

JOHNSON FURNACE INSTRUCTION MANUAL

FURNACE # 136

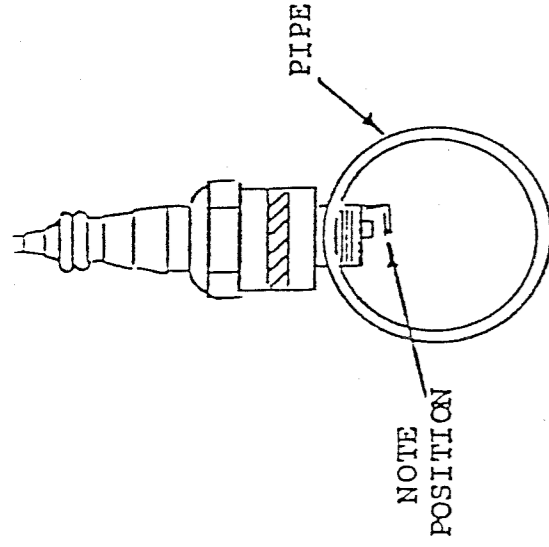
#136 Furnace with U.V. Safety System

Forms: A-1992, 1048, C-2056, A-1993, A-05-01-00125, A-2072, A-2086,
85-01-00023, PYW SERIES

INSTALLATION
&
OPERATION

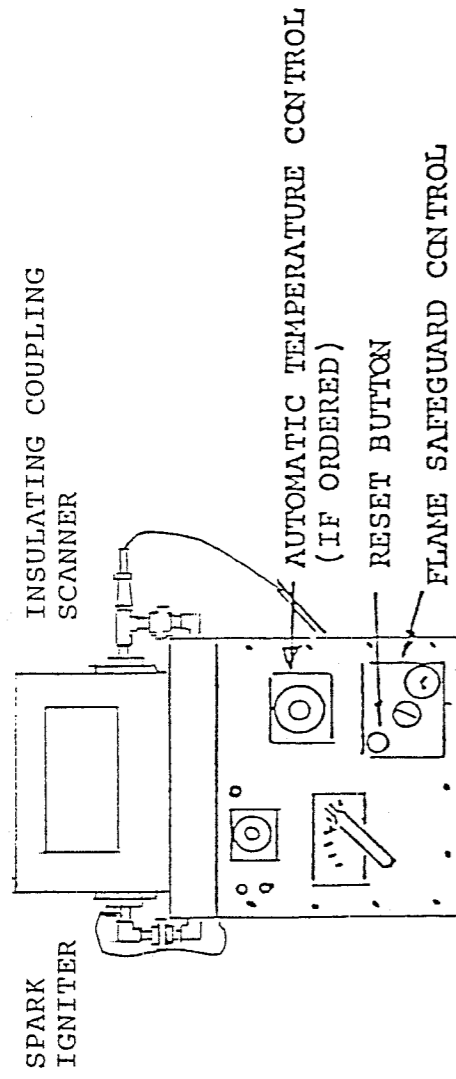
1. Position furnace in desired location, far enough from walls, to allow easy access for maintenance and operation.
2. Any walls, ceilings or floors made from combustible materials, which are subjected to the radiant heat, should be protected with non-combustible insulation board or similar material.
3. A metal hood with an exhaust fan can be used to exhaust fumes and exhaust gases. The hood should be high enough so as not to interfere with the operator. An exhaust stack MUST NEVER be directly connected to the furnace exhaust opening.
4. If the furnace is equipped with ultra-violet safety, make sure the flame scanner is positioned correctly. Make sure the spark igniter is in position and the ignition cable lead is connected from the transformer to the spark igniter.
5. Connect the gas supply line to the gas inlet pipe at the right side of the furnace. Consult the installation drawing and make sure the gas pressure is correct. ALWAYS CONFORM TO LOCAL CODE REQUIREMENTS.
6. If automatic temperature controls are being used, locate the yellow thermocouple lead coming out of the furnace. Unpack the thermocouple and insert it into the hole on the rear of the furnace body. It MUST be pushed in as far as possible for proper temperature sensing.
7. Plug in the power supply cord, located on the right side of the furnace, into a 115 volt socket or cut off the plug and connect furnace to a 115 volt, 60 cycle, 1 phase power supply. Turn on main gas and power supply. Consult lighting and operating instructions before starting furnace.
8. On the first heat up, run the furnace at a low rate for about two hours to remove the moisture from the lining. It is normal to observe water running from the furnace on the first few runs.
9. After the furnace has been heated up and cooled, you will notice that small cracks appear in the furnace lining. This is normal due to the expansion and contraction of the refractory lining and will not affect the performance or durability of the furnace.
10. The electrical components are inside the furnace cabinet base. If any maintenance is required, remove the screws from each side of the front panel. Next, remove the gas control handle, and pull the front panel outward.
11. Maintenance may also be performed by reaching through the back side of the furnace, after removing back panel in the same manner as above.

JOHNSON GAS APPLIANCE COMPANY
520 E Ave. NW
Cedar Rapids, IA 52405
319-365-5267 or 1-800-553-5422



FOR PROPER IGNITION SPARK PLUG MUST BE POSITIONED AS SHOWN.

FOR MAINTENANCE, REMOVE SCREWS FROM FRONT PANEL. REMOVE GAS CONTROL HANDLE AND PULL FRONT PANEL OUT PART OF THE WAY.



GAS SUPPLY:

THE GAS CONNECTION IS LOCATED ON THE RIGHT SIDE OF THE BASE. SUPPLY THE PROPER PRESSURE.

NATURAL GAS PRESSURE:

4 INCH WATER COLUMN MINIMUM TO 14 INCH MAXIMUM.

PROPANE GAS PRESSURE:

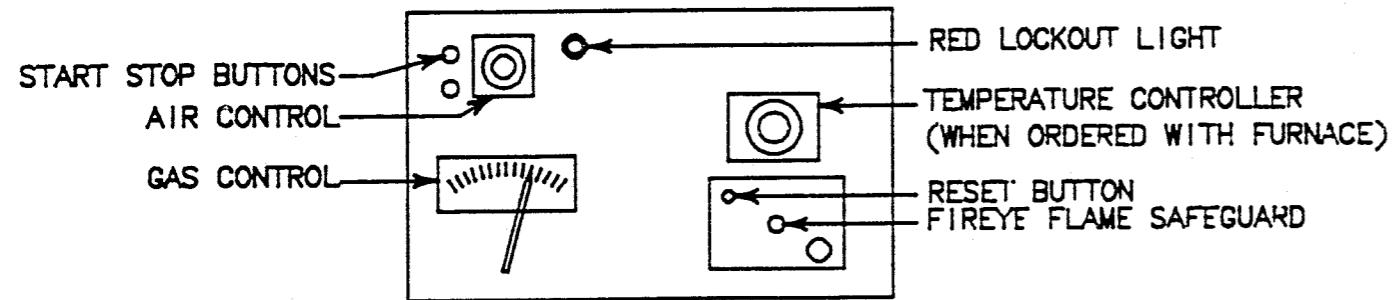
11 INCH WATER COLUMN.

CAUTION: DO NOT USE GAS WITH OVER 1/2 POUND PRESSURE. THIS WILL DAMAGE THE PRESSURE REGULATOR AND SOLENOID VALVE AND THE FURNACE WILL NOT OPERATE.

ELECTRICAL SUPPLY: 115 VOLTS, 60 CYCLE, MAX. LOAD 5 AMPS. AN ELECTRICAL LEAD WITH A PLUG IS LOCATED AT THE RIGHT SIDE OF THE BASE. PLUG THIS INTO 115 VOLT 60 CYCLE OUTLET OR CUT OFF THE PLUG AND CONNECT THE LEADS TO A 115 VOLT POWER SUPPLY.

