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# JOYGLOBAL

## MAS-500E HIGH CAPACITY OPERATIONS MANUAL

Applicable unit part number

**RMNM05E-DWH-01-HCP**

**RMNM05E-DWH-01-HC**



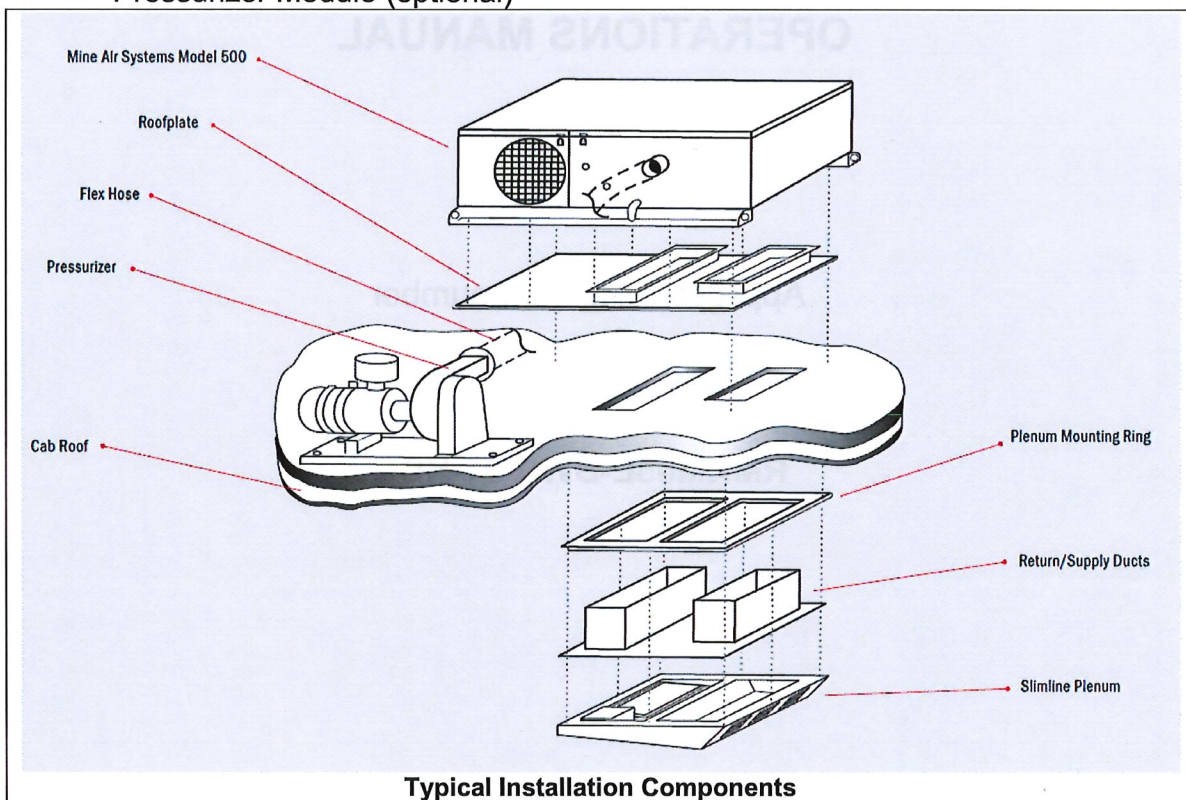
## 1.0 NORMAL OPERATIONS

### 1.1 Overview

The MAS-500 is an environmental conditioner based upon a closed loop, heating, cooling and filtering model. In this model the air from the operators cab is circulated past heating and cooling elements to achieve the desired temperature in the operators cab.

The unit is divided into 3 modules as follows:

- Compressor/Condenser module
- Evaporator/Electronics module
- Pressurizer Module (optional)

