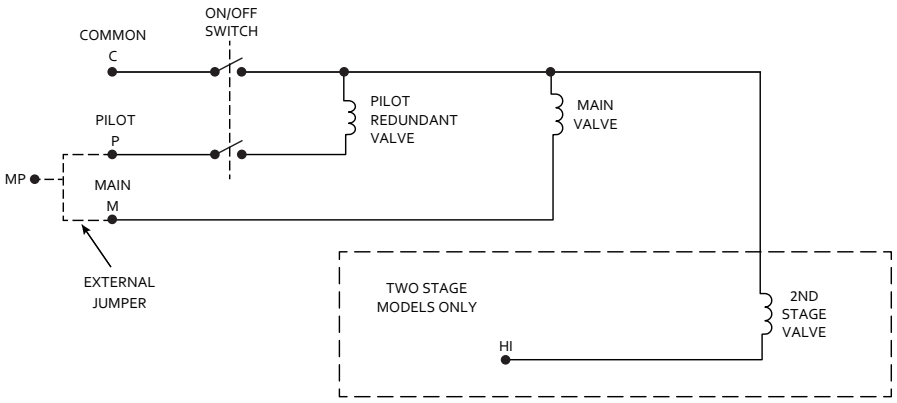
Figure 7



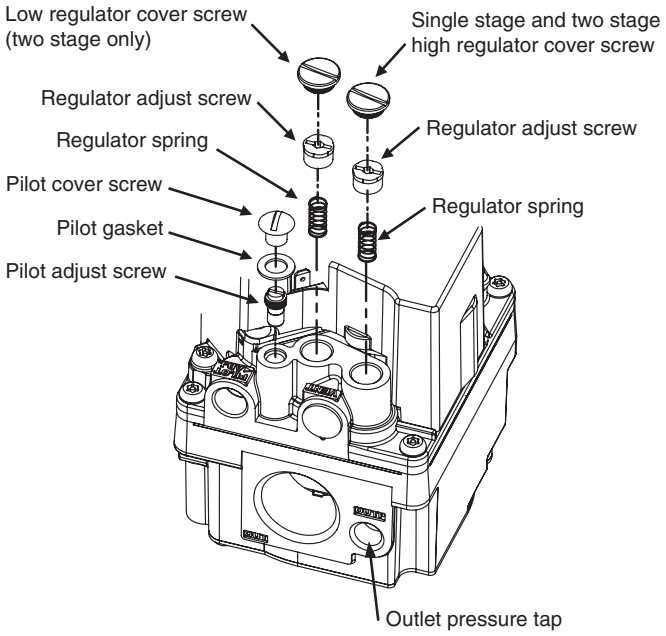
Type 2



Features and Terminal Identification



Simplified Gas Valve Internal Wiring and Terminal Identification



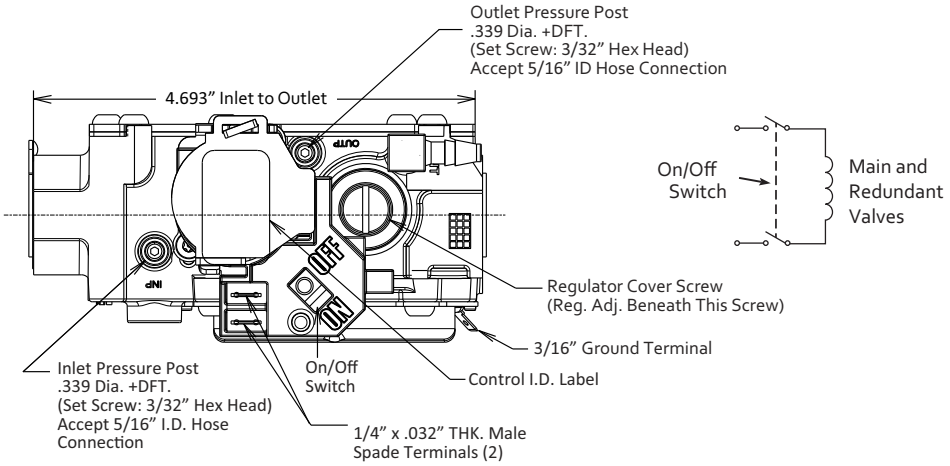


Fig. 1 - Single Stage Valve Features, Terminals and Wiring

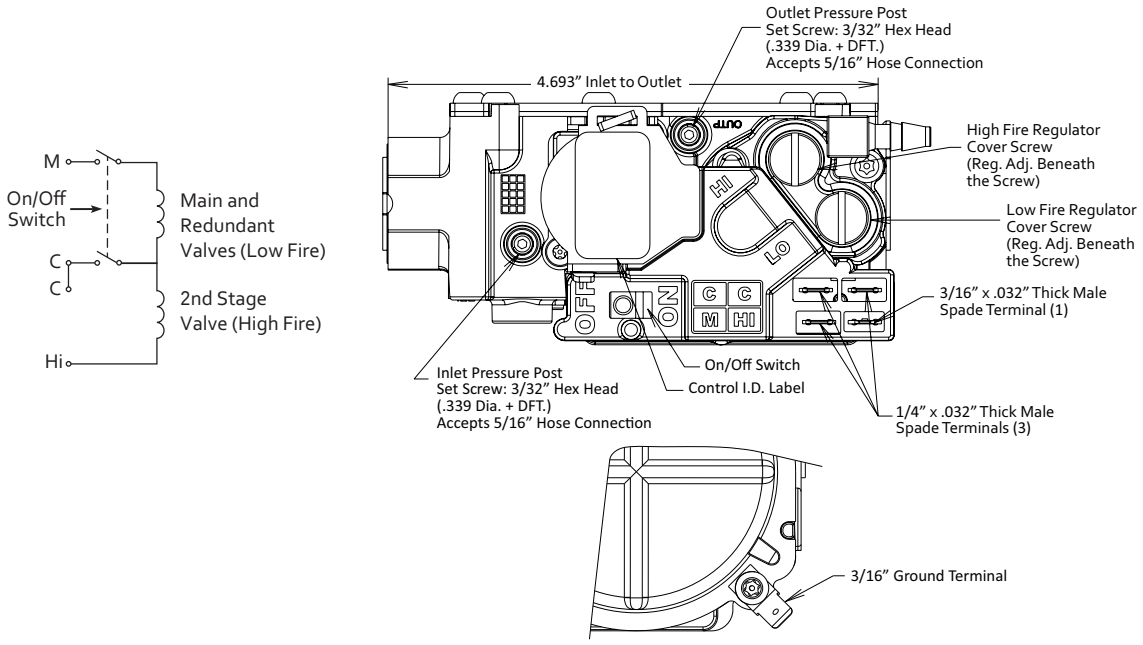
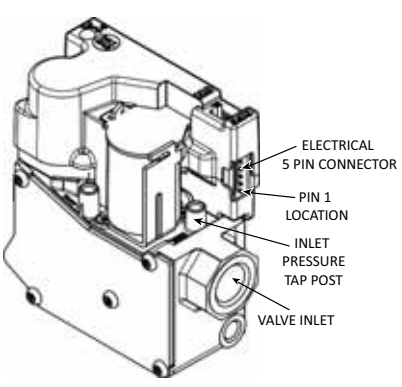
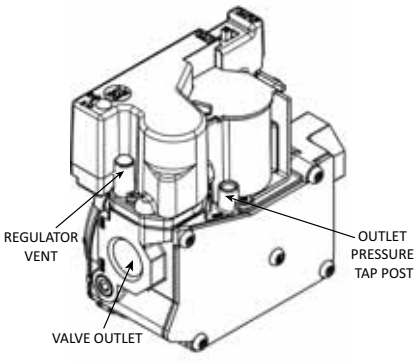


Fig. 2 - Two-Stage Valve Features, Terminals and Wiring



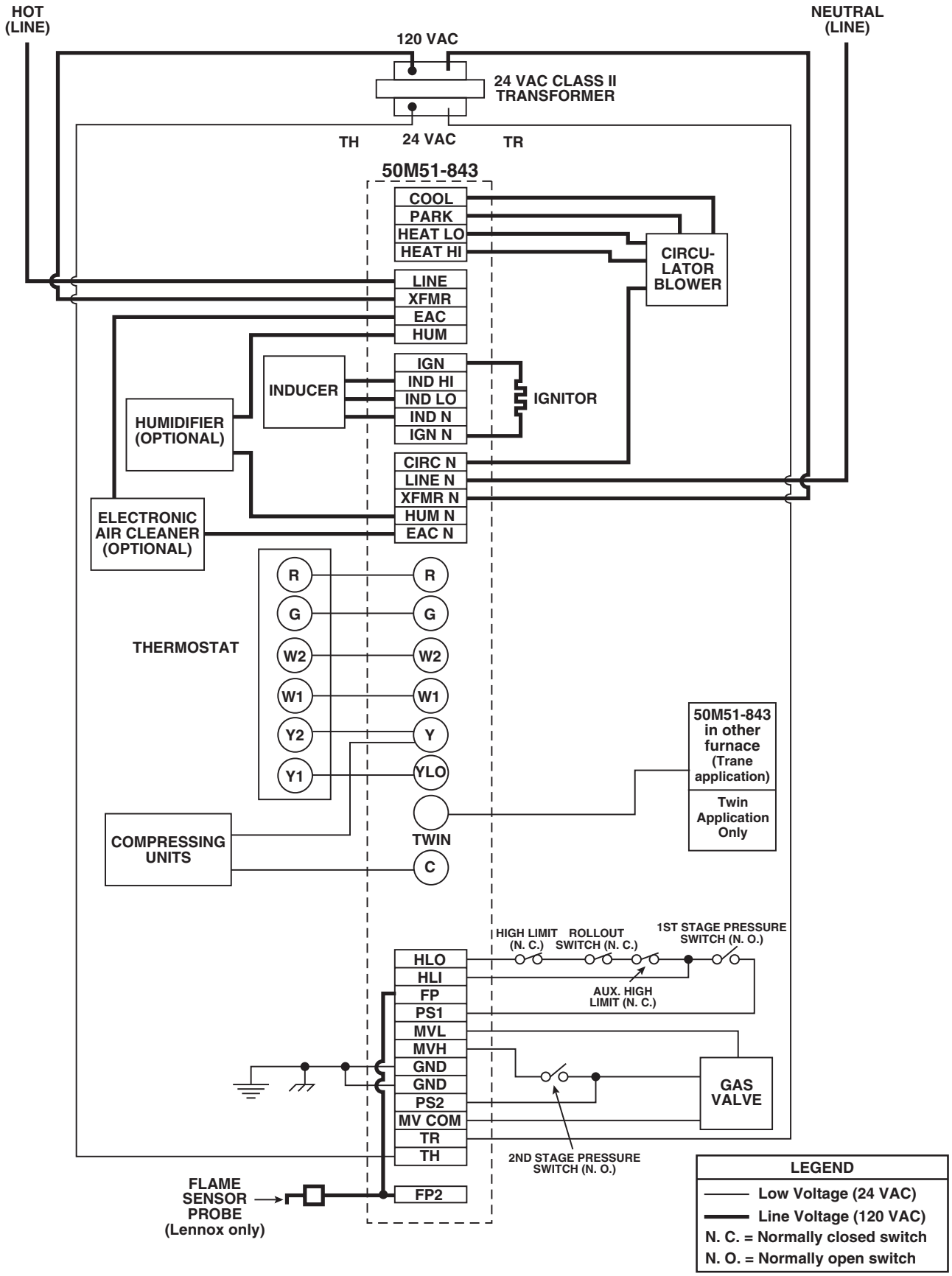


Electrical 5 PIN Connector Pin Out

PIN 5 - TH - Main Valve 24 VAC (top pin, with the cover pointing up)
PIN 4 - TR - Ground
PIN 3 - TX - Communication to IFC
PIN 2 - RX - Communication to Stepper
PIN 1 - TH - Board 24VAC (bottom pin, with the cover pointing up)

Fig.3 - 36J27 Modulating Valve Features

50M51-843 TYPICAL WIRING DIAGRAM



DIAGNOSTIC TABLE

Green LED Flash	Amber LED Flash	Red LED Flash	Error/Condition	Comments/Troubleshooting
		1	Flame sensed when no flame should be present	Verify the gas valve is operating and shutting down properly. Flame in burner assemble should extinguish promptly at the end of the cycle. Check orifices and gas pressure.
		2	Pressure switch stuck closed/ inducer error	Pressure switch stuck closed. Check switch function, verify inducer is turning off.
		3	1st-stage pressure switch stuck open/inducer error	Check pressure switch function and tubing. Verify inducer is turning on the pulling sufficient vacuum to engage switch.
		4	Open limit switch	Verify continuity through rollout switch circuit.
		5	Open rollout/open fuse detect	Verify continuity through rollout switch circuit, check fuse.
		6	1st-stage pressure switch cycle lockout	if the first stage pressure switch cycles 5 times (open, closed) during one call for heat from the thermostat the control will lockout. Check pressure switch for fluttering, inconsistent closure or poor vacuum pressure.
		7	External lockout (retries)	Failure to sense flame is often caused by carbon deposits on the flame sensor, a disconnected or shorted flame sensor lead or a poorly grounded furnace. Carbon deposits can be cleaned with emery cloth. Verify sensor is not contacting the burner and is located in a good position to sense flame. Check sensor lead for shorting and verify furnace is grounded properly.
		8	External lockout (ignition recycles exceeded where flame is established and then lost)	Check items for exceeded retries listed above and verify valve is not dropping out allowing flame to be established and then lost.
		9	Grounding or Reversed polarity	Verify the control and furnace are properly grounded. Check and reverse polarity (primary) if incorrect.
		10	Module gas valve contacts energized with no call for heat	Verify valve is not receiving voltage from a short. If a valve wiring is correct and condition persists, replace module.
		11	Limit switch open – possible blower failure overheating limit	Possible blower failure, restricted air flow through appliance or duct work. Verify continuity through limit switch circuit and correct overheating cause.
		12	Module Ignitor contact failure	Fault code indicates the module ignitor contacts are not functioning properly. Replace module.
		Solid	Module - internal fault condition	Module contacts for gas valve not operating or processor fault. Reset control. if condition persists replace module.
		Rapid	Twinning error	Check wire connections. If condition persists, replace module.
		3 double	2nd-stage Pressure Switch Stuck Open/Inducer Error	Check pressure switch function and tubing. Verify inducer is turning on and pulling sufficient vacuum to engage switch.
	1		Normal Operation with call for first stage heat	Normal operation - first stage
	2		Normal Operation with call for second stage heat	Normal operation - first stage
	3		W2 present with no W1	Second stage call for heat on thermostat circuit with no call for first stage. Verify dip switches are set for two stage thermostat and check thermostat first stage circuit. Configured for a multi-stage thermostat the Module will not initiate heating unless first stage call from thermostat is received.
	4		Y present with no G call	Module will allow cooling to operate with only a "Y signal from the thermostat but will also trigger this code. Verify thermostat is energizing both "Y" and "G" on call for cool. Check "G" terminal connections.
	Rapid		Low flame sense current	Low flame sense current is often caused by carbon deposits on the flame sensor, a poorly grounded furnace or a mis-aligned flame sense probe. Carbon deposits can be cleaned with emery cloth. Check for improve furnace and module ground. Verify sensor is located in or very near flame as specified by the appliance manufacturer.
1			Standby or Call for Cool	Normal operation. Waiting for call from thermostat or receiving thermostat call for cool.

LAST FAULT MODE

To retrieve fault codes, push and release the "LAST ERROR" button for more than 1/5 second and less than 5 seconds. (Control will indicate this period by solid GREEN for 1/5 to 5 seconds). The LED will flash up to five stored fault codes, beginning with the most recent. If there are no fault codes in memory, the LED will flash two green flashes. The control will flash the most recent error first and the oldest error last (last in first out). There shall be 2 seconds between codes. Solid LED error codes will not be displayed.

DIAGNOSTIC FEATURES

The 50M51 control continuously monitors its own operation and the operation of the system. If a failure occurs, the red LED on the control will flash a failure code. **If the failure is internal to the control, the light will stay on. In this case, the entire control should be replaced, as the control is not field-repairable.**

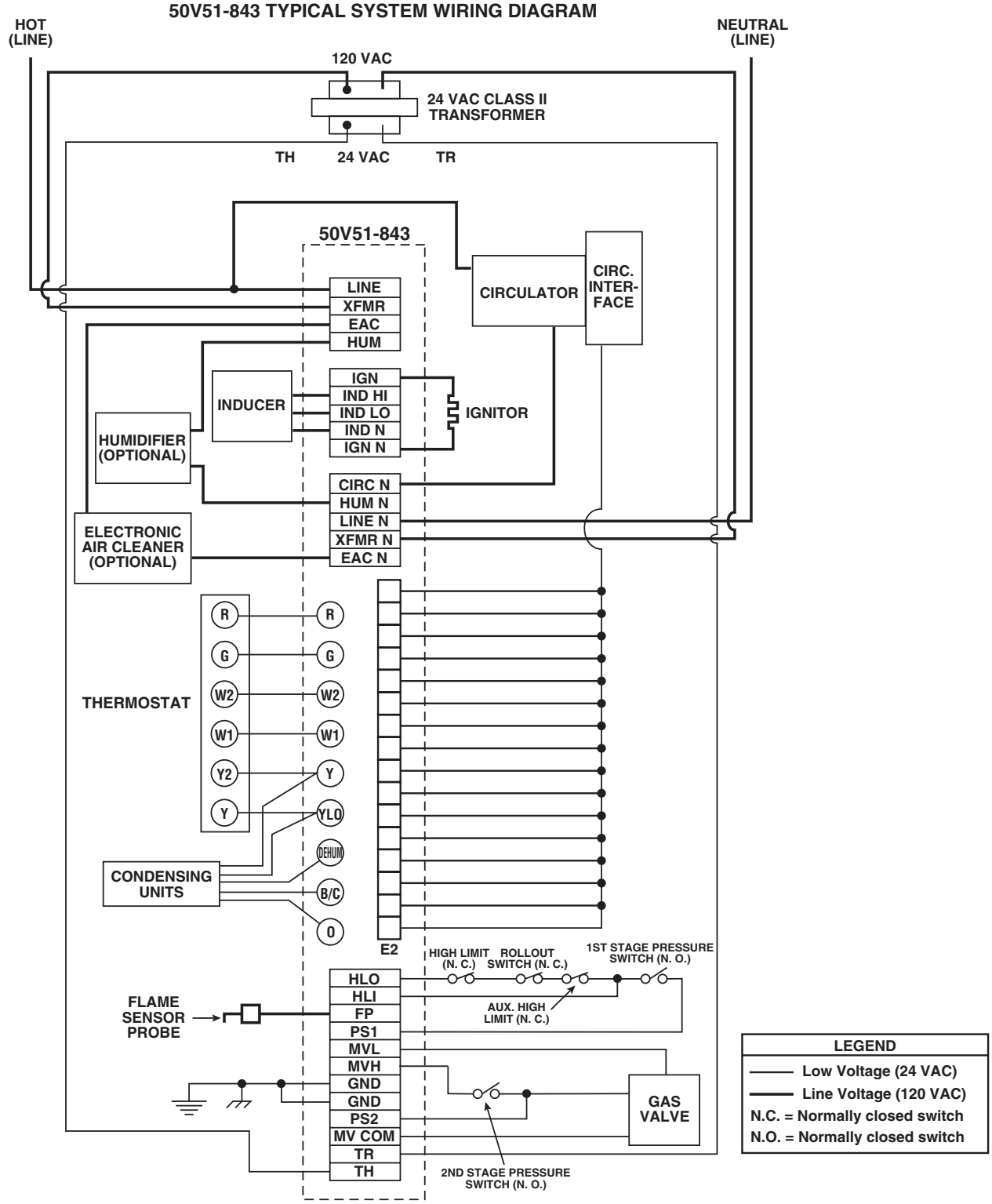
If the sensed failure is in the system (external to control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds, and each pause will last approximately 2 seconds.)

During a second-stage error condition, the red LED when in lockout will flash groups of double pulses. The red LED will flash on for approximately 1/15 second then off for 1/15 second then on for 1/15 second, then off for 3/10 second. The pause between groups of flashes is approximately 2 seconds.

The 50V51-843 has only one serviceable part –an automotive type fuse, which protects the low voltage transformer from damage if the output is short-circuited. If the fuse has opened up, remove whatever caused the short circuit and replace the fuse with only a 3 amp automotive type fuse. If the fuse is not the cause of the control's problem, replace the entire 50V51-843 control. There are no other user serviceable parts.

Following installation or replacement, follow appliance manufacturer's recommended installation or service instructions to insure proper operation.

50V51-843 TYPICAL SYSTEM WIRING DIAGRAM



TRI-COLOR (DSI LED) DIAGNOSTIC TABLE

Green LED Flash	Amber LED Flash	Red LED Flash	Error/Condition	Comments/Troubleshooting
		1	Flame sensed when no flame should be present	Verify the gas valve is operating and shutting down properly. Flame in burner assemble should extinguish promptly at the end of the cycle. Check orifices and gas pressure.
		2	Pressure switch stuck closed/ inducer error	Pressure switch stuck closed. Check switch function, verify inducer is turning off.
		3	1st-stage pressure switch stuck open/inducer error	Check pressure switch function and tubing. Verify inducer is turning on the pulling sufficient vacuum to engage switch.
		4	Open limit switch	Verify continuity through rollout switch circuit.
		5	Open rollout/open fuse detect	Verify continuity through rollout switch circuit, check fuse.
		6	1st-stage pressure switch cycle lockout	If the first stage pressure switch cycles 5 times (open, closed) during one call for heat from the thermostat the control will lockout. Check pressure switch for fluttering, inconsistent closure or poor vacuum pressure.
		7	External lockout (retries exceeded)	Failure to sense flame is often caused by carbon deposits on the flame sensor, a disconnected or shorted flame sensor lead or a poorly grounded furnace. Carbon deposits can be cleaned with emery cloth. Verify sensor is not contacting the burner and is located in a good position to sense flame. Check sensor lead for shorting and verify furnace is grounded properly.
		8	External lockout (ignition recycles exceeded where flame is established and then lost)	Check items for exceeded retries listed above and verify valve is not dropping out allowing flame to be established and then lost.
		9	Grounding or Reversed polarity	Verify the control and furnace are properly grounded. Check and reverse polarity (primary) if incorrect.
		10	Module gas valve contacts energized with no call for heat	Verify valve is not receiving voltage from a short. If a valve wiring is correct and condition persists, replace module.
		11	Limit switch open – possible blower failure overheating limit	Possible blower failure, restricted air flow through appliance or duct work. Verify continuity through limit switch circuit and correct overheating cause.
		12	Module Ignitor contact failure	Fault code indicates the module ignitor contacts are not functioning properly. Replace module.
		Solid	Module - internal fault condition	Module contacts for gas valve not operating or processor fault. Reset control. if condition persists replace module.
		3 double	2nd-stage Pressure Switch Stuck Open/Inducer Error	Check pressure switch function and tubing. Verify inducer is turning on and pulling sufficient vacuum to engage switch.
	1		Normal Operation with call for first stage heat	Normal operation - first stage
	2		Normal Operation with call for second stage heat	Normal operation - first stage
	3		W2 present with no W1	Second stage call for heat on thermostat circuit with no call for first stage. Verify DIP switches are set for two stage thermostat and check thermostat first stage circuit. Configured for a multi-stage thermostat the Module will not initiate heating unless first stage call from thermostat is received.
	4		Y present with no G call	Module will allow cooling to operate with only a "Y signal from the thermostat but will also trigger this code. Verify thermostat is energizing both "Y" and "G" on call for cool. Check "G" terminal connections.
	Rapid		Low flame sense current	Low flame sense current is often caused by carbon deposits on the flame sensor, a poorly grounded furnace or a mis-aligned flame sense probe. Carbon deposits can be cleaned with emery cloth. Check for improve furnace and module ground. Verify sensor is located in or very near flame as specified by the appliance manufacturer.
1			Standby or Call for Cool	Normal operation. Waiting for call from thermostat or receiving thermostat call for cool.

