



FLAIR MANUFACTURING CORP.

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**SPECIFICATIONS, INSTALLATION INSTRUCTIONS AND
TROUBLE-SHOOTING GUIDE FOR STACK PACK.**

**MOTORIZED STACK DAMPERS (SERIES 19 AND 21)
FOR USE ON GAS FIRED SYSTEMS ONLY.**

(See Form PR-127B For Oil Appliances)

**AGA DESIGN CERTIFIED IN COMPLIANCE WITH ANSI Z21.66 - 1977
FOR USE WITH DUAL OR REDUNDANT GAS VALVES.**

WARNING

- **THIS DEVICE MUST BE INSTALLED BY A QUALIFIED INSTALLING AGENCY, IN COMPLIANCE WITH LOCAL CODES OR, IN THE ABSENCE OF LOCAL CODES, WITH THE NATIONAL FUEL GAS CODE, ANSI Z223.1-1974, AND THE NATIONAL ELECTRICAL CODE, ANSI C1-1975.**
- **THIS DEVICE MUST BE USED ONLY WITH A GAS FIRED APPLIANCE EQUIPPED WITH A DRAFT HOOD, THE OUTLET AREA OF WHICH IS NO GREATER THAN THE INLET AREA OF THE DEVICE.**
- **THIS DEVICE MUST BE INSTALLED AFTER THE APPLIANCE DRAFT HOOD, AS CLOSE TO THE DRAFT HOOD AS PRACTICABLE, AND WITHOUT MODIFICATION OF THE DRAFT HOOD.**
- **THIS DEVICE MUST BE LOCATED IN A VENTING SYSTEM OR SECTION OF A VENTING SYSTEM SO THAT IT SERVES ONLY THE SINGLE APPLIANCE FOR WHICH IT IS INSTALLED.**
- **THIS DEVICE MUST BE INSTALLED WITH A DUAL SEATED GAS VALVE OR 2ND MAIN GAS VALVE, PIPED IN SERIES, TO CONFORM WITH ANSI Z21.66-1977.**
- **CLEARANCES OF NOT LESS THAN 6 INCHES (152 MM) MUST BE MAINTAINED FROM COMBUSTIBLE MATERIALS, WITH PROVISIONS FOR ACCESS.**
- **THE INSTALLER MUST FILL IN THE LABEL ON THE SIDE OF THE OPERATOR COVER.**
- **FOR INSTALLATION ON BOILER WITH TANKLESS COIL OR LOW LIMIT CONTROL, CONSULT FACTORY.**

SHOULD INSTALLATION PROBLEMS ARISE, CONSULT THE TROUBLE-SHOOTING GUIDE ON REAR COVER. IF PROBLEMS PERSIST, CALL OUR TOLL-FREE "TROUBLE-SHOOTING" NUMBER, 800-645-5144 OUTSIDE OF NEW YORK. IN NEW YORK STATE, DIAL DIRECT 516-234-3609.



I. INTRODUCTION

This product is an automatic, motorized stack damper that has been developed to increase the efficiency of heating systems by reducing standby losses from the heating apparatus and the conditioned air space. The damper closes the chimney vent when the burner is off and fully opens it when combustion is required. The concept is similar to the opening and closing of a fireplace flue, except that the operation is completely automatic. An interlock has been added which prevents burner operation unless the damper is in an open position. A closed damper substantially reduces standby losses on boilers and furnaces.

II. DESCRIPTION

The unit must be installed after the appliance draft diverter and as close to it as practicable, without modification. When the damper is in the closed position, it will prevent residual heat in the heating appliance from being drawn up the chimney vent by its natural draft. If located within a heated area, a closed damper will also prevent conditioned air from being pulled through the draft diverter and up the chimney by the same stack effect.

When combustion is required, the damper will rotate to its open position BEFORE an integral end switch activates the burner circuit. If the damper does not rotate to its open position, the burner circuit will not be activated. Properly installed, the electrical circuits in this product are designed not to override the existing limit controls on the appliance.

The damper is spring loaded and will drive to full open position on power failure. This feature enables the normal stack draft to effectively vent any unburned gas that may accumulate during the power outage. Cast iron vent section construction allows for close tolerance manufacture with bypass factors reduced to a minimum. A dual-seated gas valve, or a 2nd main gas valve must be installed in accordance with ANSI Z21.66 - 1977.