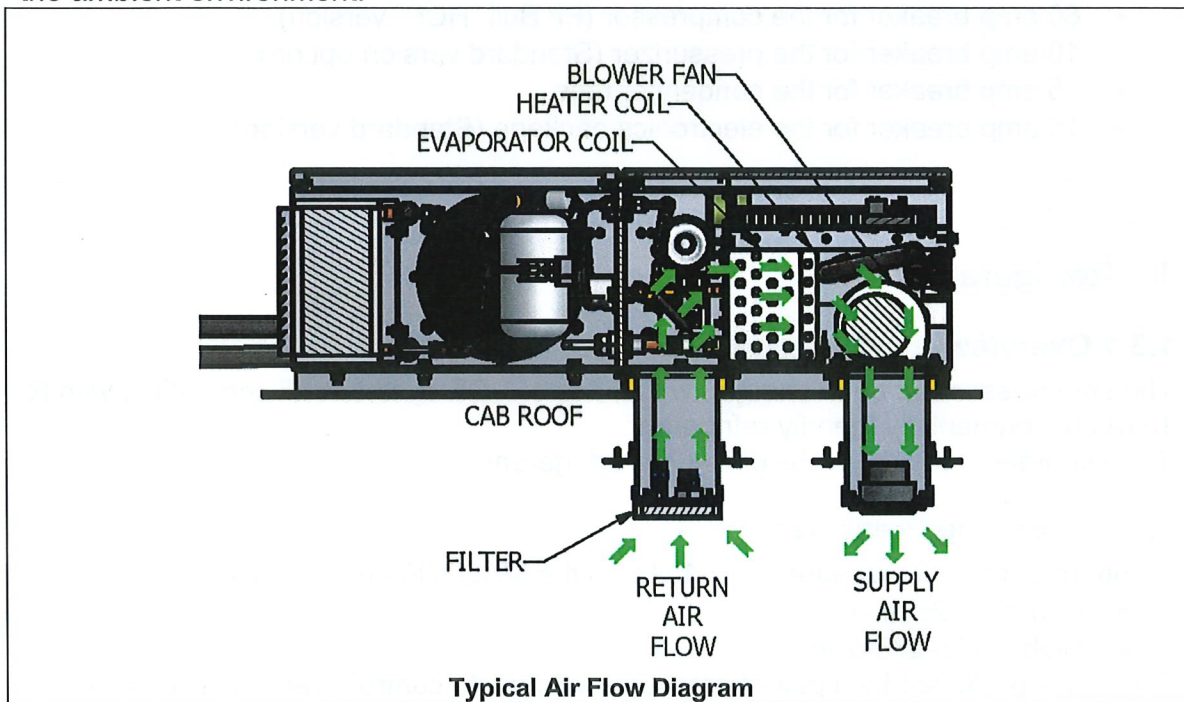




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Filtration is provided by the circulation of air. A plenum filter is installed inline on the return air side of the MAS-500 and a cartridge filter/cyclonic separator combination is installed on the suction side of the Pressurizer unit option (a 2 stage filtration system).

The typical process air flow of the MAS-500 is shown below. The units provide filtered and conditioned air thru a pair of duct works which is distributed to the cab through a set of diffusers. The return air venting allows air to be returned to the conditioner and re-circulated. New filtered air is added to the system via the pressurizer (optional), allowing the cab room to be at positive pressure in relation to the ambient environment.



The standard control system provided with the MAS-500HC is an analog system mounted on the slim line air distribution plenum.



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## 1.2 Electrical

### 1.2.0 Overview

The MAS-500 is a 24V DC system. The electrical system is organized into 2 primary sections; the electrical back pan and the internal wiring. The schematics for these sections can be found in section 4.1.

### 1.2.1 Electrical Protection Features

The MAS-500 is protected by:

- 100 amp breaker for the compressor (Standard "HC" version)
- 80 amp breaker for the compressor (Pit Bull "HCP" version)
- 10 amp breaker for the pressurizer (Standard version option)
- 15 amp breaker for the condenser fans
- 15 amp breaker for the electronics package (Standard version)

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## 1.3 Refrigeration

### 1.3.1 Overview

The compressor has been charged with 4.4oz of POE synthetic oil compatible with R-134a environmentally friendly refrigerant.

Fully charged it requires 5lbs of R-134a refrigerant.

