

STINGRAY SR3040 & 3055 STD/HP

40 SERIES GAS BURNER

MODEL 200 NATURAL GAS/PROPANE

INSTALLATION INSTRUCTIONS AND OWNER'S HANDBOOK

CAUTION: All gas burners **MUST** be installed by trained and licensed technicians.

WARNING: Installation of this burner must conform 'With local codes or, in the absence of local codes, with the Standard for the Installation of Domestic Gas Conversion Burners, ANSI 221.8-1984, and Addendum, 221.8a-1989, and the National Fuel Gas code, ANSI 2223.1-1984, and *CAN / CGA* B149.1 &.2. If an external electrical source is utilized, the conversion burner, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the national Electrical Code, ANSI/NFPA No. 70-1990 and CSA Electrical Code.

Owner is required to retain this manual for future reference.

TECHNICAL SPECIFICATIONS

FIRING RATE 70,000 TO 220,000 Btu/hr	NATURAL	PROPANE
GAS SUPPLY PRESSURES	MIN. 4" w.c. MAX. 10" w.c.	MIN. 8" w.c. MAX. 13" w.c.
MANIFOLD PRESSURES	MIN. 0.70" w.c. MAX. 1.84" w.c.	MIN. 0.9" w.c. MAX. 2.96" w.c.
POWER SUPPLY REQUIRED	120 VOLTS 60 Hz 1 PHASE	
BURNER MOTOR	232T 2.2 AMPS 3250 RPM	
INTEGRATED PRIMARY / IGNITION CONTROL	525 SE/A	

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

Do not store or use gasoline or any other flammable vapors or liquid in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

- 1) Do not try to light any appliance.
- 2) Do not touch electrical switches; Do not use any phone in your building.
- 3) Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- 4) If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, boiler tech, service agency or the gas supplier.

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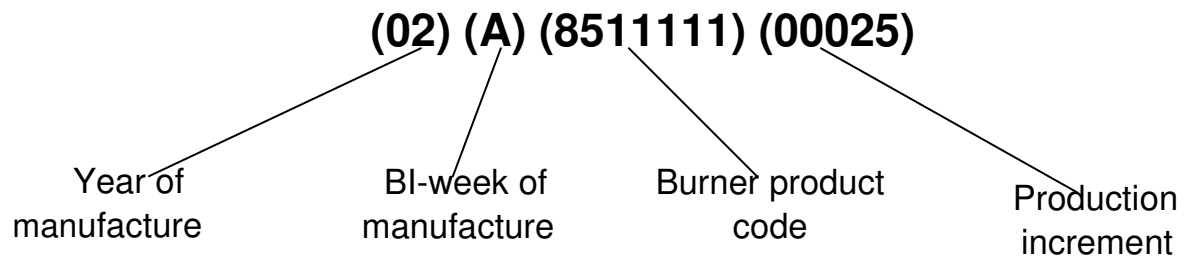
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The following pages contain information, descriptions and diagrams for the proper installation and wiring of the burner. Please read carefully before attempting final installation

This manual is to remain with the final installation designation. It is the installer's responsibility to ensure that the burner installation and operation instructions mentioned in this manual are followed and operated within local code authority limits.

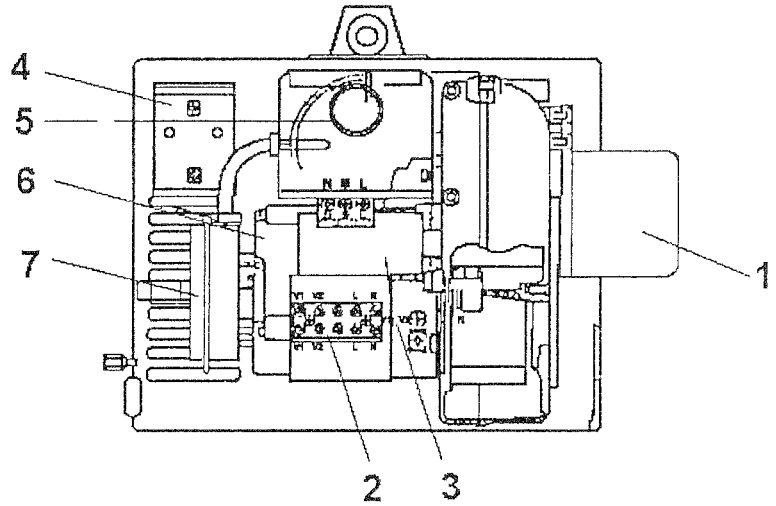
SERIAL NUMBER IDENTIFICATION

The Riello 15 character serial number, example, 02 A 8511111 00025, is identified as follows:
02 = last two digits of the year of manufacture; A = BI-week of manufacture; 8511111 = burner product code; 00025 = increment of 1 for each burner produced - specific to product code - reset to zero each January 1st.

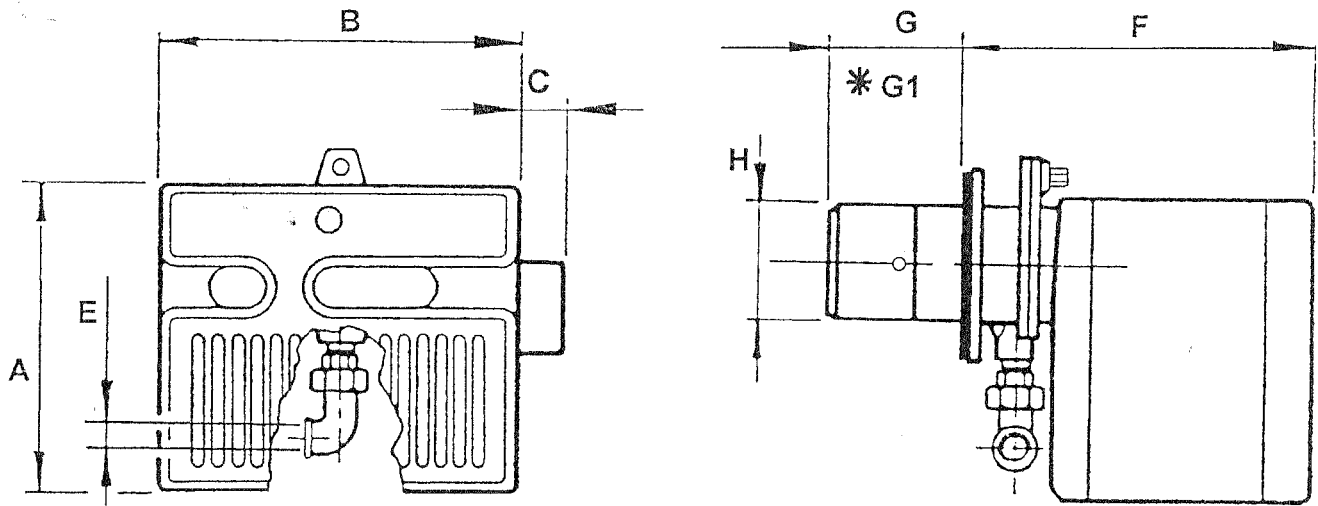


PRINCIPAL BURNER COMPONENTS

1. Electric air shutter assy. (Optional)
2. Field wiring terminal Block
3. Capacitor
4. Gas valve Transformer 120V/24 V (Optional)
5. Integrated primary/ Ignition control
6. PSC burner motor
7. Combustion air proving switch



BURNER DIMENSIONS



Model 200	A	B	C	F	G	*G1	H
inches	9 3/16	10 11/16	6 11/16	11 5/8	3 15/16	10	3 9/16
mm	233	272	35	295	85	255	91

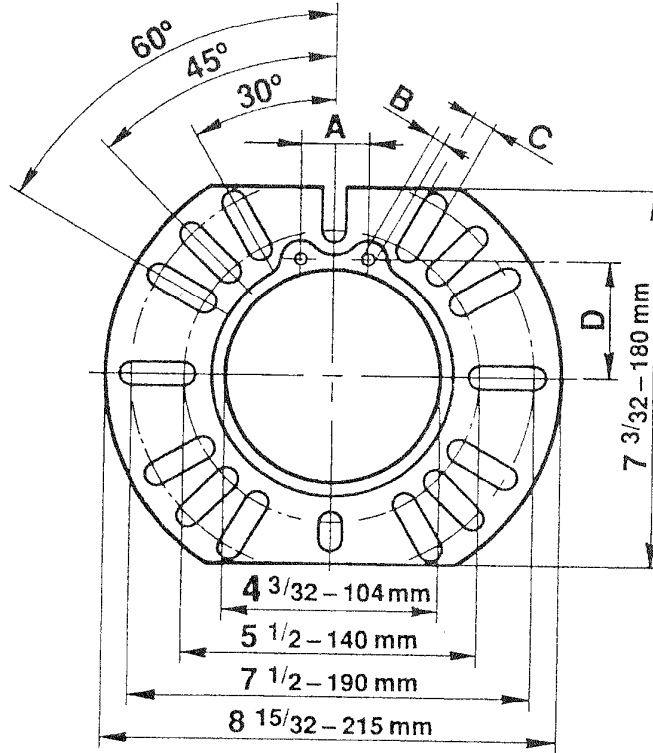
*G1 is for LBT version

Gasket thickness is 4 millimetres

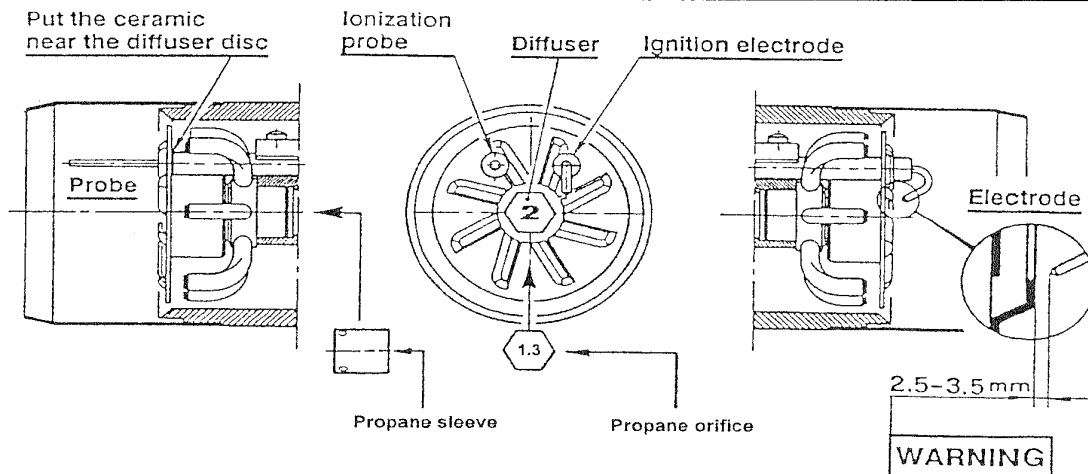
UNIVERSAL MOUNTING FLANGE

UNIVERSAL MOUNTING FLANGE DIMENSIONS

	A	B	C	D
Inches	1 1/4	1/4	7/16	2 3/16
Millimetres	32	6	11	56

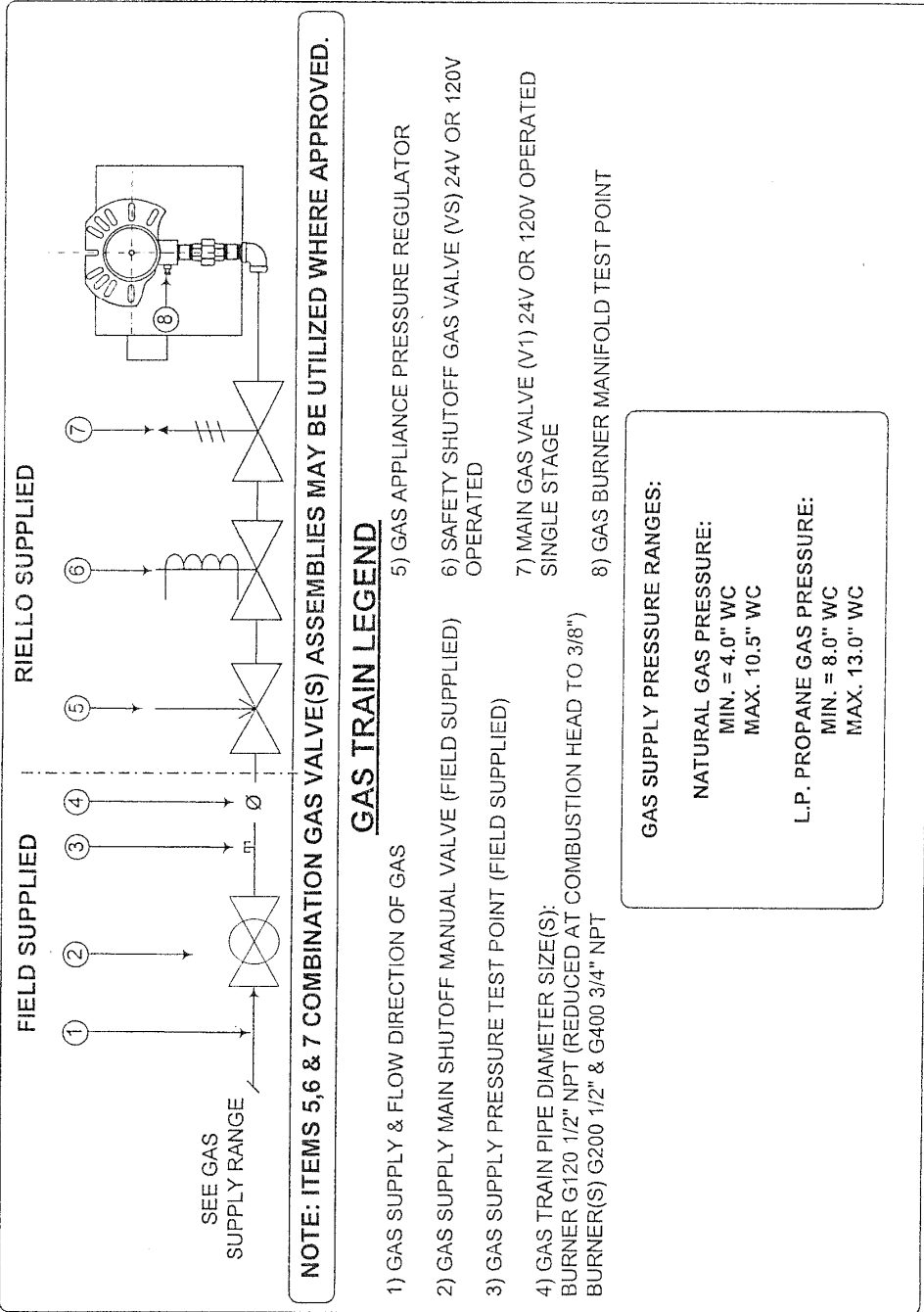


ELECTRODE AND FLAME PROBE ADJUSTMENTS



IMPORTANT: Do not turn the ignition electrode. Leave it as shown in the drawing. If the ignition electrode is put near the ionization probe, the amplifier of the control box may be damaged.

