



Industrial Electrostatic Air Cleaner Owner's Manual

SMOG-HOG[®] Model MSH



ENGINEERING YOUR SUCCESS.

KNOW YOUR EQUIPMENT

READ THIS MANUAL FIRST.

Your SMOG-HOG® system should provide many years of trouble-free service. This manual will help you understand the operation of your SMOG-HOG® unit. It will also help you understand how to maintain it in order to achieve top performance. For quick future reference, fill in the system and filter information in the spaces below. Should you need assistance, call the Parker customer service number shown below. To expedite your service, have the following information available when contacting Parker.

Parker Order #: _____

Unit Model #: _____

Unit Serial #: _____

System Accessories:

Installation Date: _____

Parker Industrial Gas Filtration and Generation
Customer Service
1-800-343-4048

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SAFETY PRECAUTIONS

We have provided many important safety messages in this manual. Always read and obey all safety messages.



This is the safety alert symbol.

This symbol alerts you to potential hazards that can kill or hurt you and others. All safety messages will follow the safety alert symbol and the word “DANGER”, “WARNING” or “CAUTION”. These words mean:



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

IMPORTANT SAFETY INSTRUCTIONS

WARNING

To reduce the risk of fire, electric shock, or injury when using the air cleaner, follow these basic precautions:

- Use two or more people to move and install the air cleaning system.
- The air cleaner must be properly grounded.
- Disconnect power before servicing.
- Replace all access panels before operating.
- Wear protective clothing and safety glasses when handling collection components or servicing the air cleaner
- Electrical connections should only be made by qualified personnel and be in accordance with local and national codes and regulations.
- Do not use in explosive atmospheres.
- Use nonflammable cleaners.
- Do not collect emissions which are explosive.
- Keep flammable materials and vapors, such as gasoline, away from air cleaner.
- The unit should be inspected frequently and dirt removed to prevent excessive accumulation which may result in flash-over or fire damage.
- The air cleaner should not be used for support of personnel or material.
- Operate only in a safe and serviceable condition.

1. Important Notice

This manual contains important safety information and precautionary measures. It is impossible to list all potential hazards associated with every air cleaning system in each application. Proper use of the equipment must be discussed with a Parker representative. Operating personnel must be aware of, and adhere to, the most stringent safety procedures.

Unit Specifications:

| Model | Airflow | | Weight* | | Blower Size | | Electrical Service | |
|------------|---------|-------|---------|-----|-------------|-----|------------------------|-----|
| | CFM | CMH | lbs | kg | HP | kW | V/PH/Hz | FLA |
| MSH-05-H | 500 | 850 | 115 | 52 | 0.25 | 0.2 | 100-120/1/60 3-wire | 2.3 |
| MSH-05-V | | | 175 | 79 | | | | 2.9 |
| MSH-05-M-H | | | | | | | | |
| MSH-05-M-H | | | | | | | | |
| MSH-11-H | 1,100 | 1,870 | 192 | 87 | 1.45 | 1.1 | 230/1/60 4-wire | 5 |
| MSH-11-V | | | 275 | 125 | | | | 5.3 |
| MSH-11-M-H | | | | | | | | |
| MSH-11-M-V | | | | | | | | |

For Indoor Use Only

* Weights are approximate and may not reflect final unit weight

2. Description (See figure 1)

This unit is a self-contained, two-stage, air cleaner designed to remove dry or oily airborne contaminants from industrial work areas. Operating on the principle of electrostatic precipitation, it pulls air past a mist-stop pre-filter, charges and collects airborne particulate, then exhausts clean air to the environment.

Mist-stop pre-filters serve the dual purpose of trapping large particles and diffusing the air stream evenly into the precipitator components at low, controlled velocity. Air passes through an ionizing section where nearly all particulate is charged; then on to a collecting section where charged particles are repelled from similarly charged plates and drawn to ground plates. Agglomerated particles separated from collection plates during unit startup are trapped on an after-filter, allowing clean air to pass through the system blower at all times.

The Model MSH may be ducted directly to the contaminant source or un-ducted to remove particles from the general environment.

2.1 System Components

1. Mist Stop Filter

The Mist Stop filter is a pre-filter used to remove large particulate and aids in diffusing the air entering the ESP section.

2. High Voltage Power Supply

The power pack contains the necessary components to convert customer provided input power (see section 1) to the high-voltage DC required for the ionizer and collection cell.

To ensure both equipment and personnel safety, the power supply high voltage output circuit is limited to a maximum of 5.0mA when using power-pack 21-1216 and 5.6mA when using power-pack 21-1234.

In the event of a short circuit or other overload condition, the power supply is designed to cause the high voltage to collapse. When the voltage collapses, the indicator light will blink. When the overload is removed, the voltage will automatically build up to normal and the indicator light will illuminate. The power supply is self-protecting against overload.

When the power is removed from the power supply circuit, an internal resistor bleeds off the residual charge on the collection cell. As a precaution, when the access door is opened, the blade of an insulated handle screwdriver should be used to ground components before removal (see grounding procedure, figures 5 & 6).

3. Unicell Ionizing & Collection Section

The ionizing section supports thin tungsten wires which carry a positive charge of approximately 11 KVDC. This section electrically charges (ionizes) the contaminated particles being pulled through the unit.

The collection section contains plates alternately charged to a positive voltage of approximately 5.5 KVDC. This section collects charged particles passing through the ionizer.

4. Air Mover

The motor/blower pulls in the contaminated air and exhausts the clean air through the outlet.

3. Installation

3.1 Inspection Notice

Upon receipt of your unit, check for any shipping damage. A damaged carton indicates that the equipment may have received rough handling during shipping that may have caused possible internal damage. Notify your delivery carrier and enter a claim if any damage is found.

3.2 Installation Planning

Locating the Unit: Consideration must be given to the placement of the precipitator to maximize its effectiveness. When your SMOG-HOG® is used as a ducted source collector, the enclosure or pickup hood design is important for adequate capture of contaminants. Model MSH blowers have limited static pressure capacity. Check with factory for anticipated duct losses in excess of 0.5 inWC (12.7 mmWC).

! DANGER

DO NOT OPERATE THIS EQUIPMENT IN THE PRESENCE OF COMBUSTIBLE VAPORS OR GASES

3.3 Unit Mounting

Carefully remove the unit from the shipping container, again inspecting for shipping damage. For ease of installation, open the access door and remove the unicell and filters from the cabinet.

Units are designed for machine mounting. Units may be mounted onto any flat surface such as a machine tool cabinet top or on an angle iron support base using the mounting feet on the unit. Ensure the structure is adequate to safely support the full weight of the MSH unit.

Prior to installation, verify you have at least 25" (635 mm) [Horizontal Single-Pass, Vertical Single & Tandem Pass] and 40" (1016 mm) [Horizontal Tandem Pass] for door swing and component access on the door side of the unit. Allow 12" (305 mm) clearance from side obstructions to electrical box where the high voltage power supply is located. Allow 15" (381mm) clearance to the blower access panel for service.

Drain Connection: MSH unit is equipped with a 1¹/₂" NPT drain and can be supplied with an optional drain loop assembly. (See figure 2) (horizontal unit only)

! DANGER

ELECTRICAL SHOCK HAZARD ELECTRICAL CONNECTIONS SHOULD ONLY BE MADE BY QUALIFIED PERSONNEL

To avoid the risk of electrical shock and proper operation of the air cleaner when making the power connection make certain the air cleaner is grounded by connecting a good earth ground wire to the earth ground point in the electrical enclosure.

Installation should conform to all national and local codes.

Refer to Section 9 for your appropriate wire diagram and interconnect. Ensure to take into account all purchased options. These may include power cord kits, remote on/off, disconnect, and/or external transformer. Complete the electrical connections to the unit utilizing the supplied terminal blocks inside the electrical enclosure.

4. Start-Up and Operation

For best results, the unit should be started before the air becomes contaminated, insuring clean air at all times. The unit has been thoroughly tested prior to shipment from the factory; however, there may be some initial arcing of the components at start-up. The arcing should cease after a few minutes of operation.

An indicator light on the unit is illuminated during normal operation of the power pack and unicell. If the light fails to illuminate when the power is turned on, see "Troubleshooting" (section 6.4) for further instructions. Periodically, momentary shorts will occur indicated by the flickering indicator light. If the light is dim, fails to glow, or continues to flicker, the components may need cleaning or servicing (see "Cleaning Instructions", Section 5.2 and 5.3).

5. Maintenance and Manual Cleaning

! CAUTION

The MSH unit should be inspected frequently and collected contaminant removed from the system regularly to prevent excessive accumulation which may result in a flashover or risk of fire.

5.1 Normal Maintenance

Once the unit is operational, periodic maintenance is necessary to assure proper performance. Follow a regular pattern of unit observation and log abnormal conditions. Since units reflect the process under control, maintenance patterns will vary accordingly.

Check Power Pack Enclosure Indicator Lights

The MSH should be monitored daily by observing that the indicator light is illuminated to each power pack enclosure. Occasional arcing (flashing of an indicator light) is normal. An established arcing condition or dead short condition (continuous flashing of an indicator light) or the indicator light is not illuminated is not normal should be corrected.

Check Component Appearance Weekly

A visual of the unicell could identify problems such as moderate to extreme contaminant build up to the unicells even though the indicator lights are illuminated. This will be helpful in scheduling a manual cleaning of the components. To check the condition of the unicells, place the MSH off line. Open the module door and perform the grounding procedure, refer to Figures 5 and 6, inspect the condition of the unicells, filters, door feed-thru insulators and interior of the cabinet. Experience will dictate whether contaminant build-up is excessive. Contaminant build up will decrease high voltage to the ionizer and collector cell circuit. When accessing the module, always clean the two door feed-thru insulators.

The following should be inspected.

Inspect the ionizer section of each unicell, noting the condition of the contact spring (distorted? bent? missing?), ionizer standoff insulators (contaminant build up) and ionizer wires (contaminant build up? missing?), repair or replace. Ionizer wires should be taut and centered between ground plates. Ground plates between each ionizer wire should be straight and parallel. Inspect the collector cell section of each unicell, noting the condition of the contact spring (distorted? bent? missing?), cell plates (bent? warped?) should be parallel and straight, repair or replace. Cell hot plates (smaller dimensional plate) should be centered between ground plates (larger dimensional plate). Cell plates should not have contaminant bridging between the cell plates or at support structure corners or the triangular insulators. Inspect filters, noting the condition (contaminant build up?, media separation?, bent frames?) should not have contaminant build up restricting airflow, repair or replace. Module drain sump should not have moderate to extreme contaminant build up. Unicell module support tracks should be free of contaminant build-up for ground contact. Module and access doors gaskets should be in-place and in good condition.

5.2 Manual Cleaning of Smog-Hog Components

There are a number of methods for manual cleaning, certain key cleaning criteria contribute to the effectiveness of every method. These include the type of detergent, detergent strength, water temperature, agitation/impingement, duration, rinse procedure and dry-out time.

Type of Detergent

In general, the detergent used on most hydrocarbons (e.g., oily residues) will be alkaline in nature. It is extremely important that the detergent have a built-in buffering agent to reduce aluminum deterioration.

Detergent Strength

Detergent concentration in a mixture with water varies with the application from 1:1 to 20:1 parts water to parts detergent. For any contaminant condition, the best course is to use a cleaning solution per the detergent manufacturer's directions. More or less detergent may eventually be required for effective cleaning at reasonable detergent cost. The recommended factory detergent concentration is 5% (20:1).