DIAGNOSTIC FEATURES

The control continuously monitors its own operation and the operation of the system. If a failure occurs the diagnostic indicator LED (DSI) will flash a “RED” failure code. **If a failure is internal to the control the “RED” indicator will stay on continuously. In this case, the entire control should be replaced as the control is not field-repairable.** If the LED is continuously OFF, there may be no power to the control or a failure within the control. If the sensed failure is in the system (external to the control), the LED will flash RED in the sequence listed in the Diagnostic Table. The LED will also indicate “System Status” as per the Amber and Green LED signatures listed in the Diagnostic Table. The LED will flash one RED flash at power up.

CFM INDICATOR

The LED (DS2) CFM flashes when the blower motor is running. The flashing indicates the motor CFM (cubic feet per minute) air flow designated by the furnace manufacturer. Consult the furnace manufacturer for flash code detail.

FAULT CODE RETRIEVAL

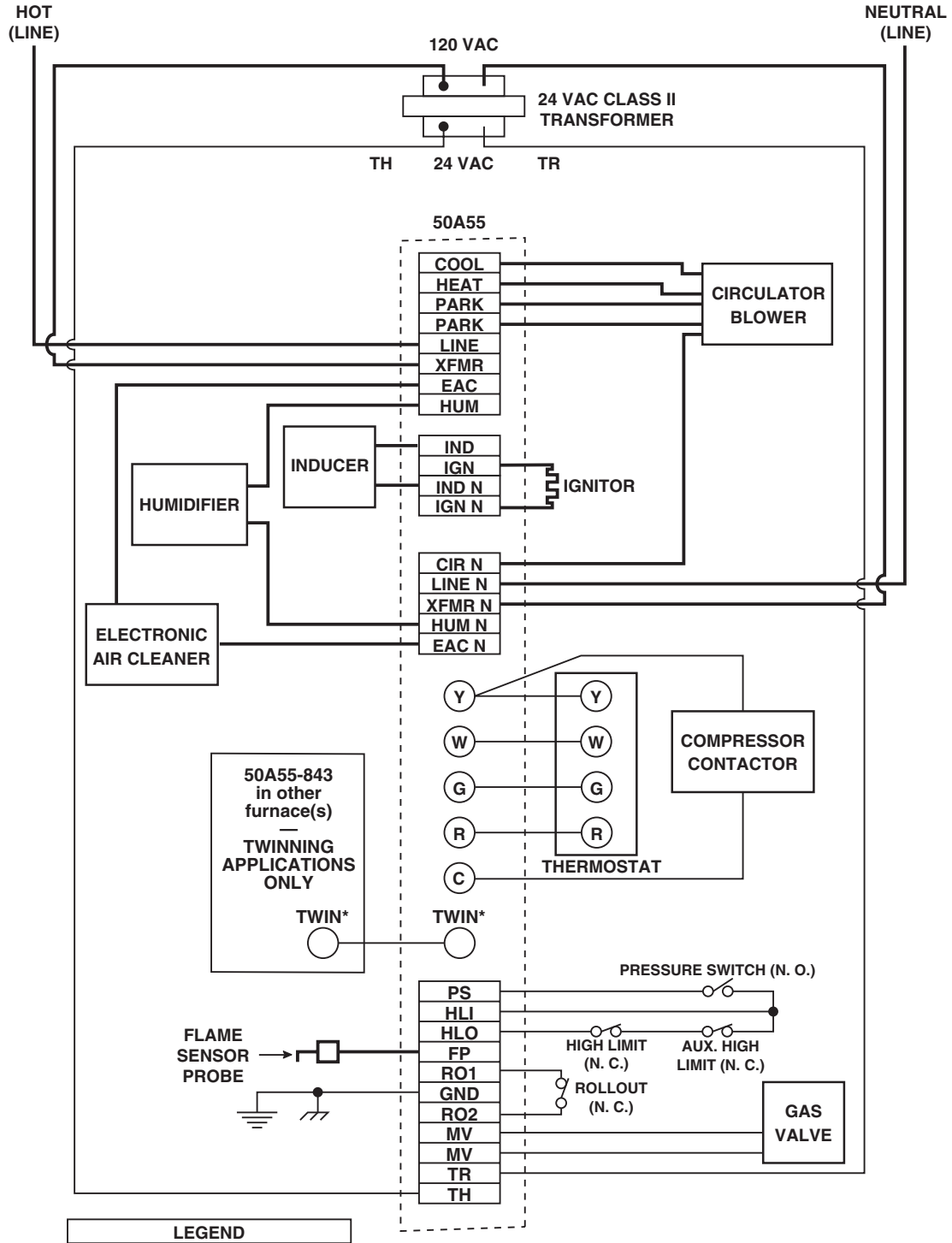
To retrieve fault codes, push and release the “LAST ERROR” button for more than 1/5 second and less than 5 seconds. (Control will indicate this period by solid GREEN for 1/5 secs. to 5 secs.). The LED will flash up to five stored fault codes, beginning with the most recent. If there are no fault codes in memory, the LED will flash two green flashes. The control will flash the most recent error first and the oldest error last (last in first out). There shall be 2 seconds between codes. Solid LED error codes will not be displayed.

NOTE

These error codes may be different from furnace label or furnace manual.

50A55-843

TYPICAL SYSTEM WIRING DIAGRAM



LEGEND
Low Voltage (24 VAC)
Line Voltage (120 VAC)
N. C. = Normally closed switch
N. O. = Normally open switch

Flame Current Requirements:

Minimum current to insure flame detection.....1 µa DC①
Maximum current for non-detection.....0.1 µa DC①
Maximum allowable leakage resistance.....100 M ohms
Flame establishing time.....0.8 seconds maximum
Flame failure response time.....2.0 seconds maximum

① Measured with a DC microammeter in the flame probe lead

The 50A55-843 is an automatic gas interrupted ignition control that employs a microprocessor to continually monitor, analyze, and control the proper operation of the gas burner, inducer, and fan.
Signals interpreted during continual surveillance of the thermostat and flame sensing element initiate automatic ignition of the burner, sensing of the flame, and system shut-off during normal operation.

OPTION SWITCHES

The option switches on the 50A55-843 control are used to determine the length of the cool delay-to-fan-off, heat delay-to-fan-on and heat delay-to-fan-off periods. The following table shows the time periods that will result from the various switch positions.

OPTION SWITCH POSITIONS

COOL delay-to-fan-off:	Set switch #1
45 sec.*	On
90 sec.	Off

HEAT delay-to-fan-on:	Set switch #2
30 sec.*	On
45 sec.	Off

HEAT delay-to-fan-off:	Set switch #3	#4
60 sec.	On	On
90 sec.	Off	On
120 sec.	On	Off
180 sec.*	Off	Off

* Factory setting

HEAT MODE

In a typical system, a call for heat is initiated by closing the thermostat contacts. This starts the 50A55 control's heating sequence. The inducer blower and optional humidifier are energized and the ignitor is powered within one second.
This controller has an adaptive algorithm that adjusts the duration of the ignitor warm-up, to extend ignitor life. Upon initial application of power, the warm-up time is 17 seconds. The ignitor on-time will then be increased or decreased depending on whether or not flame is achieved. The warm-up time is limited to a maximum of 21 seconds. During the first 64 warm-up periods following power-up, the warm-up time may not be less than 17 seconds.
Upon a call for heat, if the warm-up time has not been locked, it will be decreased by one second. This reduction of the ignitor on-time will continue until flame fails to be achieved (resulting in a retry).
In the event of a retry, the warm-up time will be increased by two seconds and locked in at that duration. Once the warm-up time is locked, it remains fixed until another call for heat results in a retry, in which case the warm-up time is again increased by two seconds and remains locked.
In the event of two successive retry attempts, the warm-up time will be unlocked and set to 21 seconds. If flame is then achieved, the warm-up time will begin adapting again with the next call for heat. If, however, this third attempt fails to achieve flame, the control will go into system lockout.
At the end of the ignitor warm-up time, both valves in the 36E manifold gas valve are opened. Flame must be detected within 4 seconds.
See installation instructions for more system sequence detail.

COOL MODE

In a typical system, a call for cool is initiated by closing the thermostat contacts. This energizes the 50A55 control and the compressor. The cool delay-to-fan-on period begins. After the delay period ends, the optional electronic air cleaner is energized, and the circulator fan is energized at cool speed. After the thermostat is satisfied, the compressor is de-energized and the cool mode delay-to-fan-off period begins. After the delay-to-fan-off period ends, the circulator fan and electronic air cleaner (optional) are de-energized.

MANUAL FAN ON MODE

If the thermostat fan switch is moved to the ON position, the circulator fan (cool speed) and optional electronic air cleaner are energized. When the fan switch is returned to the AUTO position, the circulator fan and electronic air cleaner (optional) are de-energized.

SYSTEM LOCKOUT FEATURES

When system lockout occurs, the gas valve is de-energized, the circulator blower is energized at heat speed, and, if flame is sensed, the inducer blower is energized. The diagnostic indicator light will flash or glow continuously to indicate system status. (**System lockout will never override the precautionary features**.)

To reset the control after system lockout, do one of the following:

1. Interrupt the call for heat or cool at the thermostat for at least one second but less than 20 seconds (if flame is sensed with the gas valve de-energized, interrupting the call for heat at the thermostat will **not** reset the control).
2. Interrupt the 24 VAC power at the control for at least one second. You may also need to reset the flame rollout sensor switch.
3. After one hour in lockout, the control will automatically reset itself.

DIAGNOSTIC FEATURES

The 50A55-843 control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate a failure code as shown below. **If the failure is internal to the control, the light will stay on continuously. In this case, the entire control should be replaced, as the control is not field-repairable.**

If the sensed failure is in the system (external to the control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds, and each pause will last approximately 2 seconds).

1 flash, then pause	System lockout
2 flashes, then pause	Pressure switch stuck closed
3 flashes, then pause	Pressure switch stuck open
4 flashes, then pause	Open limit switch
5 flashes, then pause	Open rollout switch
6 flashes, then pause	115 Volt AC power reversed / Improper ground
7 flashes, then pause	Low flame sense signal
Continuous flashing (no pause)	Flame has been sensed when no flame should be present (no call for heat)

The LED will also flash once at power-up.

Trane application - Jumper wire 151-2906 (provided with control) must be installed on the furnace from R01 to R02 of the 12-pin connector.

The 50A65-843 is an automatic gas interrupted ignition control that employs a microprocessor to continually monitor, analyze, and control the proper operation of the gas burner, inducer, and fan.

Signals interpreted during continual surveillance of the thermostat and flame sensing element initiate automatic ignition of the burner, sensing of the flame, and system shut-off during normal operation.

These controls incorporate system fault analysis for quick gas flow shut-off, coupled with automatic ignition retry upon sensing a fault correction.

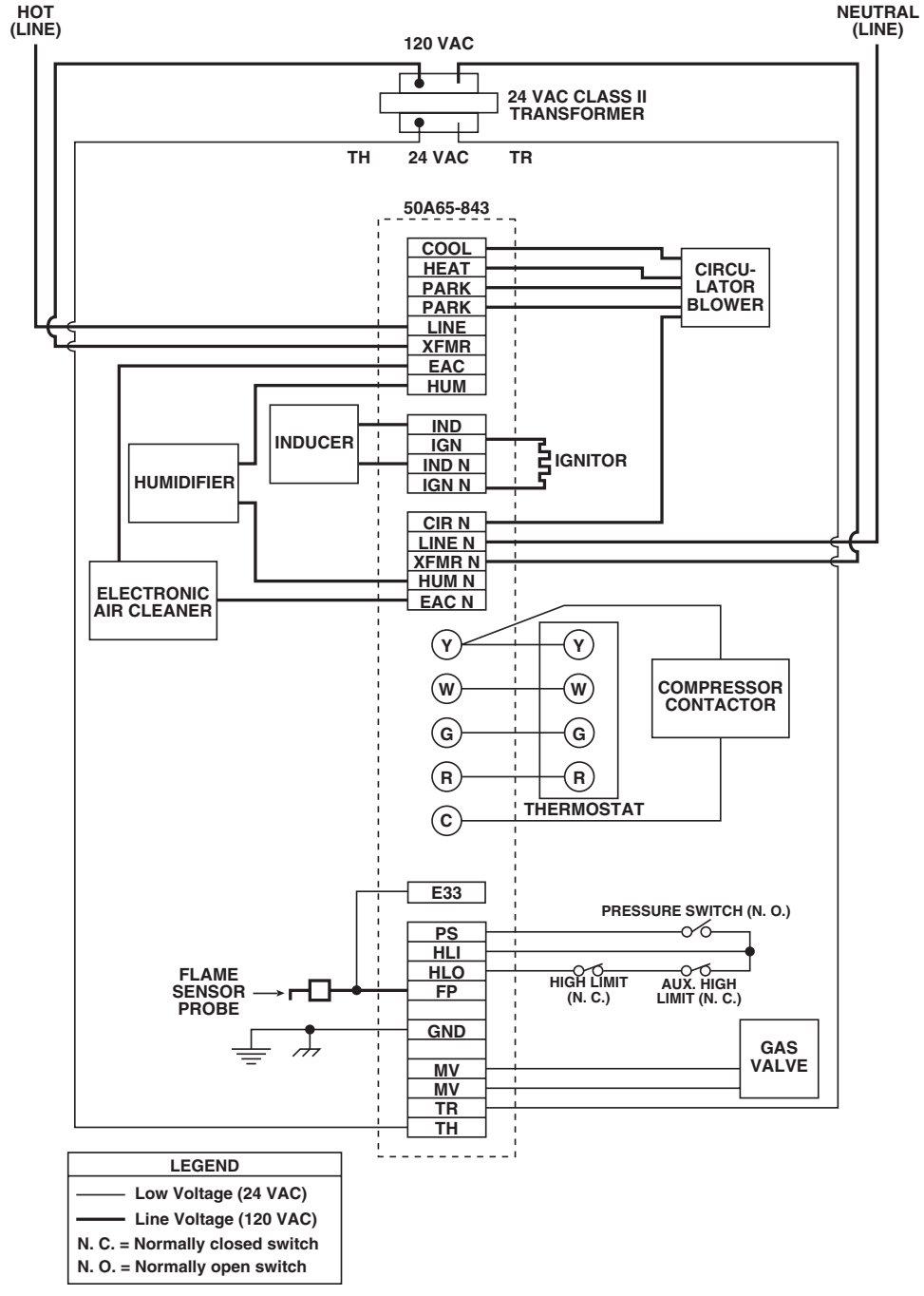
Flame Current Requirements:

Minimum current to insure flame detection.....1 µa DC①
Maximum current for non-detection.....0.1 µa DC①
Maximum allowable leakage resistance.....100 M ohms
Flame establishing time.....0.8 seconds maximum
Flame failure response time.....2.0 seconds maximum

① Measured with a DC microammeter in the flame probe lead

50A65-843

TYPICAL SYSTEM WIRING DIAGRAM



OPTION SWITCHES

The option switches on the 50A65-843 control are used to determine the length of the cool delay-to-fan-off, heat delay-to-fan-on and heat delay-to-fan-off periods. The following table shows the time periods that will result from the various switch positions.

OPTION SWITCH POSITIONS

COOL delay-to-fan-off:	Set switch #1
45 sec.*	On
90 sec.	Off

HEAT delay-to-fan-on:	Set switch #2
30 sec.*	On
45 sec.	Off

HEAT delay-to-fan-off:	Set switch #3	#4
60 sec.	On	On
90 sec.	Off	On
120 sec.	On	Off
180 sec.*	Off	Off

* Factory setting

HEAT MODE

In a typical system, a call for heat is initiated by closing the thermostat contacts. This starts the 50A65 control's heating sequence. The inducer blower and optional humidifier are energized and the 768A silicon nitride ignitor is powered within one second.

This control has an adaptive algorithm that reduces the ignitor temperature to slightly greater than the minimum temperature required to ignite gas in each particular application. The control measures the line voltage and determines an initial ignitor temperature setting based on the measurement. After each successful ignition, the control lowers the ignitor temperature slightly for the next ignition attempt. The control continues to lower the ignitor temperature until ignition does not occur, and the control goes into retry mode. For the second attempt to ignite gas within the same call for heat, the control increases the ignitor temperature to the value it was on the third previous successful ignition. After ignition is successful, the control sets the ignition temperature at this value for the next 255 calls for heat, after which the control repeats the adaptive algorithm. The control is constantly making adjustments to the ignitor temperature to compensate for changes in the line voltage.

The 80 VAC Silicon Nitride ignitor manufactured by White-Rodgers must be used. These ignitors are specially designed to operate with the 50A65's adaptive ignition routine to ensure the most efficient ignitor temperature.

MANUAL FAN ON MODE

If the thermostat fan switch is moved to the ON position, the circulator fan (cool speed) and optional electronic air cleaner are energized. When the fan switch is returned to the AUTO position, the circulator fan and electronic air cleaner (optional) are de-energized.

COOL MODE

In a typical system, a call for cool is initiated by closing the thermostat contacts. This energizes the 50A65 control and the compressor. The cool delay-to-fan-on period begins. After the delay period ends, the optional electronic air cleaner is energized, and the circulator fan is energized at cool speed. After the thermostat is satisfied, the compressor is de-energized and the cool mode delay-to-fan-off period begins. After the delay-to-fan-off period ends, the circulator fan and electronic air cleaner (optional) are de-energized.

SYSTEM LOCKOUT FEATURES

When system lockout occurs, the gas valve is de-energized, the circulator blower is energized at heat speed, and, if flame is sensed, the inducer blower is energized. The diagnostic indicator light will flash or glow continuously to indicate system status. (**System lockout will never override the precautionary features**.)

To reset the control after system lockout, do one of the following:

1. Interrupt the call for heat or cool at the thermostat for at least one second but less than 20 seconds (if flame is sensed with the gas valve de-energized, interrupting the call for heat at the thermostat will **not** reset the control).
2. Interrupt the 24 VAC power at the control for at least one second. You may also need to reset the flame rollout sensor switch.
3. After one hour in lockout, the control will automatically reset itself.

DIAGNOSTIC FEATURES

The 50A65-843 control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate a failure code as shown below. **If the failure is internal to the control, the light will stay on continuously. In this case, the entire control should be replaced, as the control is not field-repairable**.

If the sensed failure is in the system (external to the control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds, and each pause will last approximately 2 seconds).

1 flash, then pause	System lockout
2 flashes, then pause	Pressure switch stuck closed
3 flashes, then pause	Pressure switch stuck open
4 flashes, then pause	Open limit switch
5 flashes, then pause	Open rollout switch
6 flashes, then pause	115 Volt AC power reversed / Improper ground
7 flashes, then pause	Low flame sense signal
8 flashes, then pause	Check ignitor
Continuous flashing (no pause)	Flame has been sensed when no flame should be present (no call for heat)

The LED will also flash once at power-up.

Trane application - Jumper wire 151-2906 (provided with control) must be installed on the furnace from R01 to R02 of the 12-pin connector.

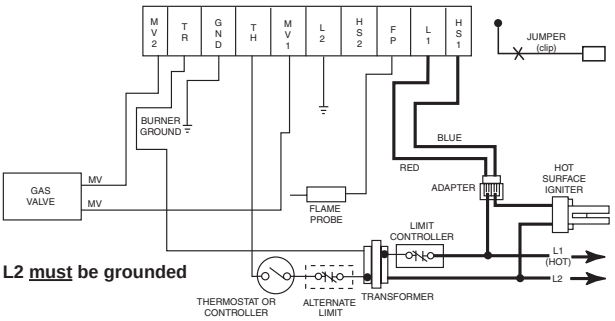


Fig. 1 – Typical hookup for White-Rodgers replacement with indirect sense using flame probe

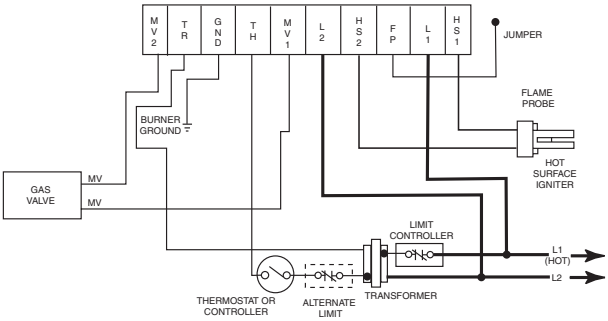


Fig. 2 – Typical hookup for competitive replacement with direct flame sense through ignitor

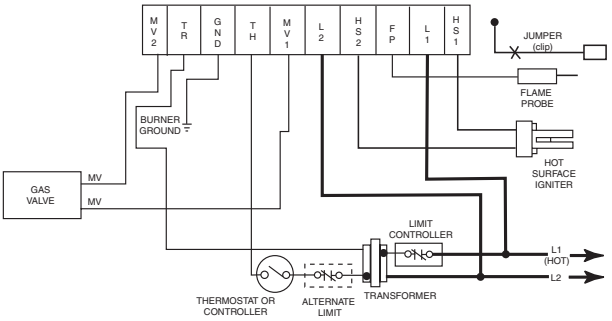


Fig. 3 – Typical hookup for competitive replacement with indirect sense using flame probe

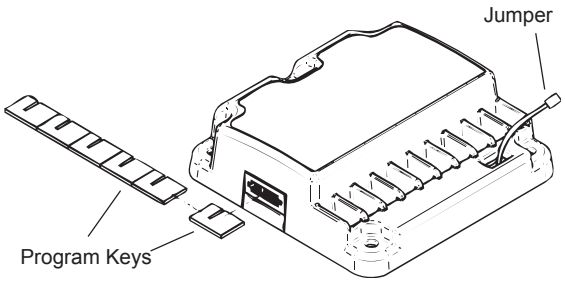


Fig. 4 – Program Key installation/Jumper for models with indirect sense clip jumper

Terminal Wiring Cross Reference

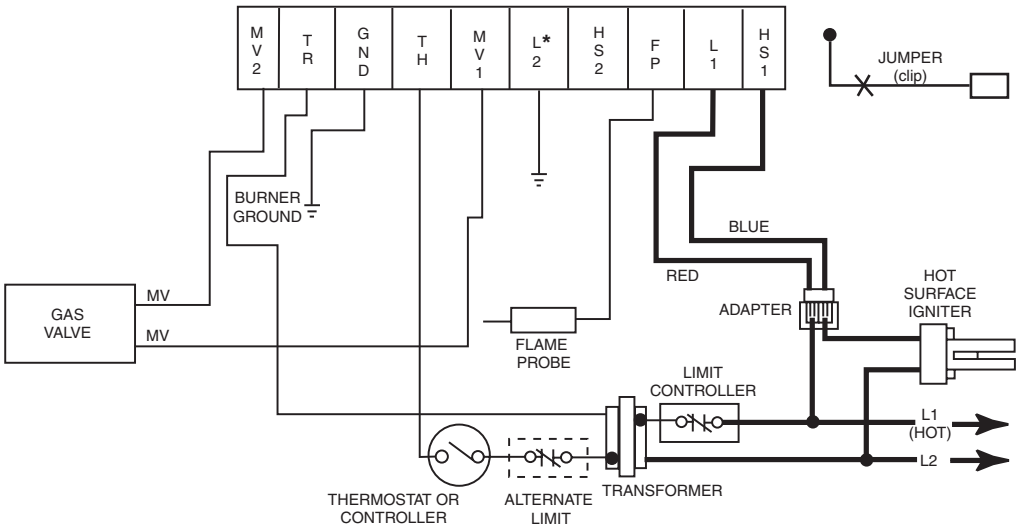
	Original Control			Replacement Control
Terminal Function	**Honeywell S89 / S890 Terminal**	**Robertshaw HS780 Terminal**	**Old White-Rodgers 50E / F47 Terminal**	**50E47-843**
Burner Ground Connection	GND (BURNER) [a]	TR (GND CLIP) [b]	GND	GND
Transformer Secondary (unswitched leg)	24V (GND) [a]	GND	TR	TR
Main Valve Common	VALVE (GND) [a]	— [c]	MV [a] (next to TR terminal)	MV2
Transformer Secondary (switched leg)	24V [a]	TH	TH	TH
Main Valve Operator	VALVE	VALVE [d]	MV [d]	MV1
120 Vac Neutral Leg	L2 120V NEUTRAL	L2	—	L2 [e]
Power Supply				
120 Vac Hot Leg	L1 120V HOT	L1	L [f]	L1 120V HOT
Power Supply				
Hot Surface Igniter Element	HSI 120V	IGN	—	HS2
Hot Surface Igniter Element	HSI 120V	IGN	IGN [g]	HSI
Flame Sensor	SEN [h]	RS [h]	FP [i]	FP [h]

[a] Remove quick-connect and replace with the included 1/4" quick-connect.
[b] Use green adapter cable (provided) to connect terminal to chassis ground.
[c] Do not use the MV2 terminal. MV2 and TR are interconnected in the appliance wiring.
[d] Remove quick-connect and replace with the included 3/16" quick-connect.
[e] Ground this terminal using green adapter cable if model being replaced does not have 120V neutral power supply connection.
[f] Use the red wire on the included adapter cable.
[g] Use the blue wire on the included adapter cable.
[h] On indirect sense models, remove jumper quick-connect from FP terminal, cut jumper wire at circuit board and discard. On direct sense models, jumper connected to FP terminal, see figure 4.
[i] Remove jumper from FP terminal, cut jumper wire at circuit board and discard.