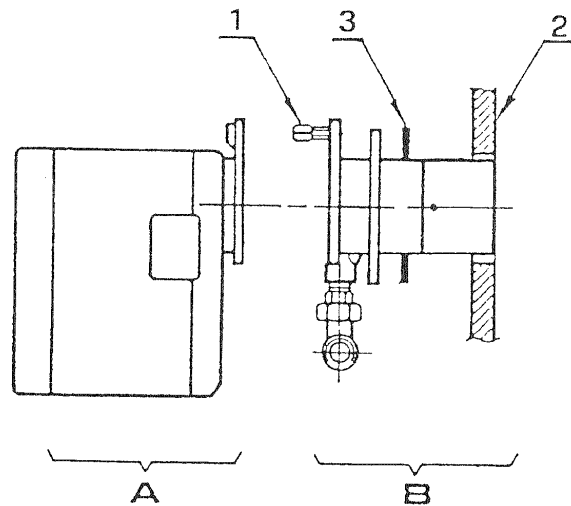
TYPICAL GAS TRAIN LAYOUT



INSTALLING THE BURNER

Wet Base Illustration

- a) Burner Chassis
- b) Combustion Head Assembly
 - 1) Locking Nut
 - 2) Appliance Mounting Plate Insulation
 - 3) Insulation Gasket



Use this checklist prior to installation:

- 1) Check the input/ output requirements of the appliance. We suggest that the appliance output should be approximately 85% of input (85% efficiency).
- 2) Check the dimensions of the combustion chamber for correct sizing against the input requirements of the application.
- 3) Check that there is sufficient air for proper combustion and adequate ventilation. Local codes should be followed. In the absence of local codes, refer to the NFPA Manual No. 31, CAN/CGA B149.1 &.2, ANSI Z223.1-1984 and Addendum 221.8A 1989.
- 4) Check that you have adequate space for servicing the equipment. The 40 Series burner requires a minimum of 13 inches clear space behind the red cover. This is required to allow easy removal of the cover for servicing and periodic maintenance.
- 5) Check that the flue is of sufficient area to handle the exhaust gases. Make sure the flue is clear and there are no obstructions.



STINGRAY Power Washer will usually require a flue pipe 2" larger than the stub on the top of the machine as pictured. STINGRAY also recommends a Part #69365 4"damper be installed in machine without it.

STINGRAY doesn't recommend using Barometric Dampers except in unusual situations. Please call STINGRAY Tech Services with any questions at 1-800-543-6278

IMPORTANT:

The installer must identify the main electrical power switch and manual gas shut off valve, for emergency conditions. The burner cover must be in place and secured before the burner is placed in operation.

GENERAL INFORMATION

Your 40 Series gas burner comes to you completely assembled and factory wired, ready for installation.

Models equipped with the short combustion head have a fixed flange, which bolts directly to the front of the appliance. When equipped with the long combustion head, the burner comes with a universal flange, which when bolted to the appliance, allows the burner to be adjusted for exact positioning in the combustion zone.

STEP~BY -STEP PROCEDURE

- 1) Remove the burner from the carton, taking care not to lose any of the supplied accessories. Check for signs of physical damage.



- 2) For STINGRAY Power Washers please install the new mounting plate to the heat exchanger per the drawing on pg 38. Bolt the combustion head and burner to the appliance. Be sure to install the supplied mounting gasket between the mounting plate and the universal mounting flange. Ensure that the burner is level (we suggest using a spirit level) and that the combustion head is centered in the appliance port. Refer to Page 7 for positioning of combustion head relative to the chamber.
- 3) Check that all gas train connections are tight and make your connections to the incoming gas supply.
 - a) A sediment trap must be provided. See pg. 10.
 - b) If not already installed, a manual shutoff valve must be supplied. This valve must be upstream of the burner gas train supply connection.
 - c) A 1/8" NPT plugged tapping must be installed immediately upstream of the burner gas train supply connection and must be accessible for a test gauge.
 - d) If required by local codes, provide gas vent lines at the gas regulators and valve.
 - e) Perform required gas pressure test on incoming gas supply lines.

NOTE: Details of sediment trap, manual gas valve, pressure test point, and line pressure test point can be found on Page 10.

- 4) Making the electrical connections for a STINGRAY Power Washer the follow wires are supplied with the machine:
 - One orange wire
 - One white wire
 - One green wire

(Please note that for Riello Burners the orange wire lead connects to L , the white wire connects to N, and the green wire connects to the green ground screw in burner junction box as shown on pg 11.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing (Step 5 (e) below).

CAUTION: The phase (HOT) wire must be connected to the black lead of the 24v relay if used; neutral to the white lead. Do not reverse the polarity. The burner will not operate with the Phase/Neutral reversed, and the control box may be damaged.

5) Check the burner functions as follows:

- a) Make a final check on both the gas and electrical connections.
- b) Loosen the screw in the manifold gas test point and install an appropriate manometer.

- c) Set the thermostat
- d) thermostat at its highest setting.
- e) Switch on power.

- e) With the manual gas valve turned off, press the burner reset button (see page 4), and allow the burner to run through a complete cycle to ensure that the sequence of operations is correct. A full starting cycle should take approximately 70 seconds from a no power condition until burner lockout, when equipped with motorized air damper, otherwise refer to the start-up cycle chart.

STINGRAY Power Washer Startup Setting:

WARNING! IF YOUR POWER WASHER USES A GAS BURNER: If you do not follow installation and operating instructions exactly, a fire or explosion may result, causing loss of life, personal injury, or damage to property.

WARNING! Proper setup and adjustment of gas-combustion equipment requires combustion-analysis tools (gas manometers, gas combustion analyzer) and knowledge of gas combustion.

If you do not have the proper expertise or equipment, seek professional help. Improper adjustment of gas-combustion equipment can cause carbon monoxide discharge, fire, or explosion, resulting in loss of life, personal injury, or property damage.

Measure and record the incoming gas pressure to the burner. (NOTE: In the power-up procedure, the burner will not fire until correct water level is reached, and the clock-override switch is turned *ON*.)

Verify that the incoming pressure is within the range specified in the table below. Lower gas pressures can reduce the burner firing rate and increase the time it takes for the machine to heat. Gas differential pressures other than those in the table below will cause firing rates other than those obtained at the factory. Use the gas pressures in Fig. 2-18 as an initial starting point for burner adjustments.

If your washer has a burner with one of the firing rates listed in Fig-2-18, make initial flue damper and burner air-inlet shutter settings as shown.

NOTE: Gas pressures below are expressed in WCI.

Firing Rate K/BTU	Burner No.	Maximum Incoming Gas Pressure Unfired	Minimum Incoming Gas Pressure Unfired	Incoming Gas Pressure Fired	Minimum Incoming Gas Pressure Fired	Manifold Gas Press Firing	Machine Flue Damper Opening	Burner Air Shutter Opening
180	40P200	10	4	10	4	2.96	30 Deg.	3.25
180	40N200	13	8	13	8	1.6	30 Deg.	3.25

- f) Once the burner is operational (up and running) a final gas leak check must be completed on the gas train.
- 6) If the burner is installed on a central warm air furnace, affix the mandatory warning labels to the furnace fan cover door (inside and outside).
- 7) Verify that the air/fuel mixture is correct with a gas-combustion equipment.

Correct Air/Fuel Mixture	
Unburned combustibles	0%
Carbon dioxide (natural gas)	9% -10%
Carbon dioxide (propane gas)	10% -12%
Oxygen	3% to 5%
Combustion efficiency	70% <i>or more</i>
Stack temperature	350° F to 1000° F (177° C to 371° C)
Carbon monoxide	200 PPM or less

INSTALLATION OF SEDIMENT TRAP AND BURNER SUPPLY

Gas piping to the burner must be 1/2 inch minimum. Install only a full-ported shutoff valve. The valve must be located outside the appliance jacket, and the pressure gauge port must be accessible.

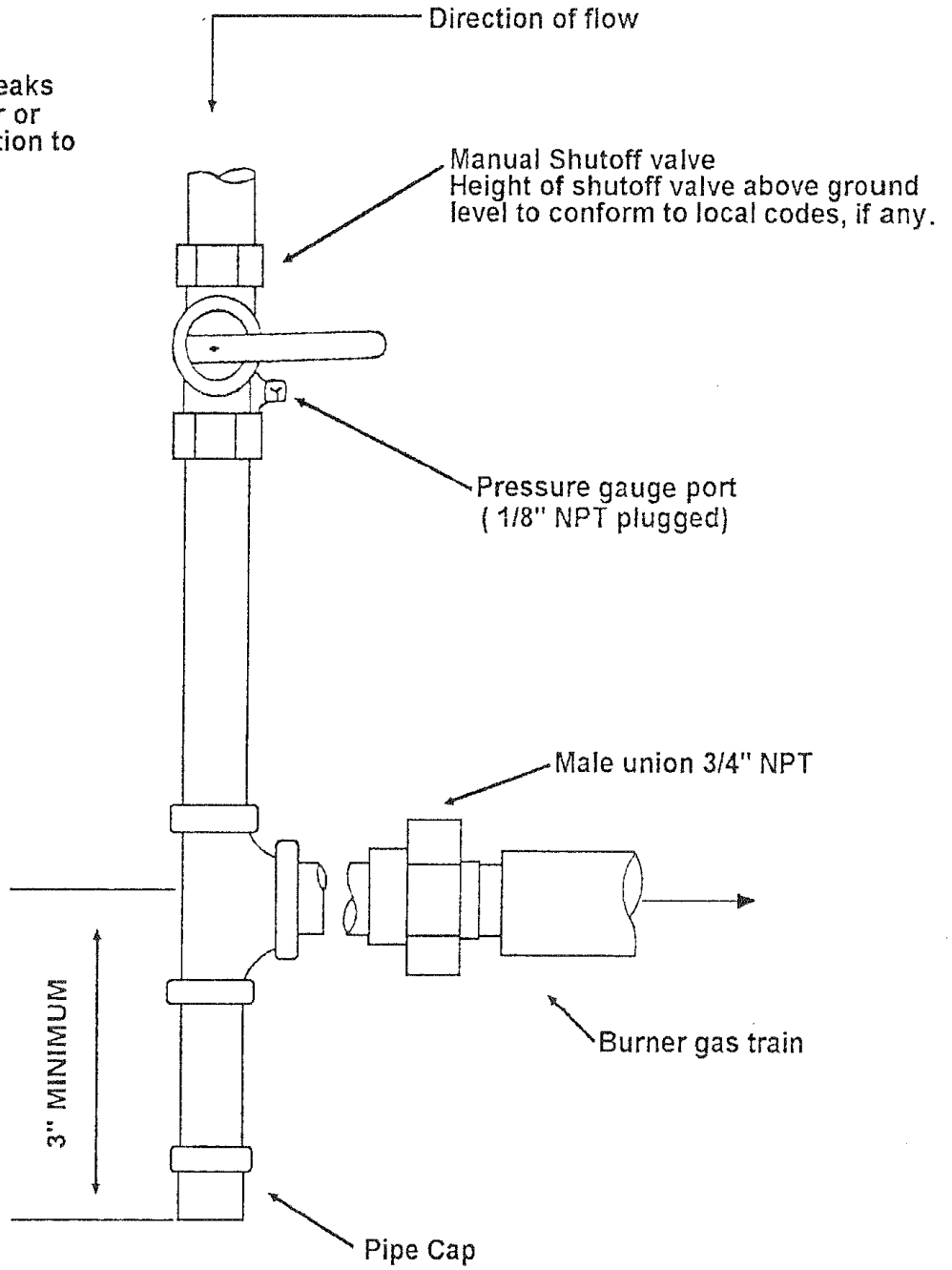
PRESSURE TEST- OVER 1/2 PSIG.

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at a test pressure in excess of 1/2 PSIG.

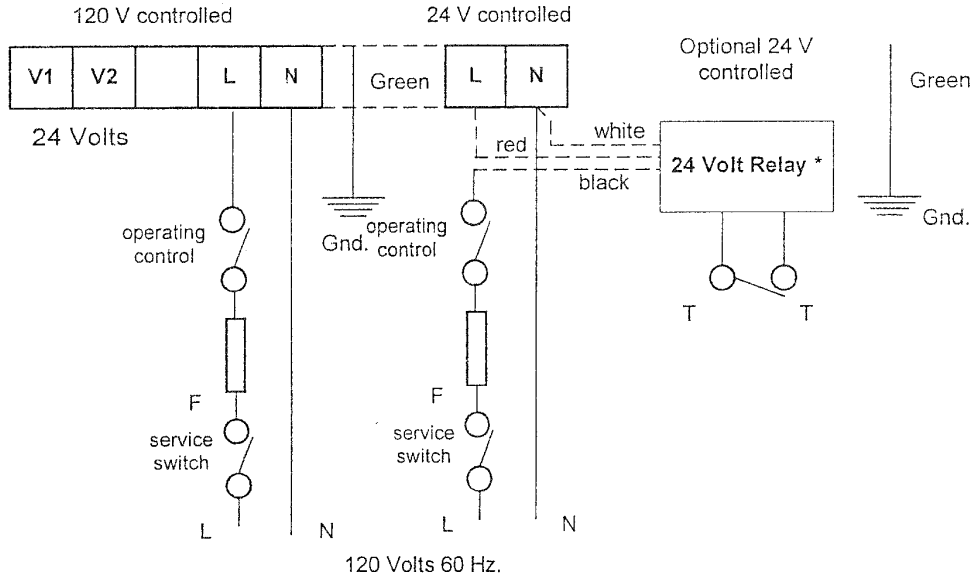
PRESSURE TEST – 1/2 PSIG OR LESS

The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG.

To check for gas leaks use a gas detector or apply a soap solution to the joints



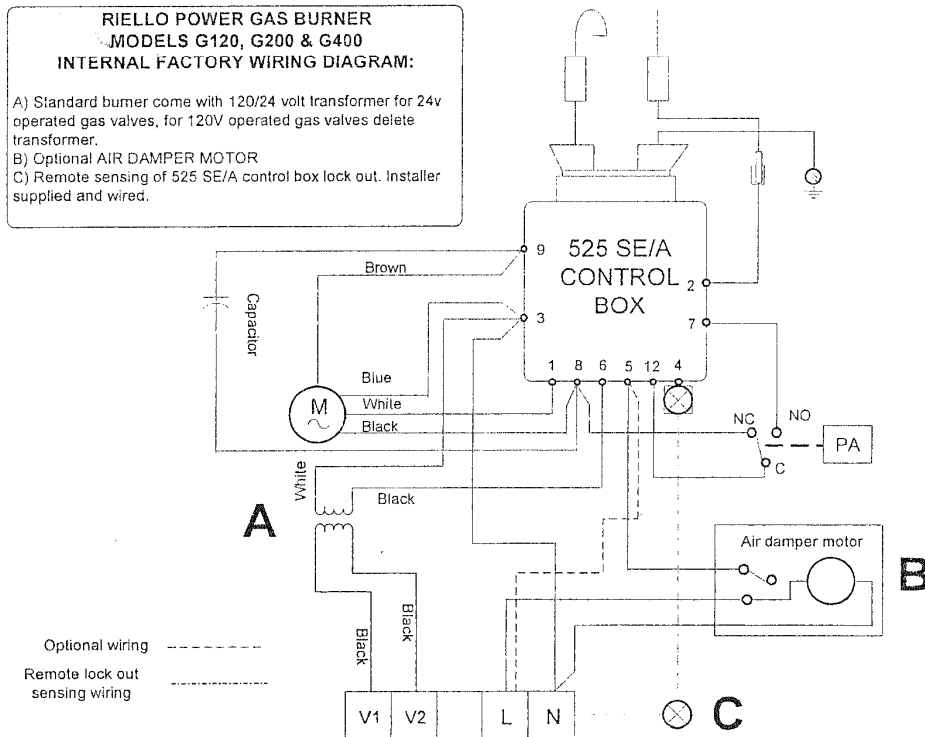
FIELD WIRING DIAGRAM



LEGEND

L = Line 1 (phase)	Gnd. = Ground
N = Line 2 (Neutral)	V1, V2 = Gas valve terminal
F = Fuse	TT = Thermostat
* 24 V switching relay as approved optional	

FACTORY WIRING DIAGRAM



This burner is approved for use without the motorized air damper. In these instances optional wiring is used
 2) The SAFETY SWITCH on the 525 SE CONTROL BOX is equipped with a contact allowing remote sensing of

burner lockout. The electrical connection is located on the CONTROL BOX terminal 4 as indicated. Should burner lockout occur, the 525 SE CONTROL BOX will supply a power source of 120 Vac to the connection terminal. The maximum allowable current draw on this terminal is 1 A.

