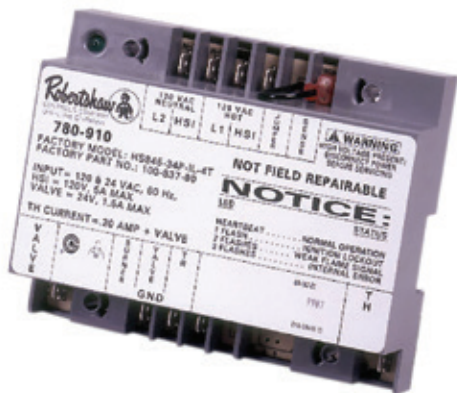




# Robertshaw®



Scan for all models, literature and cross reference



780-910

## IGNITION CONTROLS

### 780 Series - Universal Hot Surface Control Uni-Kit®

The Robertshaw® 780 Series Universal Hot Surface Control Uni-Kit® is designed for use on gas fired systems. These controls are equipped with a self-diagnostic green LED for quick troubleshooting. The LED indicates if the system is in normal operation, has gone into lockout, has a weak flame signal, or has an internal error (a defective module). This kit provides all the necessary instructions and hardware needed to replace most hot surface modules.

#### Features and Benefits

- Reduces truck stock inventory, saving space and money
- Easy-to-install with complete in-depth installation instructions
- Local (sense through the hot surface ignitor) or remote flame sensors
- Single or three ignition attempts or 7 second ignition trial time
- Ignitor warm-up time is 17 or 34 seconds
- 34 seconds or less pre-purge
- Natural or LP gas controls
- Works with 120V AC hot surface ignitors
- Maximum valve current at 1.5 Amps at 24V AC
- 95% relative humidity noncondensing at 104°F

### Specifications

Part Numbers	Description	Max Ignitor Current	Flame Failure Re-Ignition Time	Thermostat Anticipator Setting	Temperature Range	Control Input Voltage	Supply Voltage
780-910	Universal Hot Surface Ignition Uni-Kit	5 Amps	0.8 seconds	1 Amp	-40°F to 176°F	24V AC	120V AC @ 50/60 Hz



**1** Year Limited Warranty

## IGNITION CONTROLS

### 780 Series - Hot Surface Controls

The Robertshaw® 780 Series Hot Surface Controls are designed for use on gas fired systems. The system acts on a demand for heat by a switch or thermostat to supply power to the ignition control. On non pre-purge models, the ignitor will be energized immediately and remain on for either of two optional selected ignitor heat-up times: approximately 17 or 34 seconds. For models with the prepurge option, there is a time delay equal to the heat-up time selected before the ignitor is energized. At the end of the ignitor heat-up time, the gas valve is opened supplying gas to the main burner. After several seconds, the ignitor is turned off and the sensor is energized. As long as flame is sensed, the system continues to operate.

### Features and Benefits

- Reduces truck stock inventory, saving space and money
- Easy-to-install with complete in-depth installation instructions
- Molded-in terminal barriers between terminals
- Models available for local and remote sense application
- Mounting screw provides a positive ground connection
- Small compact size provides no hassle installation
- Main valve current is 1.5 Amps at 24V AC
- 95% relative humidity noncondensing at 104°F



780-785

**Robertshaw**<sup>®</sup>



Scan for all models, literature and cross reference

## Specifications

Part Numbers	Description	Valve Trial Time	Supply Voltage	Ignition Attempts	Pre-Purge Timer	Ignitor Warm-Up Timer	Sensor Type	Max Ignitor Current	Thermostat Anticipator Setting	Temperature Range
780-783	Hot Surface Ignition Control	8 seconds	120V AC	3	34 seconds	34 seconds	Local	5 Amps	0.1 Amps	-40°F to 176°F
780-785	Hot Surface Ignition Control	6 seconds	120V AC	3	NA	34 seconds	Local	5 Amps	0.1 Amps	-40°F to 176°F
780-790	Hot Surface Ignition Control	4 seconds	120V AC	1	NA	17 seconds	Local	5 Amps	0.1 Amps	-40°F to 176°F

## Specifications continued

Part Numbers	Input Voltage	Supply Voltage
780-783	24V AC @ 50/60 Hz	120, 208/240, 277 Volts AC
780-785	24V AC @ 50/60 Hz	120, 208/240, 277 Volts AC
780-790	24V AC @ 50/60 Hz	120, 208/240, 277 Volts AC



**1** Year Limited Warranty



# Robertshaw®



Scan for all models, literature and cross reference



**1** Year Limited Warranty

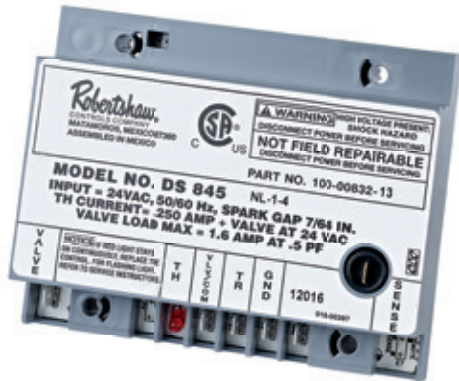
## IGNITION CONTROLS

### 780 Series - Direct Spark Controls

The Robertshaw® 780 Series Direct Spark Controls are applicable to commercial cooking equipment, gas fired heating, and water heating systems of many types. The system acts on a demand for heat by a switch or thermostat to open the gas valve. At the same time, the 780 series ignition control supplies a spark to the electrode which ignites the gas. After the gas is lit, an electronic circuit proves the presence of flame using flame rectification. When the thermostat is satisfied, the gas valve will be closed to shut off the main burner gas.

### Features and Benefits

- Replaces one rod and/or two rod systems
- Reduces truck stock inventory, saving space and money
- Easy-to-install with complete in-depth installation instructions



780-502

## Specifications

Part Numbers	Description	Type	Supply Voltage	Ignition Attempts	Valve Trial Time
780-502	Direct Spark Ignition Controls	Non Pre-Purge, Enclosed	24V AC	1	4 seconds
780-511	Direct Spark Ignition Controls	Pre-Purge, Remote, Enclosed, 1/4 Q.C.	24V AC	3	7 seconds

## IGNITION CONTROLS

### 785 Series - Automatic Pilot Relight Kits

The Robertshaw® 785 Series Automatic Pilot Relight Kits are designed for use on rooftop heating equipment, water heaters, boilers, space heaters, unit heaters, dryers, and other commercial, industrial, and residential appliances where the problem of pilot outage may occur. It should only be applied to those systems which already incorporate the necessary pilot-safety control system.

#### Features and Benefits

Kit Includes:

- Ignitor assembly
- Mounting bracket



*Robertshaw*<sup>®</sup>



Scan for all models, literature and cross reference

### Specifications

Part Numbers	Description	Spark Gap	Temperature Range	High Voltage Output	Electrical Rating
785-001	Pilot Relight Kit	1/8"	-40°F to 185°F	15KV	24/120 Volts AC, 0.1 Amp



**1** Year Limited Warranty



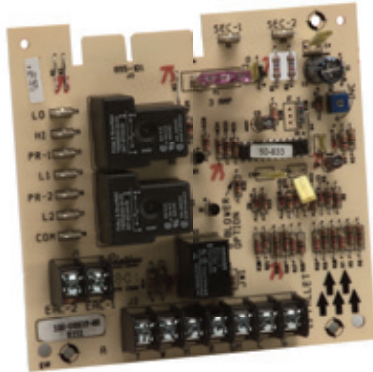
# Robertshaw®



Scan for all models, literature and cross reference

**1** Year Limited Warranty

## IGNITION CONTROLS



695-101

### 695 Series - Fan Control

The Robertshaw® 695-101 Series Fan Control is a solid state control designed and engineered for the replacement market. It replaces the Carrier / BDP Gas Furnace Control Center that has been used in new equipment for many years. This control center is an exact replacement. No modification to the original wiring or to the appliance sheet metal is required.

### Features and Benefits

- Easy-to-install with complete in-depth installation instructions
- 95% relative humidity noncondensing at 50°C
- Reduces truck stock inventory, saving space and money

## Specifications

Part Numbers	Description	Cool Off Time	Heat Off Time (Adjustable)	Temperature Range	Control Voltage	Input Voltage
695-101	Replacement Circuit Board for Fan Control Centers	90 seconds	80 to 240 seconds	-40°F to 176°F	18 - 30 Volts AC	120V AC @ 60 Hz

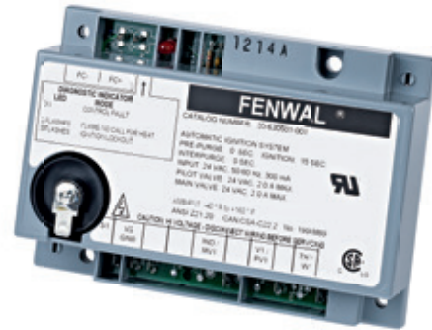
## IGNITION CONTROLS

### 35 Series - Fenwal® Intermittent Pilot Controls

The Fenwal 35 Series Pilot Controls are a 24V AC intermittent pilot ignition control. The microprocessor circuit design provides precise, repeatable timing and operating sequences. The on-board diagnostics with LED output provide assistance with troubleshooting to ensure safe and efficient operation.

#### Features and Benefits

- Quick connect terminals for easy connection
- Easy-to-install with complete in-depth installation instructions
- Pilot valve draws 2.0 Amps maximum
- Main valve draws 2.0 Amps maximum
- Gray enclosure (Noryl N-190) of fire retardent plastic
- Reduces truck stock inventory, saving space and money



35-630501-001



Scan for all models, literature and cross reference

## Specifications

Part Numbers	Description	Flame Sense Method	Auto Reset	Ignition Tries Before Lockout	Trial For Ignition	Pre-Purge	Inter-Purge	Gas Valve Rating (Main and Pilot)	Control Voltage	Electrical Rating
35-630501-001	Intermittent Pilot Ignition Control	Remote	No	1	15	0 seconds	0 seconds	2.0 Amps @ 24V AC	18 - 30 Volts AC	24V AC @ 300mA



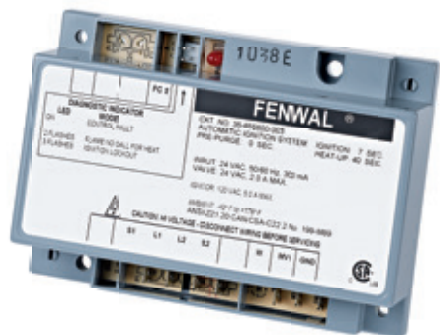
**1** Year Limited Warranty



# Heating



Scan for all models, literature and cross reference



35-655800-003

## IGNITION CONTROLS

### 35 Series - Fenwal® Hot Surface Controls

The Fenwal 35 Series Hot Surface Controls are designed to perform many gas-fired 24V AC appliance functions in a single control, resulting in lower system costs. This series monitors the demand for heat, ignites and maintains the flame during heating, and provides diagnostic support.

The on-board diagnostics with LED output provide assistance with troubleshooting and ensures safe and efficient burner operation. The microprocessor circuit design provides precise, repeatable timing sequences for ignition and pre-purge and inter-purge times, as well as multiple tries for ignition.