Select and insert the correct program key to match the application.

YELLOW FLASHING INDICATOR: IMPROPER POLARITY LOCKOUT

RED SOLID INDICATOR LIGHT: INTERNAL FAULT OR REVERSED CONNECTIONS AT GAS VALVE



*** NOTE:** Ground this terminal if model being replaced does not have 120V neutral

YELLOW FLASHING INDICATOR (IMPROPER POLARITY LOCKOUT): Yellow indicator will flash if the polarity is not correct as diagrammed above on both the primary and secondary of the system transformer.

To check the polarity on the primary of the transformer it can be tested at the module. The L1 terminal on the module should be 120 volts (Hot) and should measure 120 volts to GND.

To check the secondary of the transformer, module terminal L1 should measure approximately 95 volts to TH. If the reading is approximately 120 to 150 volts the secondary is not phased correctly. To correct this condition, reverse the secondary wires on the system transformer. Note: TR on this module is tied to GND. Some systems may have more than one ground. When you reverse the 24 volt secondary be sure that only the TR and GND leads are grounded.

RED SOLID INDICATOR LIGHT (INTERNAL FAULT OR REVERSED CONNECTIONS AT GAS VALVE): A solid red indicator light means internal module fault or reversed connections at the gas valve. Before replacing the module, reverse low voltage connections to gas valve.

At installation, this module has a self-test and requires all system components (Transformer, Ignitor, Gas Valve and Flame Sensor) to be attached and turned on for it to operate. Gas valves with an Electric “On/Off” switch must be turned “ON”. A lockout condition on this control during self-test will not damage equipment or the control.

50D50-842 WIRING

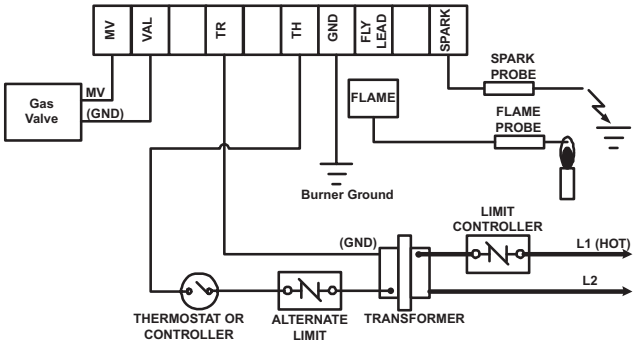


Fig. 1 – Typical hookup for White-Rodgers replacement with separate flame sense and spark probes

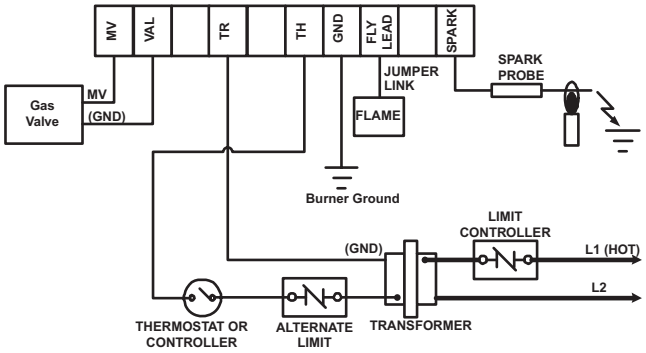


Fig. 2 – Typical hookup for White-Rodgers replacement with direct flame sense through single spark/sense probe

NOTE: Max length of spark cable should be less than 3ft (0.9m) and rated at 15kV. The cable must not run in continuous contact with any metal surface or spark voltage is greatly reduced. Use ceramic or plastic standoff insulators as required. Ensure burner is grounded directly to module for spark return path.

50D50-843 WIRING

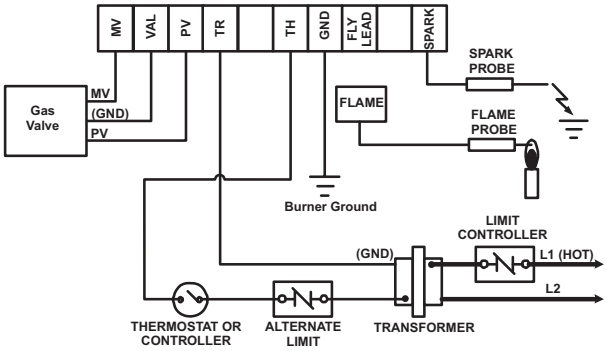


Fig. 3 – Typical hookup for White-Rodgers replacement with separate flame-sense and spark probes

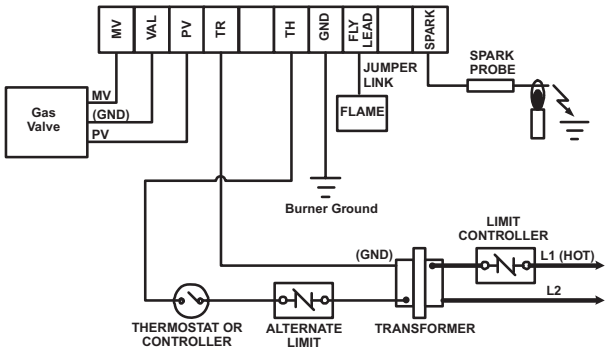


Fig. 4 – Typical hookup for White-Rodgers replacement with direct flame sense through single spark/sense probe

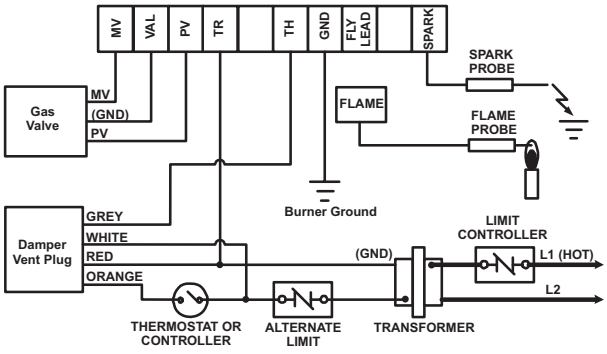


Fig. 5 – Typical hookup for White-Rodgers replacement with damper vent and separate flame-sense and spark probes

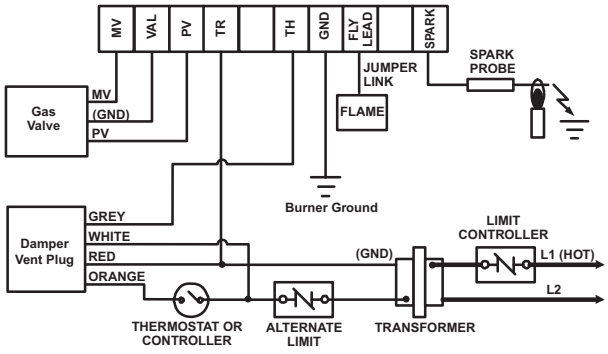
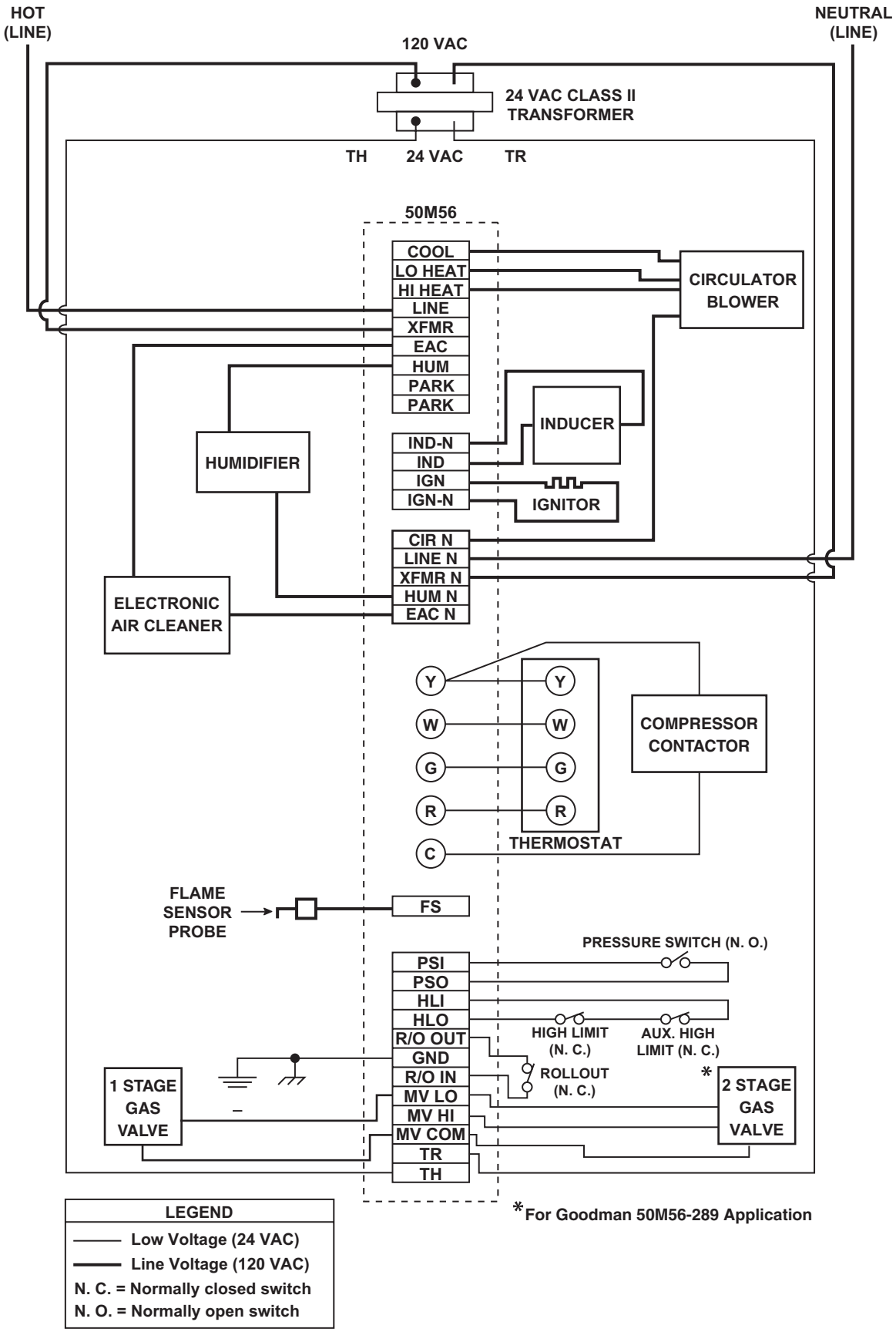


Fig. 6 – Typical hookup for White-Rodgers replacement with damper vent and direct flame sense through single spark/sense probe

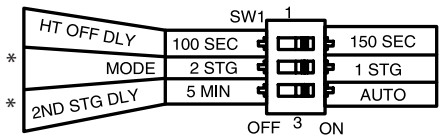
NOTE: Max length of spark cable should be less than 3ft (0.9m) and rated at 15kV. The cable must not run in continuous contact with any metal surface or spark voltage is greatly reduced. Use ceramic or plastic standoff insulators as required. Ensure burner is grounded directly to module for spark return path.

50M56U-843 TYPICAL WIRING DIAGRAM



OPTION SWITCHES

The option switches on the 50M56U-843 control are used to determine the length of the heat delay-to-fan-off period, the mode of operation, and the 2nd stage delay period. The following illustration shows the options and the selections of the switch positions. The switches are shown in the factory default positions.



*MODE and 2ND STG DLY for Goodman 50M56-289 only

HEAT MODE

When heat is required, the thermostat will send a call for heat to the control. This starts the controls heating sequence. The ignitor and humidifier (optional) are powered. The ignitor is powered after the pre-purge period.

Upon initial application of power, the warm-up time is 17 seconds. The ignitor on-time will then be increased depending on whether or not flame is achieved. The warm-up time is limited to a maximum of 19 seconds. During the first 64 warm-up periods following power-up, the warm-up time may not be less than 17 seconds.

In the event of a retry, the warm-up time will be increased by one second and locked in at that duration. Once the warm-up time is locked, it remains fixed until another call for heat results in a retry, in which case the warm-up time is again increased by one second and remains locked.

In the event of two successive retry attempts, the warm-up time will be unlocked and set to 19 seconds. If flame is then achieved, the warm-up time will begin adapting again with the next call for heat. If, however, this third attempt fails to achieve flame, the control will go into system lockout.

After the ignitor warm-up period, MV LO (first stage) and MV HI (second stage) are both energized to the gas valve. Flame must be detected within 4 seconds. If flame is detected, the 30-second HEAT delay-to-fan-on period begins. The circulator and electronic air cleaner (optional) will also energize at this time.

1 Stage operation – If the Option Switch MODE (SW1-2) is set to the 1 STG position, both MV LO and MV HI will remain energized.

2 Stage operation (Goodman 50M56-289 Application only) – If the Option Switch MODE is set to 2 STG, MV HI will de-energize after 5 seconds, leaving MV LO energized. If the MODE is in the 2 STG position, 2nd STG DLY (SW1-3) will determine the second stage- on delay as follows:

5 MIN – On call for heat, the 5 minute 2nd stage recognition timer begins. After the 5-minute delay, the second stage heat (MV HI) is energized.

AUTO – On call for heat, the automatic second stage will determine the optimum timing between stages for comfort. Auto will adapt the delay to energize MV HI from instantly to up to 12 minutes.

When the thermostat is satisfied, the gas valve is de-energized. After proof of flame loss, the heat delay-to-fan-off period begins and the inducer blower remains energized to purge the system for 25 seconds. When the purge is complete, the inducer blower is de-energized. After the delay-to-fan-off period ends, the circulator fan and electronic air cleaner are de-energized.

If flame is not detected, both valves are de-energized, the ignitor is turned off, and the 50M56U-843 control goes into the “retry” sequence. The “retry” sequence provides a 60-second wait following an unsuccessful ignition attempt (flame not detected). After this wait, the ignition sequence is restarted with an additional 1 second of ignitor warm-up time.

If flame is established for more than 10 seconds after ignition, the 50M56U-843 controller will clear the ignition attempt (or retry) counter. If flame is lost after 10 seconds, it will restart the ignition sequence.

During burner operation, a momentary loss of power of 50 milliseconds or longer will de-energize the main gas valve. When power is restored, the gas valve will remain de-energized and a restart of the ignition sequence will begin immediately.

A momentary loss of gas supply, flame blowout, or a shorted or open condition in the flame probe circuit will be sensed within 2.0 seconds. The gas valve will de-energize and the control will restart the ignition sequence. Recycles will begin and the burner will operate normally if the gas supply returns, or the fault condition is corrected.

If the control has gone into system lockout, it may be possible to reset the control by a momentary power interruption of one second or longer. Refer to **SYSTEM LOCKOUT FEATURES**.

COOL MODE

In a typical system, a call for cool is initiated by closing the thermostat contacts. This energizes the 50M56U-843 control and the compressor. The cool delay-to-fan-on period begins. After the delay period ends, the optional electronic air cleaner is energized, and the circulator fan is energized at cool speed. After the thermostat is satisfied, the compressor is de-energized and the cool mode delay-to-fan-off period begins. After the delay-to-fan-off period ends, the circulator fan and electronic air cleaner (optional) are de-energized.

MANUAL FAN ON MODE

If the thermostat fan switch is moved to the ON position, the circulator fan (low heat speed) and optional electronic air cleaner are energized. When the fan switch is returned to the AUTO position, the circulator fan and electronic air cleaner (optional) are de-energized.

SYSTEM LOCKOUT AND DIAGNOSTIC FEATURES

SYSTEM LOCKOUT FEATURES

When system lockout occurs, the gas valve is de-energized, the circulator blower is energized at heat speed, and, if flame is sensed, the inducer blower is energized. The diagnostic indicator light will flash or glow continuously to indicate system status. **(System lockout will never override the precautionary features.)**

To reset the control after system lockout, do one of the following:

1. Interrupt the call for heat or cool at the thermostat for at least one second but less than 20 seconds (if flame is sensed with the gas valve de-energized, interrupting the call for heat at the thermostat will not reset the control).
2. Interrupt the 24 VAC power at the control for at least one second. You may also need to reset the flame rollout sensor switch.
3. After one hour in lockout, the control will automatically reset itself.

DIAGNOSTIC FEATURES

The 50M56U-843 control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate a failure code as shown below. **If the failure is internal to the control, the light will stay off. In this case, the entire control should be replaced, as the control is not field-repairable.**

If the sensed failure is in the system (external to the control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds, and each pause will last approximately 2 seconds).

DIAGNOSTIC INDICATOR FLASH CODES

FLASH	
1	System Lockout (Retries Exceeded)
2	Pressure Switch Stuck Closed
3	Pressure Switch Stuck Open
4	Open High Temperature Limit Switch
5	Flame Sensed with Gas Valve De-energized
6	Open Rollout Switch
7	Low Flame Sense Signal
8	Ignitor Relay Fault
Rapid Flash	Reverse Polarity
Continuous On	Normal Operation
Off	Control Failure

INSTALLER MUST READ FOR PROPER INSTALLATION

IMPORTANT: For continuous fan speed operation, one of the unused parked motor taps must be connected to the low heat speed terminal. Failure to do this will result in the blower not energizing in the constant fan mode operation. Refer to figure 1.

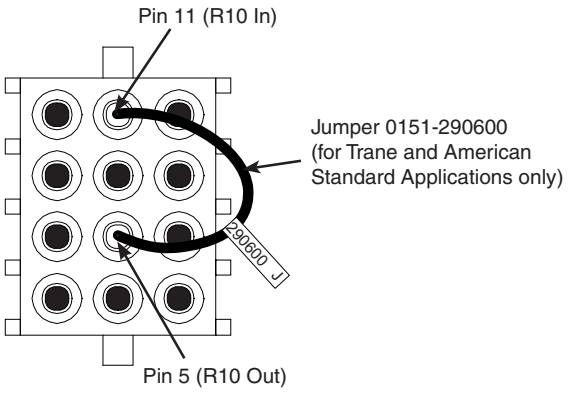
FOR ALL TRANE AND AMERICAN STANDARD APPLICATIONS ONLY: Install jumper 0151 290600 (included in this package) in the furnace 12 pin connector harness, pin 5 and pin 11 positions. Make sure jumper snaps into the connector securely. Refer to figure 1.

FAULT RECALL

The last five fault codes stored can be displayed on the diagnostic LED. When the control is in standby mode (no call for heat or cool), press the FAULT RECALL switch for approximately two seconds or until the diagnostic LED turns off. Release the switch and the LED will remain off for two seconds. Then the fault codes will display beginning with the most recent fault first with a two second pause between codes. After the stored fault codes have all displayed, the LED will remain off for two seconds and then turn on to indicate return to normal status. While displaying the stored fault codes, the control will ignore any new call for heat, cool or fan.

FAULT CODE RESET

The stored fault codes can be erased from memory. When the control is in standby mode (no call for heat or cool), press the FAULT RECALL switch for five to ten seconds or until the diagnostic LED begins to rapid flash. When the switch is released, the LED will turn off for two seconds to indicate the codes are erased. After two seconds the LED will turn on to indicate return to normal status. If the switch is held pressed for over ten seconds the rapid flash will stop and the LED will be on to indicate return to normal status.



DEFINITION OF TERMS

Auto Restart – After one (1) hour of internal or external lockout, the control will automatically reset itself and go into an auto restart purge for 60 seconds.

Cool Delay-To-Fan-Off – The period of time between the loss of a call for cool and the deactivation of the blower motor at Cool speed.

Cool Delay-To-Fan-On – The period of time after a thermostat demand for cool before energizing the circulator blower motor at Cool speed.

Flame Failure Response Time (FFRT) – The period of time between loss of the supervised main burner flame and the action to shut off the gas supply.

Heat Delay-To-Fan-Off – The period of time between the loss of a call for heat and the deactivation of the blower motor at Heat speed.

Heat Delay-To-Fan-On – The period of time between proof of the supervised main burner flame and the activation of the blower motor at Heat speed.

Igniter Warm-up Time – The length of time allowed for the igniter to heat up prior to the initiation of gas flow.

Ignition Activation Period (IAP) – The period of time between energizing the main gas valve and deactivation of the ignition means prior to the end of TFI.

Inter-purge – The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion between the failed trial for ignition and the retry period.

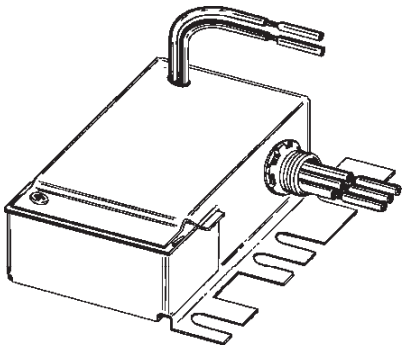
Post-purge Time – The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion at the end of a furnace burner operating cycle. Post-purge begins at the loss of flame sense.

Pre-purge Time – The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion at the beginning of a furnace operating cycle prior to initiating ignition.

Recycles – The additional attempts within the same thermostat cycle for ignition after loss of the supervised ignition source or the supervised main burner flame.

Retries – The additional attempts within the same thermostat cycle for ignition when the supervised main burner flame is not proven within the first trial for ignition period.

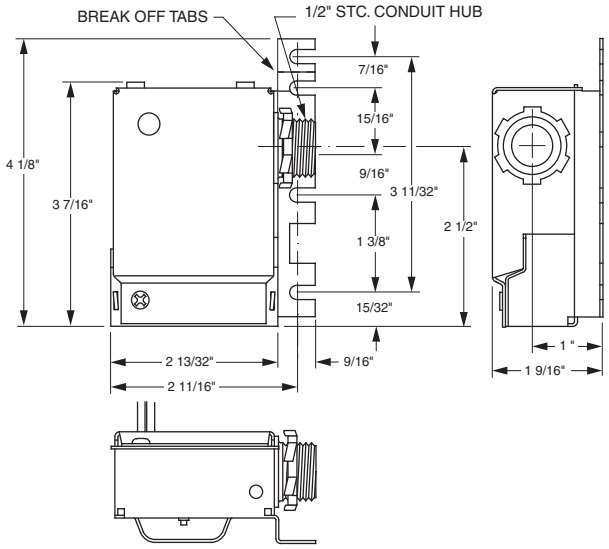
Trial for Ignition Period (TFI) – The period of time between initiation of gas flow and the action to shut off the gas flow in the event of failure to establish proof of the supervised ignition source or the supervised main burner flame.