INSTRUCTIONS

FOR
FURNACE WITH CABINET BASE



ALL WIRING AND PLUMBING MUST BE COMPLETE BEFORE CONTINUING:

1. Turn the air control knob to number 6. Set the gas control handle to the "CLOSED" position. If you have automatic temperature control, set the control's set point to your desired furnace temperature.

2. Depress and release the start button. The blower motor will start and, after approximately 5 seconds, you will hear the flame safeguard control contacts "click", and the spark igniter will "buzz". Now slowly open the gas control handle just to the position where the burners ignite.

If you depressed the red start button, and the red lockout lamp is "on", you will have to depress the reset button on the flame safeguard control. The red lamp will then go out and the spark igniter will "buzz". Then slowly open the gas control handle until the burners ignite.

If the red flame safeguard did not go out, when you depressed the reset button, wait about 30 seconds and try again.

NOTE: The gas control handle is seldom at the full open position when ignition takes place, but it should be opened slowly until the burners just ignite.

Once ignition takes place, make slight adjustments to the gas control handle to obtain a steady burner "roar".

3. After the furnace has been allowed to warm up for a few minutes, adjust the gas control handle to obtain a sharp tail of flame out the exhaust opening of the furnace. If there is no visible flame, increase the amount of gas slowly. If there is a high, lazy flame, decrease the amount of gas.

4. To reduce the gas input, slightly move the air control knob clockwise. Next adjust the gas control to obtain the desired sharp tail of flame. Repeat this procedure until the desired gas input is reached.

5. To increase the gas input, turn the air control knob counter-clockwise a small amount and re-adjust the gas control to obtain the sharp tail of flame. Repeat this procedure until the desired input is reached.

6. To shut down the furnace, depress and release the "stop" button, and turn the gas control handle to the "closed" position.

FORM NO. A-1993

JOHNSON GAS APPLIANCE COMPANY

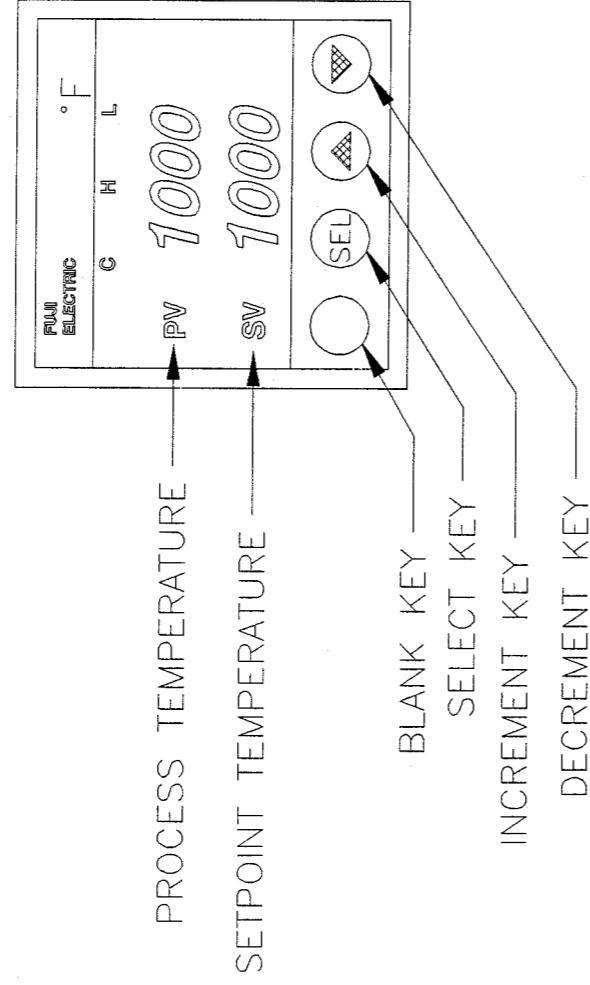
520 E Ave. NW * Cedar Rapids, IA 52405 * Ph: 319-365-5267 or 1-800-553-5422

PYW 4RAY1-4V TEMPERATURE CONTROLLER INSTRUCTIONS

THIS TEMPERATURE CONTROLLER COMES TO YOU WITH ALL OF THE MENU PARAMETERS PRE-PROGRAMMED. THE ONLY PROGRAMMING YOU WILL NEED TO DO IS ENTER YOUR TEMPERATURE SETTING.

TO CHANGE THE SET POINT TEMPERATURE:

- 1) USE THE INCREMENT AND DECREMENT KEYS UNTIL THE DESIRED TEMPERATURE IS DISPLAYED.
- 2) PRESS THE BLANK KEY TO SAVE THE NEW SETTING.



PYW SERIES

OPERATION MANUAL

VERSION 9/3/92 - 1

INTRODUCTION

Your PYW is a high quality, fully programmable temperature/process controller incorporating many user-friendly features. The following easy-to-use instructions are intended to help you understand, set-up, effectively operate, and achieve optimum performance from your PYW. When programmed and operated within the guidelines set forth in this manual, your PYW controller will give you years of precise, reliable control. We thank you for the purchase of this PYW and, if needed, offer you further technical help from our factory-trained staff.

FEATURES

- PID Autotune with Setting Override (Heating or Cooling)
- Programmable Control Action (Reverse or Direct)
- Programmable Cycle Time
- Programmable Ramp-to-Setpoint
- Programmable Balance (Manual Reset)
- Programmable Anti-Reset
- Display Inhibitors (for Control Parameters)
- 4-digit, LED Indication (PV and SV)
- Output Status Indication
- Fault Indication
- Programmable Decimal Point
- Digital Filtering (to suppress Factory Noise)
- Setting - 4 keys on front panel
- Menu Driven Format
- Programmable Input Type
- Sensor Break Protection
- Range Limiting
- Selectable °F /°C
- Offset Adjustments
- Programmable Lock Feature
- Non-Volatile Memory
- Outputs: Relay, DC Voltage Pulse, and 4-20mA dc
- Output Pulse Limiters
- Optional Heat/Cool Available on PYW 4, 5, 7, 9
- ABS Plastic Housing
- Optional - High/Low Alarm Output
- 85 to 265V ac Free Voltage Power Supply
- 3 year Warranty

SPECIFICATIONS

Indicating Accuracy +/- 0.5% Full Scale + 1 digit

Setting Accuracy +/- 0.5% Full Scale + 1 digit

Temperature Stability 5uV / °C

Repeatability 0.83 °C

Sampling Time 0.5 Secs.

Indication Process/Setting Variable: Independent

(PV): Red, 4-digit, 7 segment LEDS

(SV): Green, 4-digit, 7 segment LEDS

Status Indicators Control Output, Alarm Output

Span of Display DC: -1999 to 3276 max (Programmable)

Thermocouple: Temperature Range (Programmable)

RTD: Temperature Range (Programmable)

(Display Over-range: 30% of Range)

(Display Under-range: 30% of Range)

Setting: 4 Push Buttons on Front Panel

Control Mode:

Prop. Band 0 to 999.9% of Full Scale (Autotunable)

Integral Time 0 to 9999 secs. (Autotunable)

Derivative Time 0 to 3600 secs. (Autotunable)

Cycle Time 1 to 150 secs. (Relay, DC Voltage Pulse)

Anti-Reset 60 to 100% of Proportional Band

Manual Reset 0 to 100% of Prop. Band (Autotunable)

Ramp-to-Setpoint 1 to 999 Units/min.