### Features and Benefits

- Edge connector type for easy connection
- Easy-to-install with complete in-depth installation instructions
- Gray enclosure (Noryl N-190) of fire retardent plastic
- Reduces truck stock inventory, saving space and money

## Specifications

Part Numbers	Description	Flame Sense Method	Auto Restart	Ignition Tries Before Lockout	Trial Ignition	Pre-Purge	Inter-Purge	Hot Surface Ignitor	Gas Valve Rating	Control Voltage	Electrical Rating
35-655800-003	Hot Surface Ignition Control, Field Selectable Line Voltage Capability	Local / Remote	Yes	1	7	0 seconds	0 seconds	40 second Heat Up, 120/240 Volts AC, 5 Amps Max	2.0 Amps @ 24V AC	18 - 30 Volts AC, 50/60 Hz	24V AC @ 300mA, 120 or 240 Volts AC (L1 and L2 only)
35-655801-013	Hot Surface Ignition Control, Field Selectable Line Voltage Capability	Local / Remote	Yes	3	7	0 seconds	15 seconds	40 second Heat Up, 120/240 Volts AC, 5 Amps Max	2.0 Amps @ 24V AC	18 - 30 Volts AC, 50/60 Hz	24V AC @ 300mA, 120 or 240 Volts AC (L1 and L2 only)



1 Year Limited Warranty



## IGNITION CONTROLS

### 35 Series - Fenwal® Direct Spark Controls

The Fenwal 35 Series Direct Spark Ignition Controls utilize a microprocessor to continually analyze and control the proper operation of the gas burner.

The microprocessor circuit design provides precise, repeatable timing sequences for ignition times and purge times, one hour automatic reset and flame sensing during pre-purge.

The 35 Series includes on-board diagnostics with LED output to provide assistance with troubleshooting, and to ensure safe and efficient burner operation.

#### Features and Benefits

- Various connection and construction types available
- Easy-to-install with complete in-depth installation instructions
- Gray enclosure (where applicable Noryl N-190) of fire retardant plastic
- Reduces truck stock inventory, saving space and money



35-605606-223



Scan for all models, literature and cross reference

## Specifications

Part Numbers	Description	Flame Sense Method	Auto Reset	Ignition Tries Before Lockout	Trial For Ignition	Pre-Purge	Inter-Purge	Connection	Construction	Gas Valve Rating	Control Voltage	Electrical Rating
35-605606-111	Direct Spark Ignition Control	Remote	Yes	3	4	15	15	Edge Connector	Gray Noryl	2.0 Amps @ 24V AC	18 - 30 Volts AC, 50/60 Hz	24V AC @ 300mA
35-605606-223	Direct Spark Ignition Control	Remote	Yes	3	7	30	30	Edge Connector	Gray Noryl	2.0 Amps @ 24V AC	18 - 30 Volts AC, 50/60 Hz	24V AC @ 300mA
35-704600-005	Direct Spark Ignition Control	Local	No	1	10	0	0	Quick Connect Terminals	Open Board	1.5 Amps @ 120V AC	102 to 138 Volts AC, 50/60 Hz	120V AC @ 350mA
35-725206-117	Direct Spark Ignition Control	Remote	Thermostat Power Off	3	15	15	15	Multi-Pin Connector	Potted	1.5 Amps @ 120V AC	102 to 138 Volts AC, 50/60 Hz	120V AC @ 50mA



**1** Year Limited Warranty





# Robertshaw®



Scan for all models, literature and cross reference



41-401

## IGNITORS

### Carbide Series

The Robertshaw® Carbide Series Hot Surface Igniters deliver dependable ignition in heating systems of every description: furnaces, boilers, rooftop heaters, infrared burners, unit heaters, water heaters, and many other types of HVAC equipment.

### Features and Benefits

- Made from high-purity recrystallized silicon carbide (Crystar™) which combines physical and thermal strength with stable electrical properties
- Designed to reach ignition temperature(s) within 17 seconds
- Have 18-gauge nickel chrome lead wires embedded and metalized in place for maximum holding strength and electrical conductivity
- Manufactured with lead wires enclosed in a special high-temperature fiberglass insulation providing electrical protection
- Operate at 120V AC. Some modules are rated for 208/240V input, however, the voltage to the ignitor is stepped down to 120V AC

## Specifications

Part Numbers	Description	Ceramic Block Style	Lead Wire Length	Terminal Connector Type	Comments
41-401	Hot Surface Carbide Igniters	A	4-1/2"	A	Includes a gasket
41-402	Hot Surface Carbide Igniters	B	19"	NA	
41-403	Hot Surface Carbide Igniters	C	5-1/2"	NA	
41-404	Hot Surface Carbide Igniters	C	4-1/2"	D	Includes special mounting adaptors
41-405	Hot Surface Carbide Igniters	D	5-1/2"	NA	
41-406	Hot Surface Carbide Igniters	E	10-1/2"	NA	Includes a gasket
41-407	Hot Surface Carbide Igniters	C	4-1/2"	B	
41-408	Hot Surface Carbide Igniters	B	5"	C	
41-409	Hot Surface Carbide Igniters	C	4-1/2"	D	
41-410	Hot Surface Carbide Igniters	B	4-1/2"	B	
41-411	Hot Surface Carbide Igniters	B	4-1/2"	C	Includes special mounting adaptors
41-412	Hot Surface Carbide Igniters	F	5-1/4"	D	
41-414	Hot Surface Carbide Igniters	F	5-1/4"	D	Includes special mounting adaptors
41-418	Hot Surface Carbide Igniters	B	5-1/4"	C	Includes bracket
41-419	Hot Surface Carbide Igniters	G	5"	D	



41-402



41-403



41-404



41-405



41-406



41-407



41-408



41-409



41-410



41-411



41-412



41-414

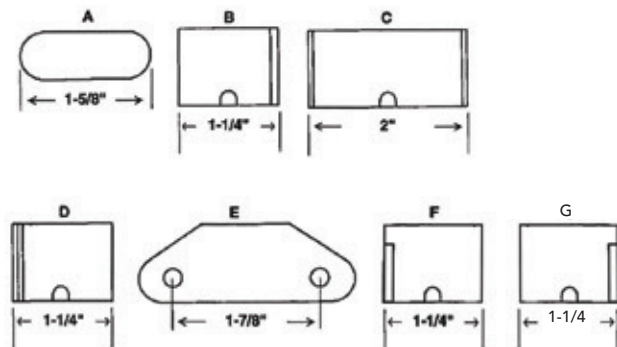


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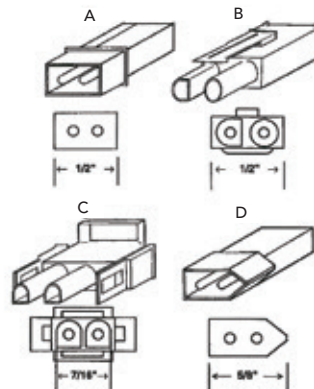


41-419

### Ceramic Block Styles



### Terminal Block Styles





# Robertshaw®



Scan for all models, literature and cross reference



41-401N

## IGNITORS

### Nitride Series

The Robertshaw® Silicon Nitride Hot Surface Ignitors provide a resilient and reliable solution to gas ignition. The Silicon Nitride Ignitor provides exceptional improvement in durability by virtually eliminating accidental breakage.

### Features and Benefits

- All Robertshaw Silicon Nitride Hot Surface Ignitors feature Kyocera™ technology for the best in reliability and robustness
- Kyocera technology has shown superior heating capabilities, generating higher ignition temperatures than other silicon nitride designs
- Robertshaw Silicon Nitride Ignitors are rated for 120V AC
- High-temperature leads are enclosed with a special fiberglass insulation providing superior electrical protection
- This ignitor is a functional upgrade or replacement to silicon carbide ignitor applications
- Ignitors are boxed with mounting hardware and termination required for direct replacement of OEM ignitors

## Specifications

Part Numbers	Description	Ceramic Block Style	Terminal Block Style	Lead Wire Length	Comments
41-401N	Hot Surface Nitride Ignitor	A	A	5-1/4"	Includes a gasket
41-402N	Hot Surface Nitride Ignitor	B	NA	24"	
41-403N	Hot Surface Nitride Ignitor	C	NA	5-1/4"	
41-404N	Hot Surface Nitride Ignitor	C	D	5-3/4"	Includes special mounting
41-405N	Hot Surface Nitride Ignitor	D	NA	9"	
41-406N	Hot Surface Nitride Ignitor	E	NA	9"	Includes a gasket
41-407N	Hot Surface Nitride Ignitor	C	B	5-3/4"	
41-408N	Hot Surface Nitride Ignitor	B	C	5-3/4"	
41-409N	Hot Surface Nitride Ignitor	C	D	5-3/4"	
41-410N	Hot Surface Nitride Ignitor	B	B	5-3/4"	



41-402N



41-403N



41-404N



41-405N



41-406N



41-407N



41-408N

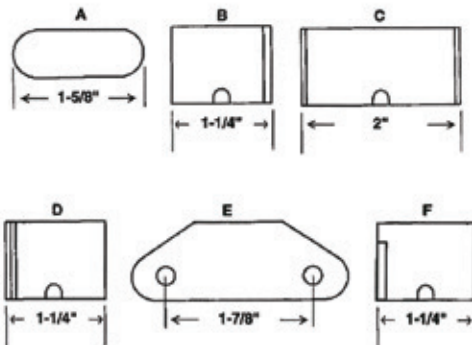


41-409N

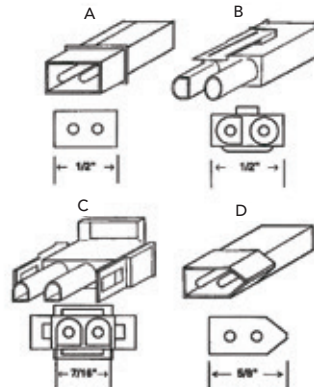


41-410N

### Ceramic Block Styles



### Terminal Block Styles





# Robertshaw®



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## IGNITORS

### Hot Surface Mini-Ignitor Series

The Robertshaw® 41-600 Series Hot Surface Mini-Ignitors deliver dependable ignition in all heating systems. The mini-ignitor's three-second heat-up time, in combination with its small size, have been embraced by gas furnace OEMs.

#### Features and Benefits

- Engineered for easy handling, simple installation and trouble-free operation
- Made of a unique, non-porous, high strength material
- Operates at 120V AC

### Specifications

Part Numbers	Description	Ceramic Block Style	Replaces
41-604	Hot Surface Furnace Mini-Ignitor	4"	Armstrong #44744-2
41-605	Hot Surface Furnace Mini-Ignitor	2.5"	York Conversion Kit #473-20937-001

**1** Year Limited Warranty

## IGNITORS

### Universal Ignitor Series

The Robertshaw® Universal Ignitors are the perfect truck stock item. All universal ignitors replace over 130 ignitors currently used in the field. To allow for universal applications, mounting brackets and hardware are included.

Robertshaw Universal Ignitors are recommended for operating voltage of 120V AC. Three models are available. The 41-802N is the best model available with the highest level of durability. The 41-801N offers medium durability, and the 41-803 offers good durability.

### Features and Benefits

#### 41-802N

- The ultimate in silicon nitride with technology from Kyocera™ for the best durability
- Best heat dissipation

#### 41-801N

- Silicon nitride technology for better durability
- Added strength

Flame sensors are required for all Silicon Nitride Ignitors (41-802N and 41-801N). Ignitor/Sensor assembly 1751-729 (24" lead) or 1751-749 (72" lead) can be used if an existing flame sensor is not present and a terminal is available on the ignition control.

#### 41-803

- High density silicon carbide for good physical strength and durability
- Less current required to light



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Scan for all models, literature and cross reference

## Specifications

Part Numbers	Description	Heating Element	Warranty Duration
41-801N	Universal Hot Surface Ignitor	Rod shaped	2 years
41-802N	Universal Hot Surface Ignitor	Flat blade	3 years
41-803	Universal Hot Surface Ignitor	Double helix spiral	1 year

**1** Year Limited Warranty

**2** Year Limited Warranty

**3** Year Limited Warranty



# Robertshaw®



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1820-009



1830-490

## PILOTS

### 1820 and 1830 Series

The Robertshaw® 1820 Series Pilot Uni-Kit® models are designed to replace hard-to-find ITT-General PG9 type pilots. A special 1/4" tubing adaptor is typically provided with nut and ball sleeve. Uni-Kits are available with and without a 32" [810mm] thermopile.