When the heating requirement has been satisfied, the burner will go off immediately, and the damper will rotate to its fully closed position.*

Potential fuel savings can vary from 10% to greater than 20% based on the following factors:

1. geographical location of dwelling;
2. the size of heating plant relative to heat loss of dwelling;
3. location of heating plant within dwelling;
4. diameter of venting system;
5. total height of chimney above heating plant;
6. outdoor temperatures over a given period of time;
7. sustained wind velocities over a given period of time;
8. settings of operating and limit controls on heating plant;
9. type of heating plant used (furnace, boiler or water heater);
10. source of domestic hot water, temperature of water, and amount used;
11. room thermostat settings;
12. infiltration factors of dwelling;
13. number of heating zones;
14. day/night thermostats;
15. presence of other vents and exfiltration factors;
16. chimney vent friction.

These conclusions have been reached by independent researchers and have not been verified by the AGA Laboratories as part of the design certification.

III. GENERAL INFORMATION

VENT SIZE	VENT SECTION MATERIAL	BYPASS REQUIRED BY ANSI	SHIPPING WEIGHT
4"	cast iron	0.5 sq/in	5 lbs
5"	cast iron	0.5 sq/in	6 lbs
6"	cast iron	0.5 sq/in	7 lbs
7"	cast iron	0.5 sq/in	8 lbs
8"	cast iron	0.5 sq/in	10 lbs
9"	cast iron	1.0 sq/in	11 lbs
10"	cast iron	1.0 sq/in	12 lbs
12"	cast iron	1.0 sq/in	17 lbs

IV. ELECTRICAL

MINIMUM WIRING REQUIREMENTS.....	24 VAC, 18 gauge, 90°C.
THERMOSTAT ANTICIPATION.....	0.1 amp + gas valve current
DAMPER DRIVE MOTOR	
power draw requirement.....	6 watts at 24 VAC when closed or closing
torque.....	40 in/oz minimum
timing.....	closes 15 seconds, opens 5 seconds (nom.)
characteristic.....	power close, normally open
type.....	synchronous
switching.....	wafer type/coin silver contacts, two position, 90° movement
* Hi-temperature protector.....	400°F ± 25°F with automatic reset

* Series 21 only, damper will open or remain open if abnormally high temperature condition exists in the vent pipe.

V. MECHANICAL

damper vane	16 gauge aluminized steel
drive rod	1/8" x 1/4" x required length, chrome plated cold rolled steel
mounting plate	aluminum, 14 gauge
operator cover	cold rolled steel, painted
maximum allowable stack temperature	550°F

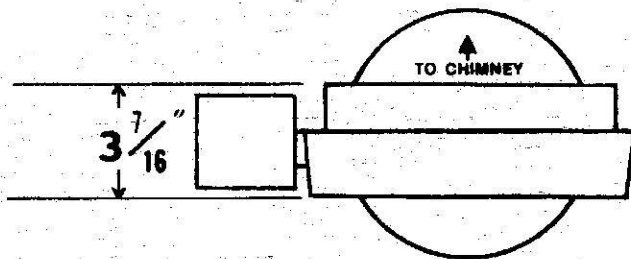
VI. FEATURES

Damper opens on power failure • No required changes in wiring of existing safety limit controls • Life cycle test in excess of 100,000 operations • Cast iron construction of vent pipe section • Burner "OFF" before start of damper close • Normal burner operations with damper disabled open • No burner operation with damper disabled closed • External damper position indicator • Direct drive, no-linkage end switch for burner off/on cycle • Low voltage (24V) circuitry compatible with standing pilot and intermittent ignition devices • Hi-temperature protector automatically opens or holds damper open at temperatures above 400° F with automatic reset.

VII. DIMENSIONS

SIDE VIEW

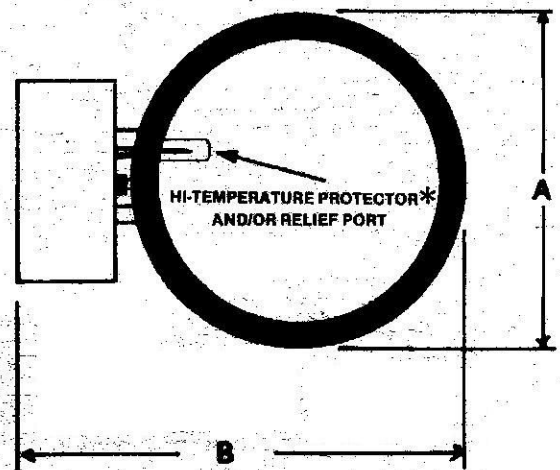
DAMPER SHOWN IN OPEN POSITION



Vent Size	4"	5"	6"	7"	8"	9"	10"	12"
A	4 ⁹ / ₁₆	5 ⁹ / ₁₆	6 ⁹ / ₁₆	7 ⁹ / ₁₆	8 ⁹ / ₁₆	9 ⁹ / ₁₆	10 ⁹ / ₁₆	12 ⁹ / ₁₆
B	8 ¹ / ₄	9 ¹ / ₄	10 ¹ / ₄	11 ¹ / ₄	12 ¹ / ₄	13 ¹ / ₄	14 ¹ / ₄	16 ¹ / ₄

TOP VIEW

DAMPER SHOWN IN CLOSED POSITION



* HI-Temperature Protector, Series 21 Only.

