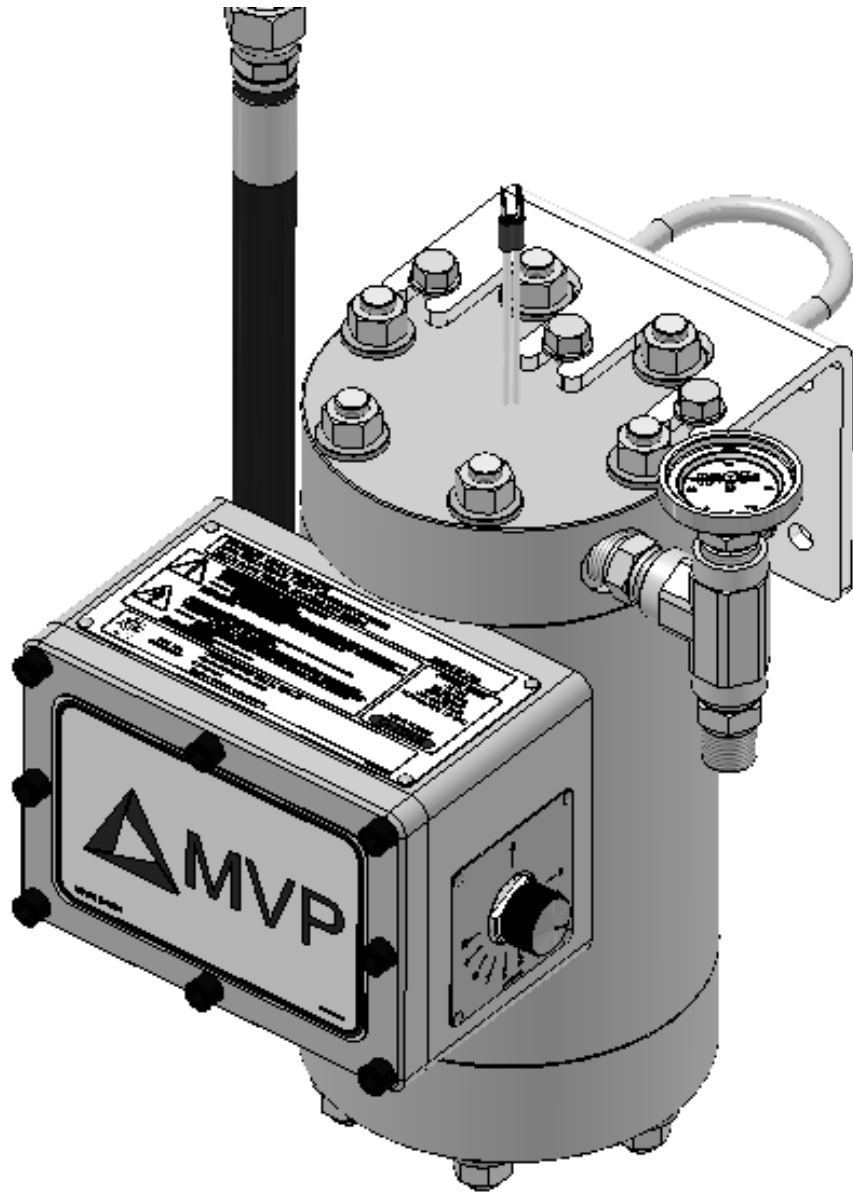


Clean Flow Heater (CFH)

Operations Manual

This manual is applicable to the following models:

- CFH-2110-1
- CFH-2220-1
- CFH-4000-1



Revision: 1
Rev. February 2020



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Use of this product confirms that Magnum Venus Products, Inc.'s standard terms and conditions of sale apply.



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Safety & Warning Information

Warnings

Due to the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. MVP assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

The end user is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used and that all documentation is adhered to.