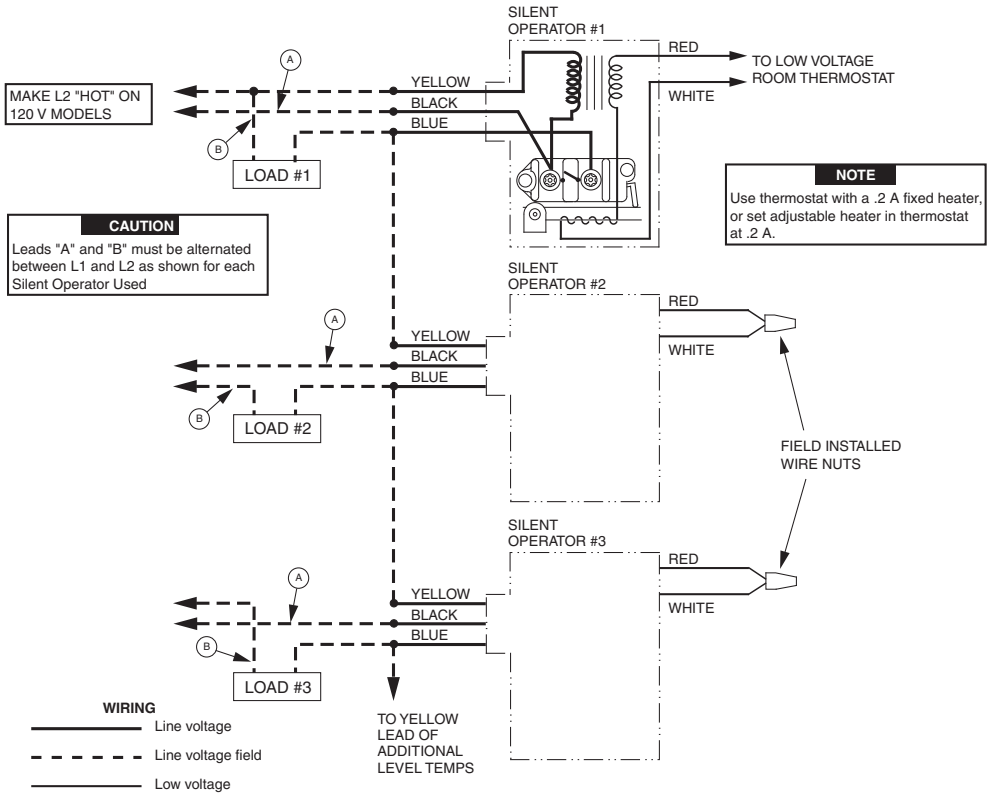


24A01 / 24A05 LEVEL-TEMP SILENT OPERATOR CONTROL

Basic Silent Operator components are a line-to-low voltage transformer, a low voltage bimetal heater, an ambient compensating bimetal, and a normally open SPST line voltage snap-action switch. In operation, a circuit is completed through the bimetal heater as the low voltage room thermostat closes its contacts. In approximately 45 seconds, the warping action of the heater closes the line voltage snap-switch to energize the heating load. When the thermostat opens its contacts, the bimetal heater cools for approximately 45 seconds before the line voltage switch opens to de-energize the heating load.

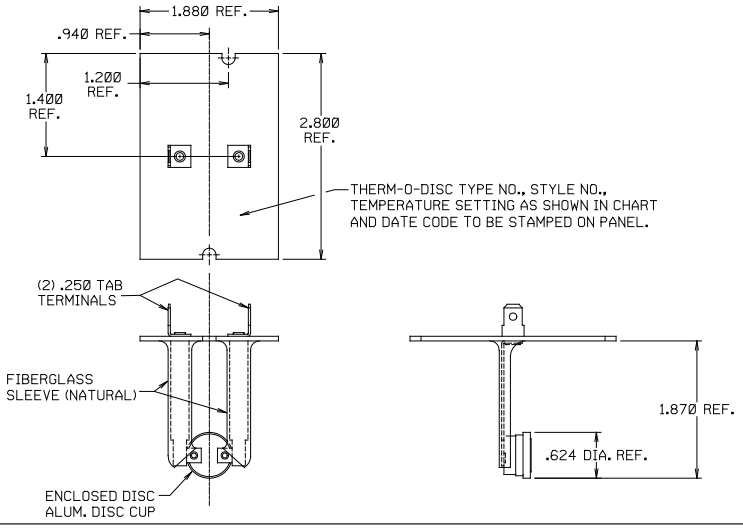
Dimensions of Type 24A01 / 05 Level Temp





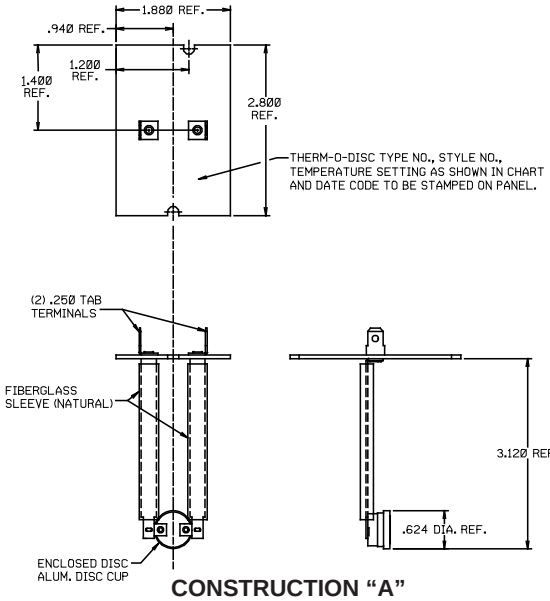
Typical Wiring Diagram To "Sequence" Two Or More Loads

NOTE: All wiring should be done in accordance with local and national electrical codes and ordinances.

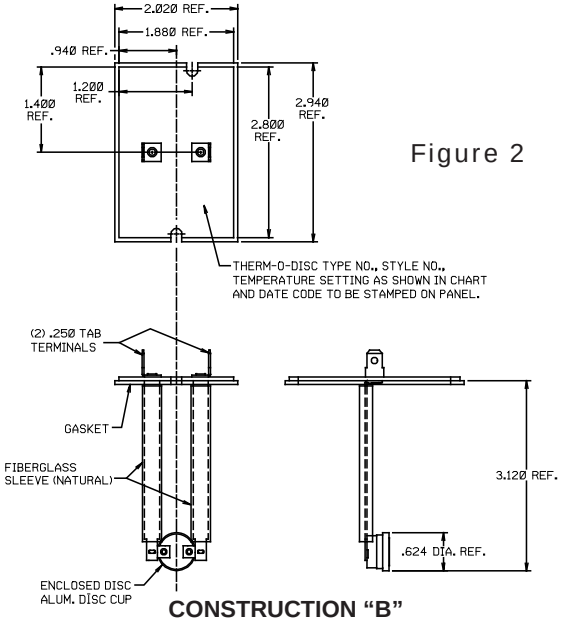


Model Number	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-1	L140-40	140°F±5°	100°F±8°
3L09-2	L170-40	170°F±5°	130°F±8°

Figure 1

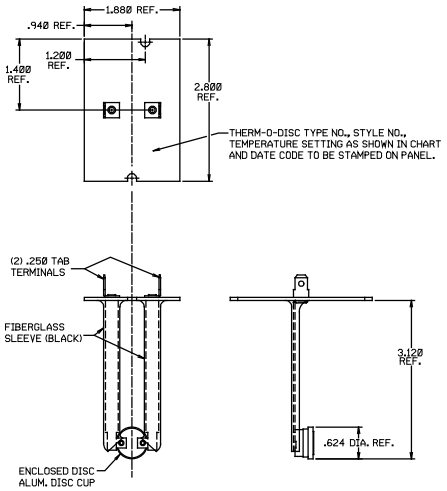


CONSTRUCTION "A"



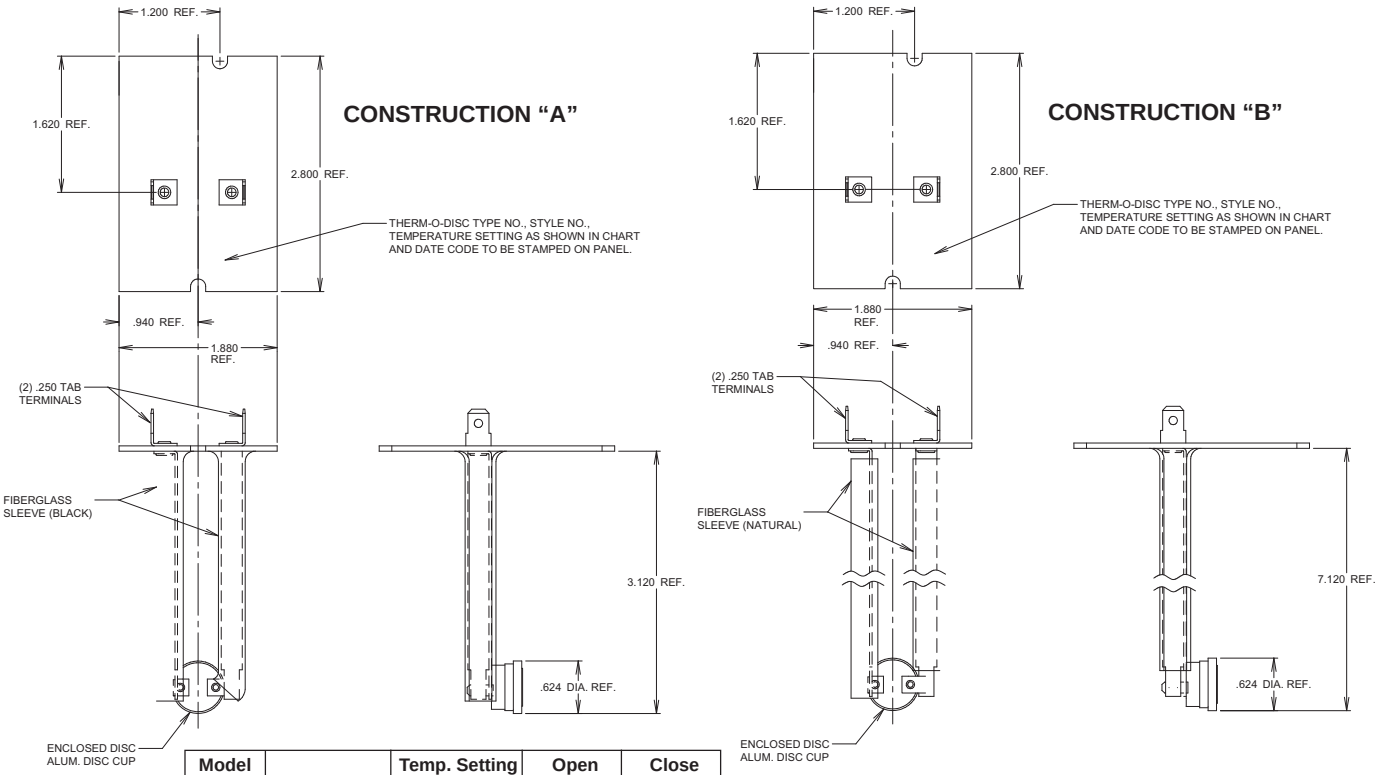
CONSTRUCTION "B"

Figure 2



CONSTRUCTION "C"

Model Number	Construction	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-3	A	L140-30F	140°F±5°	110°F±8°
3L09-4	C	L150-20F	150°F±5°	130°F±8°
3L09-5	C	L160-20F	160°F±5°	140°F±8°
3L09-6	B	L170-40F	170°F±5°	130°F±8°
3L09-7	A	L175-30F	175°F±5°	145°F±8°
3L09-8	B	L180-40F	180°F±6°	140°F±9°
3L09-9	C	L190-20F	190°F±5°	170°F±8°
3L09-10	B	L200-40F	200°F±6°	160°F±9°
3L09-11	B	L210-40F	210°F±6°	170°F±9°
3L09-12	B	L220-40F	220°F±6°	180°F±9°
3L09-13	A	L240-30F	240°F±6°	210°F±10°
3L09-14	B	L250-40F	250°F±7°	210°F±11°
3L09-15	A	L260-30F	260°F±6°	230°F±10°

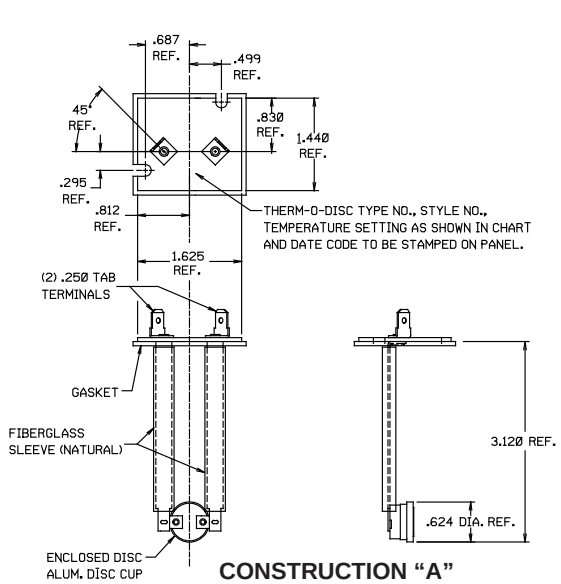


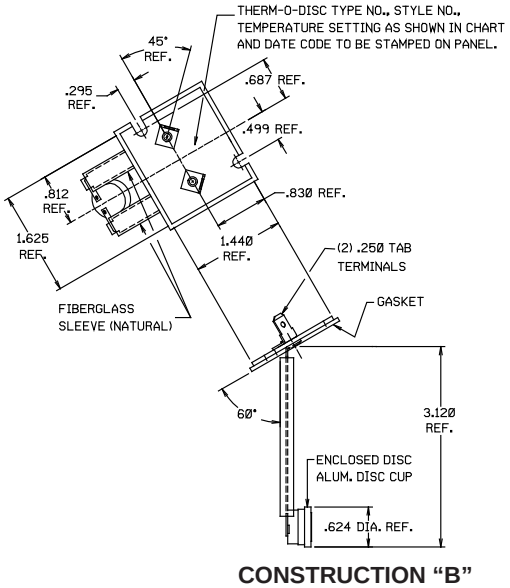
Model Number	Construction	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-16	A	L150-20F	150°F±5°	130°F±8°
3L09-17	A	L250-25F	250°F±6°	225°F±9°
3L09-18	B	L155-30F	155°F±5°	125°F±8°
3L09-19	B	L175-30F	175°F±5°	145°F±8°
3L09-20	B	L240-30F	240°F±6°	210°F±10°

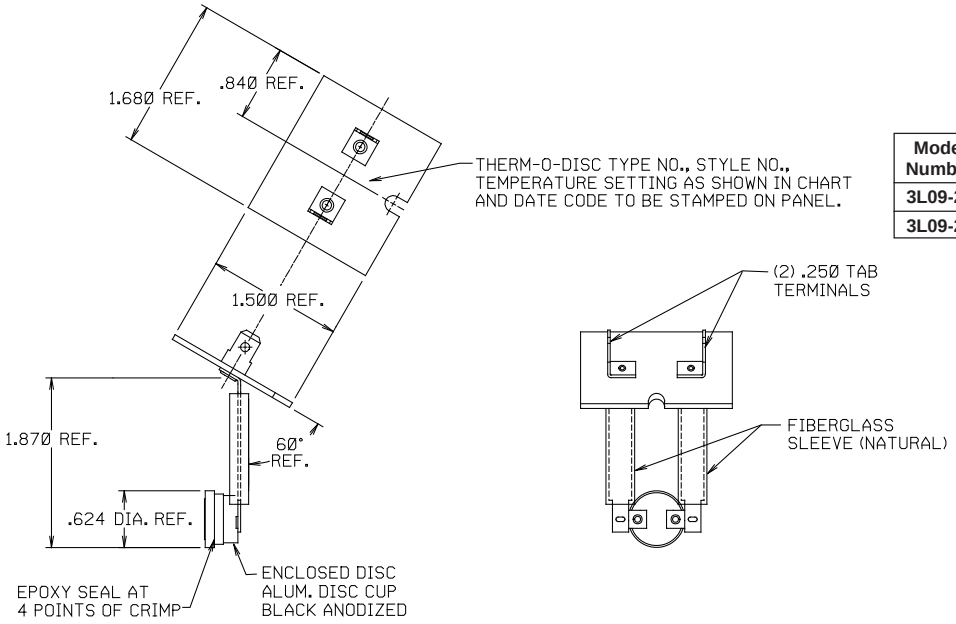
Figure 3

Model Number	Construction	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-21	A	L150-20F	150°F±5°	130°F±8°
3L09-22	A	L160-20F	160°F±5°	140°F±8°
3L09-23	A	L170-20F	170°F±5°	150°F±8°
3L09-24	B	L190-20F	190°F±5°	170°F±8°
3L09-25	B	L200-20F	200°F±5°	180°F±8°

Figure 4







Model Number	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-26	L180-20F	180°F±5°	160°F±8°
3L09-27	L220-20F	220°F±5°	200°F±8°

Figure 5

Model Number	Temp. Setting On Panel	Open Temp.	Close Temp.
3L09-28	L210-30F	210°F±5°	180°F±8°

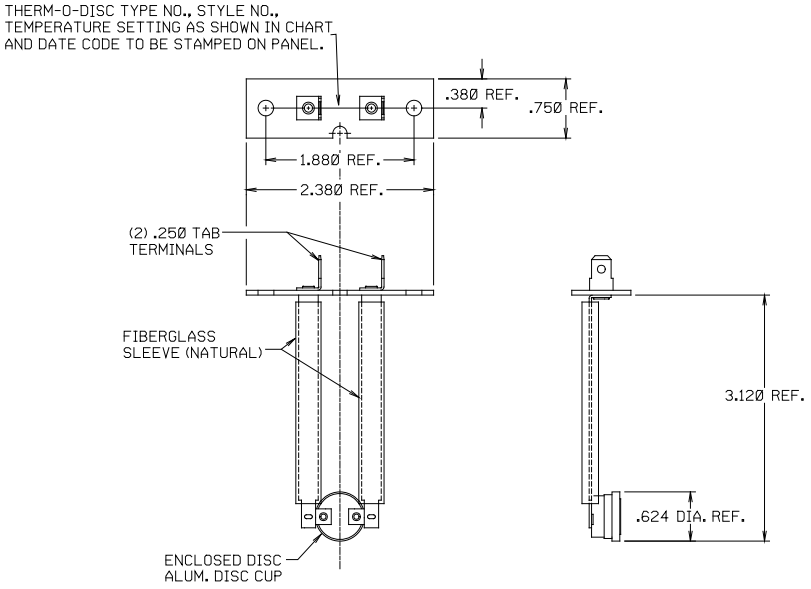


Figure 6

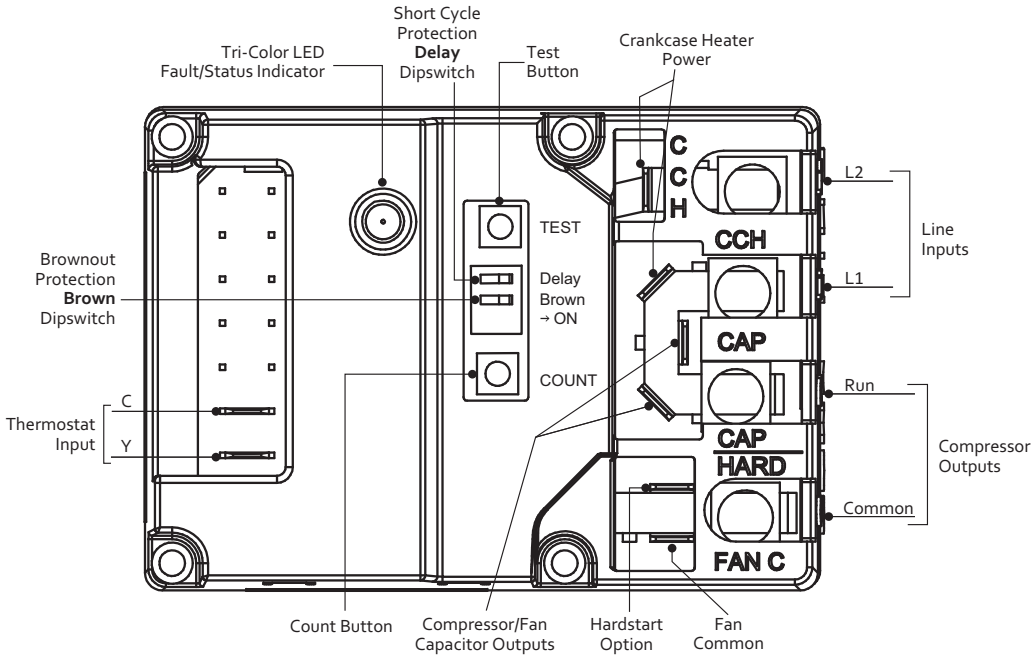
SPECIFICATIONS

ELECTRICAL RATINGS

Line Voltage Input..... 240 VAC, 50/60 Hz
Full Load Amperes (FLA) ..... 40 A
Locked Rotor Amperes (LRA) 200A
Control (Coil) Voltage (Y, C) ..... 24 VAC, 50/60 Hz

RECOMMENDED TERMINAL TORQUE – L1, L2, R and C

#4 – 6 AWG ..... 45 in-lbs
#8 AWG ..... 40 in-lbs
#10 – 14 AWG ..... 35 in-lbs



49P11-843 SureSwitch Terminals and Switches

OPERATION

CALL FOR COMPRESSOR OPERATION

24 VAC between the **Y** and **C** terminals will signal a call for compressor operation. The **C** compressor and fan outputs will be energized. Loss of 24 VAC between **Y** and **C** will de-energize the outputs.

TEST

SureSwitch includes a Test Mode to assist in system installation and troubleshooting. Press the "**TEST**" button for one second to energize the compressor and fan for five seconds without a **Y** call.

RANDOM START DELAY

At power-up and when SureSwitch recovers from a brownout, a random start delay of 5-90 seconds will be activated. This delay is in addition to the short cycle delay. During this delay the compressor will not be energized, even if a call for compressor operation is present. The random start delay can help reduce spikes in power consumption when multiple loads are re-energized after a blackout or brownout.

The random start delay cannot be disabled, but is only active at initial power-up and when recovering from a brownout. Normal compressor cycling will not activate the random start delay.

SHORT CYCLE PROTECTION

At power-up, and any time the compressor is de-energized, SureSwitch will activate a three minute short cycle delay. During this delay the compressor will not be energized, even if a call for compressor operation is present, to prevent compressor damage due to rapid on and off cycling. Normal operation resumes when the delay expires.

Short cycle protection can be disabled by setting the "**Delay**" dipswitch to the **OFF** position.

LINE-VOLTAGE BROWNOUT PROTECTION

Brownout protection will de-energize the compressor and fan if line voltage drops below 180 VAC for more than four seconds during a call for compressor operation. Compressor operation will not resume until line voltage returns to a minimum of 190 VAC. In addition, SureSwitch will not attempt to start the compressor if line voltage is less than 187 VAC.

Brownout protection can be disabled by setting the "**Brown**" dipswitch to the **OFF** position.