VIII. INSTALLATION INSTRUCTIONS

A. BEFORE YOU START TO INSTALL:

- (1) Read the cautions as listed on cover page and on the brown envelope.
- (2) Perform pre-installation inspection as required by ANSI specification Z21.66 (see Exhibit A).
- (3) Turn off all electrical power, gas supply, and wait for system to cool.
- (4) Select a proper, convenient location (see fig. 1,2).
- (5) Carefully unpack the unit. The damper is spring loaded, and should drive to an open position when removed from packing. **DO NOT FORCE IT CLOSED!** Forcing the damper may damage the gear train and void the warranty.

B. NOW, PROCEED AS FOLLOWS:

- (1) Separate the vent pipe directly on top of the draft hood or diverter and insert the casting. The arrow imprint on the open damper should point in direction of vent gas flow (towards chimney).
- (2) Re-assemble the vent piping. Be sure the casting is well seated. (See fig. 6 if support or "screw-together" assembly is required.)

Do not proceed if heating appliance is a gas-fired boiler with a low limit control or tankless coil. Consult factory for wiring information. Be prepared to give complete name, series, model number and description of boiler control (AQUASTAT) being used.

- (3) Wire the system according to proper diagram. (See wiring diagrams.)
- (4) Restore electrical power, turn on gas supply and light pilot (if applicable).

C. AFTER INSTALLATION:

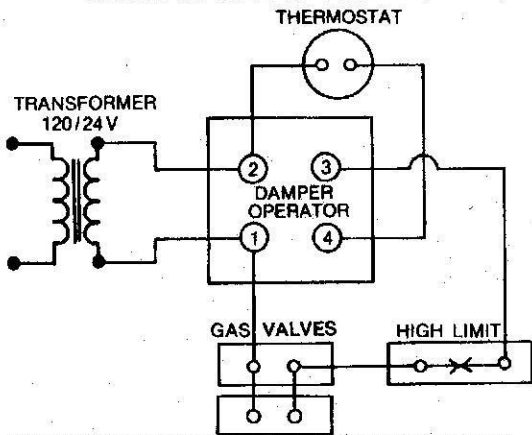
- (1) Operate system through two complete cycles to check for opening and closing in proper sequence, and proper burner operation.
- (2) Perform installation checks as required by ANSI specification Z21.66 (see Exhibit B).
- (3) Check the trouble-shooting section if problems arise with the installation.

WIRING DIAGRAMS

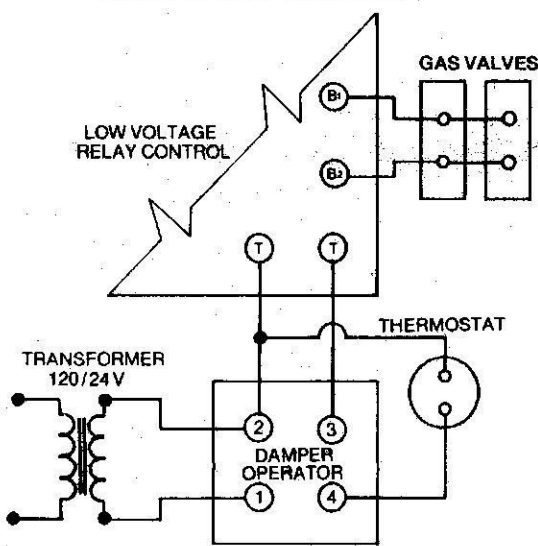
CONSULT FACTORY FOR APPLICATION ON BOILER (HYDRONIC) SYSTEMS WITH TANKLESS COIL OR LOW LIMIT CONTROL.

