



Installation, Operation & Maintenance  
Instructions

100% Makeup Air Dehumidification Series  
Water Source Units

MH/MV Series

## Introduction

MH and MV series units are designed for dehumidification of air at a rate considerably higher than a conventional air conditioning unit of the same nominal horsepower. The heat removed in dehumidification is available to heat the space.

The air entering the unit first passes over the evaporator coil where cold refrigerant removes the heat from the hot humid air. Air is cooled below its dew point to remove the moisture. Air exiting the evaporator coil enters a hot gas coil located directly behind the evaporator coil.

The cold but superheated refrigerant returns to the compressor where it is compressed to a high pressure, high temperature gas referred to as discharge gas. The discharge gas is circulated through the hot gas coil. The hot gas coil reheats the air before it is discharged out of the unit.

The quantity of heat available for reheating the air is greater than the quantity of heat removed as the air passes through the evaporator coil. This excess heat is available for space heating.

The remote air cooled condenser, the MH-MV unit can also provide space cooling. When space cooling is required, the discharge gas is diverted to the condenser. The heat is rejected in the condenser rather than the hot gas coil.

## Receiving the Unit

MH-MV units are shrink wrapped and secured to a skid for shipping. The shrink wrapping allows for an easy inspection of the exterior of the unit for possible damage in shipment. It is possible to have interior damage without any signs on the exterior of the unit. We suggest you sign all receiving papers as ***CONTINGENT UPON INTERNAL INSPECTION.***

Remove all access panels and look for an accumulation of leaked oil and check if fan housing is out of position. Depress a schrader valve on the suction line momentarily to check if the unit has a refrigerant charge. *Any claims for shipping damages must be filed promptly with the delivering carrier.* ClimateMaster is not responsible for damages incurred during shipping.

## **Installation**

Make a note of the model number shown on the data plate. The model number can be decoded using the product coding information. This will help you determine the optional features provided with the unit.

## **Location**

MH-MV units are to be installed indoors in protected space where the ambient temperature will remain above 55°F.

The unit may be set on a concrete floor or a rigid support with vibration isolator pads underneath to prevent transmission of vibrations to the structure.

MH-MV units can be suspended from the supporting girders or joists using factory supplied hanger kits. The hanger kit is in a plastic bag located in the fan discharge along with the instructions.

## **Service Clearances**

There should be a *minimum* of two feet clearance all the way around the unit for easy serviceability and maintenance access.

The MV unit needs to be sited to allow access for service from at least the front but preferably the front and one other side. The duct from the outlet on top of the unit must be the same size or larger than the outlet. Duct bends must be gradual to avoid additional external resistance above the specified level.

The filter supplied with the MV unit must be mounted between the unit and the pool area on the inlet and must be accessible by the customer for ease of cleaning. The filters are the throw away type and will need checking once a week. Old filters will probably need to be replaced once a month.

## **Duct Hook Up**

The supply and return duct system must be sized properly for noise considerations as well as pressure drop. Refer to the MH-MV

performance data for the design airflow and external static pressure capability of the unit being installed.

Do not connect metal ducts directly to the unit. Use a flexible canvass coupling between the unit and the duct.

The supply registers should be located along the outside walls away from the return air grilles, thermostat and the humidistat (if wall mounted one is use).

### **Condensate Piping**

MH-MV units are provided with a 3/4" FPT or 1" FPT condense piping connection. Condensate piping size should not be smaller than the connection at the unit.

Figure 4 shows the condensate drain trap dimensions. Condensate piping should be pitched a minimum of 1" per 10 feet of horizontal run and must have an open vent.

For the MV units, provision must be made for adequate drainage of the condensed water produced by the unit. A pipe is provided on the side of the unit to which a waste pipe is to be connected to take the condensation to the nearest drain. Care should be taken to ensure that such piping is given a sufficient fall to ensure speed of drainage.

*Caution: Piping must comply with all applicable codes*

### **Water Condenser Piping**

MH-MV units come with a factory installed water cooled condenser set up to give space cooling. MH-MV units are provided with 1" or 2" FPT fittings for water piping connection.

Water piping must include a filter to prevent foreign substances from restricting the flow of water through the heat exchanger.

All piping must be leak tested and flushed out prior to start up. The water pump should run continuously for proper operation.

*Caution: Do not use "Stop-Leak" or any similar chemical agent in this system. Addition of these chemicals to the loop water will foul the system and will inhibit unit operation.*

## Electrical

Electrical wiring to the MH-MV unit should be completed in accordance with the NEC and local electrical codes.

### **\*Warning\***

*To prevent injury or death due to electrical shock or contact with moving parts, open unit disconnect switch before servicing unit.*

## Power Supply Wiring

Power supply wire size should be based on the minimum circuit ampacity value shown on the rating plate. Refer to the current NEC book and local codes for proper power supply wire size. Long service runs to the unit may require a larger wire size to assure proper voltage at the unit.

The fuse (time delay type) or circuit breaker (HACR type) size should not exceed the value shown on the rating plate. Undersizing of the fuses or the circuit breakers will cause nuisance tripping. A disconnect switch must be installed within three feet of the MH-MV unit.

MH-MV units are provided with a knockout for the connection of power supply conduit (marked *Power Supply*).

Power supply wires should be connected to the line side (top) of the compressor contactor. Refer to the wiring diagram in figure 5. Equipment grounding conductor from the power supply must be connected to a grounding lug (marked *Ground*) located inside the control box.

All 208/230 volt units are shipped with low voltage transformer primary connected for 208 volt power supply. If the power supply is 230 volt, change the transformer primary tap as noted on the wiring diagram.

***Caution: Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.***

## Wiring Building Safeties

The unit can be interlocked with the building's safety controls such as smoke alarms, firestats, etc. To connect the building's safety controls, remove the factory jumper wire between 0 and 1 at the terminal block

located on the control box and connect the two wires from the normally closed contacts of the safety control in place of the jumper.

## **Low Voltage Wiring**

Low voltage wiring includes wiring of the thermostat, humidistat and interlock wiring from the MH-MV unit and the remote air cooled condenser as shown on the wiring diagram. A copy of the wiring diagram located in the control box shows the low voltage field wiring.

All MH-MV units are shipped with the Thermostat and humidistat in one ready for duct mounting. Consult with the factory if you must substitute a thermostat/humidistat other than one supplied by the factory.

MH-MV units use a class 2 transformer for low voltage power supply. consult local codes for wiring requirements. #18 AWG conductor cable may be used if acceptable to local codes. Long thermostat wire lengths will require larger wire sizes to prevent voltage drop.

Thermostats and humidistats should be installed approximately five feet above the floor at a location that is representative of the average temperature and the humidity conditions of the zone controlled by the unit. Avoid locations close to the supply grilles or on an outside wall.

## **Start Up Procedure**

For proper start up, the space temperature should be above 75°F. If the space temperature is below this, use auxiliary heat to raise the space temperature.

## **Check List Start Up**

Check the following items before turning on power.

1. Make sure all electrical connections in the control box are tight.
2. Make sure low voltage wiring at the low voltage terminal block is as shown in the wiring diagram (figure 5).
3. Check the fan belts for proper tension.

4. Remove any construction debris from the fan compartment and the drain pan. Check air filters. If dirty, replace the filter.
5. Turn the reset switch *OFF* and the fan switch to *AUTO* position.
6. Measure the supply voltage at the disconnect. Voltage should be within the range specified on the rating plate of the unit. *Do not start the unit until the appropriate voltage is available.*
7. Switch on the power supply to the unit. Check that the pre-set temperatures on the thermostat are to the customer's requirements, and if adjustment is required, refer to the operating instructions.

## **Power On**

8. Measure voltage at the compressor contactor (line side). If the power supply is three phase, check all three phases. If the voltage is not within the range specified on the rating plate, turn the power off until the voltage is corrected.
9. Check voltage between the "0" and "1" terminals on the low voltage terminal block on control box. The voltage should be 24 volts +/- 3 volts. If not, check the wiring. *CAUTION: do not short "0" and "1" to check the voltage by sparking. This may damage the transformer.*
10. Turn the reset switch and the fan switch on. Fan should start. Check the fan rotation. If rotation is reversed, for single phase belt driven motors, check the wiring at the motor. For three phase motors, interchange any two phases at the fan motor contactor. Fan rotation cannot be changed in the field. Contact the factory if fan rotation is incorrect.
11. Check fan motor current. If the current is greater than the FLA shown on the rating plate, adjust the motor sheave to slow down the fan by opening the sheave. *CAUTION: Not all units are designed to run at full load amps. Do not increase the fan speed unless it is not delivering the proper airflow. Increasing the fan speed may require a larger fan motor.*
12. Hook up the refrigerant gauges to schrader valves provided on the compressor suction and the discharge lines.
13. Install an amp probe on the compressor power supply wires.

The unit operation must be checked through all operating modes during start up.

Set the set point on the Johnson ZT to a temperature that will make

the unit start in the cooling mode. The time and date will also need to be check to make so that it is correct. Unit needs this for occupied and unoccupied modes. Move the reset switch to the on position and the fan switch to the on position.

The unit should start and operate in the cooling mode.

The factory installed water cooled condensers will need to be set, adjust the water flow rate such that the difference between the leaving and entering water temperature is 10 to 20°F.

Check the suction and discharge pressures. Refer to the operating pressures in the appendix to make sure pressures are within the normal operating range.

## Refrigerant Oil

Units with remote condensers should have oil added during the piping installation. Units without remote condensers should not require additional oil at start up.

Sizes MH020, MH040, MH050 and MV050 with small hermetic compressors do not have an oil sight glass. There is no positive way to check the oil level on these units.

The compressors in sizes MH-070 and MH120 are provided with an oil sight glass. The oil level should be slightly below the halfway mark when the compressor is operating. Check the oil level after 72 hours of operation. Make sure that the compressor had been running continuously for 20 minutes before the oil level is checked.

To add oil on sizes MH070 and MH120, force the unit to go through the pump down cycle. Then close the compressor suction and discharge valves. Bleed off the residual refrigerant through the suction valve service port. Add refrigerant oil through the service port. Use only *Suniso 3GS* or *Suntex 200* refrigerant oil. Evacuate the compressor shell. Open the suction and discharge valves.



## Refrigerant Charge

MH-MV units will not require additional refrigerant charge for proper operation. Unit was fully charged at the factory.

Bubbles visible in the sight glass (located in MH-MV unit) is a good indication that the unit may need additional charge. The other signs are low suction and discharge pressures, high superheat and low subcooling.

To add refrigerant, connect the high side of a refrigerant charging manifold to the liquid out shutoff valve on the receiver (located in the MH-MV unit). The liquid out valve is towards the bottom of the receiver. Connect the center port of the manifold to the refrigerant tank. Front seat the liquid line shut off valve on the receiver to stop the refrigerant flow out of the receiver.

Open the refrigerant manifold high side valve. If the low side pressure is above 30 PSIG, start the unit in the cooling mode. The compressor suction will draw the refrigerant from the tank and store it into the receiver.

Watch the discharge pressure gauge. Pressure will rise very slowly initially. The bubbles in the sight glass should start to diminish. When discharge pressure starts to rise rapidly, or when bubbles disappear, stop charging the refrigerant.

Open the shut off valve on the receiver outlet. Disconnect the refrigerant charging manifold. Check suction and discharge pressures after 15 minutes of operation. In a properly charged system, superheat should be between 12 to 15°F range and subcooling should be minimum 10°F.

## Maintenance

- √ The air filter should be checked after every three months of operation. Dirty filters will affect the operating efficiency of the unit.
- √ The air filter for the MV should be checked once a week. Old filters should be replaced once a month.
- √ Check the fan belt after the first month of service and every six months there after. Adjust the center distance to get proper

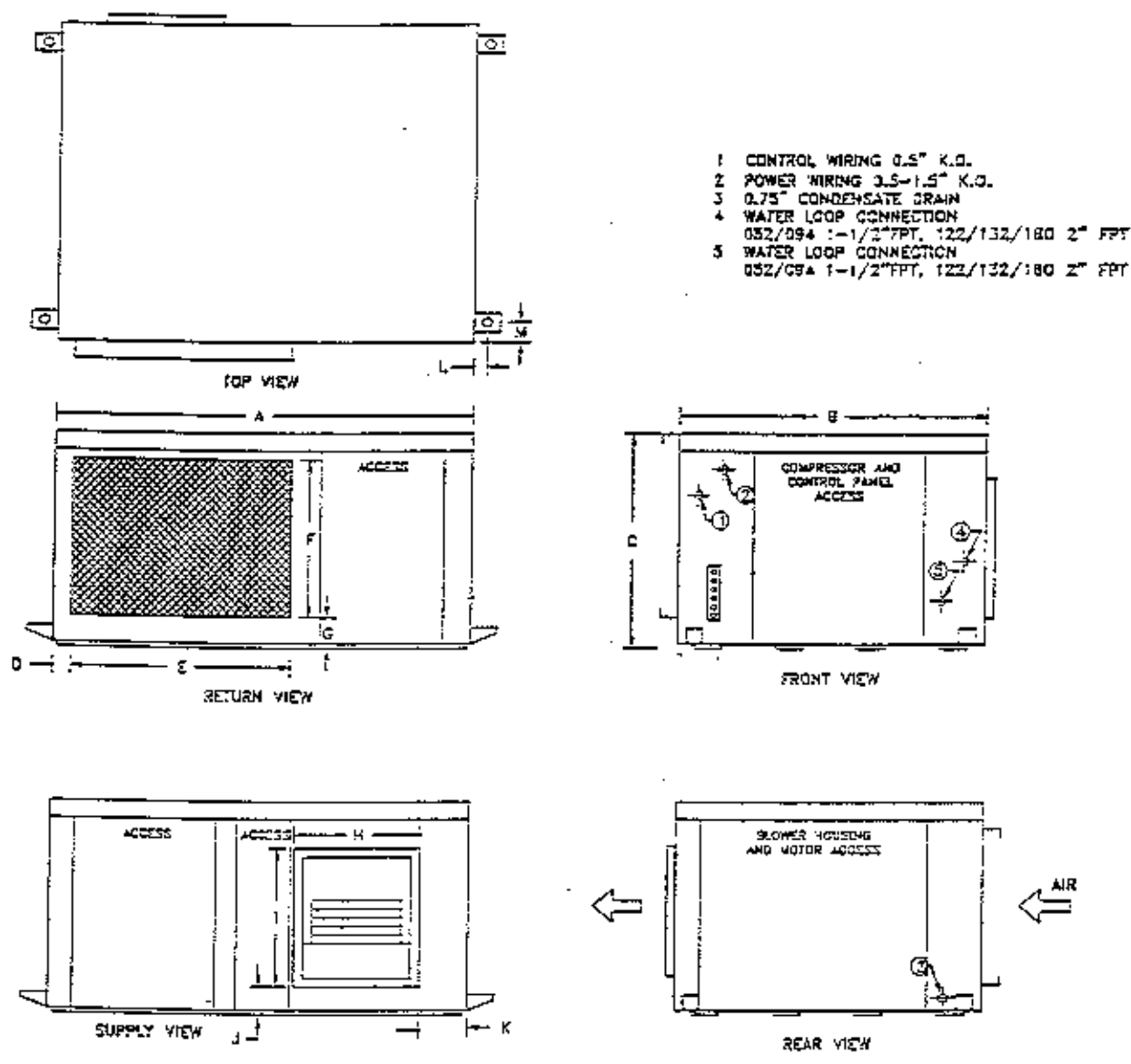
belt tension.

✓ Check operating pressures, superheat and subcooling in all modes of operation, every 12 months. If indications are loss of charge, identify the source of the leak and repair it.

✓ Check the fan wheel and housing for corrosion. Replace if necessary. ✓ Check the coils for possible accumulation of dust, leaves, etc. For optimum performance, the coil should be clean and there should be no obstructions to the airflow through the coil.

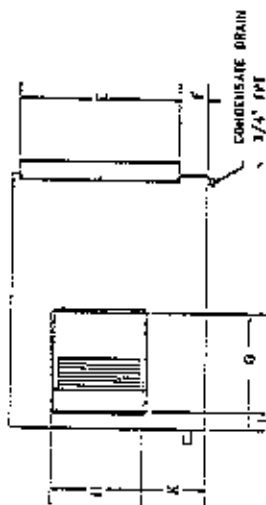
✓ Check the insulation on refrigerant piping connecting the air cooled condenser and the MH-MV unit. If deteriorated, replace it.

✓ MH-MV units use permanently lubricated, sealed fan bearings. No maintenance is required on the bearings.

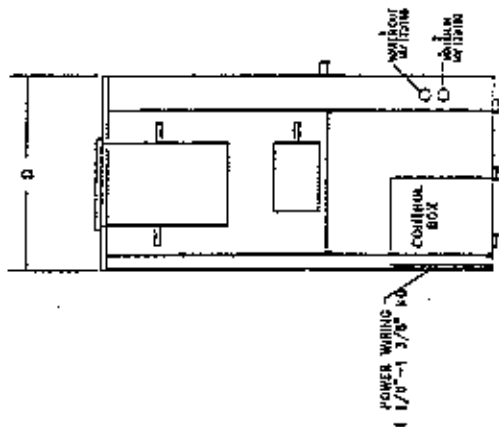


	MH-052	MH-094	MH-122	MH-180	MH-220	MH-240
A	48 1/2	48 1/2	67	67	76	75
B	36	36	44	44	44	44
C	25 3/16	25 3/16	44 1/8	44 1/8	52 1/2	52 1/2
D	1	1	1	1	1	1
E	25	25	25	25	36.5	36.5
F	20 1/8	20 1/8	36	36	36	36
G	5 1/16	5 1/16	8	8	7 1/2	7 1/2
H	10 1/8	14 5/16	16 1/8	16 1/8	16 1/8	15
I	11 1/8	12 7/16	17 1/2	17 1/2	17 1/2	17 3/4
J	6	6	8 1/4	8 1/4	8 1/4	8 1/4
K	3 1/2	3 1/2	18	16	16	16
L	1	1	1 3/8	1 3/8	1 3/8	1 3/8
M	1	1	1 3/16	1 3/16	1 3/16	1 3/16
N	23.000	23.000	32.062	32.062	43.000	45.000
FILTER	20x25	20x25	1 16x20 1 20x20	2 16x20 2 20x20	2 16x20 2 16x25	2 16x20 2 16x25

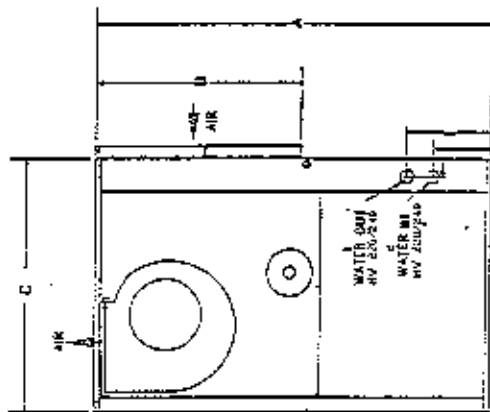
FIGURE - 2



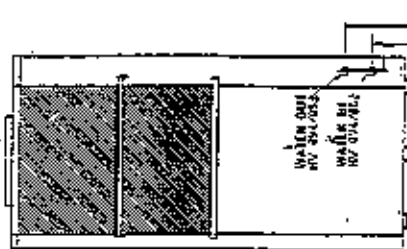
TOP VIEW



SIDE VIEW



FRONT VIEW



REAR VIEW

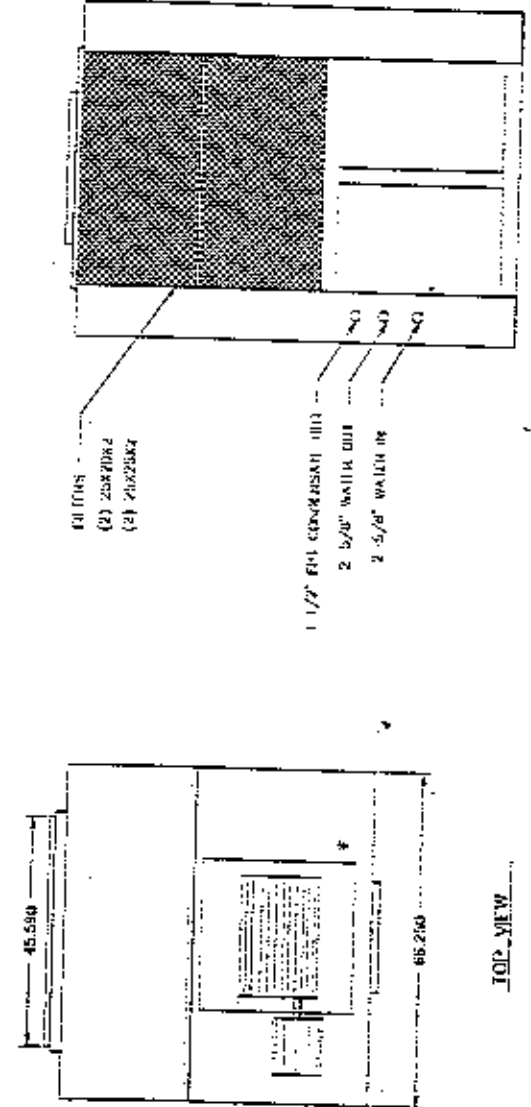
	MODEL NUMBER	MODEL NUMBER	MODEL NUMBER	MODEL NUMBER
A	MV-052	MV-081	MV-100	MV-210
B	59.00	69.00	79.00	78.000
C	18.00	20.00	22.50	16.50
D	18.00	20.00	22.50	16.50
E	20.00	22.00	24.00	18.00
F	3.25	3.25	3.25	3.25
G	14.750	14.750	14.750	14.750
H	5.375	5.375	5.375	5.375
I	1.5	1.5	1.5	1.5
J	7.938	7.938	7.938	7.938
K	1.5	1.5	1.5	1.5
L	1.5	1.5	1.5	1.5
M	1.5	1.5	1.5	1.5
N	1.5	1.5	1.5	1.5
O	1.5	1.5	1.5	1.5
P	1.5	1.5	1.5	1.5
Q	1.5	1.5	1.5	1.5
R	1.5	1.5	1.5	1.5
S	1.5	1.5	1.5	1.5
T	1.5	1.5	1.5	1.5
U	1.5	1.5	1.5	1.5
V	1.5	1.5	1.5	1.5
W	1.5	1.5	1.5	1.5
X	1.5	1.5	1.5	1.5
Y	1.5	1.5	1.5	1.5
Z	1.5	1.5	1.5	1.5

**CLIMATE MASTER**  
 THE ENVIRONMENTAL SYSTEMS PACKAGE  
 CORPORATION  
 1000 W. 10TH AVE.  
 DENVER, CO. 80202

MODEL NO. 6985007  
 DATE: 01MAY 86  
 SHEET: N15  
 DRAWING NO. 6985007

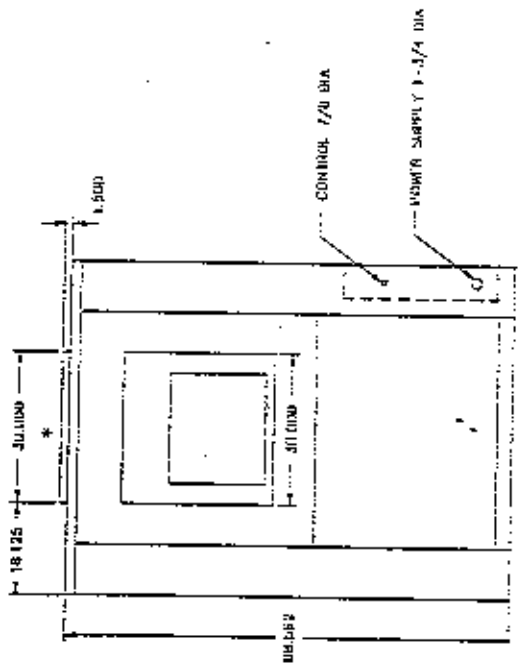
VERTICAL UNIT  
 MODEL NO. 6985007  
 DATE: 01MAY 86  
 SHEET: N15  
 DRAWING NO. 6985007

- NOTE:
1. ALL DIMENSIONS ARE IN INCHES.
  2. CLIMATE MASTER WORKS CONTINUOUSLY TO IMPROVE ITS PRODUCTS, AS A RESULT, THE DESIGN AND SPECIFICATIONS OF EACH PRODUCT AT THE TIME OF ORDER MAY BE CHANGED WITHOUT NOTICE.



TOP VIEW

REAR VIEW



FRONT VIEW

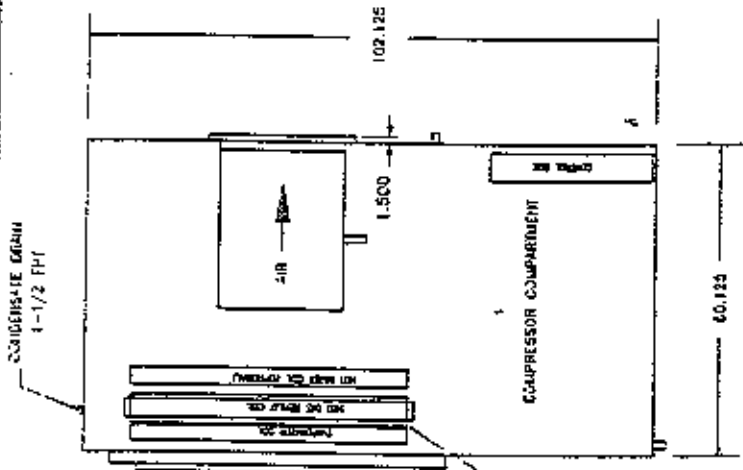
RIGHT VIEW

CLIMATE MASTER MV 350F

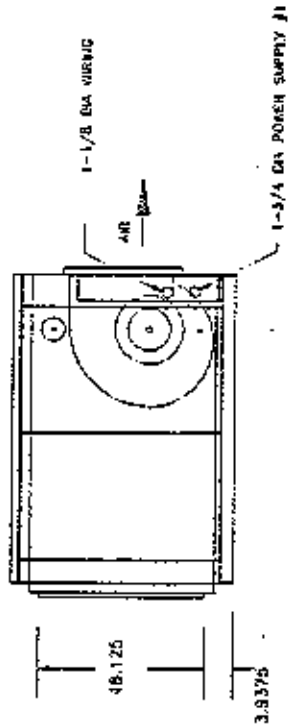
CLIMATE MASTER MV 350F		REV 4/15/96		415900SH	
NO.	DATE	BY	CHECKED	APP.	DESCRIPTION
1					ISSUE FOR ESTIMATE
2					
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4					
5					
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15					

NOTES:

1. ALL DIMENSIONS ARE IN INCHES
2. CLIMATE MASTER WORKS CONTINUOUSLY TO IMPROVE ITS PRODUCTS, AS A RESULT THE DESIGN AND SPECIFICATION OF EACH PRODUCT AT THE TIME OF ORDER MAY BE CHANGED WITHOUT NOTICE.
3. ASSEMBLY TOLERANCES  $\pm .125$



-TOP VIEW



-SIDE VIEW

NOT WATER CHX 1-5/8 O.D. (OPTIONAL)  
NOT WATER IN 1-5/8 O.D. (OPTIONAL)

WATER IN 2-5/8 O.D.  
WATER OUT 2-5/8 O.D.

CONTROL BOX

-FRONT VIEW

**ClimateMaster**  
001360

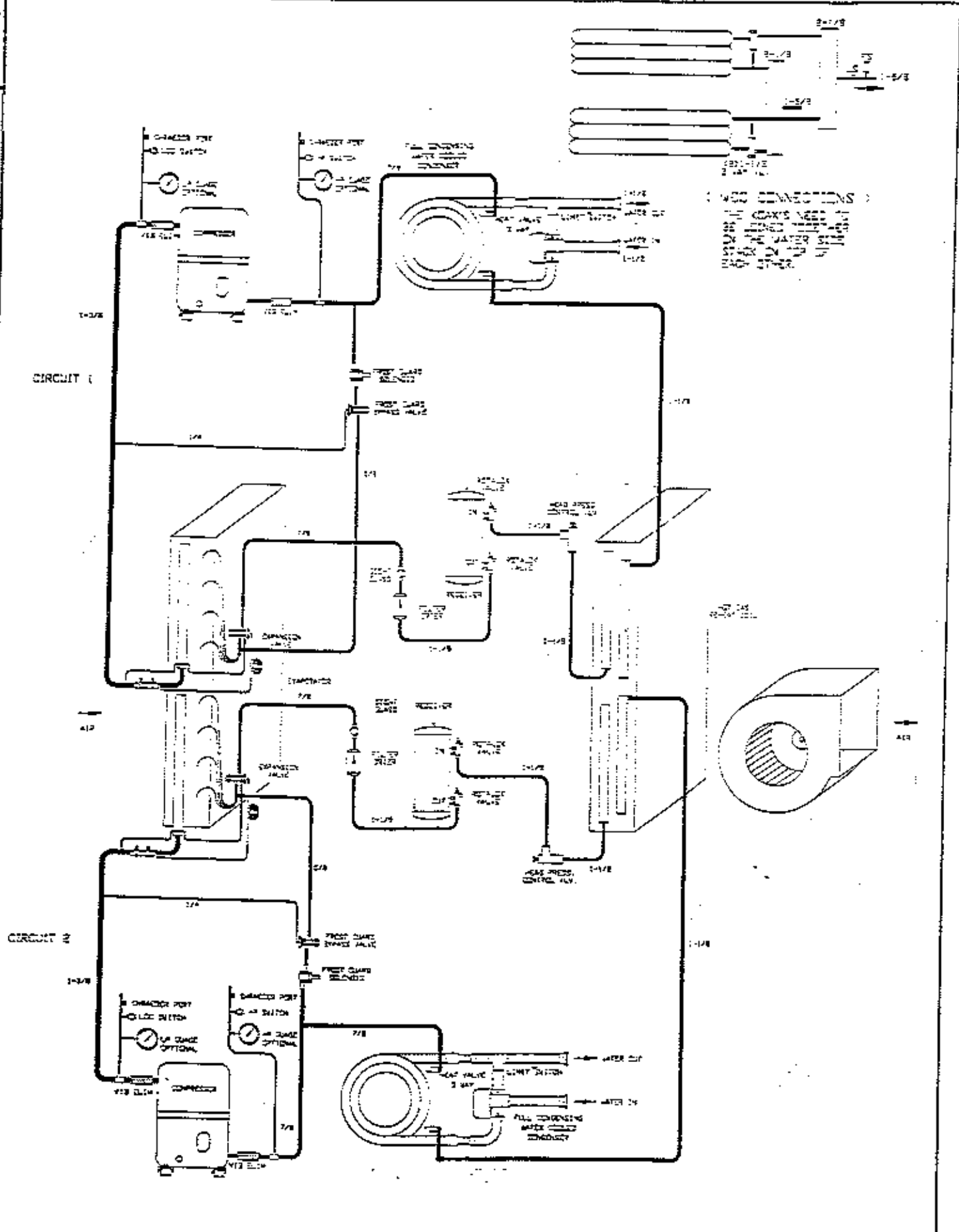
DATE: 01/29/96  
DRAWN BY: 41506DSH  
CHECKED BY: 41506DSH

Scale: 1/16" = 1"

REV	DATE	DESCRIPTION	BY	CHKD

APPROVED: \_\_\_\_\_

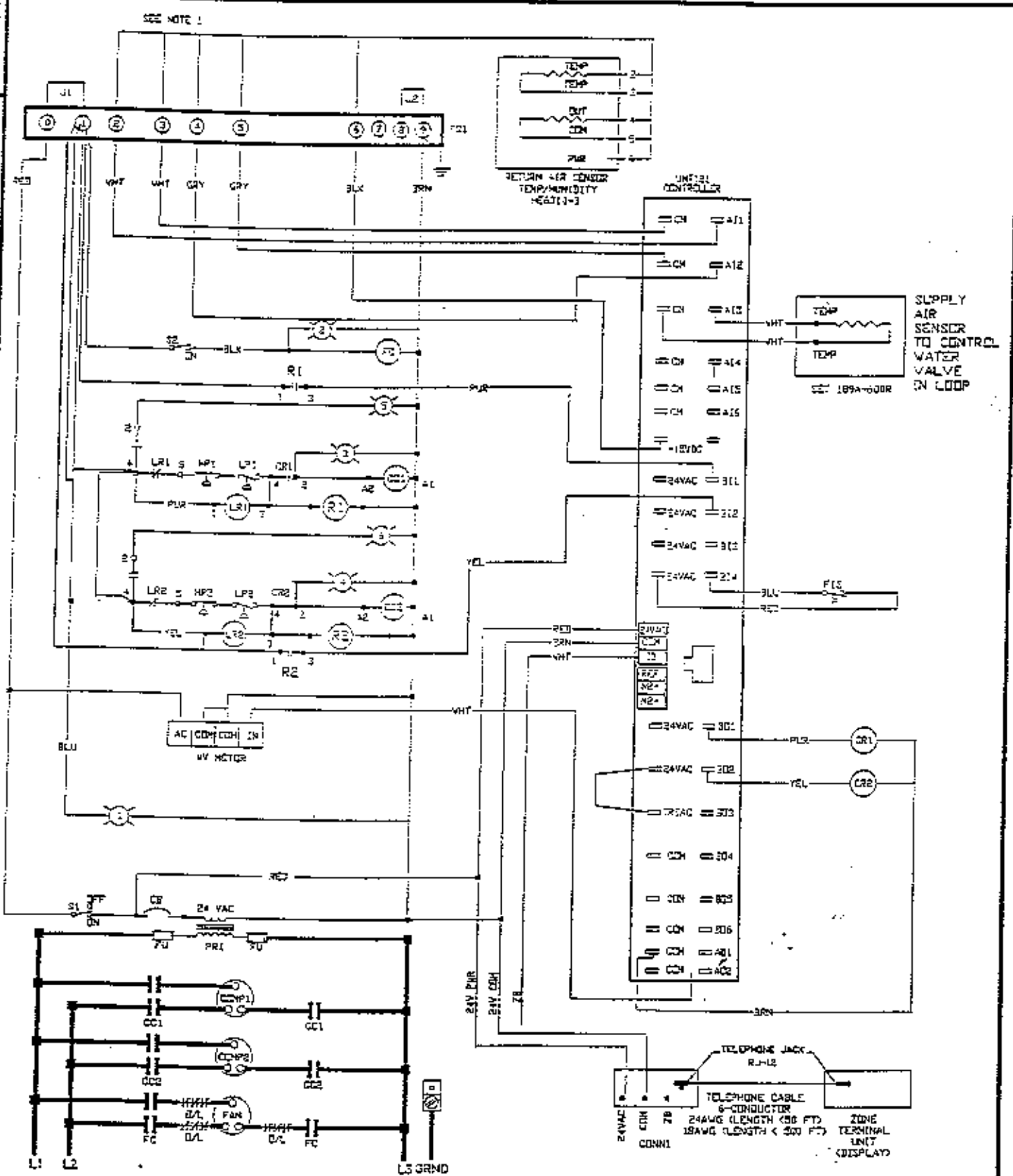
92360501



WATER COOLING CONNECTIONS  
 CONDENSER  
 WATER IN  
 WATER OUT  
 WATER VALVE  
 WATER SWITCH

WATER COOLING CONNECTIONS  
 CONDENSER  
 WATER IN  
 WATER OUT  
 WATER VALVE  
 WATER SWITCH

REF 69565-180



2. PRDG.  
 1. ——— REPRESENT FIELD WIRING CLASS 1 MIN. 14 AWG TRM TYP.

NOTES:  
 POWER SUPPLY (USE COPPER CONDUCTORS ONLY)  
 □ 208 VAC 3Ø 60 HZ  
 ○ 480 VAC 3Ø 80 HZ

CLM

MODEL NUMBER  
 MV/MH SERIES UNIT CONTROLLER

DRAWING #  
 69783103  
 3/26/96

SHEET #  
 1



Symptoms	Cause	Check and Remedy
Compressor and fan both do not run (fan switch is in on position).	Blown fuse at the disconnect.	Check for loose wiring touching the enclosure or short with the other wires. Secure wire properly. Check fuse size with unit data plate. Replace with fuse of correct size. <i>Note: fuse must be time delay type.</i>
	Low supply voltage.	Check supply voltage at the disconnect and at the unit. Take corrective action to assure that the supply voltage is between the range specified on the data plate.
	Burned out transformer.	Check continuity of transformer windings. If open or shorted to enclosure, replace the transformer.
	Incorrect thermostat and/or humidistat wiring.	Check the wiring with the wiring diagram in the unit. Correct the wiring.
Fan runs but compressor does not (fan switch in on position).	Incorrect thermostat and/or humidistat setting (no voltage at O and Y1 terminals).	Lower humidistat setting below the space humidity or increase the thermostat setting (heating) above space temperature. Check thermostat/humidistat calibration and replace if defective.
	Safety circuit open (red safety light is on). Compressor contactor is de-energized.	Hook up manifold gauges. Reset the safety circuit and observe pressure gauges to identify low suction pressure or high discharge pressure. Refer to the appropriate symptom below.
	Defective lockout relay (normally closed contacts stay open after pressure switches have closed and the control circuit was reset).	Replace the lockout relay.
Compressor draws locked rotor current at start up and trips on overload.	Compressor motor winding open or internal overload stays open (make sure that the power supply is off and the compressor is at room temperature when checking).	Replace the compressor.
	Low supply voltage.	Take corrective action to assure voltage is within the range shown on the rating plate.
	Defective start relay (NC contacts open) or defective start capacitor.	Replace the defective starting components.
	Compressor motor winding grounded to housing.	Check the continuity between the junction box terminals and the housing. If there is continuity winding is grounded. Replace the compressor.

Compressor draws locked rotor current at start up and trips on overload, continued.	Seized compressor.	One-phase units: use one size larger start capacitor to size up the compressor. If compressor starts and continues to run for 15 minutes, remove larger start capacitor and replace with the original capacitor. If compressor does not start again, replace the compressor. Three-phase units: replace the compressor.
Start relay coil burned out of open (one-phase units).	Incorrect start relay.	Start relay and the start capacitor combination must be the one recommended by the compressor manufacturer. Replace with the correct start relay.
Start capacitor burned out (one-phase units).	Unit short cycling.	Refer to short cycling symptoms.
Run capacitor burned out (one-phase units).	Incorrect start capacitor size and/or voltage.	Replace with the correct start capacitor.
Unit runs continuously.	Start relay contacts remain closed when compressor is running.	Replace the start relay along with the start capacitor.
	Incorrect capacitor voltage rating.	Replace with the correct run capacitor.
	Thermostat set too high (heat) or too low (cool) or humidity setting is too low.	Check thermostat and humidistat settings and adjust as required.
	Short of refrigerant (low suction pressure and high superheat).	Find the refrigerant leak location and repair the leak. Add refrigerant charge.
	Superheat set too high.	Adjust valve to approximately 15°F.
	Refrigerant over-charged.	Remove the excess charge into environmentally safe container.
	Broken compressor valves.	Replace the compressor.
	Dirty condenser.	Clean the condenser.
	Dirty air filters.	Replace the air filters.
	Loose or broken blower belt.	Check if suction pressure is low. Tighten or replace the broken belt.
	Excessive duct restrictions causing significant drop in air flow.	Eliminate the excessive restrictions such as loose insulation blocking duct.
	Un-insulated supply and return air ducts causing heat losses to surrounding air.	Insulate the return air ducts.

Unit runs continuously, continued.	Unit undersized for the load.	Check load calculations. Add additional unit if the unit is under sized.
Unit short cycles.	<p>Improper settings on thermostat.</p> <p>Improper location of thermostat/humidistat.</p> <p>Compressor overload.</p>	<p>Increase heat anticipator setting if short cycling on heating demand.</p> <p>Thermostat/humidistat should be located away from supply air registers, inside walls and five feet above the floor.</p> <p>If the compressor is hot, the unit may be short of refrigerant charge. Allow the compressor to cool. Check suction pressure and superheat. If low on charge, identify the leak, repair it and add the charge.</p> <p>If compressor is cold, overload may be defective. Check windings for continuity. Replace the compressor if overload is defective.</p>
Discharge pressure too high when operating in heating mode.	<p>Over charged refrigerant.</p> <p>Non-condensables in the system.</p> <p>Dirty air filters (heating).</p> <p>Loose or broken belt (heating).</p> <p>Dirty air cooled condenser (cooling)</p> <p>Air cooled condenser fan motor not operating (cooling).</p>	<p>Bleed off excess refrigerant.</p> <p>Purge the non-condensables. If the problem persists, evacuate the unit and recharge with fresh refrigerant.</p> <p>Replace with new filters.</p> <p>Tighten or replace the belt.</p> <p>Clean the condenser.</p> <p>Check voltage.</p> <p>Check fan speed controller. If defective, replace the controller.</p> <p>Check the fan cycling pressure switch settings (036 and 060 sizes). Cut in should be 275 PSIG, differential = 40 PSIG.</p>
Discharge pressure too low.	<p>Heat rejection valve not shifting.</p> <p>High water flow through the pool heat exchanger.</p> <p>Short of refrigerant.</p> <p>Space temperature too cold.</p>	<p>Check power supply to the solenoid. Check if the solenoid coil is operating correctly. Replace the solenoid if defective. If the solenoid is not a problem, replace the valve.</p> <p>Adjust the water flow for 20°F temperature rise.</p> <p>Repair leak and recharge.</p> <p>Raise space temperature above 75°F using auxiliary heat.</p>

Discharge pressure too low.	Fan speed/cycling control on remote air cooled condenser malfunction.	Check fan speed control pressure connection at the gas inlet. If fan speed control fails to slow the fan, replace the speed controller. Check the fan cycling control settings. Cut-in = 275, differential = 40.
Suction pressure too high.	Excessive load on evaporator.  Expansion valve over feeding.	Space temperature and humidity very high. Check thermostat and humidistat setting. Check air-flow, reduce the air flow if high.  Make sure remote bulb is secured to the suction line. Bulb should be covered with insulation. Adjust superheat to approximately 15°F.
Suction pressure too low.	Discharge pressure too low.  Clogged liquid line filter drier.  Expansion valve port restricted due to foreign substance.  Condenser check valve leaking (if there is a temperature drop across the check valve, it is leaking).	Refer to symptoms and remedies for this cause.  Replace the filter drier.  Clean the valve or replace.  Replace the valve.
Noisy unit.	Noisy compressor.  Blower wheel loose.  Cabinet panels loose or missing.  Metal to metal contact between tubes.  Loose fan belt.  Liquid slugging to compressor.	Make sure shipping spacers around compressor mount have been removed and compressor is floating freely on the mount. If compressor noise indicates internal mechanical damage, replace the compressor.  Secure the blower wheel.  All panels must be in place and secured tightly.  Use presstite or equivalent to isolate the tubing.  Tighten the belt.  Check superheat at the compressor. If below 15°F, adjust the superheat.