LIFETIME CYCLE COUNT

A count of compressor cycles since the control was installed is stored in the control's memory. To display the count, press and hold the "**COUNT**" button for one second. The LED will flash to indicate the total number of compressor cycles, rounded to the nearest 100 cycles:

GREEN – One Flash per 10,000 Cycles
RED – One Flash per 1,000 Cycles
YELLOW – One Flash per 100 Cycles

EXAMPLE: 52,318 cycles would flash five GREEN, then two RED, then three YELLOW

LED STATUS CODES

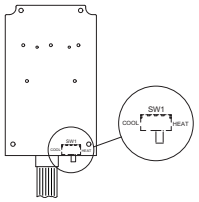
The tri-color LED will flash fault and status codes while SureSwitch is powered.

LED Color	Status
NONE	No Power
GREEN Slow Flash	Standby – No Call
GREEN Solid	Call for Compressor – Compressor and Fan Energized
GREEN Fast Flash	Short Cycle/Random Start Delay
GREEN/RED Alternating	Brownout Detected
GREEN/RED/YELLOW Alternating	Compressor Test Mode – Compressor and fan Energized

Wiring Instruction Notes

Switch Settings

Circuit Board
Inside Cover



Switch SW1 must be set for system mode as shown:

	SW1
Refrigeration	Cool
Heating	Heat

Switch SW2 must be set for applications as shown:

	SW2
Line Voltage (Power Stealing)	PS
Line Voltage (Non Power Stealing)	Non PS
24 VAC (Non Power Stealing)	Non PS

Power Stealing

Power Stealing is an electronic design within the control that can eliminate the need to connect a neutral line to power the control. The control receives power from the unit it is controlling. Power Stealing saves time and money by often eliminating the labor to run a neutral wire to the control for power. See compatibility chart below for certain limitations.

Power Stealing Compatibility Chart

Application	Power Stealing	Non-Power Stealing
Line Voltage, replacing existing control that has a common wire	Yes	Yes
Line Voltage, with load greater than 2.5 amps, without Defrost timer or other power interruption circuit, with or without alarm	Yes	Yes
Line Voltage, with load greater than 2.5 amps, with Defrost timer of other power interruption circuit, no alarm	See Note 1	Yes
Line Voltage with load greater than 2.5 amps, with Defrost timer or other power Interruption circuit, with alarm	No	Yes
Line Voltage with load less than 2.5 amps	No	Yes
24 VAC Application	No	Yes

NOTE 1: During defrost or time when load circuit is broke, display will be blank because power has been interrupted to the control. All menu settings and setpoint will be restored when power is returned.

* NTC – Negative Temperature Coefficient
PTC – Positive Temperature Coefficient

NOTE: Only one sensor (PTC or NTC) may be connected. Sensor must meet specific temperature vs. resistance specifications.

Fig. 3 Line Voltage Application (Power Stealing)

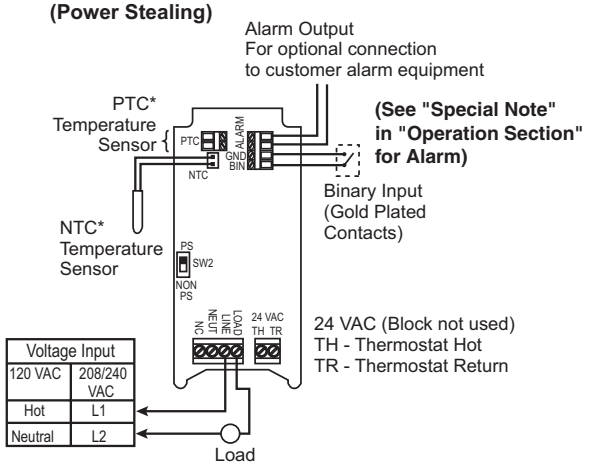


Fig. 4 Line Voltage Application (Non-Power Stealing)

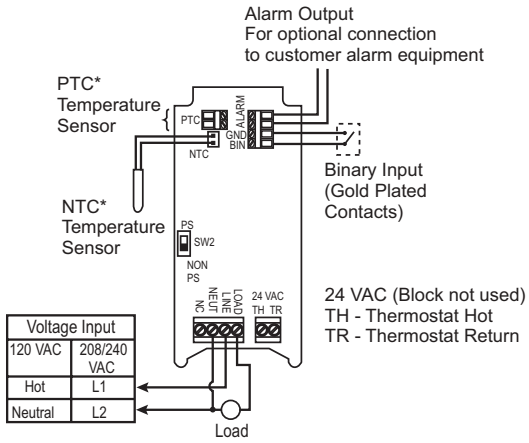
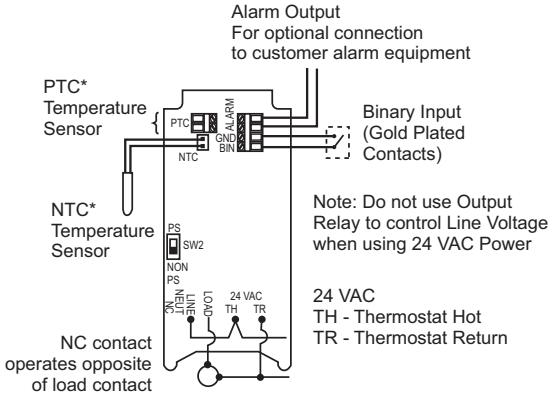


Fig. 5 24 VAC Applications (Non-Power Stealing)



USER MENU OPERATION SETTINGS:
The control has user Menu settings that will determine how the control operates. The unit is shipped with factory default settings. The user must change any of the settings as required for the application. To reset all settings to factory defaults, press and hold all 3 buttons simultaneously (MENU, ✙, and ▭ buttons) for approximately 5 seconds.

To view Menu items, press and hold MENU for 5 seconds. The unit will display the first Menu item on the left side of the display. The right side of the display indicates the Menu item settings. To change the setting, momentarily press the ✙ or ▭ key.

A momentary press of the MENU key advances the display to the next Menu item, and continues, till the last menu item is displayed. Pressing the key one more time with the last menu item, (aL) displayed returns the control to the operating mode.

Each press of MENU results in forward movement to the next Menu item. If you need to change an item “passed”, you must repeatedly press MENU, return to the operating mode, then press and hold MENU for 5 seconds to re-enter the Menu mode. Then repeatedly, momentarily press MENU until the desired Menu item is again displayed.

To store any changes made to any Menu items, the Menu must be exited by pressing MENU when the last item is displayed. If no buttons are pressed for ten minutes while in the menu, the control will return to operating mode and any changes that were made will be lost.

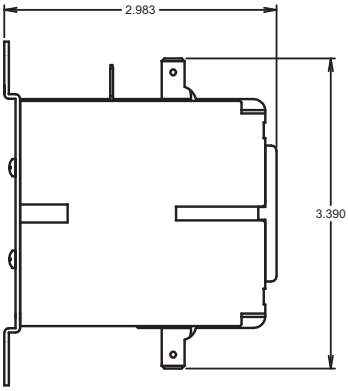
The following table shows the menu items, default settings and optional settings.

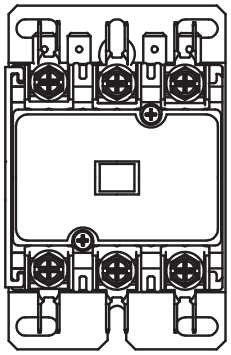
NOTE: The Heat/ Cool switch (SW1) MUST be in the proper position BEFORE setting options.

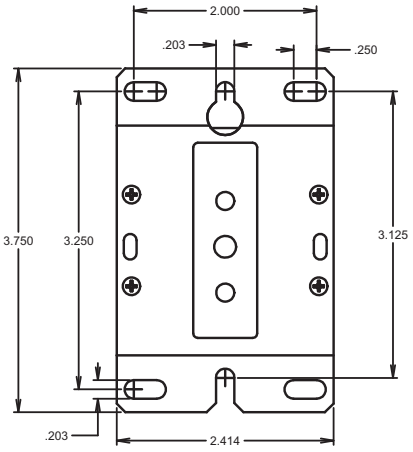
Menu Item	Description	Factory Default	Options Press ✙ or ▭ to select	Comments
CF	Temperature Scale	F	C or F	Selects temperature display in Fahrenheit or Celsius
dFF	Differential	5	1 to 30	Selects the range between Cut In and Cut Out.
SP	Set Point Mode Cool Heat	CI CO	CO or CI CI or CO	Selects how the set point temperature will operate the load terminal. CI indicates the setpoint temperature will be the Cut In temperature. CO indicates the temperature will be the Cut Out temperature. See Operation section.
SOF	Sensor Operation Failure Cool Heat	1 0	0 or 1 None	Cooling - Selects the operation of the Control Load relay in the event of a sensor failure in Cool mode. 1 (default) will cause the load contacts of the relay to close and remain closed if the sensor either opens or shorts. 0 causes the load contacts of the relay to open and remain open. Heating has no optional selection. Sensor failure in Heating will result in the relay contacts opening.
dL	Display Light	Off	On or Off	Selects the LCD display light Off or On. With this selected Off, the display light will illuminate any time a keypad button is pressed to provide better viewing in low lighting conditions, and go off after 10 seconds. If On is selected, the display light will be On continuously.
ASd	Anti Short-Cycle Delay	Cool 1 Heat 0	0 to 12	Selects the minimum time (in minutes) that the load contacts will remain open after a cycle before closing again. This will prevent the compressor or other load from being damaged by cycling too soon. A blinking Snowflake or Flame icon indicates that the control has a demand to energize the load, but is waiting for the delay time to elapse. A setting of 0 indicates no time and the feature is disabled. SW1 must be set to the proper position before checking this setting.
LP	Lock Front Panel Keypad	Off	On or Off	When selected Off, the keypad can be used as normal. When selected On, prevents unauthorized access to the control settings by locking out all keys. To unlock the control when it is locked, press and hold the Menu key for 5 seconds.
OFS	Ambient Temperature Offset	0	-4, -3, -2, -1, 0, 1, 2, 3, 4	This control is calibrated at the factory, but the “sensed" temperature may read different because of mounting/installation, or other factors. This item allows the displayed temperature to be shifted the number of degrees set to compensate for this difference
bIn	Binary Input	Off	On or Off	The default setting of Off will have no affect on the operation of the thermostat. When set to On, it allows an external binary input (switch or relay) to start a temperature set back. See Set Back (Sb).
Sb	Set Back	0	0 to 50	Selects the number of degrees the thermostat will change the setpoint temperature when the external binary input signal is received. 0 will cause no temperature change to occur. See Binary Input (bin).
AL	Alarm	0	0 to 99	Selects the time delay (in minutes) before a Temperature Out of Range alarm output is sent. A setting of 0 disables the alarm relay.

OUTLINE DRAWINGS

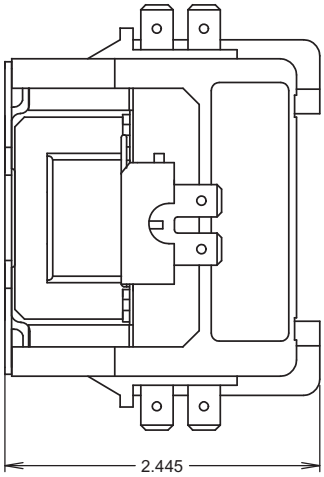
90-160 thru 90-172

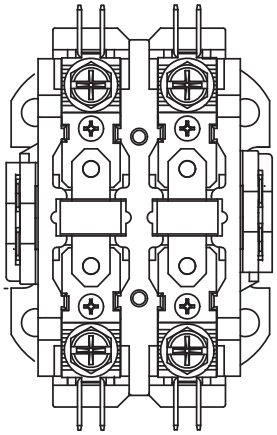


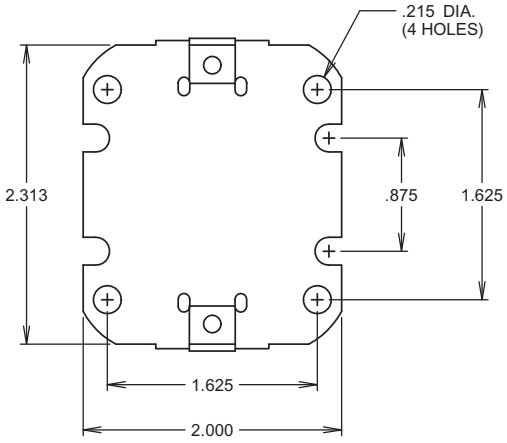




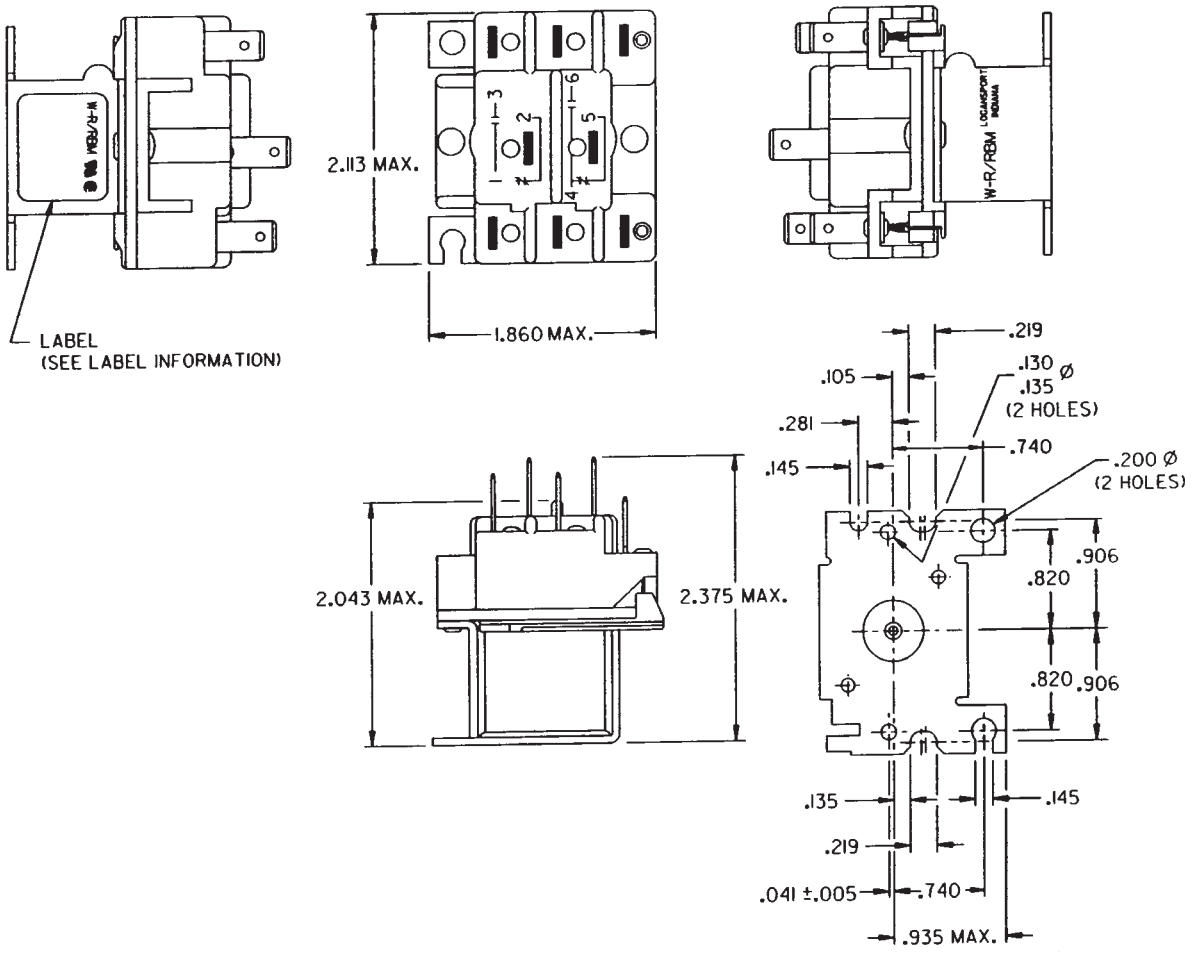
90-244 thru 90-249





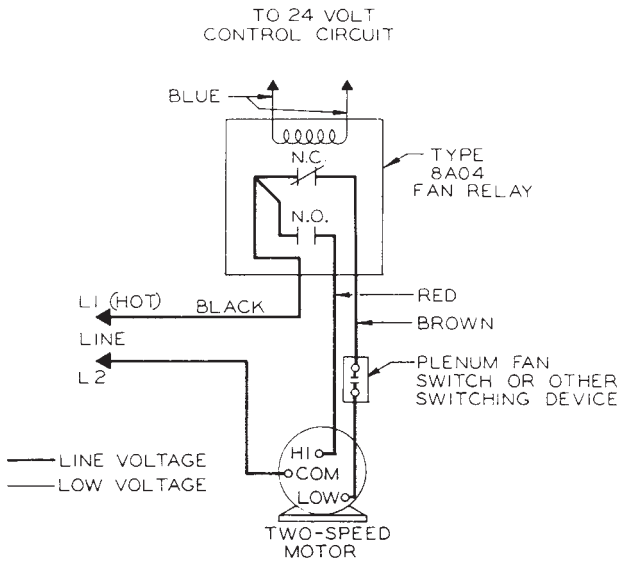


90-340 thru 90-342

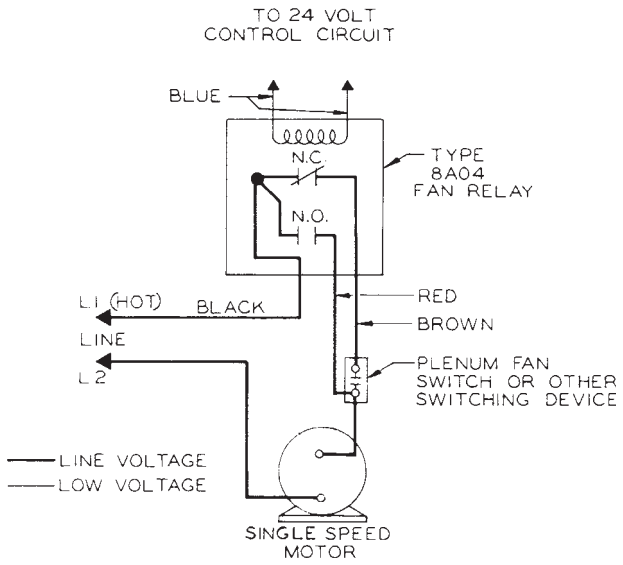


8A04-1 Typical Wiring

Using Type 8A04-1 With Two-Speed Motor



Using Type 8A04-1 With Single Speed Motor



NOTE: All wiring should be done according to local and national electrical codes and ordinances.

These wiring diagrams show connections to be made for various types of systems. Wiring to all safety controls (high limit, gas valve, pilot) must be N.E.C. Class 1 wiring or other approved safety wiring.

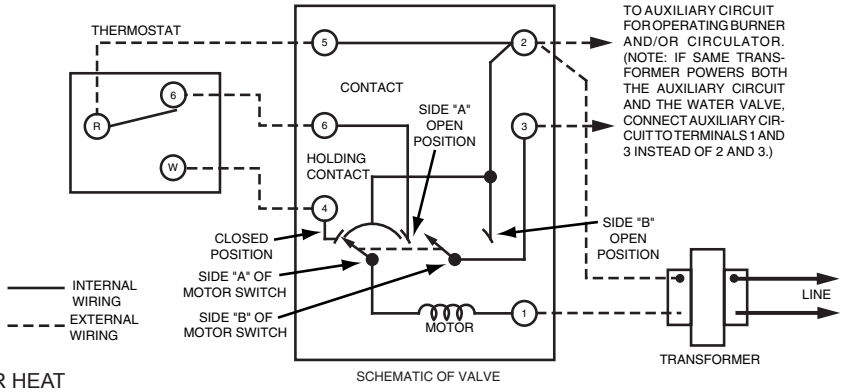
1311 Three-Wire Zone Valve

TERMINALS 1, 2 = POWER TO VALVE
1= 24 VAC NEUTRAL
2 = 24 VAC HOT

TERMINALS 5,4,6 = SPDT THERMOSTAT
5 = POWER (SAME AS 2 INTERNALLY)
4 = OPENS VALVE
6 = CLOSES VALVE

TERMINALS 2, 3 = AUXILIARY SWITCH
2, 3 BECOME SAME POINT ON CALL FOR HEAT

TERMINALS 1, 3 = POWER OUT TO AUXILIARY CIRCUIT ON CALL FOR HEAT



TROUBLESHOOTING:

1) Attach a voltmeter to terminals 1 and 2. Power (24 volts) should always be present on 1 and 2. If power is interrupted check transformer or power source.

2) With a voltmeter attached as above, jumper terminals 5 and 4 to verify the valve opens. If power is present on 1 and 2 but the valve fails to open check connections. Replace motor assembly (replacement Motor # F19-0097) if condition persists. When the valve opens, break the connection between 5 and 4 and jumper between 5 and 6. The valve should close. If the valve fails to close replace motor assembly.

3) Terminals 2 and 3 (auxiliary circuit) become the same point electrically when the valve opens. Because terminal 2 is 24 volts hot, a voltmeter should read 24 volts between terminal 3 and terminal 1 (neutral) when the valve is open.

Note: If the auxiliary circuit terminals (2 and 3) are being attached to a control circuit with a separate transformer the transformers must be in phase or one transformer may be damaged. If phasing the transformers is not possible a 24 volt isolation relay can be installed with the coil attached to terminals 1 and 3 and the contacts can be used to operate the control circuit. The relay will energize when the valve opens.

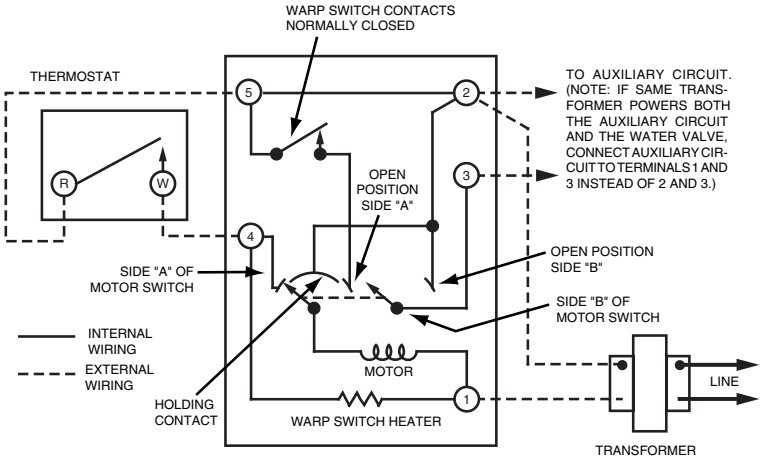
For complete installation instructions visit our website.