LOW VOLTAGE SYSTEMS

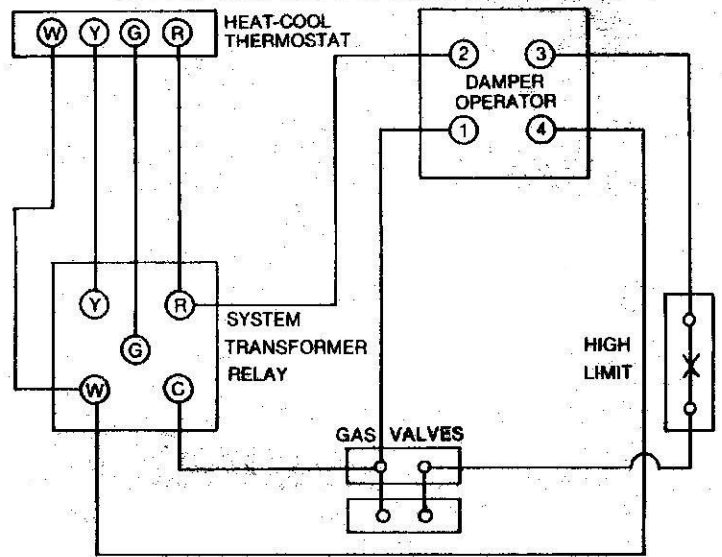
FURNACE OR BOILER, LOW VOLTAGE WITHOUT RELAY CONTROL



FURNACE OR BOILER, LOW VOLTAGE WITH RELAY CONTROL



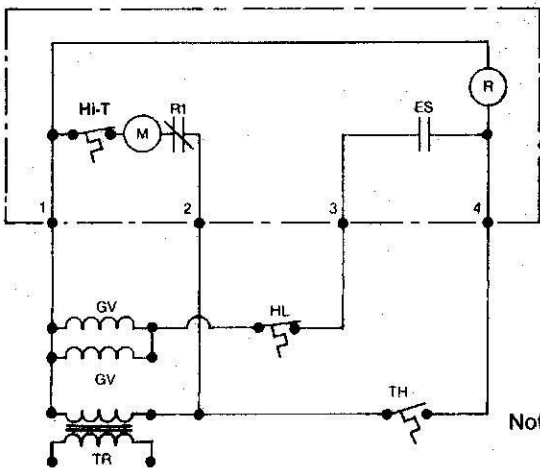
FURNACE, LOW VOLTAGE, WITH RELAY CONTROL HEATING/COOLING



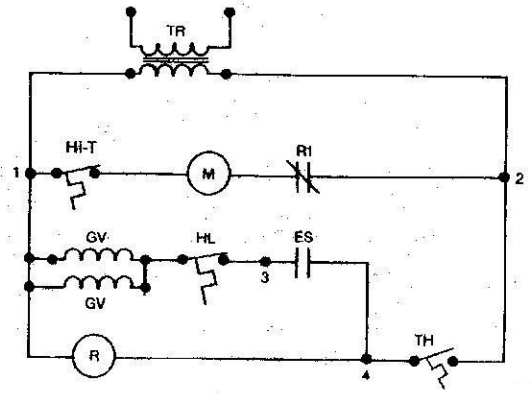
CONSULT FACTORY FOR WIRING INSTRUCTIONS WHEN STACK DAMPER IS TO BE INSTALLED IN CONJUNCTION WITH A NON-STANDING PILOT, INTERMITTENT IGNITION DEVICE (IID).

An Adequate Electrical Supply Must Be Provided.

SYSTEM SCHEMATIC



LADDER DIAGRAM



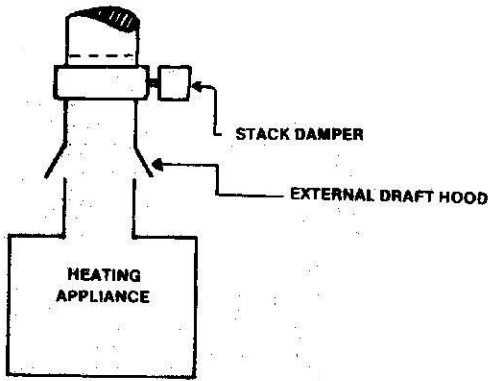
LEGEND

- M Damper Motor
- R Relay
- ES End Switch
- TR Transformer 120/24V
- HL High Limit
- TH Thermostat, Heating, Low Voltage
- * Hi-T Hi-Temperature Protector
- GV 24V Gas Valve

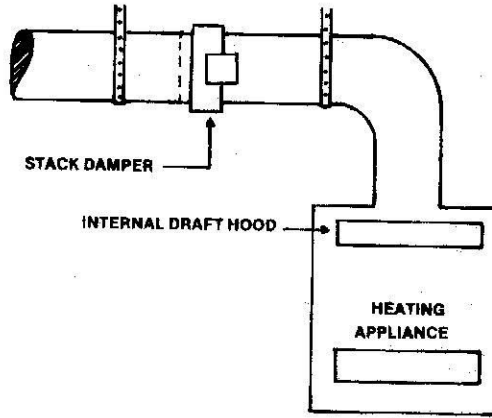
Note: Circuit shown with damper in closed position; no call for heat.