IMPORTANT

Terminal 4 is to be used only for the connection of a remote sensing device. If a neutral or ground lead is attached to terminal 4 the control box will be damaged should lockout occur

SETTING UP THE BURNER

After burner output has been determined, use the **TABLE** below **AS AN INITIAL GUIDE** for burner settings.

Approximate Btu/hr burner output	Head settin	Air setting	Manifold pressure
Natural Gas			
70,000	0.0	1.40	0.70"w.e
96, 000	1.0	1.75	0.80"w.e.
122,000	2.0	2.25	0.91"w.e.
148,000	3.0	2.75	1.12"w.e .
STINGRAY Power Washer			
180.000	4.0	3.25	1.60"w.e.
200.000	5.0	4.0	1.84"w.e .
Propane			
70,000	0.0	1.40	0.90"w.e.
96, 000	1.0	1.75	1.16"w.e.
122,000	2.0	2.25	1.38"w.e.
148,000	3.0	2.75	1.77"w.e .
STINGRAY Power Washer			
180 000	4.0	3.25	2.96"w.e.
200,000	5.0	4.0	2.96"w.e.

All settings in this table were obtained under the following conditions.

- 0 (zero) draft in the combustion zone.
- Small DIN test boiler.
- 7" supply pressure for natural gas.
- 11" supply pressure for propane.
- steady state (HOT) operating conditions

STEP BY STEP PROCEDURE

- 1) Set air gate. See **AIR GATE ADJUSTMENT** on pg. 13/14.
- 2)Set combustion head. See **COMBUSTION HEAD SETTING** on pg. 14
- 3)Set the manifold pressure using the following method.
 - a) In order to determine existing manifold pressure, start the burner. At the end of the prepurge cycle (approx. 30s), the gas valve is energized. During the 5 sec. trial for ignition, note the manifold pressure. If the burner lights and continues to run, go to step (d).
 - b) Compare the observed manifold pressure from step (a) to the required value from **TABLE 1**.
 - c) Repeat step (a), making adjustments to the gas valve, until flame is established.
 - d) Once flame has been established, set your manifold pressure to the desired value from **TABLE 1**.
- 4) Check combustion gases using proper combustion analysis equipment to ensure safe levels of CO2 and CO during appliance heat up. The gas valve should be used to make any necessary adjustments to ensure safe combustion. At this point do not adjust the air or head settings unless absolutely necessary.
- 5) Allow burner to run until normal operating temperatures and conditions have been achieved.
- 6)
 - a) Clock the gas meter to determine actual burner output.

b) Set the manifold pressure, by adjusting the gas valve, to achieve desired output.

- 4) c) Check combustion gases once again to ensure safe operation. Make sure the burner cover is in place and air gate locking screws are secure for all combustion analysis. Adjust air gate if necessary. This test must be done by a qualified technician. The maximum recommended CO_2 level for natural gas is 10%; the maximum recommended level for propane gas is 12%. The recommended flue gas temperature for a STINGRAY Power Washer from 350°F to 1000°F max..

7) After completing the adjustments, remove the manometer and tighten the screw inside the manifold test point. Replace the regulator cap on the gas valve.

8) Complete the adjustment data tag, described on page 18. Explain the burner's essential functions

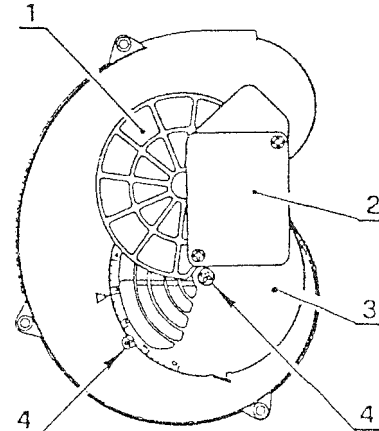
NOTE: Do not assume the heating system is operating at optimum performance.

(starting and stopping) to the owner. Do not forget to give the dealer or Service Company's name and address. Please see page 19 for information on burner maintenance procedures.

THERE IS NO SUBSTITUTE FOR PROPER COMBUSTION TESTING

AIR GATE ADJUSTMENT

The mobile air damper (1), operated by the air damper motor (2), assures the complete opening of the intake. To regulate the combustion air, adjust the Manual air gate (3), by loosening the locking screws (4). Once the optimal adjustment is reached, tighten the Locking screws (4), to assure free movement of the mobile air damper.



EXAMPLE SETTING (For natural gas)

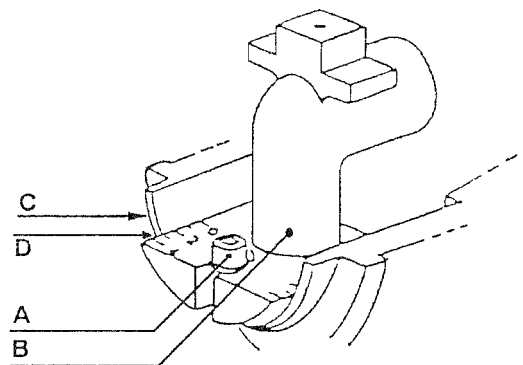
To set the air intake for a desired burner Output of STINGRAY Power Washer Burner 180,000 Btu/hr, use the TABLE provided on page 11 to determine the correct air gate setting. In this Case, the setting would be 3.25. Turn the manual air gate (3) until the arrow points to 3.25 on the scale then tighten the two locking Screws (4).

COMBUSTION HEAD SETTING (Stop Gate)

Note! Burners from STINGRAY for a Power Washer are preset before shipping to the customer. Loosen the Allen screw (A). Slide the elbow (B) so that the number on the indicator scale (D) aligns with the back edge of the air tube (C). See TABLE 3 for set points. Tighten the Allen screw (A).

NOTE: To disassemble remove the combustion head, use the procedure below.

- 1) Remove the Allen screw completely.
- 2) Withdraw the head.
- 3) Pull the head straight out.



EXAMPLE SETTING (For natural gas):

For a desired burner output of STINGRAY Power Washer 180,000 Btu/hr, the combustion head setting would be 4.0.

Please Note: Burner must be fired ONLY with fuel that is listed on the burner serial label

MANIFOLD PRESSURES

Manifold gas pressure for various firing rates must be set by adjusting the gas regulator of the gas valve. To check manifold gas pressure, attach a manometer to the manifold test point, shown on typical gas train layout on page 6. Approximate manifold pressure settings are indicated in TABLE provided on page I3.

Example (for natural gas):

For a burner to be fired at STINGRAY Power Washer 180,000 Btu/hr, the manifold pressure would be approximately 1.60" W.C. (inches of water column).

Manifold pressure will have to be adjusted to compensate for varying application conditions.

Please Note: Burner must be fired ONLY with fuel that is listed on the burner serial label.

HIGH ALTITUDE SETTINGS

It should be noted that for higher altitudes more air for combustion is required. All settings in this manual have been obtained at approximately sea level. Special attention should be paid to air for combustion at elevations above sea level. If an increase in combustion air is insufficient, the burner must then be de-rated by approximately 4% for every 1000 feet above sea level.

OPERATING FAULTS

The integrated control system is self-checking. The cycle from start up to flame establishment, takes Approximately 30 seconds.

The burner will go into lockout under the following circumstances:

- a) Burner fails to ignite.
- b) The ionization probe is grounded.
- c) Opening of the air pressure switch or the normally open contacts of the air pressure switch not making.

Should overheating of the appliance occur, shut off the manual gas valve to the burner. Do NOT Shut off the switch to the circulating pump or blower fan.

SHUT DOWN PROCEDURE

Switch off electrical power to the unit. Close the manual supply gas valve. START UP PROCEDURE

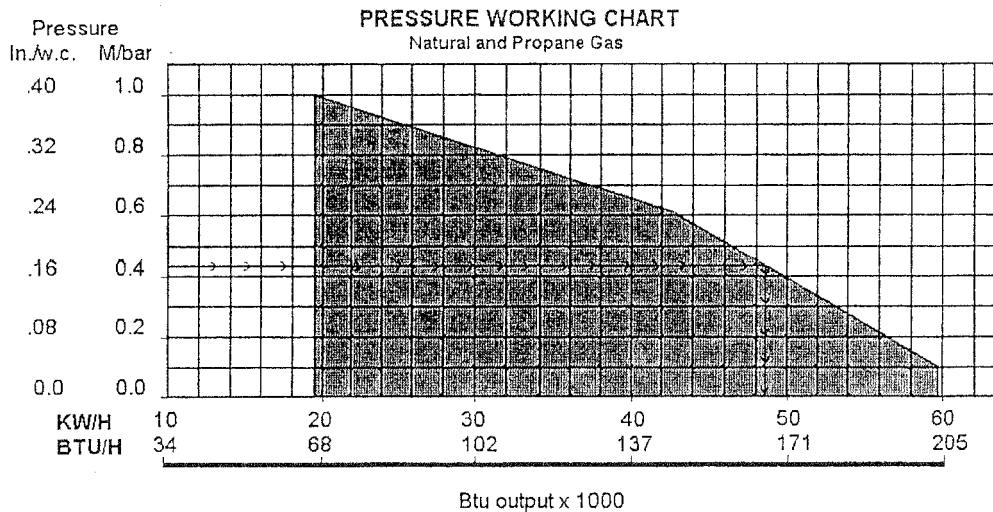
See page 8, Item 5

NOTE: If an external electrical source is utilized, the conversion burner, when installed, must be electrically grounded in accordance with local codes. In the absence of local codes, refer to the National Electrical Code, ANSI/NFPA 70-1990.

In Canada follow the Canadian Electrical Code Part 1 CSA C22.1.

PRESSURE WORKING CHART

The chart below shows effects of pressure in the combustion zone on the minimum/maximum burner outputs. In this example, with a maximum operating pressure of 0.16 inches water column in the combustion zone, you will be able to obtain a maximum of 165,500 Btu/hr burner output.



Any change from zero (0) pressure in the combustion zone will affect the Btu output of the burner. To supply the required input to the appliance, manifold pressure will have to be adjusted to compensate for this condition.

NOTES:

- 1) Sizes shown above are for cylindrical or wet base boilers, or air cooled heat exchangers.
- 2) To size the chamber in applications other than wet base boilers, you must calculate area in square inches of the combustion zone required to give you a grate area or floor area to match the BTU inputs according to the local authority. Refer to CAN/CGA B149.1 & .2 ANSI Z21.8-1984, and ANSI Z223.1-1984.
- 3) Firebrick or cerafelt chamber materials should have a continuous run temperature rating of 2400 degrees Fahrenheit and a melting point of 3000 degrees Fahrenheit.

COMBUSTION CHECKS

C02

It is advisable not to exceed a measured reading of 10% C02 for Natural Gas or 12% C02 for Propane Gas with the burner cover in place and with steady state condition obtained.

CO

For safety reasons, the value of .02% (200ppm) free air sample must not be exceeded. It is suggested that the CO formation should not exceed 50 PPM on most applications.

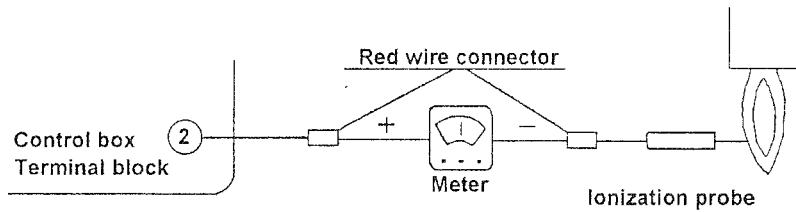
IGNITION

Ignition should be smooth with no delay or flash back of flame, if delay or flash back is observed. Check ignition rod position and spacing. Also check burner settings.

IONIZATION (FLAME SIGNAL) CURRENT MEASUREMENT

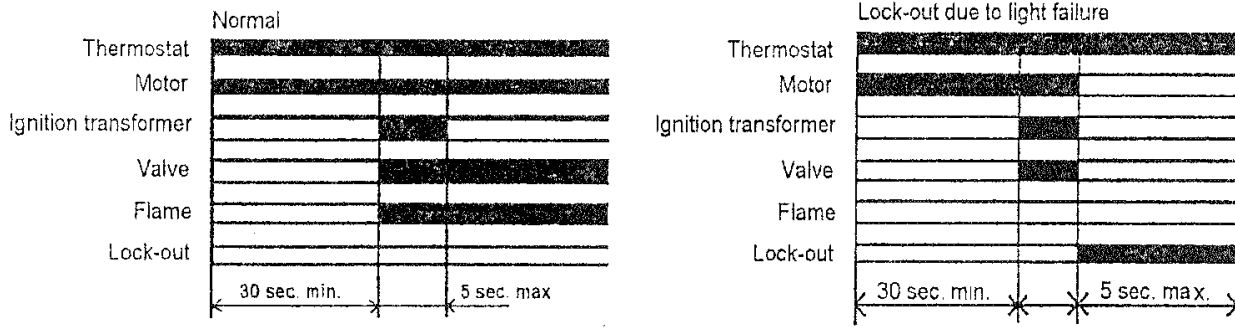
IONIZATION CURRENT

The minimum amount of current necessary for the control box to operate properly is 5 micro amps DC. To measure the ionization current, disconnect the red wire connector and insert a DC micro amp meter in series with control box terminal 2 and the ionization probe, which senses the flame. Refer to the diagram below.