1361 Two-Wire Zone Valve

TERMINALS 1, 2 = POWER TO VALVE
1= 24 VAC NEUTRAL
2 = 24 VAC HOT

TERMINALS 2, 4 = SPST THERMOSTAT
MAKE TO OPEN, BREAK TO CLOSE

TERMINALS 2, 3 = AUXILIARY SWITCH
2, 3 BECOME SAME POINT ON CALL FOR HEAT



TERMINALS 1, 3 = POWER OUT TO AUXILIARY CIRCUIT ON CALL FOR HEAT

TROUBLESHOOTING:

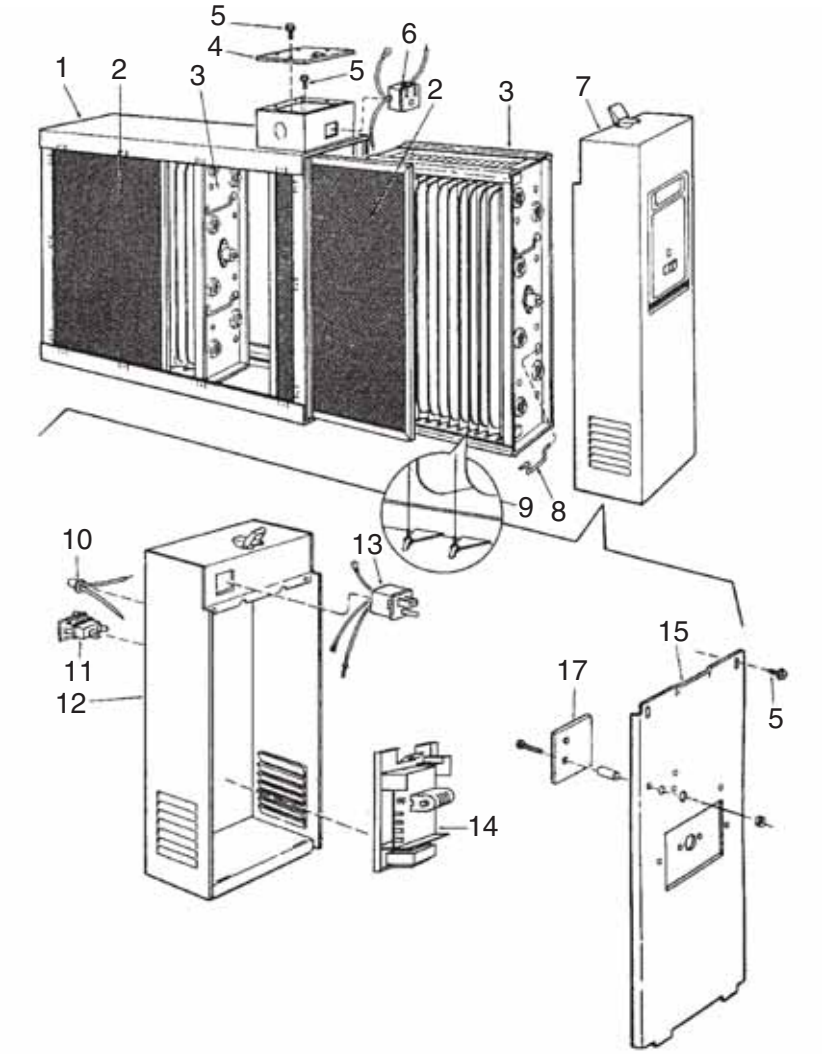
1) Attach a voltmeter to terminals 1 and 2. Power (24 volts) should always be present on 1 and 2. If power is interrupted check transformer or power source.

2) With voltmeter attached as above, jumper terminals 2 and 4 to verify the valve opens. If power is present on 1 and 2 but the valve fails to open check connections. Replace motor assembly (Replacement Motor # F19-0104) if condition persists. When the jumper is removed between 2 and 4 the valve should close. If the valve fails to close replace motor assembly.

3) Terminals 2 and 3 (auxiliary circuit) become the same point electrically when the valve opens. Because terminal 2 is 24 volts hot, a voltmeter should read 24 volts between terminal 3 and terminal 1 (neutral) when the valve is open.

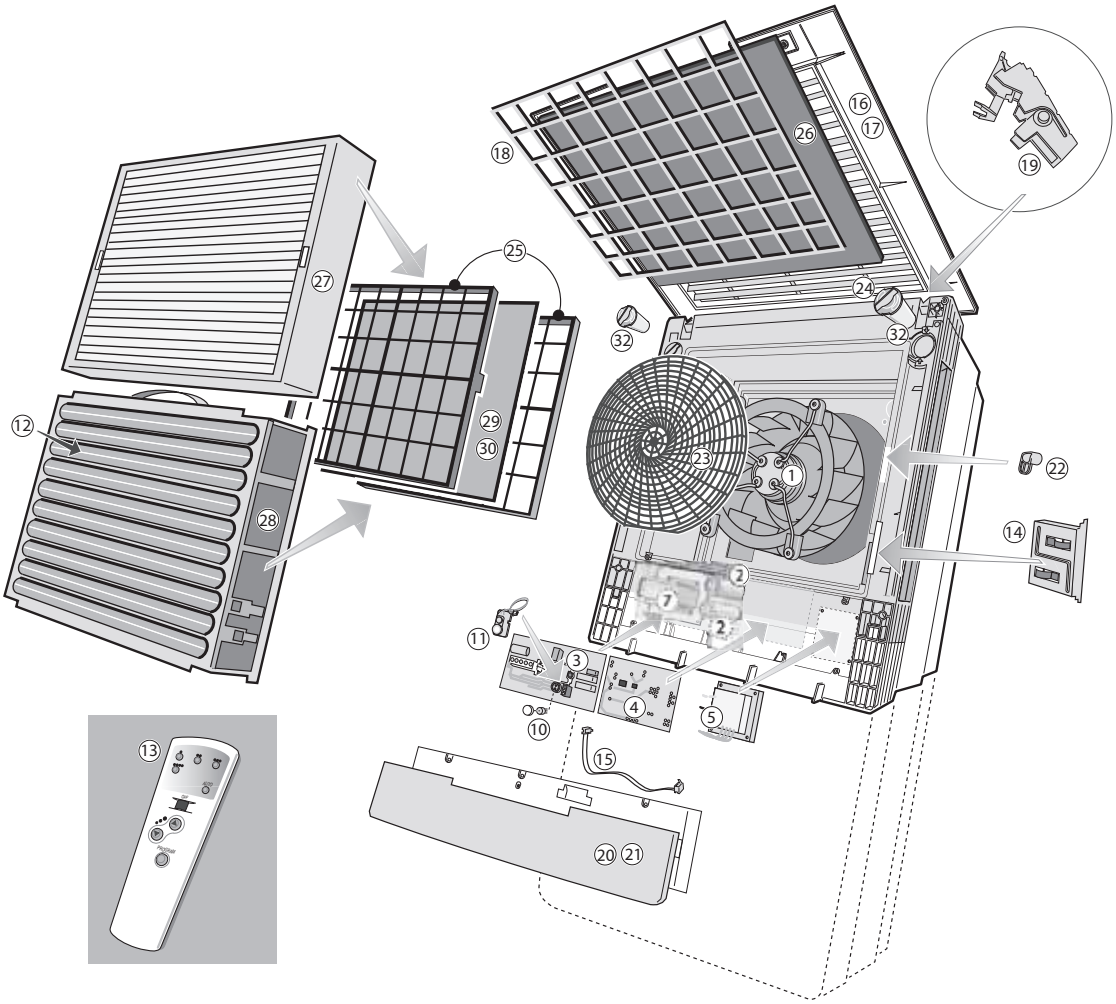
Note: If the auxiliary circuit terminals (2 and 3) are being attached to a control circuit with a separate transformer the transformers must be in phase or one transformer may be damaged. If phasing the transformers is not possible a 24 volt isolation relay can be installed with the coil attached to terminals 1 and 3 and the contacts can be used to operate the control circuit. The relay will energize when the valve opens.

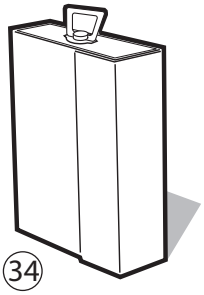
For complete installation instructions visit our website.

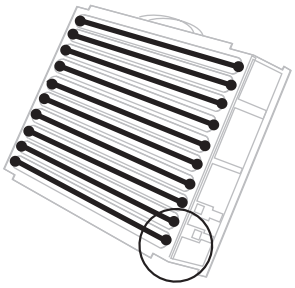


ITEM NO.	DESCRIPTION	SST1000-101 / 151	SST1400-101 / 151	SST1600-101 / 151	SST2000-101 / 151
1	Cabinet	N/A	N/A	N/A	N/A
2	Pre-Filter	• F825-0431	• F825-0432	• F825-0337	• F825-0338
3	Collecting Cell	• F811-0398	• F811-0397	None	• F811-0319
4	Junction Box Cover	None	None	None	None
5	Screw #6 X 3/8 *	–	–	–	–
6	Connector, Female	F818-0053	F818-0053	F818-0053	F818-0053
7	Power Pack Assembly without Air Flow	None	None	None	None
	Power Pack Assembly with Air Flow	None	None	None	None
8	Cell Handle	None	None	None	None
9	Ionizing Wire	F843-0484	F843-0484	F843-0500	F843-0500
10	Light	F844-0130	F844-0130	F844-0130	F844-0130
11	Switch	F876-0202	F876-0202	F876-0202	F876-0202
12	Power Pack, Cabinet Only	N/A	N/A	N/A	N/A
13	Connector, Male	F827-0026	F827-0026	F827-0026	F827-0026
14	Power Supply	F858-1002	F858-1002	F858-1002	F858-1002
15	Cover, Power Pack	None	None	None	None
16	Manual †	37-6373E	37-6373E	37-6373E	37-6373E
17	Charcoal Filter (with mounting clips) †	F825-0466	• F825-0467	• F825-0468	• F825-0469
18	Air Flow Switch (monitor kit) ††	F859-0381	F859-0381	F859-0381	F859-0381
	Power Cord, 6 ft., 120 V †	None	None	None	None

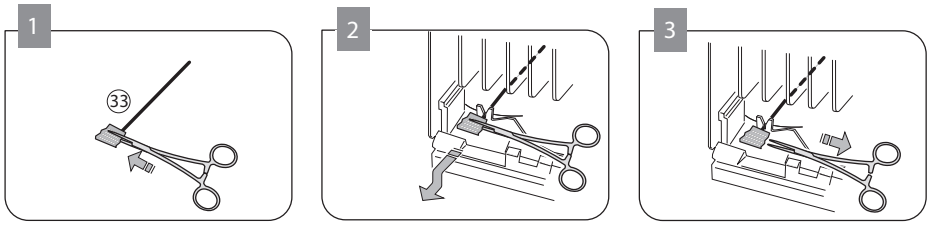
* Standard Hardware Item
• Two Required
† Not Shown
†† Kit converts -100 models to Air Flow Switch. -150 models include Air Switch





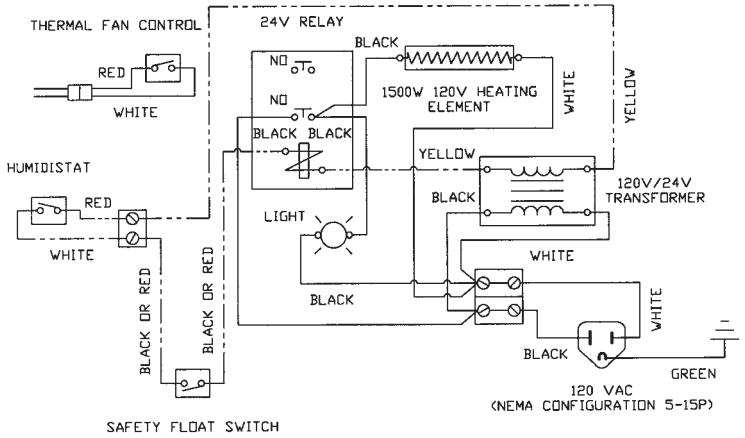


Replacement ionizing wires electronic cell

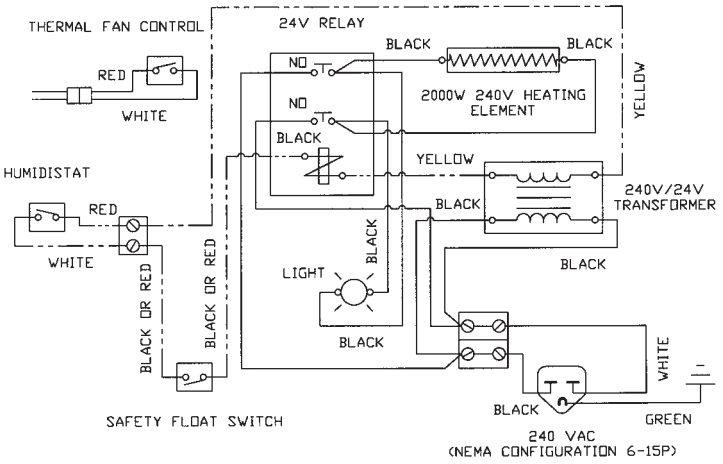


Pos.	White-Rodgers Model Number	Description	UL	Units where used							
				MCS600W	MCS600B	MCD1200W	MCD1200B	ECS750W	ECS750B	ECD1500W	ECD1500B
Electrical components											
1	F849-0064	Motor + fan (120V / 1ph / 60Hz)	x	x	x	x	x	x	x	x	x
2	F809-0095	Capacitor 5,0 µF (120V / 1ph / 60Hz)	x	x	x	x	x	x	x	x	x
3	F859-0386	PC board control	x	x	x	x	x	x	x	x	x
4	F859-0387	PC board HT	x					x	x	x	x
5	F881-0241	HT transformer (120V / 1ph / 60Hz)	x					x	x	x	x
7	F881-0242	Transformer motor (120V / 1ph / 60Hz)	x	x	x	x	x	x	x	x	x
8	F881-0244	Choke 120V / 60Hz Kit UV Light	x	x	x	x	x	x	x	x	x
10	F829-0014	Fuse 4,0 A-T (120V / 60Hz)	x	x	x	x	x	x	x	x	x
11	F848-0389	Sensor module Air Quality Analyzer	x	x	x	x	x	x	x	x	x
12	F843-1398	Ionizing wires collecting cell (set of 10)	x					x	x	x	x
13	F848-0390	Remote control	x	x	x	x	x	x	x	x	x
14	F819-0160	Contact board	x					x	x	x	x
15	F843-1399	Flatcable	x					x	x	x	x
Mechanical components											
16	F831-0131	Inlet grid white	x	x	x	x	x	x	x	x	x
17	F831-0132	Inlet grid bronze	x	x	x	x	x	x	x	x	x
18	F828-0212	Frame prefilter	x	x	x	x	x	x	x	x	x
19	F833-0023	Hinge inlet grid	x	x	x	x	x	x	x	x	x
20	F820-0355	Base cover white	x	x				x			
21	F820-0356	Base cover bronze	x		x				x		
22	F839-0020	Turning knob electronic cell	x					x	x	x	x
23	F828-0213	Fan protection frame	x	x	x	x	x	x	x	x	x
24	F820-0357	Cover fragrance gel	x	x	x	x	x	x	x	x	x
25	F828-0214	Frame activated carbon filter	x	x	x	x	x	x	x	x	x
Spare filters											
26a	F825-0630	Prefilter (2 pcs)	x	x	x	x	x	x	x	x	x
27b	F825-0633	Media filter (2 pcs)	x	x	x	x	x				
28	F825-0634	Electronic cell	x					x	x	x	x
29a	F825-0635	Activated carbon filter (2 pcs)	x	x	x	x	x	x	x	x	x
30a	F825-0628	Activated carbon filter Odor Free (2 pcs)	x	x	x	x	x	x	x	x	x
30b	F825-0629	Activated carbon filter Odor Free (2 pcs)	x	x	x	x	x	x	x	x	x
32	F848-0391	Fragrance gel (2 pcs)		x	x	x	x	x	x	x	x
	F801-0198	ComfortPro Level 1 service kit includes: 6 prefilters, 1 media filter, 6 activated carbon filters		x	x	x	x	x	x	x	x
	F801-0199	ComfortPro Level 2 service kit includes: 12 prefilters, 2 media filters, 12 activated carbon filters		x	x	x	x	x	x	x	x
	F801-0202	ComfortPro service kit includes: 12 prefilters, 12 activated carbon filters		x	x	x	x	x	x	x	x
General components											
33	F848-0386	Service tool for ionizing wires electronic cell						x	x	x	x
34	F810-0360	Service transport box electronic cell						x	x	x	x
	F801-0193	Wall mounting kit for single air cleaner (option)		x	x			x	x		
	F801-0194	Corner Wall Mount Hardware Kit		x	x			x	x		
	F801-0195	Ceiling mount kit		x	x	x	x	x	x	x	x
	F801-0196	Recessed ceiling mount kit for single air cleaner		x	x			x	x		
	F801-0197	Recessed ceiling mount kit for double air cleaner									x
	F848-0384	Pedestal mount for single air cleaner (option)		x	x			x	x		
	F848-0388	2 UV replacement bulbs only		x	x	x	x	x	x	x	x

120 VOLT MODEL HSP2000



240 VOLT MODEL HSP2600



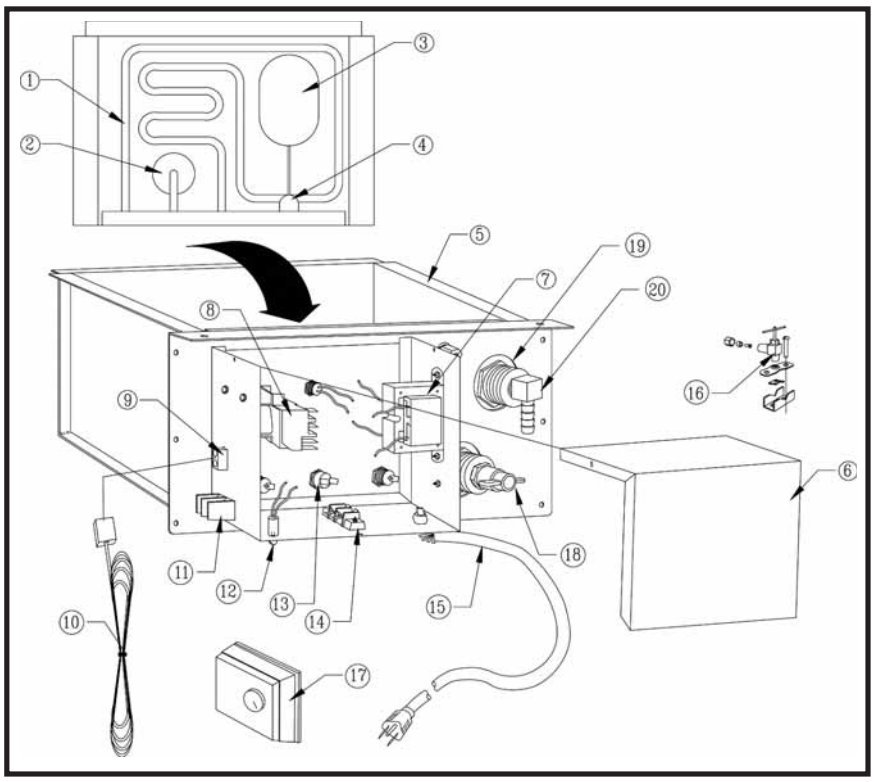
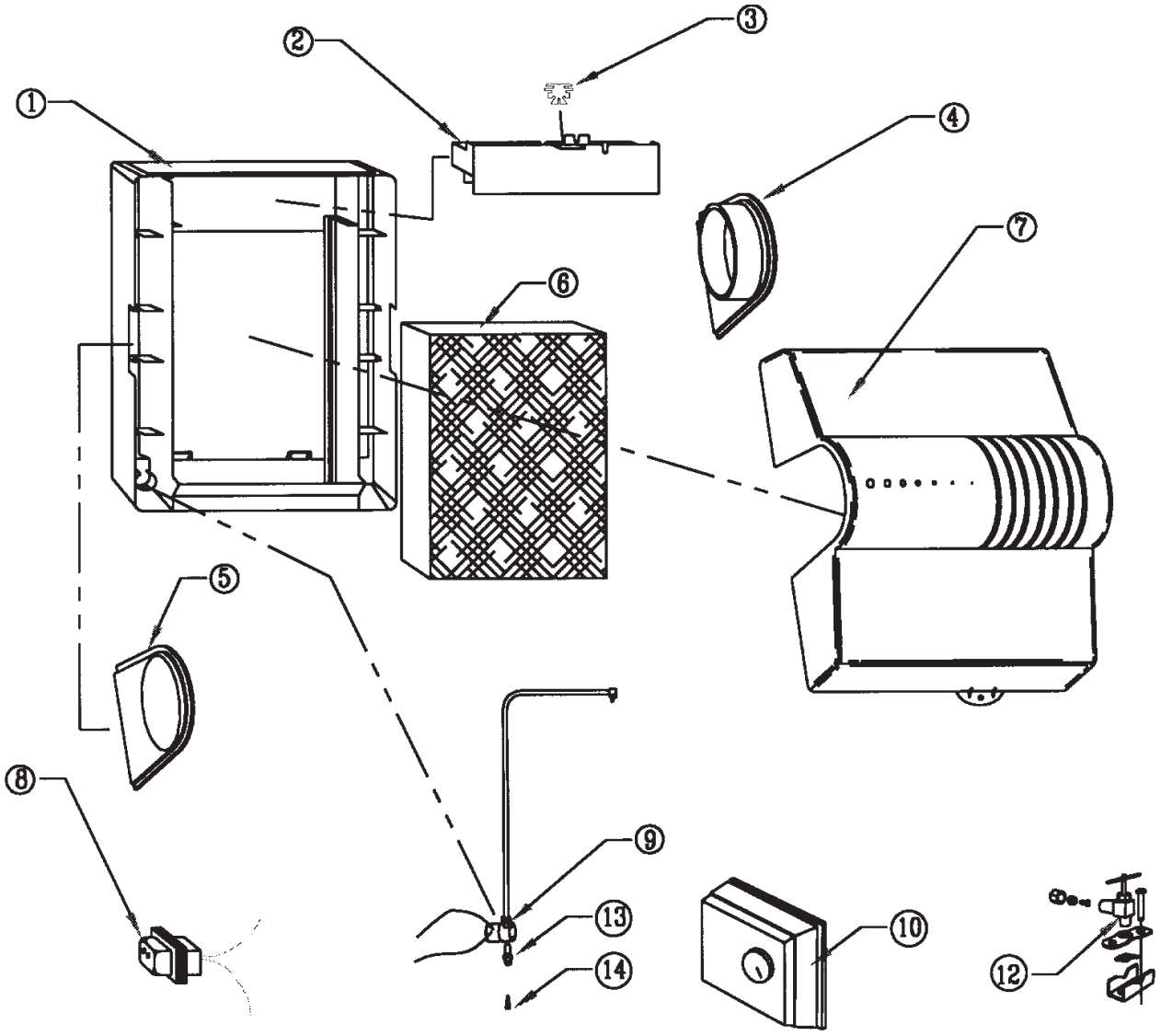