The 1830 Series Pilot Uni-Kit models are designed to be used with all Robertshaw and most competitive thermocouples. Uni-Kit models include an adaptor that converts a threaded thermocouple/thermopile model 2CH to a snap-in thermocouple type, model 2C.

### Features and Benefits

- Many flame pattern types available
- Thermocouple or thermopile options
- Spark electrode available
- Horizontal or vertical gas inlet
- Several mounting bracket types available
- Aerated pilots with non-linting characteristics

## Specifications

Part Numbers	Description	Hood Type	Mounting Bracket Type	Flame Pattern Type	Lead Lengths	Includes
1820-009	PG9 Replacement Pilot Uni-Kit®	NA	NA	90° Right Hand	36"	1950-532 Thermopile and Orifices
1820-019	PG9 Replacement Pilot Uni-Kit	NA	NA	90° Left Hand	36"	1950-532 Thermopile and Orifices
1830-001	2CH & 2C Incinerator-Target Pilot Uni-Kit	2	6	Standard	NA	Orifices
1830-210	2CH & 2C Incinerator-Target Pilot Uni-Kit	2	2	Standard	NA	Orifices
1830-489*	2CH & 2C Incinerator-Target Pilot Uni-Kit	6	6	3-Way	NA	Orifices
1830-490	2CH & 2C Incinerator-Target Pilot Uni-Kit	6	6	3-Way	NA	Orifices
1830-491	2CH & 2C Incinerator-Target Pilot Uni-Kit	6	6	3-Way	NA	Orifices

\*International export models

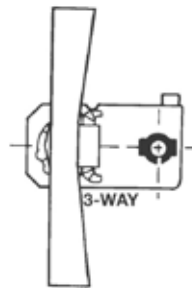
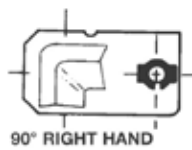
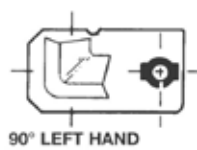
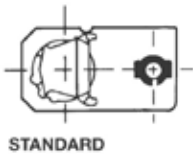
## Hood Type



## Mounting Bracket Type



## Flame Pattern Type







# Robertshaw®



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1980-030

## THERMOCOUPLES

### 1900 Series

The Robertshaw® 1900 Series Thermocouples include either a special low-mass or quick dropout thermocouple. It is usually found on applications that require an oxygen depletion system on the thermo safety. It is also found on many LP gas applications that require a quick dropout of the thermo safety if there is a loss of pilot flame.

**⚠ ATTENTION:** The 1960-027 has standard thermocouple threads, and WILL NOT fit applications with metric threads.

The Robertshaw 1970 Series Uni-Couple® design allows for installation to virtually all pilot burners. The versatile zip nut may be pushed, pulled or threaded onto the thermocouple's rolled threads for proper positioning in every application.

The Robertshaw 1980 Series Snap-Fit Thermocouples offer easy installation into the majority of pilot burners. They are manufactured without complicated adaptors, but with extra insulation that the brass sheath provides under high ambient temperatures.

### Features and Benefits

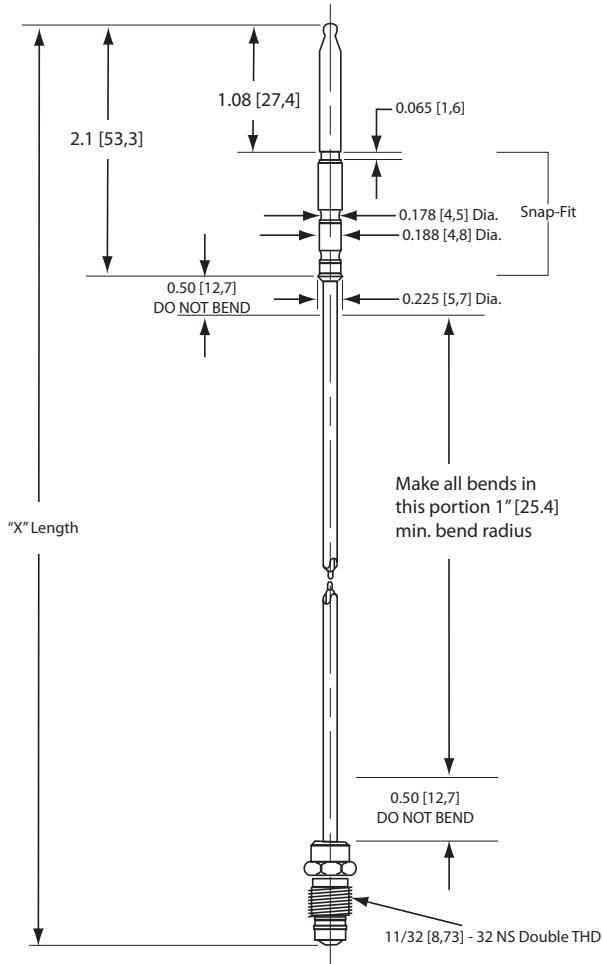
- Easy burner installation with attached threaded nut
- Stainless steel outer jacket for long life and resistance to heat blistering
- Combination of copper and nickel alloys for good electrical conductivity
- Mica washer to insulate from shorting conditions
- Tinnerman clip included
- Various lengths available for multiple applications

## Specifications

Part Numbers	Description	"X" Length
1960-027	Low Mass Thermocouple	27"
1970-018	Uni-Couple® 20 to 30 Millivolts	18"
1970-024	Uni-Couple 20 to 30 Millivolts	24"
1970-036	Uni-Couple 20 to 30 Millivolts	36"
1980-018	Snap-Fit Thermocouple	18"
1980-024	Snap-Fit Thermocouple	24"
1980-030	Snap-Fit Thermocouple	30"
1980-036	Snap-Fit Thermocouple	36"
1980-048	Snap-Fit Thermocouple	48"

## Product Drawings

### 1980 Series



**Robertshaw**<sup>®</sup>

**1** Year  
Limited  
Warranty



# Robertshaw®



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1950-001



1951-001

## THERMOPILES

### 1950 and 1951 Series

The Robertshaw® 1950 and 1951 Series Thermopiles lead the industry for gas appliance applications. Their primary function is to ensure a standing pilot light is operative so that on a call for heat, the main burner gas will be properly ignited. Thermopiles are placed in gas applications to detect the existence of a flame for safety purposes by shutting off the potential gas flow to a burner.

A thermopile is the assembly of many thermocouples to increase the millivolt output.

Robertshaw thermopiles have two types of connections: coaxial and two-wire spade connectors. The 1950 Series Thermopiles, also known as TP-75, are two-wire spade connectors. The 1951 Series Thermopiles, also known as CP-2 (250 to 750 millivolts), are coaxial connectors. The 1950 and 1951 Series Thermopiles (pilot generators) are designed for use on self-powered gas control systems. They can be used to replace similar competitive devices.

### Features and Benefits

- Easy burner installation with attached threaded nut
- Stainless steel outer jacket for long life and resistance to heat blistering
- Combination of copper and nickel alloys for good electrical conductivity
- Mica washer to insulate from shorting conditions
- Tinnerman clip included
- Various lengths available for multiple applications

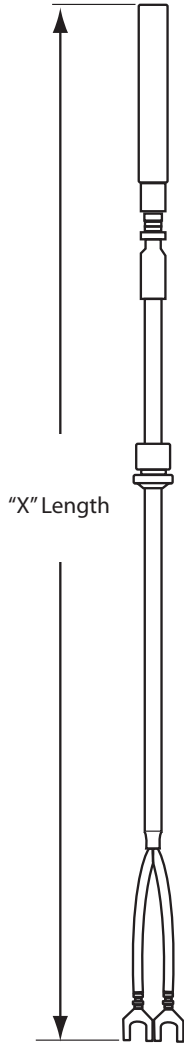
## Specifications

Part Numbers	Description	"X" Length	Includes	Connection Type	Open Circuit Output
1950-001	Thermopile	36"	PG9 Pilot Adaptor	Two Lead	250-750 mV
1950-532	Thermopile	36"		Two Lead	250-750 mV
1951-001	Thermopile	36"	PG9 Pilot Adaptor	Coaxial	250-750 mV
1951-536	Thermopile	36"		Coaxial	250-750 mV

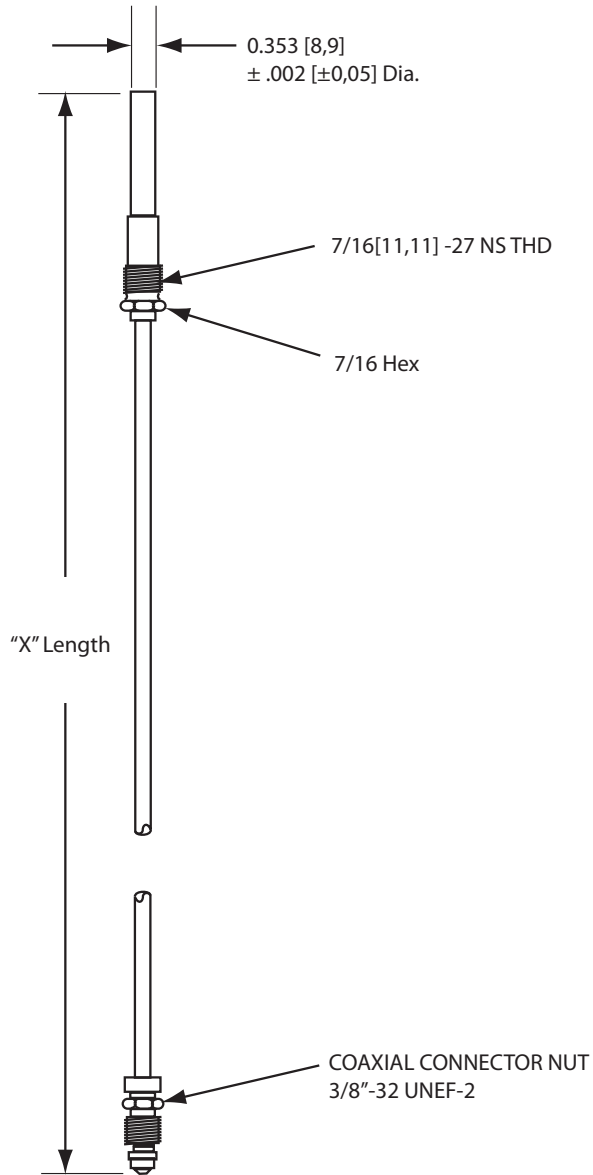


## Product Drawings

1950 Series



1951 Series



**Robertshaw**<sup>®</sup>

**1** Year  
Limited  
Warranty



# Robertshaw®



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2374-510



10-650

## AIR PRESSURE SENSING SWITCHES

### 2374 Series - Universal

The Robertshaw® 2374-510 Air Pressure Sensing Switch has a glass-filled polycarbonate housing containing a sensing diaphragm and an integral snap-acting switch with three male 90° quick-connect terminals. The switch can sense positive, negative or differential air pressure. The field adjustable set point range of this switch is 0.10" WC to 10.0" WC. Using the switch accessories contained in this kit, the switch can be applied to a wide variety of residential and light commercial HVAC applications.

#### 2374-510 Kit Contents:

- Air pressure sensing switch
- Calibration springs (5 options)
- Orifice flows (4 options)
- Mounting brackets (2 options)
- Calibration tool (hex wrench)

The Robertshaw 10-650 Sensing Probe Kit provides a simple, practical and standardized approach to sampling air for HVAC air pressure sensing applications. This convenient kit includes a seven inch universal air sample probe suitable for both static and impact applications. The included mounting flange is efficiently installed using the (2) 6# x 3/8" type 25 tap screws. The mounting flange locks the air sample probe in place via a 6# x 1/4" slotted set screw, providing a standard method of controlling the insertion depth of the air sample probe into the air stream. Three feet of clear vinyl tubing is included in the kit for connecting the air sample probe to the air switch. Also provided is a slip-on adaptor for use with an installed air switch equipped with a compression style air sample line connector.