BURNER OPERATING SEQUENCE

Burner Start-up Cycle



PROBLEM SOLVING GUIDE

Burner starting difficulties and their causes:

- 1) The burner goes through the prepurge period normally. The flame ignites, but the burner goes to lockout within five seconds.
 - a) The phase / neutral lines are reversed.
 - b) The wiring to ground is absent or ineffective.
 - c) The ionization probe is grounded, or not in contact with the flame, or the circuit to the control box is broken.
 - d) The spark interferes with the flame signal due to incorrect setting of the electrode.
- 2) The burner goes to lockout after the prepurge period because the flame does not ignite.
 - a) Air has not been fully bled from the gas lines.
 - b) The gas valve is passing too little gas.
 - c) The spark is irregular or not present.
- 3) The burner does not start when the thermostat calls for heat.
 - a) The gas pressure switch (if supplied) does not close contact due to low gas pressure.
 - b) The 24-volt switching relay is defective.
 - c) The line switch is off.
 - d) There is a blown fuse in the panel.
 - e) Terminals on the control module are bent or loose
 - f) The motor is defective.
 - g) The capacitor is defective.
 - h) The end switch on the air damper is defective.
 - i) The control box is defective.
 - j) The air pressure switch is not in the normally closed position
- 4) The burner continues to repeat the starting cycle without going into lockout.

This is a very specific situation caused when gas pressure in the gas main lines is *very close* to the value at which the gas pressure switch has been set. This can be corrected by resetting the gas pressure switch to a lower level. The gas pressure switch, if required, may be supplied, or may have to be field installed.

- 5) The burner does not go through prepurge, and the control module goes to lockout. The air pressure switch does not change over from normally closed to normally open contacts.

This condition exists because there is insufficient air pressure in the combustion head.

OWNER INFORMATION AND ROUTINE MAINTENANCE

SAFETY LOCKOUT

This burner is equipped with multiple interlocking safety devices. In the event of a failure in the fl311e, or any blockage of the combustion air supply, the burner will "lock out" in a safety condition. In such an event, an illuminated red button will show on the centre front of the red cover. To restart the burner, press the button once only. Should the burner return to the lock out condition, call a qualified service technician or your gas company for assistance.

NOTE: Keep the area around the burner free and clear of all combustible materials, gasoline and other flammable vapours and liquids. Do not allow any obstructions which may prevent the free flow of air to the burner.

MAINTENANCE

Like all precision equipment, your burner will require periodic maintenance. At an interval of 2 months, you should:

- 1) Visually check the flame if your heating appliance has an observation port.
- 2) Check and clean the air intake louvers to remove any build up of fluff, dust, pet hair etc.
- 3) The motor is permanently lubricated and does not need oiling.

For any maintenance or repairs over and above those listed, contact your service technician or gas company. THERE ARE NO OWNER SERVICEABLE PARTS INSIDE THE BURNER COVER.

Once a year, you should have the burner serviced as indicated below. This service should be performed by your local authorized dealer.

- 1) Check burner distributor head and mixing plates. Clean if necessary.
- 2) Check ignition electrode. Clean, adjust, or replace as necessary.
- 3) Check the flame sensor rod (ionization rod) for dirt or carbon build up. Clean, adjust, or replace as necessary.
- 4) Check manifold gas pressure.
- 5) Check all burner adjustments.
- 6) Generally clean all exposed parts and components.
- 7) Do a complete combustion test with the burner cover in place and the air gate locking screws secure.

Your Riello 40 gas burner is only part of your heating system. Once every year you should have your heating appliance serviced by a qualified service technician. You should also have the chimney checked, and cleaned if necessary.

INSTALLATION DATA

Note: This label is supplied in the package with the burner and should be filled out and affixed to the inside of the electrical panel door on a STINGRAY Power Washer when the conversion burner is installed.

ADJUSTMENT DATA TAG ANSI Z21-17b-1994
INPUT C.F.H.
MANIFOLD PRES.
AIR DAMPER
AIR/GAS RATIO No.
FLUE GAS TEMP.
O2 LEVEL %
CO2 LEVEL %
CO LEVEL P.P.M
DATE:
COMPLETED BY
INSTALLATION CONTRACTOR



For Technical help call, fax, or e-mail
Arcus Corporation dba: STINGRAY Tech Services
2450 Adie Road Suite 100 Maryland Heights, MO 63043
Tele: 1-800-543-6278 Fax: 314-567-6318

E-mail jessea@StingRaywash.com or patrick@StingRaywash.com Website: www.StingRaytechservices.com

GAS BURNER SYSTEM RIELLO 40 N200
REVISED: 09/01

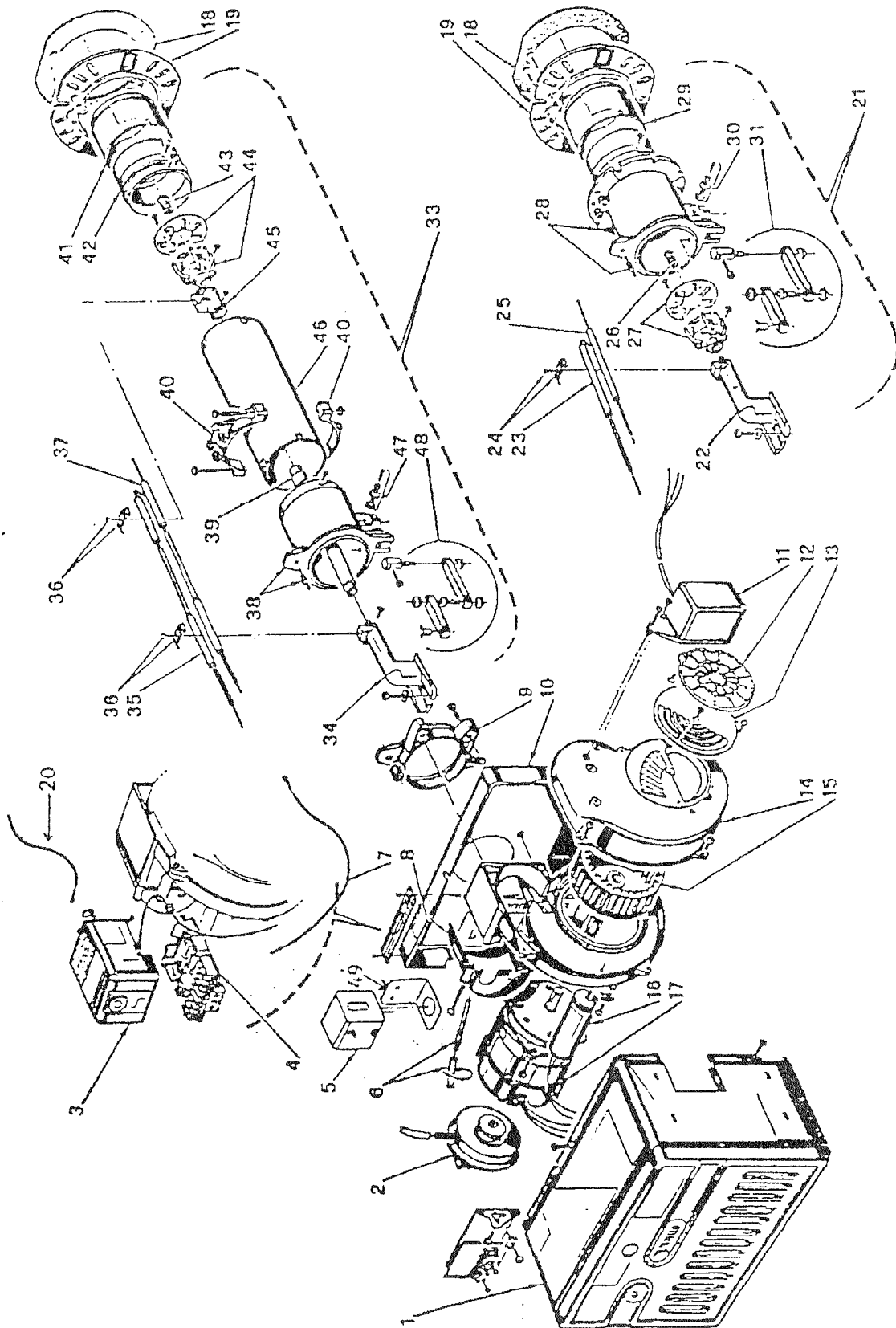
NO	MTS PARTS NUMBER	DESCRIPTION	NO	MTS PARTS NUMBER	DESCRIPTION
1	CALL	Burner back cover	21	CALL	Short combustion head (27ST1)
2	CALL	Air switch	22	CALL	Drawer assembly elbow
3	53368	Primary control box 525 SE/A	23	53374	Electrode assembly
4	CALL	Primary control sub-base	24	CALL	Electrode and ionization clamp
5	N/A	120/24 volt transformer	25	53375	Ionization assembly
6	CALL	Air switch tube and connector	26	53376	Natural gas orifice
7	CALL	Ionization lead	27	CALL	Distributor head and mixing plate
8	CALL	Air tube cover	28	CALL	Manifold
9	CALL	Chassis mounting collar	29	CALL	End cone
10	CALL	Chassis front plate	30	CALL	Gas test point
11	CALL	Air damper motor	31	CALL	Hinge assembly
12	53370	Motorized air damper			
13	CALL	Manual air shutter(air gate)			
14	CALL	Air intake housing			
15	CALL	Fan			
16	53371	Capacitor 10uF			
17	53372	Burner motor			
18	53373	Mounting gasket			
19	CALL	Universal mounting flange			
20	CALL	Ground lead and connector			
Gas Valve Train Assembly (Not listed Refer to Gas Valve Manual)					
1	53703	Gas train 1/2" complete			
1	85029	1/2" nat. Gas regulator			
1	85030	Valve soleniod, 1/2"			
1	85031	Valve, shutoff, nat. Gas			



To order call, fax, or e-mail

Arcus Corporation dba: STINGRAY Tech Services
2450 Adie Road Suite 100 Maryland Heights, MO 63043
Tele: 1-800-543-6278 Fax: 314-567-6318

E-mail jessea@StingRaywash.com or patrick@StingRaywash.com Website: www.StingRaytechservices.com



NEW BURNER STARTUP FORM

To be filled out by the customer.

Model No. _____ Serial No. _____
Customer _____ Contact _____
Address _____
State _____ ZIP _____ Ph. _____ FAX. _____

Services and Connections

Electrical:

Incoming voltage, _____
Master Disconnect Installed. Yes _____ No _____

Water makeup:

Supply pipe dia. _____, Length from next size feeder _____ ft.
Water supply turned on. Yes _____ No _____

To be performed by qualified gas burner/boiler technician!

Gas supply Line (If applicable)

Type, Natural Gas _____ Propane _____ Oil _____ . Diameter of supply pipe _____
Approximate distance to next larger size line or fuel tank, _____ ft.
Other devices on same main trunk _____ total BTU's _____

Gas flue pipe (customer installed):

Material _____, Diameter _____, Number and type of elbows _____
Vertical length _____ ft. Horizontal length _____ ft. Is rain cap installed. Yes _____ No _____
Is flue exhaust above highest point of roof line, Yes _____ No _____
If no, Explain, _____

Gas Burner Information

Measure and record incoming gas pressure (burner unfired) _____ w.c.i.
Measure and record incoming gas pressure (burner fired) _____ w.c.i.
Measure and record manifold gas pressure (burner fired) _____ w.c.i.
Measure and record exhaust stack temperature with burner fired and water at or near desired temperature. _____ deg. F.
Measure and record exhaust emissions, CO _____, Oxygen _____, Co2 _____
Test measurements taken by _____ Company _____

Temperature Control:

Does water heat system function properly, Yes _____ No _____ If no, Explain, _____
Record time required for machine to heat from ambient temperature to approx. 175-190 deg. F. _____ min's. **Please refer to to the operating manual for recommended operating temperatures for your machine.**
Please write the altitude above sea level in feet for your machine _____

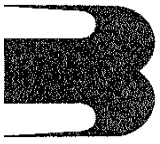
Tested Burner

Operation, Good _____ Fair _____ Poor _____
Comments: _____

Thank you for taking time to complete the above. Should you have any questions on your STINGRAY Power Washer during this test, or anytime in the future, we at the STINGRAY Technical Services (800)543-6278 are here to assist you in resolving any questions or problems.

To begin your STINGRAY Warranty, please sign and return to STINGRAY Tech Services by mail or fax.

Authorized Signature _____ Title _____ Date _____



GAS BURNER ~ GAS TRAIN ADJUSTMENTS INSTRUCTIONS

Please follow all instructions regarding the OEM gas train adjustments.

Some instructions listed in this addendum may differ from our standard installation manual.

The gas train configuration must not be altered.

This gas product must be installed by a licensed and trained gas technician

Gas leakage test must be performed according to the local gas utility requirements.

Please follow your local code authorities regarding the gas appliance installation requirements and emissions limits.

PRELIMINARY & BURNER GAS MANIFOLD ADJUSTMENTS INSTRUCTIONS

THE STEPS LISTED BELOW ARE TO BE PERFORMED AFTER THE BURNER HAS BEEN INSTALLED ONTO THE GAS FIRED EQUIPMENT ACCORDING TO THE APPLIANCE INFORMATION AND/OR OUR BURNER INSTALLATION MANUAL AND ANY LOCAL CODE AUTHORITY INSTALLATION REQUIREMENTS.

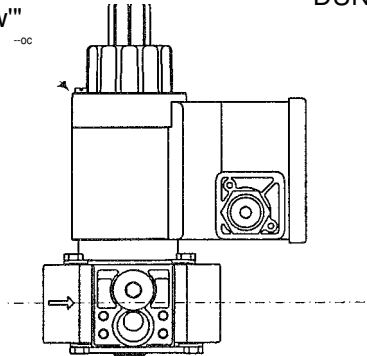


40 SERIES POWER GAS BURNER SINGLE STAGE OPERATION GAS TRAIN ADJUSTMENTS & BURNER MANIFOLD ADJUSTMENTS

/ Sealing! adjustment cap tool

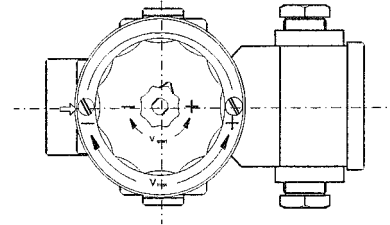
Flow adjustment cap
Pan head screw"

SIDE VIEW



DUNGS MVDLE GAS VALVE SHOWN, ALL OTHERS PLEASE REFER TO VALVE LITERATURE

TOP VIEW



THE MAIN & SECONDARY SAFETY SHUTOFF GAS VALVE REQUIRE NO ADJUSTMENTS FROM THE FACTORY, THERE ARE TO BE ADJUSTED TO MAX 100% OPEN POSITION. PLEASE VERIFY PRIOR TO STARTING BURNER! APPLIANCE.

BURNER MANIFOLD FLOW/PRESSURE ADJUSTMENTS ARE TO BE ADJUSTED BY THE APPLIANCE GAS REGULATOR. NO ADJUSTMENTS.

STEP 1:

INSTALL A MANOMETER TO THE BURNERS COMBUSTION HEAD MANIFOLD TEST POINT (SEE BURNER MANUAL FOR LOCATION)

STEP 2:

THE MAIN SAFETY SHUTOFF VALVE MAY REQUIRE THE INITIAL/START GAS FLOW/PRESSURE SETTING TO BE ADJUSTED, PLEASE FOLLOW THE MAIN SAFETY GAS VALVE INSTRUCTIONS FOR PROPER ADJUSTMENTS. ADJUST THE INITIAL GAS FLOW/PRESSURE TO 50%, THIS MAY TAKE SEVERAL ATTEMPTS UNTIL ACCEPTABLE BURNER IGNITES OR IGNITION NOISE IS OBSERVED.