*Series 21 Only

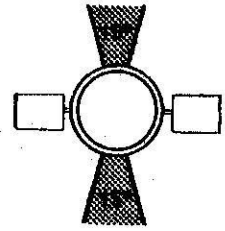
Use Band Iron For Support If Required
(Replace any damaged or rusted vent pipe)



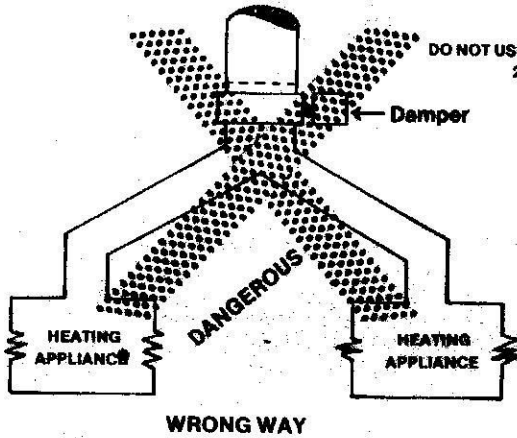
VERTICAL INSTALLATION
Fig. 1



HORIZONTAL OR SLOPING INSTALLATION *
Fig. 2



*INSTALL OPERATOR IN ANY POSITION AS SHOWN ABOVE. DO NOT INSTALL THE OPERATOR ABOVE THE VENT PIPE (TO AVOID EXCESSIVE HEAT) OR BELOW THE VENT PIPE (TO AVOID POSSIBLE CONDENSATE DAMAGE).



CAUTION
DO NOT USE ONE STACK DAMPER TO CONTROL 2 HEATING APPLIANCES

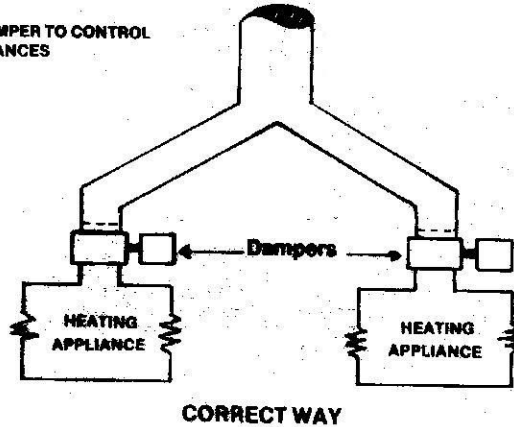
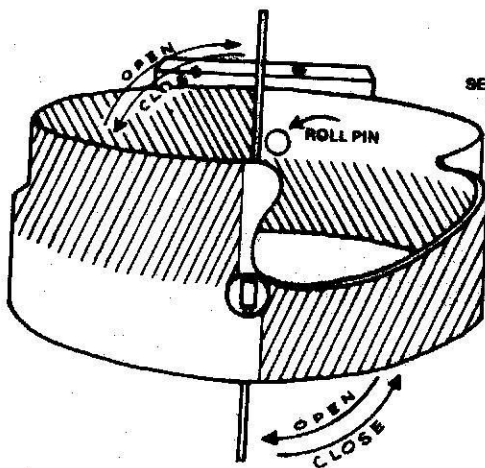


Fig. 4

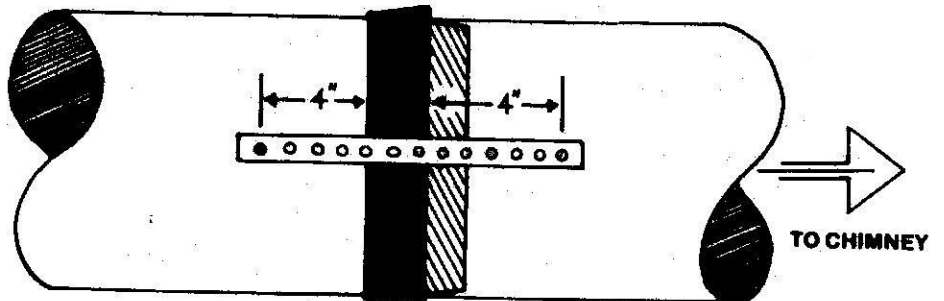


SECTION REMOVED TO SHOW SHADED AREA

CAUTION

TO PREVENT INTERFERENCE WITH DAMPER VANE MOVEMENT, SCREWS OR POP RIVETS MUST NOT BE LOCATED IN SHADED AREAS OF THE CASTING, AND MUST NOT EXCEED ONE-HALF (1/2) INCH IN LENGTH.

