

# HEATING – GAS VALVE SYSTEMS

**ROBERTSHAW IS PROUD TO PARTNER WITH**

# ASGE

American Society of Gas Engineers

**Las Vegas 2018**

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# SUBJECTS WE WILL COVER IN THIS SESSION

- Fuel and Pressure Characteristics
- Gas Valve Applications
- Gas Valve Actuator Types
- Gas Valve Characteristics
- Gas Valve Manufacturers
- Ignition Control System
- Ignition Manufacturers
- Flame Rectification
- Pilot Basics
- Thermocouple Basics
- Thermopile Basics
- Installation and Troubleshooting Tips
- Website Tools
- Q&A



# ACRONYMS

BTU	=	British Thermal Units
LC	=	Low Capacity
LP	=	Liquid Propane
MV	=	Main Valve
NAT	=	Natural Gas
PD	=	Pressure Drop
PV	=	Pilot Valve
SLC	=	Snap-action Low Capacity
mV	=	MilliVolts
WC	=	Water Column



# FUEL CHARACTERISTICS

Natural Gas	Characteristics	Liquid Propane (LP)
0.64	Specific Gravity	1.53
1000	BTUs / Cubic Feet	2500
7"WC – 10.5"WC	Service Pressure Range	11"WC – 14"WC
1200° F	Ignition Temperature	950° F
10/1	Combustion Air/Gas Ratio	24/1

- Natural gas is lighter than air and *rises*
- L.P. gas is heavier and *puddles* in lowest area it can find



# FUEL CHARACTERISTICS OF BRITISH THERMAL UNITS

- Definition of BTU: The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit
- Many gas appliances are rated on BTU output
- The more heat needed, the higher the BTU rating
- Residential gas water heaters (regardless of fuel) are rated between 15,000 and 75,000 BTU
- Commercial water heaters are rated between 75,000 and 750,000 BTU



# PRESSURE CHARACTERISTICS

Pressure Side	Natural Gas	Liquid Propane
Inlet Pressure	7" – 10" WC	14" – 17" WC
Outlet Pressure	3" – 4" WC @ 1" PD	10" – 11" WC @ 1" PD

- Excessive inlet pressure will not necessarily cause the gas valve to lock up
- However the valve may not regulate correctly
- Gas line pressure from utilities vary seasonally with demand
  - During peak usage, inlet pressure can drop below the 7" WC Natural gas shown above
- High rise buildings may experience low pressure on upper floors
  - Especially during cold weather, many times a 2 psig system is used to compensate
- In some instances OEMs will specify higher outlet pressures
  - To obtain BTU rates beyond the capabilities of the gas valve at 1" pressure drop



# CENTRAL HEATING APPLICATIONS

Factory Model (Uni-Line® Part)	BTU @ 1" PD	Min - Max BTU Capacity	Standing	Intermittent	Direct
<b>7000 STD</b> (Uni-Line 700)	Nat 300,000	10,000 – 720,000	✓	✓	✓
	LP 485,000	10,000 – 900,000	✓	✓	✓
<b>7000 HC</b> (Uni-Line 700)	Nat 600,000	200,000 – 800,000	✓	✓	✓
	LP 972,000	300,000-1,150,000	✓	✓	✓
<b>7200</b> (Uni-Line 720)	Nat 150,000	15,000 – 200,000	✓	✓	✓
	LP 240,000	15,000 – 320,000	✓	✓	✓



# SPACE HEATING AND HEARTH APPLICATIONS

Factory Model	BTU @ 1" PD	Min - Max BTU Capacity	Standing	Intermittent	Direct
<b>7000 STD</b> <b>(Uni-Line 700)</b>	Nat 300,000	10,000 – 720,000	✓	✓	✓
	LP 485,000	10,000 – 900,000	✓	✓	✓
<b>7200</b> <b>(Uni-Line 720)</b>	Nat 150,000	15,000 – 200,000	✓	✓	✓
	LP 240,000	15,000 – 320,000	✓	✓	✓
<b>2000</b> <b>(Uni-Line 722)</b>	Nat 125,000	25,000 – 170,000	✗	✓	✓
	LP 200,000	25,000 – 272,000	✗	✓	✓
<b>7500</b> <b>(Uni-Line 722)</b>	Nat 100,000	6,700 – 160,000	✓	✗	✗
	LP 162,000	6,700 – 226,000	✓	✗	✗
<b>7000 LC</b> <b>(Uni-Line 710)</b>	Nat 40,000	5,000 – 70,000	✓	✗	✗
	LP 65,000	5,000 – 100,000	✓	✗	✗
<b>7000 ST</b> <b>(Uni-Line 700)</b>	Nat 100,000	10,000 – 160,000	✓	✗	✗
	LP 162,000	10,000 – 225,000	✓	✗	✗



# COMMERCIAL WATER HEATING APPLICATIONS

Factory Model	BTU @ 1" PD	Min - Max BTU Capacity	Standing	Intermittent	Direct
<b>7000 STD</b>  (Uni-Line 700)	Nat 300,000	10,000 – 720,000	✓	✓	✓
	LP 485,000	10,000 – 900,000	✓	✓	✓
<b>7200</b>  (Uni-Line 720)	Nat 150,000	15,000 – 200,000	✓	✓	✓
	LP 240,000	15,000 – 320,000	✓	✓	✓
<b>2000</b>  (Uni-Line 722)	Nat 125,000	25,000 – 170,000	✗	✓	✓
	LP 200,000	25,000 – 272,000	✗	✓	✓
<b>7000 HC</b>  (Uni-Line 700)	Nat 600,000	200,000 – 800,000	✓	✓	✓
	LP 972,000	300,000 – 1,150,000	✓	✓	✓



# COMMERCIAL COOKING APPLICATIONS

Factory Model	BTU @ 1" PD	Min - Max BTU Capacity	Standing	Intermittent	Direct	Temp Rating
7000 STD (Uni-Line 700)	Nat 300,000	10,000 – 720,000	✓	✓	✓	-40 to 175°F
	LP 485,000	10,000 – 900,000	✓	✓	✓	
7200 (Uni-Line 720)	Nat 150,000	15,000 – 200,000	✓	✓	✓	-40 to 175°F
	LP 240,000	15,000 – 320,000	✓	✓	✓	
2000 (Uni-Line 722)	Nat 125,000	25,000 – 170,000	✗	✓	✓	-40 to 175°F
	LP 200,000	25,000 – 272,000	✗	✓	✓	
7500 (Uni-Line 722)	Nat 100,000	6,700 – 160,000	✓	✗	✗	0 to 185°F
	LP 162,000	12,000 – 226,000	✓	✗	✗	
7000 LC (Uni-Line 710)	Nat 40,000	5,000 – 70,000	✓	✗	✗	-40 to 225°F
	LP 65,000	5,000 – 100,000	✓	✗	✗	
TS11 J & K (Uni-Line 700)	Nat 210,000	NA	✓	✗	✗	32 to 300°F
	LP 340,000	NA	✓	✗	✗	



# RESIDENTIAL WATER HEATING APPLICATIONS

Factory Model	BTU @ 1" PD	Min - Max BTU Capacity	Standing	Intermittent	Direct	Temp Rating
<b>220R</b>  (Uni-Line 110)	Nat 86,000	10,700 – 107,000	✓	✗	✗	32 to 175°F
	LP 100,000	7,000 – 140,000	✓	✗	✗	
<b>R103RV</b>  (Uni-Line 110)	Nat NA	NA	✓	✗	✗	32 to 175°F
	LP > 35,000	3,500 – 35,000	✓	✗	✗	
<b>2000</b>  (Uni-Line 722)	Nat 125,000	25,000 – 170,000	✗	✓	✓	-40 to 175°F
	LP 200,000	25,000 – 272,000	✗	✓	✓	
<b>R110R</b>  (Uni-Line 110)	Nat 86,000	10,700 – 107,000	✓	✗	✗	32 to 175°F
	LP 100,000	7,000 – 140,000	✓	✗	✗	