### 1.3.2 Operating Pressures

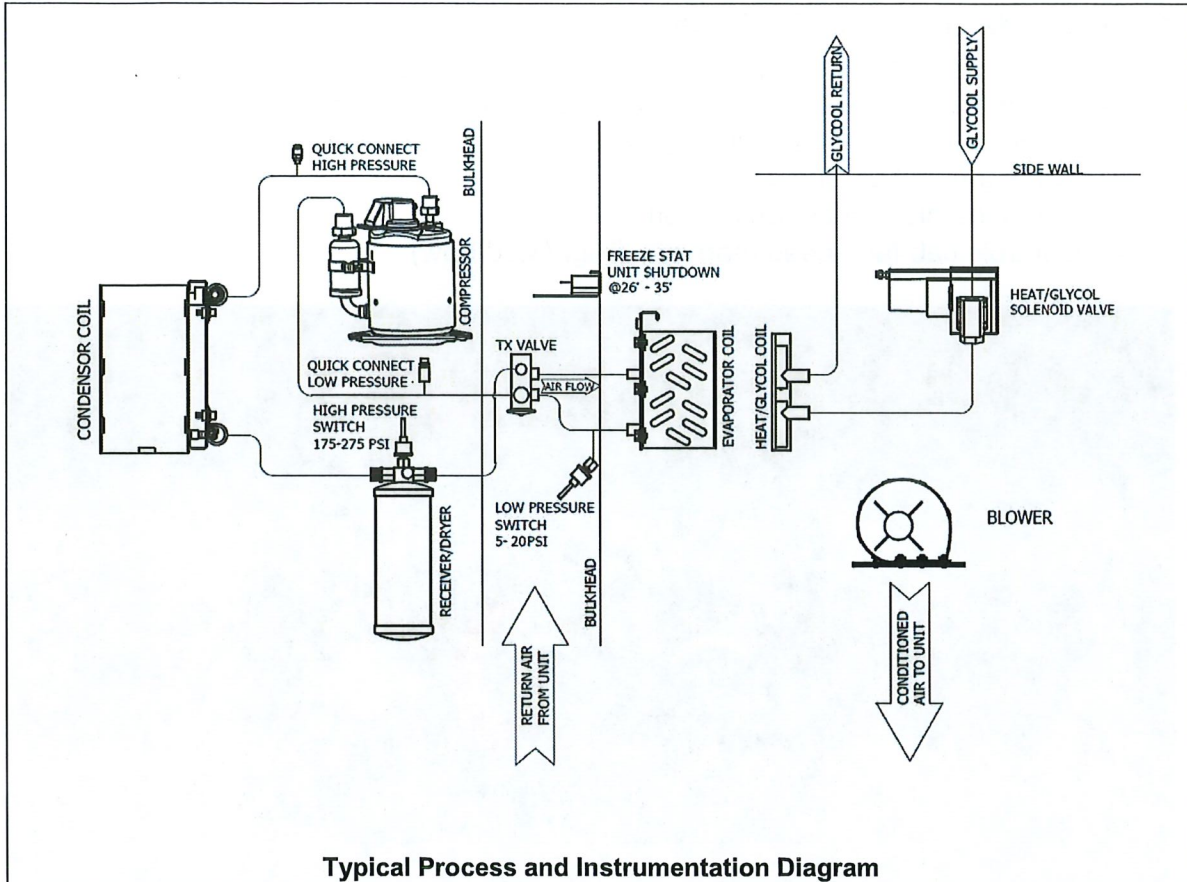
Standard operating pressures of R-134a on the MAS-500 are as follows:

- Low = 10-25 psig
- High = 175-275 psig

The unit is protected by a pair of pressure switches to control over/under pressure situations.