#### 10-650 Kit Contents:

- Universal 7" probe
- Mounting flange
- Flange-locking screw set
- 3' vinyl tubing
- Slip-on adaptor

## Specifications

Part Numbers	Description	Switch	Set Point Range	Temperature Range	Connection	Electrical Rating
2374-510	Universal Air Pressure Sensing Switch	SPDT	0.10" to 10.0" WC	-40°F to 190°F (-40°C to 88°C)	Silver Contacts	1/10 Hp @ 120 to 277 Volts AC; 28VA Pilot Duty @ 24V AC; 125VA Pilot Duty @ 120V AC; 5 Amps @ 24, 120, 277 Volts AC
10-650	Sensing Probe Kit with 7" Probe	NA	NA	-40°F to 190°F (-40°C to 88°C)	3/16" Flexible Rubber Tubing	NA



1 Year Limited Warranty

## AIR PRESSURE SENSING SWITCHES

### 2374 Series - Adjustable

The Robertshaw® 2374 Series Adjustable Air Sensing Switches are designed to replace a wide variety of air sensing switches found in residential and light commercial applications including furnaces, electronic air cleaners and humidifiers. Two models are currently available with adjustable ranges. Both models are provided with an SPDT switch that can be actuated by positive or negative pressure or by pressure differential. Highly accurate, these switches are practically insensitive to temperature change with an operating temperature range of -40°F to 190°F (-40°C to 88°C). Each switch includes mounting hardware and an adjustment tool for easy installation and calibration.

### Features and Benefits

- Field adjustable control set point
- Air sample line connectors will accept 1/8", 1/4" or 3/8" tubing
- Electrical connection is 1/4" spade
- Vertical operating mounting position for diaphragm
- UL File Number MH6213, CSA File Number LR18754



2374-495

**Robertshaw**®



Scan for all models, literature and cross reference

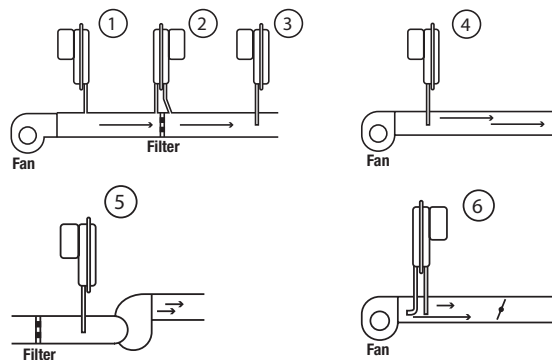
### Specifications

Part Numbers	Description	Switch	Set Point Range	Maximum Pressure	Temperature Range	Electrical Rating
2374-495	Adjustable Air Sensing Switch	SPDT	0.25" to 1.0" WC	0.5 PSI	-40°F to 190°F (-40° to 88°C)	5 Amps @ 120-277 Volts AC, 5 Amps @ 28V DC, 1 Amp Pilot Duty 120 VA
2374-498	Adjustable Air Sensing Switch	SPDT	1.00" to 4.0" WC	0.5 PSI	-40°F to 190°F (-40° to 88°C)	5 Amps @ 120-277 Volts AC, 5 Amps @ 28V DC, 1 Amp Pilot Duty 120 VA

### Typical Applications For Sensing Switch and Sensing Probe Kit

1	Positive static pressure increases as the filter gets dirty.
2*	Differential across filter changes as filter gets dirty.
3	Flow is reduced as filter gets dirty.
4	Fan operation or air flow with little or no static pressure.
5	Negative pressure increases as the filter gets dirty.
6*	Fan operation and true air flow with varying amounts of static pressure. Probes must be perpendicular to the air flow.

\* Applications use two (2) Sensing Probe Kits



**2** Year Limited Warranty



# Robertshaw®



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**1** Year Limited Warranty

## HEATING ACCESSORIES

### Flame Sensors

The Robertshaw® Flame Sensor Assembly and Replacement Sensors have high temperature Kanthol sensor rods that will withstand 1800°F (982°C). The sensor rod is 4" long and can be cut and bent to match an original unit. Excellent replacement for most manufacturers' flame sensors.

### Features and Benefits

- Includes 30" of Teflon insulated lead wire with a 482°F (250°C) rating
- Connects to a 1/4" quick connect terminal



### Specifications

Part Numbers	Description	Comments
10-227	Replacement S1 Sensor	S1 Sensor has 1/4" quick connect terminal
10-760	Flame Sensor Assembly	Full assembly

## HEATING ACCESSORIES

### Universal Pilot Ignitor Sensor

The Robertshaw® Universal Pilot Mounting Ignitor Sensor is primarily used with the 712 series intermittent pilot ignition Uni-Kit®. This ignitor and sensor assembly includes mounting bracket, mounting hardware and 24" lead.

### Features and Benefits

- Includes all necessary parts for installation
- Quick replacement parts



### Specifications

Part Numbers	Description	Length	Comments
1751-729	Universal Pilot Mounting Ignitor Sensor	24"	Includes ignitor/sensor assembly, mounting bracket and hardware

## HEATING ACCESSORIES

### Pilot Orifices

The Robertshaw® Pilot Orifices are used as replacement parts in Robertshaw 1820 and 1830 type pilots.

### Features and Benefits

- Compatible with 1820, 1830 (2C, 2CH, 2S, 2SH) Pilots
- Orifice can fit into 3/16" or 1/4" tubing



10-021

### Specifications

Part Numbers	Description	Type Gas	Tube Size	Orifice Size
10-021	Pilot Orifice for Heating or Cooking	Natural Gas	3/16" or 1/4"	0.018"
10-114	Pilot Orifice for Heating or Cooking	LP	3/16" or 1/4"	0.010"
10-209	Pilot Orifice for Heating or Cooking	Natural Gas	3/16" or 1/4"	0.026"
10-210	Pilot Orifice for Heating or Cooking	LP	3/16" or 1/4"	0.016"

**Robertshaw**<sup>®</sup>



## HEATING ACCESSORIES

### Tubing

The Uni-Line® aluminum tubing is versatile for all your replacement needs. It comes in a full range of sizes in 50 and 5 foot lengths.

### Features and Benefits

- Aluminum tubing meets ASTM Standard #483
- Uses a 1435 alloy with a 0.035 wall thickness
- Tubing is rated at 90 PSI with an 11,000 tensile, 9500 yield and a 25% elongation



11-193

### Specifications

Part Numbers	Description	Length	Diameter Size
11-193	Aluminum Tubing	50'	1/4"
11-195	Aluminum Tubing	50'	3/8"
11-293	Aluminum Tubing with Fittings	5'	1/4"



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**1** Year Limited Warranty





# Robertshaw®



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**1** Year Limited Warranty

## HEATING ACCESSORIES



1751-012

### Dial - Gas

The Robertshaw® line of replacement gas dials for gas valves come in many colors with various options. More selections can be viewed at [www.uni-line.com](http://www.uni-line.com).

### Features and Benefits

- Replacement dial for use with Unitrol® 7000 gas valves
- Beige color with On, Off and Pilot selections
- Not for use with 700 Series Pilot Ignition gas valves

## Specifications

Part Numbers	Description
1751-012	Beige knob dial

## HEATING ACCESSORIES

### 4590 Series - Breakaway Ferrules

The Robertshaw® 4590 Series Breakaway Ferrules are used for attaching tubing to gas valves. Applications include heating, cooking and water heating.

#### Features and Benefits

- One breakaway ferrule part replaces the need for an additional nut
- Sold in multiple quantities for convenience
- Screw machined brass fittings for quality performance



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### Specifications

Part Numbers	Description	Size	Quantity
4590-065	Breakaway Ferrules For Venting	1/8" Tubing	Package of 15
4590-067	Breakaway Ferrules	3/16" Tubing	Package of 15
4590-069	Breakaway Ferrules	1/4" Tubing	Package of 15
4590-071	Breakaway Ferrules	3/8" Tubing	Package of 6
4590-816	Extended Breakaway Ferrules	1/4" Extended	Package of 15

**1** Year Limited Warranty



Installers prefer a vast selection of quality solutions for commercial refrigeration applications while requiring intuitive installation set-up and dependable performance.

The Ranco® and Eliwell™ brands are trusted in commercial refrigeration for ease-of-use, performance, reliability and innovation.

Electronic Refrigeration Controls .....	C2
Electronic Controls .....	C8
Temperature Controls - Cold Controls .....	C12
Temperature Controls .....	C15
Temperature Controls - Specialty Applications .....	C16
Temperature Controls - Wide Range .....	C19
Pressure Controls.....	C20
Lube Oil Control.....	C24
Refrigeration Accessories .....	C25
Reversing Valves .....	C26
Reversing Valves - Solenoid Coils .....	C28
Electrical Ratings .....	C29



# Refrigeration





**eliwell™**



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## ELECTRONIC REFRIGERATION CONTROLS



### EWPlus Series

The Eliwell™ **EWPlus** Electronic Refrigeration Control Kit offers versatility and high performance for your refrigeration cabinet needs. The **EWPlus** family of controls are easy-to-use and provide full cabinet control.

### Features and Benefits

#### Easy-to-Select

- Four universal models to cover all applications

#### Easy-to-Use

- Simple and intuitive menus for rapid learning
- Display features large digits and colorful icons for at-a-glance operating status monitoring
- Simplified installation with high quality screw connectors and slide-in clips for easy mounting

#### Easy-to-Configure

- USB Unicard for fast programming

#### Quality Features

- High duty compressor contact output up to 1Hp at 120V AC, or 2Hp at 230V AC
- Full cabinet control with up to 3 relay contacts, 2 temperature probes and 1 digital input
- Compressor short cycle protection
- Defrost management
- Door switch control
- Full alarm management



## Specifications

Part Numbers	Description	Buzzer	Electric Defrost	Hot Gas Defrost	Temperature Defrost Termination	Evaporator Fan Management	Number of Relays	Digital Output	Digital Input	Analog Input	Electrical Rating
EWPLUS902-115	EWPlus 902 Medium Temp	No	No	No	No	No	1	SPDT, 8 Amps max	1	1 NTC probe	115V AC
EWPLUS902-230	EWPlus 902 Medium Temp	No	No	No	No	No	1	SPDT, 8 Amps max	1	1 NTC probe	230V AC
EWPLUS961-115	EWPlus 961 Medium Temp	No	No	No	No	No	1	SPST, 16 FLA max	1	1 NTC probe	115V AC
EWPLUS961-230	EWPlus 961 Medium Temp	No	No	No	No	No	1	SPST, 12 FLA max	1	1 NTC probe	230V AC
EWPLUS971-115	EWPlus 971 Medium Temp	No	Yes	Yes	Yes	No	2	SPDT, 8 Amps max, SPST, 16 FLA max	1	2 NTC probes	115V AC
EWPLUS971-230	EWPlus 971 Medium Temp	No	Yes	Yes	Yes	No	2	SPDT, 8 Amps max, SPST, 12 FLA max	1	2 NTC probes	230V AC
EWPLUS974-115	EWPlus 974 Low Temp	Yes	Yes	Yes	Yes	Yes	3	SPDT, 8 Amps max, SPST, 16 FLA max, SPST, 3 Amps max	1	2 NTC probes	115V AC
EWPLUS974-230	EWPlus 974 Low Temp	Yes	Yes	Yes	Yes	No	3	SPDT, 8 Amps max, SPST, 12 FLA max, SPST, 3 Amps max	1	2 NTC probes	230V AC
CCA0BHT00UU00	Unicard USB /TTL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

## USB UNICARD

### Applications

The USB Unicard is a memory device for rapid parameter configuration and duplication, specifically designed for controls in the **EWPlus** and **IDPlus** families.

By downloading the DeviceManager software from the secure area of the [www.eliwell.com](http://www.eliwell.com) website, you can read and write parameter lists on the UNICARD. No other interfaces or licenses are required.