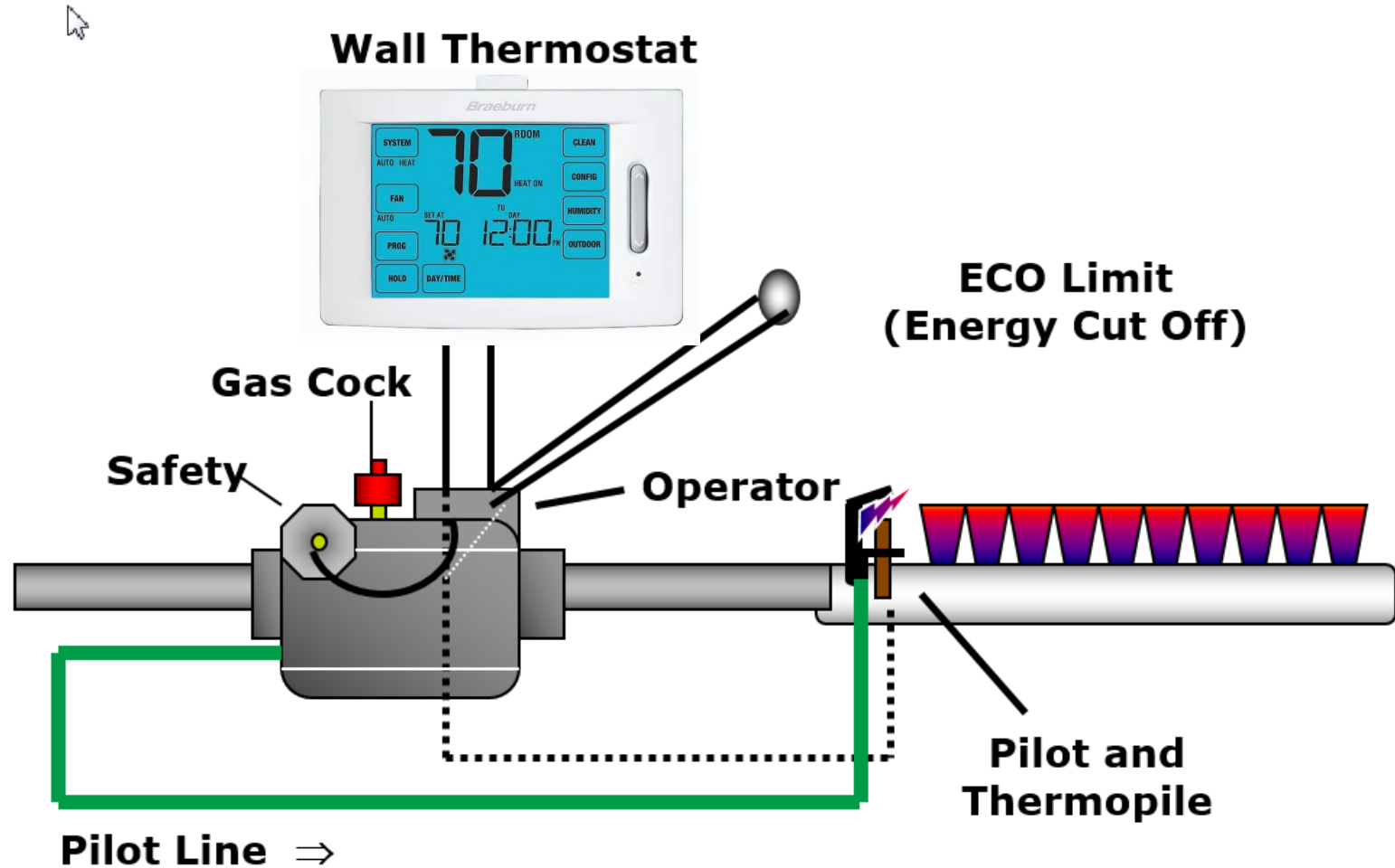


# GAS VALVE ACTUATOR TYPES

- **Manual** – Standing pilot valve manually turned ON and OFF for each heating cycle.
- **Millivolt** – Wall thermostat actuated with manual gas cock, automatic pilot safety valve and a Millivolt operator. The automatic pilot safety is separate from gas cock and provides shutoff in case of pilot outage. Millivolt gas valves do not require external power source.
- **24 Volt, 120 Volt, and 240 Volt** – Combines a manual main and pilot gas valve, a separate automatic safety pilot valve, pilot filtration, and automatic electric valve.
- **Hydraulic** – Temperature is sensed by a capillary bulb. The bulb in the return air stream is actuated open and close by the hydraulic system.