Figure 10—Parts Diagram of Models HSP2000 and HSP2600

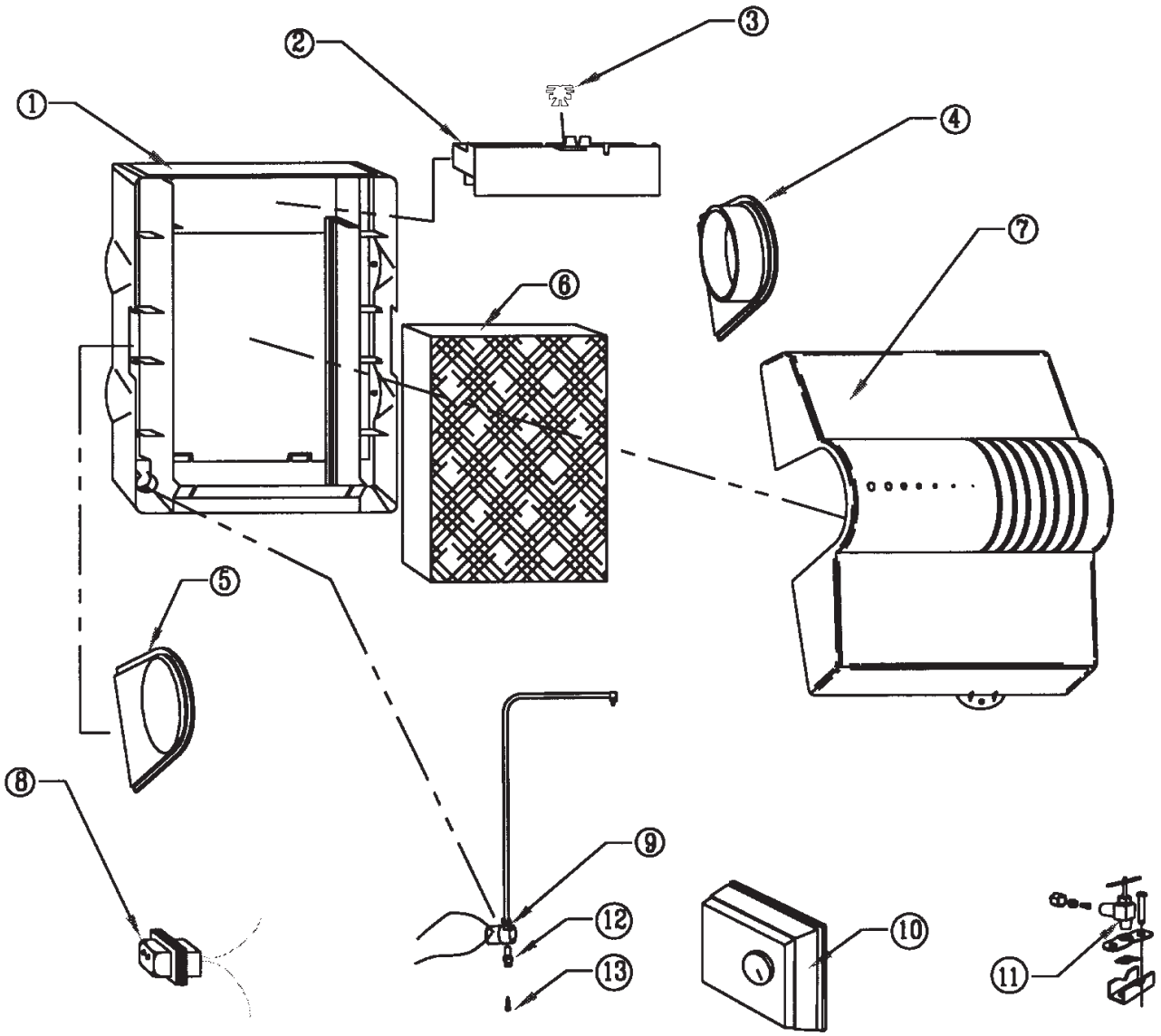
Parts for Models HSP2000 and HSP2600		
Item	**Part Name**	**Part No.**
1*	120 Volt Heater	000-0430-055
1**	240 Volt Heater	000-0430-056
2	Safety Float Switch	000-0814-132
3	Float for Water Fill Valve	A00-1309-012
4	Water Fill Valve	000-1731-012
5	Water Pan Assembly	A01-1730-078
6	Cover	N/A
7*	Transformer 120 Volt Primary, 24 Volt Secondary	000-0814-133
7**	Transformer 240 Volt Primary, 24 Volt Secondary	000-0814-140
8	Control Relay DPST 24 Volt	000-0431-031
9 & 10	Fan Wiring Assembly	N/A
11	Humidistat Control Terminal Block	000-0814-135
12	Indicator Light	000-0814-139
13	Thermal Fan Control "Thermostat"	000-0431-030
14	Power Distribution Terminal Block	N/A
15*	120 Volt Power Supply Cord	000-0811-107
15**	240 Volt Power Supply Cord	N/A
16	Saddle Valve	A00-1128-005
17	Compustat Assembly	N/A
18	Drain Cock Valve	000-1349-065
19	Drain & Overflow Bushing (w/ Overflow Bushing, Washer & Lock Nut)	A00-1319-067
20	90° Barbed Elbow	N/A
Not Shown	9 pc. Gasket Set (w/ Drain, Overflow, Thermostat, Safety Float & Heater Washers)	A00-0693-020

*Model HSP2000 **Model HSP2600



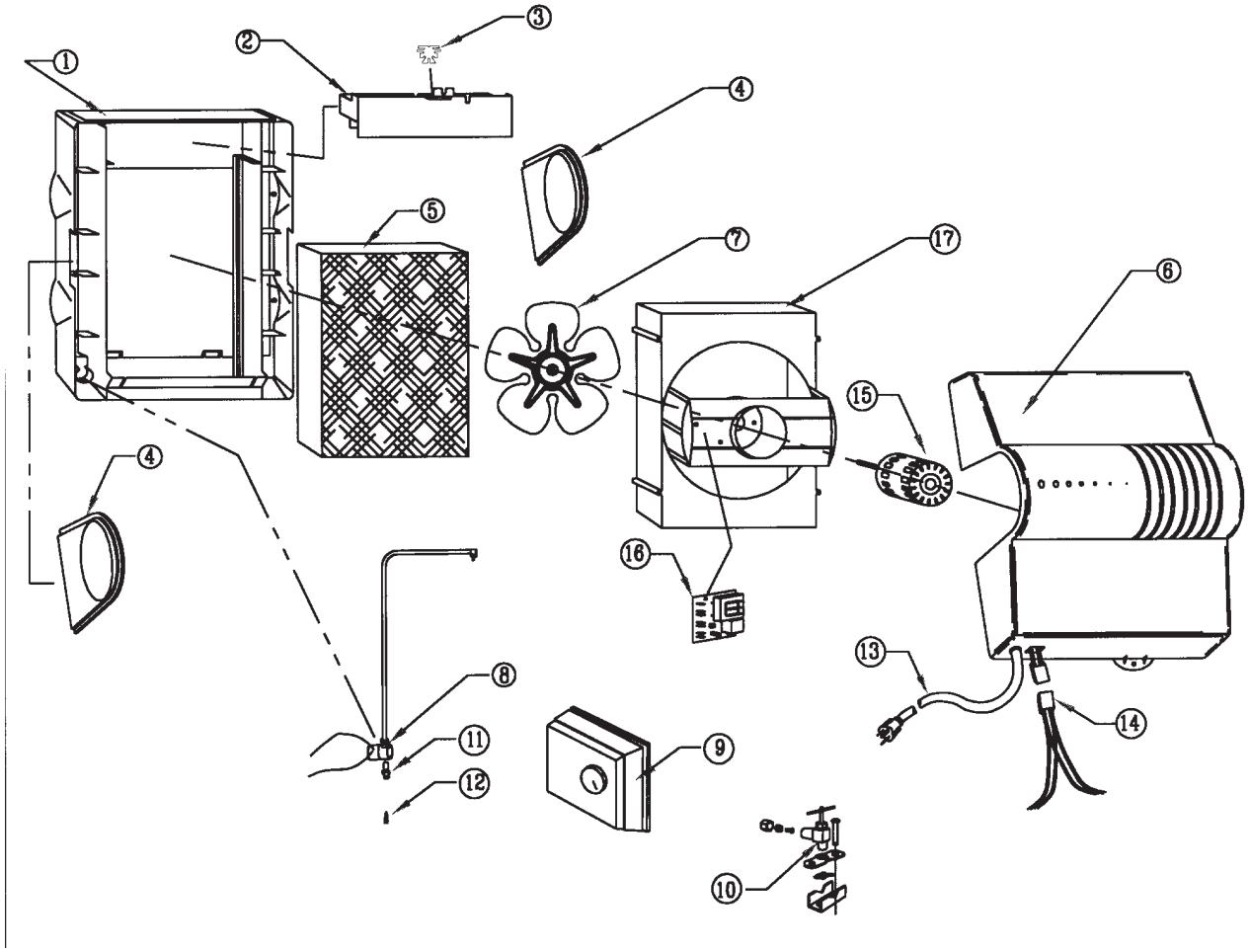
ITEM NO.	DESCRIPTION	MODEL NUMBER
1	MOUNTING BASE	–
2	DRIP TRAY	000-0602-055
3	WICK	000-1317-091
4	SIDE PIECE WITH COLLAR	–
5	SIDE PIECE W/O COLLAR	–
6	EVAPORATOR PAD INCLUDES KEY #3	PAD-A04-1725-052
7	COVER	–
8	TRANSFORMER 24V, 10 VA, 120V PRIMARY	000-0814-008
9	24V SOLENOID VALVE (UNIVERSAL KIT	WRA01-0814-148
10	HUMIDISTAT ASSEMBLY	2271-100
12	SADDLE VALVE ASSEMBLY	A00-1128-005
13	ORIFICE .020DIA.	000-1106-030
14	IN-LINE FILTER	000-1319-051
†	CURRENT SENSING RELAY	A50

† Not Shown



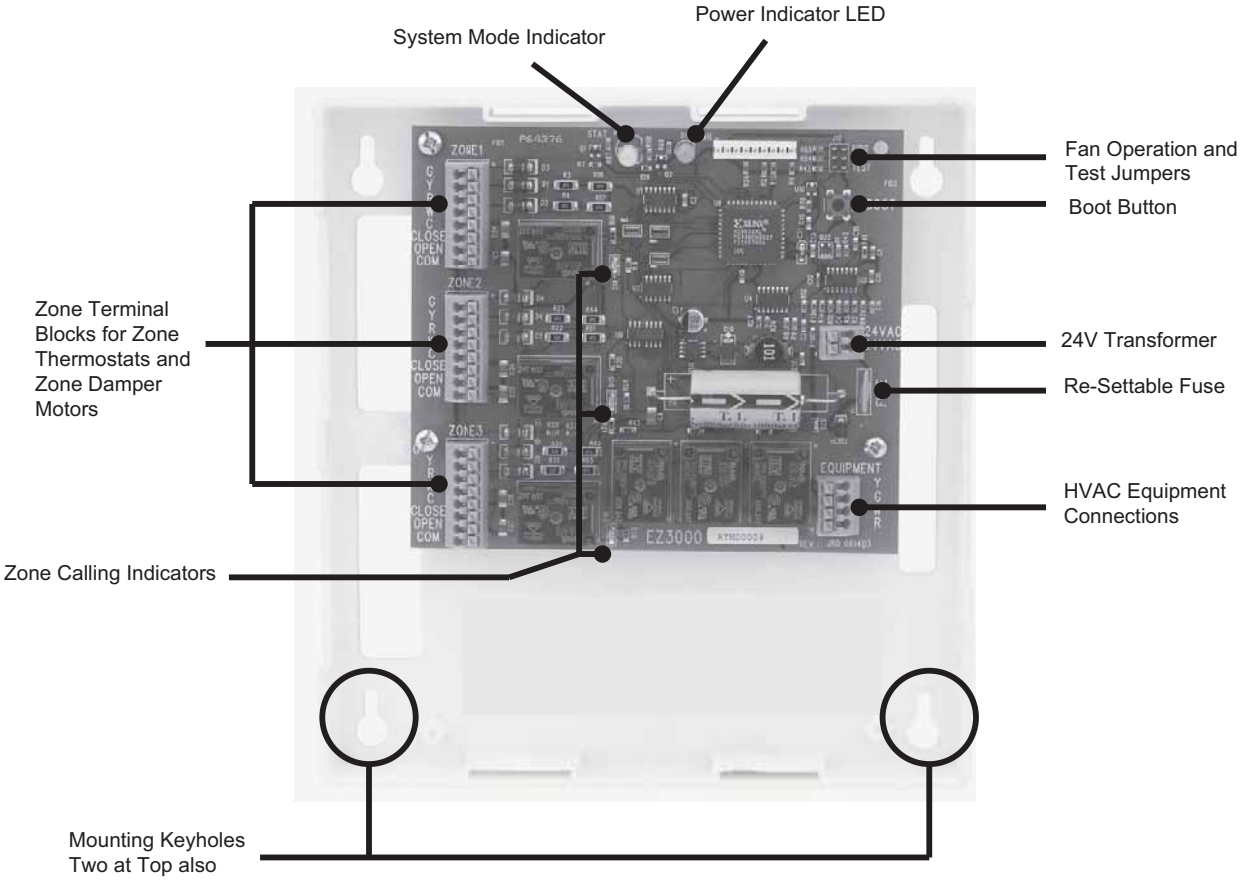
ITEM NO.	DESCRIPTION	MODEL NUMBER
1	MOUNTING BASE	000-1730-091
2	DRIP TRAY	000-0602-055
3	WICK	N/A
4	SIDE PIECE WITH COLLAR	NLA
5	SIDE PIECE W/O COLLAR	N/A
6	EVAPORATOR PAD INCLUDES KEY	PAD-A04-1725-051
7	COVER	N/A
8	TRANSFORMER 24V, 10 VA, 120V PRIMARY	000-0814-008
9	24V SOLENOID VALVE (UNIVERSAL KIT)	WRA01-0814-148
10	HUMIDISTAT ASSEMBLY	2271-100
11	SADDLE VALVE ASSEMBLY	A00-1128-005
12	ORIFICE .020DIA.	000-1106-030
13	IN-LINE FILTER	000-1319-051
†	22.5″ TUBING	NLA
†	CURRENT SENSING RELAY	A50

† Not Shown



ITEM NO.	DESCRIPTION	MODEL NUMBER
1	MOUNTING BASE	000-1730-091
2	DRIP TRAY	000-0602-055
3	WICK	N/A
4	SIDE PIECE W/O COLLAR	N/A
5	EVAPORATOR PAD INCLUDES KEY #3	PAD-A04-1725-051
6	COVER W/VENTS	A05-0641-169
7	10- DIA. FAN BLADE	NLA
8	24V SOLENOID VALVE (UNIVERSAL KIT)	WRA01-0814-148
9	HUMIDISTAT ASSEMBLY	2271-100
10	SADDLE VALVE ASSEMBLY	A00-1128-005
11	ORIFICE .020DIA.	000-1106-030
12	IN-LINE FILTER	000-1319-051
13	POWER SUPPLY CORD	N/A
14	2 PC. CONNECTOR ASSEMBLY	N/A
15	FAN MOTOR	000-1721-048
16	ISOLATION RELAY	000-0431-034
17	FAN SHROUD	N/A
†	SIDE PIECE WITH COLLAR	NLA
†	CURRENT SENSING RELAY	A50
†	22.5″ TUBING	NLA
†	120/24 VOLT TIMER 10VA	000-0814-008
†	COVER ATTACH KNOB	NLA

† Not Shown



INSTALLATION

The Emerson Zoning System-3 is a two (2) and three (3) zone control panel for single stage heating only, cooling only or heating and cooling. The CMM-3 can control any single stage gas-oil-electric furnace, hydro-air heating and air conditioning. The CMM-3 panel is the central control panel where all zone dampers, zone thermostats, HVAC Equipment and power transformer are wired. When installing the CMM-3 panel it is important to pick a central location where it is most convenient to bring all the wires. Most often this is at the furnace or air handler. It is often the most convenient location and closest to power, the HVAC unit controls and the zone dampers when typically located at or near the plenum.

The CMM-3 panel is made of sturdy ABS plastic and can be mounted to any flat surface. It is recommended that the panel be mounted to a wall or return plenum and NOT on the furnace or plenum where it will be in contact with the high temperatures. The panel can be located in an attic space or in an enclosed cabinet of a rooftop unit, provided the panel enclosed and not in direct exposure to the elements. The cover easily removes from the case by pulling firmly and separating the cover from the case exposing the circuit board. There are 4 key-hole mounting points in each corner of the case. The case has openings in the rear of the case as well as the side for all wiring. Wiring can come from the back as well as the side in order to make a neat installation.

OPERATION

The CMM-3 can controls single stage heating and cooling HVAC Equipment. The CMM-3 is compatible with any standard single stage thermostat and setback thermostats as well. The CMM-3 has various features that make installation and checkout very simple for all of the board's functionality. The CMM-3's basic function is zone control. On a call for heating or cooling, the panel will accept the first call from any zone. Upon accepting this call the CMM-3 will keep open the damper(s) to the zone calling; close the damper(s) to those zones not calling, activate the needed HVAC controls for heating or cooling, whichever is being called and not accept any calls for the opposite mode.

Any calls for the opposite mode will be locked out until the initial mode is either satisfied or a period of time has elapsed that is sufficient for the first mode to satisfy, a maximum of 20 minutes. A Patent Pending sequence determines the time the unit has been running or needs to continue to run in order to adequately provide conditioning for each mode. If a particular mode has already been calling for 20 minutes or longer and an opposite call comes in the CMM-3 will immediately drop the mode, enter the purge mode in order to dissipate the conditioned air into the zones calling before switching over to provide the new conditioning call to its zones.

PURGE TIME

Once a call is satisfied the CMM-3 drops the call for the heating or cooling unit controls, whichever was calling and hold the damper(s) to the zone(s) that were last calling during the Purge Mode. The Purge mode is nominally 2 minutes and allows the excess conditioned air in the plenum to be distributed only to the zone(s) that were last calling. This eliminates the problem of overshooting the temperature in the satisfied zones. During the Purge mode the panel can be set to keep the Fan running during Purge or to let the fan control in the HVAC unit to control the fan. By using the FIPG (Fan On-In Purge) jumper, on the top right corner of the control panel, this keeps the fan running until the Purge mode is over. This mode avoids the fan shutting off during the Purge mode and coming back on when another zone may be on constant fan after the Purge Mode is over. This may be more often used in commercial applications for continuous air circulation (CAC). In residential applications the fan remaining on, especially in heating, may be drafty and objectionable. Once all zone thermostats are satisfied for heating and cooling, the CMM-3 can now accept Fan calls allowing Continuous Air Circulation (CAC) in those zones where the thermostat's Fan Switch is set to ON. These zone dampers will be OPEN while the dampers to the zones where the Fan Switch is set to AUTO will be CLOSED. When all zone thermostats are satisfied for both Heating and Cooling, and all Fan switches are set to AUTO position, the HVAC unit will be off and all zone dampers will return to a normally open position. Once a zone calls for heating, cooling or fan, the dampers to the calling zones remain open and the dampers to the zones not calling will close.

HVAC EQUIPMENT SET UP

The CMM-3 is factory set for conventional fossil fuel (oil or gas) single stage heating and cooling. The panel only needs to be configured when using with a conventional electric furnace or hydro-air system in order to bring the fan on with a call for heat. By using the FIH (Fan On-In Heat) jumper, located on the upper right corner of the board, this allows the Fan to be activated with a call for heat. Once the heat call is satisfied the fan will shut off as well, as long as the FIPG jumper is off as well.

CHANGEOVER TIMER

Whenever a call is made for either heating or cooling, the changeover timer is activated in order to track the amount of time heating or cooling is on. When an opposite call is made after a first call is existing the changeover timer calculates the amount of time the unit has already been supplying the first mode in order to determine how long it will hold off the opposite call. If an opposite call is made shortly after the first call, the opposite call may be held off for as much as 20 minutes. If the first call or subsequent calls for the first call mode has had that mode operating for up to 20 minutes already and an opposite call comes in after 20 minutes, the changeover timer will immediately recognize the opposite call, shutting off the current mode, enter the purge mode and automatically switch to the opposite mode.

The longer a call has been running up to 20 minutes, the shorter the wait time will be for an opposite call. If a call is over 20 minutes and an opposite call is made the changeover will be immediate following the purge time. This intelligent changeover timing makes the CMM-3 unique to any other zoning system.

CHECKOUT

The CMM-3 has unique features that simplify the checkout of the system and has LED readouts that constantly indicate the system operation. Once 24 Volt Power is applied to the panel the Green Power LED will illuminate. This will stay illuminated constantly when power is applied.

The System LED will provide several different indications based upon color and if it is flashing.

Heat ON – RED
Heat Overlimit – RED Flashing
Cool ON – GREEN
Cool Overlimit – Green Flashing
FAN ON – AMBER
PURGE – AMBER Flashing

Each zone has its own small Green indicator LED next to each zone relay. This light is lit when the specific zoning is calling for the mode shown on the System LED.

WIRING

The CMM-3 is very simple to wire and requires only a minimum number of connections. The CMM-3 terminal blocks are screw-less and all wires can easily be pushed into their respective terminal by de-pressing the button for each point and releasing once the wire is seated. To remove the wire, just press its button again and remove the wire.

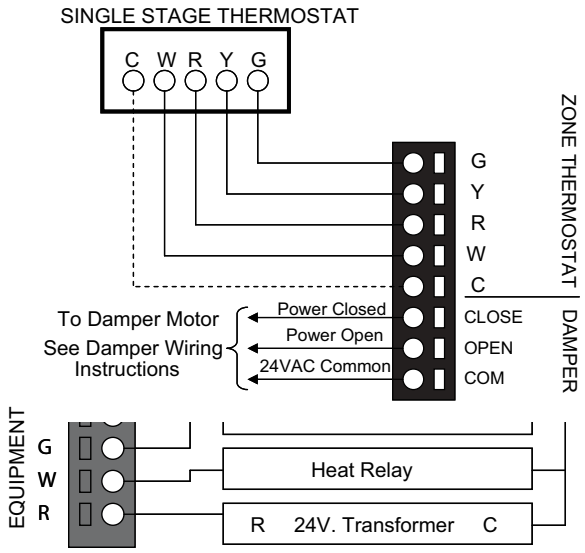
Zone Dampers – The CMM-3 can power any 24VAC damper, either 2 wire or 3 wire. See specific wiring instructions with the damper and inside panel cover.

Zone Thermostats – The thermostats wiring will for single stage can be four or five wire. The fifth wire being the C-Common terminal for 24 Volt powered thermostats. There are 5 terminals on the CMM-3 for each thermostat, marked Y-G-R-W-C. This wiring is shown on Wiring Diagram 1 for single stage thermostats.

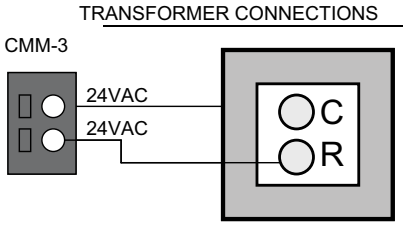
HVAC Equipment – The HVAC equipment will follow Wiring Diagram 2 for Single Stage Systems.

Transformer – A separate 24 Volt AC, 40VA Transformer is recommended to power the control panel and dampers. Often the transformer on the HVAC unit only has enough power for its own controls. Therefore it is recommended a separate transformer be used to power this panel and the dampers wired to it.

WIRING DIAGRAM 1 – Zone Thermostat and Damper



WIRING DIAGRAM 3 – 24 Volt AC, 40 VA Transformer

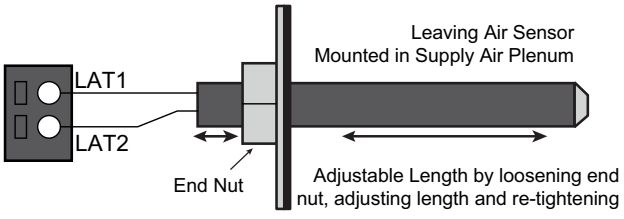


LEAVING AIR SENSOR (CLAS)

The Leaving Air Sensor, Model CLAS, is a remote sensor that is located in the supply air duct to sense the leaving air temperature of the HVAC Unit. The CLAS is a high limit protection for the heating and a low limit protection for the cooling. When zoning, the airflow through the HVAC Unit is critical. The CLAS protects the equipment in low air flow situations as well as when by-pass air is being directed back into the return air duct.

The heating limit is fixed at 180°F. The cooling limit is fixed at 40°F. When the CLAS senses heating above its set point, or cooling below its set point, the CMM3 will drop both stages of heating or cooling. The CLAS must sense a 10°F fall for heating or rise for cooling before re-activating the first stages of heating or cooling. If two stage heating or cooling is being used the second stage timer will start again once the first stage is re-activated.

The CLAS requires 2 wires from the sensor to the LAT terminals on the CMM3 panel. The CLAS probe can also be adjusted for length by loosening the end nut and sliding the probe thru the mounting plate in order for the probe to pass through any duct insulation.



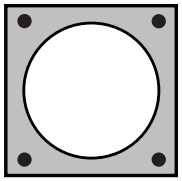
NOTE: If the CLAS is not used, the NO SENSOR jumper located just above the LAT terminals must be on the pins.

TROUBLESHOOTING

The CMM-3 is a very simple control to troubleshoot, especially with the LED indicators. The only other device needed is a simple Volt/Ohm meter.

The first check is for 24VAC Power to the panel. When there is power the Green Power LED will be lit. If not check the transformer and the power supply to it.