**1** Year Limited Warranty



**eliwell™**



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IDPlus 978

## ELECTRONIC REFRIGERATION CONTROLS

### IDPlus Series - Not available in US or Canada

The controllers in the Eliwell™ IDPlus 902 and 961 series are new generation devices with one activation point, capable of operating in conjunction with both heated applications and static cold storage units at normal temperatures over freezing. The controllers in the IDPlus 971 and IDPlus 974 series are suitable for cold storage units at normal and low temperatures such as static and ventilated cold storage units. The IDPlus 978 series controllers are also suitable for small and medium-sized mono-blocks, in addition to 974 functionality.

### Features and Benefits

- Simplified user interface
- Fully separated wiring
- Independent power supply from relay outputs
- Display with large digits and colored icons to understand operating status easily
- Simple, intuitive menus for fast learning
- Suited for applications with hydrocarbons
- Multiple probe menu-selection available: NTC and Pt1000
- Display temperature ranges -50°C to 150°C depending on probe

### Probes

- Made with thermoplastic rubber on the outer and polypropylene on the inner
- Probes rated for IP68 applications
- AISI 304 capsule material
- Temperature range of -50°C to 100°C
- Co-molded with double insulated cable



Gray



NTC



Green



Pt1000

### Accessory Specifications

Part Numbers	Description	Length	Color Code	Size of Capsule	Dielectric Strength
CCA0BHT00UU00	Unicard USB /TTL	NA	NA	NA	NA
SN8DAE11502C0	NTC Probe	1.5 meters	Gray	6mm X 20mm	2000 V
SN8DAE13002C0	NTC Probe	3.0 meters	Gray	6mm X 20mm	2000 V
SN9DAE11502C6	Pt1000 Probe	1.5 meters	Green	6mm X 20mm	2000 V
SN9DAE13002C6	Pt1000 Probe	3.0 meters	Green	6mm X 20mm	2000 V





## Specifications

Part Numbers	Models	Description	Buzzer	Electric Defrost	Hot Gas Defrost	Temperature Defrost Termination	Evaporator Fan Management	Number of Relays	Digital Input	Analog Input	Electrical Rating
IDPLUS902-12*	IDP11D03S0000	IDPlus 902 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	12V DC
IDPLUS902-230*	IDP11D07S0000	IDPlus 902 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	230V AC
IDPLUS961-12*	IDP17D03S0000	IDPlus 961 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	12V DC
IDPLUS961-230*	IDP17D07S0000	IDPlus 961 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	230V AC
IDPLUS971-12*	IDP29DB3S0000	IDPlus 971 Medium Temp	Yes	Yes	Yes	Yes	Yes	2	1 + 1 optional	2 + 1 optional	12V DC
IDPLUS971-230*	IDP29DB7S0000	IDPlus 971 Medium Temp	Yes	Yes	Yes	Yes	Yes	2	1 + 1 optional	2 + 1 optional	230V AC
IDPLUS974-12*	IDP2EDB3S0000	IDPlus 974 Low Temp	Yes	Yes	Yes	Yes	Yes	3	1 + 1 optional	2 + 1 optional	12V DC
IDPLUS974-230*	IDP2EDB7S0000	IDPlus 974 Low Temp	Yes	Yes	Yes	Yes	Yes	3	1 + 1 optional	2 + 1 optional	230V AC
IDPLUS978-230*	IDP24DB7S0000	IDPlus 978 Low Temp	Yes	Yes	Yes	Yes	Yes	4	1 + 1 optional	2 + 1 optional	230V AC

## Specifications - Brazil

Part Numbers	Models	Description	Buzzer	Electric Defrost	Hot Gas Defrost	Temperature Defrost Termination	Evaporator Fan Management	Number of Relays	Digital Input	Analog Input	Electrical Rating
IDPLUS902-115-BRA*	IDP11D06Z0000	IDPlus 902 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	115V AC
IDPLUS902-230-BRA*	IDP11D07Z0000	IDPlus 902 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	230V AC
IDPLUS961-115-BRA*	IDP17D06Z0000	IDPlus 961 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	115V AC
IDPLUS961-230-BRA*	IDP17D07Z0000	IDPlus 961 Medium Temp	No	No	No	No	No	1	1	1 + 1 optional	230V AC
IDPLUS971-115-BRA*	IDP29DB6Z0000	IDPlus 971 Medium Temp	Yes	Yes	Yes	Yes	Yes	2	1 + 1 optional	2 + 1 optional	115V AC
IDPLUS971-230-BRA*	IDP29DB7Z0000	IDPlus 971 Medium Temp	Yes	Yes	Yes	Yes	Yes	2	1 + 1 optional	2 + 1 optional	230V AC
IDPLUS974-115-BRA*	IDP2EDB6Z0000	IDPlus 974 Low Temp	Yes	Yes	Yes	Yes	Yes	3	1 + 1 optional	2 + 1 optional	115V AC
IDPLUS974-230-BRA*	IDP2EDB7Z0000	IDPlus 974 Low Temp	Yes	Yes	Yes	Yes	Yes	3	1 + 1 optional	2 + 1 optional	230V AC
IDPLUS978-230-BRA*	IDP24DB7Z0000	IDPlus 978 Low Temp	Yes	Yes	Yes	Yes	Yes	4	1 + 1 optional	2 + 1 optional	230V AC

\*International export models

**1** Year Limited Warranty

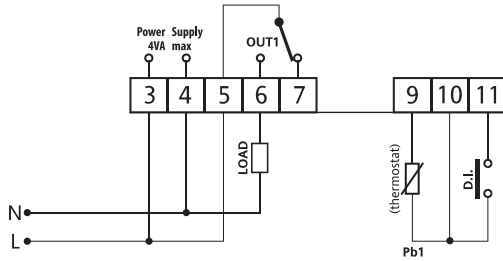




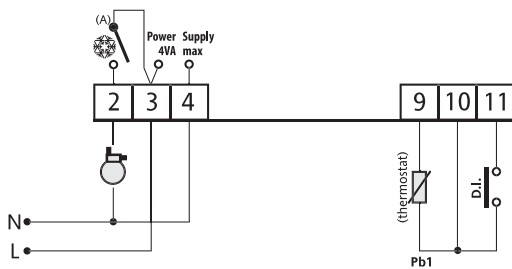
## Product Drawings

### EWPlus

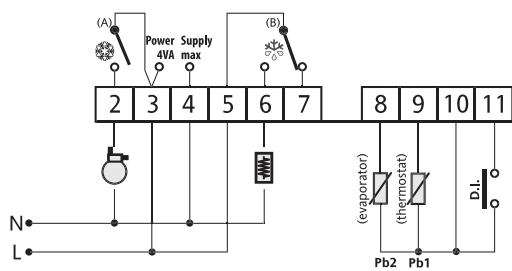
#### EWPlus 902



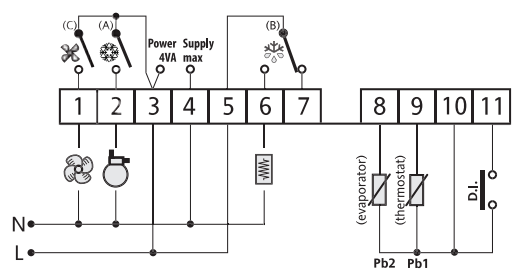
#### EWPlus 961



#### EWPlus 971



#### EWPlus 974

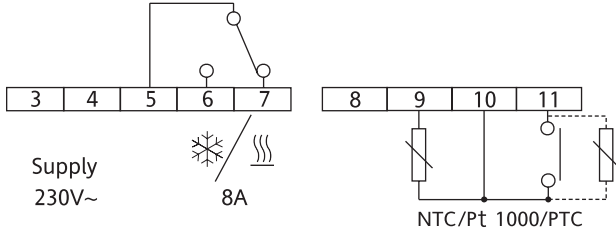




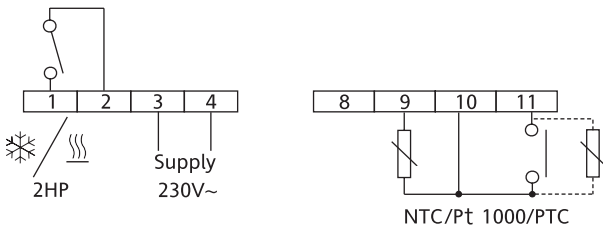
## Product Drawings

### IDPlus

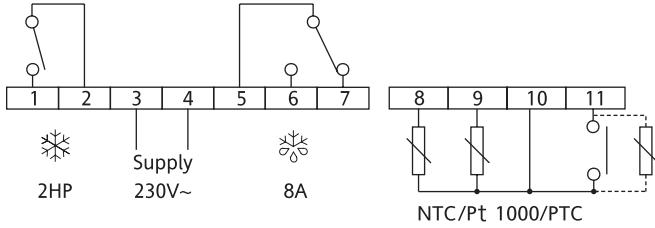
#### IDPlus 902



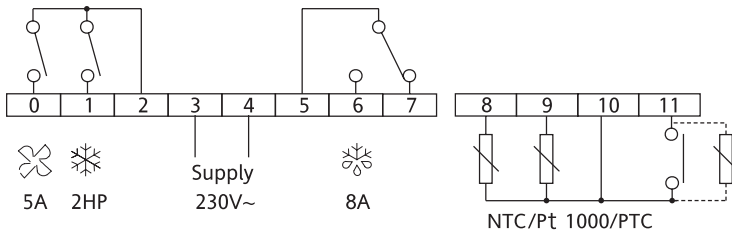
#### IDPlus 961



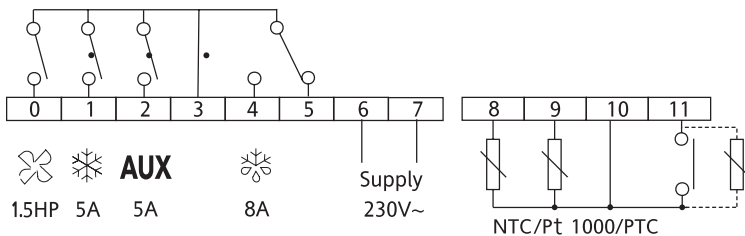
#### IDPlus 971



#### IDPlus 974



#### IDPlus 978



### Digital Outputs

Series	120V AC Loads	250V AC Loads
IDPlus 902	1 SPDT 8(4)A	1 SPDT 8(4)A
IDPlus 961	1 SPST 1HP 12(8)A	1 SPST 2HP 12(8)A
IDPlus 971	1 SPST 1HP 12(8)A 1 SPDT 8(4)A	1 SPST 2HP 12(8)A 1 SPDT 8(4)A
IDPlus 974	1 SPST 1HP 12(8)A 1 SPDT 8(4)A 1 SPST 5(2)A	1 SPST 2HP 12(8)A 1 SPDT 8(4)A 1 SPST 5(2)A
IDPlus 978	1 SPST 0.75HP 10(6)A 1 SPDT 8(4)A 1 SPST 5(2)A 1 SPST 5(2)A	1 SPST 1.5HP 10(6)A 1 SPDT 8(4)A 1 SPST 5(2)A 1 SPST 5(2)A



# PARAGON®



Scan for all models, literature and cross reference



ERC2-212111-370

## ELECTRONIC CONTROLS

### ERC-2 Series

The Paragon® ERC-2 Electronic Refrigeration Control is a microprocessor-based electronic controller designed to manage both the temperature and the defrost functions of a commercial refrigeration unit.