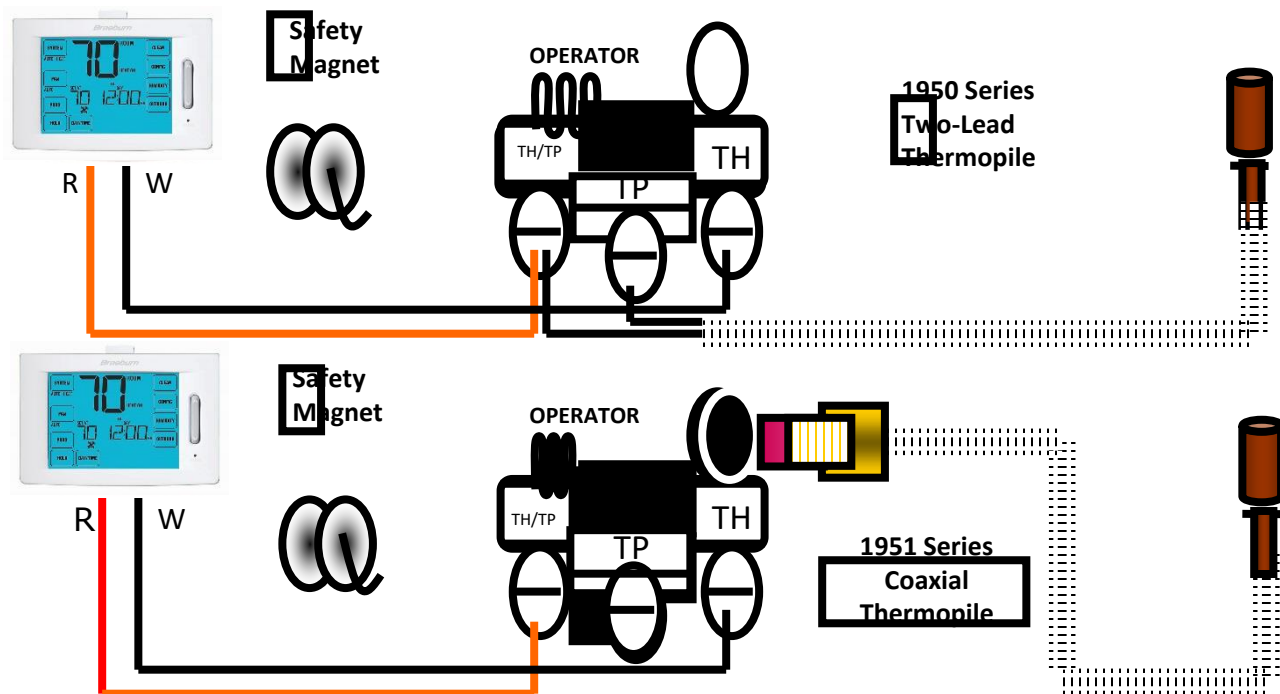


# MILLIVOLT ACTUATED GAS VALVE



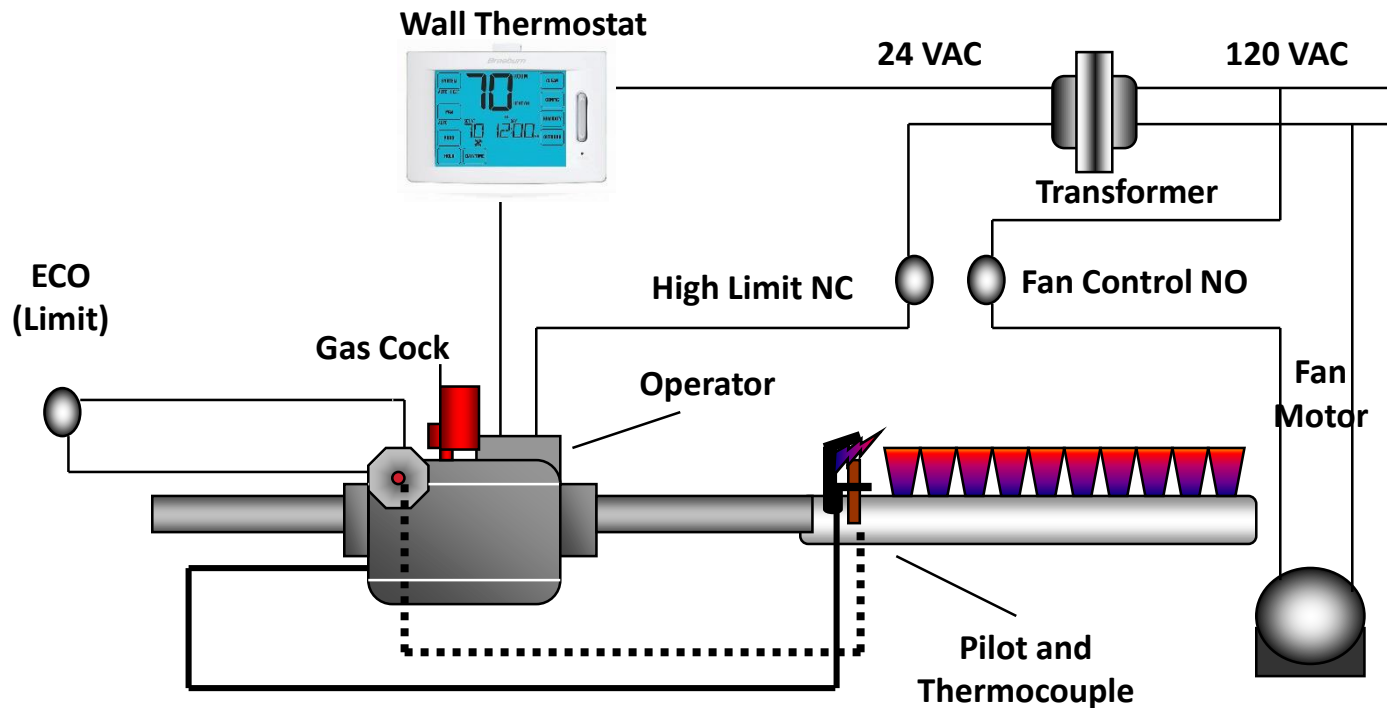


# MILLIVOLT WIRING



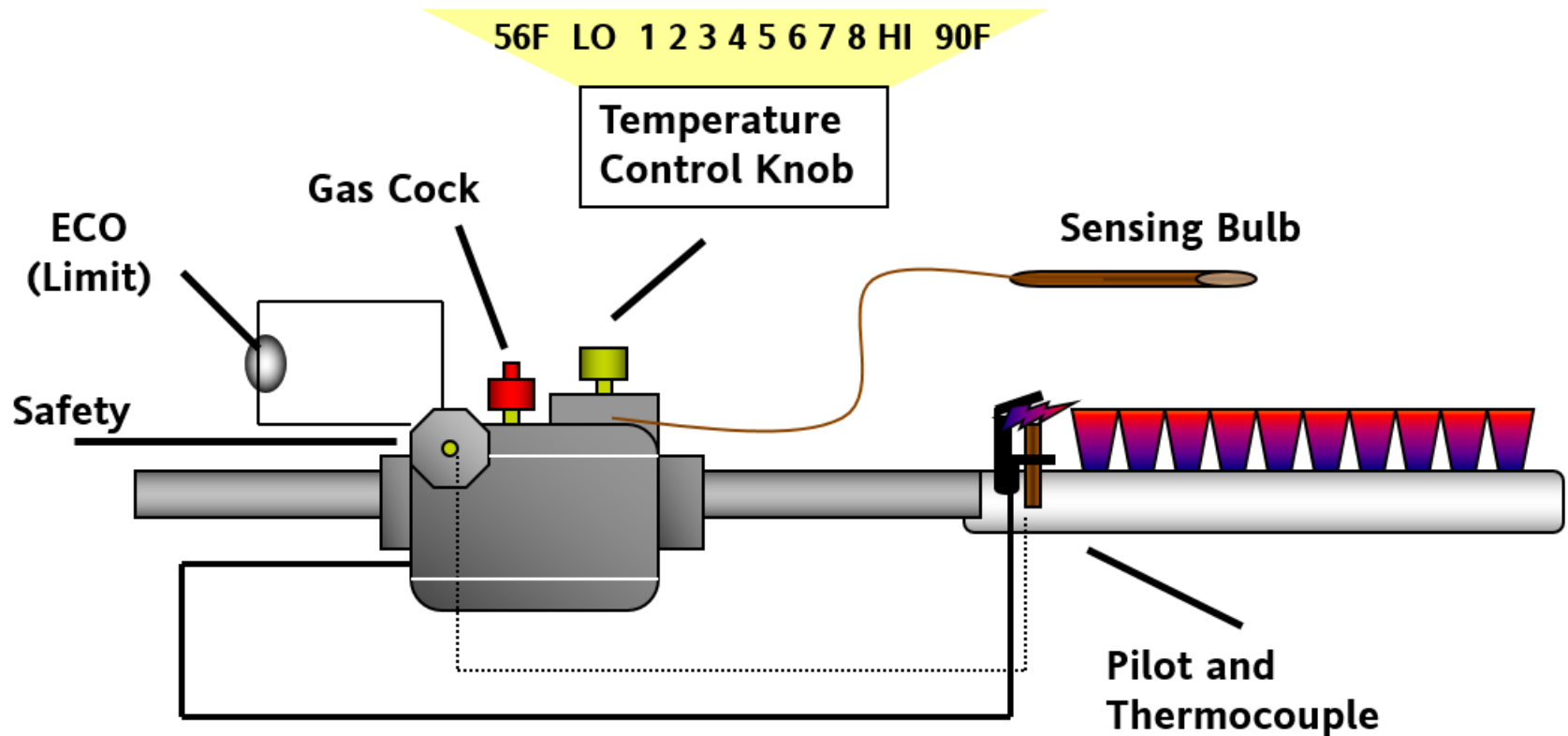


# 24 VOLT ACTUATED – STANDING PILOT SYSTEM





# HYDRAULIC ACTUATED – STANDING PILOT SYSTEM





# ADDITIONAL GAS VALVE CHARACTERISTICS

- Combination Gas Valves
- Open Valve Options
  - Standard Opening
  - Slow Opening
  - Step Opening
  - Two-stage Models
- Close Valve Options
  - Snap Action
  - Snap Throttle

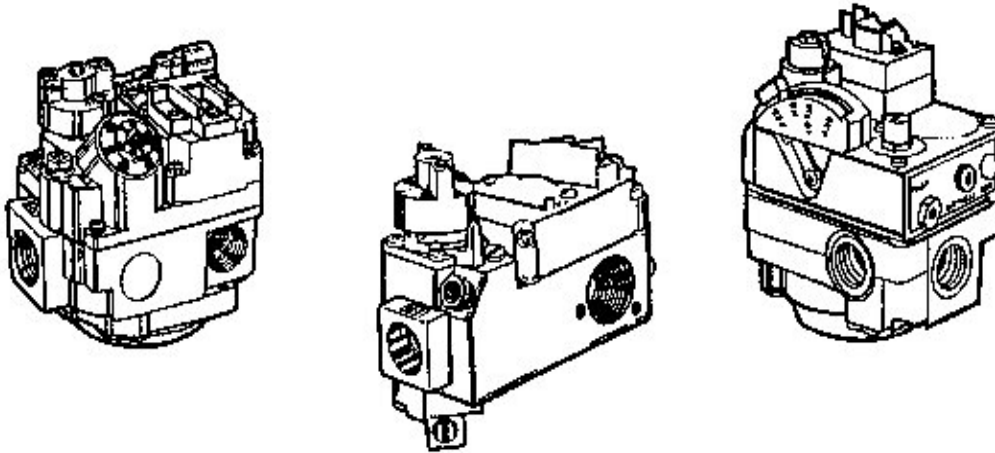




# COMBINATION GAS VALVES

Combination valves include three components

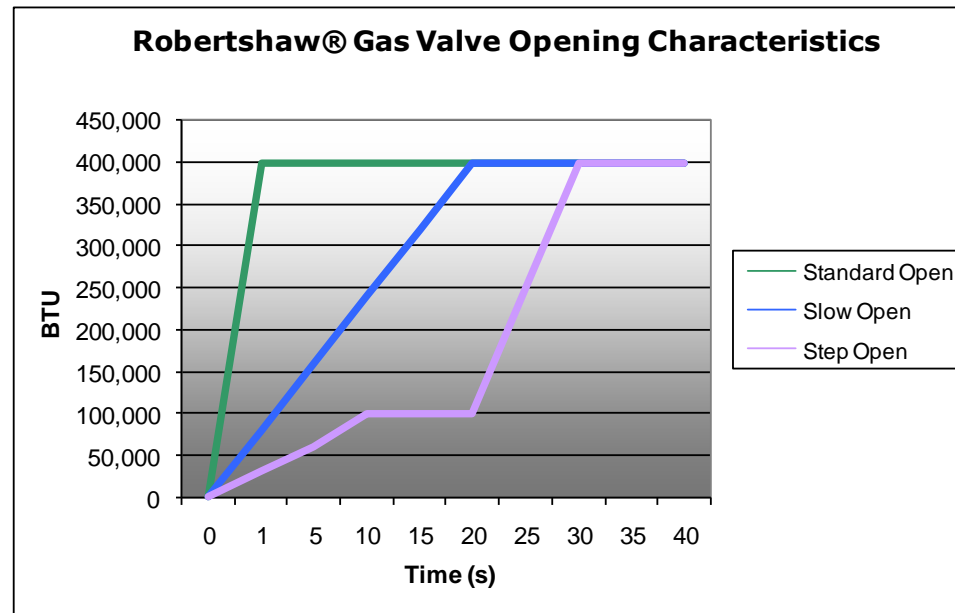
- Regulation
- Safety valve
- Main valve actuated by thermostat or bulb





# ADDITIONAL GAS VALVE CHARACTERISTICS

LEGEND
OPENING CHARACTERISTICS
<b>STANDARD OPEN</b>
instant full flow
<b>SLOW OPEN</b>
S7A = 0 - 5 sec. to full flow
S7B = 5 - 10 sec. to full flow
S7C = 10 - 30 sec. to full flow
<b>STEP OPEN</b>
SO1 = 30% of full flow
SO2 = 40% of full flow
SO3 = 50% of full flow
SO4 = 60% of full flow
SO5 = 70% of full flow



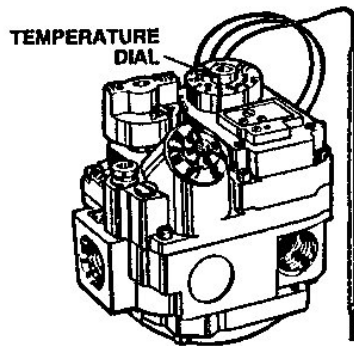


# ADDITIONAL CHARACTERISTICS FOR TWO-STAGE

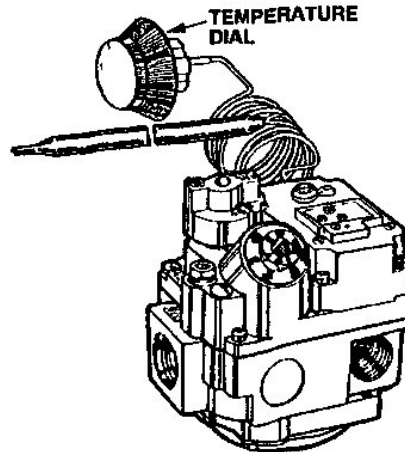
- Two-stage gas valves use a two-stage, two-pressure regulator which responds to a two-stage controller (thermostat)
- Available in capacities from 29,000 to 960,000 BTU/Hr
- Piping sizes from 3/8" to 1 inch
- Can be used with either natural gas or liquid propane
- Two-stage has the ability to vary the gas pressure delivered to the main burner(s) through the use of a solenoid operated two-pressure regulator
- First stage actuator of the gas valve is energized
- When heat demand increases, second stage regulator is energized
- First stage setting is determined as a percentage of the full output of the valve and is factory set
- Second stage pressure regulator setting is nominal 3.5" WC for natural gas and 11" for LP