### 1.3.3 Process Flow Overview





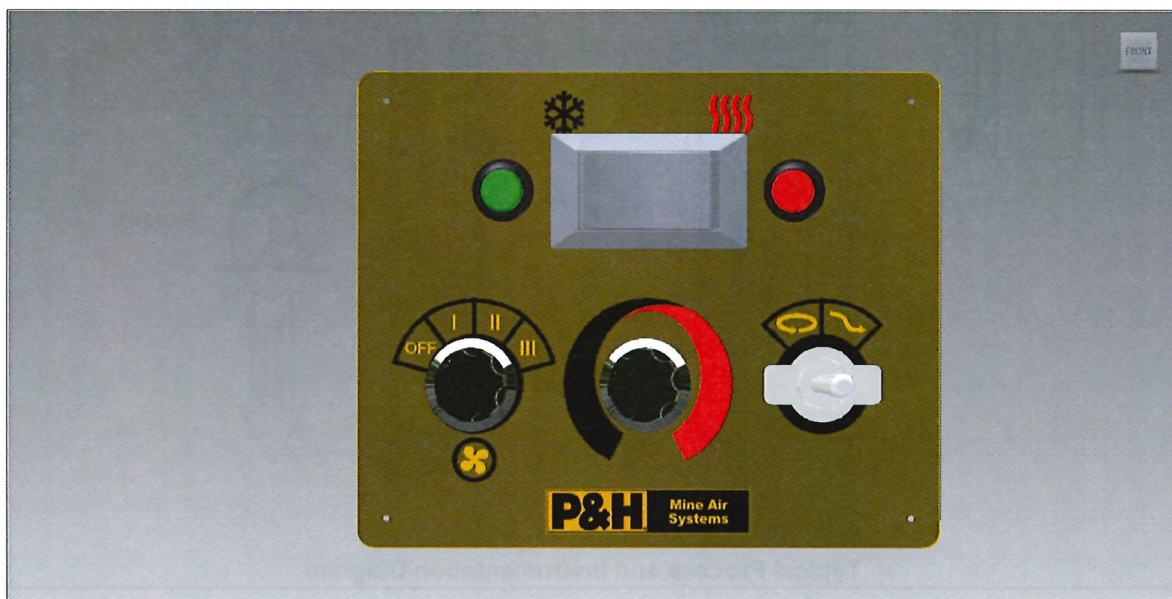
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## 1.4 Control System

### 1.4.1 Standard Control Package

The standard controller is an analog control panel that interfaces between the operator and the MAS-500HC. The panel is comprised of analog buttons and potentiometers to control the following functions:

- Turns the unit on and off.
- Turns the pressurizer on and off.
- Controls cab fan speed manually (High/Med/Low)



**Control Panel Arrangement**

The operator controls are located within the operators cab. Note that the symbols might change between units, but the button location and layout is the same.

\*Pit bull cab controls will differ to standard models, see shovel literature for more details\*



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## 2.0 MAINTENANCE

### 2.1 Overview

Your Mine Air system will be trouble free and give you excellent service for many years if a few simple maintenance up-keep procedures are followed. Maintenance consists of these main areas:

- Filter Replacement and Cleaning
- MAS-500 Condenser Module
- MAS-500 Evaporator/Electronics Module
- PM Checklist (Refer to Section 5.0)

### 2.2 Filters

#### 2.2.1 Overview

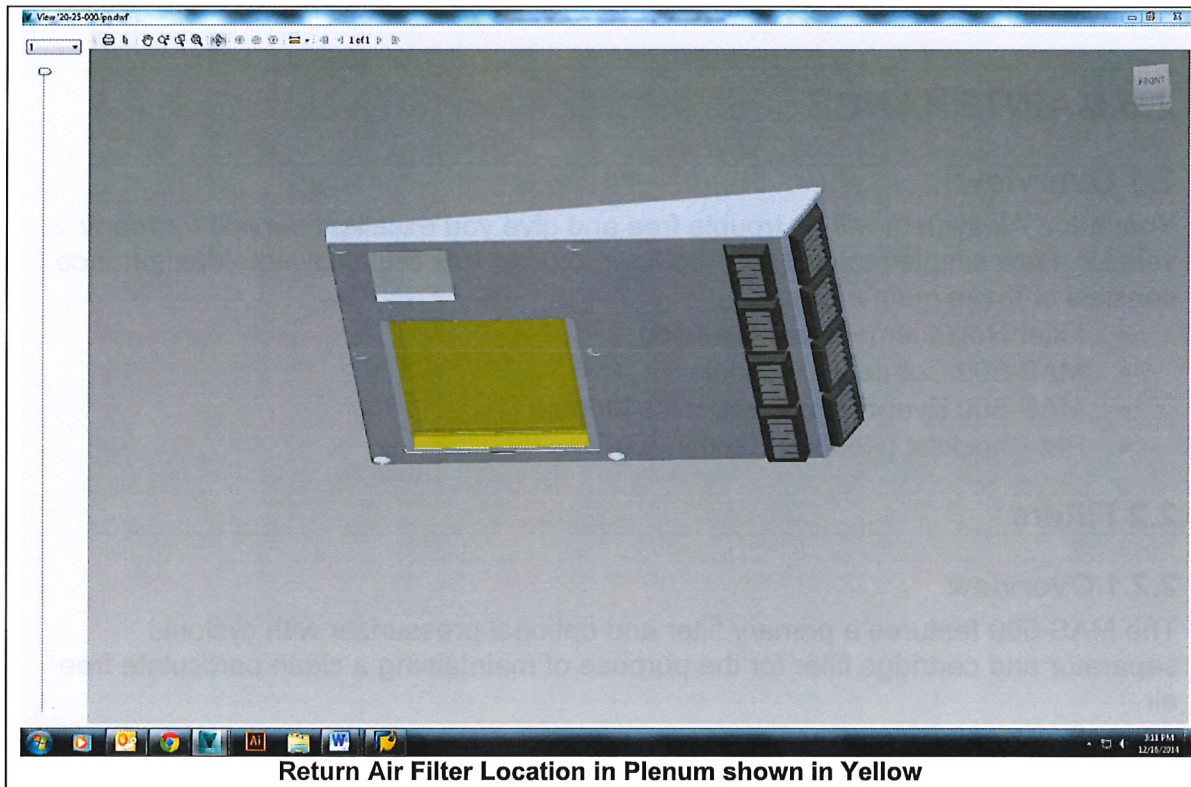
The MAS-500 features a primary filter and optional pressurizer with cyclonic separator and cartridge filter for the purpose of maintaining a clean particulate free air.