### Features and Benefits

- Real-time clock for defrost control
- Integrated control
- Temperature control function
- 4 relay outputs 120-240 Volts AC @ 50/60 Hz
- Compressor
- Evaporator fan
- Alarm
- Digital display module
- Keypad programming
- Two temperature sensors (supplied)
- Refrigeration cycle
- Safe mode operation
- Continues operation based on performance average in the event sensor fails
- Power failure recovery
- All settings retained in memory
- Time-of-day carried over for 100 hours

## Specifications

Part Numbers	Description	Case Type	Temperature Sensor	Defrost Cycles	Temperature Range	Electrical Rating
ERC2-212111-370	ERC-2 Electronic Control with integrated display	NEMA 1	NTC thermistor	1 to 8 per day or 1 every 48 hours	-40°F to 60°F (-40°C to 16°C)	120/208/240 Volts AC (+10, -15%), 50/60 Hz





## Output Relay Rating

Compressor: SPST	120V AC	208V AC	240V AC
Horsepower Rating (HP)	1	1.5	2
FLA/LRA	16/96	12/72	12/72
Pilot Duty (VA)	470	470	470
Defrost: SPST NO	120V AC	208V AC	240V AC
Resistive Amps	16	16	16
Horsepower Rating (HP)	1/2	3/4	1
Pilot Duty (VA)	470	470	470
Evaporator Fan: SPST NC	120V AC	208V AC	240V AC
Resistive Amps	16	16	16
Horsepower Rating (HP)	1/2	3/4	1
FLA/LRA	10/59	8/48	8/48
Pilot Duty (VA)	470	470	470
Alarms: SPST NO	120V AC	208V AC	240V AC
Resistive Amps	5	5	5
Pilot Duty (VA)	240	240	240

**PARAGON**<sup>®</sup>

**1** Year  
Limited  
Warranty



# RANCO®



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ETC-111000-000

## ELECTRONIC CONTROLS

### ETC Series

The Ranco® ETC Series Electronic Temperature Control offers a full-featured electronic replacement for electrical-mechanical temperature controls used in many commercial refrigeration applications. With its wide temperature range, one and two stage capability, selectable heating/cooling modes and multi-voltage input, the ETC is designed to provide application flexibility. Models available include 120/208/240 Volts AC and 24V AC.

### Features and Benefits

- Wide temperature range (-30°F to 220°F)
- Wide differential adjustment (1°F to 30°F)
- LCD read-out for sensor temperature, control settings, and relay status
- High Amp output relay (FLA 16 Amps @ 120V AC and 8 Amps @ 208/240 Volts AC) single stage
- EEPROM memory retains control settings during power outages
- Keypad lockout to prevent end-user alteration of settings
- 8 foot lead with sensor is extendable up to 400 feet using 18 or 22-gauge thermostat wire
- Easy 4-step set-up
- Heavy-duty relay is 1 HP rated
- Selectable °F or °C heating/cooling modes
- Single and two stage models
- NEMA 1 case and cover
- NEMA 4X models available

### Specifications

Part Numbers	Description	Number of Stages	Enclosure Type	Temperature Range	Differential Range	Electrical Rating	0 to 10 Volt Output
ETC-111000-000	Electronic Temperature Control	One	NEMA 1	-30°F to 220°F (-34°C to 104°C)	1°F to 30°F (1°C to 16°C)	120/208/240 Volts AC	No
ETC-112000-000	Electronic Temperature Control	One	NEMA 1	-30°F to 220°F (-34°C to 104°C)	1°F to 30°F (1°C to 16°C)	24V AC	No
ETC-141000-000	Electronic Temperature Control	One	NEMA 4X	-30°F to 220°F (-34°C to 104°C)	1°F to 30°F (1°C to 16°C)	120/208/240 Volts AC	No
ETC-211000-000	Electronic Temperature Control	Two	NEMA 1	-30°F to 220°F (-34°C to 104°C)	1°F to 30°F (1°C to 16°C)	120/208/240 Volts AC	No
ETC-212000-000	Electronic Temperature Control	Two	NEMA 1	-30°F to 220°F (-34°C to 104°C)	1°F to 30°F (1°C to 16°C)	24V AC	No
1309007-044	Thermistor Sensor, 2" long x 1/4" diameter with 8' #22 AWG cable	NA	NA	NA	NA	NA	NA



## Relay Electrical Ratings

Single Stage Models			Two Stage Models	
120V AC	208/240 Volts AC	NO Contact	120V AC	208/240 Volts AC
16 Amps	8 Amps	Full-load Amps	9.8 Amps	4.9 Amps
96 Amps	48 Amps	Locked Rotor Amps	58.8 Amps	29.4 Amps
15 Amps	8 Amps	Resistive Amps	9.8 Amps	4.9 Amps
1 HP	1 HP	Horsepower	1/2 HP	1/2 HP
120V AC	208/240 Volts AC	NC Contact	120V AC	208/240 Volts AC
5.8 Amps	2.9 Amps	Full-load Amps	5.8 Amps	2.9 Amps
34.8 Amps	17.4 Amps	Locked Rotor Amps	34.8 Amps	17.4 Amps
5.8 Amps	2.9 Amps	Resistive Amps	5.8 Amps	2.9 Amps
1/4 HP	1/4 HP	Horsepower	1/4 HP	1/4 HP

**RANGO**

**1** Year  
Limited  
Warranty



**RANCO**

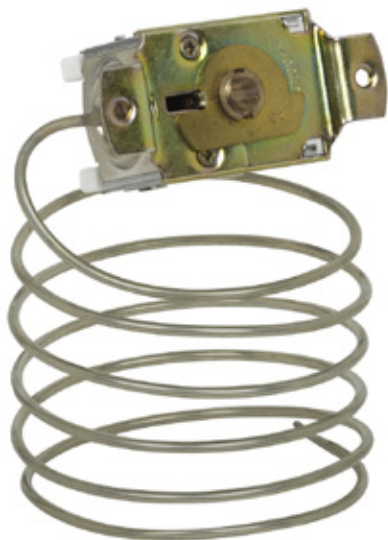


Scan for all models, literature and cross reference

**RAI** US  
Recognized Component

**1** Year Limited Warranty

## TEMPERATURE CONTROLS - COLD CONTROLS



A12-1560

### A12 and 9531 Series - Constant Cut-in

The Ranco® A12 and 9531 Series Constant Cut-in Temperature Controls are designed to switch electrical components of refrigeration systems in response to sensed temperatures.

#### Features and Benefits

- Laser-welded stainless steel bellows
- Fixed or adjustable temperature settings
- High-amperage contacts
- Pneumatic action provided by vapor-filled capillary or capillary with bulb sensing elements
- Constant On or Off positions available
- Choice of mounting brackets, adjustment ranges and cams, and slotted or flatted shafts
- Standard 1/4" quick-connect terminals with optional screw terminals

### Specifications

Part Numbers	Description	Cold Off	Normal Off	Warm Off	Cut-In	Capillary Length
A12-1506	Constant Cut-In Control	9°F	15°F	22°F	38°F	39" x 3/8" x 1-3/8"
A12-1560	Constant Cut-In Control	19°F	24°F	29°F	38°F	72"
A12-700	Constant Cut-In Control	11.5°F	18°F	26°F	37°F	84"
A12-701	Constant Cut-In Control	15°F	23.5°F	31°F	41°F	84"
9531N195	Constant Cut-In Control with Pigtail	5°F	NA	29°F	40°F	58.5"
9531N320	Constant Cut-In Control	11°F	16°F	21°F	40°F	20.5"
9531N395*	Constant Cut-In Control with Pigtail	12°F	19°F	25°F	38°F	48.5"

\*International export models



## TEMPERATURE CONTROLS - COLD CONTROLS

### A22, A30 and 9530 Series - Constant Differentials

The Ranco® A22, A30 and 9530 Series Constant Differential Temperature Controls are designed to switch electrical components of refrigeration systems in response to sensed temperatures.

#### Features and Benefits

- Laser-welded stainless steel bellows
- Fixed or adjustable temperature settings
- High-amperage contacts
- Pneumatic action provided by vapor-filled capillary or capillary with bulb sensing elements
- Constant On or Off positions available
- Choice of mounting brackets, adjustment ranges and cams, and slotted or flatted shafts
- Standard 1/4" quick-connect terminals with optional screw terminals



A30-2210

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literature and  
cross reference

### Specifications

Part Numbers	Description	Switch	Off Position	Cold Off	Cold On	Normal Off	Normal On	Warm On	Differential	Capillary Length
A22-391	Adaptable Constant Differential Control	SPDT	No	11°F	19°F	27°F	35°F	51°F	8°F	66"
A22-1112	Adaptable Constant Differential Control	SPST	No	25°F	30°F	34°F	39°F	44°F	5°F	72"
A22-1129	Ice Bin Level and Harvest Control	SPDT	NA	NA	NA	35°F	51°F	NA	6°F	48"
A30-180	Adaptable Constant Differential Control	SPST	Yes	-4°F	9°F	9°F	22°F	38°F	13°F	42"
A30-260	Adaptable Constant Differential Control	SPST	Yes	0.5°F	5.5°F	16°F	22°F	30°F	6°F	72"
A30-261	Adaptable Constant Differential Control	SPST	Yes	32°F	38°F	NA	NA	61°F	6°F	84"
A30-262	Adaptable Constant Differential Control	SPST	Yes	3°F	15°F	20°F	32°F	43°F	12°F	84"
A30-263	Adaptable Constant Differential Control	SPST	Yes	0.5°F	23°F	11°F	33.5°F	47°F	22.5°F	84"
A30-301	Adaptable Constant Differential Control	SPST	No	-24°F	NA	-3°F	5.5°F	20.5°F	8.5°F	84"
A30-2209	Constant Differential Control with Dial	SPST	Yes	35°F	NA	36.5°F	44.5°F	46°F	8°F	48"
A30-2210	Constant Differential Control with Dial	SPST	Yes	30°F	NA	32°F	40°F	42°F	8°F	48"
9530N814	Constant Differential Control with Dial	SPST	Yes	12°F	NA	16°F	40°F	43°F	24°F	30"

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Recognized  
Component

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## TEMPERATURE CONTROLS - COLD CONTROLS



K12L-1529-002

### K Series

The Ranco® K Controls are used all over the globe to control the temperature in commercial and domestic refrigeration, air conditioning and heating applications. Typical uses include refrigerators, freezers, bottle and liquid coolers, and refrigerator display cases.

### Features and Benefits

- Compact size
- Standard mounting configurations
- Constant/fixed differential
- SPST close-on-rise switching
- Various capillary lengths

### Specifications

Part Numbers	Description	Country of Origin	Switch	Cold Cut-In	Cold Cut-Out	Normal Cut-Out	Warm Cut-In	Warm Cut-Out	Constant Cut-In	Capillary Length
K12L-1529-002*	Cold Control International Models	Czech Republic	SPST	NA	-8.3°C	-4.7°C	NA	-0.8°C	5.5°C	2130 mm
K50P-1125-001*	Cold Control International Models	Czech Republic	SPST	-9°C	-18°C	NA	9°C	NA	NA	1200 mm
K50P-1126-001*	Cold Control International Models	Czech Republic	SPST	-18°C	-24°C	NA	-9°C	NA	NA	1200 mm
K50P-1127-001*	Cold Control International Models	Czech Republic	SPST	5°C	2°C	NA	13°C	NA	NA	1200 mm
K50P-6063-001*	Cold Control International Models	Czech Republic	SPST	5°C	-6°C	NA	11°C	NA	NA	1200 mm
K50Q-1125-001*	Cold Control International Models	China	SPST	-9°C	-18°C	NA	9°C	NA	NA	1200 mm
K50Q-1126-001*	Cold Control International Models	China	SPST	-18°C	-24°C	NA	-9°C	NA	NA	1200 mm
K50Q-1127-001*	Cold Control International Models	China	SPST	5°C	2°C	NA	13°C	NA	NA	1200 mm

\*International export models



## TEMPERATURE CONTROLS

### Varifix® Series

The Ranco® Varifix International Cold Controls are designed for fast and easy service replacements. They are available for both refrigerator and freezer applications.