STEP 3:

START BURNER, OBSERVE PRE - VENTILATION PERIOD PRESSURE (AIR PRESSURE), THE INITIAL LIFT GAS FLOW/PRESSURE MUST BE AT LEAST 50% MORE THAN THE AIR PRESSURE TO ENSURE PROPER MIXING AND SUCCESSFUL IGNITION.

STEP 4:

ONCE BURNER HAS IGNITED, WAIT UNTIL THE MANIFOLD PRESSURE IS STABLE, THEN ADJUST APPLIANCE REGULATOR TO REQUIRED MANIFOLD PRESSURE ACCORDING TO THE APPLIANCE INFORMATION AND/OR BURNER INSTALLATION MANUAL.

IF APPLIANCE/BURNER FAILS TO IGNITE:

- A) ENTRAPPED AIR IN GAS PIPING, BLEEDNENT AIR ACCORDING TO LOCAL CODES
- B) INITIAL START GAS FLOW/PRESSURE NEEDS ADDITIONAL ADJUSTMENTS
- C) IGNITION & FLAME SENSING ROD OUT OF SPECIFICATION, CHECK BURNER INST ALLA TION MANUAL FOR PROPER SPECIFICATIONS

RESTART APPLIANCE AND CHECK BURNER STOPS & STARTS, IGNITION QUALITY AND MANIFOLD PRESSURE



SPECIFICATIONS

MVD Normally closed automatic shutoff valve, fast opening, fast closing. Adjustable max. flow

MVDLE Normally closed automatic shutoff valve, slow opening, fast closing. Adjustable initial lift. Adjustable max. flow.

NEMA Type 1 enclosure designations end in /6.; NEMA Type 4x enclosure designations end in /604.

Body size	Size
MV-D 505 & MV-DLE 205	1/2" NPT
MV-D 507 & MV-DLE 207	3/4" NPT
MV-D 510 & MV-DLE 210	1" NPT
MV-D 512 & MV-DLE 212	1 1/4" NPT
MV-D 515 & MV-DLE 215	1 1/2" NPT
MV-D 520 & MV-DLE 220	2" NPT
MV-D 525 & MV-DLE 225	2 1/2" NPT
MV-D 530 & MV-DLE 230	3" NPT

Gases
Natural gas, Propane, Butane; Other Noncorrosive gases

Maximum Operating Pressure
MV-D 7 PSI (500 mbar) UL,FM; 5 PSI (345 mbar) CSA
MV-DLE 3 PSI (200 mbar) UL,FM; 2 PSI (140 mbar) CSA

Maximum Closing Pressure
15 PSI (1000 mbar) FM Ambient / Fluid Temperature
-20 of to + 140 of (-30 °C to +60 °C), (UL)
-20 of to + 140 of (-30 °C to +60 °C), (CSA)
-30 °F to + 150 °F ; (-15 °C to +60 °C) (FM)

Electrical Ratings Available
120 Vac / 60 Hz; 24 Vac / 60 Hz in some models

Enclosure Ratings Available
NEMA Type 1 OR NEMA Type 4x

Electrical Connection
Screw terminals with 1/2" NPT conduit connection

Operating Time
100 % duty cycle

Closing Time < 1 second

Opening Time
MV-D series: < 1 sec.
MV-DLE series: 10 to 20 sec. at 70 of Max. Flow Setting

Adjustable from <10 to 100 % of total flow; <10 to 100 % of stroke

Initial Lift Adjustment (MV-DLE series only)
Adjustable from 0 to 70% of total flow; 0 to 25% of stroke

Materials in contact with Gas
Housing: Aluminum, Steel
Sealings on valve seats: NBR-based rubber

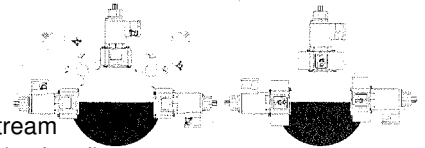
Mounting Position
Vertically upright to horizontal

Test Port
Two 1/4" NPT upstream and two 1/4" NPT downstream ports

Position Indication (optional)
Visual Indicator
CPI 400 w/ visual indication and electrical switch (SPDT)

Classification of Valve
UL 429
ANSI Z21.21 • CSA 6.5 C/I Valves
FM 7400

Approvals
UL Listed: File NO.MH16727
CSA: Certificate: 1133914 & 1010989
FM Approved: Report J.1.0V9A8.AF



CAPACITY


Body size	Size	CFH	<u>Capacity in CFH at pressure drop of 1 inch water column; natural gas, sp.gr.=0.64</u>
MV-D 505 & MV-DLE 205	1/2" NPT	250	
MV-D 507 & MV-DLE 207	3/4" NPT	575	
MV-D 510 & MV-DLE 210	1" NPT	825	
MV-D 512 & MV-DLE 212	1 1/4" NPT	1250	
MV-D 515 & MV-DLE 215	1 1/2" NPT	1700	
MV-D 520 & MV-DLE 220	2"NPT	2700	
MV-D 525 & MV-DLE 225	2 1/2" NPT	3900	
MV-D 530 & MV-DLE 230	3"NPT	5100	

ATTENTION

- Read these instructions carefully.
- Failure to follow them and/or improper installation may cause explosion, property damage and injuries.
- Installation must be done with the supervision of a licensed burner technician.
- The system must meet all applicable national and local code requirements.
- Check the ratings in the specifications to make sure that it is suitable for your application .
- Never perform work if gas pressure or power is applied, or in the presence of an open flame.
- Once installed, perform a complete checkout including leak testing.
- Label all wires prior to disconnection when servicing. Wiring errors can cause improper and dangerous operation
- Verify proper operation after servicing.

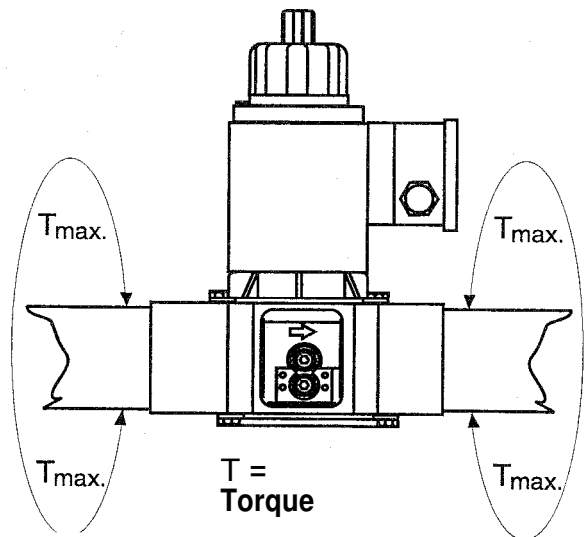
MOUNTING

- Examine the valve for shipping damage .
- The main gas supply must be shut off before installation .
- The inside of the valve, threads and piping all must be clean and free of dirt. Failure to remove dirt! debris could result in valve damage or cause improper performance.

 **CAUTION:** If the flow is not in the same direction of the arrows the valve will not operate properly.

Recommended Piping Procedure

- Use new, properly reamed and threaded pipe free of chips .
- Apply good quality pipe sealant, putting a moderate amount on the male threads only. If pipe sealant lodges on the valve seat, it will prevent proper operation. If using LP gas, use pipe sealant rated for use with LP gas .
- Do not thread pipe too far. Valve distortion and/or mal function may result from excess pipe in the valve body .
- Apply counter pressure only a parallel jaw wrench only to the flats on the flange when screwing the pipe into the flanges.
- Do not overtighten the pipe. Follow the maximum torque values listed below .
- After installation is complete, perform a leak test.

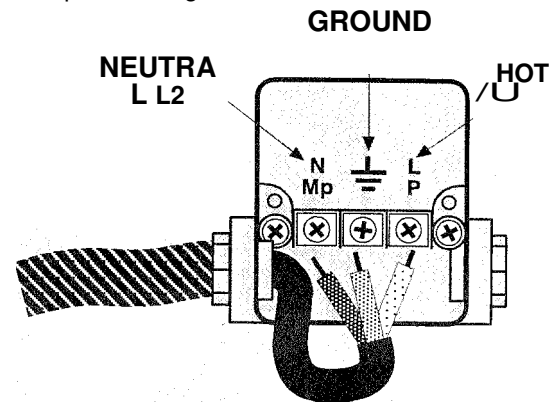
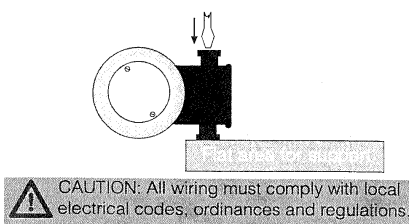


NPT	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
Tmax[lb-in]	443	752	1106	1770	1991	2213	2876	3540

WIRING

NOTE: Use 14 or 16 gauge wire rated for 95°C(200°F) .

- Remove the wiring box cover to expose the three terminals.
- The wiring box can be rotated to accommodate the conduit connection .
- Knock out only one of the conduit connections on the side of the terminal box you wish to make your conduit connection to. Support the opposite side of the electrical box when knocking out the conduit connection.
- For NEMA Type 1 applications (Indoors) Attach 1/2" NPT conduit to the junction box .
- For NEMA Type 4x applications (Outdoors or Wet locations) use SEAL-TITE conduit to the junction box with appropriate connector.
- Use appropriate tools to connect the conduit to the electrical box.
- Make electrical connections to the valve using the wiring diagram.
- Replace wiring box cover.



VALVE ADJUSTMENT

Max. Flow Setting

- The valves are factory set with the flow adjustment fully open.
- **CAUTION:** Make sure gas flow does not create a hazard.
- Locate the flow adjustment on top of the valve [MV-D (black knob) MV-D(LE) (base of the hydraulic brake)]. There are two screws, the holding screw is recessed and has a blue sealing compound on it, while the pan head screw protrudes from the cap.
- Loosen the pan head screw until you can freely rotate the flow adjustment.
- Turn clockwise for less gas or counterclockwise for more gas.
- Check the flow at the burner with an orifice or flow meter.
- Tighten the pan head screw on the adjustment cap.

Initial Lift Adjustment (MV-DLE series only)

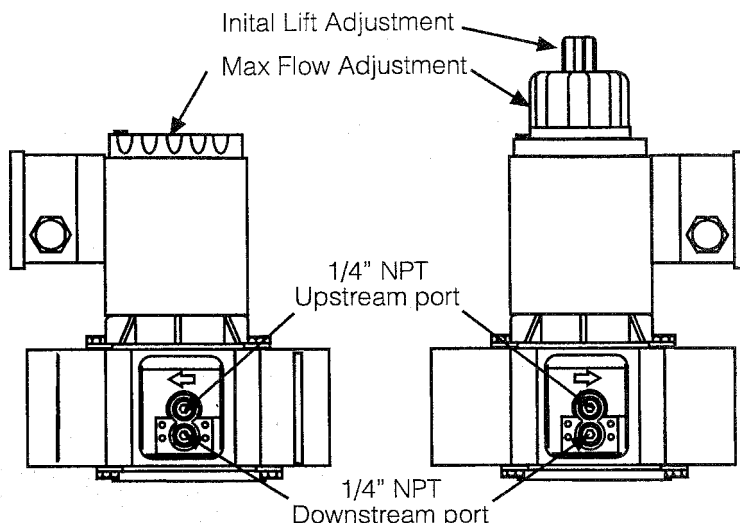
This adjustment can vary the initial flow between 25% and 70% of the total gas flow; 25% to 70% of stroke. All MV-DLE valves are factory set with no initial lift.

To adjust the initial lift:

- Unscrew the small black cap on top of the flow adjustment cap to expose the initial lift adjustment knob.
- The black cap also serves as tool; turn the cap over and insert it on the slot on the adjustment knob.
- Turn the knob clockwise for a min. initial lift or counterclockwise for a max. initial lift.
- Once the desired initial fast lift has been achieved, reinstall the black cap.

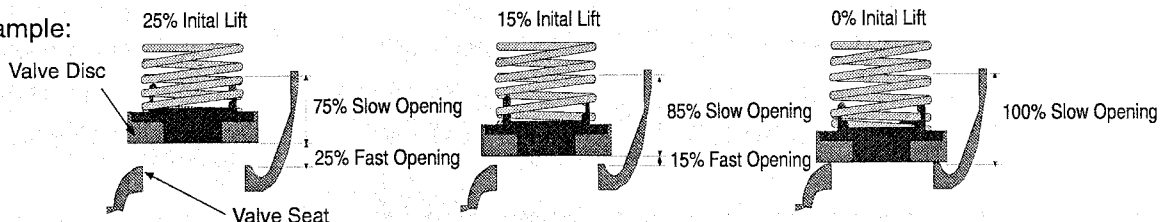
Test Ports

The 1/4 inch NPT taps are available on both sides upstream of the valve seat and downstream of the Valve seat.



Do not adjust or remove any screws or bolts which are sealed with a Red or Blue colored compound. Doing so will void all approvals and warranties.

Initial Lift Example:



VALVE LEAKAGE TEST

This test checks the sealing capabilities of the MV-D(LE) automatic shutoff valve. This test requires a test nipple that needs to be installed in the downstream accessory port of both automatic shutoff valves to make the required hose connection.

Only qualified personnel should perform this test at the initial system startup, annually or more depending on the application, environmental parameters, and the requirements of the authority having jurisdiction. It is recommended that this test be included in scheduled inspection and maintenance procedures. Use the illustration on page 4 as a reference.

Externally leak test the valve. Recommended using an all purpose liquid leak detector solution (Snoop "tm" or a soapy water solution). Apply the liquid leak detector solution to the areas indicated on the next page. The presence of bubbles indicates a leak. Be sure to include any accessories mounted to the valve.

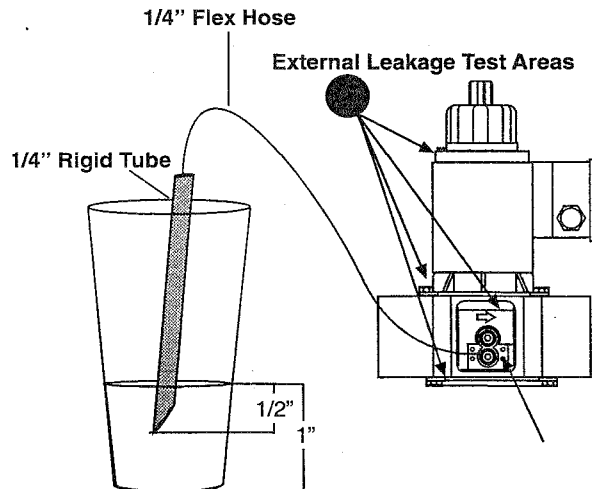
1. De-energize the burner system to ensure that there is no power to automatic shutoff valve # 1 and #2.
2. Close the upstream manual ball valve, and close the downstream manual ball valve.
3. Be sure that the test nipples are properly installed in each valve and are leak tight.
4. Test all gas piping in the test manifold with soapy water to determine that it is leaktight.
5. Have a glass of water filled at least 1 inch from the bottom. Connect a 1/4" flexible hose to a rigid tube. The rigid tube shall be 1/4 in. diameter and have a 45" cut at the end that is not connected to the flexible hose. The rigid tube can be made from either aluminum or copper.
6. Using a screwdriver, slowly open the test nipple of the upstream automatic shutoff valve.
7. Connect the 1/4" flexible hose to the test nipple of the valve that is being tested.