Almost all problems can be traded to an external component or wiring to the CMM-3. While the CMM-3 has been designed to operate under extreme voltage conditions and is fuse protected, like any computer the micro-processor can hang up and not operate properly. For these instances a BOOT button has been installed that re-boots the micro-processor just like your computer. Pressing this button for a few seconds and then release it will allow the micro-processor to re-boot and in most all cases eliminate the problem. If not the following procedure can help isolate the problem.



Zone(s) Not Calling
Each zone has a Green LED next to the zone relay when it is calling. The LED being lit shows that the call is being recognized by the CMM-3. If a zone is supposed to be calling and the Zone LED is not on, check for 24VAC across the thermostat terminal C and the Y, if a Cool call, W if a Heat Call, or G if a Fan call. If there is no voltage here at the panel the panel is not getting the signal from the thermostat. The problem is mis-wiring, a broken wire or a problem in the thermostat. To check the zone on the panel, place jumper from R to Y to simulate a Cool call, R to W to simulate a Heat call, or R to G to simulate a Fan call. By jumpering these terminals the zone call LED will activate.

Zone(s) Will Not Shut Off
If a zone will not stop calling, the Zone LED should still be on. Depending on the call disconnect the Y, W or G wire from the terminal strip. The zone will drop out. Check the thermostat wiring for a mis-wiring or short that keeps the zone calling.

Damper Motor Checkout
To checkout the dampers, the panel provides 24VAC to the COM and OPEN terminal when the damper is to be open and 24VAC to COM and CLOSE when the damper is to be CLOSED. When any zone is calling and its Green LED is ON, there is 24VAC across COM and OPEN. The only time a damper will close is when another zone is calling and its zone is not calling. In this instance there will be 24VAC across COM and CLOSE terminals. Refer to the instructions with each damper for their individual checkout.

CSPRD STATIC PRESSURE REGULATING DAMPER

White-Rodgers

BAROMETRIC RELIEF DAMPERS

The Static Pressure Regulating Dampers, Model CSPRD, are barometric relief dampers used to by-pass excess air pressure on zoned systems. The CSPRDs automatically respond to the air pressure in duct as the various zone dampers open and close.

As zone dampers close off air to a number of zones, the supply air pressure in the duct system will increase. This increase in air pressure can increase the noise level and reduce the flow of conditioned air through the HVAC Unit. Using the CSPRD solves this by automatically compensating for the excess air pressure by opening on the increased pressure and relieving the excess air. The CSPRD helps maintain a constant air pressure in the duct system. This reduces noise that is caused by high air pressures and velocities, as well as maintains a constant volume of air (CFM) through the duct system. Maintaining a constant volume of air through the HVAC System keeps the efficiency of the system at its maximum.

CALCULATING BY-PASS AIR REQUIREMENTS

Determining the need for by-pass air and the size of the SPRD required is very simple. It can be very simply calculated by knowing the total CFM capacity of the HVAC unit (T_{CFM}) and subtracting the CFM capacity of the smallest zone (S_{CFM}) will equal the CFM of air required to be by-passed (B_{CFM}).

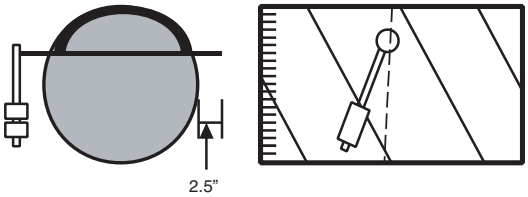
T_{CFM}	-	S_{CFM}	=	B_{CFM}
Total CFM		Smallest Zone CFM		By-Pass CFM

Once the by-pass amount of air is known, use the chart above to select an appropriately sized by-pass damper. It is always recommended to have a larger size by-pass than having one that is too small. It is much easier to reduce by-pass air through the damper or close it off than having to increase the size of the by-pass duct and/or damper.

LOCATION

Selecting a location to place the SPRD is very important for overall system operation. Ideally the best place for the SPRD is as far away from the air handler as possible and before any zone dampers. In an extended plenum application where zones come off the side of the main trunk, the end of the extended plenum is the ideal situation.

In most residential applications however the zone dampers are right at the plenum of the air handler. In this application the only location for the CSPRD is at the plenum. In this application, especially when the CSPRD is ducted to the return, it is recommended that a freeze protection, Model AFC, be used as well as the supply air sensors with the zoning panel to protect the equipment from overheating or cooling due to the return by-pass.

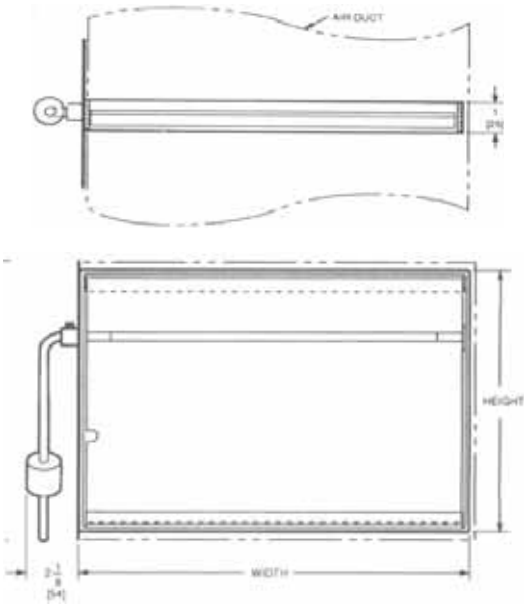


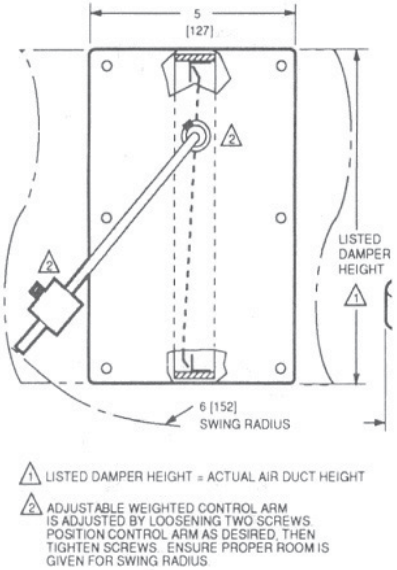
Most CSPRD installations are typically in horizontal ducts where the CSPRD control blade will close vertically. The CSPRD can also be installed in vertical ducts as well, however the counter balanced, weighted arm must be adjusted to offset the weight of the blade. See installation instructions for further information on this application.

The CSPRD has a weighted control arm that counter balances the weight of the damper blade. The weight adds pressure to the blade to control the amount of air by-passed. The weight can be adjusted up or down on the arm depending upon the amount of air to be by-passed.

In addition to the adjustment of the weight the arm can also be moved in order to add leverage for the weight to push against the blade to add more resistance.

To adjust the CSPRD, first all zones dampers must be open and the fan operating. When all dampers are open the CSPRD should be closed. In some instances the damper may be open slightly, especially when the CSPRD is installed as a true by-pass between the supply and return ducts. This occurs frequently when the damper is closest to the plenum.





1 LISTED DAMPER HEIGHT = ACTUAL AIR DUCT HEIGHT

2 ADJUSTABLE WEIGHTED CONTROL ARM IS ADJUSTED BY LOOSENING TWO SCREWS. POSITION CONTROL ARM AS DESIRED, THEN TIGHTEN SCREWS. ENSURE PROPER ROOM IS GIVEN FOR SWING RADIUS.

SINGLE BLADE, ROUND, SPRING RETURN DAMPERS

The CRDS series are galvanized steel, single blade dampers compete with a 24 Volt, spring return motor actuator. These dampers are shipped complete and ready for installation. The CRDS can be installed in any position in any properly sized duct. All CRDS dampers are rated for duct systems less than 1.0" W.C.

All CRDS dampers are typically shipped as Normally Open dampers that are powered closed and spring returned opened. The CRDS is also unique in that it can be field converted from powered closed to powered open in less than a couple of minutes.

A 24 Volt AC, 50/60 Hz, spring return damper motor, powers the CRDS. The motor powers the damper closed and spring returns the damper open for fail-safe operation. Providing power to the damper drives the damper closed. Removing power from the motor allows the motor to spring back to the open position.

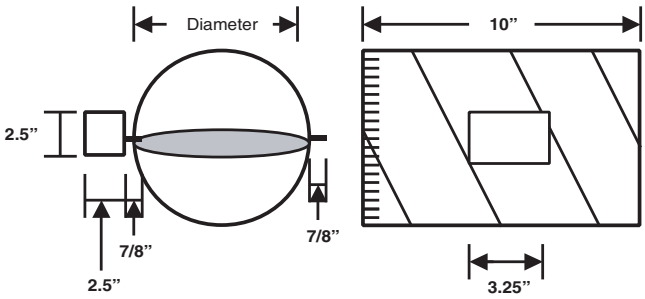
The 24 Volt, hysteresis, synchronous motor has been tested to over 250,000 cycles to provide long life. Even replacing the motor is a simple less than one (1) minute change by loosening the setscrew holding the motor onto the damper.

The CRDS motor also has a simple adjustment for setting the damper to a minimum position. A minimum position allows for excess by-pass air. To set a minimum position, loosen the setscrew, align the setscrew to the minimum position label and re-tighten.

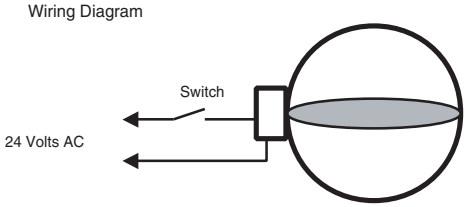
Minimum Position Adjustment

The minimum position screw can also be used to determine the damper position. The setscrew is aligned with the position of the damper blades. When the setscrew is in line with the duct, pointed at the Closed on the minimum position label, the damper is actually open. When it is hidden behind the motor and stopped against the anti-rotation post on the motor, it is Closed or at the minimum position.

Dimensional Drawing



Wiring Diagram



Damper Dimensions and Weights

Diameter		Length		Weight	
Inches	MM	Inches	MM	Lbs.	Kg
5"	127	10"	254	4lbs.	1.82
6"	152	10"	254	4lbs.	1.82
8"	203	10"	254	5lbs	2.26
9"	238	10"	254	7lbs.	3.18
10"	254	10"	292	7lbs.	3.18
12"	305	10"	336	9lbs.	4.08
14"	356	10"	394	12lbs.	5.44
16"	406	10"	451	15lbs.	6.80
18"	457	10"	482	19lbs.	9.09

Damper Specifications

Linkage – Direct Drive
Motor Voltage – 24 Volts AC, 50 / 60 Hz, 6.5 Watts, 7VA
Torque – 35in-oz to 55in-oz
Duct Pressure – Maximum 1.0" W.C.

A GUIDE TO THE WHITE-RODGERS NUMBERING SYSTEM

Older models start with the dash in the basic Model Number, then working to the left, eliminate all letters. The number remaining will give you the Series and Control Category listed in the box below.

Example: **1F56-301**
Leave out the letter **F**, the number remaining is **156** or a **100 Series** of Room Thermostats

Example: **21D18-3**
Leave out the letter **D**, the number remaining is **2118** or a **2100 Series** of Pre-Packaged Kits

Series	Control Category	Series	Control Category	Series	Control Category
100	Room Thermostats	900	Flame Detectors	2400	Sequencers and Time Delay Relays
200	Space Thermostats	1000	Temperature Controls	2500	Solenoid Gas Valves
300	Fan or Limits	1100	Hot Water Controls	3000	Mercury Flame Sensors
400	Limits, Fans and Temperature Controls	1300	Zone Valves and Hydronics	3400	Commercial Motor Actuators
500	Fan, Limit or Fan and Limits	1600	Refrigeration Temperature Controls	3600	Combination Gas Manifold Valves
600	Oil Controls	1700	Refrigeration Temperature Controls	3700	Gas Water Heater Controls
700	Miscellaneous Controls	2000	Motorized Zone Dampers	3900	Commercial Economizers
800	Relays	2100	Pre-Packaged Kits	5000	Ignition Components

MODEL AND TYPE NUMBER EXAMPLES

SERIES	100	800	3600	Allows for up to 100 basic models in each series
MODEL	165	848	3603	Basic model number within a series
MODEL	1A65	8B48	36C03	Letter after first or second digit of Model number identifies another control model after the basic model, which allows expansion of the numbering system
MODEL		8B48A	36C03U	Letter after Model number (or absence of letter) identifies operator coil voltage* (see table below)
TYPE	1A65-641	8B48A-217	36C03U-333	Dash number identifies a specific device within a control model. Model number plus dash number/ type number

VOLTAGE DESIGNATIONS (60 Hz)

Code *	Voltage	Voltage Designations on Gas Valves & Switching Relays		
No Letter	24 VAC	No Letter —	24 VAC	36C03-333
A	120 VAC	Letter A —	120 VAC	36C03A-310
E	208 VAC	Letter E —	208 VAC	24A06E-1
G	240 VAC	Letter G —	240 VAC	24A06G-1
U	750mv DC	Letter U —	750mv DC	36C03U-333
Z	SPECIAL	Letter Z —	SPECIAL	24A06Z-1

COMMENTS
* These designations only apply to power consuming devices that operate at a specific voltage (relays, solenoids, gas valves, motors, etc.) They are not used with thermostats or temperature controls.

SINGLE STAGE MECHANICAL LOW VOLTAGE THERMOSTAT LEGEND

	Vertical	Horizontal	Example
Snap Action Contacts	C	D	1C30, 1D35
*Mercury Bulb Switch	E	F	1E30, 1F56

*Mercury bulb thermostats are no longer produced. See current models for specifications.

PIPE SIZE DESIGNATIONS (GAS VALVES ONLY)

PIPE SIZE	SUFFIX NO.
3/8 x 3/8	1 thru 49
1/2 x 1/2 INV. FL.	50 thru 74
3/4 x 1/2	75 thru 90
1/2 x 3/8	100 thru 199
1/2 x 1/2	200 thru 299
1/2 x 3/4	300 thru 399
3/4 x 3/4	400 thru 499

A GUIDE TO THE WHITE-RODGERS DATE CODING SYSTEM

Year	Code	Year	Code	Year	Code	Year	Code
1939	A	1945	G	1951	N	1957	V
1940	B	1946	H	1952	P	1958	W
1941	C	1947	J	1953	R	1959	X
1942	D	1948	K	1954	S	1960	Y
1943	E	1949	L	1955	T	1961	Z
1944	F	1950	M	1956	U	1962	AA

1939-1962 — Letter indicated year of manufacture
— 1 or 2 digit number (1-52) indicated week of manufacture
Example: **X49** was the 49th week of 1959

1963-1975 — First 1 or 2 digit number indicated month of manufacture (1-12)
— Following two digit number indicated year of manufacture (63-75)
— Letter following numbers indicated week of manufacture (A-E)
Example: **1175C** was the 3rd week of November, 1975

1976-present — First two digits indicate year of manufacture (15-20)
— Last two digits indicate week of manufacture (15-20)
Example: **1520** was the 20th week of 2015

ELECTRIC

CONVERSION TABLE FOR WATTS – AMPERES – VOLTS

Watts	Voltage (AC – Single Phase)			
	120	208	240	277
	Amperes			
500	4.2	2.4	2.1	1.8
1000	8.3	4.8	4.2	3.6
1500	12.5	7.2	6.3	5.4
2000	16.7	9.6	8.3	7.2
2500	20.9	12.0	10.4	9.0
3000	25.0	14.4	12.5	10.8
3500	29.2	16.8	14.6	12.6
4000	33.3	19.2	16.7	14.4
4500	37.5	21.6	18.8	16.3
5000	41.7	24.0	20.8	18.0

HEAT AND POWER EQUIVALENTS

1 Btu ..... 252 calories
1 Btu/Hr ..... 0.293 watts
1 Watt ..... 3.413 Btu/Hr
1 Kw (1000 Watts) ..... 3413 Btu/Hr
1 Hp. ..... 0.746 Kw

PRESSURE CONVERSION TABLE

1″ Water ..... 0.0361 lbs/sq. in. or 0.0735 in. Mercury
1″ Mercury ..... 13.6 in. water or 0.491 lbs/sq. in.
1 PSI ..... 27.7 in. water or 2.036 in. Mercury

MAXIMUM WIRE LENGTHS FOR SELF-GENERATION SYSTEMS

Because of the small amount of power available on self-generating systems, the gas valve may not operate if there is too much resistance in the circuit. Therefore, choose a location that does not require any more wire than the recommended lengths shown in the table below.

Wire Sizes	Max. Length (2-Wire Cable)	Maximum Combined Length (2 Single Wires)
No. 18	30 ft.	60 ft.
No. 16	50 ft.	100 ft.
No. 14	80 ft.	160 ft.

VARIATIONS OF OHMS LAW

$$I\ (Amps) = \frac{P\ (Watts)}{E\ (Volts)} = \frac{E\ (Volts)}{R\ (Ohms)}$$

$$R\ (Resistance) = \frac{E\ (Volts)}{I\ (Amps)} = \frac{P\ (Watts)}{I2\ (Amps)}$$

$$E\ (Volts) = I\ (Amps) \times R\ (Ohms) = \frac{P\ (Watts)}{I\ (Amps)}$$

$$P\ (Watts) = I2\ (Amps) \times R\ (Ohms) = I\ (Amps) \times E\ (Volts)$$

GAS

CONVERSION FACTORS FOR GAS VALVE CAPACITIES

Capacities shown in this catalog are for AGA Standard Gas (1000 Btu/Cu. Ft., .64 Specific Gravity) at 1.0″W.C. pressure drop across valve. Table below shows conversion factors for other gases.

Total Heating Value (Btu/Cu.	Specific Gravity	Conversion Factor (multiply listed capacity by:)
Less than 800	0.60	0.516
800 to 950	0.70	0.765
2500 (LP Gas)	1.53	1.620

BTU CONTENT OF FUELS

Natural Gas ..... 950 to 1,150 Btu/Cu. Ft.
Butane Gas..... 3,200 Btu/Cu. Ft.
Propane (LP) Gas..... 2,500 Btu/Cu. Ft.
No. 2 Oil..... 140,000 Btu/Gallon

RATE OF FLOW OF GASES THROUGH ORIFICES

Table for **NATURAL GAS** at 3.5″W.C. with 1000 Btu/Cu. Ft., .65 Specific Gravity and .82 orifice coefficient.

Drill Size	Diameter (inches)	Natural Gas (Btu/Hr)	Drill Size	Diameter (inches)	Natural Gas (Btu/Hr)
56	.0465	5,359	26	.1470	53,500
54	.0550	7,510	22	.1570	61,100
52	.0635	10,000	18	.1695	71,200
46	.0810	16,250	12	.1890	88,600
42	.0935	21,680	6	.2040	103,200
38	.1015	25,530	2	.2210	121,100
34	.1110	30,550	A	.2340	135,700
31	.1200	35,690	E(1/4)	.2500	154,900
30	.1285	40,900			

Table for **PROPANE (LP) GAS** at 11.0″W.C. with 2500 Btu/Cu. Ft., 1.53 Specific Gravity and .80 orifice coefficient.

Drill Size	Diameter (inches)	LP Gas (Btu/Hr)	Drill Size	Diameter (inches)	LP Gas (Btu/Hr)
70	.0280	5,490	46	.0810	45,800
67	.0320	7,150	44	.0860	51,600
64	.0360	9,050	42	.0935	61,100
61	.0390	10,600	38	.1015	72,000
58	.0420	12,300	34	.1110	86,200
56	.0465	15,100	30	.1285	115,300
54	.0550	21,200	26	.1470	151,000
52	.0635	28,200	22	.1570	172,000
50	.0700	34,200	18	.1695	200,500
48	.0760	40,400			

FULL ELECTRICAL RATINGS OF WHITE-RODGERS CONTROLS

Any number of motors may be operated from one control provided that neither the sum of the full load currents nor the sum of the locked rotor currents are greater than the rating of the control. If the electric load consists of an oil burner motor and ignition transformer in parallel, the motor current plus the transformer current cannot exceed the values shown.

MOTOR (Amps)

Power Supply and Load	SIMPLIFIED RATING CODE OF WHITE-RODGERS CONTROLS												
												HH2C	
	FG	FGH	HT	HTV	HH	B	CF	CL	FB	SPDT	R	White	Red
120 VAC Full Load	14.0	16.0	14.0	10.0	7.4	7.4	8.0	10.0	7.4	7.4	3.2	7.4	7.4
120 VAC Locked Rotor	84.0	84.0	84.0	60.0	44.5	44.5	48.0	60.0	44.5	44.5	19.2	44.5	44.5
240 VAC Full Load	7.0	8.0	7.0	6.0	3.7	3.7	6.0	6.0	3.7	3.7	1.5	3.7	3.7
240 VAC Locked Rotor	42.0	42.0	42.0	36.0	22.2	22.2	36.0	36.0	22.2	22.2	9.6	22.2	22.2

VALVES, RELAYS, MOTOR STARTERS (Amps)

Power Supply and Load	SIMPLIFIED RATING CODE OF WHITE-RODGERS CONTROLS												
												HH2C	
	FG	FGH	HT	HTV	HH	B	CF	CL	FB	SPDT	R	White	Red
0.3 to 12v DC	①	①	①	1.0	①	①	①	1.0	①	①	①	①	①
25 VAC	5.6	5.6	5.6	6.0	2.9	2.9	3.2	4.0	2.9	2.9	1.2	2.9	2.9
120 VAC	5.6	5.6	5.6	4.0	2.9	2.9	3.2	4.0	2.9	2.9	1.2	2.9	2.9
240 VAC	2.8	2.8	2.8	2.4	1.4	1.4	2.4	2.4	1.4	1.4	0.6	1.4	1.4
600 VAC	125VA	125VA	①	①	①	125VA	①	①	125VA	125VA	①	①	①

ELECTRIC HEATERS (Amps)

Power Supply and Load	SIMPLIFIED RATING CODE OF WHITE-RODGERS CONTROLS												
												HH2C	
	FG	FGH	HT	HTV	HH	B	CF	CL	FB	SPDT	R	White	Red
120 VAC	25.0	25.0	14.0	10.0	7.4	25.0	8.0	10.0	25.0	24.0	5.0	②	②
240 VAC	22.0	22.0	7.0	6.0	3.7	20.0	6.0	6.0	20.0	20.0	2.5	②	②
277 VAC	18.0	18.0	①	①	①	18.0	①	①	18.0	①	①	②	②

LAMPS (Watts)

Power Supply and Load	SIMPLIFIED RATING CODE OF WHITE-RODGERS CONTROLS												
												HH2C	
	FG	FGH	HT	HTV	HH	B	CF	CL	FB	SPDT	R	White	Red
120 VAC	1000	1000	1000	700	500	500	700	700	500	500	200	②	②
240 VAC	1000	1000	1000	800	500	500	800	800	500	500	200	②	②

① Indicates that control CANNOT be used on that power supply and load
② Indicates that control is not likely to be used on that power supply and load

125VA means 125 volt amperes; for example: 125VA at 440 volts would be 125 + 440 equals 0.28 amperes

HORSEPOWER AMPERE TABLE

Electrical ratings of White-Rodgers controls are always given in amperes. In general, these ampere ratings correspond to the various horsepower ratings given in the table.

The ampere rating of all motors will not necessarily correspond to the horsepower rating shown in the table. Therefore, the control device selected must have a rating that is equal to (or greater than) the actual full load and locked rotor currents of the motor.

Approximate Horsepower	Full Load	Locked Rotor	Full Load	Locked Rotor
1/10	3.0	18.0	1.5	9.0
1/8	3.8	22.8	1.9	11.4
1/6	4.4	26.4	2.2	13.2
1/4	5.8	34.8	2.9	17.4
1/3	7.2	43.2	3.6	21.6
1/2	9.8	58.8	4.9	29.4
3/4	13.8	82.8	6.9	41.4
1	16.0	96.0	8.0	48.0
1 1/2	20.0	120.0	10.0	60.0
2	24.0	144.0	12.0	72.0
3	34.0	204.0	17.0	102.0