### Features and Benefits

- Trusted brand
- Capillary is crimped and sealed for maximum reliability
- High level of performance
- Complete kit includes all necessary hardware



VT9

### Specifications

Part Numbers	Description	Application	Normal Cut-Out	Normal Cut-In	Capillary Length
VB7	Service Replacement Thermostat	Bottle or Beverage Cooler and Frost Free Refrigerator	3°C	7°C	1200 mm
VC1	Service Replacement Thermostat	Refrigerator / Manual Defrost	-14.5°C	-5°C	1200 mm
VF3	Service Replacement Thermostat	Freezer and Ice Cream Cabinet	-24°C	-16°C	2000 mm
VT9	Service Replacement Thermostat	Refrigerator Auto Defrost	-18.5°C	33.5°C	1200 mm



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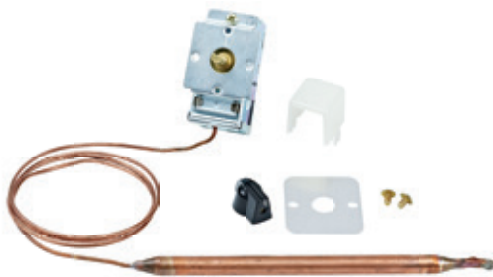
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## TEMPERATURE CONTROLS - SPECIALTY APPLICATIONS



C12-5010

### Heat/Cool

The Ranco® Heat / Cool Controls replace many OEM controls which govern the on/off compressor function. Heat and cool controls are found on room air conditioners such as packaged terminal, room and through-the-wall heat and cool units.

### Features and Benefits

- Fixed or adjustable temperature settings
- Laser-welded stainless steel sensing elements
- Narrower differentials attainable
- C12 can be used for cool only units or heat/cool units when used with a separate changeover switch
- C17 has two SPDT electrically isolated switches, calibrated at different set points and differentials
- Two stage SPDT switches are staged 3.5°F

### Specifications

Part Numbers	Description	Application	Switch	Temperature Range	Differential	Capillary	Sensing Element
C12-5010	Single Stage Heat / Cool Control	Packaged Terminal, Room and Through-the-Wall Heat / Cool Units	SPDT	60°F to 98°F	3°F	36"	3/8" x 9" Bulb
C17-100	Two Stage Heat / Cool Control	Packaged Terminal, Room and Through-the-Wall Heat / Cool Units	2 SPDT	71°F to 101°F (Cooling), 64°F to 94°F (Heating)	3.5°F	26"	3/8 x 8-9/16" Bulb



## TEMPERATURE CONTROLS - SPECIALTY APPLICATIONS

### Heat Pump Controls

The Ranco® Heat Pump Controls provide accurate control of temperature and defrost for heat pumps.

The C12-2001 control is an adjustable resistance heat thermostat used to turn on heat in response to outdoor temperature.

The E15-2601 provides field-adjustable timer control for de-icing of heat pump outdoor coils.

Interlock prevents more than one defrost cycle per time period and temperature must be 28°F or lower to start.

### Features and Benefits

- Laser-welded stainless steel sensing elements
- Narrower differentials attainable
- Defrost includes field selectable defrost cycles



C12-2001

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cross reference

### Specifications

Part Numbers	Description	Application	Switch	Temperature Range	Timing	Differential	Capillary Length	Sensing Element
C12-2001	Resistance Heat Lockout Thermostat	Heat Pump Controls	SPDT	-1°F to 59°F	NA	5°F	30"	3/8" x 6" Bulb
E15-2601	Timer-Initiated Heat Pump De-Ice Control	Heat Pump Controls	SPDT	Adjustable 55°F to 78°F	Field Selectable: 30, 45, or 90 Minutes	NA	60"	5/16" x 5-1/16" Bulb

**1** Year  
Limited  
Warranty



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## TEMPERATURE CONTROLS - SPECIALTY APPLICATIONS



F25-107

### F Series - Fan Control

The Ranco® Fan Controls terminate defrost, and delay the evaporator fan operation on electric heat, hot gas and reverse cycle commercial refrigeration systems.

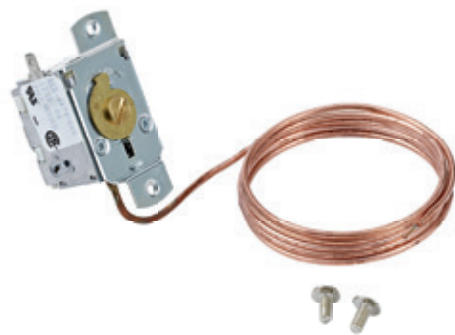
#### Features and Benefits

- Prevents warm, moist air from being circulated into the refrigerated space
- Remote bulb sensing
- Factory-fixed low event for fan delay

### Specifications

Part Numbers	Description	Application	Switch	Fan On	Defrost Termination Range	Capillary Length	Sensing Element
F25-107	Defrost Termination / Fan Delay Control	Beverage / Reach-in Medium Temperature	SPDT	20°F Fixed	40°F to 75°F (5°C to 24°C)	60"	3/8" X 4" Cross Ambient Bulb

## TEMPERATURE CONTROLS - SPECIALTY APPLICATIONS



K-3001

### Water Cooler Control

The Ranco® Water Cooler Control is designed as a universal replacement for water and beverage cooler applications.

#### Features and Benefits

- Small, compact design
- Laser-welded bellows for reliability
- Computer calibrated
- Patented switch for high performance
- Screwdriver adjustment

### Specifications

Part Numbers	Description	Application	Cold Off	Normal Off	Normal On	Warm On	Differential	Capillary Length
K-3001	Direct Replacement Water Cooler Control	Ice Equipment, Thermal Storage and Water Cooler Controls	37°F	46°F	53°F	61°F	7°F	48"



## TEMPERATURE CONTROLS - WIDE RANGE

### O Series

The Ranco® Wide Range O Series Temperature Controls provide a wide selection of controls customized to allow users exact adjustments within manufacturers' limits.

The Ranco O Series features heavy-duty plated steel frames, non-conductive covers with front-located captive cover screws, raised screw terminals for fully accessible wiring, and large easy-to-read scales.

Recognizing the need for flexibility in design of refrigeration equipment, these controls offer a wide selection for such products as self-contained refrigerators, freezers, coolers, walk-in units, and refrigeration display cases.

### Features and Benefits

- Maximum adjustment accuracy with 7 revolution range adjustment screws
- NEMA 1 enclosure with non-conductive cover
- Universal mounting and compact design
- Laser-welded bellows for extended life
- Wide range adjustable differential
- Differential at low end range is 6°F to 25°F
- O10 Series SPST switch opens low

### The O60 Series have these additional features:

- Virtually unaffected by ambient temperature
- 10 times setting sensitivity of most other wide range controls
- Gas-filled, nonposition-sensitive bulb



O10-1409  
with Coil Capillary



O10-1418  
with Air Coil

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## Specifications

Part Numbers	Description	Switch	Temperature Range	Differential	Capillary Length	Bulb
010-1408	Low Temperature Controls	SPST	-15°F to 40°F	3°F to 20°F	72"	Remote
010-1409	Medium Temperature Controls	SPST	0°F to 55°F	3°F to 20°F	72"	Remote
010-1410	High Temperature Controls	SPST	25°F to 75°F	3°F to 20°F	72"	Remote
010-1416	Medium Temperature Controls	SPST	0°F to 55°F	3°F to 20°F	72"	Cross Ambient
010-1418	Medium Temperature Controls	SPST	0°F to 55°F	3°F to 20°F	Air Coil	Remote
060-100	Extra Low-Wide Range Temperature Controls	SPDT	-35°F to 95°F	4°F to 50°F	96"	3/8" x 6" Cross Ambient



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O10-1402

## PRESSURE CONTROLS

### O Series - Single Low Pressure Controls

The Ranco® O Series Single Low Pressure Controls offer a variety of pressure ranges and switch action to provide maximum application flexibility.

#### Features and Benefits

- Controls available for most refrigerant types
- High-amp rated switch (SPST) design (O10-1402/O10-1483)
- Super Cap® capillary vibration protection system
- Non-conductive front cover with captive screw
- Adjustable differential and range
- Easy-to-read scale plate
- Vibration cone (absorbs and reduces vibration away from brazed joint)
- Low mass copper alloy capillary tube (reduces capillary stress caused by equipment vibration)

#### The O16-624 control has additional features:

- Compatible with refrigerants 134A, 401A, 401B, 402A, 402B, 403A, 403B and 404A
- Originally designed for use with obsolete refrigerants R12, R22, R500 and R502

## Specifications

Part Numbers	Description	Reset	Switch	Pressure Range	Differential	Pressure Connection	Capillary Length
O10-1402	Low Pressure Control	Auto	SPST	12" Hg to 50 PSI	5 to 35 PSI	1/4" SAE flare nut	36"
O10-1483	Low Pressure Control	Auto	SPST	10" Hg to 100 PSI	10 to 40 PSI	1/4" SAE flare nut	36"
O16-527	Low Pressure Control	Auto	SPDT	10" Hg to 100 PSI	10 to 40 PSI	1/4" SAE flare nut	36"
O16-624	Low Pressure Control	Auto	SPST	12" Hg to 80 PSI	5 to 38 PSI	1/4" SAE flare nut	36"



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## PRESSURE CONTROLS

### O Series - Single High Pressure Controls

The Ranco® O Series Single High Pressure Controls offer a variety of pressure ranges and switch action to provide maximum application flexibility.

#### Features and Benefits

- NEMA 1 enclosure with non-conductive cover
- Front-located captive cover screw
- Large, easy-to-read scale plate
- Super Cap® capillary protection system
- Universal mounting and compact design
- Screw terminals are raised and fully accessible for easy wiring
- Laser-welded bellows for extended life
- Heavy-duty plated steel frame
- Suitable for R12, R22, and R502 applications



O16-108

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### Specifications

Part Numbers	Description	Reset	Switch	Pressure Range	Differential	Pressure Connection	Capillary Length
010-2054	Single Function High Pressure Control	Auto	SPST	100 to 400 PSI	40 to 150 PSI	1/4" SAE flare nut	36"
016-108	Single Function High Pressure Control	Auto	SPDT	100 to 400 PSI	40 to 150 PSI	1/4" SAE flare nut	36"
016-200	Single Function High Pressure Control	Manual	SPDT	150 to 450 PSI	40 PSI	1/4" SAE flare nut	48"
020-7006	Single Function High Pressure Control	Auto	DPST	100 to 400 PSI	40 to 150 PSI	1/4" SAE flare nut	36"

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O12-1506

## PRESSURE CONTROLS

### O Series - Dual Pressure

The Ranco® Dual Pressure Controls combine the functions of a single high-pressure limit control and a single low-pressure control in one unit with a single pole, single throw (SPST) switch.

#### Features and Benefits

- Convertible feature allows selection of manual or reset function when operating at high pressure (O12-4833/ O12-4834)
- A wide range of high-pressure manual or automatic reset controls can be replaced (O12-4833 or O12-4834)
- A high-pressure limit is combined with suction pressure sensing to provide temperature control and/or pump-down
- High-limit adjustment screw
- Low-pressure differential and range adjusting screws
- Selector screw for manual or automatic
- Reset button
- Low-pressure scale plate
- High-impact plastic cover with center mount screw
- High-pressure scale plate
- Super Cap® capillary protection system
- Color-coded for easy identification of pressure line
- High-side capillary flare nut (silver)
- Low-side capillary flare nut (brass)

### Specifications

Part Numbers	Description	Switch	Low Reset	Low Cut-In	Low Differential	High Reset	High Cut-Out	High Differential	Pressure Connection	Capillary Length
O12-1502	Dual Pressure Control	SPST	Auto	12" Hg to 50 PSI	5 to 35 PSI	Auto	150 to 450 PSI	70 Fixed PSI	1/4" SAE flare nut	36"
O12-1506	Dual Pressure Control	SPST	Auto	12" Hg to 50 PSI	5 to 35 PSI	Auto	100 to 250 PSI	50 Fixed PSI	1/4" SAE flare nut	36"
O12-1549	Dual Pressure Control	SPST	Auto	10" Hg to 100 PSI	10 to 40 PSI	Auto	150 to 450 PSI	70 Fixed PSI	1/4" SAE flare nut	36"
O12-4833	Dual Pressure Control	SPST	Auto	12" Hg to 50 PSI	5 to 35 PSI	Convertible	150 to 450 PSI	70 Fixed PSI	1/4" SAE flare nut	48"
O12-4834	Dual Pressure Control	SPST	Auto	10" Hg to 100 PSI	10 to 40 PSI	Convertible	150 to 450 PSI	70 Fixed PSI	1/4" SAE flare nut	48"



## PRESSURE CONTROLS

### O Series - Ice Bank Control

The Ranco® O Series Ice Bank Control is suitable for soft drink dispensers, drink vending machines and ice builders for thermal storage. Uses a special water-filled bulb and transmission fluid to control ice thickness in applications utilizing a refrigerated water bath with ice bank reserve capacity.