CAUTION

Never mix caustic and alkaline detergents for manual cleaning. Detergent mixing could cause rapid heat release, gel formation, or some other undesirable condition.

Water Temperature

Detergents can be up to twice as effective in hot water. Hot water alone is very effective in softening built-up residue. Water temperature should be 140°F to 170°F, not to exceed 180°F.

Agitation/Impingement

These methods are virtually the same, with impingement being the most extreme form of agitation. Any liquid movement over built-up residue will remove a layer, allowing detergent to work on the next layer. A reduction in cleaning time duration usually results.

Cleaning Cycle Duration

In most cleaning methods, adequate time should be allowed for the detergent to remove the contaminant thoroughly. Reaction time will vary depending on detergent strength, temperature and agitation. Guidelines for mixing, heating and expected results are included on specification sheets for most detergents. Time is necessary for effective cleaning. Soaking may seem slower and less effective than high impingement and/or hot water above 180°F for cleaning action, so personnel should be forewarned about using excessive pressure or temperature to shortcut the cleaning process. High pressure or stream spray cleaning until plate edges are shiny is not effective. Not only will penetration to the cell core not occur, but warping and bending of the plates may result as well. Patience and thoroughness of cleaning best preserve the integrity of the components in the long term. Soaking and gentle rinsing provides for best results.

Rinse Procedure

Cleaned components should be rinsed off quickly and thoroughly to remove remaining contaminants. Some detergent residue will remain if rinsing is not performed. The residue may contribute to voltage bleed-down when the unicell is placed in operation. Also, even though the detergent is "buffered" prolonged contact could cause minor corrosion. Hot water should be used for rinsing.

Dry-Out Time

Unicells and filter media should be dry before the MSH is placed into operation. Startup of a wet system will cause dead short conditions to the ionizer and collector cell circuits. Wet unicells and filter media should be placed in a warm room for drying. Techniques such as hand wiping insulators and blow drying unicells and filter media with compressed air will decrease drying time.

5.3 Manual Cleaning Methods

The manual cleaning method selected will depend on the type of contaminant, rate of deposit, facility limitations such as cleaning time windows (process downtime) and available utilities. All cleaning methods listed in this section are acceptable.

Soak Tank

This method involves placing unicells and filter media in an agitated solution of hot water and detergent and is the most effective method. With proper detergent selection, this procedure will quickly remove most contaminants. Unicells and filter media should not be placed in highly concentrated detergent solutions or allowed to soak for extended periods, (e.g., overnight), especially at elevated temperatures. Extended soaking (e.g., days) in solvent or detergent solution will degrade components over time and should be avoided.

Portable Pressure Washer

A self-contained pressure washer with a spray wand can be an effective cleaning method, providing it is used with caution. Care should be taken not to expose the unicells to close-up and prolonged blasts of high pressure/temperature, causing cell plate deformation, requiring a replacement set of unicells and filter media.

Automatic Parts Washers

Certain commercially available units combine and automate the features necessary for effective cleaning, including water heating, detergent injection, agitation, rinsing and drying.

Other Cleaning Considerations

The previous methods address the cleaning of unicells and filter media. The MSH cabinet should also be periodically cleaned (i.e., during normal planned downtimes) to reduce contaminant build up. High voltage output of the power packs should also be checked when manual cleaning is performed.

5.4 Appearance Of Components After Cleaning

Components should have a clean, not necessarily “new,” aluminum appearance. Moderate discoloration will not affect unit efficiency. Checklist for acceptable components.

Unicell

1. Frame, end plates and cell plates are free of contaminant build-up (residual contaminant has been removed between plates and at corner supports).
2. The frame is square, cell plates are parallel and cell hot plates are centered between ground plates.
3. Ionizer standoff insulators and cell triangular insulators are cleaned (no residual coating). Cracked or carbon-tracked insulators have been replaced.
4. Ionizing wires and springs are intact and taut, centered between plates and free of coatings.
5. Contact springs and contact screws are properly located, and replace missing contact hardware.
6. Contact springs are not deformed.
7. Bent or broken parts have been repaired or replaced.

Pre-filters/After-filters

1. Aluminum media and frame are free of contaminant.
2. Frame is square and media is intact.
3. Filters are to be installed with drain holes on the bottom.

Cabinet

1. Door feed-thru insulators are cleaned and white.
2. Door gaskets are cleaned and intact.
3. Component tracks are free of contaminant build up (for unicell grounding).
4. Module drain sump is cleaned and free-flowing.
5. Interior is free of extreme contaminant build-up.
6. Blower wheel is free of contaminant build-up.

5.5 Replacing Damaged Ionizer Wires

1. Remove the damaged wire from each spring. Also replace spring if it is damaged.
2. Loop one end of the new wire over the bottom spring, then extend the top spring and loop the end of the wire over the top spring. Pliers may aid in this procedure (Refer to Figure 4).

NOTE: In the event that replacement wires are not immediately available, the ionizer may be left in service. Remove broken wire(s) and springs from the assembly. Operation with missing wires will result in reduced operating efficiency.

6. Troubleshooting

 **CAUTION**

TROUBLESHOOTING AND SERVICING PROCEDURES SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY

6.1 Tools Required

Screwdriver: 8 inches or longer with insulated plastic handle.

Volt-Ohm meter: For checking input voltage, low-voltage DC and continuity (ohms).

High-voltage probe: For checking high-voltage power supply (range: 0 to 15 KVDC)


Amp probe (or clip-on amp meter): For checking motor current.

6.2 Perform Before Troubleshooting

The following should be checked to the module(s) in which the indicator light(s) is flashing or is not illuminated. Corrections should be completed and parts replaced.

- Contact springs in the correct location, Figure 1.
- Unicell components have a moderate to extreme contaminant build up, manually clean the unicell components.
- Ionizer wires and tension springs missing or broken, remove broken wires and springs from the drain sump.
- Ionizer standoff insulators, cell triangular insulators, and or door feed through insulators display moderate to extreme contaminant build up, broken or carbon tracked insulators (imbedded black streak which cannot be removed by cleaning, replace insulator).

6.3 Troubleshooting Procedure

 **CAUTION**

Risk of electrical shock. The high voltage circuits to the ionizer and collector should be grounded before removing the power pack, high voltage wires, door feed through insulators and unicell(s). The grounding procedure can be accomplished by waiting one minute after turning the unit off and referring to Figures 5 and 6. An internal resistor within the power pack discharges the residual high voltage. The grounding procedure statement is not identified within the troubleshooting steps but should be performed. The power pack total current output is limited to a maximum of 5 milliamps to assure personnel safety.

WARNING

Power pack enclosure(s) service voltage is 120VAC or 230VAC. This can be lethal. Voltage (120 VAC) or (230 VAC) is present within the power pack enclosure.

HIGH VOLTAGE SPECIFICATIONS:

Ionizer Circuit Operating Range: 10.0 to 11.8 KVDC

Collector Cell Circuit Operating Range: 5.0 to 7.5 KVDC

There will be continuous cell arcing if cell voltages exceed 7.5 KVDC.

If there is a dead short condition or arcing condition usually the problem is within the collector cell. The power pack should be confirmed that the power pack is operational, start with step (1), before proceeding to the step (2). In the event of a dead short condition the power pack is designed to "shut down" the high voltage to the ionizer and collector cell circuits causing the indicator light to flash. When the dead short condition is removed the high voltage output will return to normal. The indicator light will be illuminated. The power pack is self protecting from dead short conditions.

All connectors on the power pack are identified with name and wire number with the exception of the ground connector (green wire to this connection) Refer to Figure 7. Step 1 and Step 2 do not require a high voltage probe.

The ionizer section supports 10 mil tungsten wires which apply a high voltage positive charge to the contaminant particles.

The cell section contains plates alternately charged collecting the charged particles from the ionizer section.

High voltage problems can generally be isolated by reference to the indicator light. If the indicator light(s) are illuminated and the unit is moving air but efficiency is below normal (unicells not dirty, smoke discharging from the exhaust blower) check that the contact springs are in the correct locations, see Figure 1.

A high voltage probe is required to measure high voltages to the ionizer and collector circuits to the unit. As an accessory, a high voltage probe can be purchased for a multimeter.

STEP 1

PROBLEM: Indicator light is flashing or not illuminated

PROCEDURE: Checking the power pack

The MSH should be placed "off", open power pack enclosure lid door, and disconnect both high voltage wires (Ionizer #8 and Collector #7) from the power pack. The high voltage wires should carefully be placed away from the ionizer and collector cell power pack connectors, eliminating the high voltage wires from contacting the power pack connectors. Place the MSH "on"; the indicator light should be illuminated. If the indicator light is illuminated the power pack is operational, proceed to step (2). If the indicator light is flashing (high voltage wires #8 and #7 disconnected from the power pack), the power pack requires replacement. If the indicator light is not illuminated proceed with following until the problem is corrected.

Verify there is 120 VAC to the power pack, place the MSH "off" and remove the 120 VAC wires from the power pack terminals 5 and 6. Connect the multimeter to the two 120 VAC wires and place the MSH "on". If 120 VAC is not present there are problems upstream from the power pack, refer to wiring diagram.

STEP 2

PROBLEM: Indicator light is flashing.

PROCEDURE: Checking the unicell components

Do not proceed with step (2) until step (1) is completed. The following steps are the process of elimination in identifying the problems to the ionizer/collector cell circuit.

There are four conditions which could occur with a flashing indicator light.

1. The high voltages are below specifications to the ionizer and or the collector cell circuit(s).
2. There is an arcing condition to the ionizer and or collector cell circuit(s).
3. There is a dead short condition.
4. The power pack has failed. Refer to step 1.

(a) Place the MSH "off", and open power pack lid door. Disconnect high voltage wire #8 to the ionizer connector with high voltage wire #7 (Collector) connected on the power pack and place MSH "on". The indicator light should be illuminated. If so, the cell circuit is operational proceed to (b). If indicator light is flashing perform the following:

- Place MSH "off", open component door, and remove the unicell(s).
- Place MSH "on". The indicator light should be illuminated. If the indicator light is illuminated the problem is within the collector cell section. If the indicator light is flashing the problem is the high voltage door feed through insulator (dirty, cracked, carbon tracking) and or the high voltage wire (broken wire or wire insulation has deteriorated causing a dead short condition).

Parts should be replaced as required.

Inspect the unicell(s) for the following:

Collector Cell Conditions Causing Failure

- Dirty collector cell(s) (contaminant build up bridging the cell plates and or on cell triangular insulators) requiring manual cleaning.
- "Wet" collector cell(s), not properly dried after manual cleaning, use compressed air to accelerate the drying time.
- Deformed collector cell contact springs contacting a "grounded surface".
- Bent cell plate(s) contacting the opposing cell plate(s).
- Carbon tracking to the cell triangular insulators, imbedded black streak which cannot be removed by cleaning (replace insulator).
- Surface oxidation to unicell component requiring a replacement.
- Unicell is structurally weak, loose steel rivets, deterioration to cell plate spacers or paper thin cell plates due to utilizing the improper detergent.

Parts should be replaced as required, install unicell(s).

Sometimes a flashing indicator light will clear itself by removing the unicell(s) from the module and then installing the unicell(s) back into the module.

Place MSH "off"; connect all wires which have been disconnected and install unicell(s).

(b) Indicator light is illuminated with the high voltage wire #7 connected to the collector cell connector on the power pack. Place MSH "off" and connect high voltage wire #8 to the ionizer connector on the power pack. Place the MSH "on".