# Introduction

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The Zone Terminal is a hand-held or wall-mounted person/machine interface for the Metasys™ Application Specific Controllers. It has the versatility to connect to a controller in several ways, and allows the user to monitor or adjust set points and time scheduling within a specific zone.

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## Application Details

The Zone Terminal is used to monitor or adjust set points and for time scheduling of occupied, warmup/cooldown, or shutdown zone conditions. It connects to:

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## Theory of Operation

The Zone Terminal is designed as an easy-to-use hands-on device with which you can:

- quickly identify an alarm and its location
- monitor and adjust up to 18 analog points
- monitor 18 binary points
- extend a daily time schedule using Occupied Extend
- add or modify daily, holiday, and temporary time schedules

For specific Theory of Operation details, refer to the *Zone Terminal* section of the *HVAC PRO User's Manual*.

## Displays

The ZT uses a liquid crystal display (LCD) divided into three sections from top to bottom. Each display includes:

- five, seven-segment digits
- decimal points
- colon

To the left of the display are 18 cursors (●) and triangles (▲), 6 per display. The cursors indicate current position in the respective display. When flashing, the triangles indicate an alarm condition in the corresponding analog points.

The right side of the ZT display includes 18 pairs of binary indicators—a bar (|) for On, and a circle (○) for Off. These symbols flash when the respective binary point is in alarm.

Five LED's located in the bottom panel include four green Mode Indicators and one red Alarm Indicator. The Alarm Indicator LED flashes when any analog or binary point is in alarm.

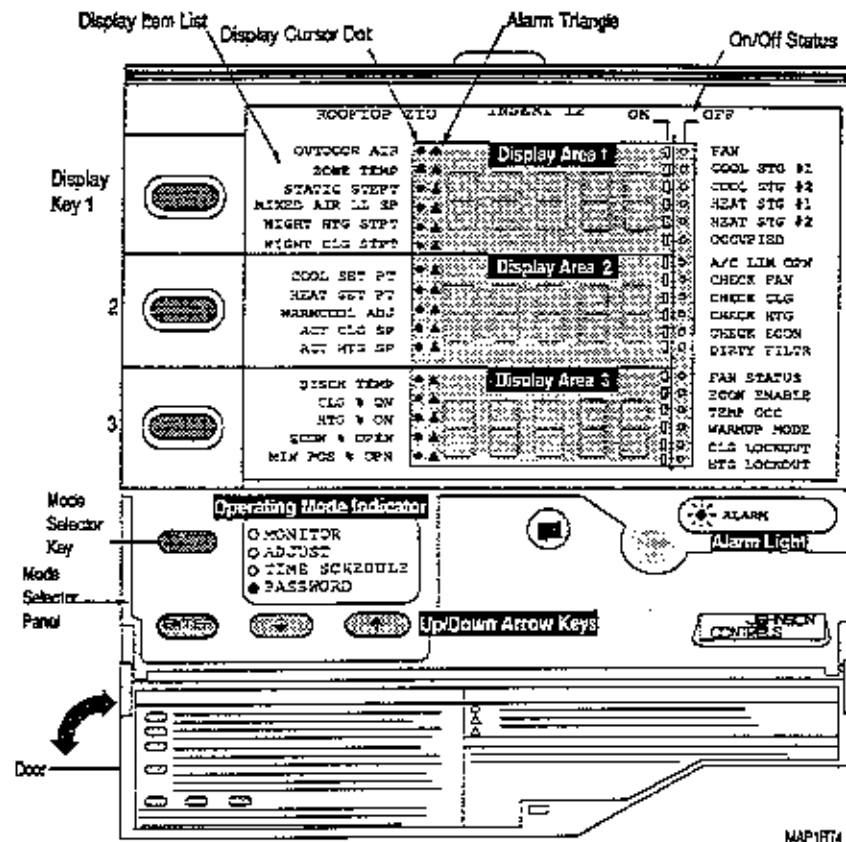


Figure 1: The Zone Terminal

### Keys

Refer to Figure 1 to locate each of the seven ZT keys.

Key	Description
Display Key 1, 2, 3	Moves the cursor through insert items
Operating Mode Selector	Moves the LED to the desired operating mode: Monitor, Adjust, Time Schedule, Password
(↑) or (↓)	Adjust Up or Down changes the numbers in the displays
Enter	Commits adjustments

# Making ZT Adjustments

## **Adjusting Control Settings**

This section of the manual is for users who have Password access to the Adjust Mode.

If you haven't already entered your Password, you must do so. See *Entering Your Password*.

You can adjust only a flashing number with the ZT. If the number does not flash, that item is a monitor only item.

Adjust Control Settings in Display 1, 2, or 3 as follows:

1. Press the Mode Selector Button until the green Mode Indicator Light moves next to the word Adjust.
2. Press either Display Button 1, 2, or 3 to locate adjustable items, which are indicated by flashing numbers.

If you continue pressing the display buttons, the dot ● in each display changes positions and the corresponding number appears.

3. Press the Up ↑ or Down ↓ Arrow key until you reach the number you want to enter. If you hold down the Up ↑ or Down ↓ Arrow keys, you can speed through the numbers more quickly. Press Enter.

After you press Enter, the numbers stop flashing for a few seconds. This pause tells you the ZT has processed your adjustment.

4. Press any of the Display Buttons to make other adjustments, and repeat Steps 2 and 3.

**Notes:** Some adjustable set points have high and low limits beyond which you cannot adjust them. For example, a heating set point may have an upper limit of 86°F (30°C).

When you make adjustments, they become permanent in the ZT. To make a temporary change, write down the original value before making the change so you can re-enter it later.

## Entering Your Password

If your system uses the Password feature, you must enter the Password before you can make changes to the set points, or before you gain access to Time Scheduling.

To enter your Password:

1. Open the Mode Selector Panel by pulling the door down.
2. Press the Mode Selector Button until the green Mode Indicator Light moves next to the word **PASSWORD**. When the Mode Selector Button is in the Password position, a number appears in Display 1. This number *must match* the number on the top, center of your Insert. If the numbers do not match, the data that appears in the displays will not match the description on the Insert. Replace the incorrect Insert.

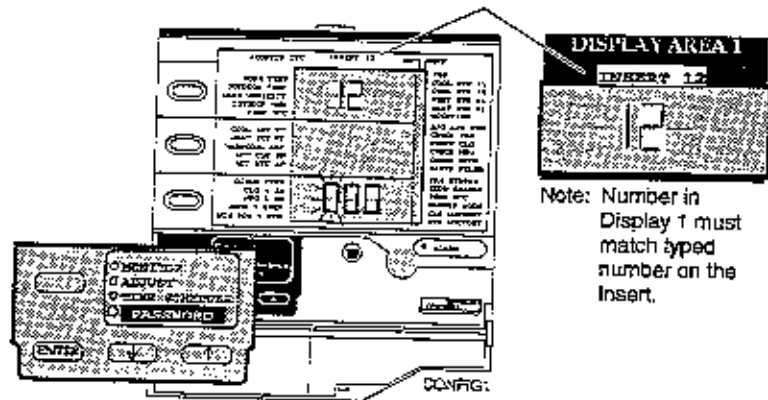


Figure 8: Matching the Insert Number

Three numbers appear in Display 3. The number in the left position flashes.

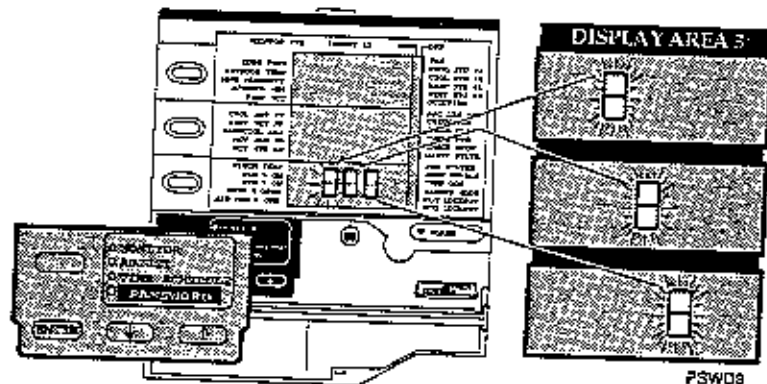


Figure 9: Entering Password

3. Press the Up ↑ or Down ↓ Arrow key until the first number of your Password appears in the flashing position. Press Enter.

The middle number in Display 3 begins flashing.

4. Press the Up ↑ or Down ↓ Arrow key until the middle number of your Password appears in the flashing position. Press Enter.

The third, or far right number, begins flashing.



5. Press the Up ↑ or Down ↓ Arrow key until the last number of your Password appears in the flashing position.

Press Enter.

You must press Enter for *each* of the three numbers in your Password in order for the ZT to recognize it as a valid Password. If you do not press Enter *each* time, the ZT ignores your Password entry and you cannot gain access to Adjust Mode or Time Scheduling Mode.

After you press Enter for the last number of your Password, the green Mode Indicator Light moves next to the word Adjust in the Mode Selector Panel. If it does not go to this position, the Password is incorrect.

You can now begin changing values or set points in the Adjust Mode, or press the Mode Selector Button to move the green Mode Indicator Light to the Time Schedule position. Time Scheduling may require a different Password.

Note: The ZT is preset to time out after a 1 to 15-minute interval between entries. If you wait too long to enter an adjustment, you must re-enter your Password. This prevents unauthorized use of the ZT if you forget to cancel your Password.

#### Cancel Password

After entering the Password, you can easily cancel without waiting for the Zone Terminal to time out.

1. Press the Mode Selector Button until the green Mode Indicator Light moves next to the word Password.
2. Press Enter three times. In doing this, you have entered zeroes as the Password. Access is immediately canceled because 000 is not a valid Password.

# Troubleshooting Procedures

## Troubleshooting Chart

Problem	Solution
Displays remain blank after ZT is connected	No power is getting to the ZT—check for appropriate connections.
Displays show only dashes -----	ZT unit is operational, but not communicating with the controller. Check the Zone Bus wire/controller. If no wiring errors are found, download the AHU w/HVAC PRO, Rel 3.
Displays show all dots ...	Download in ZT does not match connected controller, or download is invalid. Select correct download (ZT load file) and re-load the ZT.
Displays show 99999	An entered number is too large to display.
Displays show -9999	An entered number is too small to display.
Displays show Err 01	Internal RAM/Processor Error*
Displays show Err 02	External RAM Error*
Displays show Err 03	E <sup>2</sup> PROM Error*
Displays show Err 04	ROM (Code) Error*
Displays show Err 05	Battery Bad**
Displays show Err 06	Battery-backed RAM Error*
Cannot enter Adjust Mode	Has proper Password been entered? Do you have Password access to this mode?
Cannot enter Time Scheduling Mode	Has proper Password been entered? Do you have Password access to this mode? Is the ZT plugged into the controller selected for Time Scheduling?
ZT reverts back to Monitor Mode	ZT has timed-out. Re-enter your Password and begin again.
One minute lapse in time scheduling has occurred at Midnight	Enter 24:00 to cross the day boundary.
Numbers in the display do not relate to the items listed on the insert	The insert is not the correct one for this ZT and Controller. Verify the insert number by entering Password Mode.

\* For Errors 1, 2, 3, 4, and 6—Re-power device two or three more times. If error still exists, disconnect ZT and run diagnostics by holding the Display Key 1 and Adjust Down (↓) Key when the phone jack is plugged in. The word DIAG appears on Display 1 at the start, and all display segments light up for "Pass." When all segments light, push Display Key 1 two times, and then follow the prompts.

\*\* For Error 5—This is only a warning and indicates the battery-backed data, specifically Time Scheduling, has been lost. If you press Enter, the ZT loads the default time schedule and you may continue. Replace the battery at your earliest convenience. Use a Panasonic® lithium or Ray-O-Vac®—battery number BR2325.

Ray-O-Vac®—battery number BR2325.

**Internal Diagnostic  
Errors**

The figure below explains what the ZT is reporting in the event it fails its internal diagnostic. The digit "1" appears in displays 2 and 3 indicating where the error has occurred.

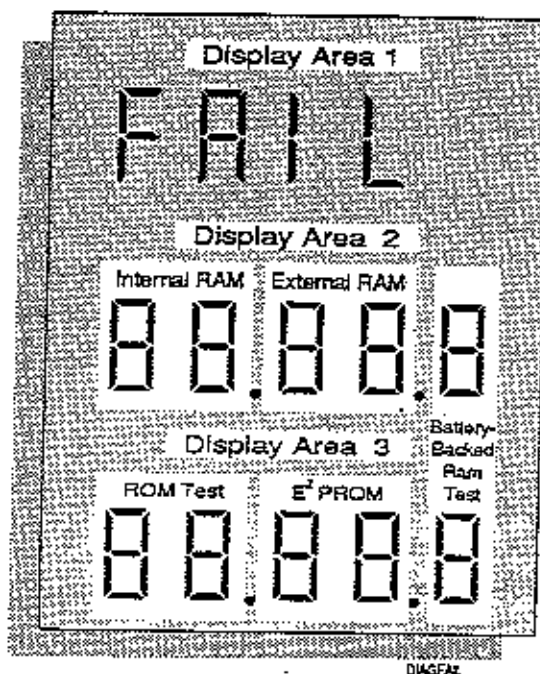


Figure 17: Internal Diagnostics

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