Fig. 5



INSTALL BAND IRON AS REQUIRED. USE 1/2" SELF-TAPPING SCREWS OR POP RIVETS AND LOCATE THEM A MINIMUM OF 4" FROM THE EDGE OF THE CASTING.

Fig. 6

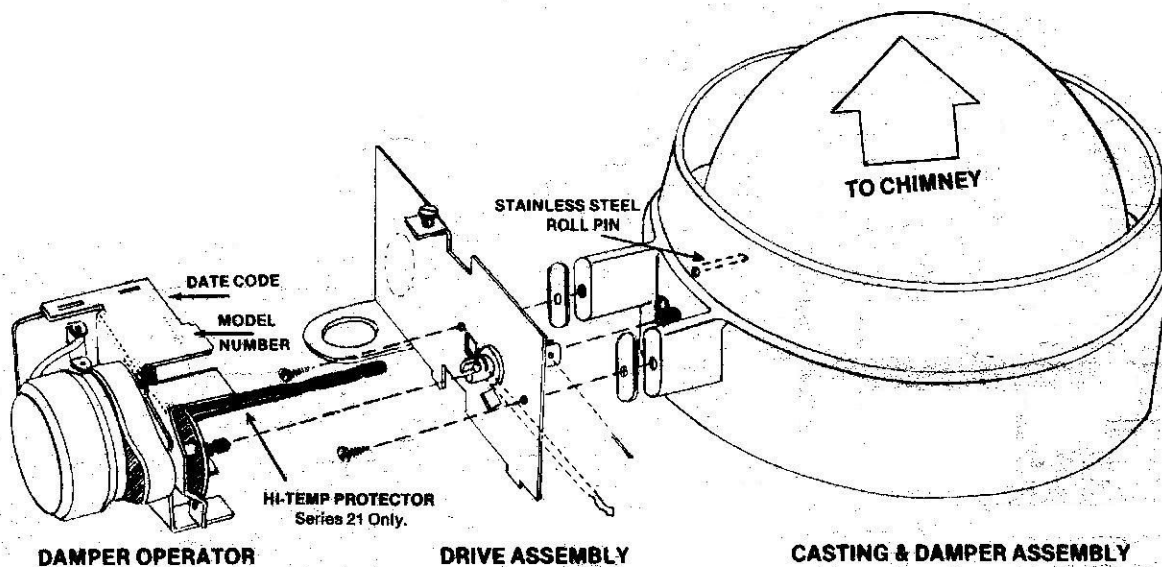
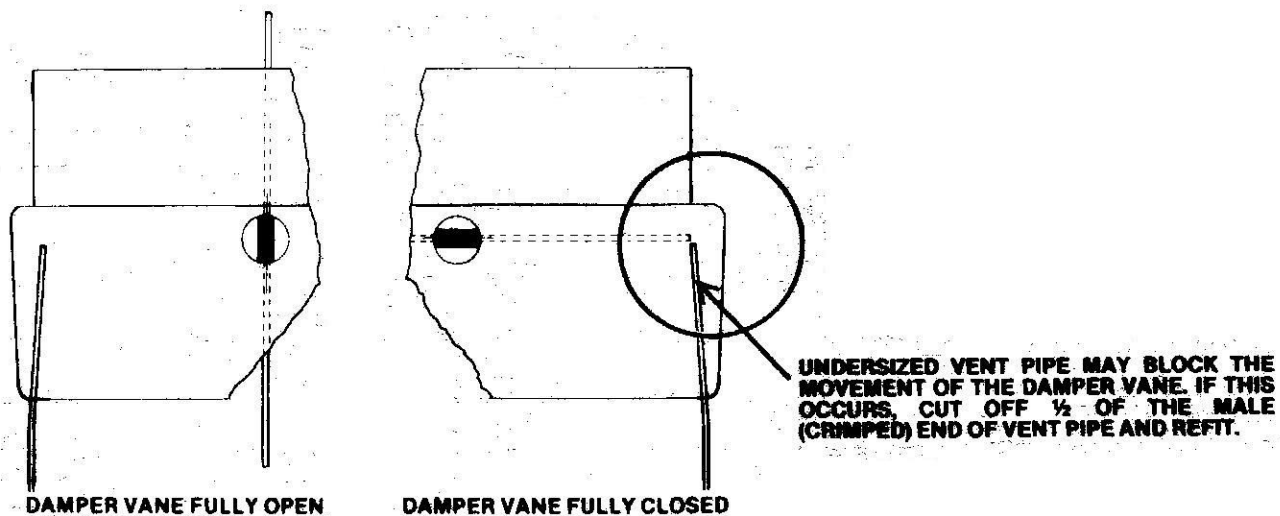