The indicator light should be illuminated? If so, the unicell(s) are operational. If the indicator light is flashing perform the following:

- Place MSH "off", open the component door, and remove unicell(s).
- Place MSH "on". If the indicator light is illuminated the problem is within the ionizer section. If the indicator light is flashing the problem is the high voltage door feed through insulator (dirty, cracked, carbon tracking) and or the hv wire (broken wire or wire insulation has deteriorated causing a dead short condition).

Parts should be replaced as required, install unicell(s).

Inspect the unicell(s) for the following:

Ionizer Conditions Causing Failure

- Dirty ionizer(s) (contaminant build up) requiring manual cleaning.
- "Wet" ionizer(s), not properly dried after a wash cycle or manual cleaning procedure, use compressed air to accelerate the drying time.
- Deformed ionizer contact springs contacting a "grounded surface."
- Broken ionizer wires.
- Contaminant build up and or cracked ionizer stand off insulators.
- Carbon tracking (black streak) to the ionizer stand off insulators (replace insulator).
- Ionizer wires not "taut" contacting the ground plates.
- Bent ionizer wire support bar contacting a "grounded surface."
- Bent ground plates contacting the ionizer wires.
- Surface oxidation to unicell component requiring a replacement.
- Unicell is structurally weak or has loose rivets.

Parts should be replaced as required.

Sometimes a flashing indicator light will clear itself by removing the unicell(s) from the module and then installing the unicell(s) back into the unit.

High Voltage Probe Measurements

A high voltage probe (refer to manufacturers instructions) is required to measure high voltage output from the power pack. The component door should be closed with unicell(s) installed, the indicator light illuminated and high voltage wires #8 and #7 connected to the power pack. Refer to Figure 3. If the indicator light is flashing or not illuminated perform STEP 1 and if required STEP 2 as outlined earlier in this section.

"With Load" is a measurement with high voltage wires #8 and #7 connected to the power pack and unicell(s) installed.

1. Place MSH "on".
2. Open the lid door to the power pack enclosure and connect the ground wire from the high voltage probe to the bare metal surface.
3. Place the tip of the high voltage probe to the ionizer door feed through insulator bolt. The high voltage measurement should be 10.0 to 11.8 KVDC. If the ionizer voltage is below specifications refer step 2, "Ionizer Conditions Causing Failure." Low ionizer voltage will decrease the collector cell voltage but low cell voltage will not affect the ionizer voltage.
4. Place the tip of the high voltage probe to the collector cell door feed through insulator bolt. The high voltage measurement should be 5.0 to 7.3 KVDC. If the collector cell voltage is below specifications refer step 2, "Collector Cell Conditions Causing Failure."

"No Load" is a measurement of the power pack with high voltage wires #8 and #7 disconnected from the power pack.

1. Place MSH "off".
2. Remove the high voltage wires #8 and #7 from the power pack gently bend high voltage wires to eliminate the high voltage wires from touching the power pack connectors.
3. Place MSH "on".
4. Place the tip of the high voltage probe to the ionizer and to the collector power pack connectors. The high voltage measurement should be 10.0 to 11.8 KVDC to the ionizer and 5.0 to 7.3 KVDC to the collector cell. If high voltage is below specifications to one or both circuits replace the power pack.

COMBUSTIBLE DUST HAZARDS – SMOG-HOG[®] and DUST-HOG[®] Pollution Control Systems

Pursuant to National Fire Protection Agency (NFPA) Standards, the owner/user is required to test their dust mixtures to evaluate and understand potential combustion or deflagration hazards that may exist. In addition, NFPA standards require the owner/user to perform and have record of a Dust Hazard Analysis (DHA) if there is potentially a combustible material involved within or exposed to the process.

The DHA serves as a systematic review of the process to:

- 1) Identify where fires and explosions can occur;
- 2) Identify the potential causes and consequences, and;
- 3) Determine if existing and proposed safeguards are sufficient.

It is the responsibility of the owner/user to evaluate, interpret and document any associated risk in their process including adherence and compliance to any and all applicable local, state and federal codes, standards, laws and regulations.

It is the sole responsibility of the equipment owner/user of record to coordinate and perform sample material collection and combustion/explosivity testing of any and all dust and material that will be extracted and filtered by the Air Pollution Control (APC) filtration equipment and to notify Parker of the results prior to any discussion involving equipment specification and solution recommendation. It is recommended to utilize a Certified Industrial Hygienist (CIH) or certified safety expert that is properly trained, licensed and approved and to use a licensed and approved dust testing facility for proper dust and material analysis, testing protocol and reporting procedures. A sample of testing facilities and list of Industrial Hygiene (CIH) and other occupational and environmental health and safety (OEHS) consultants can be located through AIHA (American Industrial Hygiene Association) website.

To minimize the risk of fire or explosion, user must ensure proper installation, operation and maintenance of Parker equipment. Since application, installation, operation and maintenance are beyond the control of Parker, Parker disclaims any liability or responsibility for damage from fires or explosions regardless of origin. Parker recommends that all APC dust collection equipment, installation and application conform to any and all applicable local, state and federal standards, codes, laws and regulations including the addition of appropriate fire or explosion protection systems including but not limited to venting, mitigation, suppression and isolation when and where required. Installation of Parker equipment should be by a licensed contractor that is also experienced in potential fire and explosion hazards and adheres to related local, state and federal codes, standards, laws and regulations. Parker is not an expert nor certified design consultant in relation to spark, fire or explosion mitigation including but not limited to detection, mitigation, suppression and isolation of combustible dusts and materials. Therefore, Parker recommends that any industrial air filtration system recommendation, design or solution be reviewed, approved, stamped and signed by an industry expert consultant in air filtration systems, combustible dust/materials or certified safety expert such as a Certified Industrial Hygienist (CIH) or a Certified Professional Engineer (PE) who is a licensed and certified expert with industrial filtration system design and application including adherence and compliance to any and all applicable local, state and federal codes, standards, laws and regulations.

Pursuant to Parker's Offer of Sale (terms and conditions) and by accepting the purchased equipment, Buyer and owner/user agree to defend, indemnify, and hold harmless Parker, its successors, assignees, suppliers, shareholders, directors, officers, employees, agents, and affiliated companies from all losses, costs, damages, demands, claims, liabilities, fines, penalties or any other expenses (including attorneys' fees, court costs, and expert fees) (collectively "losses"), caused or contributed to in any way by Buyer or owner/user's failure to follow these instructions and/or failure to properly install, apply, operate, or maintain the equipment purchased from or supplied by Parker, or losses caused or contributed to in any way by Buyer's and owner/user's failure to provide accurate information, specifications or dust explosivity values.

6.4 Troubleshooting Table

| PROBLEM | POSSIBLE CAUSE | POSSIBLE SOLUTIONS |
|--|--|--|
| 1. Control switch on, indicator lamp off, air mover operates. | Defective lamp | Replace lamp |
| | Faulty connection to lamp | Check connection to lamp |
| | Loss of high voltage | Check power supply |
| 2. Control switch on, indicator lamp on, air mover does not operate. | Air mover faulty | Replace air mover |
| | Foreign object blocking air mover | Clean foreign object from air mover |
| | Faulty control switch | Replace control switch |
| | Connector not properly connected (at control switch) | Check connection at control switch |
| 3. Control switch on, air mover and lamp off | Fault in input supply voltage | Correct wiring |
| | Safety interlock switch not engaged | Engage safety interlock switch |
| | Safety interlock switch defective | Replace safety interlock switch |
| | Control switch defective | Replace control switch |
| 4. Poor air quality | Unicell dirty | Clean unicell |
| | Unicell malfunction | Check unicell for: <ul style="list-style-type: none"> • Foreign matter between plates • Ionizer wires loose or broken • Defects in insulators |
| | Unicell installed backwards or upside down | Install unicell correctly |
| | High-voltage contacts dirty | Clean high-voltage contacts |
| 5. High voltage output low or zero | Loss of input voltage | Determine loss of input voltage |
| | Unicell malfunctioning | Check unicell for: <ul style="list-style-type: none"> • Foreign matter between plates • Ionizer wires loose or broken |
| | Power supply defective | Replace power supply |

7. Replacement Parts

Common replacement parts are shown on the following page. For additional information regarding your air cleaner, contact your local representative.

For prompt service, please have available:

1. Unit model number (nameplate)
2. Unit serial number (nameplate)
3. Part number and part description

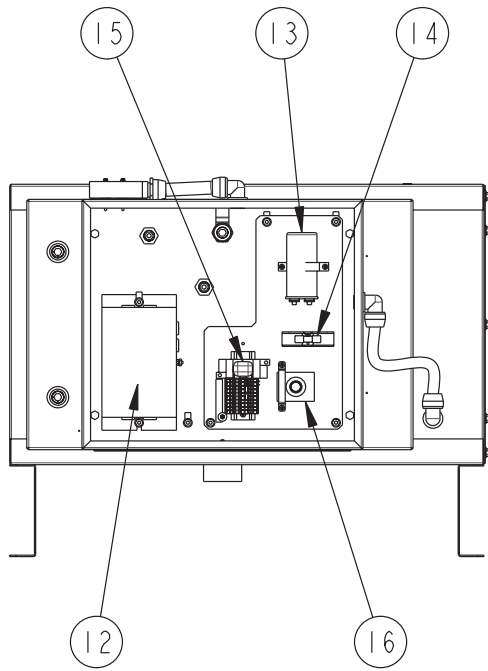
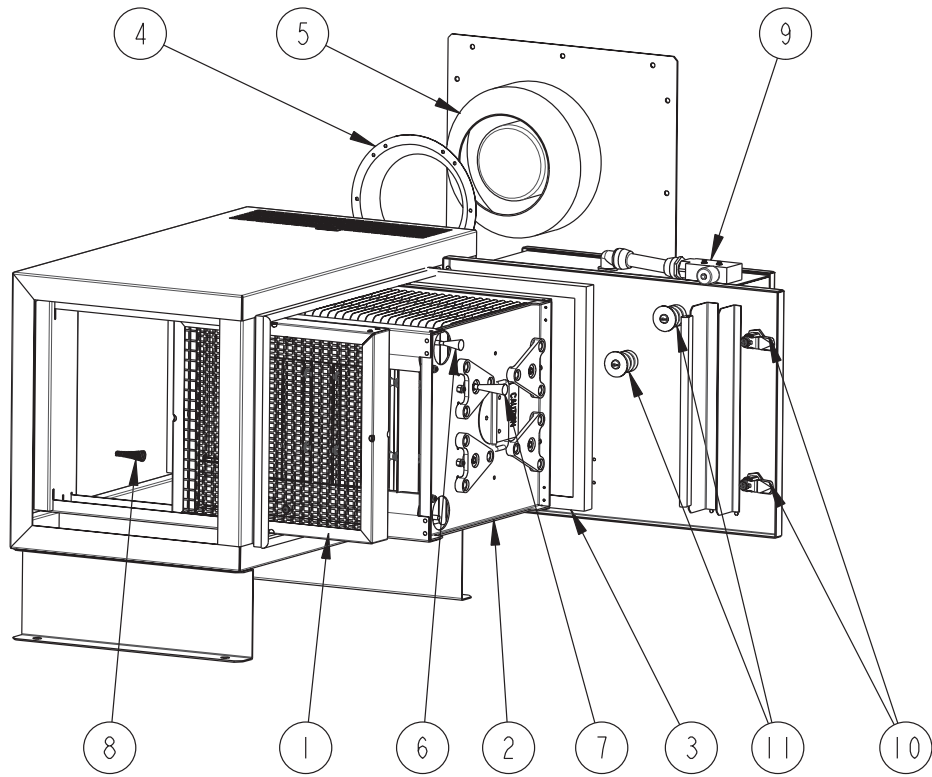
Returning parts: When returning parts directly to Parker for any reason, call Parker at 1-800-343-4087 for a return authorization number before returning the parts. This number must be on the package being returned.