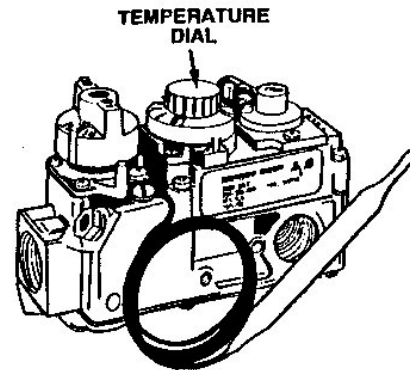
# SNAP-ACTION AND SNAP-THROTTLE HYDRAULIC VALVES



HYDRAULIC  
700-202



HYDRAULIC WITH  
REMOTE DIAL  
700-206



HYDRAULIC  
710-205



# GAS VALVE MANUFACTURERS

Attributes	Robertshaw®	Honeywell	White-Rodgers	Dexen	SIT
US Based Engineering	✓	✓	✓	✗	✗
US Based Technical Services	✓	✓	✗	✗	✗
Space & Central	✓	✓	✓	✓	✓
Residential Water	✓	✓	✓	✗	✗
Hearth Products	✓	✓	✗	✓	✓
Pilot, Thermocouple and Ignition Controls	✓	✓	✓	✗	✓



# IGNITION CONTROL SYSTEMS

- Standing Pilot
- Intermittent Pilot Ignition (IPI)
- Direct Spark Ignition (DSI)
- Hot Surface Ignition (HSI)



# DEFINITIONS

- **Standing Pilot** - Pilot is manually ignited and stays on constantly. When the thermostat calls for heat, and the pilot flame is making good contact with the thermocouple, the gas valve allows gas to flow to main burner until the call for heat is satisfied.
- **Intermittent Pilot** - (also known as “spark to pilot”) - Pilot is ignited by a spark generated by an ignition module and electrode. When enough heat is generated in the thermocouple, the gas valve allows gas to the main burner and is ignited by the pilot until the call for heat is satisfied.
- **Direct Spark** - When the thermostat calls for heat, the main burner is ignited by a direct spark or ceramic (glow bar) igniter. Eliminates the pilot, but requires flame sensor and more expensive ignition module.
- **Hot Surface** - Similar to direct spark except it uses a “glowbar” or ceramic ignitor to heat up to ignition combustion temperature within 17 or 34 seconds. There are silicon carbide (more fragile) and silicon nitride versions available. Requires flame sensor.



# ACRONYMS

GRD	=	Ground
IGN	=	Ignition
LP	=	Liquid Propane
MV	=	Main Valve
NO	=	Normally Open
NC	=	Normally Closed
PV	=	Pilot Valve
V AC	=	Voltage Alternating Current
V DC	=	Voltage Direct Current



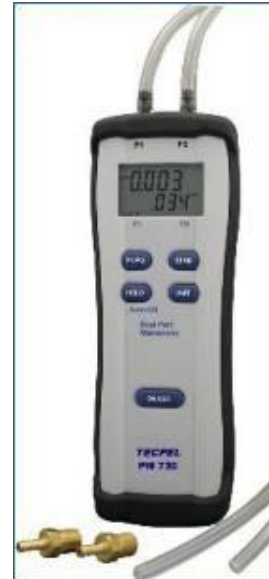
# DEFINITIONS

- **Sensors** - Senses the variable change in temperature and sends a signal to the controller.
- **Transmitters** - Interprets signal from sensor to display condition of temperature variable.
- **Transformer** - An electromagnetic device that either raises or lowers the voltage of an alternating current electrical system.
- **Voltage** - The electrical potential pressure behind the flow of electricity, measured in terms of Volts.
- **Current** - The movement of an electrical charge through a circuit, measured in terms of Amps.
- **Hertz** - A unit of measurement for frequency in cycles per second of a waveform.
- **Relay** - An electromechanical device that opens or closes contacts when a current is passed through a coil.



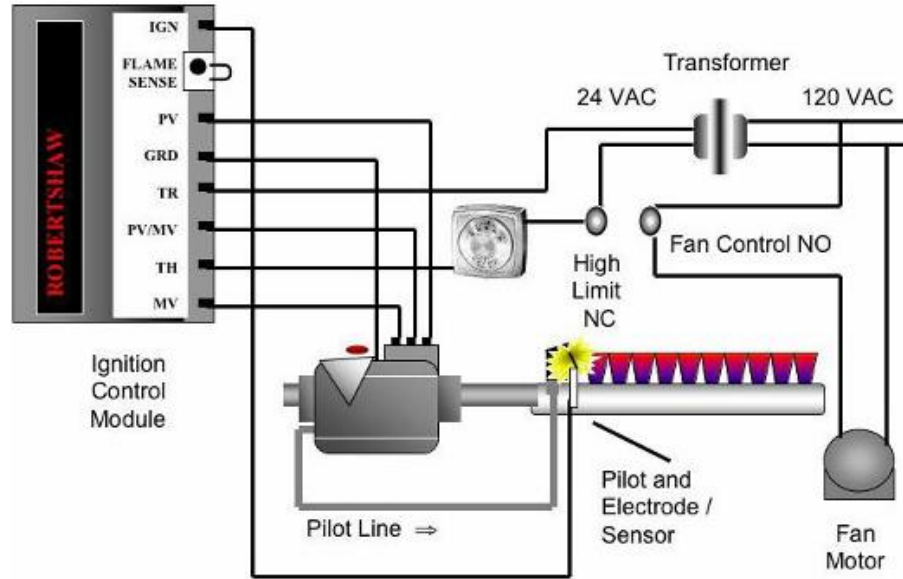
# GASES USED IN APPLICATIONS

- L.P. tends to hover at ground level
- Natural Gas rises, goes up the flue
- Manometer measures gas pressure
  - Inches of Water Column





# IGNITION CONTROL SYSTEM



1. Thermostat calls for heat
2. Ignition controller requests a spark to the electrode which ignites the gas
3. Control uses flame rectification or sensor to identify if flame is present
4. Ignition controller sends signal to open gas valve
5. When thermostat is satisfied, gas valve closes to shut off main burner gas

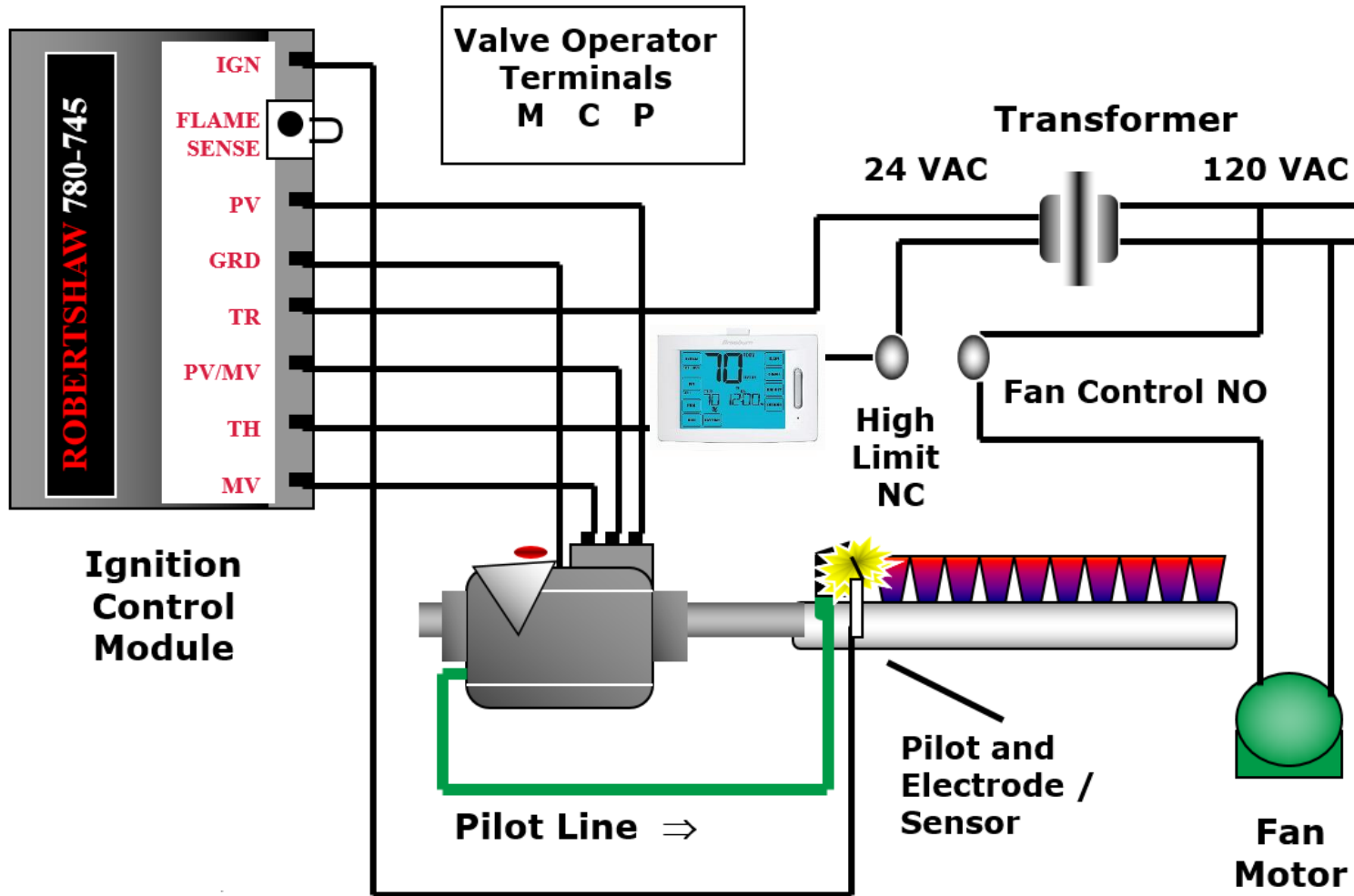


# FEATURE LIST FOR IGNITION CONTROLS

- Approvals
  - CSA
  - UL
- Ease of Use
  - Local vs. Remote Sensing
  - Diagnostic LEDs
- Application Timings
  - Trial Attempts (1, 3, infinite)
  - Ignition Timing (seconds)
  - Pre/post/inter-purge settings
- Physical
  - 24V AC @ 50 / 60 Hz
  - Surface Mount Technology
  - Conformal coating
  - Installable in NEMA-3R boxes
  - Quick connects or plugs
- Safety
  - Hard Lockout
  - Auto-Restart Lockout
    - Eliminates service calls



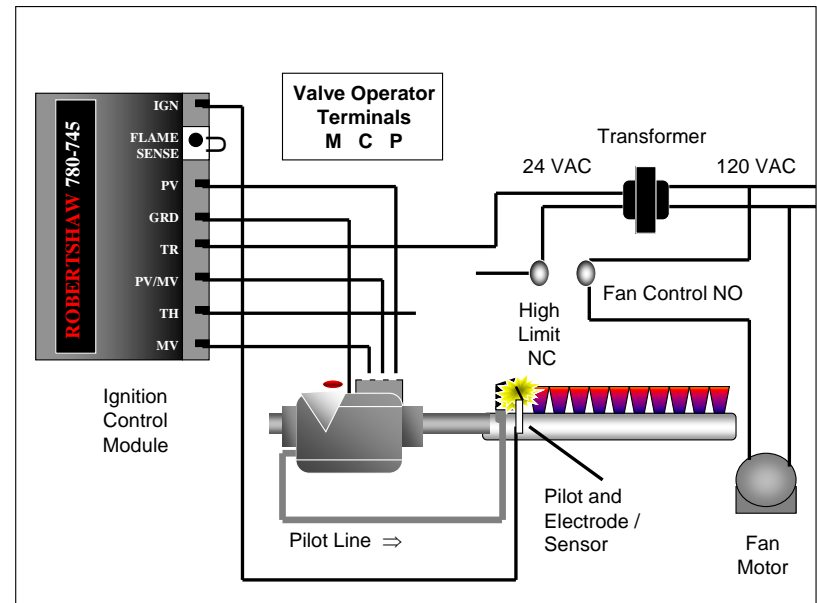
# PILOT IGNITION SYSTEM





# INTERMITTENT PILOT CHECKOUT PROCEDURE

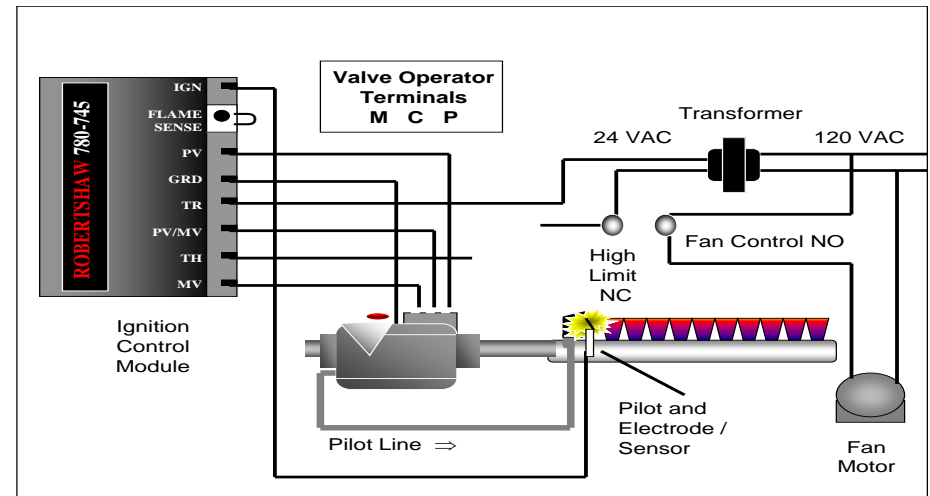
- Turn on main gas supply
- Turn on manual gas valve
- Turn on electrical power
- Set thermostat to call for heat
- Spark begins
- Air purged from gas line
- Pilot Ignition - main burner ignition
- Turn manual gas valve off
- Burner and pilot go out
- Sparking begins - turn manual valve on
- Pilot ignites - main burner ignites





# INTERMITTENT PILOT SEQUENCE OF OPERATION

- Thermostat calls for heat
- Primary valve (PV) opens
- Pilot gas flows
- Sparking begins at burner
- Pilot gas ignites
- Pilot flame impinges on electrode / sensor
- Main gas valve (MV) opens
- Main burner ignites
- Once thermostat satisfied, switch contacts open
- Main burner and pilot off





**ROBERTSHAW HS780**

TH  
VALVE  
GND  
TR  
RS  
120  
IGN  
IGN  
NEUT

Grounded With Mounting Screw

24 VAC 120 VAC  
Transformer

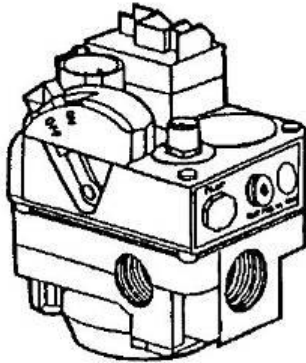
High Limit NC

Ignition Control Module

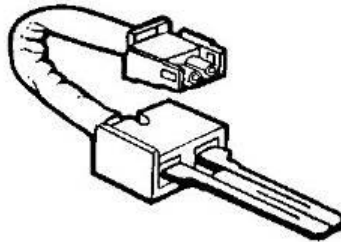


# HOT SURFACE IGNITION SYSTEM

## Gas Valve



## Ignition Control



## Hot Surface Ignitor



# HOT SURFACE TERMINOLOGY

- Pre-purge cycle - Allows draft blower to purge the combustion chamber prior to start of equipment
- Ignition attempts - Number of times the system will attempt to light the ignition if a flame is not detected. After last try, unit goes into lockout
- Valve trial time or lockout timing - Number of seconds the main valve is left open for ignition. If flame is not detected in a specified time
  1. The unit goes into lockout if it is a single try for ignition control
  2. The unit sequences to next ignition attempt cycle if it is a multi-try



# HOT SURFACE TERMINOLOGY CONTINUED

- Sensor type - The presence of a flame can be detected two ways
  1. Local sense, using a hot surface ignitor to ignite the gas and detect the presence of a flame
  2. Remote sense, using a sense rod that impinges into the main burner flame
- Ignitor warm-up time - Time required for hot surface ignitor to come up to operating temperature
  - An induced draft blower may also come on during this time period to purge the combustion chamber prior to the main valve opening



# HOT SURFACE SEQUENCE OF OPERATION

- Thermostat calls for heat, 24 Volts to ignition module
- Combustion blower & other relays are energized
- Non-purge modules - Ignition is powered in 1 second
- Pre-purge modules - Ignition powered in 17 or 34 secs
- Ignitor heats to approximately 2500° Fahrenheit
- Valve activated allowing gas to flow to burner
- Ignitor shuts off at end of trial time and becomes sensor
- If flame not sensed during trial time, system shuts down
- If flame is sensed, system satisfies thermostat demand



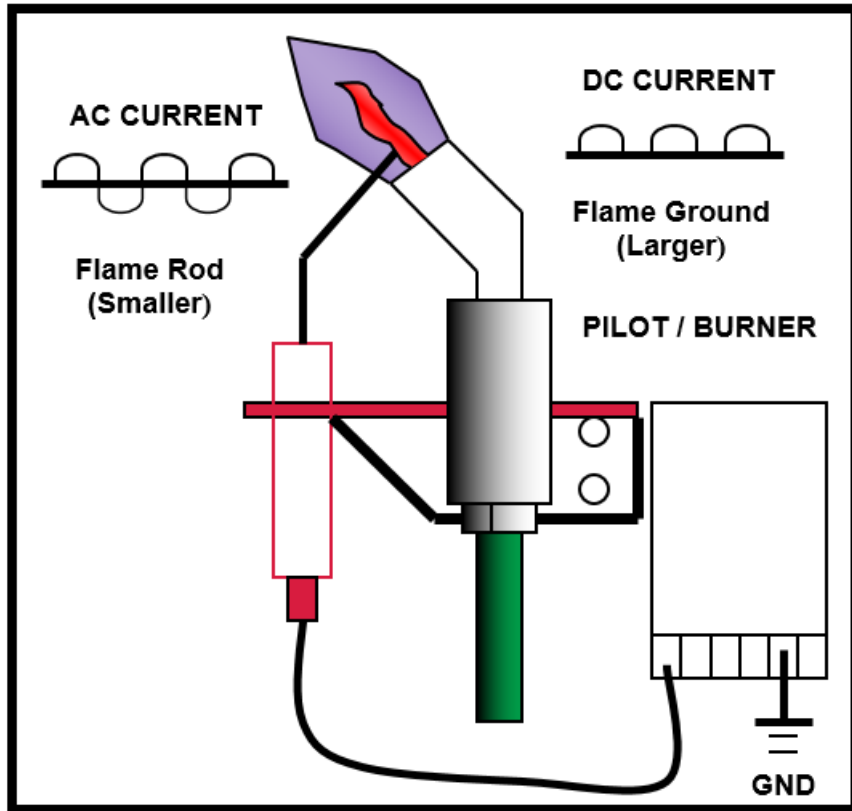
# MANUFACTURERS

- Johnson Controls®
- White-Rodgers®
- Honeywell®
- RAM
- Fenwal®
- Robertshaw®





# FLAME RECTIFICATION



## Used On

- IPI Intermittent Pilot Ignition
- DSI Direct Spark Ignition
- HSI Hot Surface Ignition

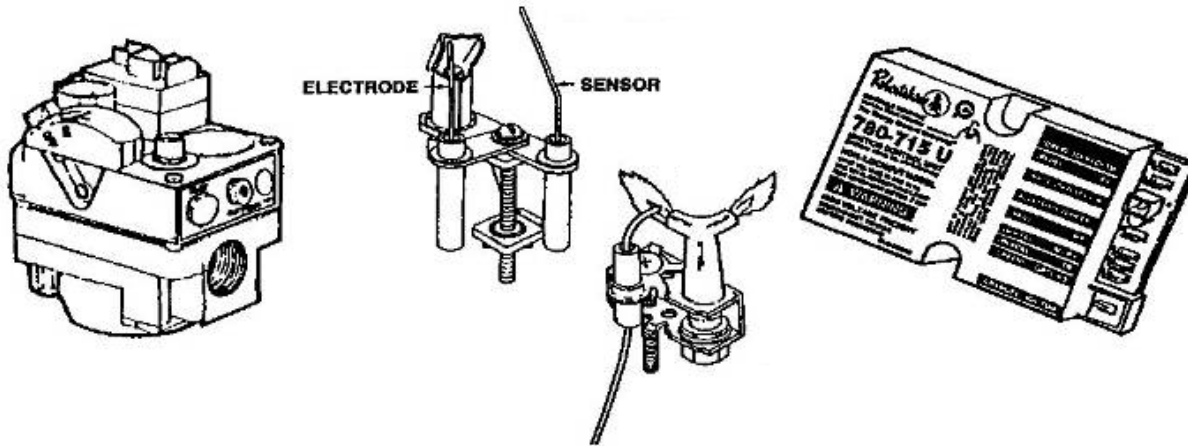
## How it Works

- Rectifies AC current to DC
- Requires flame to ground
- Proves pilot/burner



# FLAME RECTIFICATION PILOT IGNITIONS

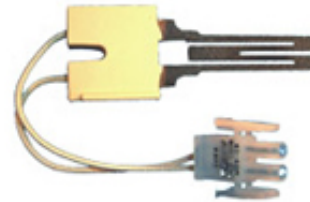
## UNI-LINE 712 SERIES FLAME RECTIFICATION PILOT IGNITION SYSTEMS





# HOT SURFACE IGNITERS

- Hot Surface Igniter Types
  - Silicon Carbide (fragile)
  - Silicon Nitride



- Robertshaw® 41-400 Series
  - Silicon Carbide

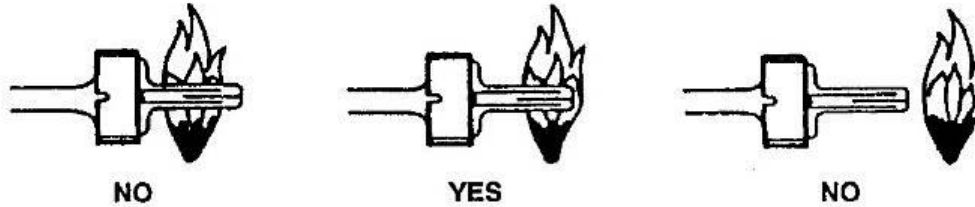
- Robertshaw® 41-400N Series
  - Silicon Nitride



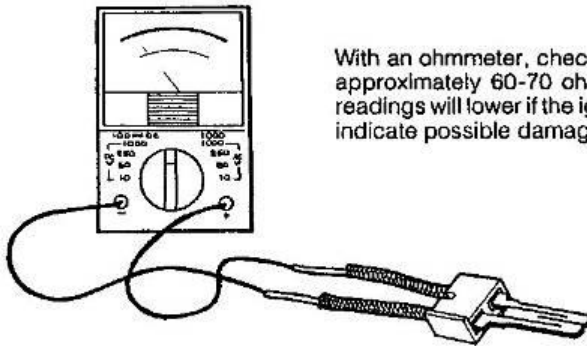


# IGNITOR POSITION

## POSITIONING OF IGNITOR



IGNITOR SHOULD EXTEND INTO FLAME AS SHOWN IN CENTER EXAMPLE.



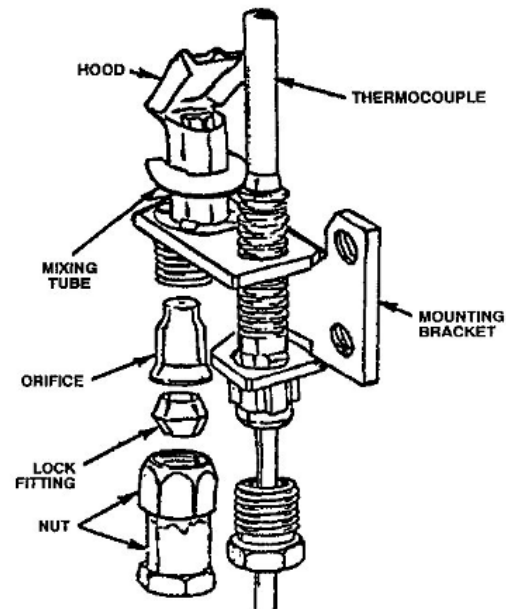
With an ohmmeter, check resistance of the ignitor. It should be approximately 60-70 ohms at room temperature. (Resistance readings will lower if the ignitor is warm. High resistance readings indicate possible damage of the ignitor.)



# PILOT BASICS



TYPICAL PILOT ASSEMBLY

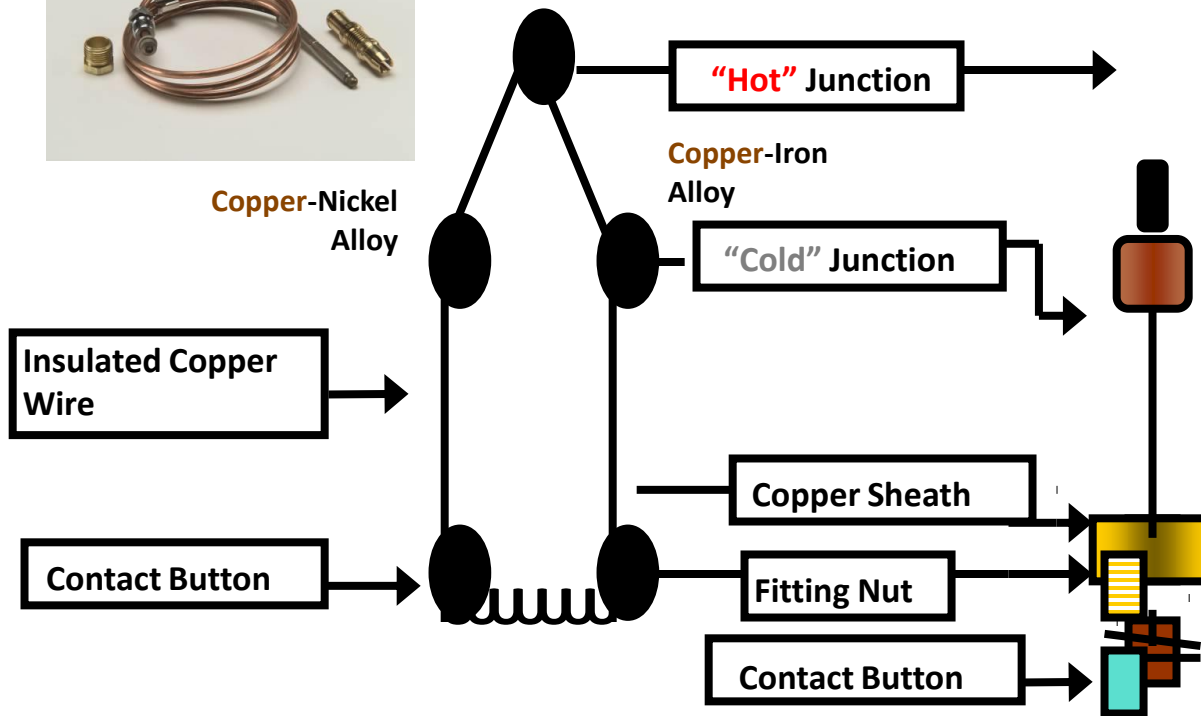




# THERMOCOUPLE BASICS



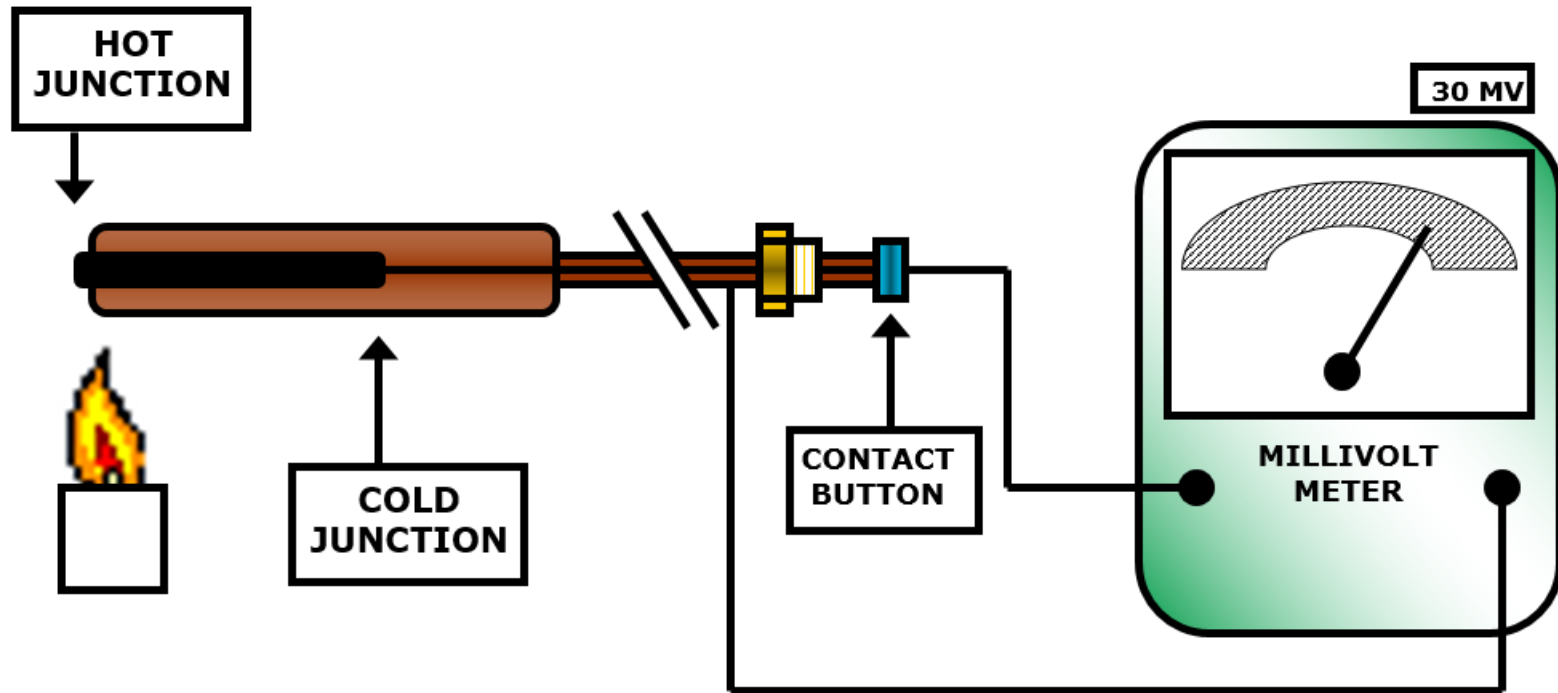
Copper-Nickel Alloy





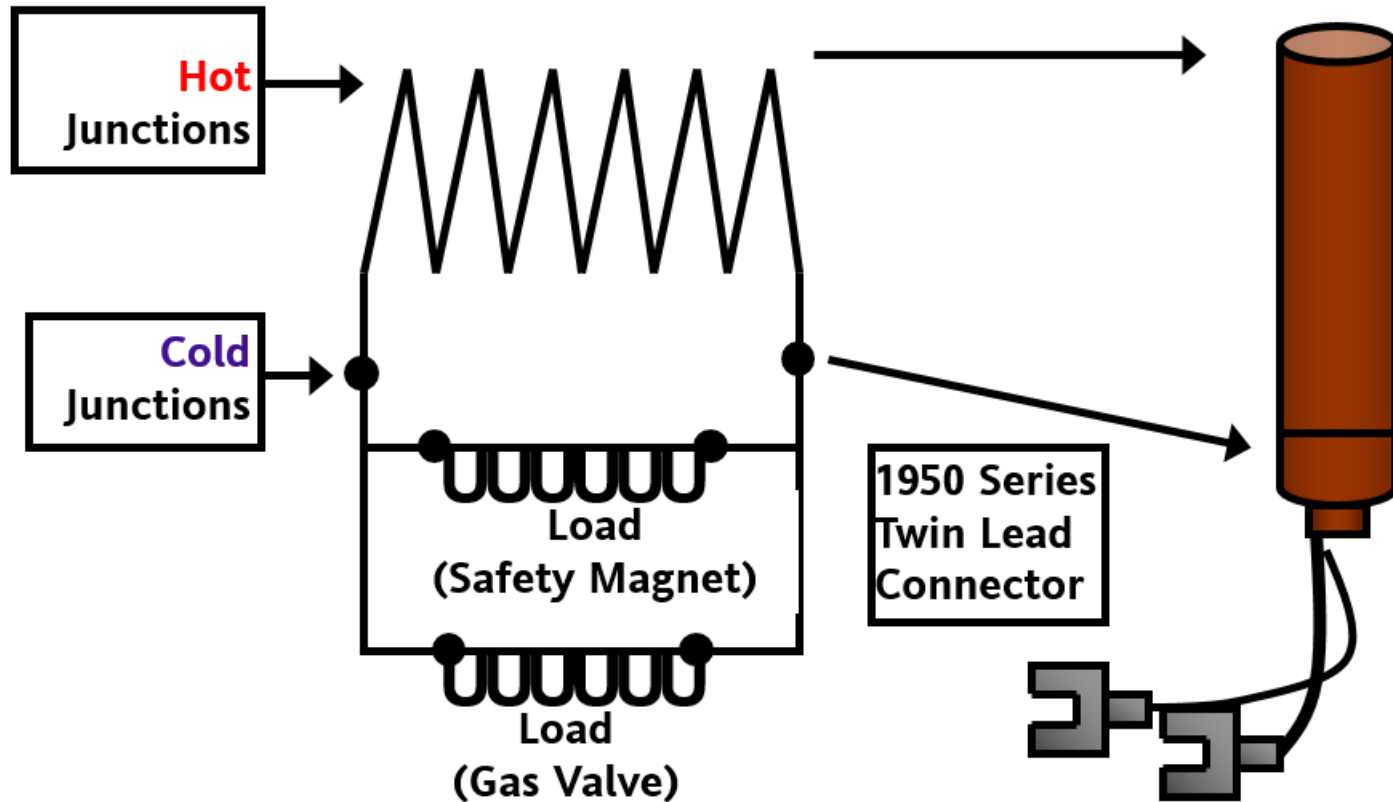
# THERMOCOUPLE TEST

Open circuit typically 20 to 25 Millivolts





# THERMOPILE BASICS





# THERMOPILE PARTS

- The 1950 series thermopiles have two lead wire connections and are primarily used in HVAC applications
- The 1951 coaxial series used on Commercial Cooking applications



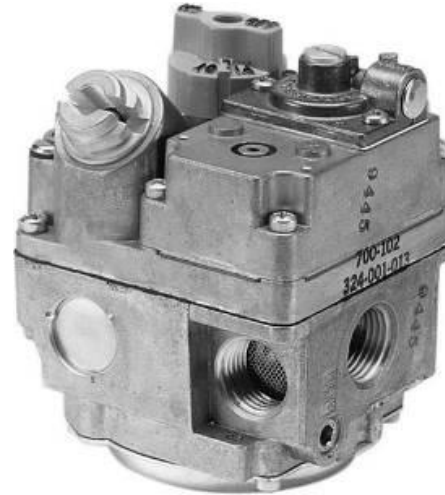
Twin lead wires



# GAS VALVE INSTALLATION TIPS

Determine:

- Natural gas or liquid propane
- Inlet and outlet size
- BTU requirements
- Ignition method to be used
- Outlet pressure setting requirement
- Ambient temperature
- Orientation of gas valve
  - Valves should not to be mounted upside down
- Actuator type: 24 Volts, millivolt, hydraulic, line voltage
- Opening speed of gas valve





# TROUBLESHOOTING TIPS FOR GAS SYSTEMS

Condition	Possible Cause	Possible Cure
<b>Flame Too Large</b>	<ol style="list-style-type: none"> <li>1. Outlet pressure too high</li> <li>2. Defective regulator</li> <li>3. Orifice too large</li> </ol>	<ol style="list-style-type: none"> <li>1. Outlet pressure too high</li> <li>2. Defective regulator</li> <li>3. Orifice too large</li> </ol>
<b>Noisy Flame</b>	<ol style="list-style-type: none"> <li>1. Excessive primary air</li> <li>2. Noisy Pilot</li> <li>3. Burr in orifice</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust air shutter</li> <li>2. See Pilot Troubleshooting slide</li> <li>3. Remove burr or replace orifice</li> </ol>
<b>Yellow Tip Flame</b>	<ol style="list-style-type: none"> <li>1. Too little primary air</li> <li>2. Clogged burner ports</li> <li>3. Misaligned orifice</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust air shutter</li> <li>2. Clean burner ports</li> <li>3. Realign orifice and burner</li> </ol>
<b>Floating Flame</b>	<ol style="list-style-type: none"> <li>1. Blocked venting</li> <li>2. Insufficient primary air</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect vent and clean</li> <li>2. Adjust air shutter</li> </ol>



# TROUBLESHOOTING TIPS FOR GAS SYSTEMS

Condition	Possible Cause	Possible Cure
<b>Delayed Ignition</b>	<ol style="list-style-type: none"> <li>1. Improper ignition location</li> <li>2. Pilot flame too small</li> <li>3. Burner ports clogged</li> <li>4. Low outlet pressure</li> </ol>	<ol style="list-style-type: none"> <li>1. Reposition ignition source</li> <li>2. Check orifice and clean</li> <li>3. Clean burner ports</li> <li>4. Adjust pressure regulator</li> </ol>
<b>Failure to Ignite</b>	<ol style="list-style-type: none"> <li>1. Main gas "Off"</li> <li>2. Poor electrical connections</li> <li>3. Defective gas valve</li> <li>4. Defective thermostat</li> </ol>	<ol style="list-style-type: none"> <li>1. Open manual valve</li> <li>2. Check, clean, &amp; tighten</li> <li>3. Replace with new</li> <li>4. Replace with new</li> </ol>
<b>Burner won't turn "Off"</b>	<ol style="list-style-type: none"> <li>1. Poor thermostat location</li> <li>2. Defective gas valve</li> <li>3. Defective thermostat</li> </ol>	<ol style="list-style-type: none"> <li>1. Relocate thermostat</li> <li>2. Replace with new</li> <li>3. Replace with new</li> </ol>
<b>Rapid Burn Cycles</b>	<ol style="list-style-type: none"> <li>1. Clogged furnace filters</li> <li>2. Excess t-stat anticipation</li> <li>3. Poor thermostat location</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean or replace</li> <li>2. Adjust t-stat anticipator</li> <li>3. Relocate thermostat</li> </ol>

- Check gas supply is in the "ON" position





# QUESTIONS TO ASK WHEN SELECTING IGNITION CONTROL MODULE

- What are you heating? What is OEM Factory Number?
- What is the supply voltage?
- What is the control voltage?
- Do you want to clear gas before, during, and/or after heating cycle?
- How many trials for ignition would you like?
- How many seconds between trials?
- What style of heating (direct spark, hot surface, or intermittent pilot)?
- Do you want remote or local sensing of flame (dual rod or single rod)?
- How do you want to handle lockout? How long?
- Do you want board enclosed or open?
- What type of connectors do you want?
- Do you need to change voltage levels, switch machines on or off, detect air pressure, replace parts, or need a kit?



# TROUBLESHOOTING TIPS

## Problem # 1: Hot Surface Igniter Does Not Glow Red

### Possible Causes:

- No main power
- Faulty transformer
- Faulty thermostat- check call for heat
- Faulty limit switch
- Faulty blower interlock switch
- Faulty hot surface ignitor
- Faulty ignition control
- Remember to wait for purge time, 17 or 34 seconds

### Troubleshooting:

- With power on and thermostat at its highest position, check voltage between “TH” and “TR” on HS780 module
  - If 24 Volts is not present, check transformer output
  - If no 24 Volts present on secondary side, change transformer
- Check for 120 Volts at the igniter across “IGN” and “GND”
  - If voltage present, change ignitor
  - If no voltage present, change module



# TROUBLESHOOTING TIPS

## Problem # 2: Igniter Glows Red but Main Burner Will Not Light

### Possible Causes:

- Improper igniter or sensor alignment
- Faulty ignition control
- Faulty gas valve
- High inlet gas pressures
- Polarity reversed
- No earth ground

### Troubleshooting:

- Check availability of gas at gas valve, check valve upstream is in ON position
- Check pressure is OK
- Check “GRD” and “PV/MV” by reversing wires
  - If reversed the gas valve will not open
- Check proper ignition position and properly grounded
- Check for 24 Volts at gas valve terminals
  - “1” and “2” on a 7200 series, “TH” and “TR” on a 7000 series
  - If Yes, check wire resistance or change gas valve
  - If no, change the 780 series module





# TROUBLESHOOTING TIPS

## Problem # 3: **Main Burner Shuts Off before the Thermostat is Satisfied**

### Possible Causes:

- Improper ignitor or sensor alignment
- Faulty ignition control
- Contaminated ignitor and/or sensor
- Bad burner ground

### Troubleshooting:

- Check polarity
- Check for proper ignitor position
- Check for proper ignition control grounding
- Visually inspect ignitor and remote sensor for any contamination
  - Clean and replace
- Check main burner ground
- If above steps are OK, replace ignitor



# TROUBLESHOOTING TIPS

## Problem # 4: **Main Burner Does Not Shut Off When Thermostat is Satisfied**

### Possible Causes:

- Faulty gas valve
- Faulty ignition control

### Troubleshooting:

- Check thermostat to make sure contacts are open
- Check for 24 Volts between “TH” and “TR”
  - Should be Zero, if gas valve is stuck open, replace valve
- Check for 24 Volts between “PV/MV” and “GND”
  - If 24 Volts present, replace ignition control
  - If 24 Volts not present, replace gas valve





# PILOT FLAME TROUBLESHOOTING TIPS

<b>Correct Flame</b> <ul style="list-style-type: none"><li>✓ Tip of Thermocouple or Thermopile is 3/8" to 1/2" into pilot flame</li></ul>	<b>Wavy Blue Flame</b> <ul style="list-style-type: none"><li>✓ Draft Condition at Pilot</li></ul>
<b>Noisy Lifting, Blowing Flame</b> <ul style="list-style-type: none"><li>✓ High Gas Pressure</li><li>✓ Wrong Pilot Orifice</li></ul>	<b>Hard Sharp Flame</b> <ul style="list-style-type: none"><li>✓ High Gas Pressure</li><li>✓ Pilot Orifice Too Small</li></ul>
<b>Lazy Yellow Flame</b> <ul style="list-style-type: none"><li>✓ Clogged Primary Air Opening</li><li>✓ Low Gas Pressure</li><li>✓ Clogged Pilot Orifice</li></ul>	<b>Small Blue Flame</b> <ul style="list-style-type: none"><li>✓ Wrong Pilot Orifice Size</li><li>✓ Low Gas Pressure</li><li>✓ Clogged Pilot Tube</li></ul>



# WEBSITE TOOLS:

## WWW.ROBERTSHAW.COM

The screenshot shows the Robertshaw website with a red header and navigation bar. The main content area features a 'PRODUCTS' section with a list of categories: Air Conditioning, Dishwashing, Heating, Refrigeration, and Specialty Applications. A pop-up window titled 'COMPETITOR CROSS REFERENCE' is overlaid on the right side, displaying a search result for '7200'.

**COMPETITOR CROSS REFERENCE**

Need to find a replacement part? Our easy-to-use Cross Reference tool can help you cross competitor product numbers to the Uni-Line® replacement part. In addition, you can link to Uni-Line product details and find a distributor to buy the products you need.

Competitor Cross References provided are intended to be functional equivalents and are not exact matches of products listed. Robertshaw assumes no liability in connection with the information contained herein and makes no representations regarding the accuracy of any such information. Final selection of a replacement product is the sole responsibility of the buyer.

7200

Showing 1-84 of 84 results found

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Part Search Results		Compatible Robertshaw Parts		Cross Reference Info		
Mfg Part Number	Manufacturer Name	Replacement Part	Description	XRef Type	Notes	Status
7200	SUNRAY	G1-116	G1/G4/G4A Series	Functional		discontinued
720-002P01	BOWMAR/TIC	5300-617	5300 Uni-Kits (K & S Series) SP Model Uni-Kit	Functional		production
72001PER	ROBERTSHAW	720-079	Universal Models-Intermittent Pilot, Direct Spark and Hot Surface	Functional		production

Original control



# WHEN YOU HAVE QUESTIONS

## Telephone:

Technical Service	1-800-445-8299
Customer Service	1-800-304-6563
Customer Service Fax	1-800-426-0804

## Websites:

### General Information Websites for

Robertshaw®, Paragon®, Ranco®, Uni-Line® and PowerTools®

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