VALVE LEAKAGE TEST

8. Open the upstream manual ball valve.
9. Immerse the 1/4 in. tube vertically 1/2 in. (12.7 mm) into the glass of water.
10. If bubbles emerge from the rigid tube, let the rate stabilize and count the number of bubbles appearing during a 10 second period. (See chart below for leakage rates.)
11. Repeat a similar procedure for the downstream valve except that valve #1 needs to be opened during the test.

After completing the above tests:

12. Close the upstream and downstream manual ball valve and de-energize all automatic shutoff valves.
13. Remove the flexible hose, and close all test nipples.
14. Open the upstream manual ball valve, and energize both automatic shutoff valves.
15. Use soapy water to leak test all test nipples to ensure that there are no leaks.
16. de-energize all automatic shutoff valves
17. Open the downstream manual ball valve.

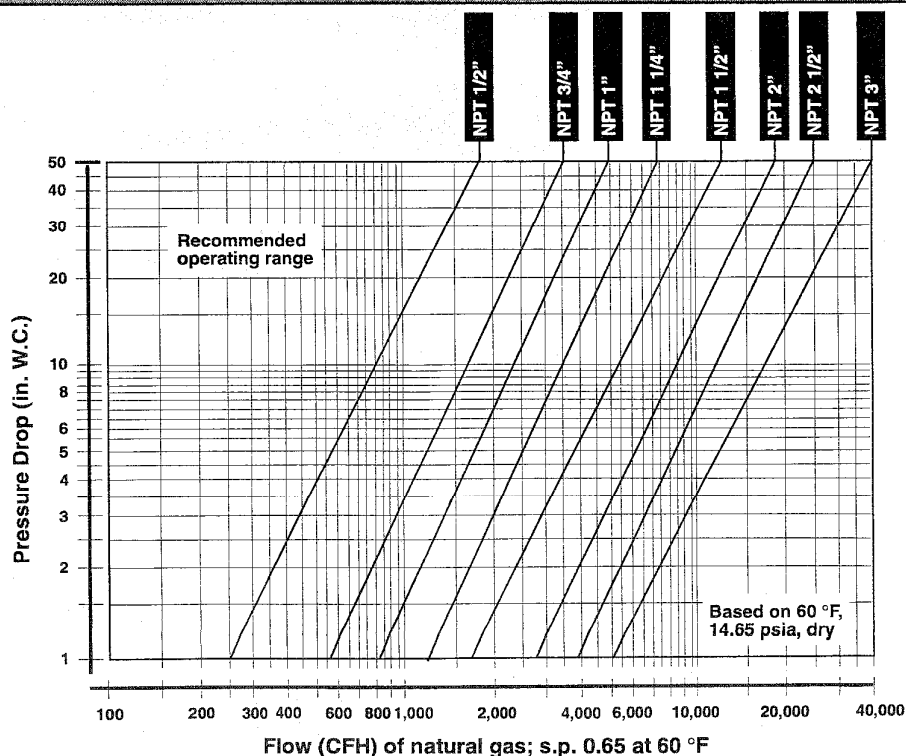


WARNING: If leakage values are exceeded, replace valve immediately.

Valve	Allowable leakage (cc/hr)*	# of Bubbles	# of Bubbles	# of Bubbles
		in 10 Seconds (AIR)	in 10 Seconds (Natural Gas)	in 10 Seconds (L.P.)
MV-D 505 & MV-DLE 205	235	4	5	4
MV-D 507 & MV-DLE 207	268	5	6	4
MV-D 510 & MV-DLE 210	323	6	7	5
MV-D 512 & MV-DLE 212	296	5	7	5
MV-D 515 & MV-DLE 215	481	9	11	8
MV-D 520 & MV-DLE 220	601	11	14	9
MV-D 525 & MV-DLE 225	666	12	15	10
MV-D 530 & MV-DLE 230	814	15	19	13

*Based on air, and test conditions per UL 429 Section 29. (Air or inert gas at a pressure of 1/4 psig and also at a pressure of one and one-half times maximum operating pressure differential, but not less than 1/2 psig. This test shall be applied with the valve in its intended position.) Volume of bubble defined in Table 2 of FCI 70-2-1998

FLOW CURVE



Installation & Maintenance Instructions

SERIES

2-WAY DIRECT – ACTING SOLENOID VALVES
 NORMALLY CLOSED OPERATION — 3/8", 1/2", 3/4", OR 1" NPT
 FUEL GAS SERVICE

K3A4
 K3A5

Service Notice

Except for coil replacement, the Series K3A4 and K3A5 are not repairable. When any performance problems are detected during routine inspection, replace valve immediately.

DESCRIPTION

Series K3A4 and K3A5 valves are 2-way normally closed direct-acting solenoid valves designed for fuel gas service. Valve bodies are made of rugged aluminum with trim and internal parts made of steel and stainless steel. Series K3A4 Hlves are designed for low pressure, while Series K3A5 are designed for medium pressure. These valves are provided with a general purpose junction box solenoid enclosure.

Provisions for Pressure and Seat Leakage Testing

Series K3A4 and K3A5 valves are provided with two 1/8" NPT tapped and plugged holes (pressure taps). The upstream tapped and plugged hole is on the side of the valve body; downstream on the bottom of the valve body. One upstream for pressure testing; one downstream for seat leakage testing. Leakage testing frequency shall be at least annually in accordance with NFPA -86 or original equipment manufacturer recommendations. For instructions, refer to section on *Testing for Internal (Seat) Leakage* and Figure 3.

Partial view of valve body showing location of tapped and plugged holes for pressure and seat leakage testing

Pipe plugs are 1/8/1 NPT (use 3/16" hex key wrench)

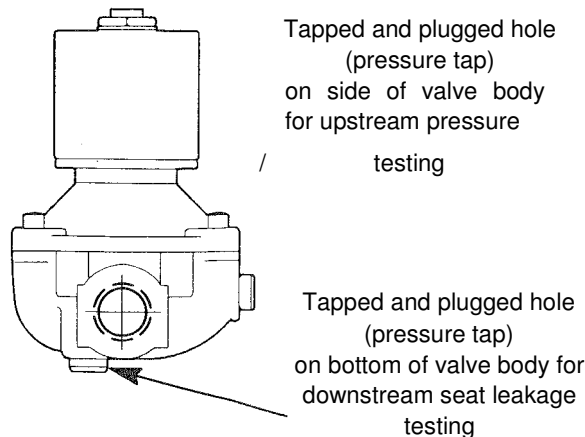


Figure 1. Provisions for pressure and seat leakage testing,

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

Note: No minimum operating pressure differential required.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Temperature Limitations

Coil Class	Nominal Fluid Temperature	Ambient Temperature Range
F		-40° F (-40°C) to 175° F (80°C)
311°F (155°C)	77°F (25°C)	

Positioning

Valve must be mounted with solenoid vertical and upright or in a horizontal position only. Valves equipped with rainproof housings (W in the 3rd character position of the valve catalog number) must be mounted in a vertical and upright position only.

Piping

A CAUTION: Piping must comply with applicable local and national codes and ordinances, including the National Fuel Gas Code ANSI Z223.1/NFPA No. 54. Connect piping to valve according to flow arrow on bottom of valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point. Valve should be checked for external leakage at piping connections after installation, see *Testing for External Leakage* section.

A CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If Teflon* tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction.

A CAUTION: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

Wiring

Wiring must comply with local codes and the National Electrical Code. To facilitate wiring, the solenoid enclosure may be rotated 360° by loosening the hex nut on the top of the enclosure. Rotate enclosure to desired position, then torque hex nut to 25 to 30 in -lbs [2,8 to 3,4 Nm]. The junction box housing has two 7/8" diameter knockouts to accommodate 1/2" conduit. Drive out appropriate knockout with junction box completely assembled (with cover) for support. Remove "J" box cover, by spreading cover and disengaging nibs (lift up and pull down simultaneously). The coil jacket is provided with a grounding screw (green) and a tab for the grounding connection. Within the junction box solenoid enclosure use field wire that is rated 90° C or greater for connections. Replace "1" box cover before operating.

Testing for External Leakage

! WARNING: To prevent the possibility of severe personal injury or property damage, extinguish all open flames and avoid any type of sparking or ignition.

1. Block gas flow on downstream side of valve.
2. Apply pressure to valve within nameplate rating and energize solenoid.
3. Apply a soapy solution or a commercially available leak detecting solution to the pipe connections and check for bubbles. If the valve has been tested for seat leakage, apply the solution around the pipe plugs.
4. If leakage exists, depressurize valve and turn off electrical power supply. Tighten connections as required and retest following the above steps.

Solenoid Temperature

Series K3A4 and K3A5 valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the hand for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

! WARNING: To prevent the possibility of severe personal injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before inspection or removing the valve from service.

Preventive Maintenance

- Prepare and follow a routine inspection schedule based on the media, environment, and frequency of use. This should include periodic internal and external leakage checks.
- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- While in service, the valve should be operated at least once a month to ensure proper opening and closing.

NOTE: For performance problems, refer to *Troubleshooting Chart* on page 4 of 4.

Coil Replacement (Refer to Figure 2)

NOTE: It is not necessary to remove the valve from the pipeline for *Coil Replacement*.

! CAUTION: Exercise care to prevent damage to the plunger tube. Do not grasp plunger tube with wrench or pliers.

1. Remove cover and disconnect supply wires to coil, grounding wire, and rigid conduit from coil jacket.
2. Remove hex nut and lockwasher, then carefully lift coil jacket assembly off plunger tube.
3. Remove coil and washers from coil jacket.
4. Reassemble in reverse order of disassembly, using a new replacement coil.
5. Place upper split washer inside coil jacket.
6. Insert coil lead wires through hole in coil jacket. Pull wires all the way through, and seat coil in jacket. Coil voltage markings must face toward valve body.
7. Place lower split washer, then bottom washer inside coil jacket. Washer has an "X" marked on the side which must face coil.
8. Install coil assembly on plunger tube. Install lock washer and hex nut onto exposed, threaded end of plunger tube. Torque hex nut to 25 to 30 in -lbs [2,8 to 3,4 Nm].
9. Make electrical connections to solenoid, see *Wiring* section.
10. Replace "J" box cover on coil jacket.

! CAUTION: Solenoid must be fully reassembled as the coil jacket and internal parts are part of and complete the magnetic circuit.

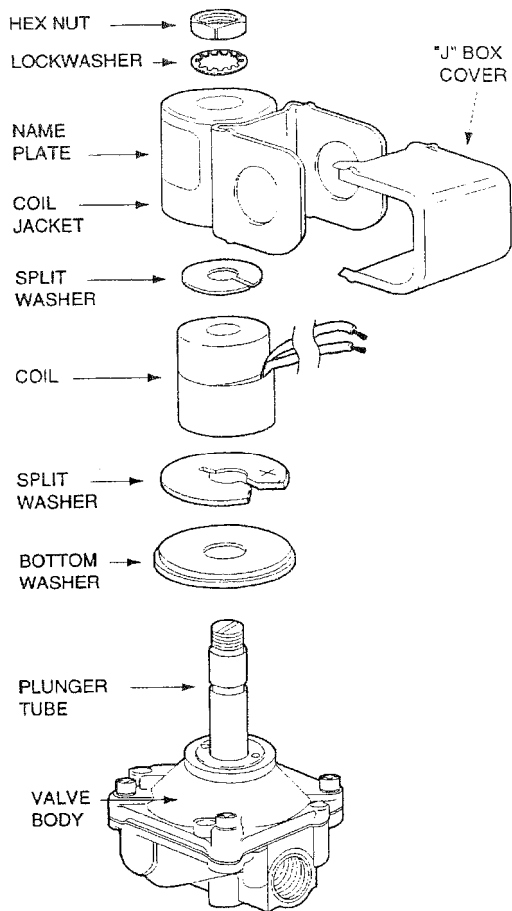


Figure 2. Exploded view, typical K3A valve.

Testing for Internal (Seat) Leakage (Refer to Figure 3) .A

CAUTION: Be sure valve can be tested without affecting other equipment.

1. Shut off both the upstream and downstream manual gas cocks. The downstream manual gas cock should remain closed throughout the entire test procedure.
2. Program the control system to operate the valve through five cycles. Listen carefully for the solenoid coil to *click* indicating proper operation.
3. Open the upstream manual gas cock. Program the control system to energize and maintain the valve in the open (energized) position. Check all valve and piping connections for external leaks with rich soap and water solution or a commercially available leak detecting solution.
4. Shut off the upstream manual gas cock and de-energize valve. Remove the plug from the leak test tap or downstream pressure tap in the valve body. Connect leak test equipment with the test petcock in the closed position (Figure 3).
5. Open the upstream manual gas cock. Program the control system to energize the valve to the full open position, then immediately de-energize it to seat the valve operationally.

6. Immerse the 1/4" leak test tube vertically into a jar of water to a depth of about 1/2". Slowly open the test petcock. Bubbles may appear in the water as the pressure equalizes.
7. After the rate of bubbles coming through the water stabilizes, count the number of bubbles appearing in a 10 second period. The allowable leakage in 10 seconds for an orifice diameter of 1 inch (25.4 mm) or less is 6 bubbles (3 cc/min). If leakage exceeds this rate, replace valve.

NOTE: The leakage rate above recognizes that some wear and contamination from use can result in a slight amount of leakage. The allowable leakage rate is well within the leakage limits as recognized by applicable approval agencies.

8. Close the upstream manual gas cock and the test petcock. Then remove the test equipment. Apply a small amount of Loctite Corporation's PST® Pipe Sealant 567 (or equivalent) to the pipe plug threads. Reinstall the pipe plug and tighten securely.
9. Turn on the gas supply at the upstream manual gas cock and energize the valve.
10. Open the upstream manual gas cock. Program the control system to energize and maintain the valve in the open (energized) position. Check all valve and piping connections for external leaks with rich soap and water solution or a commercially available leak detecting solution.
11. De-energize the valve. Open the downstream manual gas cock.
12. Restore the system to normal operation.

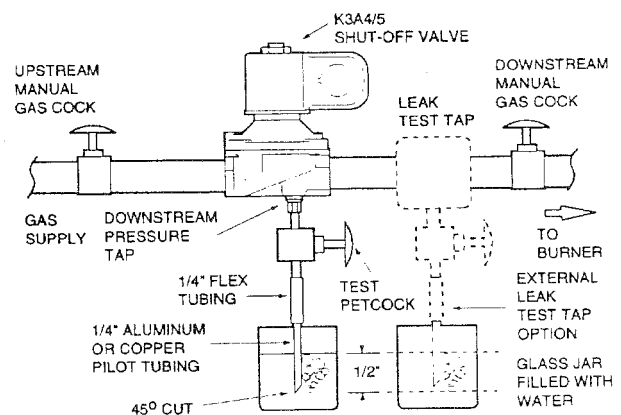


Figure 3. Testing for internal seat leakage.