7.1 Replacement Parts List (Reference Figure 1)

| Item | Description | MSH-05 | MSH-11 |
|------|-------------------------------|-----------------|---------------------|
| 1 | Mist Stop Pre-Filter | 33-10116 | 33-10121 |
| 2 | Unicell | 02-10429-0001-S | 02-1921-S |
| 3 | Mesh After-Filter | 33-10110 | 33-10120 |
| 4 | Inlet Cone Ring | 32-10053 | 32-10067 |
| 5 | Motorized Impeller Fan | 32-10052 | 32-10065 |
| 6 | Ionizer Spring | 36-0068 | 36-0068 |
| 7 | Cell Spring | 36-0012 | 36-0012 |
| 8 | Cell Ground Spring | 36-0016 | 36-0016 |
| 9 | Interlock Switch | 20-0005 | 20-0005 |
| 10 | Filter Door Latch | 39-10054 | 39-10054 |
| 11 | Feed Through Insulator | 37-0026 | 37-0026 |
| 12a | Power Pack | 21-1216 | 21-1216 |
| 12b | Power Pack, High Energy | 21-1234 | 21-1234 |
| 13 | Capacitor* | 20-2640 | 25-10012 |
| 14 | Fuse | 20-0769 | 20-1245 |
| 15 | Relay | 20-2955 | 20-10181-4PR |
| 16 | Speed Control | 20-10187 | 20-001277 |
| - | Spring, Ionizer wire (20/set) | 03-0559 | 03-0559 |
| - | Ionizer Wire 10 mil | 02-10426-0001 | 03-0738 (set of 10) |
| - | 12V, Green Indicator Lamp | 02-10561-G | 02-10561-G |

For parts not listed above, please consult Parker for assistance.

*MSH-11 Capacitor is located in clean air chamber next to blower.