Fig. 7

NOTE: Consult your local distributor for part numbers and pricing. **FOR SAFETY REASONS,** only component assemblies as shown are available. Orders for sub-assemblies will not be accepted.



DAMPER POSITION INDICATOR MAY BE VIEWED THROUGH HOLE IN THE CASTING ON THE SIDE OPPOSITE THE OPERATOR.

Fig. 8

IMPORTANT
● THE STEP-BY-STEP INSPECTION AND INSTALLATION PROCEDURES AS SPECIFIED IN EXHIBITS A AND B MUST BE FOLLOWED.
● THE QUALIFIED INSTALLER MUST FILL IN THE LABEL ON THE SIDE OF THE OPERATOR.
● AN ADEQUATE ELECTRICAL SUPPLY MUST BE PROVIDED.

EXHIBIT A
PROCEDURE FOR SAFETY INSPECTION OF AN EXISTING APPLIANCE INSTALLATION

The following procedure is intended as a guide to aid in determining that an appliance is properly installed and is in a safe condition for continuing use.

This procedure is predicated on central furnace and boiler installations, and it should be recognized that generalized procedures cannot anticipate all situations. Accordingly, in some cases deviation from this procedure may be necessary to determine safe operation of the equipment:

- This procedure should be performed prior to any attempt at modification of the appliance or of the installation.
- If it is determined there is a condition which could result in unsafe operation, the appliance should be shut off and the owner advised of the unsafe condition.

The following steps are to be followed in making the safety inspection:

- Conduct a gas leakage test of the appliance piping and control system downstream of the shutoff valve in the supply line to the appliance.
- Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion, or so forth which could cause an unsafe condition.
- Shut off all gas to the appliance. Use the shutoff valve in the supply line to the appliance.
- Applicable only to furnaces — inspect heat exchanger for cracks, openings or excessive corrosion.
- Applicable only to boilers — inspect for evidence of water leaks.
- Insofar as is practical close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on any exhaust fans (range hood, bathroom exhausts and so forth) so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers. If, after completing Steps 7 through 12, it is believed sufficient combustion air is not available, refer to local codes, or in the absence of local codes, to the National Fuel Gas Code, ANSI Z223.1-1974 (NFPA No. 54) for guidance.

- Place appliance in operation. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
- Determine that the pilot(s) is burning properly and that main burner ignition is satisfactory by turning the main power supply switch off and on. Test the pilot safety device to determine it is operating properly by extinguishing the pilot burner(s) when the main burner is off and determining, after 3 minutes, that the main gas valve does not open upon a call for heat.
- Visually determine that main burner gas is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
- Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use a match, candle or smoke from a cigarette, cigar or pipe.
- Turn on all other fuel-burning appliances within the same room so they will operate at their full input. Follow lighting instructions for each appliance.
- Repeat Steps 9 and 10.
- Shut off other fuel-burning appliances operated in Step 11.
- Return doors, windows, exhaust fans and fireplace dampers to their previous conditions of use.
- Applicable only to furnaces — Check both the limit control and the fan control for proper operation.
- Applicable only to boilers —
 - Determine that the water pumps are operational.
 - Test low water cutoffs, automatic feed controls, high pressure limit controls, high temperature limit controls and relief valves to determine they are operating.

EXHIBIT B
PROCEDURE FOR INSTALLING ELECTRICALLY OPERATED AUTOMATIC VENT DAMPER DEVICES ON EXISTING APPLIANCES

This procedure is intended as a guide to aid in safely installing an automatic vent damper device on an existing appliance.

This procedure is based on the assumption that the history of the specific appliance has been one of safe and satisfactory operation.

This procedure is predicated on central furnace and boiler installations, and it should be recognized that generalized procedures cannot anticipate all situations. Accordingly, in some cases deviation from this procedure may be necessary to determine safe operation of the equipment.

The following steps are to be followed in making the modifications:

- Perform a safety inspection of the existing appliance installation. See Exhibit A for a recommended procedure for such a safety inspection.
- Shut off all gas and electricity to the appliance. To shut off gas use the shutoff valve in the supply line to the appliance.
- Install the Automatic vent damper device in strict accordance with the manufacturer's installation instructions. Make certain the device is not located in that portion of the venting system which serves any appliance other than the one for which the damper is installed.
- Make sure wiring connections are tight and wires are clear of high temperature locations. When an additional automatic valve has been incorporated or an existing gas control replaced, conduct a gas leakage test of the appliance piping and control system downstream of the shutoff valve in the supply line to the appliance.
- Visually inspect the modified venting system for proper horizontal pitch.
- Check that the damper operates properly and is properly sequenced with the appliance operating controls so that it opens when there is a call for heat and closes when the appliance is in a standby condition. (Note: If a boiler gas valve is sequenced by the aquastat, determine that the damper opens prior to or simultaneous with the opening of the gas valve.)

- Determine the amperage draw of the gas control circuit and damper device.
 - Check appliance transformer for adequate capacity.
 - Check heat anticipator in comfort thermostat to determine it is properly adjusted.
- Sequence the appliance through at least three normal operating cycles.
- Insofar as is practical close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on any exhaust fans (range hoods, bathroom exhausts and so forth) so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- Place appliance in operation. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
- Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use a match, candle or smoke from a cigarette, cigar or pipe.
- Visually determine that main burner gas is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
- Determine that the pilot(s) is burning properly and that main burner ignition is satisfactory by turning the main power supply switch off and on. Test the pilot safety device to determine it is operating properly by extinguishing the pilot burner(s) when the main burner is off and determining, after 3 minutes, that the main gas valve does not open upon a call for heat.
- Applicable only to furnaces — Check both the limit control and the fan control for proper operation.
- Applicable only to boilers —
 - Determine that the water pumps are operational.
 - Test low water cutoffs, automatic feed controls, high pressure limit controls and high temperature limit controls to determine they are operating.

For continued safe operation, the Homeowner should check all flue product carrying areas of the appliance, its vent system, and the damper device at least once a year. Particular attention should be given to the replacement of parts deteriorated by corrosion or other sources. Such replacement must be done by a qualified installing agency, who shall also carry out an annual inspection of the appliance-device combination.

TROUBLE SHOOTING GUIDE

(listed in order of probability)

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
Heating required and burner will not operate. Damper open.	Thermostat is set wrong.	Reset room thermostat to call for heat.
	No electrical power.	Turn on switch, replace fuse, reset circuit breaker, or repair wiring.
	Improper wiring.	Recheck and correct any wiring errors.
	Defective burner components.	Check, repair or replace burner components. (Thermocouples, gas valve, pilot, IID, etc.)
	Damaged or defective damper operator.	Replace damper operator.
Burner operates normally, damper will not close.	Temperature in vent. exceeds 400°F.	Allow system to cool.
	Damper is blocked open.	Check for free damper movement, and remove blockage.
	Improper wiring.	Recheck and correct any wiring errors.
	Damaged or defective damper operator.	Replace damper operator.
	Damaged or defective hi-temperature protector. (Series 21 only.)	Replace damper operator.
Burner will not operate. Damper closed and will not open.	No call for heat.	Reset thermostat (heat or hot water) to call for heating.
	Damper is blocked closed.	Check for free damper movement and remove blockage.
	Improper wiring.	Recheck and correct any wiring errors in line and low voltage circuits.
	Broken return spring.	Replace drive assembly.
Burner will not operate. Damper operates normally.	Improper wiring.	Recheck and correct any wiring errors.
	Defective burner components.	Check, repair or replace burner components.
Burner operates before damper is open.	Improper wiring.	Recheck and correct any wiring errors.
Damper vane stops in other than fully open or fully closed position.	Damper is blocked.	Check for maximum 90° damper movement. If less than 90°, remove blockage.
	Missing roll pin damper stop.	Replace stainless steel roll pin.
	Broken coupling.	Inspect and replace drive assembly.
	Broken return spring.	Replace drive assembly.
	Broken spring stop.	Replace drive assembly.
Intermittent burner operation. Damper operates normally.	Bent or broken coupling.	Replace drive assembly.
	Bad ground.	Recheck and correct any wiring errors.
	Damaged or defective switch.	Replace damper operator.
Burner operates with damper closed.	Improper wiring.	Recheck and correct any wiring errors.
	Boiler equipped with tankless coil or low limit and not wired properly.	Consult factory for required wiring modifications.

INSTALLATION AND SERVICE SHOULD BE PERFORMED BY A QUALIFIED INSTALLING OR SERVICE AGENCY.