ORDERING INFORMATION

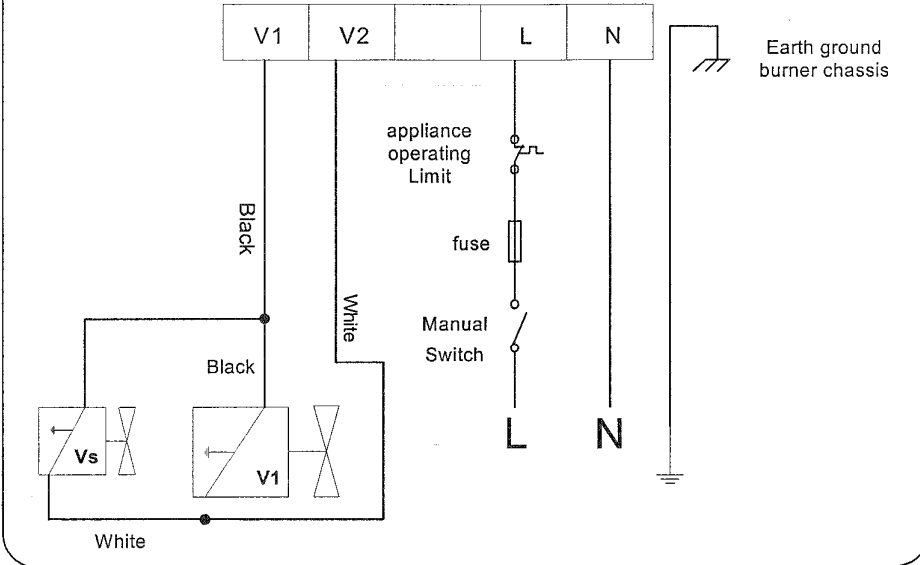
FOR COIL REPLACEMENT

When ordering coils, specify valve catalog number, voltage and coil number, if possible.

Troubleshooting Chart

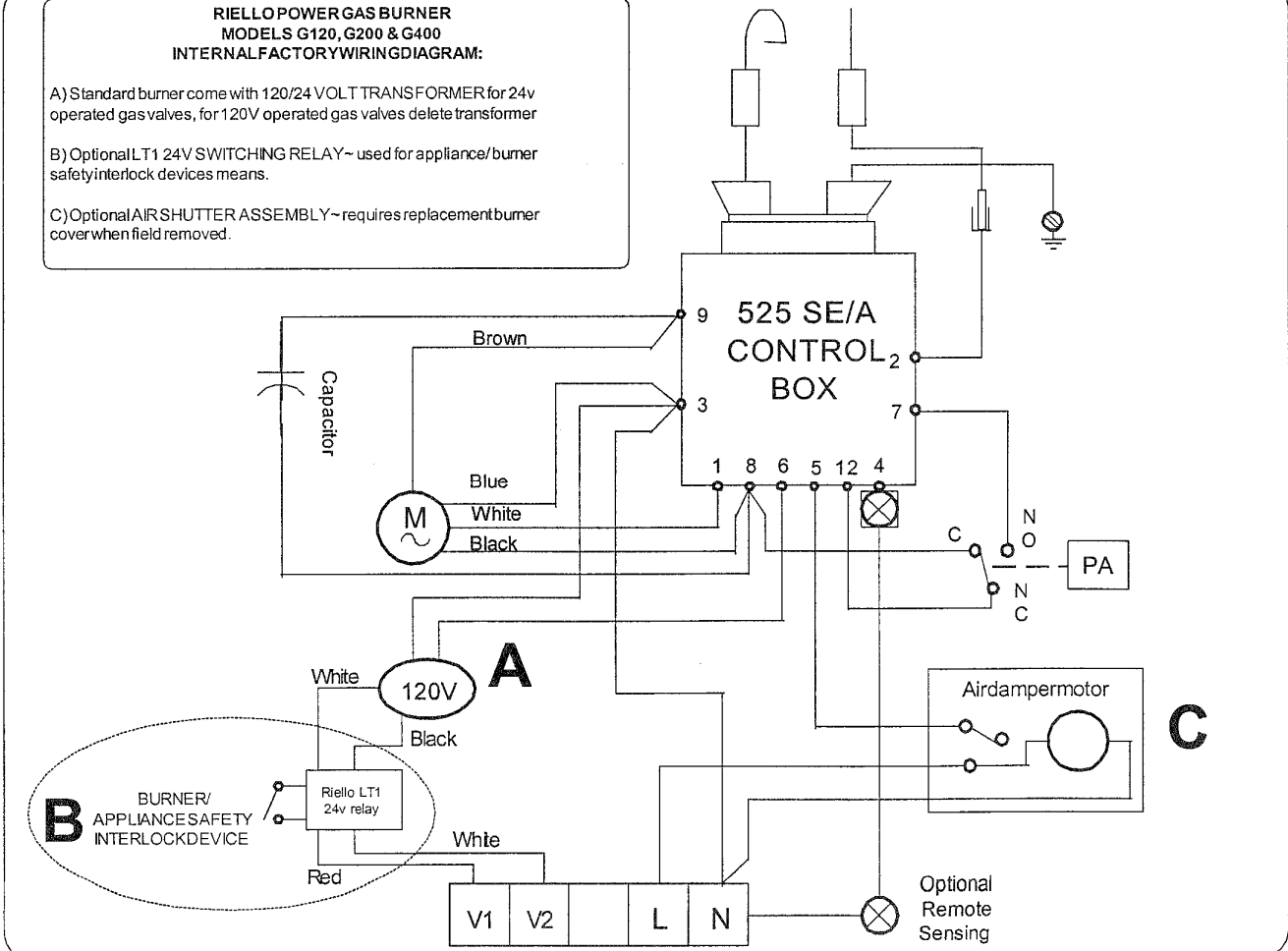
Trouble	Possible Cause	Remedy
Valve operation is sluggish	<p>Solenoid coil short, or wrong voltage.</p> <p>Damaged plunger assembly.</p> <p>Dirt or other foreign matter restricting operation of valve.</p>	<p>Check coil voltage. Replace solenoid coil.</p> <p>Replace valve.</p> <p>Replace valve and install strainer upstream of valve.</p>
Valve fails to open	<p>Timer, limit controls or other devices not energizing circuit.</p> <p>Damaged plunger assembly preventing plunger operation.</p> <p>Solenoid coil short, burned-out or wrong voltage.</p> <p>Dirt, pipe compound or other foreign matter restricting operation of valve.</p>	<p>Check circuit for limit control operation, blown fuse, short circuit and loose wiring.</p> <p>Replace valve.</p> <p>Replace with solenoid coil of correct voltage.</p> <p>Replace valve and install strainer upstream valve.</p>
Valve fails to close	<p>Damaged plunger assembly preventing plunger operation.</p> <p>Dirt, pipe compound or other foreign matter restricting operation of valve.</p> <p>Limit controls improperly installed to grounded side.</p>	<p>Replace valve.</p> <p>Replace valve and install strainer upstream of valve.</p> <p>Wire controls in hot side of circuit.</p>
Valve "chatters"	<p>Valve supply voltage is improper (too low)</p> <p>Dirt or chips between top of plunger assembly and plunger tube.</p>	<p>Apply correct voltage to valve.</p> <p>Replace valve and install strainer upstream of valve.</p>

RIELLO 40 SERIES G120, G200 & G400 SINGLE STAGE POWER GAS BURNER
Field wiring: Appliance operating controller(s) to burner chassis



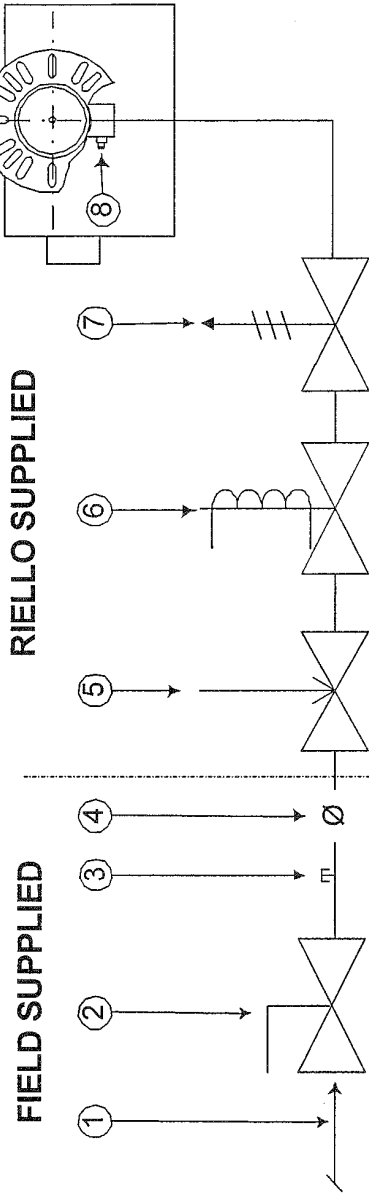
RIELLO POWER GAS BURNER
MODELS G120, G200 & G400
INTERNAL FACTORY WIRING DIAGRAM:

- A) Standard burner come with 120/24 VOLT TRANSFORMER for 24v operated gas valves, for 120V operated gas valves delete transformer
- B) Optional LT1 24V SWITCHING RELAY~ used for appliance/burner safety interlock devices means.
- C) Optional AIR SHUTTER ASSEMBLY~ requires replacement burner cover when field removed.



NATURAL GAS
PRESSURE:
MIN. = 4.0" WC
MAX. 14.0" WC

L.P. PROPANE GAS
PRESSURE:
MIN. = 8.0" WC
MAX. 13.0"



OEM GAS TRAIN:

- 1) GAS SUPPLY & FLOW DIRECTION OF GAS
- 2) GAS SUPPLY MAIN SHUTOFF MANUAL VALVE (FIELD SUPPLIED)
- 3) GAS SUPPLY PRESSURE TEST POINT (FIELD SUPPLIED)
- 4) GAS TRAIN PIPE DIAMETER SIZE(S):
BURNER G120 1/2" NPT REDUCED @ COMBUSTION HEAD 3/8" NPT
BURNER G200 1/2" NPT
BURNER G400 3/4" NPT
- 5) GAS APPLIANCE PRESSURE REGULATOR*
- 6) SAFETY SHUTOFF GAS VALVE (24V OR 120V OPERATED)*
- 7) SAFETY MAIN SHUTOFF GAS VALVE (24V OR 120V OPERATED)*
- 8) GAS BURNER MANIFOLD TEST POINT

ITEMS: 5, 6 & 7 COMBINATION GAS VALVES MAYBE EMPLOYED AS APPROVED.

EXAMPLE STANDARD GAS TRAIN SHOWN
OTHER OEM GAS TRAIN CONFIGURATION ARE
AVAILABLE UPON REQUEST

SAFETY WARNING INSTRUCTIONS

MAXITROL CSA DESIGN CERTIFIED
GAS PRESSURE REGULATORS

**NOTE: GAS PRESSURE REGULATORS WILL NOT
TURN OFF THE FLOW OF GAS.**



SPECIAL WARNINGS

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE. NO UNTRAINED PERSON SHOULD ATTEMPT TO INSTALL, MAINTAIN OR SERVICE GAS PRESSURE REGULATORS.

To minimize the possibility of FIRE, EXPLOSION, and OTHER HAZARDS:

1. All products, including gas pressure regulators, used with combustible gas **must** be installed and used **strictly** in accordance with the instructions of the manufacturer, with government codes and regulations, and plumbing codes and practices.
2. Do **not** use a gas pressure regulator if it appears to have been subjected to high temperatures, damaged in any way, or to have been taken apart or tampered with. Any of these may be signs of possible leakage or other damage that may affect proper operation and cause potentially dangerous combustion problems.
3.
 - a. Install the regulator properly with gas flowing as indicated by the arrow on the casting.
 - b. Use pipe compound or thread sealant, properly threaded pipes and careful assembly procedure so that there is no cross threading, etc., which might cause damage or leakage.
 - c. Apply wrench or vise pressure only to the flat areas around the pipe fittings at the end being threaded to the pipe to avoid possible fracture of the regulator body which could result in leakage.
 - d. Make sure markings or wording on regulator are not painted over or obliterated.
4. Check carefully for gas leaks immediately after the regulator has been installed and the gas turned on. **Do this before attempting to operate the appliance or other gas burning device.** Use a rich soap solution (or other accepted leak tester) around the diaphragm flanges, bottom plate, vent opening, seal cap, pipe connections, and all other joints. Wipe clean with a damp rag. It is a good practice to periodically check for leakage during use of the appliance. **Absolutely no leakage should occur, otherwise there is a danger of fire or explosion depending upon conditions. Never use if leakage is detected.**



CAUTION

NEVER CONNECT REGULATOR DIRECTLY TO THE PROPANE SUPPLY SOURCE. MAXITROL REGULATORS REQUIRE AN EXTERNAL REGULATOR (NOT SUPPLIED). INSTALL THE EXTERNAL REGULATOR BETWEEN THE PROPANE SUPPLY SOURCE AND MAXITROL REGULATOR.

5. Very high pressure surges in the gas supply line (or as a result of exposing the system to high pressure) may result in serious internal damage and cause leakage or affect regulator operation. If you suspect that a Maxitrol regulator has been exposed to more than twice the maximum operating inlet pressure, as shown in the following chart, turn off the gas and have the system checked by an expert.

DIRECTIVES DE SÉCURITÉ

RÉGULATEURS DE PRESSION DE GAZ MAXITROL
CERTIFIÉS CSA

**REMARQUE: LES RÉGULATEURS DE PRESSION DE GAZ
N'INTERROMPENT PAS L'ÉCOULEMENT DU GAZ.**



AVERTISSEMENTS PARTICULIERS

LA NON-CONFORMITÉ AUX DIRECTIVES
QUI SUIVENT PEUT PROVOQUER UN INCENDIE OU UNE EXPLOSION QUI PEUT ENDOMMAGER LA PROPRIÉTÉ, OU ENCORE CAUSER
DES BLESSURES OU ENTRAÎNER LA MORT.
AUCUNE PERSONNE NE POSSÉDANT PAS LA FORMATION
REQUISE NE DEVRAIT TENTER D'INSTALLER, D'ENTREtenir
OU DE RÉPARER DES RÉGULATEURS DE PRESSION DE GAZ.