Hysteresis 0.0 to 20.0% of Full Scale

Input: (Programmable)

Thermocouple J,K,R,S,T,N,PL-II

Cold Junction Compensation

Thermocouple Break Protection (Upscale, Downscale)

Lead Wire Effect: 0.5uV / ohm

RTD

(PT 100) IEC JIS

RTD Break Protection (Upscale, Downscale)

Lead Wire Effect: 0.015% /ohm

Current

4-20mA dc

Impedance: 250 ohm

Voltage

1-5V dc

Impedance: 400K ohm

Input Range:

(Thermocouple)

J 0 1000 °C 32 1832°F

K 0 1200 °C 32 2192°F

R 0 1600 °C 32 2912°F

S 0 1600 °C 32 2912°F

T -200 400 °C -328 752°F

N 0 1300 °C 32 2372°F

PL-II 0 1300 °C 32 2372°F

(RTD)

-150 400°C -238 752°F

(4-20mA dc)

-1999 3276 Engineering Units

(1-5V dc)

-1999 3276 Engineering Units

Output:

Relay 3 Amps @ 220V ac: SPDT (Resistive Load)

Electrical Life: 10⁶ Operations

Mechanical Life: 10⁷ Operations

Output Pulse Limiters (Programmable)

DC Voltage

24Vdc (DC drive for SSR)

(Pulsed)

ON: 24V dc typical, 60V dc max.

OFF: 0.3V dc max.

Output Pulse Limiters (Programmable)

Current

4-20mA dc (Resistive Load)

Impedance: 600 ohms or less

Ripple Effect: 1.5% Full Scale /2Hz

Alarms

(Optional)

Setting Type Deviation, Absolute, Zone, and Combination

Alarm Type High

Low

Low with Hold on Start-up

High/Low

High/Low with Hold on Start-up

High/High

Output Relay: 1 Amp @ 220V ac: SPST (Resistive Load)

Memory

Non-Volatile

Diagnostics

Monitored by Watchdog Timer

Mounting

Flush, Panel Mount

Enclosure

ABS Plastic (Color: off-white)

Termination

Screw-down Type Terminals

(PYW-5, PYW-7, PYW-9)

8 or 11 pin Socket with Screw-down Terminals

(PYW-4)

Front Panel

Lexan

Drip and Dust Proof (IEC IP55 Standard)

Power Supply

85-265 V ac 50 / 60 Hz

Power Consumption

10 Watts

Dielectric Strength

Input: 500V ac

Power Supply 1500V ac

Insulation Resistance

50M ohm or more

Noise Rejection

Common Mode: 110db typical

Normal Mode: 50db typical

Ambient Temperature

-10 to 50°C

Storage Temperature

-20 to 60°C

Ambient Humidity

90% RH or less

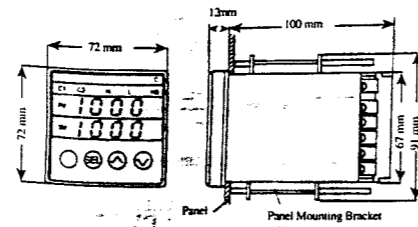
PYW5, PYW7, PYW9 MOUNTING

The PYW5, PYW7, and PYW9 are flush panel-mounted instruments. To flush panel-mount your controller(s), first verify that the depth of your cabinet will accommodate the depth of your instrument(s). Also, verify that where the controller(s) are to be mounted, there are no corrosive gases (sulfuric gas, ammonia, etc.), vibration, impact, water, or extreme temperatures present.

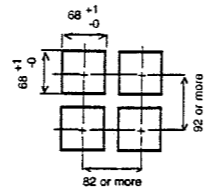
Next, follow the diagrams below and cut appropriately sized hole(s) from the cabinet's panel. The panel should be between 1 and 8 millimeters thick. Insert each unit through the front of the panel. The controller's bezel should catch and not feed through the cut-out. If the fit seems too tight, insert the outer case alone. Mount, then insert the rest of the controller inside the mounted case. Clip each of two metal, screw-type mounting brackets (two are shipped with each PYW5, PYW7 and PYW9 unit) to the top and bottom of the controller. The mounting bracket's tabs fit into the two holes on both the top and bottom of the controller's outer case.

With an instrument screwdriver, turn the screw in the mounting bracket until the end of it touches the back of the panel. Do this to both brackets. Making sure that the face of the controller is flush and straight, tighten both mounting bracket screws. Your controller should now be firmly set. If the controller is still loose, tighten the mounting bracket screws a little more. Do not use excessive force. Follow these procedures for each controller you mount. Your controllers are now ready to be wired.

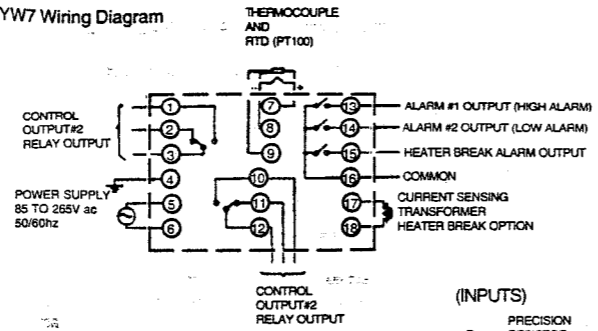
PYW7 Dimensions



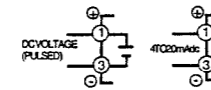
PYW7 Cut-out in Millimeters when mounting one or multiple units



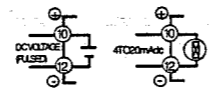
PYW7 Wiring Diagram



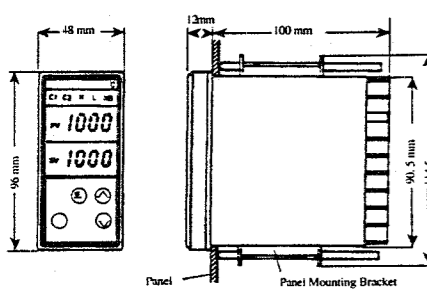
CONTROL OUTPUT #1 (OUTPUTS)



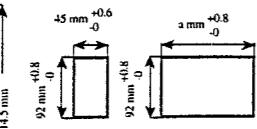
CONTROL OUTPUT #2 (OUTPUTS)



PYW5 Dimensions

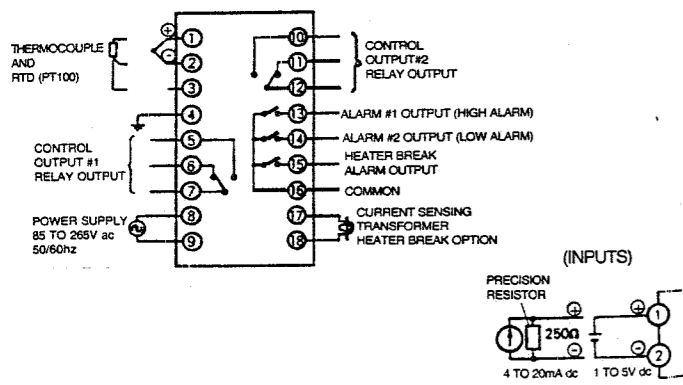


PYW5 Cut-out in Millimeters when mounting one unit

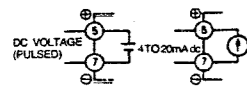


No. of units	2	3	4	5	6
a	93	141	189	237	285

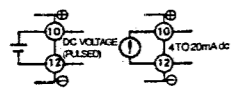
PYW5 Wiring Diagram



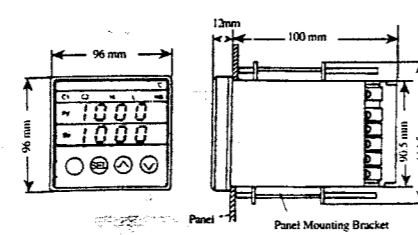
CONTROL OUTPUT #1 (OUTPUTS)



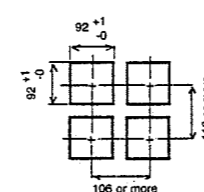
CONTROL OUTPUT #2 (OUTPUTS)



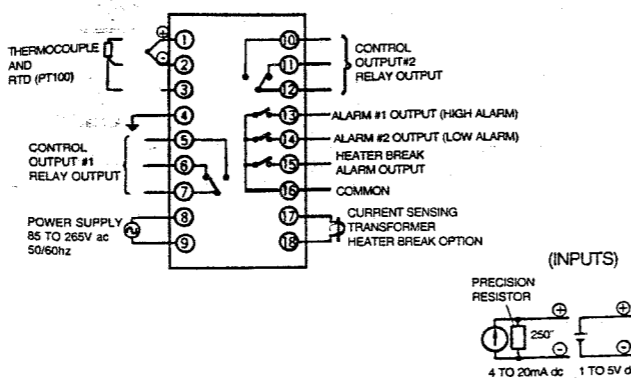
PYW9 Dimensions



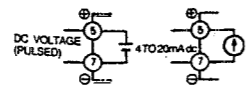
PYW9 Cut-out in Millimeters when mounting one or multiple units



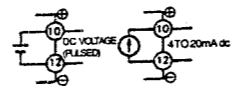
PYW9 Wiring Diagram



CONTROL OUTPUT #1 (OUTPUTS)



CONTROL OUTPUT #2 (OUTPUTS)



SECONDARY (SYSTEM) MENU

PARAMETER	ITEM	MEANING	DESCRIPTION
P	P	Proportional Band	The Proportional Band is that area around main setpoint where the control output is neither full on nor full off. Setting range: 0.0 to 999.9% of full scale. For On/Off set to '0'.
0.0			
I	I	Integral Time	The Integral Time is the speed at which a corrective increase or decrease in output is made to compensate for offset or steady state error. The larger the time entered, the slower the action. The smaller the time entered, the faster the action. Too small a time may create process oscillation. Setting Range: 0 to 9999 secs. Integral Action is off when set to '0'.
0			
D	D	Derivative Time	The Derivative Time is essentially a predictor of PV based on its present rate of change. The control action is then determined based on this prediction. A small derivative time will predict PV in the near future and a large derivative time will predict PV in the far future. Setting Range: 0 to 3600 secs. Derivative Action is off when set to '0'.
0			
TC	TC	Cycle Time (Output #1)	The Cycle Time, for relay and SSR outputs, is the amount of time for one complete On/Off cycle. The On time and Off time are determined by the percentage of output demand. Setting Range: 0 to 150 secs. Not indicated with Current output. For On/Off control set to '0'.
3.0			
HYS	HYS	Hysteresis (Output #1)	Hysteresis is used with On/Off control to reduce relay chatter around setpoint. Hysteresis is the area around the main setpoint where the output does not change condition. Setting Range: 0.0 to 20.0% of full scale.
1.0			
Sr	Sr	Setpoint Ramp Rate	The Setpoint Ramp Rate is the speed at which the process will approach setpoint on startup or after a setpoint change. Setting range is .1 to 999 Units/mins. Function is off when set to '0'.
0			
TC2	TC2	Cycle Time (Output#2)	Setting Range: 0 to 150 secs. Not indicated with Current Output For On/Off Control set to '0'.
30			

SECONDARY (SYSTEM) MENU

PARAMETER	ITEM	MEANING	DESCRIPTION
COOL	Cool	Proportional Band	The Proportional Band Coefficient for cooling is set as a multiple of the main control proportional band. With Cool = 1, the proportional band for cooling would be identical to the main (heat) proportional band. Setting range is .1 to 100.0 Not indicated without control output #2. For On/Off control set to '0'.
1.0			
db	db	Dead Band/Overlap	Dead Band/Overlap establishes an area where both heat and cool are off or an area where both heat and cool are on. Setting Range: -50.0 to 50.0% of the heating proportional band. Not indicated without control output #2.
0			
BAL	BAL	Balance (Manual Reset)	Balance is used to pre-position the proportional band with respect to setpoint. With Balance set at 50%, the proportional band will be centered around setpoint. To move the band left or right, decrease or increase the balance setting, respectively. Setting Range: 0 to 100%. Balance is 50% with integral time off.
50			
Ar	Ar	Anti-Reset	Anti-Reset is used to limit the range where integration occurs. With Anti-Reset set at 100%, integration will occur throughout the proportional band. With Anti-Reset set to 90%, integration will occur at 90% of the band above setpoint and 90% of the band below setpoint. Setting Range: 60 to 100% of proportional band above and below setpoint.
100			
rS	rS	Ramp-to-Setpoint	The Ramp-to-Setpoint setting is used to initiate or cancel the ramp to setpoint feature. Setting: 0 - Non-Ramping 1 - Ramp-to-Setpoint
0			
P-n2	P-n2	Input Type	The Input Type setting informs the controller of the input signal type. Refer to the input type code chart at the end of the SECONDARY (SYSTEM) MENU and enter the appropriate code for your input type. Thermocouple, RTD model has a jumper plug on the controller's main circuit board. For thermocouple input, the jumper should be on the TC pins. For RTD input, the jumper should be on the RTD pins. The 4-20mA current input model is equipped with a 250 ohm precision resistor for conversion to 1-5V. If your input signal is 4-20mA, connect this resistor across the appropriate input terminals of the controller.
3			

FACTORY PRESET MENU

Code	Alarm Type	Diagram
15	High/Low Alarm without Low Alarm Hold	
10	High Alarm	
5	Low Alarm without Low Alarm Hold	
79	High/Low Alarm with Low Alarm Hold	
69	Low Alarm with Low Alarm Hold	

Code	Alarm Type	Diagram
19	High/Low Alarm	
3	High/Low Alarm without Low Alarm Hold	
2	High Alarm	
1	Low Alarm without Low Alarm Hold	
67	High/Low Alarm with Low Alarm Hold	
65	Low Alarm with Low Alarm Hold	

Code	Absolute Value	Deviation	Diagram
23	High Alarm	High Alarm	
7	High Alarm	Low Alarm	
11	High Alarm	High Alarm	
75	Low Alarm with Low Alarm Hold	High Alarm	
71	High Alarm	Low Alarm with Low Alarm Hold	

Code	Low Alarm	High Alarm	Diagram
179	Absolute Value	Absolute Value	
183	Deviation	Absolute Value	
187	Absolute Value	Deviation	
191	Deviation	Deviation	

CONTROL ACTION CODE

SINGLE OUTPUT TYPE

Code	Sensor Break Protection	Control Action (Output #1)
0	Upscale	Reverse Acting
1	Downscale	Reverse Acting
16	Upscale	Direct Acting
17	Downscale	Direct Acting

DUAL OUTPUT TYPE

Code	Sensor Break Protection	Control Action (Output #1)	Control Action (Output #2)
2	Upscale	Reverse Acting	Direct Acting
3	Downscale	Reverse Acting	Direct Acting
18	Upscale	Direct Acting	Direct Acting
19	Downscale	Direct Acting	Direct Acting
34	Upscale	Reverse Acting	Reverse Acting
35	Downscale	Reverse Acting	Reverse Acting
50	Upscale	Direct Acting	Reverse Acting
51	Downscale	Direct Acting	Reverse Acting

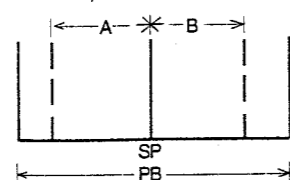
SINGLE OUTPUT TYPE

Error Indication	Cause	Control Output
UUUU	1: Thermocouple break with Upscale Break Protection 2: RTD (PT100) Break with Upscale Break Protection	Reverse Acting: Off or less than 4mA dc Direct Acting: On or greater than 20mA dc
LLLL	1: Thermocouple Break with Downscale Break Protection 2: RTD (PT100) Break with Downscale Break Protection 3: Short across a RTD (PT100)	Reverse Acting: On or greater than 20mA dc Direct Acting: Off or less than 4mA dc
UUUU	1: Process Variable (PV) is greater than P-SU by more than 30% of full scale	Normal Control Output for both Reverse and Direct Acting Applications
LLLL	1: Process Variable (PV) is less than P-SL by more than 30% of full scale	Normal Control Output for both Reverse and Direct Acting Applications

PARAMETER	ITEM	MEANING	DESCRIPTION
P-n1	P-n1	Control Action	Setting Control Action: (Code) Reverse or Direct Setting Sensor Break Protect: (Code) Upscale or Downscale See Control Action Code Table
P-dF	P-dF	Digit Filter	Setting Range: (Formula) 0 to 201 1/2 of Setting = 63% Response Time
P-An	P-An	Alarm Hysteresis	Setting Range: 0-255 Units
P-48	P-48	Cold Junction Compensation	Setting: (Code) 0 - Without CJC (Cur. or Vol. Input) 1 - With CJC (TC or RTD Input) Not to be changed
PLC1	PLC1	Pulse Output Low Limit (Output #1)	Setting Range: 0 to 100 See Below Output Limiter Range
PHC1	PHC1	Pulse Output High Limit (Output #1)	Setting Range: 101 to 201 See Below Output Limiter Range
PLC2	PLC2	Pulse Output Low Limit (Output #2)	Setting Range: 0 to 100 See Below Output Limiter Range
PHC2	PHC2	Pulse Output High Limit (Output #2)	Setting Range 101 to 201 See Below Output Limiter Range
PCUT	PCUT	Pulse Limiting TYPE	Setting: (Code) See Output Limiter Type Code
dSP1	DSP1	Display Inhibitor #1	Add up the Codes of those Parameters not to be displayed and enter the total 1 - Low Alarm (Flashing 'L' Indicator) 2 - High Alarm (Flashing 'H' Indicator)
dSP2	DSP2	Display Inhibitor #2	Add up the Codes of those Parameters not to be displayed and enter the total 1 - P 2 - I 4 - D 8 - TC 16 - HYS 32 - SRR 64 - TC2 128 - Cool
dSP3	DSP3	Display Inhibitor #3	Add up the Codes of those Parameters not to be displayed and enter the total 1 - db 2 - BAL 4 - Ar 8 - rS

OUTPUT LIMITER RANGE

The following illustrates the meaning of Pulse Output Low and High Limit Settings (PLC1 and PHC1).



$$A = (PHC1 - 101) \cdot (PB/2)$$

$$B = (100 - PLC1) \cdot (PB/2)$$

Setting Range:
PHC1: 101 TO 201
PLC1: 0 TO 100

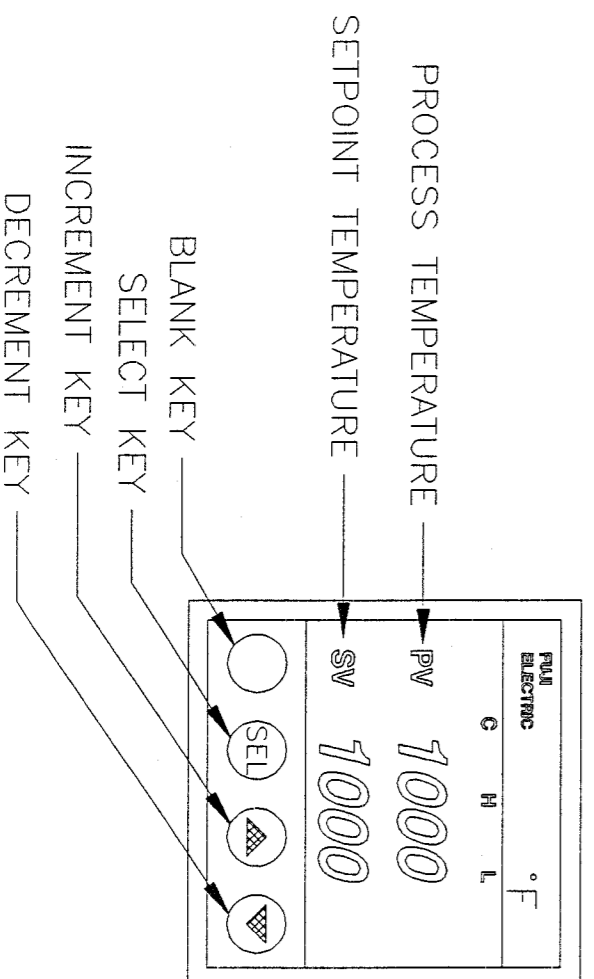
OCT 1 1991

PYW 4RAY1-4V TEMPERATURE CONTROLLER INSTRUCTIONS

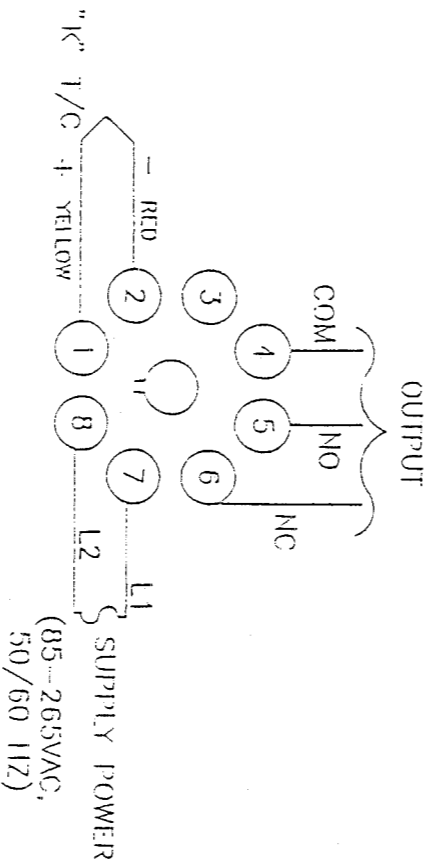
THIS TEMPERATURE CONTROLLER COMES TO YOU WITH ALL OF THE MENU PARAMETERS PRE-PROGRAMMED. THE ONLY PROGRAMMING YOU WILL NEED TO DO IS ENTER YOUR TEMPERATURE SETTING.

TO CHANGE THE SET POINT TEMPERATURE:

- 1) USE THE INCREMENT AND DECREMENT KEYS UNTIL THE DESIRED TEMPERATURE IS DISPLAYED.
- 2) PRESS THE BLANK KEY TO SAVE THE NEW SETTING.



A-05-01-00125

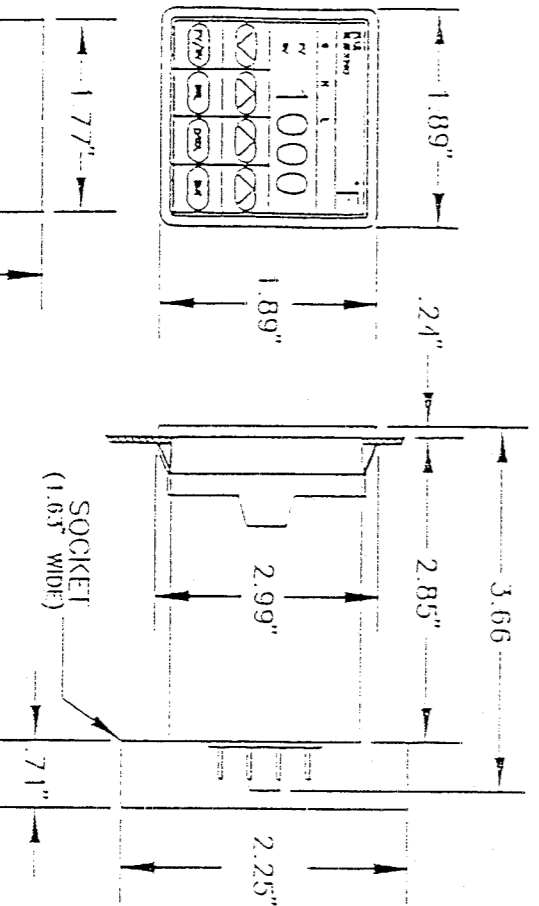


SPECS:
INPUT: THERMOUPLE, TYPE "K"
OUTPUT: RELAY CONTACT, 220 VAC, 3A MAX.
OPERATING CYCLE: 0.5 SEC.
POWER SUPPLY: 85-265 VAC, 50/60 HZ
POWER CONSUMPTION: APPROX. 10 VA
AMBIENT TEMPERATURE: -10 TO 150 °C. (114 TO 117°F)
AMBIENT HUMIDITY: 90% RH OR LESS
INDICATION SYSTEM: LED, 4 DIGITS
CONTROL ACTION: PID WITH RAMP OPTION
INDICATOR ACCURACY: +/- .05% FULL SCALE, 4 / 1 DIGIT

MENU #1

MENU #2

- P = 0.0
- I = 0
- D = 0
- TC = 30
- lys = 1.0
- Str = 0
- AV = 0
- Loc = 2
- Pn-1 = 0
- Pn-2 = 3
- P-dF = 4
- P-SL = 32
- P-SU = 2500
- P-Ab = 3
- P-An = 1
- P-dp = 0
- P-48 = 3
- FS = 0
- PUOF = 0
- SUOF = 0
- P-F = 1



CHANGE	DESCRIPTION	DATE
^	FLIP/TURNED SW & lys POSITIONS P-48 WAS 2	0/4/01

PART NAME FULL PYZ4 ON/OFF TEMPERATURE CONTROLLER -- "K" TYPE

MAT'L. PYZ4RAY1-4V "K" 32F - 2500F

PLANK SIZE

USED ON

SOCKET INCLUDED: ATX2PSB TYPE "

INDUSTRIAL

NOTE: ADD 1.00" EITHER WAY FOR MULTIPLE TIGHT MOUNTINGS

IND. REQ'D.:

JOHNSON GAS APPLIANCE CO.

A-05-01-00125

SCALE NONE

CEDAR RAPIDS, IOWA 52405

DATE AUG 1991

VENTING REQUIREMENTS FOR
JOHNSON FURNACES

1. POT FURNACES, FORGES, AND MELTING FURNACES.

SINGLE UNITS OR MULTIPLE INSTALLATIONS

FOR EXHAUST HOODS APPROXIMATELY 6' 6" TO 7' ABOVE FLOOR, THE EXHAUST FAN SHOULD BE SUFFICIENT TO PROVIDE A 200 FPM FACE VELOCITY AT THE HOOD.

2. OVEN TYPE FURNACES (INCLUDES OVEN FORGES)

A. SINGLE INSTALLATIONS

FOR SINGLE INSTALLATION THE VENT REQUIREMENTS SHOULD REDUCE FLUE GAS TEMPERATURE TO 500 OR BELOW. FOR CFM REQUIREMENTS, DIVIDE BTU INPUT OF THE FURNACE BY 225. (APPLICABLE WHERE THE VENT HOOD IS 6" TO 8" ABOVE EXHAUST OPENING.)

B. FOR SINGLE OR MULTIPLE INSTALLATIONS WHEN SINGLE EXHAUST HOOD IS 6' 6" TO 7' ABOVE FLOOR, PROVIDE FOR A 200 FPM FACE VELOCITY.

FORM NO. A-2072

SEQUENCE OF EVENTS
WHEN USING THE UVM-1D ULTRA-VIOLET
SAFETY SYSTEM

- 1] PUSH START BUTTON.
- 2] MAIN STARTING RELAY IS ENERGIZED.
- 3] BLOWER MOTOR STARTS AND FLAME SAFEGUARD IS ENERGIZED.
- 4] BLOWER MOTOR COMES UP TO SPEED. AIR SWITCH ON BLOWER MOTOR CLOSES.
- 5] AT THIS POINT THE FLAME SAFEGUARD BEGINS ITS PROCESS.
- 6] AFTER AN APPROXIMATE 14 SECOND DELAY FOR "PRE-PURGE" AND IGNITION TEST, THE IGNITER PLUG FIRES. A SPLIT SECOND LATER THE GAS SOLENOID VALVE OPENS AND COMBUSTION TAKES PLACE.
- 7] THE ULTRA-VIOLET SAFETY SCANNER SENSES THE ULTRA-VIOLET IN THE FLAME. THE FLAME SAFEGUARD IS SATISFIED AND GOES INTO A "RUN" CIRCUIT.
- 8] THE UNIT WILL CONTINUE TO RUN UNTIL THE STOP BUTTON IS PUSHED.
- 9] A TEMPERATURE CONTROL DEVICE CAN ALSO BE INSTALLED WHICH WILL TURN THE UNIT OFF AND ON AUTOMATICALLY.

TROUBLE SHOOTING

THE FOLLOWING EVENTS CAN OCCUR THAT WILL EFFECT THE NORMAL OPERATION OF THE UVM-1D SAFETY SYSTEM:

1. THE START BUTTON IS PUSHED AND THE BLOWER MOTOR COMES ON, BUT THE UNIT FAILS TO IGNITE. THE FLAME SAFEGUARD WILL GO INTO A SAFETY SHUT-DOWN. A SAFETY SHUT-DOWN IS DESCRIBED AS FOLLOWS:

THE UNIT ATTEMPTS TO LIGHT, BUT THERE IS NO FLAME DETECTED WITHIN THE 4-10 SECOND IGNITION TEST. THE GAS SAFETY SOLENOID VALVE WILL CLOSE. THE FLAME SAFEGUARD STARTS A BI-METAL WARP SWITCH WHICH WILL TAKE FROM 30-90 SECONDS TO WARP OUT. AT THE END OF THIS TIME THE RED LOCKOUT LIGHT WILL COME ON. THE RED LIGHT INDICATES THAT ALL SYSTEMS ARE SHUT DOWN AND OPERATING CORRECTLY EXCEPT THE BLOWER MOTOR WHICH WILL CONTINUE TO OPERATE. AT THIS POINT THE STOP BUTTON SHOULD BE PUSHED. WAIT 3 MINUTES AND PUSH THE RED RESET BUTTON ON THE FLAME SAFEGUARD AND ATTEMPT TO RELIGHT THE UNIT.
2. THE START BUTTON IS PUSHED. THE BLOWER MOTOR COMES ON. THE UNIT LIGHTS AND IS OPERATING PROPERLY, BUT THERE IS A GAS INTERRUPTION. AT THIS TIME THE FLAME SCANNER SENSES THAT THERE IS NO ULTRA-VIOLET OR FLAME IN THE COMBUSTION CHAMBER. THE UNIT WILL ATTEMPT TO RELIGHT FOR A TEST PERIOD OF 4 SECONDS. IF REIGNITION DOES NOT OCCUR WITHIN THE 4 SECOND TIME PERIOD THE GAS SAFETY SOLENOID VALVE WILL CLOSE AND THE FLAME SAFEGUARD WILL GO INTO ITS SAFETY SHUT-DOWN PROCESS.
3. THE START BUTTON IS PUSHED, THE UNIT LIGHTS AND IS OPERATING PROPERLY, BUT THERE IS AN ELECTRICAL INTERRUPTION WHICH CAUSES THE MAIN LATCHING RELAY TO DROP OUT. AT THIS TIME THE UNIT WILL COMPLETELY SHUT DOWN INCLUDING THE BLOWER MOTOR AND IT WILL BE NECESSARY TO RESTART THE UNIT FROM THE BEGINNING. ANY TIME THERE IS AN ELECTRICAL INTERRUPTION THE LATCHING RELAY WILL DROP OUT. THIS IS A SAFETY FACTOR THAT WILL NOT ALLOW THE UNIT TO RESTART ON ITS OWN. FOR INSTANCE IF THE UNIT WAS NOT BEING ATTENDED THE UNIT SHOULD NOT BE ABLE TO COME BACK ON WITHOUT THE OPERATOR KNOWING WHAT HAD HAPPENED TO THE STANDARD PROCESS.

4. THE START BUTTON IS PUSHED. THE UNIT FIRES AND IS OPERATING PROPERLY. BUT, THE BRUSHES ON THE MOTOR ARE WORN OUT, OR THE FAN WHEEL COMES LOOSE FROM THE BLOWER MOTOR SHAFT. AT THIS TIME AIR PRESSURE WILL DROP IN THE BLOWER HOUSING COMPARTMENT AND CAUSE THE AIR SWITCH TO OPEN AND STOP THE ELECTRICITY FLOW TO THE GAS SOLENOID VALVE. THE GAS SOLENOID VALVE WILL CLOSE. AT THIS POINT THE FLAME SCANNER WILL NOT DETECT ANY ULTRA-VIOLET AND THE UNIT WILL GO INTO A SAFETY SHUT-DOWN PROCESS.
5. THE START BUTTON IS PUSHED AND THE UNIT ATTEMPTS TO LIGHT, BUT THERE IS NO SPARK. THE GAS VALVE WILL OPEN FOR A PERIOD OF 4 SECONDS AND ATTEMPT TO LIGHT. AT THIS TIME THERE IS NO ULTRA-VIOLET DETECTED BECAUSE THERE IS NO FLAME AND THE UNIT WILL GO INTO A SAFETY SHUT-DOWN PROCESS.
6. THE START BUTTON IS PUSHED, THE BLOWER MOTOR STARTS AND THE IGNITER COMES ON, BUT THERE IS NO IGNITION. THIS MAY BE DUE TO NOT HAVING ANY GAS SUPPLY; THE BLOWER MOTOR NOT RUNNING DUE TO NEEDING BRUSHES OR BEING BURNED OUT; THE COIL IN THE SOLENOID VALVE BEING BURNED OUT; THE AIR SWITCH NOT BEING CLOSED; THE IMPELLER WHEEL COMING LOOSE FROM THE BLOWER SHAFT, OR THE FLAME SAFEGUARD NOT GIVING A SIGNAL TO OPEN THE SOLENOID VALVE FOR IGNITION. AT THIS TIME THERE IS NO ULTRA-VIOLET DETECTED BECAUSE THERE IS NO FLAME AND THE UNIT WILL GO INTO A SAFETY SHUT-DOWN PROCESS.
7. THE START BUTTON IS PUSHED AND NOTHING HAPPENS AT ALL. A FUSE MAY HAVE BLOWN, A CIRCUIT BREAKER MAY HAVE TRIPPED, OR THE LATCHING RELAY MAY BE DEFECTIVE. THESE WILL NEED TO BE CHECKED OUT.
8. THE START BUTTON IS PUSHED. THE LATCHING RELAY CLICKS IN OR PULLS IN, BUT NOTHING ELSE HAPPENS. THE CHANCES ARE THE CONTACTS ARE DIRTY IN THE LATCHING RELAY. THE RELAY SHOULD BE REPLACED OR THE CONTACTS SHOULD BE CLEANED.
9. THE START BUTTON IS PUSHED. THE BLOWER STARTS AND NOTHING ELSE HAPPENS... A TIME PERIOD OF 2-3 MINUTES MAY GO BY AND THE BLOWER MOTOR CONTINUES TO RUN. CHANCES ARE YOU HAVE WHAT IS DESCRIBED AS A "RUN-A-WAY" SCANNER. A RUN-A-WAY SCANNER IS:

THE START BUTTON IS PUSHED AND THE BLOWER MOTOR COMES ON AND NOTHING ELSE HAPPENS. YOU MAY WAIT FOR 2, 3 OR 5 MINUTES AND STILL NOTHING HAPPENS. WITH THE UNIT STILL RUNNING, UNSCREW THE FLAME SCANNER FROM THE SIDE OF THE FURNACE AND CUP IT IN YOUR HANDS OBSERVING THE GLASS EYE END THAT WOULD NORMALLY "SEE" THE FLAME. IF THERE IS A "FLICKER" IN THE SCANNER IT MEANS THAT THE SCANNER IS DEFECTIVE. IT ALSO MEANS THAT IT IS SENDING A PREMATURE SIGNAL TO THE FLAME SAFEGUARD AND IT IS SATISFIED THAT THE UNIT IS BURNING AND IT DOES NOT NEED TO IGNITE OR OPEN ANY GAS VALVE. THIS IS A GOOD FEATURE BECAUSE IT TELLS YOU WHEN THE FLAME SCANNER NEEDS TO BE REPLACED. IT WILL ALSO NOT ALLOW THE COMBUSTION PROCESS TO TAKE PLACE AND POSSIBLY CREATE AN UNSAFE OPERATING CONDITION. THE FLAME SCANNER MUST BE REPLACED.

ANY FURTHER QUESTIONS REGARDING THE OPERATION OF THE ULTRA-VIOLET SAFETY SYSTEM SHOULD BE DIRECTED TO TECHNICAL SALES.

Johnson Gas Appliance Company
520 E. Avenue N.W.
Cedar Rapids, IA 52405

[319] 365-5267 or 1-800-553-5422

FAX 319-365-6282

MAINTENANCE INSTRUCTIONS FOR JOHNSON FURNACES

Johnson equipment is designed to give the longest possible service at the lowest maintenance cost. Due to the high temperatures reached by Johnson furnaces certain repairs are required from time to time to keep them in good operating condition. We are listing below pertinent maintenance information.

OVEN TYPE HEAT TREATING FURNACES [#70, #120, #121, #142, #143, #654, #706]

A. GENERAL MAINTENANCE:

These furnaces are lined with high temperature insulating refractory. This refractory expands and contracts as the furnace heats and cools; and cracks will appear throughout the lining. These are normal and should not be cause for alarm and should NOT be filled with cement as it will cause the brick to spall. The door brick on the #70, #120, #121 & #654 furnaces should be replaced occasionally. It is furnished with inconel screws and washers to withstand the high temperatures. The door should NOT be used as a shelf or parts dragged across the door brick in the process of removing parts from the furnace. Also, avoid striking the sides of the furnace with tongs. The hearth plate will require replacement occasionally, as will the front and back hearth rests on which the plate is set. The hearth plate must be used with the channel edges up. Parts to be heated should be pre-heated or brought up to temperature with the furnace when possible; avoid placing a cold piece on a hot hearth plate. When the gas is turned off to the furnace, turn off the blower at once so the lining will cool gradually.