ELECTRICAL PANEL DOOR,
 LABELS, AND DOOR GASKET
 REMOVED TO SHOW INTERIOR
 COMPONENTS

61-10076

Figure 1. Unit Components

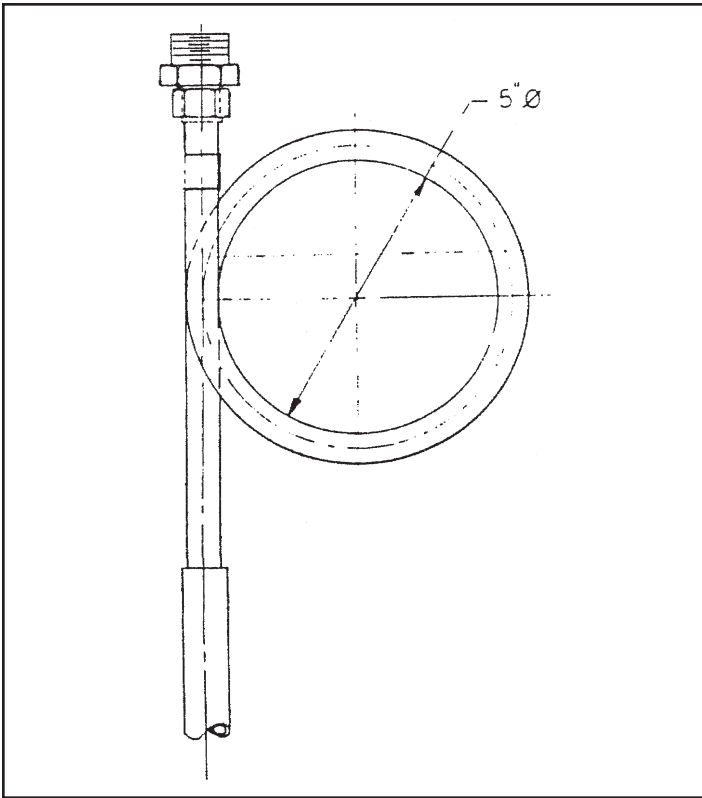


Figure 2. Drain Loop Assembly

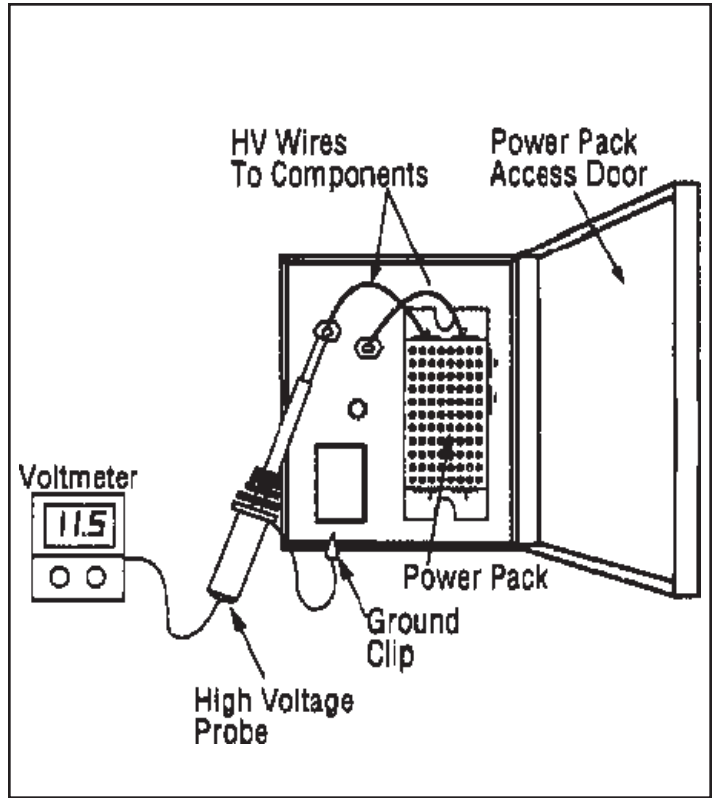


Figure 3. Ionizer and Cell Voltage Measurement

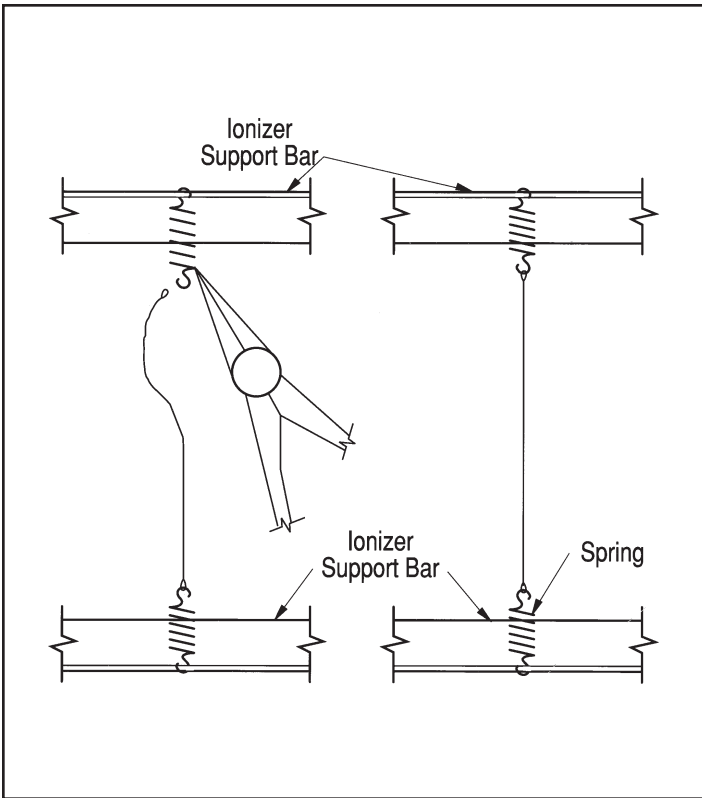


Figure 4. Replacing Ionizer Section

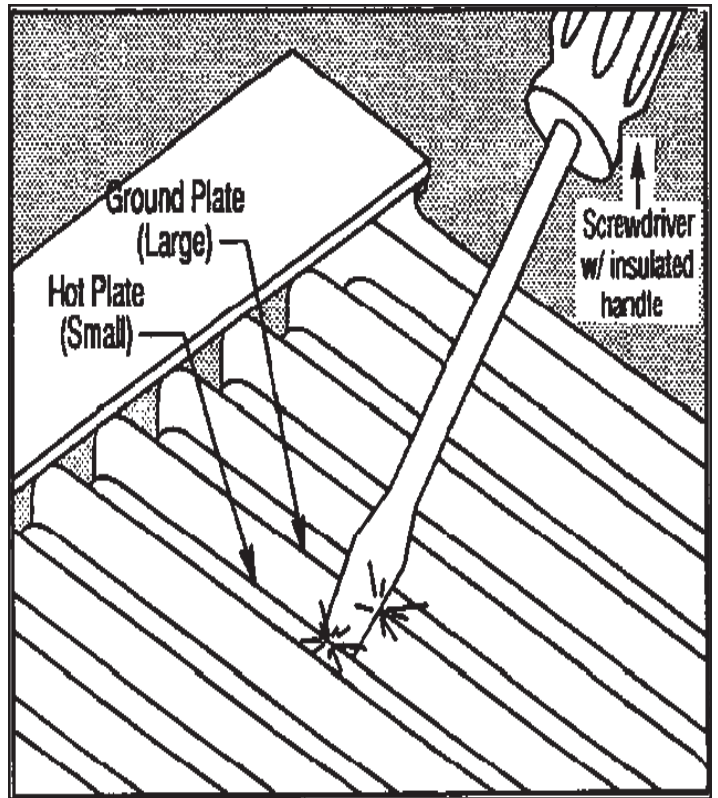


Figure 5. Grounding The Collector Cell Section

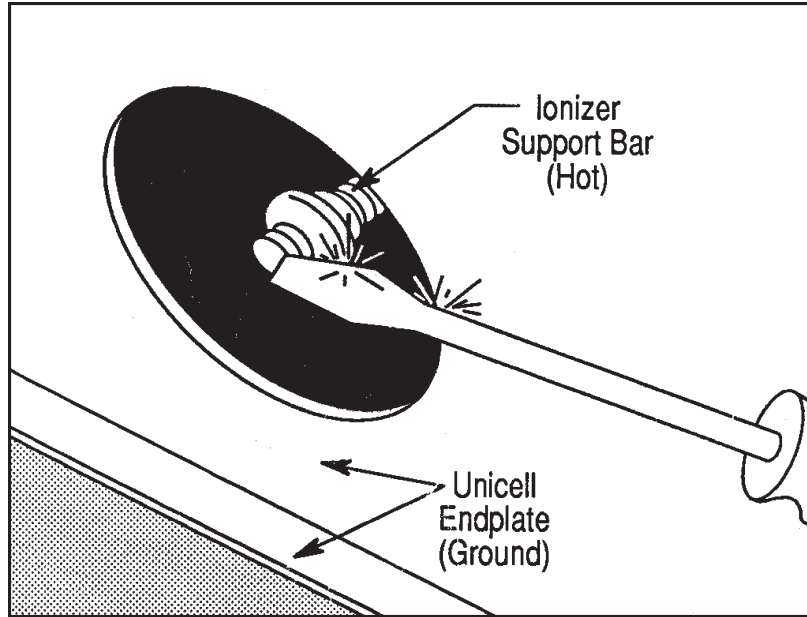


Figure 6.
Grounding the Ionizing Section

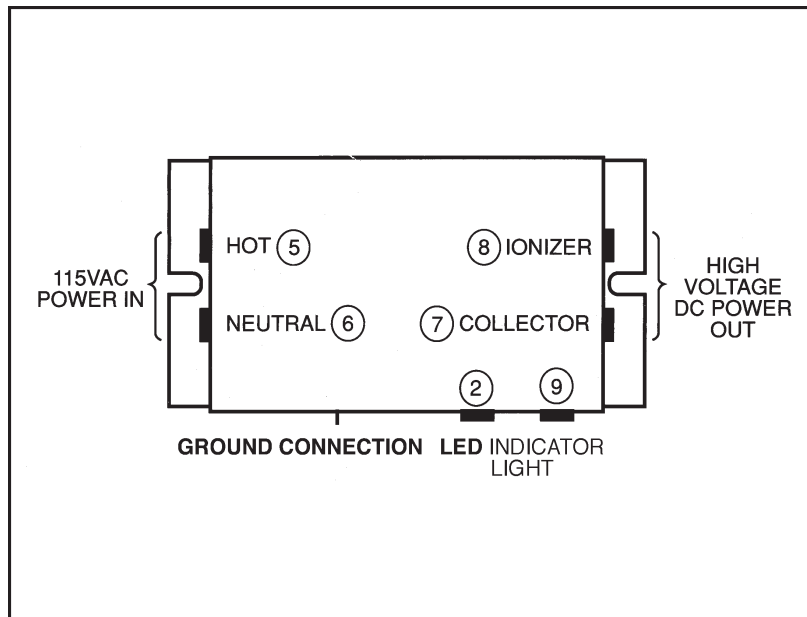
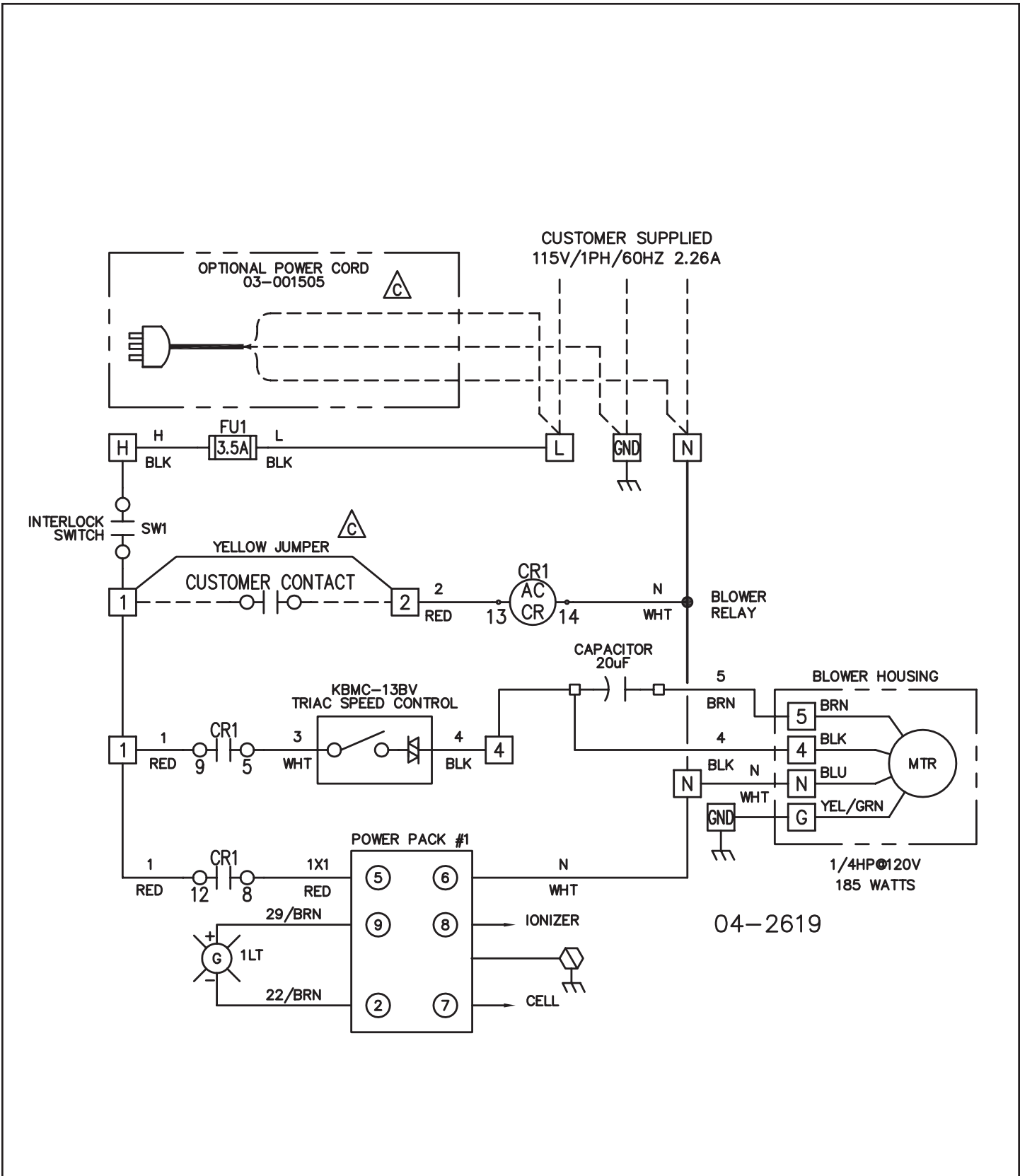
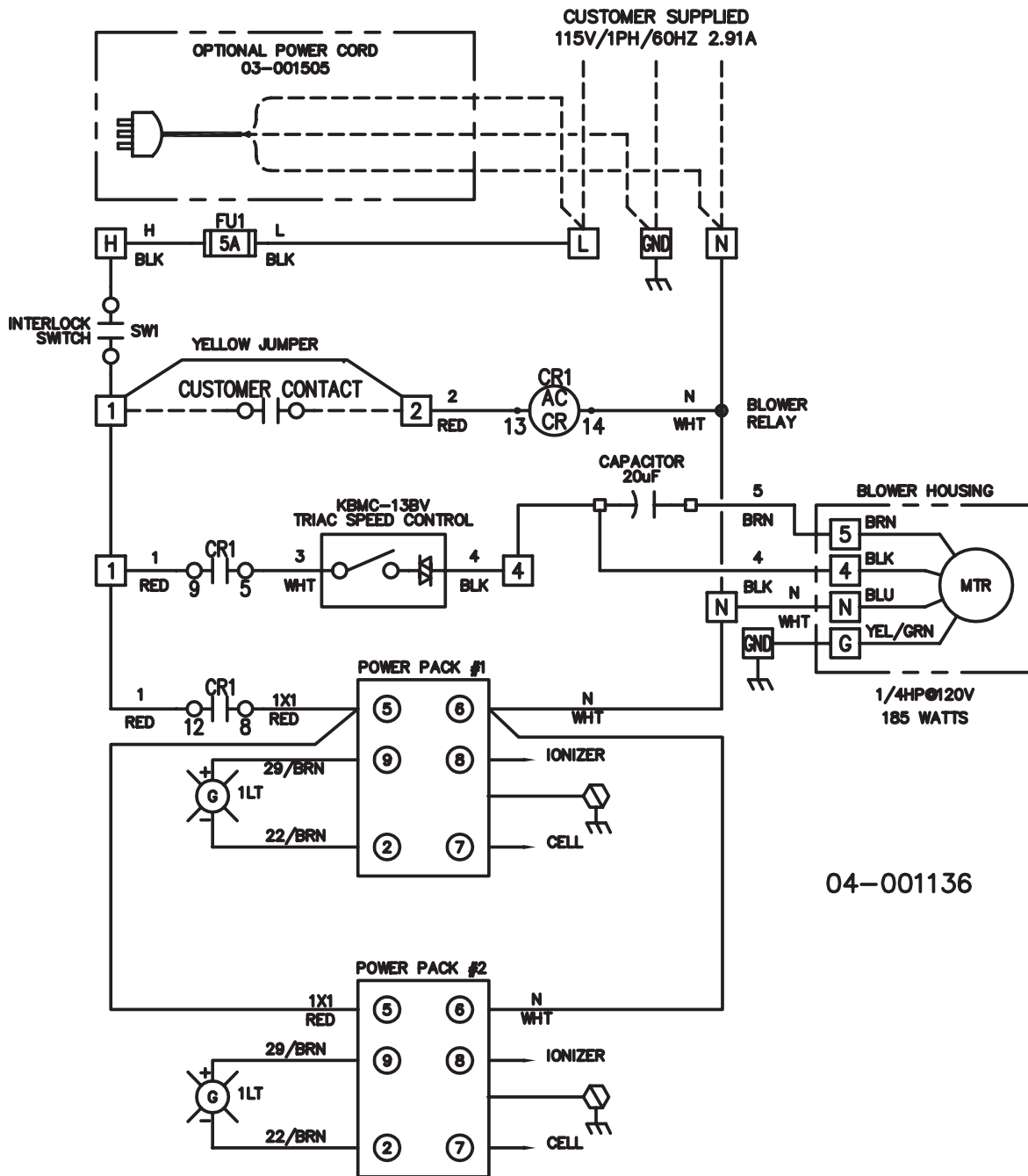


Figure 7.
Power Pack Input/Output Connections



MSH-05



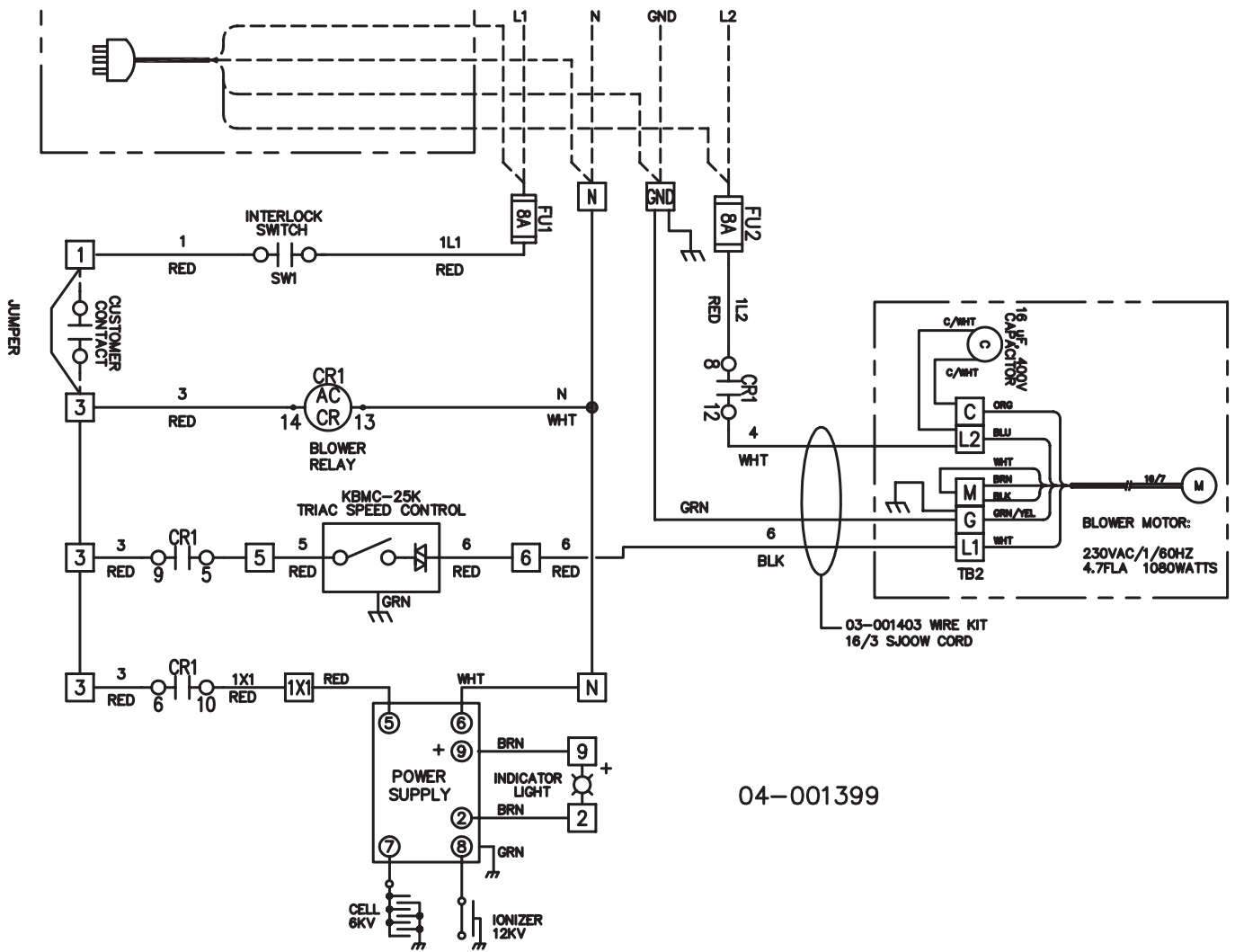
04-001136

MSH-05-M

RECOMMENDED PLUG/RECEPTACLE:
L14-20P PLUG AND L14-20R RECEPTACLE

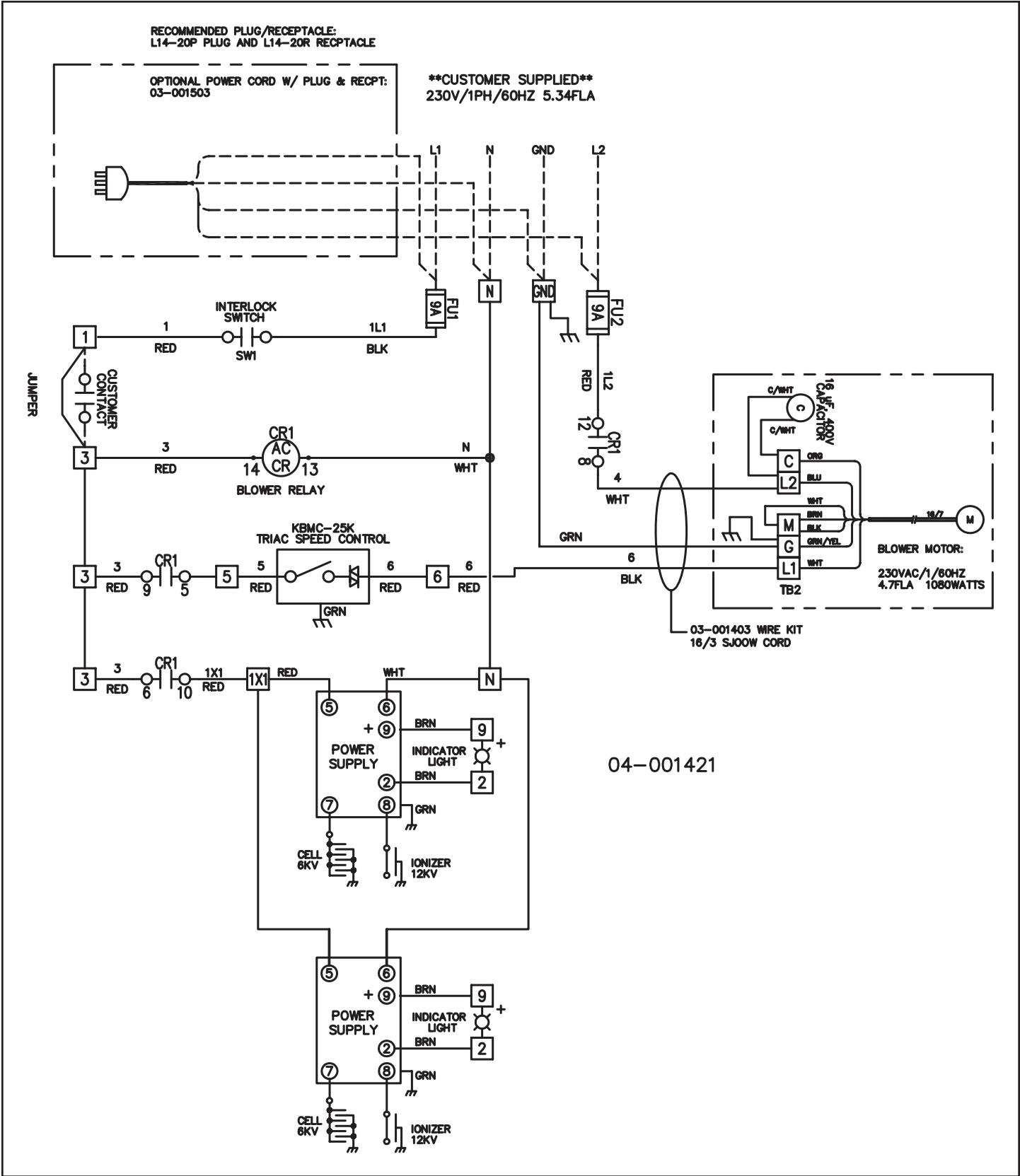
OPTIONAL POWER CORD W/ PLUG & RECPT:
03-001503