Pour réduire au minimum les risques d'INCENDIE, D'EXPLOSION, ET AUTRES RISQUES:

1. Tous les produits, y compris les régulateurs de pression de gaz, utilisés avec des gaz combustibles doivent être installés et employés en stricte conformité avec les directives du fabricant, les codes et règlements gouvernementaux et les codes et pratiques en matière de plomberie.
2. Ne **pas** employer un régulateur de pression de gaz qui semble avoir été soumis à des températures élevées, endommagé de quelque façon que ce soit, avoir été démonté ou manipulé. Toutes ces situations indiquent des possibilités de fuite ou de tout autre dommage qui pourrait nuire au bon fonctionnement de l'appareil et provoquer des problèmes de combustion potentiellement dangereux.
3.
 - a. Installer le régulateur correctement de sorte que le gaz s'écoule dans le sens indiqué par la flèche gravée.
 - b. Utiliser un composé ou un mastic pour joints filetés, des tuyaux filetés soudés correctement, et suivre des méthodes d'assemblage adéquates de façon à éviter les filets faussés, etc. qui puissent provoquer des dommages ou des fuites.
 - c. Appliquer la pression d'une clé ou d'une pince-étau uniquement aux surfaces plates autour des raccords des tuyaux à l'embout vissé à la canalisation pour éviter de fracturer le corps du régulateur, ce qui pourrait provoquer des fuites.
 - d. S'assurer que les marques ou les mots qui apparaissent sur le régulateur ne sont pas recouverts de peinture ou cachés de quelque autre manière.
4. Vérifier soigneusement les fuites de gaz immédiatement après l'installation du régulateur et la reprise de l'alimentation en gaz. **Procéder à la vérification avant de tenter de mettre l'appareil ou tout autre appareil au gaz en marche.** Utiliser une solution savonneuse (ou une autre solution servant à repérer les fuites) autour des brides de la membrane et autour de la plaque du fond, de l'ouverture de purge, du bouchon d'étanchéité, des raccords des canalisations et des autres joints. Essuyer le tout au moyen d'un chiffon humide. On recommande de vérifier à l'occasion la présence de fuite pendant que l'appareil fonctionne. Il ne devrait y avoir absolument aucune fuite. Une fuite de gaz présente un danger d'incendie ou d'explosion selon la situation. Ne jamais utiliser l'appareil en cas de fuite.
5. Les surpressions très élevées dans la canalisation d'alimentation (ou découlant d'une exposition du système à des pressions élevées) peuvent provoquer d'importants dommages internes et causer des fuites ou nuire au fonctionnement du régulateur. Si l'on soupçonne qu'un régulateur Maxitrol a été exposé à plus du double de la pression d'entrée maximale, comme l'indique le tableau ci-dessous, couper l'arrivée de gaz et faire vérifier le système par un spécialiste.



MISE EN GARDE

NE JAMAIS RACCORDER DIRECTEMENT LE RÉGULATEUR À LA SOURCE D'ALIMENTATION EN PROPANE. LES RÉGULATEURS MAXITROL EXIGENT LA PRÉSENCE D'UN RÉGULATEUR EXTERNE (NON FOURNI). INSTALLER LE RÉGULATEUR EXTERNE ENTRE LA SOURCE D'ALIMENTATION EN PROPANE ET LE RÉGULATEUR MAXITROL.

6. Venting **must** be controlled in accordance with government and plumbing codes and regulations to avoid the danger of escaping gas should there be internal leakage. Vent pipes **must** be open and the open end protected against entry of foreign matter, including water.

7. The outlet pressure of the regulator **must** be measured to make sure it is in accordance with intended usage. If a spring change is required to develop the required outlet pressure, the spring **must be one specified by MAXITROL** and the new outlet pressure recorded on the regulator.

8. Caution should be used to guarantee that there is sufficient inlet pressure to achieve the desired outlet pressure and no readjustment of the outlet pressure setting should be made unless the inlet pressure is within the proper limits for the regulator. Failure to follow this may result in overfiring of the appliance or other gas burning device. **The MAXITROL bulletin for the regulator should be consulted for specific inlet and outlet pressure relationships.**

9. For convertible regulators, simply invert the snap-in device beneath the cap to convert from natural to LP.

10. A MAXITROL regulator **must be used** within the temperature range and not in excess of the maximum inlet pressure shown in the following table and should be in the mounting position indicated. Maxitrol regulators can be used with all fuel gases.

11. In case of any doubt, please contact the Service Manager, Maxitrol Company, Southfield, MI USA. Phone: 248/356-1400.

PRESSURE RATING INFORMATION: Inlet pressures shown below are for **CSA Rated Inlet Pressures and Maximum Operating Inlet Pressures.** The CSA Rated Inlet Pressures are established by ANSI standard Z21.18 and CSA1-6.3 (CV47 also certified to Z21.78 and CSA1-91). The Maximum Operating Inlet Pressures are tested by Maxitrol in excess of these standards, and recommended by us.

6. L'aération **doit** être régiee conformément aux règles gouvernementales et aux codes de plomberie afin d'éviter les dangers reliés aux fuites de gaz. Les canalisations d'aération **doivent** être ouvertes et l'extrémité ouverte doit être protégée contre la pénétration de matières étrangères, y compris l'eau.

7. On **doit** mesurer la pression de sortie du régulateur et s'assurer qu'elle convient à l'usage prévu. Si l'on doit changer le ressort afin d'obtenir la pression de sortie voulue, le ressort **doit faire partie de ceux qui sont recommandés par Maxitrol** et la nouvelle pression de sortie doit être inscrite sur le régulateur.

8. On doit prendre les mesures nécessaires pour garantir que la pression d'entrée suffit à obtenir la pression de sortie voulue. On ne doit apporter aucun ajustement de pression de sortie si la pression d'entrée dépasse les limites prescrites pour le régulateur. La non-conformité à cette consigne peut provoquer la surchauffe de l'appareil ou d'un autre dispositif au gaz. **Consulter la notice sur le régulateur Maxitrol pour connaître les relations précises entre les pressions d'entrée et de sortie.**

9. Dans le cas de régulateurs combinés, il suffit d'inverser le dispositif encliquetable situé sous le couvercle pour convertir le régulateur du gaz naturel au pétrole liquéfié.

10. On **doit** employer un régulateur Maxitrol dans les limites des températures indiquées et sans dépasser la pression d'entrée maximale figurant au tableau ci-dessous. Le régulateur devrait aussi être installé dans la position de montage indiquée. Les régulateurs Maxitrol peuvent être employés avec tous les types de gaz combustibles.

11. En cas de doute, communiquer avec le directeur du service après-vente de Maxitrol, à Southfield, au Michigan. Téléphone: (248) 356-1400.

PRESSIONS NOMINALES: Les pressions d'entrée indiquées ci-dessous correspondent aux pressions d'entrée nominales CSA et aux pressions d'entrée maximales de fonctionnement. Les pressions d'entrées nominales CSA sont établies d'après la norme ANSI Z21.18 et la norme CSA1-6.3 (le modèle CV47 est également certifié conforme aux normes Z21.78 et CSA1-9.1). Les pressions d'entrée maximales de fonctionnement ont été mises à l'essai par Maxitrol à des pressions qui dépassent celles qui sont spécifiées par les normes, et recommandées par nous.

Model Number (Numéro de modèle)	CSA Rated Inlet Pressure (Pression d'entrée nominale CSA)	Maximum Operating Inlet Pressure (Pression d'entrée maximale de fonctionnement)	Pressure Range [inches w.c.] (Plage de pression réglable) [en pouce d'eau]		Ambient Temperature Range (Plage de température ambiante)	Mounting Position (see below) (Position de montage) (voir ci-dessous)
			Adjustable (Réglable)	Convertible (Combiné)		
RV12LT	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		-40° - 275° F (-40° - 135° C)	A, B, C, D
RV20L	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		-40° - 225° F (-40° - 107° C) -40° - 275° F (T Model)	A, B, C, D
RV20C	1/2 psi (34 mbar)	1/2 psi (34 mbar)		4 to 10	32° - 225° F (0° - 107° C)	A, B, C, D
RV47C, CV47C, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)		4.5 or 6 to 10 or 11	32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV47, CV47, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV47A, CV47A, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3.8-4.3, 4.7-5.3, 5.6-6.4, 9.7-11.3		32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV48, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3-6, 4-8, 6-10, 5-12		32° - 225° F (0° - 107° C) 32° - 275° F (T Model)	A, B, C, D, (*1)
RV48C, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)		5 to 10	32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV52, RV53, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
RV61, (*1)	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
RV81, RV91	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A
RV111	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A
R400, 500, R600, (*1)	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8 (not R400), 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
R400S, R500S, R600S, (*1)	1/2 psi (34 mbar)	5 psi (345 mbar)	3-6, 4-8 (not R400S), 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
R400Z, (*2)	1/2 psi (34 mbar)	1 psi (69 mbar)	-1.5 to +1.0		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*2)
R500Z, (*3)	1/2 psi (34 mbar)	1 psi (69 mbar)	-1.0 to +2.5		32° - 205° F (0° - 96° C)	A, B, C, D, (*3)
325-3, 325-5A, (*1)	2 psi (138 mbar) 5 psi (345 mbar)	10 psi (690 mbar), (*1)	5-9, 6-10, 7-11		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)

NOTE: (*1) To ensure fast response of the regulator when equipped with a ball-check type automatic vent limiting device (12A04, 12A09, 12A39), regulators must be in upright position (A) with non-integral vent limiter installed directly into vent threads. Any other mounting position may interfere with lockup or cause pilot outage, where applicable. Maximum inlet pressure for regulators with 12A09 or 12A39 is 2 psi (LP) or 5 psi (natural). Inlet pressures exceeding 2 psi (LP) or 5 psi (natural) require a vent line.

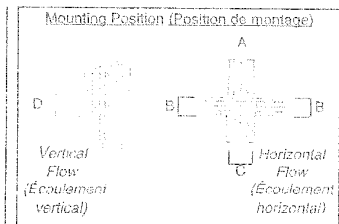
(*2) Minimum vacuum pressure -0.3 to -13.0 inches w.c., added to set pressure.

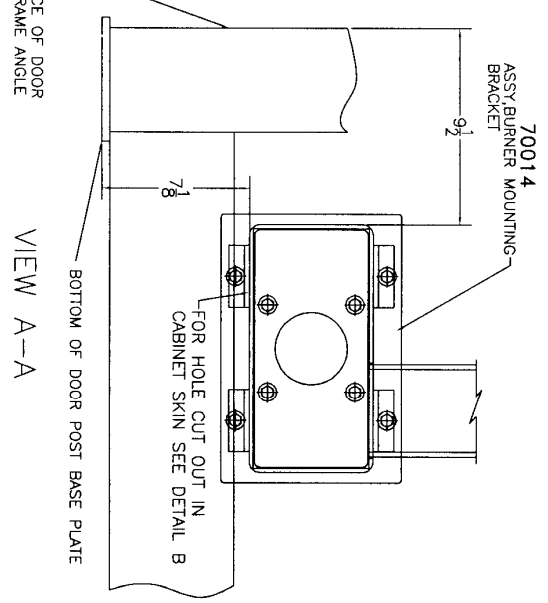
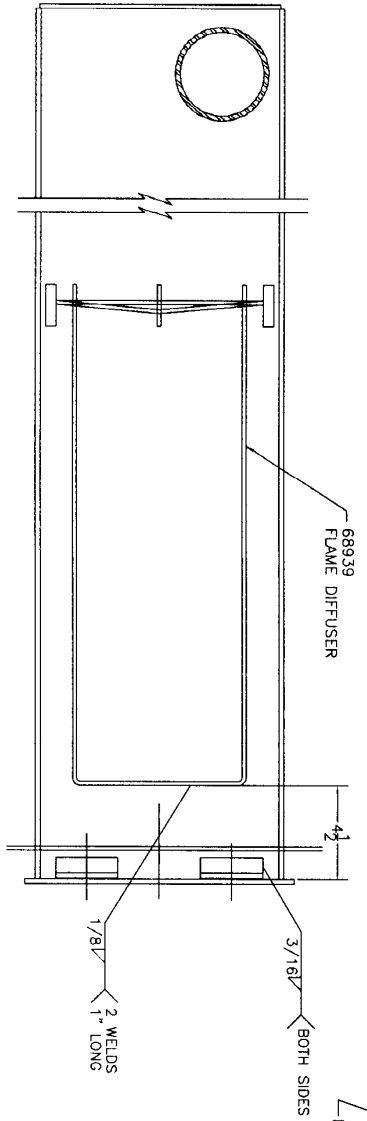
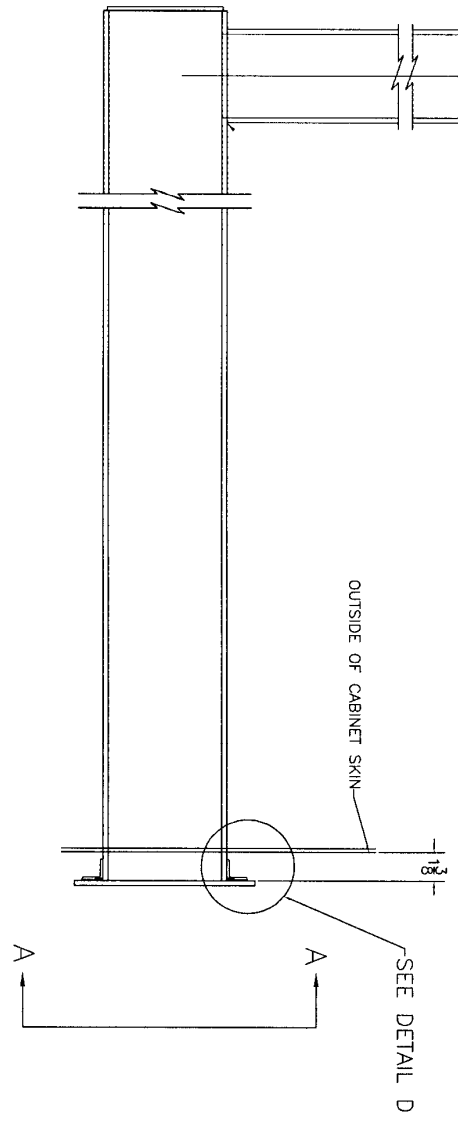
(*3) Minimum vacuum pressure -0.3 to -11.5 inches w.c., added to set pressure.

Remarque (*1): Pour garantir une réponse rapide du régulateur quand l'équipement comprend un dispositif automatique de limitation de ventilation du type à clapet de non-retour à houle (12A04, 12A09, 12A39), les régulateurs doivent être en position verticale (A) avec un limiteur de ventilation non solidaire installé directement dans les filets de l'event. Toute autre position de montage peut gêner le verrouillage ou causer une panne de pilote, là où c'est applicable. Les régulateurs équipés de 12A09 ou de 12A39 sont limités à des pressions maximales d'admission de 2 psi (LP) ou 5 psi (naturel). Pour toutes applications nécessitant de pressions d'admission supérieures à 2 psi (LP) ou 5 psi (naturel) un tuyau d'aération est requis.

(*2) Pression à vide minimale de -0,3 à -13,0 pouces d'eau ajoutée à la pression réglée.

(*3) Pression à vide minimale de -0,3 à -11,5 pouces d'eau ajoutée à la pression réglée.





THE DIMENSIONS & THE INDENTIONS
 ON THIS DRAWING ARE TO BE USED AS
 A GUIDE ONLY. THE MANUFACTURER SHALL
 BE RESPONSIBLE FOR THE FINAL
 DIMENSIONS & INDENTIONS.

		THE MORT CORPORATION ST. LOUIS, MO.	
SCALE: $\frac{1}{2}$ " = 1" TITLE: 40hp Heat Exchanger Install DWG NO: S663371 SHEET NO: D	DRAWN BY: CHECKED BY: DATE: 	SCALE: $\frac{1}{2}$ " = 1" TITLE: 40hp Heat Exchanger Install DWG NO: S663371 SHEET NO: D	DRAWN BY: CHECKED BY: DATE: