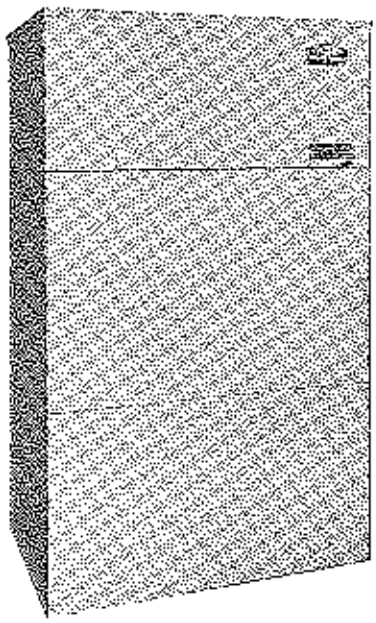
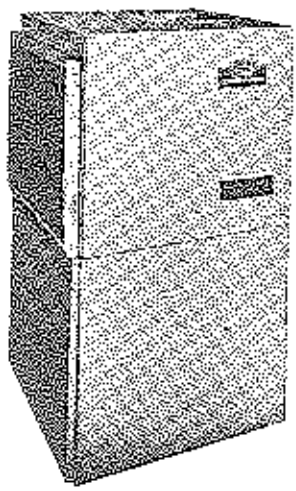
CAT. CM — 72-1-S

Climate Master

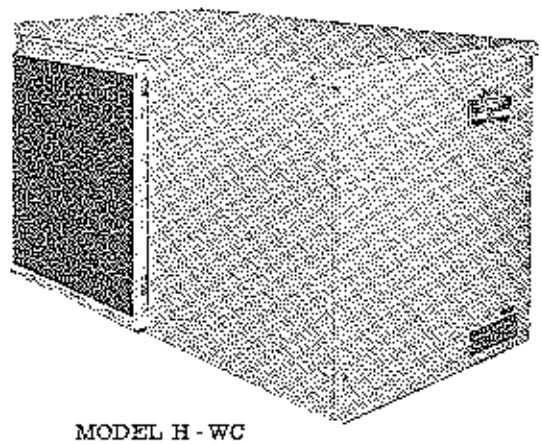
INSTALLATION OPERATION and MAINTENANCE MANUAL



MODEL V - W



MODEL V - WC



MODEL H - WC
or
H - W

Climate Master • 2007 Beechgrove Place • Utica, New York 13501
A DIVISION OF INTERNATIONAL HEATING & AIR CONDITIONING CORP.

DIVISION WEIL-MCLAIN

F-9999

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GENERAL

These instructions are a general guide only and do not supersede local codes and ordinances. Consult local code requirements before installing the unit.

UNPACKING & INSPECTION

The Climate Master heat pump is a self-contained, factory assembled unit. Each unit has been inspected and operationally run tested at the factory by Quality Control. The unit has been packaged to arrive in good condition, however mishandling in transit can cause damage.

Report evidence of visible and concealed damage to the carrier's agent immediately. Request an inspection and a report to originate a claim.

PRINCIPLE OF OPERATION OF THE HEAT PUMP

The basic principle of operation of the water to air heat pump is that heat is rejected to the water from the air to be conditioned (cooled) on cooling cycle and heat is gained from the water by the air to be conditioned (heated) on heating cycle. Dehumidification is also achieved on the cooling cycle by removal of moisture from the air in the form of condensate. The medium of heat transference is the refrigerant. Basic components used in the system are the compressor, co-axial heat exchanger, and a finned coil heat exchanger. The system reverts from cooling to heating cycles by means of a reversing valve. (See Figs. 1 & 2 — page 10.)

A remote thermostat signals the unit to operate on cooling or heating cycle. When the preset comfort level is achieved the unit will turn off automatically.

The Climate Master heat pump is a factory assembled unit, requiring only electrical power of the proper voltage, an adequate supply of water in the range of 60 degrees F to 95 degrees F, with a place to waste this used water. A drain for wasting the condensate water is also required. Duct work to supply air to be conditioned and return conditioned air is provided by the installer.

INSTALLATION OF UNIT

Typical installation of the 'vertical' models is illustrated in the following diagrams:

Fig. 3 - Unit in a closet installation (page 11)

Fig. 4 - Installation in a utility room or garage (page 12)

Typical installations of the 'horizontal' models is illustrated in the following diagrams:

Fig. 5 - Unit on floor, attic or closet installation (page 13)

Fig. 6 - Ceiling mounted installation (page 13)

For acceptable operation of the heat pump particular care in location, setting and connection of the heat pump must be exercised. The following points are worthwhile considerations when installing a Climate Master heat pump.

A.) All units should be installed to provide space for removal of access panels for servicing the condensing and air handler sections.

B.) Prevent the transmission of noise and vibration to the building structure, ducts and piping.

It is recommended that vibration eliminator pads be installed at the base of each corner of the unit. The compressor is internally sprung and bolted to the base with special isolation mounts. After installation of the unit the hold down nuts should be loosened so that the compressor is floating free.

Install flexible connections between the unit and the duct work.

Connect water and condensate lines by means of flexible connections or suitable hose.

The use of flexible conduit in making the electrical connections is recommended.

C.) The ducts should be designed for velocities in accordance with ASHRAE standards. It is recommended that airborne noise be controlled with sound attenuating materials. The resistance of the duct work and discharge and return grilles must be within the limits of the external static pressures shown in the 'Engineering Performance Data' for the particular unit being installed.

PIPING

Recommended water piping to the unit is shown in figure 7 (page 14).

Balancing valves installed in the supply and return water lines to the unit will allow for adjustment of proper flow to each unit and provide a means of water shut-off should it be necessary when servicing the unit.

Hoses used to make water connection to the unit must be suitable for the system water pressure.

The condensate line should be trapped (per local code) at the unit and should be pitched away from the unit.

Successful operation of the heat pump depends on sufficient pressure and adequate quantity of water to the unit. Undersized pipes (and low water pressure) will result in low water consumption, however large power consumption and reduced capacity of the unit will occur. It will result in high head pressures in summer operation and possible freezing of the water in the heat exchanger during the winter operation.

Water flow rates for efficient operation are listed in the engineering data sheets. The water temperature to the unit must be between 60 degrees F minimum and 95 degrees F maximum. The unit will not operate efficiently at water temperatures outside of this range and may result in damage to the unit.

The supply water must be clean, free of sand and solid foreign matter. Also, the supply water must be free of air. Air in the system will set up an oxidation process and create an undesirable scaling condition.

Supply water must be connected to the condenser to provide a counter flow to the refrigerant in the cooling cycle. Inlet or supply connection is on the bottom, the outlet or discharge connection is on the top of the condenser. A flow control valve (optional) is usually installed on the discharge side of the condenser. This flow control valve is designed to control a fixed rate of flow (GPM) at any pressure from 15 PSI to 60 PSI. Due to the construction of this valve, a noise is created at pressures above 35 PSI so the water should be balanced to prevent this noise. On a cooling tower system this flow control valve is not used.

No galvanized pipe or galvanized pipe fittings are recommended for use with these units due to possible electrolysis.

When using a semi-closed system, with an "open" cooling tower, the water treatment system should be operational with initial water flow.

NOTE: Operation of CM units lacking proper condenser water flow due to valving or improper pump operation is hazardous to the CM units and voids the warranty.

WIRING

Power wiring to the heat pump should be in conformance with applicable codes and connected as shown on the wiring diagram furnished with the unit. No starters are required.

Each heat pump is furnished for a rated voltage frequency and phase marked on the data plate. For units with a nameplate marking of 208/230 Volts, the permissible operating voltage range is 197-253 Volts. For units with other voltage markings the operating range must be within plus or minus 10%.

The wiring diagram and name plate data indicates the dual element fuse size or circuit breaker size for each compressor circuit. Make certain that the unit is adequately grounded.

For 208 Volt operation make the necessary change in transformer wiring as shown on the wiring diagram.

Low voltage wiring between the terminal board in the unit control panel and the wall thermostat should be made in conformance with applicable codes. Color coded low voltage cable is recommended to simplify wiring between the thermostat and unit.

Line voltage and low voltage wiring is illustrated in Fig 8 (page 15).

Operation of the thermostat is described in Fig. 9. More details of installation instructions are packed with the thermostat and sub-base.

CHECK, START-UP AND TEST

After the unit has been installed, wired, piped and ducted, the unit is ready to be checked, tested and balanced for continuous operation.

Before starting the unit check the following:

1.) Proper voltage to unit
2.) Correct fuse sizes
3.) Tight electrical connections
4.) Water system clean and flushed
5.) Air purged from water system
6.) Adequate water flow and pressure to the unit
7.) Water temperature between 60 degrees F and 95 degrees F
8.) Condensate line clear and unclogged
9.) Blower wheel free to rotate
10.) Return air filter is installed

11.) Access panels and enclosures are installed and secured
12.) Thermostat on 'off' position

To start and balance the unit follow these steps:

Adjust the room thermostat to its lowest setting and turn to "COOL" position. Set the fan switch on "AUTO". The unit should now be operating. If the unit has failed to start see the trouble shooting guide section.

The difference between the entering and leaving water temperatures can be felt. Set the water flow rate so that the leaving water temperature is between 85 degrees F and 105 degrees F (depending on the incoming water temperatures and unit design conditions as specified in the Engineering Data Sheets.)

Check for cool air at the outlets after a few minutes of operation. Air flow in each area should be adjusted to the design airflow. The air temperature should drop 15 degrees F to 22 degrees F depending on the airflow across the unit and external static pressures. If the air is too cold (more than 22 degrees F drop from entering air) or too warm (less than 16 degrees F drop from entering air) re-adjust the outlets to provide the unit design air-flow.

After the air and water flows are established and the return air temperature is about 80 degrees F, check the current against the nameplate data. At these normal operating conditions current draw should be below the full load amperes stated on the unit nameplate.

Turn the thermostat to OFF position. A "swishing" sound should be noticable at the unit indicating a properly functioning reversing valve.

Let the system pressure equalize for about two minutes. Adjust the thermostat to its highest setting and switch to "HEAT".

Check for warm air at the outlets after a few minutes. At this stage the unit is operationally checked and the system balanced. Check for any vibrations, unusual noises or water leaks.

After being satisfied that the unit operates normally and the system is ready to run, the thermostat should be set on either 'heat' or 'cool' depending on the climatic conditions and temperature setting at the desired level of comfort.

OPERATING INSTRUCTIONS

Operation of your Climate Master heat pump is designed for ambient air temperatures of not less than 60 degrees F.

The standard model is designed for indoor installation and when installed in an unconditioned space, the unit may not start in cool weather, (approximately 50 degrees F). In this case, it may be necessary to start the unit on cooling in cool weather for three to five minutes, then shut off and turn to heat after one minute shut down. (It may be necessary to repeat this procedure several times, especially when a crankcase heater is not used.)

The Climate Master Unit is equipped with high and low pressure safety controls, set to take the unit off the line under abnormal operating temperatures and flow conditions. If the unit goes off on one of the high or low pressure controls due to a known reason (if dirty filter or temporary lack of water or power failure the controls can be reset by setting the thermostat to "OFF", waiting a few minutes for the system pressures to equalize, and then turning to "HEAT" or "COOL".

For economical operation of the Climate Master heat pump it is advisable to prevent heat transmission from ambient (outdoors) to the conditioned space.

A popular but erroneous concept is that if the thermostat is set at extremely lower or higher temperatures the environment will cool or heat faster. It is good practice to set the thermostat at the desired level of comfort and not try to achieve comfort levels by constantly manually changing the thermostat from cooling to heating and cycling the unit.

Like any other type of mechanical equipment, the Climate Master Unit performs best when it is well maintained.

There is no substitute for the "know how" and experience of a competant refrigeration and air conditioning serviceman.

PREVENTIVE MAINTENANCE INSTRUCTIONS

Regular service greatly improves the operating efficiency, reliability and longevity of the Climate Master Unit.

Maintenance on the unit is simplified to the following items.

1.) The Climate Master Heat Pump is furnished with a one inch fiberglass throw away type air filter. This unit should not be operated without this filter in place.

Filters should be inspected every three months and replaced when it is evident they are dirty. Unit operation becomes very inefficient with dirty filters. Three or four filter replacements may be necessary a year.

2.) Condensate drains can pick up lint and dirt, especially with dirty filters. Inspect the condensate pan and drain twice a year to avoid the possibility of overflow.

3.) For units that are on city water or well water, it is important to check the cleanliness of the condenser. Should the condenser become contaminated with dirt and scaling, as a result of bad water, the condensers will have to be back flushed and cleaned with a chemical that will remove the scale. Your CM dealer can determine the exact procedure for this problem.

Cooling towers must be maintained, kept free of algae and contaminants and should have water treatment.

4.) Check the contactors and relays within the control panel at least once a year.

It is also good practice to check the tightness of the various wiring connections within the control panel, (especially when line power wiring to the machine is aluminum).

5.) The blower motor on the "WC" heat pump models are rated permanently lubricated.

The "W" model blower motor requires oiling twice a year with a few drops of #20 SAE non-detergent oil. This should be done by a competent refrigeration service mechanic. It is good practice to inspect for belt wear and tension at this time. Correct belt tension is for the motor to be resting by its weight on the belt. If the belt is excessively tight there will be excessive heat generated in the bearings and ultimate failure.

On closed circuit water systems where there is auxiliary equipment, such as cooling towers, boilers, pumps, etc., the Preventive Maintenance of the system is just as important as the Preventive Maintenance on the units.

OPERATING PRESSURES AND TEMPERATURES

The Climate Master heat pump is a factory charged unit. However, in cases of service or replacement of major components it will be necessary to recharge the unit. Prior to recharging the system the following steps are recommended:

1.) Pressure test with dry nitrogen. Locate and repair all leaks.

2.) Charge with several ounces of Refrigerant 22.

3.) Use a good vacuum pump and evacuate system to 500 microns vacuum or equivalent (29.9 inches of mercury vacuum).

4.) Charge the unit with quantity of ounces of Refrigerant 22 as specified on the dataplate. Do not attempt to charge the unit by running the machine and measuring the ampere draw to full load conditions.

There are cases when a particular system will have to be charged in accordance with pressures.

There are many variables (airflow, air temperatures, water flow and temperatures) in an air-conditioning system that will affect operating refrigerant pressures and temperatures. The chart below shown approximate conditions and is based on airflow at the rated CFM.

COOLING CYCLE: Range of Approximate Operating Pressures (PSIG)*

AIR ON (°F)	LEAVING WATER TEMPERATURE (°F)					
	85° F		95° F		105° F	
	SUCTION	DISCHARGE	SUCTION	DISCHARGE	SUCTION	DISCHARGE
75	66-70	190-210	68-74	220-240	70-76	240-260
80	68-72	195-215	70-76	220-240	72-78	245-265
85	70-74	200-220	74-78	220-240	76-80	250-270

HEATING CYCLE: Range of Approximate Operating Pressures (PSIG)*

AIR ON °F	WATER TEMPERATURES		DISCHARGE PRESSURE (PSIG)
	°F ENTERING	°F LEAVING	
70°	60°	53°	210-230
	70°	63°	240-260
	80°	73°	280-300
75°	60°	53°	230-250
	70°	63°	250-270
	80°	73°	290-320

* Variances from these operating pressures will occur from machine to machine and model to model.

For abnormal pressures see the trouble shooting charts.

A machine that is normally operating well on cooling cycle will have a warm (to touch) compressor dome and cool crankcase at the suction port. If the crankcase and dome are very hot (to touch) there is an indication of less charge. On the contrary, if the crankcase and dome are very cold or frosting, the unit is likely to be overcharged.

TROUBLE SHOOTING CHART

Complaint	Possible Cause	Checks And Correction
ENTIRE UNIT DOES NOT RUN	Blown Fuse	Replace fuse or reset circuit breaker.
	Broken or loose wires	Replace or tighten the wires.
	Voltage supply low	If voltage is below minimum voltage specified on dataplate, contact local power company.
	Control Center	Check 24 volt transformer for burnout or voltage less than 18 volts.
	Thermostat	Set thermostat on "COOL" and lowest temperature setting, unit should run. Set thermostat on "HEAT" and highest temperature setting, unit should run. Set fan on "RUN", fan should run. If unit does not run in all three cases the thermostat could be wired incorrectly, or faulty. To ensure faulty or miswired thermostat disconnect thermostat wires at unit and jumper between "R", "Y", "G", and "W" terminals and unit should run.
BLOWER RUNS BUT COMPRESSOR DOES NOT	Voltage supply low	If voltage is below minimum voltage specified on the dataplate, contact local power company.
	Thermostat	Check setting, calibration and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor or contactor.
	High or Low Pressure Controls	The unit could be off on the high or low pressure cut out control. Reset the thermostat to "OFF". After a few minutes turn to "COOL". If the compressor runs, unit was off on high or low pressure (See complaints for possible causes). If the unit still fails to run, check for faulty pressure switch by jumpering the high and low pressure controls individually.

Complaint	Possible Cause	Checks And Correction
BLOWER OPERATES BUT COMPRESSOR DOES NOT	Defective Capacitor	Check capacitor, if defective remove, replace and revise correctly.
	Seized Compressor	Try an auxiliary capacitor in parallel with the run capacitor momentarily. If the compressor starts but the problem reoccurs on starting install an auxiliary start Kit. The hard start kit comprises of a recommended start relay and correctly sized capacitor. If the compressor still does not start, replace the compressor.
	Compressor overload open	In all cases an 'external' or 'internal' temperature sensative compressor overload is used. If the compressor dome is too hot to touch the overload will not reset until the compressor cools down. If the compressor is cool and the overload does not reset, there may be a defective or open overload. If the overload is external replace the overload, otherwise replace the compressor.
	Compressor Motor grounded	Internal winding grounded to the compressor shell. Replace the compressor.
	Compressor Windings Open	Check continuity of the compressor windings with an ohmmeter. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CUT-OUT CONTROL	Discharge pressure too high	On COOLING Cycle: Lack of or inadequate water flow. Entering water too warm. Scaled or plugged condenser. On HEATING Cycle: Lack of or inadequate air flow. Entering air too hot. Blower inoperative, clogged filter or coil, restrictions in duct work.
	Refrigerant Charge	The unit is overcharged with refrigerant. Bleed off some charge or evacuate and recharge with specified amount of R-22.
	High Pressure Switch	Check for defective or improperly calibrated high pressure switch.

Complaint	Possible Cause	Checks And Correction
UNIT OFF ON LOW PRESSURE CUT-OUT CONTROL	Suction pressure too low.	On COOLING Cycle: Lack of OR inadequate airflow. Entering air too cold. Blower inoperative, clogged filter or coil, restrictions in ductwork. On HEATING CYCLE: Lack of or inadequate water flow. Entering water too cold. Scaled or plugged condenser.
	Refrigerant charge	The unit is low in charge of refrigerant. Locate leaks, repair, evacuate and recharge with specified amount of R-22.
	Low Pressure Switch	Check for defective or improperly calibrated low pressure switch.
UNIT SHORT CYCLES	Thermostat	The differential is set too close in the thermostat. Re-adjust setting.
	Wiring and Controls	Loose connections in the wiring or the control contactors defective.
	Compressor Overload	Defective compressor overload, check and replace if necessary. If the compressor runs too hot it may be due to the deficient refrigerant charge.
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heat gains or losses for space to be conditioned. If excessive rectify by adding insulation, shading, etc.
	Loss of conditioned air by leaks.	Check for leaks in ductwork or introduction of ambient air through doors and windows.
	Thermostat	Improperly located thermostat (eg. near kitchen sensing inaccurately the comfort level in living areas.)
	Airflow	Lack of adequate airflow or improper distribution of air.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.

Complaint	Possible Cause	Checks And Correction
INSUFFICIENT COOLING OR HEATING	Compressor	Check for defective compressor. If discharge pressure is too low and suction pressure too high, compressor is not pumping properly. Replace compressor.
	Reversing Valve	Defective reversing valve creating by-pass of refrigerant from discharge to suction side of compressor.
	Operating Pressure	Incorrect operating pressure (See chart)
	Refrigerant System	Check strainer and capillary tubes for possible restrictions to flow of refrigerant. The refrigerant system may be contaminated with moisture, non-condensibles and particles. Dehydrate, evacuate and recharge the system.
NOISY OPERATION	Compressor	Make sure the compressor is not in direct contact with the base or sides of the cabinet. The hold down bolts used for shipping should be loosened so that the compressor is floating free on its isolator mounts. Excessive noise will occur if the compressor has a broken valve or loose discharge tube. Replace the compressor.
	Blower and Blower Motor	Blower wheel hitting the casing. Adjust for clearance and alignment. Bent blower, check and replace if damaged. Loose blower wheel on shaft. Check and tighten. Defective Bearings. Check and replace.
	Contactors	A 'clattering' or 'humming' noise in the contactor could be due to control voltage less than 18 volts. Check for low supply voltage, low transformer output or extra long runs of thermostat wires. If the contactor contacts or coil is defective repair or replace.
	Rattles and Vibrations	Check for loose screws, panels or internal components. Tighten and secure. Copper piping could be hitting the metal surfaces. Carefully readjust by bending slightly.
	Airborne noises and other sounds	Undersized ductwork will cause high airflow velocities and noisy operation. Excessive water through the water-cooled heat exchanger will cause a rattling sound. Throttle back on the water flow ensuring adequate flow for good operation but eliminating the noise.

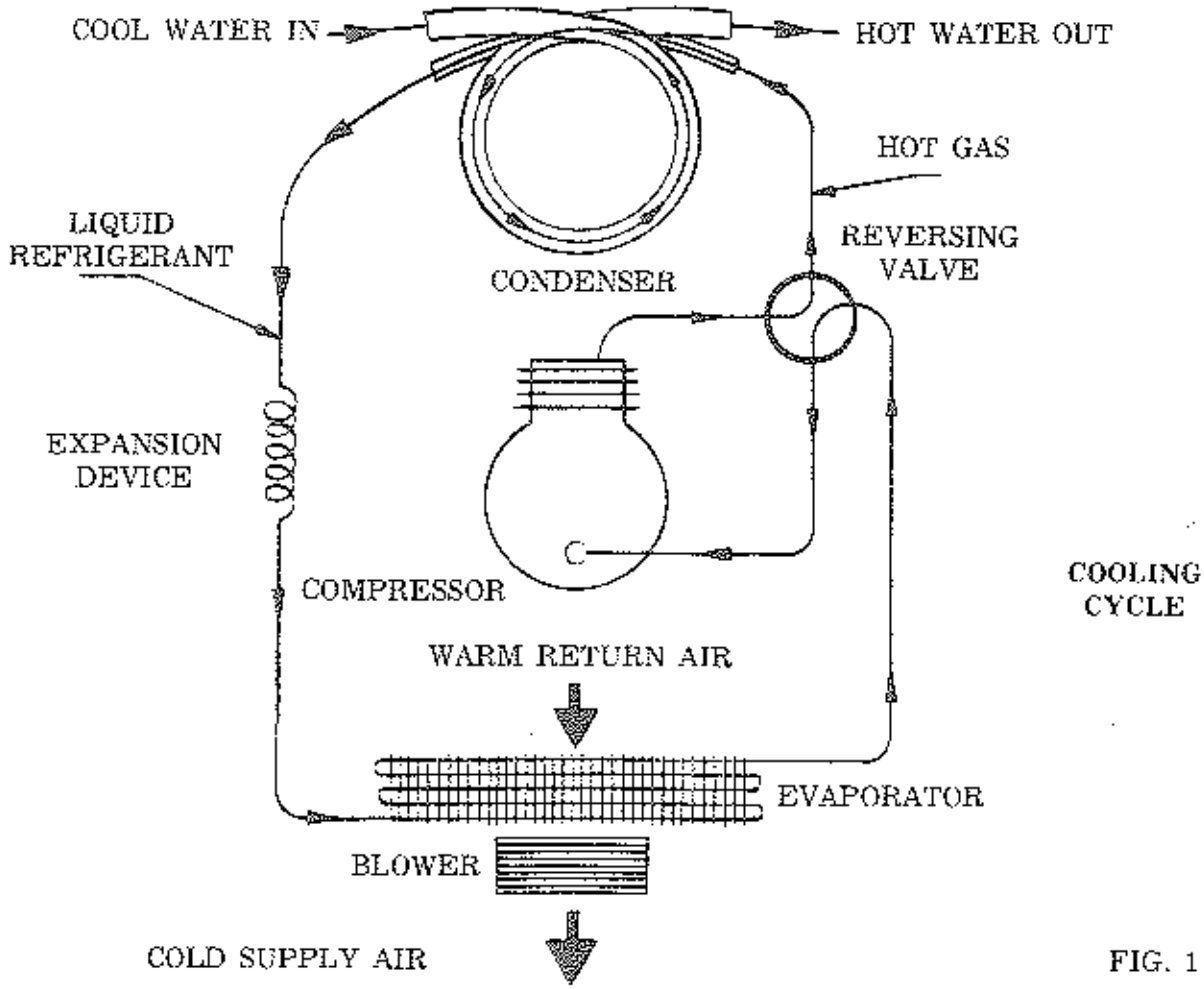

COOL WATER IN
HOT WATER OUT
HOT GAS
LIQUID
REFRIGERANT
REVERSING
VALVE
CONDENSER
EXPANSION
DEVICE
COMPRESSOR
COOLING
CYCLE
WARM RETURN AIR
EVAPORATOR
BLOWER
COLD SUPPLY AIR

FIG. 1

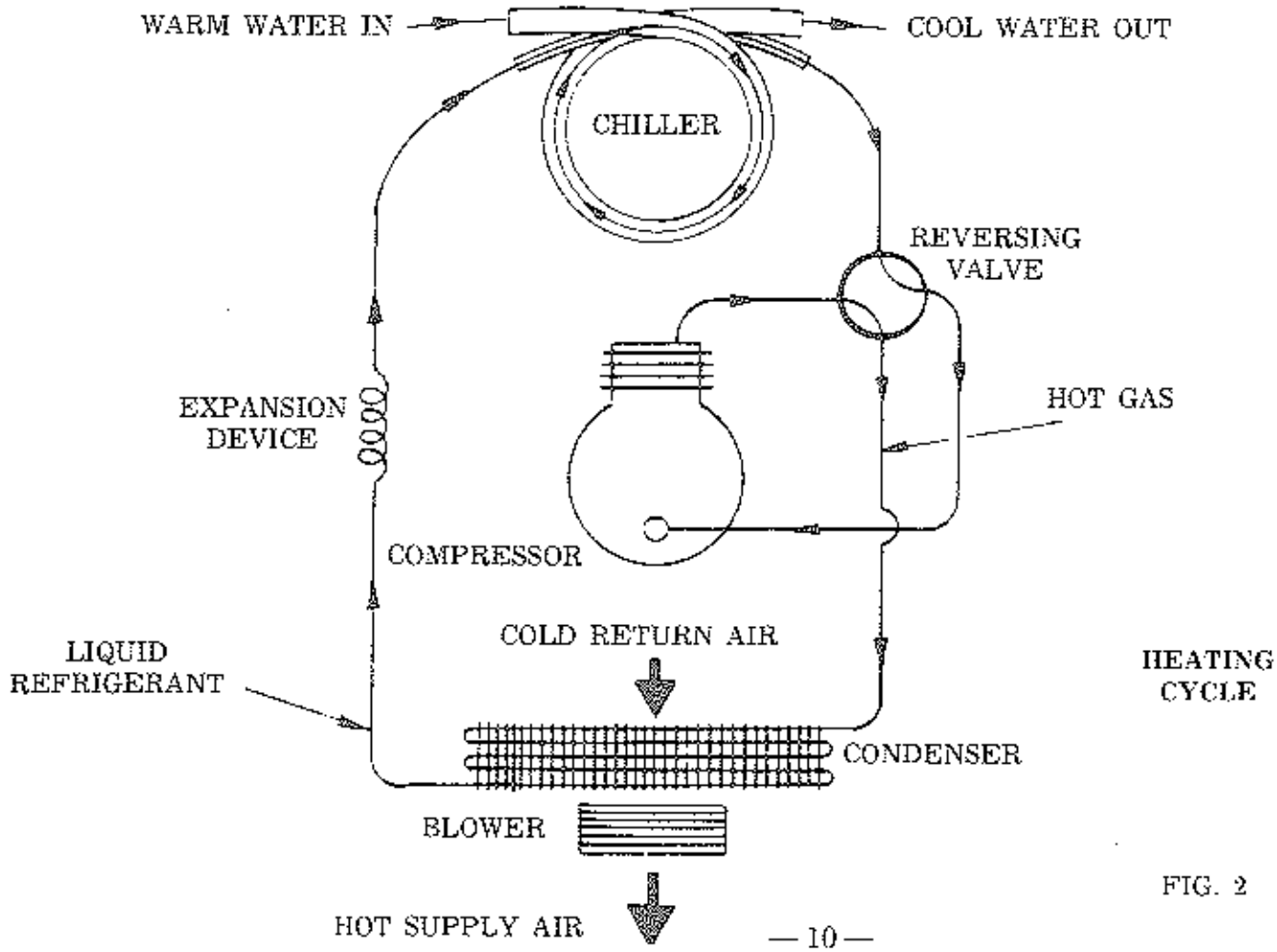
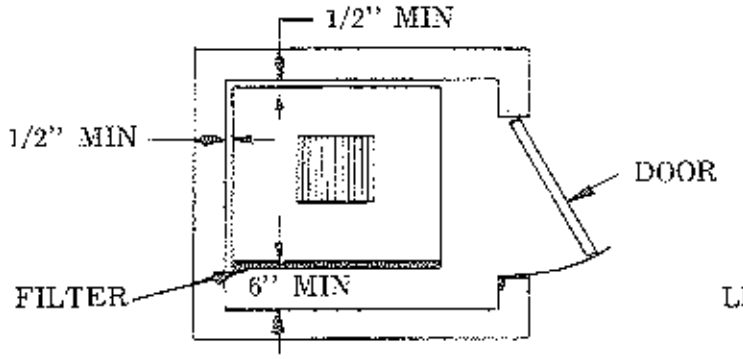
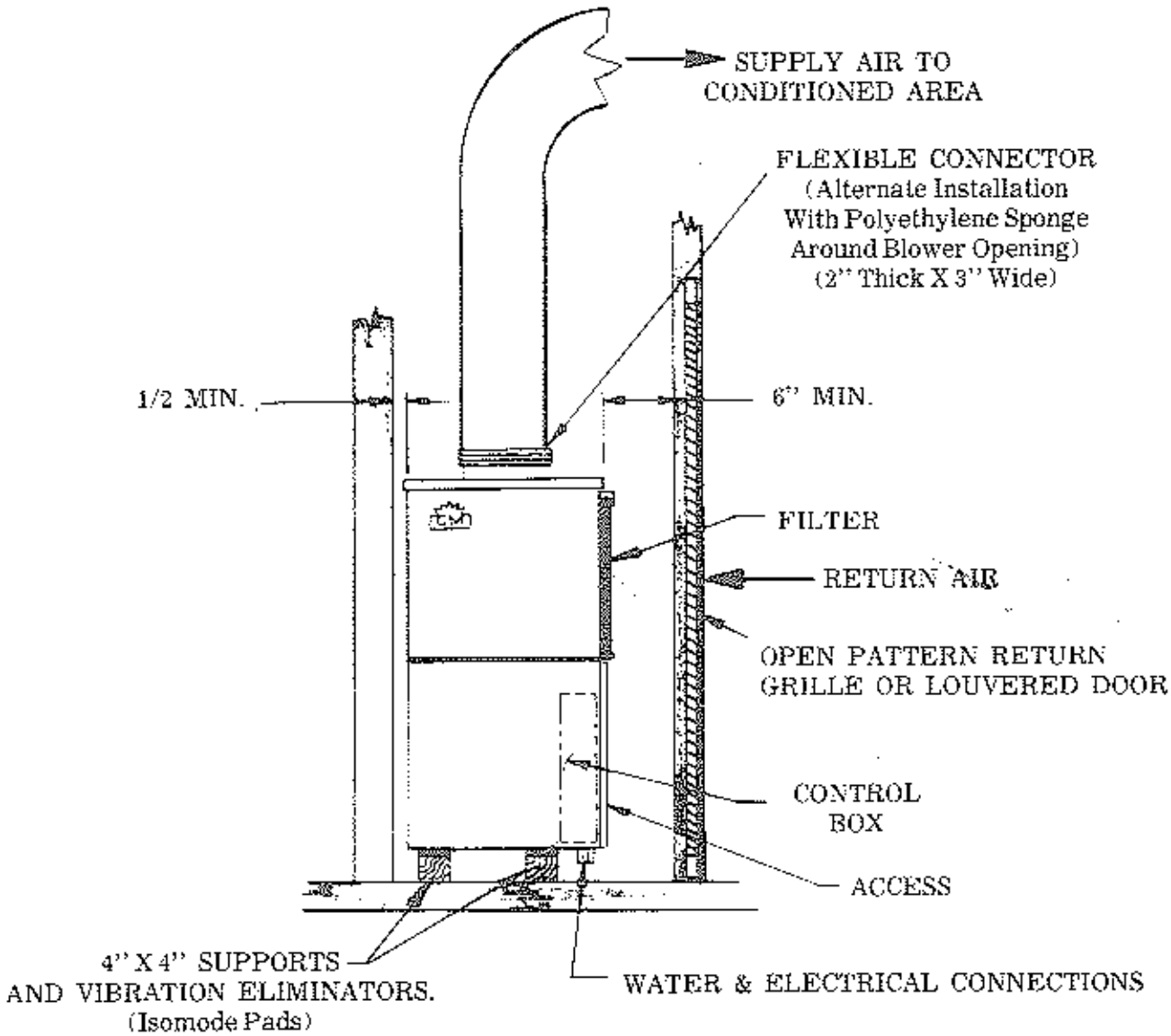

WARM WATER IN
COOL WATER OUT
CHILLER
REVERSING
VALVE
EXPANSION
DEVICE
HOT GAS
COMPRESSOR
COLD RETURN AIR
LIQUID
REFRIGERANT
HEATING
CYCLE
CONDENSER
BLOWER
HOT SUPPLY AIR

FIG. 2



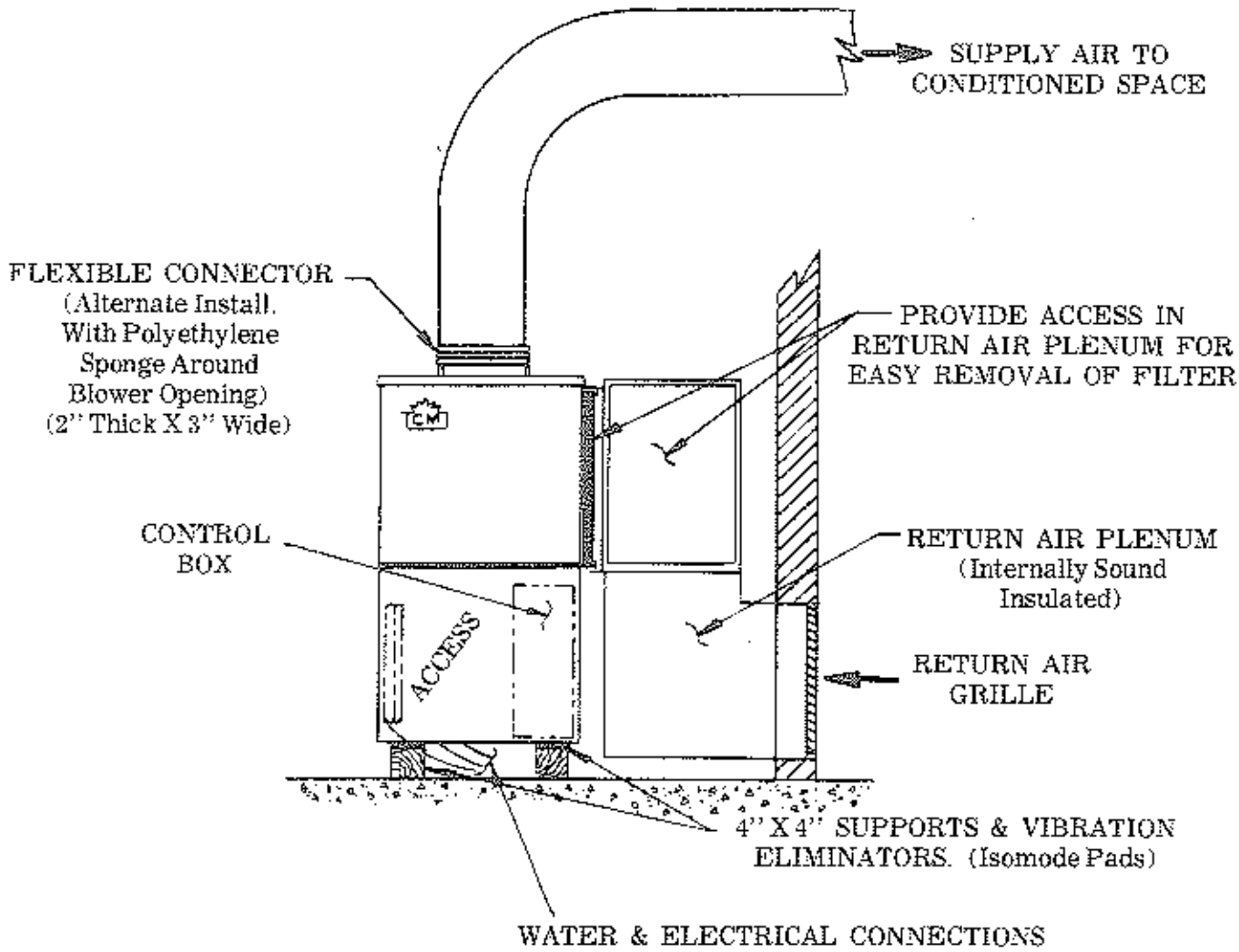
ALTERNATE INSTALLATION FOR QUIETER UNIT OPERATION



UNIT SHOWN
FRONT RETURN

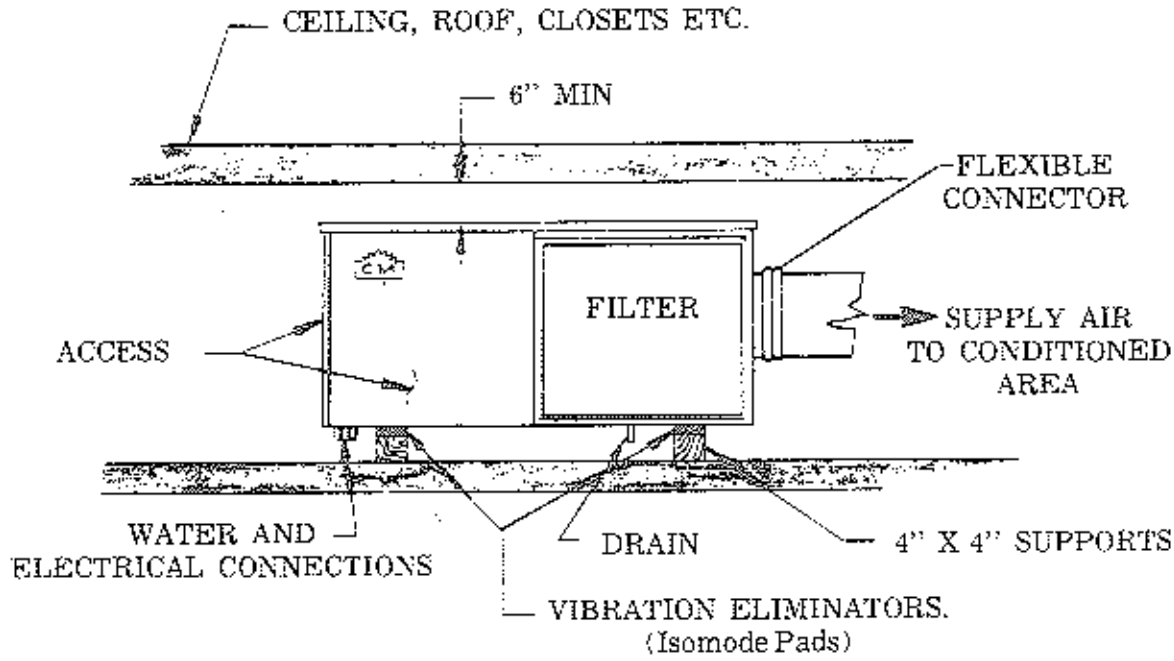
TYPICAL CLOSET INSTALLATION

FIG. 3



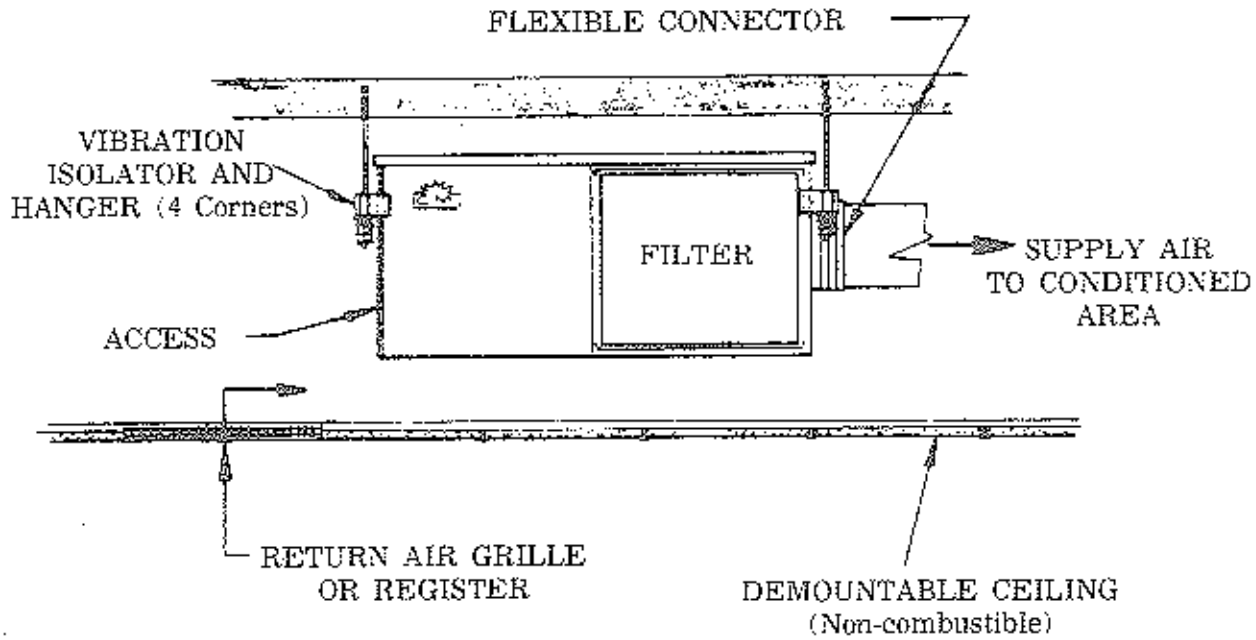
TYPICAL INSTALLATION FOR GARAGE
OR UTILITY ROOM

FIG. 4



TYPICAL HORIZONTAL INSTALLATION

FIG. 5

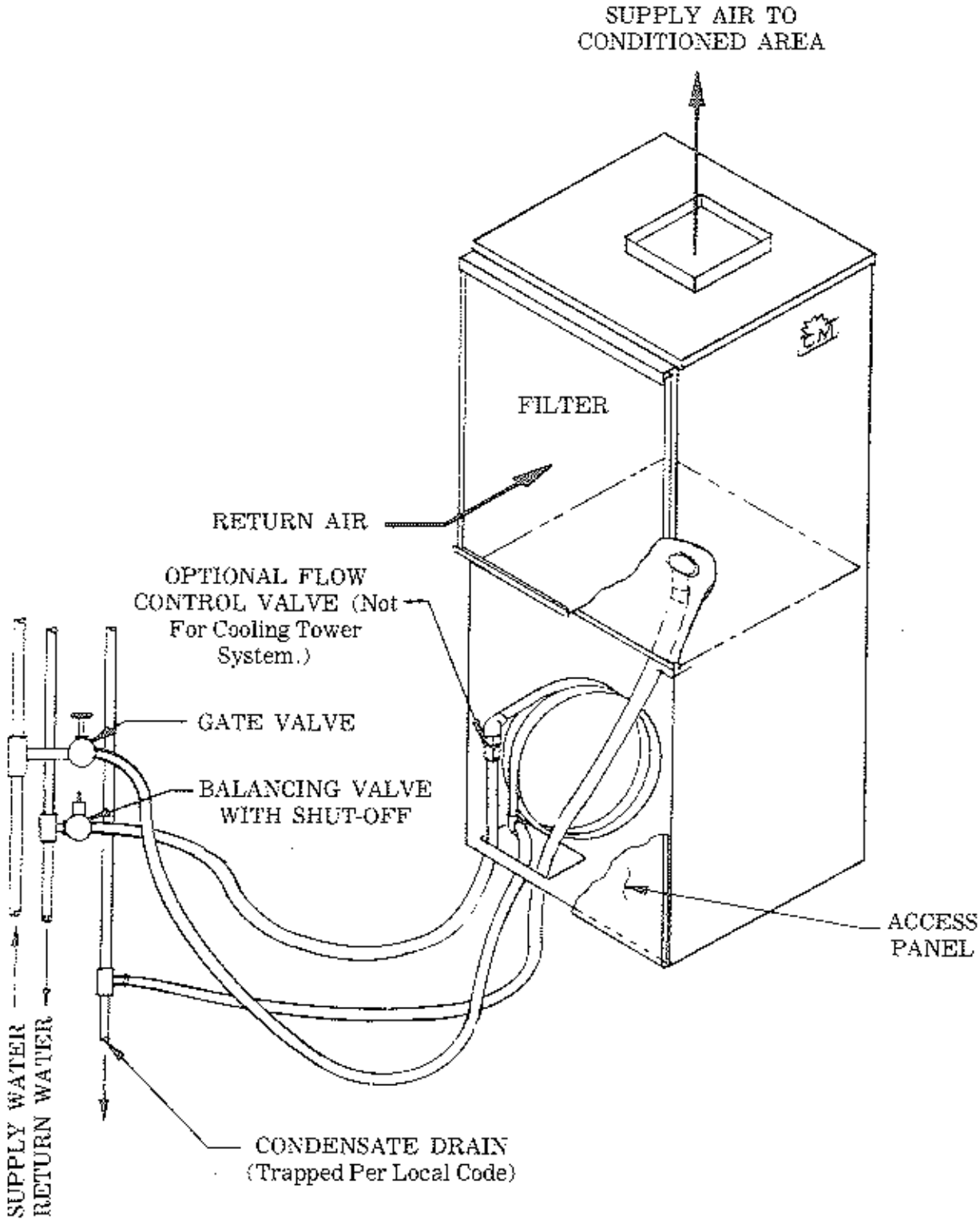


NOTES:

1. Construction of Return Air Plenum must comply with Building Codes.
2. Fire Dampers must be installed where required by Building Codes.

TYPICAL CEILING HANGER INSTALLATION

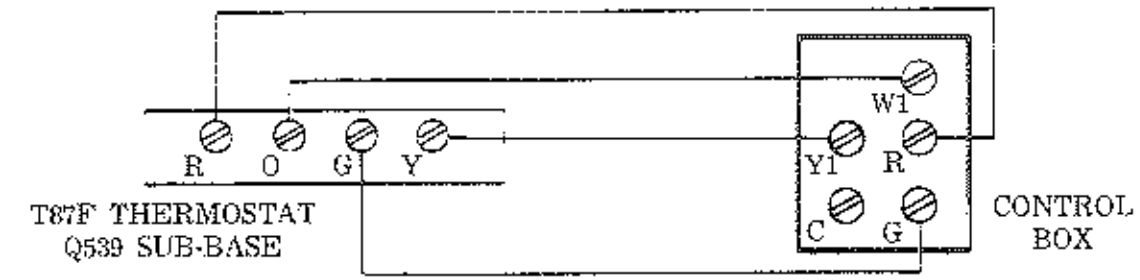
FIG. 6



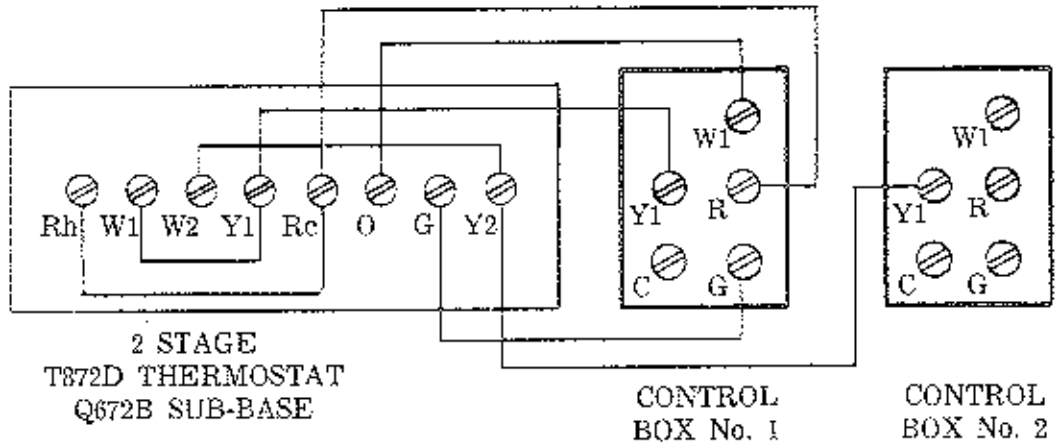
TYPICAL PIPING, WATER SUPPLY AND DISCHARGE

FIG. 7

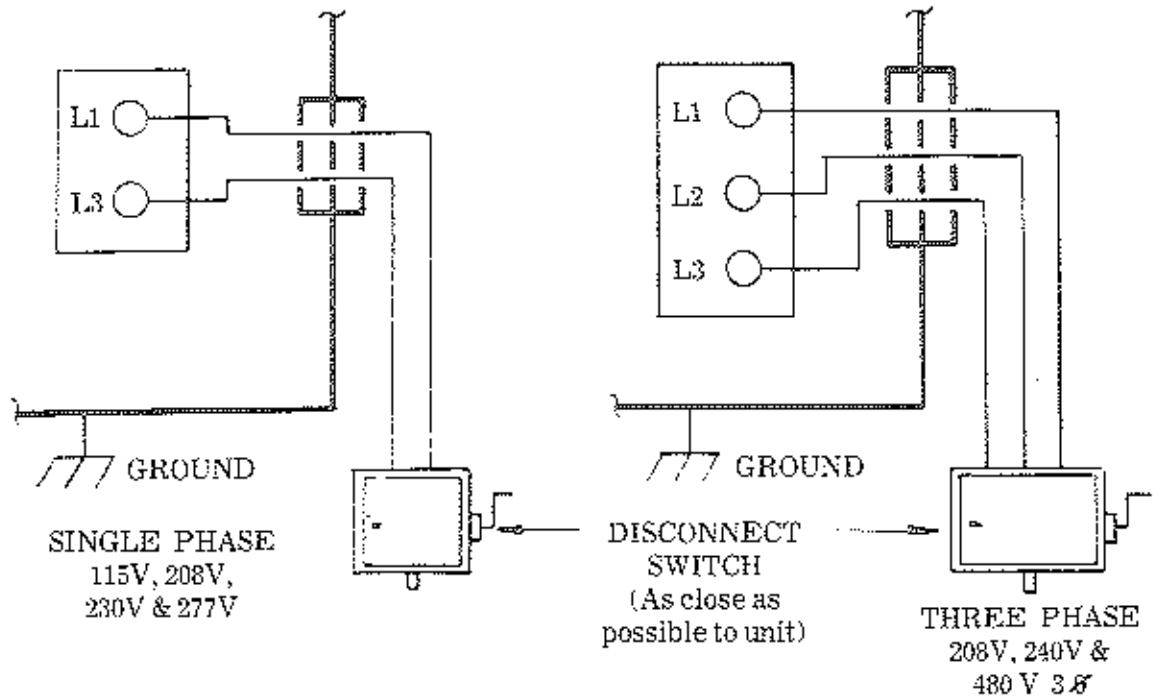
LOW VOLTAGE WIRING — SINGLE MODELS



LOW VOLTAGE WIRING — DUAL MODELS



POWER WIRING

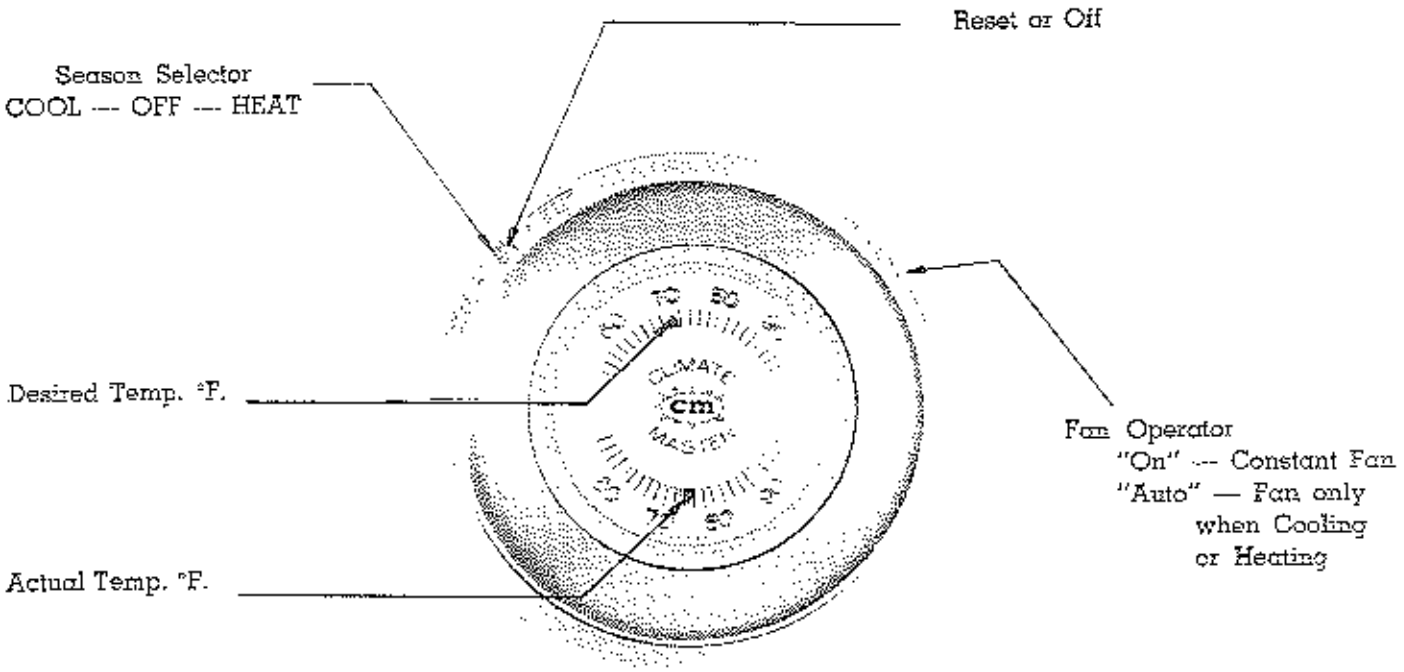


FIELD WIRING DIAGRAMS

FIG. 8

THERMOSTAT OPERATION

(T 87 F)



SUMMER OPERATION — COOLING: — Set thermostat on "COOL" . . . Fan on "AUTO". Dial desired temperature for complete operation.

SUMMER NIGHT OPERATION: — Same as above except move fan to "ON" position.

WINTER OPERATION — HEATING: — Set thermostat on "HEAT" . . . Fan on "AUTO". Dial desired temperature for complete operation.

Thermostat should be located on a solid support, free of vibration, drafts, and direct sunlight. (See installation instructions packed with Thermostat and sub-base).

FIG. 9