****CUSTOMER SUPPLIED****
230V/1PH/60HZ 5FLA

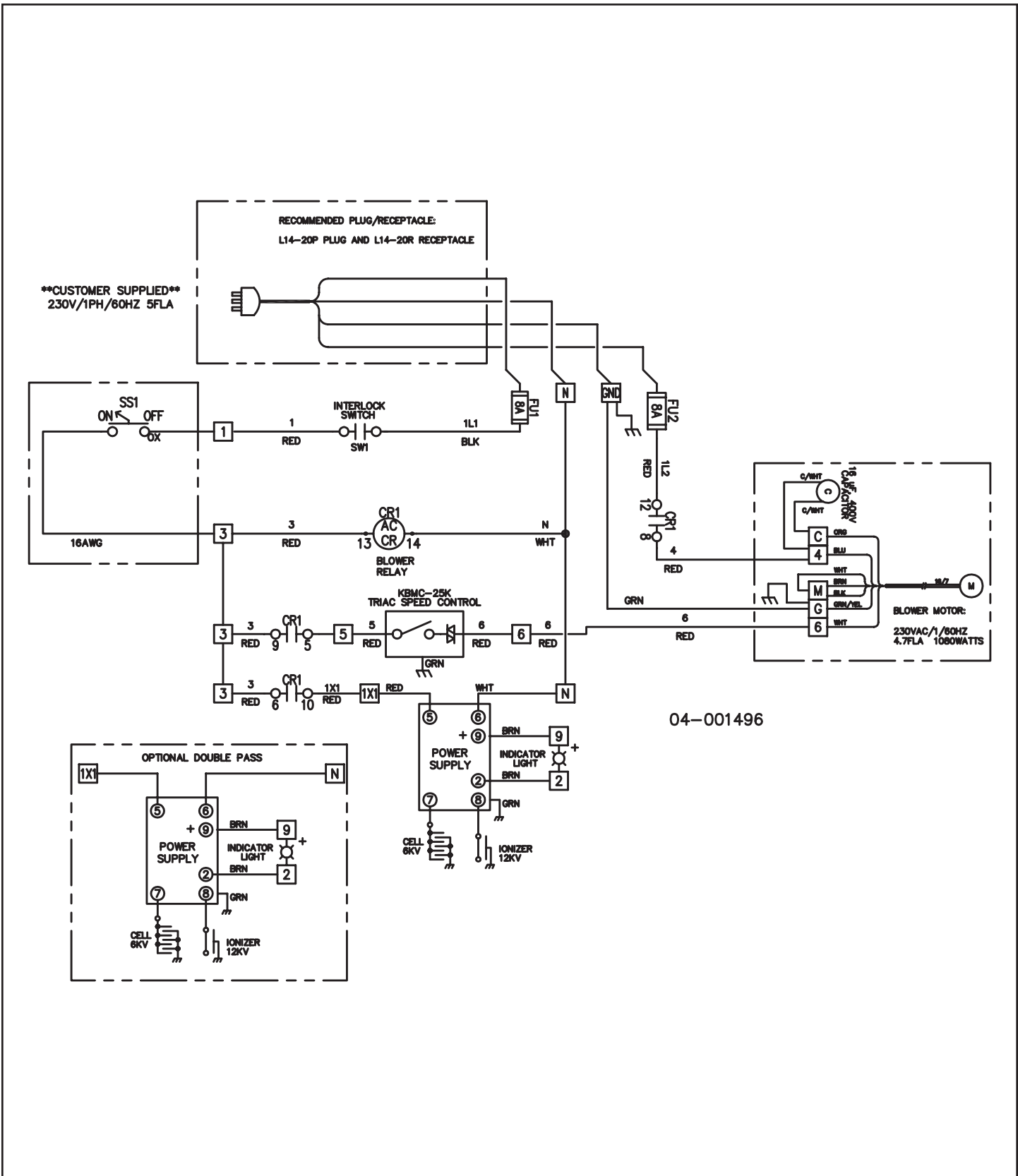


04-001399

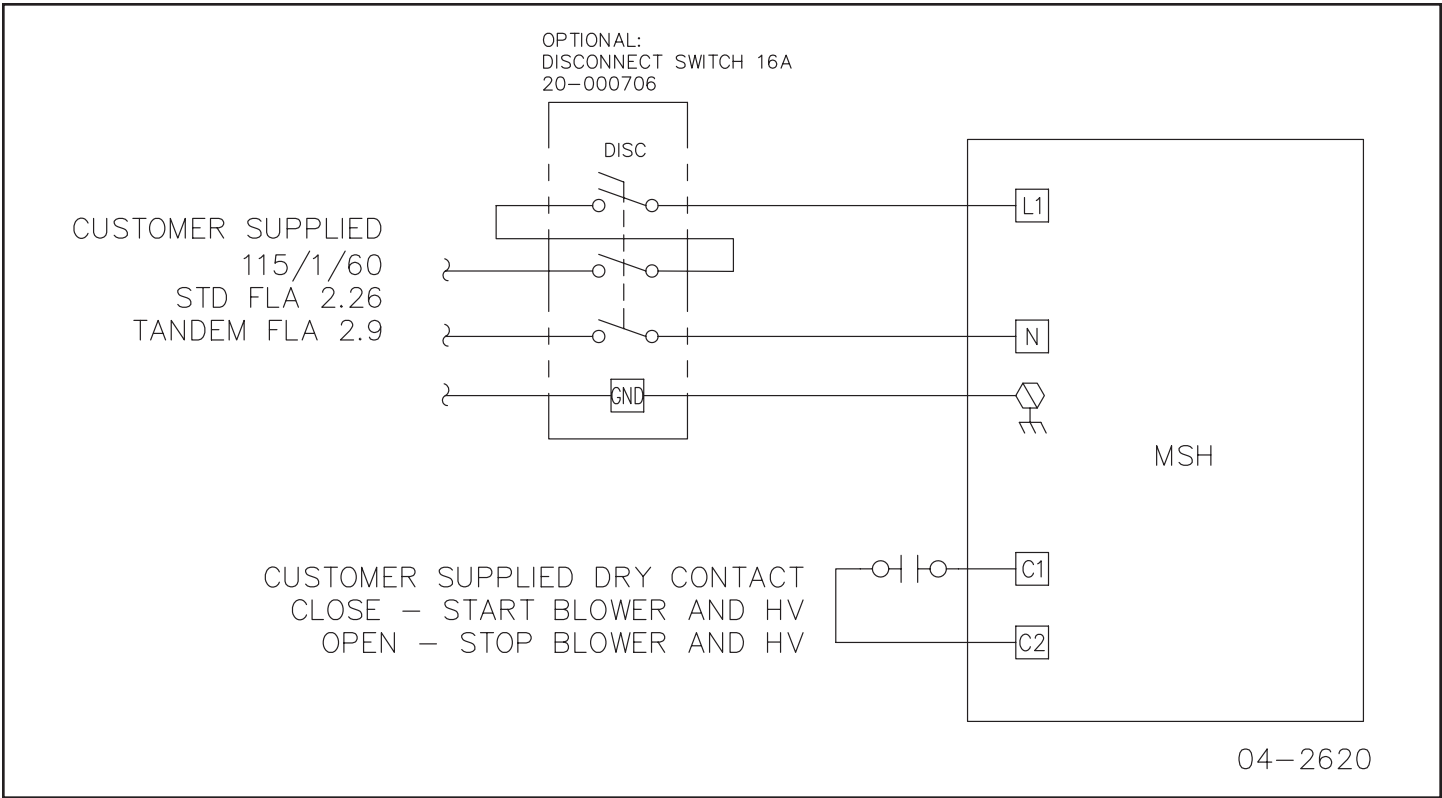
MSH-11



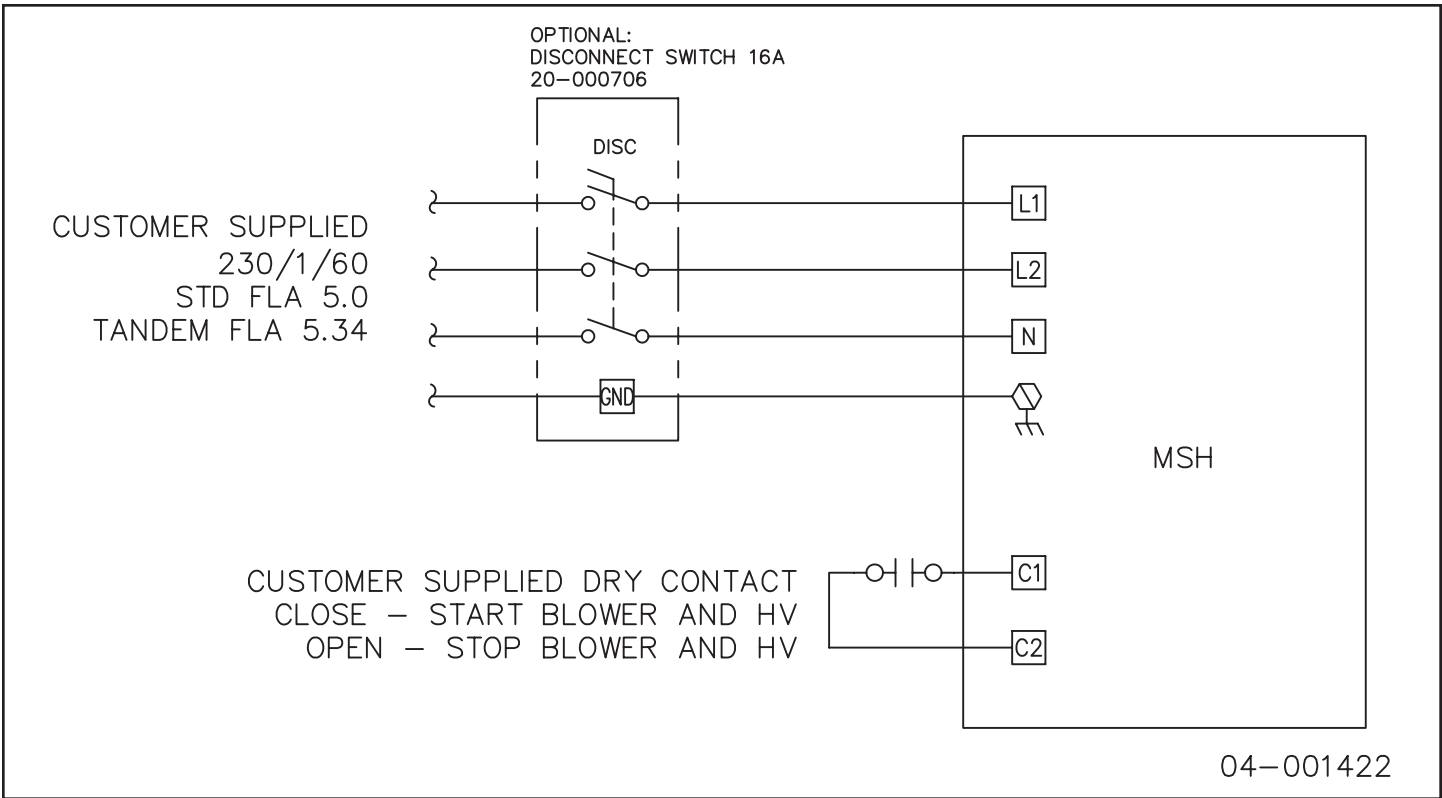
MSH-11-M



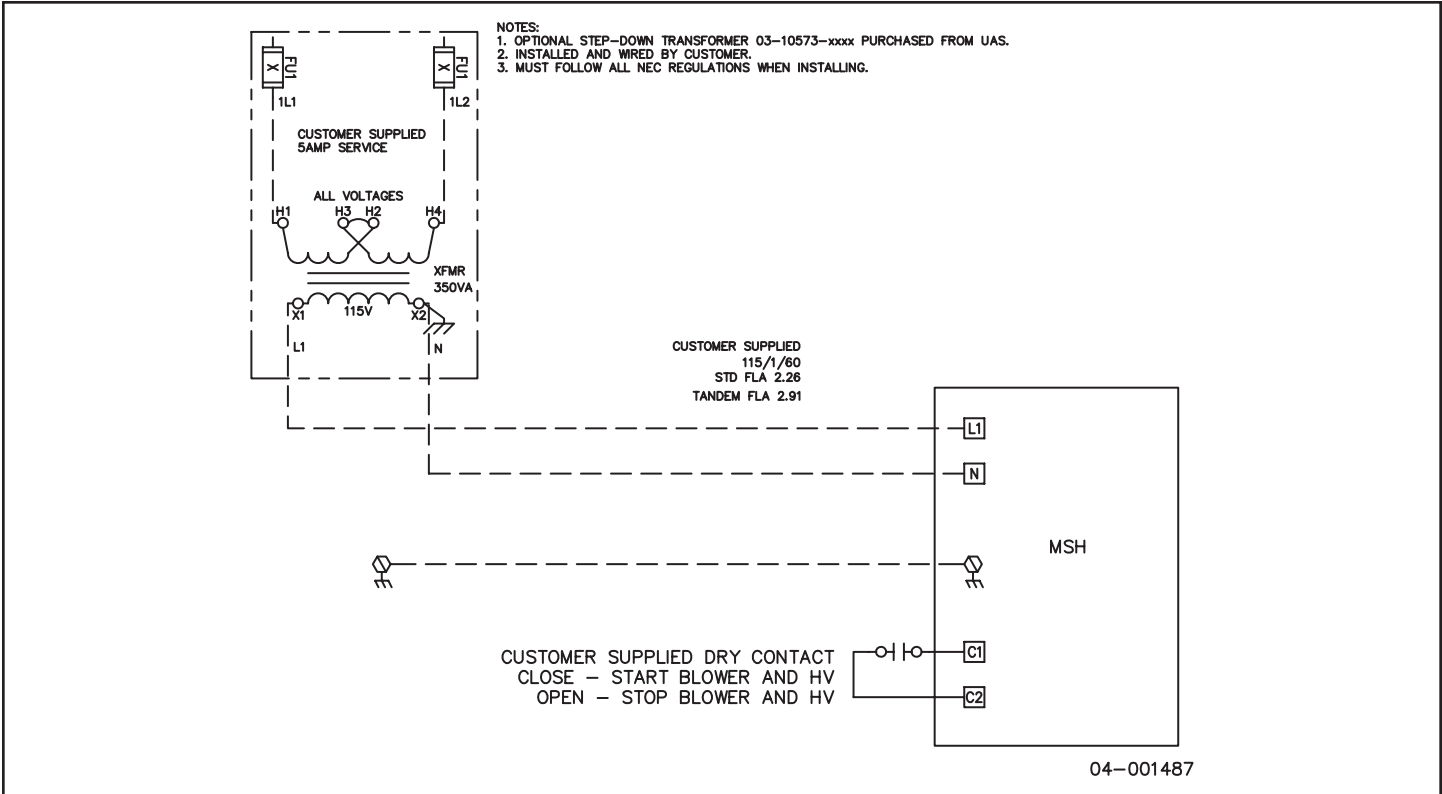
MSH-11 w/ Optional ON/OFF Switch



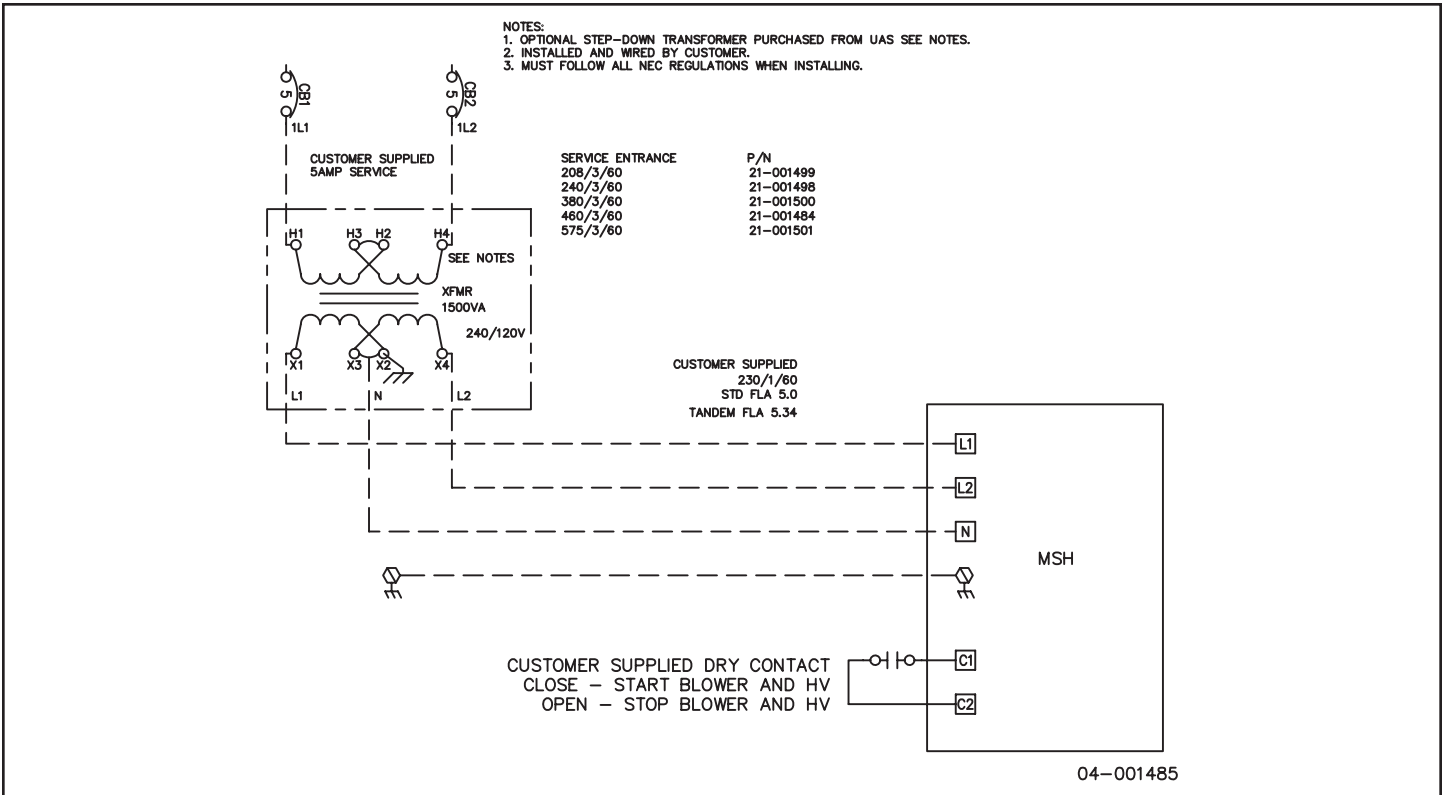
MSH-05 1PH Interconnect



MSH-11 1PH Interconnect



MSH-05 3PH Interconnect



MSH-11 3PH Interconnect

Product Warranty – SMOG-HOG[®] and DUST-HOG[®] Pollution Control Systems

1. Subject to the terms and conditions hereof, Parker-Hannifin Corporation (PARKER) warrants that major structural components on MCB, PNP, SDC, SFC, and SHM series will be free from defects in materials and workmanship for ten (10) years from the date of shipment from Parker. Subject to the terms and conditions hereof, warrants to the original Buyer of any Parker product (PRODUCT) installed and used as recommended by PARKER in normal service, that if the PRODUCT fails or is materially defective within twenty-four (24) months from date of installation or thirty (30) months from the date of shipment (whichever is earlier), of such PRODUCT, then PARKER, at PARKER'S sole option, will replace the PRODUCT with the same or equivalent PRODUCT, repair the PRODUCT or refund the original purchase price for the PRODUCT. Such replacement, repair or payment by PARKER shall be in complete satisfaction of any and all liability of PARKER and its agents with respect to such PRODUCT. Excluded from any Parker warranty are hose, electrical motors or consumable products such as flexible hose, belts, filter cartridges, filter media, ESP cells, electrical components, gasketing, or any component defined by PARKER as a consumable item.

2. Parker IGFG's warranty policy covers defects that are due to manufacturing quality. Equipment must be installed, commissioned and maintained in accordance with Parker IGFG recommendations as documented in the specific user manual related to your dust or wet collector product. This warranty does not cover defects due to poor environmental conditions, improper installation, or wear and tear items. This warranty shall be void in case of:

- a) Any buyer's modifications not explicitly approved by Parker IGFG Division,
- b) Misuse or failure in maintenance - not in accordance with Parker's product recommendations,
- c) Use of unauthorized or non-genuine Parker replacement parts,
- d) Damage caused by corrosion, abrasion, abnormal use or misuse, misapplication, or normal wear and tear,
- e) Equipment not properly installed, operated and maintained under normal conditions and recommended applications.

As Buyers exclusive remedy for any defects in the equipment, Parker will exchange or repair any defective parts during the warranty period, provided such parts are returned, prepaid, to Parker factory. The obligation of Parker is limited to furnishing replacement parts EXW Parker factory or making repairs at Parker factory of any parts that are determined, upon inspection by Parker, to be defective. In no event will Parker be responsible for labor or transportation charges for the removal, reshipment or reinstallation of the parts. Replacement parts will be provided via INCOTERMS EXW from Parker's Lancaster NY location. Parker makes no warranty as to goods manufactured or supplied by others.

3. THE FOREGOING IS THE ONLY WARRANTY, GUARANTEE OR REPRESENTATION OF ANY KIND MADE WITH RESPECT TO THE SUBJECT PARKER PRODUCTS. NO IMPLIED WARRANTY, INCLUDING ANY IMPLIED WARRANTY OF NONINFRINGEMENT, DESIGN, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, APPLIES TO THE PRODUCT, AND NO OTHER EXPRESS WARRANTY OR GUARANTY, EXCEPT AS MENTIONED ABOVE, GIVEN BY ANY PERSON, FIRM OR CORPORATION WITH RESPECT TO THE PRODUCT SHALL BIND PARKER. PARKER SHALL NOT BE LIABLE FOR LOSS OF REVENUES OR PROFITS, EXPENSE FOR SUBSTITUTE EQUIPMENT OR SERVICE, STORAGE CHARGES, OR ANY OTHER SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES CAUSED BY THE USE, MISUSE OR INABILITY TO USE THE PRODUCT REGARDLESS OF THE LEGAL THEORY ON WHICH THE CLAIM IS BASED, AND EVEN IF PARKER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. NOR SHALL RECOVERY OF ANY KIND AGAINST PARKER BE GREATER IN AMOUNT THAN THE PURCHASE PRICE OF THE PRODUCT SOLD BY PARKER AND CAUSING THE ALLEGED DAMAGE. WITHOUT LIMITING THE FOREGOING, YOU ASSUME ALL RISK AND LIABILITY FOR LOSS, DAMAGE OR INJURY TO YOU AND YOUR PROPERTY AND TO OTHERS AND THEIR PROPERTY ARISING OUT OF USE, MISUSE OR INABILITY TO USE THE PRODUCT NOT CAUSED DIRECTLY BY THE NEGLIGENCE OF PARKER. THIS LIMITED WARRANTY IS GIVEN ONLY WITH RESPECT TO A PRODUCT PURCHASED FROM PARKER OR AN AUTHORIZED PARKER DISTRIBUTOR.

4. IN NO EVENT IS PARKER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, NONCOMPLETION OF SERVICES, USE, LOSS OF USE OF, OR INABILITY TO USE THE PRODUCT OR ANY PART THEREOF, LOSS OF DATA, IDENTITY, PRIVACY, OR CONFIDENTIALITY, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT PARKER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL PARKER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT.