- Return Air Filter (Qty:1)
- Cartridge Filter (Optional, Qty:1)
- Cyclonic Separator (Optional, Qty:1)

Maintenance procedures are to be carried out as per the Preventative Maintenance Checklist found in section 5.0 of the Operations Manual.



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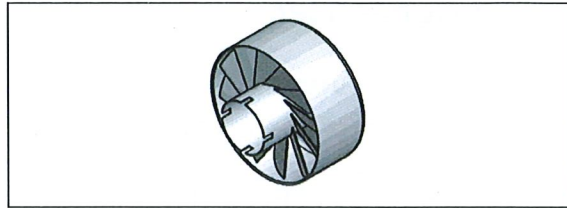


\*Pressurizer, filter positions and part numbers may be different in the Pit Bull version, see Shovel literature for more details\*



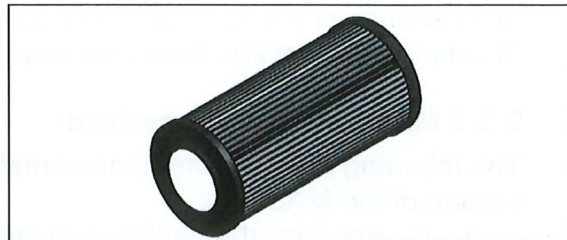
### 2.2.2 Cyclonic Separator Self Cleaning Pre-filter

This is a self-purging pre-cleaner. Other than checking this pre-cleaner during standard maintenance and blowing it out with compressed air, there are no required procedures for replacement.



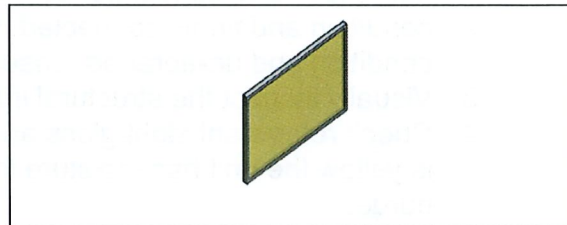
### 2.2.3 Cartridge Filter Part # 80-01-021

This is a cartridge style filter element located in the pressurizer filter housing. Note, for preventative maintenance reasons remove and dump the Vacuum Cap/Dust collector when replacing this cartridge.

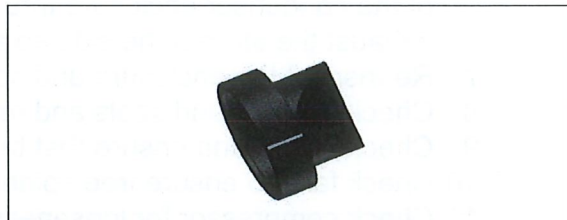


### 2.2.4 Return Air Filter Health Guard Part# MN80-04-000

This is a standard plenum filter located in the cab on the return air duct. This is a MERV 8 rated filter.



### 2.2.5 Dust Plug Check Valve Part# 80-02-022





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## **2.3 Condenser**

### **2.3.1 Overview**

This section of the unit houses the condenser coil and the compressors. Its purpose is to reject waste heat generated by the unit and is cooled by two fans. The efficiency of the unit is affected by the cleanliness of the condenser coil and the ability to move un-obstructed air through this enclosure.

Maintenance procedures are to be carried out as per the Preventative Maintenance Checklist found in section 5.0 of the Operations Manual.

### **2.3.2 Maintenance Procedure**

The following is the recommended maintenance procedure for the Condenser section of the MAS-500:

1. De-energize the unit by unplugging the main power cable.
2. Open hinged top cover and visually inspect the hose, pipe, wiring harnesses and condenser coil. Ensure all electrical cables are in good condition and firmly connected. Ensure all hose and wire are in good condition and un-abraded, ensure there is no damage to the coil fins.
3. Visually inspect the structural integrity of the enclosure.
4. Check refrigerant sight glass and ensure indicator is green. If the indicator is yellow the unit has moisture in the R-134a system and will require a purge.
5. Using compressed air (and insuring a safe distance from any flying particulates) blows out and debris from the condenser coil from the front of the unit and back into the case until the coil is clear of obstructions.
6. Using compressed air and maintaining a safe distance, blow out the inside of the condenser enclosure through the side fan panels. It is important to exhaust the air through the side so as not to obstruct the coil.
7. Re-Inspect the enclosure and coil to ensure a clean environment.
8. Check gaskets and seals and replace if required.
9. Check drains and ensure that they are un-obstructed.
10. Check fans to ensure free spinning fan operation.
11. Check compressor for looseness. Tighten if required.
12. Check the air dryer and receiver for looseness. Tighten if required.
13. Check condenser coil for movement. Tighten if required.
14. Re-connect the main power cable.



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## 2.4 Maintenance Procedure

The following is the recommended maintenance procedure for the Evaporator section of the MAS-500

1. De-energize the unit by unplugging the main power cable.
2. Open enclosure cover and visually inspect the hose, pipe, wiring harnesses and evaporator coil. Ensure all electrical cables are in good condition and firmly connected. Ensure all hose and wire are in good condition and un-abraded, ensure no damage has been incurred against the coil fins.
3. Visually inspect the structural integrity of the enclosure.
4. Using compressed air, if required, (and insuring a safe distance from any flying particulates) blow out dust and debris from the evaporator coil. Be aware that using compressed air will push debris into the cabin. The return air filter must be replaced if compressed air has been used in the cleaning process.
5. Re-Inspect the enclosure and coil to ensure a clean environment.
6. Check gaskets and seals and replace if required.
7. Check condensate drains and ensure that they are un-obstructed. Remove rubber flapper check valves and ensure that they are clean and in good working condition.
8. Check supply air fan to ensure free spinning fan operation.
9. Check evaporator coil for looseness. Tighten if required.
10. Re-connect the main power cable.



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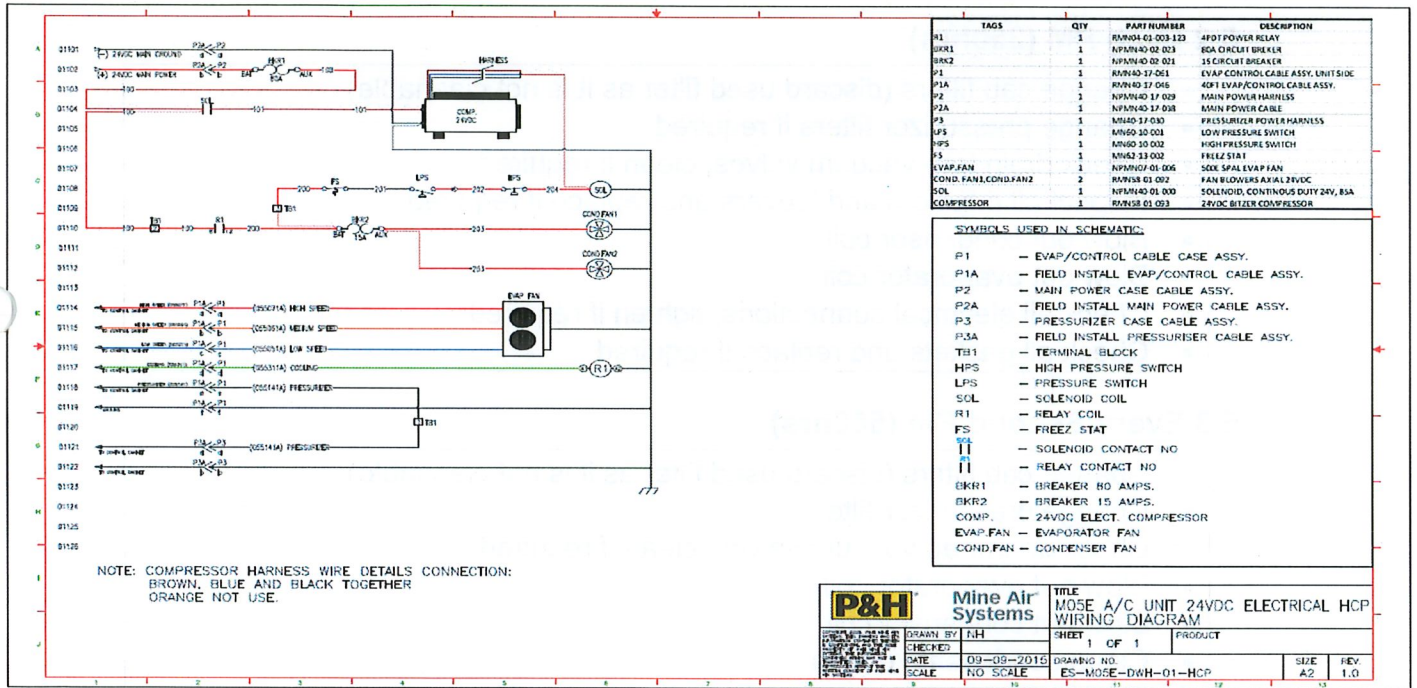
## 3.0 TROUBLE SHOOTING

### 3.1 Overview

The modular design of the MAS-500 allows you two options if verification reveals a problem with either the electrical or mechanical functions:

- Option 1: The entire unit can be replaced with an identical model in under 30 minutes at the next convenient work break in the field with a mechanic and a hoist. If a spare unit is not available weather guards must be installed on the roof flanges. This option has the following advantages:
  - Minimizes downtime of production equipment
  - Permits the time consuming removal and storage of R-134a according to B52 Mechanical and HVAC codes.
  - Allows for a full service check to be performed in a shop environment by a qualified HVAC mechanic or contractor.
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- Option 2: The problem can be diagnosed and solved on the spot. Because of down time and considerations with the refrigeration code, problems solved in the field should be limited to the following:
  - Breakers
  - Pressure sensors
  - Modular components like the pressurizer
  - Condenser coil cleaning
  - Motors, Fans and Blower Pack
  - Ambient sensor

4.0 MAS-500HCP ELECTRICAL SCHEMATIC





## 5.0 PREVENTATIVE MAINTENANCE CHECK LIST

### 5.1 Daily

- Inspect and or blow out pressurizer filter
- Inspect and blow out the cab filter
- Inspect units for any visible damage
- Replace filter every 120hrs (discard used filter as it is not cleanable)

### 5.2 Each PM (250hrs)

- Change cab filters (discard used filter as it is not cleanable)
- Change pressurizer filters if required
- Check drain trap vacuum valves, clean if required
- Inspect all diffusers and louvers and replace if required
- Blow out condenser coil
- Blow out evaporator coil
- Check all electrical connections, tighten if required
- Check all gaskets and replace if required

### 5.3 Every Second PM (500hrs)

- Change cab filters (discard used filter as it is not cleanable)
- Change pressurizer filter
- Check drain trap vacuum valves, clean if required
- Blow out evaporator coil
- Blow out condenser coil
- Clean condensate drains
- Check condenser fan blades for tightness and bearing wear
- Check Amp draw of compressor and condenser fans
- Check Amp draw on high and low blower fan speed
- Check temperature control for correct cooling fan speed settings
- Check and tighten all electrical connections
- Visually inspect compressor and lines for breakage or leaks
- Check pressures and temperatures (Qualified HVAC Mechanic Required)



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#### 5.4 Seasonal Cooling

- Blow out evaporator coil
- Blow out condenser coil
- Clean condensate drains
- Change filters
- Check air flow into cab
- Check controller operation
- Check fan and ambient sensor
- Check and tighten all electrical connections
- Visually inspect compressor and lines for breakage or leaks

#### 5.5 Seasonal Heating

- Change filters
- Check air flow into cab
- Check controller operation
- Check fan and ambient sensor
- Check and tighten all electrical connections



## 6.0 RECOMMENDED SPARE PARTS LIST

PART#	DESCRIPTION	QTY
NPMN40-01-000	24VDC, 85A Solenoid	1
RMN58-01-093	24VDC HC RC Compressor	1
MN60-10-001	Low Pressure Switch	1
MN60-10-002	High Pressure Switch	1
RMN58-01-094	6lb Receiver	1
RMN58-01-093	HC RC Condenser Fan	1
NPMN40-02-023	80 Amp Breaker <i>500HCP Version Only</i>	1
RMNMA-5E-006	500E E-Box Assembly <i>500HC Version Only</i>	1
NPMN60-07-006	Heating Valve Assembly <i>500HC Version Only</i>	1
NPMNHA-01-003	Condenser Louver Panel	1
RMN58-01-048	11" Finger Guard	1
NPMN07-01-005	500 Unit Evaporator Fan	1
NPMNMA-05-107-HC	Condenser Lid	1
RMNMA-5E-106	Evaporator Lid	1
MN80-04-000	Health Guard in cab Disposable Filter Merv8	4/month
NPMN50-02-009	Louvre, Cab Plenum 1-3/4 x 5-1/8 <i>500HC Cab Plenum Only</i>	1
MN40-02-021	15 Amp Breaker	1
MN50-01-005	Red light <i>500HC Controller Only</i>	1
MN50-01-004	Green light <i>500HC Controller Only</i>	1
MN50-01-003	Rocker switch <i>500HC Controller Only</i>	1
MN50-01-007	Temp Control <i>500HC Controller Only</i>	1
MN50-01-019	Knob <i>500HC Controller Only</i>	1
MN50-14-008	SPST Switch on/off <i>500HC Controller Only</i>	1
RMN04-01-003-1 -2 -3	-1 24vdc Power Relay -2 Relay Clip -3 8 Pin Socket	1 of each
MN60-08-002	Filter Dryer	1



## 7.0 UNIT OVERVIEW AND SPECIFICATIONS

Feature	Specification	Feature	Specification
<b>Description</b>	Roof Mounted Climate Control System w. Optional Pressurizer (24VDC PR-PK-125)	<b>Exchangeability</b>	Complete system - 25 min Electrical module - 10 min Control Module - 10 min
<b>Electrical</b>	24 Volt DC; Maximum 80 Amp current draw Pit Bull version Maximum 100 Amp current draw standard version	<b>Heating Capacity</b>	22500 Btu/hr @ 180 deg F glycol supply @ 5GPM Flow modulation via automatic on/off solenoid valve
<b>Recirculated Air Flow</b>	Merv:8 Filtration High Speed - 593 CFM Medium Speed - 490 CFM Low Speed - 360 CFM Merv:15 Filtration High Speed - 318 CFM Medium Speed - 261CFM Low Speed - 215 CFM	<b>Cooling Capacity</b>	18250 BTUH @ 85f
<b>Safety Controls</b>	Field replaceable without refrigerant loss. Low and high pressure. Ambient Switch	<b>Capacity Control</b>	Self-equalizing thermostatic expansion block valve
<b>Compressor</b>	Internal 24VDC Electric	<b>Compressor Oil</b>	POE Synthetic oil 4.4oz Charge from factory
<b>Refrigerant</b>	R-134A 5lb charge from factory	<b>Testing Pressure</b>	250psi
<b>Pressurization (Optional)</b>	100 CFM with clean filter, 20% reduction at change interval. Self cleaning pre-cleaner. Maintainable second stage filter cup. Donaldson radial seal disposable filter element (no fasteners). Cast aluminum, high speed impellor.	<b>Control</b>	Independent pressurizer control Function LEDs to indicate operational state Cooling/Heat mode switch
<b>Filter</b>	Disposable 65% efficient in cab filter. Custom filters to MERV 15 to suit individual requirements are available	<b>Construction</b>	Case: 16 gauge 316 stainless steel, polished finish. Coils: copper tube/copper fin - 10 fins/in Fins utilize sine wave profile for greater efficiency



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<b>Physical Size</b>	37.13" long x 33.56" wide x 11.13" high (943mm x 838mm x 283mm)	<b>Weight</b>	275lbs (125kg)
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