O18-100

### Specifications

Part Numbers	Description	Switch	Cut-In	Cut-Out	Temperature	Capillary Length	Sensing Element
O18-100	Ice Bank Control	SPST	34.5°F	27.5°F	Fixed 32°F	76"	Bulb

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P30-5826

## LUBE OIL CONTROLS

### P30 Series

The Ranco® P30 Series Lube Oil Protection Controls guard pressure-lubricated refrigeration compressors against major damage due to loss of oil pressure.

This control utilizes the built-in P30 Time Delay Switch to start timing when oil pressure drops below operating requirements.

The timer is designed not only to track oil pressure recovery within a set period, but also to alert the control circuit to open and stop the compressor when the recovery period is exceeded.

These controls also feature replaceable time delay modules, Super Cap® capillary protection system and front-located captive cover screw.

### Features and Benefits

- Alarm circuit standard
- Ambient temperature compensated
- Super Cap® capillary protection system
- High impact, non-conductive cover
- Field replaceable switch module
- Manual reset
- Industry standard circuitry and terminal identification

## Specifications

Part Numbers	Description	Pressure Connection Lube and Suction	Time Delay	Pressure Range	Electrical Rating
P30-5826	P30 Series Lube Oil Protection Control	36" Capillary with Flare Nut	120 seconds	9 PSID Fixed	120V AC or 240V AC, Pilot Duty 720VA

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## REFRIGERATION ACCESSORIES

### Refrigerant Hoses

The Ranco® refrigerant hose is a heavy-duty hose designed for critical applications such as commercial refrigeration.

Made of teflon tubing and surrounded by a braided 304 stainless steel wire, the hose is designed to resist breakage from compressor vibration.

### Features and Benefits

- Hose inner diameter - 3/16"
- Hose outer diameter - 5/16"
- Maximum operating pressure - 3,000 PSI
- Minimum burst pressure - 12,000 PSI
- Minimum bend radius - 2"
- Vacuum - 28" Hg



1290132-A24



1290132-A36

### Specifications

Part Numbers	Description	Hose Length	Fittings (1/4 SAE)
1290132-A24	Refrigerant Hose	24"	One straight and one 90° elbow. Both ends have 7/16" - 20 Female Flare Connector
1290132-A36	Refrigerant Hose	36"	One straight and one 90° elbow. Both ends have 7/16" - 20 Female Flare Connector

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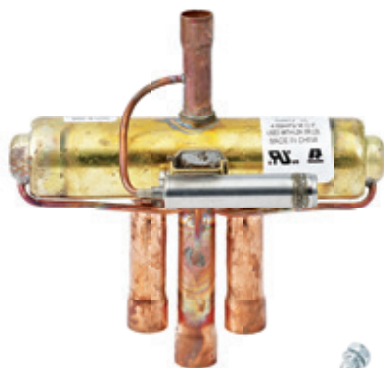


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## REVERSING VALVES



V2-408060-170

### V Series

The Ranco® 4-Way Reversing Valves are designed for heat pump applications such as window-type, unitary and split systems.

They are the key component to provide heating and cooling from the heat pump system by reversing the flow direction of the refrigerant.

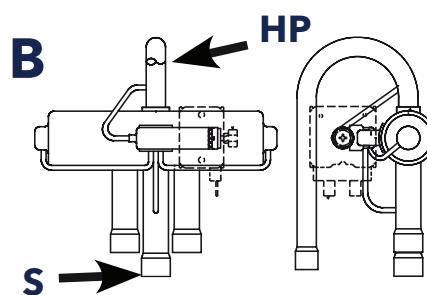
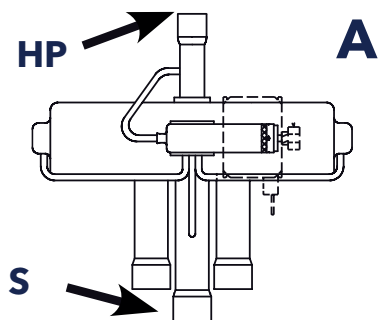
These solenoid operated valves are slide type with a 4-way pilot valve, and operate under the full pressure of the heat pump system.

Note: Solenoid coils are not included.

### Specifications

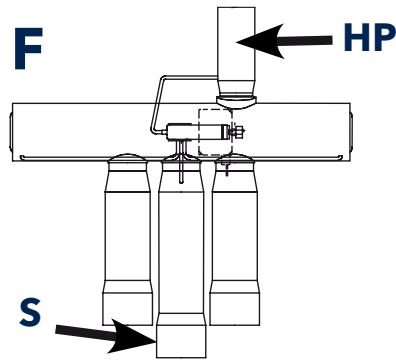
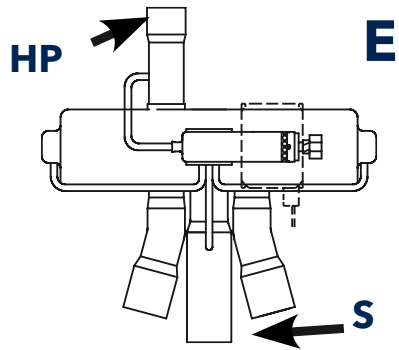
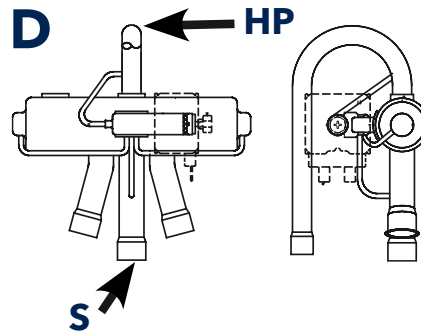
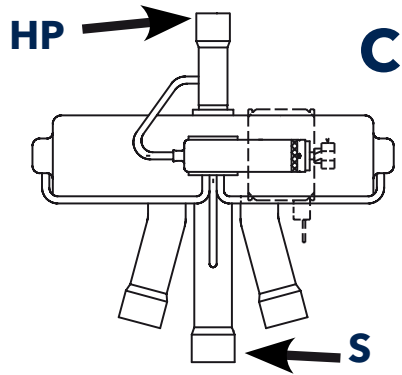
Part Numbers	Description	Capacity Nominal	Capacity R-22	Capacity R-410A	Tube Size Suction	Tube Size Discharge	Style
V2-408060-170	4-Way Reversing Valve	1 ton	0.75 to 2.0 tons	0.9 to 2.2 tons	1/2"	3/8"	A
V2-408060-270	4-Way Reversing Valve	2 tons	0.75 to 2.0 tons	0.9 to 2.2 tons	1/2"	3/8"	B
V2-410060-470	4-Way Reversing Valve	2 tons	1.0 to 2.5 tons	1.3 to 2.5 tons	5/8"	3/8"	D
V2-4100F0-370	4-Way Reversing Valve	2 tons	1.0 to 2.5 tons	1.3 to 2.5 tons	5/8"	3/8" Outer Diameter	C
V3-410080-770	4-Way Reversing Valve	3 tons	1.0 to 2.8 tons	1.3 to 3.1 tons	5/8"	1/2"	E
V3-412080-870	4-Way Reversing Valve	3 tons	1.0 to 3.0 tons	1.3 to 3.5 tons	3/4"	1/2"	E
V6-412080-170	4-Way Reversing Valve	6 tons	1.0 to 5.5 tons	1.3 to 6.7 tons	3/4"	1/2"	A
V6-414080-170	4-Way Reversing Valve	6 tons	1.0 to 5.5 tons	1.3 to 6.7 tons	7/8"	1/2"	A
V10-414080-170	4-Way Reversing Valve	10 tons	3.0 to 9.9 tons	3.8 to 11.9 tons	7/8"	1/2"	A
V10-418140-170	4-Way Reversing Valve	10 tons	3.0 to 11.2 tons	3.8 to 13.5 tons	1-1/8"	7/8"	A
V12-4220T0-270	4-Way Reversing Valve	12 tons	6.0 to 14.0 tons	6.3 to 16.8 tons	1-3/8"	1-1/8" Outer Diameter	F

### Product Drawings





## Product Drawings



### Legend

HP: High Pressure

S: Suction

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## REVERSING VALVES - SOLENOID COILS



LDK-110000-070

### LDK Series

The Ranco® LDK Series Solenoid Coils are designed for use with current production (Generation 4) V0, V1, V2, V3, V6, V10 and V12 Ranco 4-way Reversing Valves.

These color-coded, encapsulated, continuous duty, moisture resistant electro-magnetic coils are designed to operate the pilot valve that controls these reversing valves.

A W29 wiring harness with 48" leads is included with the solenoid coil.

### Features and Benefits

- Epoxy encapsulated
- Continuous duty
- Moisture resistant magnetic coils
- Includes wiring harness

### Specifications

Part Numbers	Description	Color Code	Lead Length	Electrical Rating	Power
LDK-110000-070	Solenoid Coils for Reversing Valves	Red	48"	24V AC	5 Watts at 50 Hz, 4 Watts at 60 Hz
LDK-310000-070	Solenoid Coils for Reversing Valves	Black	48"	120V AC	5 Watts at 50Hz, 4 Watts at 60 Hz
LDK-410000-070	Solenoid Coils for Reversing Valves	Green	48"	208/240 Volts AC	5 Watts at 50 Hz, 4 Watts at 60 Hz



## ELECTRICAL RATINGS

Control Type	Volts AC	Motor Load Rating		Resistive Load Maximum Amps	Pilot Duty Maximum Volt Amps	Switch Action
		Maximum Full Load Amps	Maximum Locked Rotor Amps			
A12	120	16	80	NA	240	SPST
	208	16	80	NA	240	
	240	16	80	NA	240	
A22	120	20	80	25	500	SPDT
	240	20	80	25	500	
	277	16	60	NA	500	
A30	24	NA	NA	NA	240	SPST
	120	20	80	NA	240	
	240	20	80	NA	240	
	277	16	60	16	240	
C12-2001	24	NA	NA	NA	240	SPDT
	120	20	85	25	240	
	240	20	85	25	240	
	277	16	60	20	240	
C12-5010	125	20	80	25	240	SPDT
	240	20	80	NA	240	
	277	16	60	16	240	
C17-100	120	20	80	NA	240	2 SPDT
	240	20	80	NA	240	
	277	16	60	16	240	
E15	24	NA	NA	NA	240	SPDT
	120	10	40	25	240	
	240	10	40	25	240	
	277	10	40	16	240	
F25	120	20	80	NA	360	SPDT
	240	20	80	25	360	
K	120	10	40	NA	240	SPST
	250	6	36	6	240	
O10	24	NA	NA	NA	144	SPST
	120	24	144	24	720	
	240	24	144	24	720	
	241/600	NA	NA	NA	125	
O16, O60	24	NA	NA	NA	144	SPDT
	120	17	102	24	720	
	240	17	102	24	720	
	241/600	NA	NA	NA	125	
P30	120	NA	NA	NA	720	NA
	240	NA	NA	NA	720	