5. Defective PRODUCTS must be documented via PARKER support "Case Number" within thirty (30) days after the date of the alleged failure or defect and within the warranty period by contacting Parker Technical Support via email or phone:

smoghog@parker.com or dusthog@parker.com
800-343-4048, option 2

The claim must specify in reasonable detail:

- 1) Product Serial Number or Parker Sales Order # and approximate Date of Purchase;
- 2) Where or from whom the product was originally purchased;
- 3) Description of problem symptom;
- 4) Description of troubleshooting effort details;
- 5) Description of physical location and/or environment details. The Buyer shall cooperate with PARKER in its investigation and provide full information and documentation concerning the PRODUCT and its usage.

Upon receipt of the claim, Parker IGFG will review and determine if the parts replaced need to be returned for quality evaluation and root cause investigation. If a part is required to be returned, Parker IGFG will issue a Return Material Authorization (RMA) to Return via email. Parts should be returned to Parker IGFG, freight collect, within 45 days accompanied by the RMA packing slip placed on the package. If the repaired part does not need to be returned you will be advised to field scrap it and the claim will be processed. Proof of the defect (written description and pictures of the parts units in question) is required.

NOTE: ANY PART NOT RETURNED WITHIN THE REQUIRED 45 DAYS WILL NOT BE REIMBURSED ON THE CLAIM.

On claims that require repaired parts return, the claim will be processed after the part has been evaluated by the Parker IGFG Quality Department for verification of failure mode. The claims will be paid in the form of a credit to the customer's account. Parker reserves the right to withdraw any quotation or proposal or reject any purchase order without liability.

Worldwide Filtration Manufacturing Locations

North America

Compressed Air Treatment

Industrial Gas Filtration and Generation Division

Lancaster, NY
716 686 6400
www.parker.com/igfg

Haverhill, MA
978 858 0505
www.parker.com/igfg

Engine Filtration

Racor

Modesto, CA
209 521 7860
www.parker.com/racor

Holly Springs, MS
662 252 2656
www.parker.com/racor

Hydraulic Filtration

Hydraulic & Fuel Filtration

Metamora, OH
419 644 4311
www.parker.com/hydraulicfilter

Laval, QC Canada
450 629 9594
www.parkerfarr.com

Velcon
Colorado Springs, CO
719 531 5855
www.velcon.com

Process Filtration

domnick hunter Process Filtration SciLog

Oxnard, CA
805 604 3400
www.parker.com/processfiltration

Water Purification

Village Marine, Sea Recovery, Horizon Reverse Osmosis

Carson, CA
310 637 3400
www.parker.com/watermakers

Europe

Compressed Air Treatment

domnick hunter Filtration & Separation

Gateshead, England
+44 (0) 191 402 9000
www.parker.com/dhfn

Parker Gas Separations

Etten-Leur, Netherlands
+31 76 508 5300
www.parker.com/dhfn

Hiross Zander

Essen, Germany
+49 2054 9340
www.parker.com/hzfd

Padova, Italy
+39 049 9712 111
www.parker.com/hzfd

Engine Filtration & Water Purification

Racor

Dewsbury, England
+44 (0) 1924 487 000
www.parker.com/rfde

Racor Research & Development

Stuttgart, Germany
+49 (0)711 7071 290-10

Hydraulic Filtration

Hydraulic Filter

Arnhem, Holland
+31 26 3760376
www.parker.com/hfde

Urzala, Finland
+358 20 753 2500

Condition Monitoring Parker Kittiwake

West Sussex, England
+44 (0) 1903 731 470
www.kittiwake.com

Process Filtration

domnick hunter Process Filtration Parker Twin Filter BV

Birtley, England
+44 (0) 191 410 5121
www.parker.com/processfiltration

Asia Pacific

Australia

Castle Hill, Australia
+61 2 9634 7777
www.parker.com/australia

China

Shanghai, China
+86 21 5031 2525
www.parker.com/china

India

Chennai, India
+91 22 4391 0700
www.parker.com/india

Parker Fowler

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+91 80 2783 6794
www.johnfowlerindia.com

Japan

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+81 45 870 1522
www.parker.com/japan

Korea

Hwaseon-City
+82 31 359 0852
www.parker.com/korea

Singapore

Jurong Town, Singapore
+65 6887 6300
www.parker.com/singapore

Thailand

Bangkok, Thailand
+66 2186 7000
www.parker.com/thailand

Latin America

Parker Comercio Ltda.

Filtration Division
Sao Paulo, Brazil
+55 12 4009 3500
www.parker.com/br

Pan American Division

Miami, FL
305 470 8800
www.parker.com/panam

Africa

Aeroporto Kempton Park, South Africa
+27 11 9610700
www.parker.com/africa



Parker Hannifin Corporation
Industrial Gas Filtration
and Generation Division
4087 Walden Avenue
Lancaster, NY 14086
phone 800 343 4048
www.parker.com/igfg



State of California ONLY
WARNING: Proposition 65
The products described herein can expose you to chemicals known to the State of California to cause cancer or reproductive harm.
For more information: www.P65Warnings.ca.gov