B. FURNACE RELINING AND FURNACE EXCHANGE:

The furnace should be used until the complete lining is considerably deteriorated. It should then either be replaced with a new lining or new furnace body from the factory. Complete sets of fire brick linings with special shapes to fit the furnace and cement for sealing the brick are available with easy-to-follow installation instructions. Many operators, however, prefer to take advantage of the special price on replacement furnace bodies. Check our repair parts list for prices. This method is popular because it insures an expertly relined furnace in operation at all times; it eliminates the time and trouble of relining the furnace in the customer's shop; and it eliminates the "down" time for returning to the factory for relining. WHEN ORDERING, SPECIFY IF FURNACE IS TO HAVE SAFETY PILOT PORT INSTALLED. FOR ADDITIONAL INFORMATION ON SAFETY EQUIPMENT SEE PAGE 3.

PYROMETER EQUIPMENT:

Occasional replacement must be made of the thermocouple elements, the protection tubes or of the complete thermocouple assembly. We carry replacement parts in stock for immediate delivery.

POT TYPE FURNACES [#920, #950, #568, #580, #565, #565A, #521, #575, #575A, & #575B]

A. FURNACE RELINING:

These furnaces are lined with a high-quality, wear-resistant, castable lining poured with molds used in our factory. These linings are very rugged, and the furnaces should be used until the linings are considerably deteriorated, and then replaced with new furnace bodies. The new bodies are furnished complete less blower equipment and pots or crucibles. Prices for the new bodies are given on the repair parts list. With this method the customers are assured of an expertly lined furnace; and they are never without a furnace to use in their shops. If the lid lining needs replacement before the furnace body, material can be supplied to be mixed with water and molded into the furnace lid or a refractory lid can be supplied.

B. FURNACE RELINING #900 CRUCIBLE FURNACE:

This furnace is lined with a precast lining that can be replaced in the shop or a new replacement body can be supplied.

C. USE OF POTS:

DO NOT use a pressed steel pot for melting aluminum. A graphite crucible is used in the crucible furnaces. A cast iron pot is also suitable when contamination of aluminum by the cast iron is not objectionable.

To extend pot life carry a neutral or slightly reducing flame [more gas than air]. A flame that is too blue is oxidizing and will cause rapid scaling of the pot.

Avoid infiltration of cyanide or other salts into the combustion chamber. If seepage or splashing is occurring, place a ring of dry, powdered fire clay under the flange of the pot.

Turn the pot a little each day so that a different part is exposed to the hottest gases.

Remove sludge or sediment from pot at least once a day. This acts as an insulator, causing local overheating of pot.

Remove the pot at regular intervals and thoroughly clean the inner surface. Also hammer off thin scale that forms on outside.

D. USE OF CRUCIBLES:

Crucibles should be kept in a warm, dry area. Before using a new crucible anneal it by placing it in a warm furnace and gradually raising the temperature at about five minute intervals over a period of forty five minutes until the crucible becomes red.

BLOWER MOTORS:

Motors on the blowers should be oiled occasionally. The brushes should be checked and replaced periodically to avoid wear on the armature.

FORGE FURNACES [#122 & #133]

The forge furnaces are lined with hard firebrick on all wearing surfaces. Individual firebricks can be easily replaced when desired. Lining for the lid or complete lining can be replaced when necessary. Sets of linings are furnished with simple instructions for installation.

SOFT METAL MELTING FURNACES [#379, #313 & #616]

A. FURNACE RELINING:

These furnaces can be relined with brick and castable material supplied by our Company. An instruction sheet accompanies the shipment.

B. GENERAL MAINTENANCE:

Avoid permitting metal to solidify in the pots. If the metal does "freeze" in the pot, turn one burner only on until the metal melts slowly; do not turn all burners on at once or the pot will crack. When melting metal, let small amount of metal form a molten pool before adding additional metal.

SMALL BENCH FURNACES [#101, #112, #108 & #118]

The burner tubes on these furnaces are slotted on the ends to retain the flame, and care should be taken about striking the ends with soldering irons. These tubes are made of cast iron and will give long service, but when the slots are knocked off, the tubes should be replaced to insure good combustion. The #108 and #118 furnaces are equipped with individual valves for each burner. The #101 and #112 furnaces are equipped with double valves. After considerable use the valve plugs will tighten causing the valves to "freeze". When this happens the complete valve will should be replaced as prompt replacement of the complete valve will avoid gas leakage. Linings for all these furnaces are carried in stock. Lining sets are supplied for those in which both hood and bottom are lined. This set consists of material to be molded in to the furnace body and includes a new angle iron.



Form = A-2086

APPROVED COMPONENTS FOR INDUSTRIAL FURNACES

Approved components used on our industrial furnaces and power burners with flame rod or thermocouple safety and ultra-violet safety

JOHNSON PARTS	APPROVAL		
	UL	CSA	OTHER
Baso Switch	√		
Baso Valve		√	AGA
Baso Thermocouple			AGA
Baso Pilot w/Orifice		√	AGA
Air Switch	√		
ITT Solenoid Valve	√		Factory Mutual
Transformer	√	√	
Lock Out Light	√		
Ignition Button	√	√	
1/30 Motor Bodine	√	√	
1/7 Carter Motor	√		
1/3 Motor w/ back Contact	√		
P & B Relay	√	√	
Speed Control Switch	√	√	
Start - Stop Switch			Top/Application Only
Ignition Wire	√		
All Other Wire	√		
3/4 Gas Pressure Regulator			AGA
OJ21 Ignitor Plug	√		
Gas Adjustment Valve	√		
Fireye Control	√		
Flame Rod 12"	√		
Scanner	√		

NOTE: All Johnson Gas Industrial Furnaces are factory tested for proper function of all systems and all piping is leak tested.

JOHNSON GAS APPLIANCE COMPANY • 520 E AVENUE N.W. • CEDAR RAPIDS, IOWA 52405

1-800-553-5422 • 319-365-5267 • FAX 319-365-6282

Manufacturers since 1901 / Heat Treating Furnaces / Industrial Gas Burners / Stock Tank Heaters / Concrete Curing Systems



WARRANTY

We warrant our equipment to be free of workmanship or material defects. Should any material prove defective within one year after shipment due to faulty material or improper workmanship we will furnish without charge to the original purchaser, replacement or repair of said defective part or parts returned freight prepaid to Johnson Gas Appliance Company, Cedar Rapids, Iowa. The foregoing shall not apply to equipment that has been altered or repaired after shipment to you by anyone except our authorized employees, and the Company will not be liable in any event for alterations or repairs except those made with its written consent. On material not of our manufacture, the manufacturer's guarantee to us is extended. This paragraph does not cover ordinary wear and tear, corrosion or improper handling or storage after leaving our point of shipment. If inspection by the Company does not disclose any defect in workmanship or material, the Company's regular charges will apply. Any refractories supplied with this order will be warranted as to quality and will be selected in accordance with good practice for the service intended. The foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties, or merchantability or otherwise, express or implied in fact or by law, and state our entire and exclusive liability and buyer's exclusive remedy for any claim or damages in connection with the sale or furnishing of goods or parts, their design, suitability for use, installation or operation. We will in no event be liable for any special or consequential damages whatsoever, and our liability under no circumstances will exceed the contract price for the goods for which liability is claimed.

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