Recommended Occupational Safety & Health Act (OSHA) Documentation:

- 1910.94 Pertaining to ventilation
- 1910.106 Pertaining to flammable liquids
- 1910.107 Pertaining to spray finishing operations, particularly paragraph (m), Organic Peroxides and Dual Component Coatings

For Additional information, contact the Occupational Safety and Health Administration (OSHA) at <https://www.osha.gov/about.html>.

Recommended National Fire Protection Association (NFPA) Documentation:

- NFPA No.33 Chapter 14 Organic Peroxides and Dual Component Materials
- NFPA No. 63 Dust Explosion Prevention
- NFPA No. 70 National Electrical Code
- NFPA No. 77 Static Electricity
- NFPA No. 91 Blower and Exhaust System
- NFPA No. 654 Plastics Industry Dust Hazards

Fire Extinguisher – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

The following general warnings and guidelines are for the setup, use, grounding, maintenance, and repair of equipment. Additional product-specific warnings may be found throughout this manual as applicable. Please contact your nearest MVP Technical Service Representative if additional information is needed.

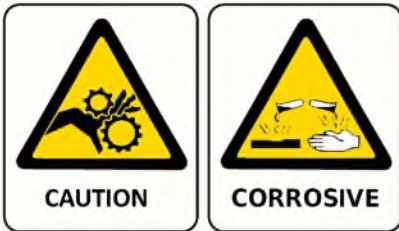
Safety Precautions

- Avoid skin contact and inhalation of all chemicals.
- Review Material Safety Data Sheet (MSDS) to promote the safe handling of chemicals in use.
- Restrict the use of all chemicals to designated areas with good ventilation.
- Chemicals are flammable and reactive.
- Noxious fumes released when combusted.
- Operate equipment in a ventilated environment only.
- Uncured liquid resins are highly flammable unless specifically labeled otherwise.
- Cured laminate, accumulations of overspray, and laminate sandings are highly combustible.
- Do not operate or move electrical equipment when flammable fumes are present.
- Ground all equipment.
- If a spark is seen or felt, immediately halt operation. Do not operate the equipment until the issue has been identified and repaired.
- Contaminated catalyst may cause fire or explosion.
- Containers may explode if exposed to fire / heat.
- Use and store chemicals away from heat, flames, and sparks.
- Do not smoke in work areas or near stored chemicals.
- Do not mix Methyl Ethyl Ketone Peroxide (MEKP) with materials other than polyethylene.
- Do not dilute MEKP.
- Keep food and drink away from work area.



Physical Hazards

- Never look directly into the spray gun fluid tip. Serious injury or death can result.
- Never aim the spray gun at or near another person. Serious injury or death can result.
- Chemical compounds can be severely irritating to the eyes and skin.
- Inhalation, ingestion, or injection may damage internal organs and lead to pulmonary disorders, cancers, lymphomas, and other diseases or health conditions.
- Other potential health effects include: irritation of the eyes and upper respiratory tract, headache, light-headedness, dizziness, confusion, drowsiness, nausea, vomiting, and occasionally abdominal pain.
- Eye contact: Immediately flush with water for at least 15 minutes and seek immediate medical attention.
- Skin Contact: Immediately wash with soap and water and seek immediate medical attention.
- Inhalation: Move the person to fresh air and seek immediate medical attention.
- Do not remove shields, covers, or safety features on equipment that is in use.
- Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can shoot liquid through the skin.
- Keep hands and body parts away from any moving equipment or components.
- Do not stand under plunger
- An improperly loaded drum may lead to an imbalance, causing a unit to tip over



Personal Protective Equipment (PPE)

- MVP recommends the use of personal safety equipment with all products in our catalog.
- Wear safety goggles, hearing protection, a respirator, and chemical resistant gloves.
- Wear long sleeve shirts or jackets and pants to minimize skin exposure.
- PPE should be worn by operators and service technicians to reduce the risk of injury.



For Additional information, contact the Occupational Safety and Health Administration (OSHA). <https://www.osha.gov/about.html>

Symbol Definitions



Indicates the risk of contact with chemicals that are hazardous, which may lead to injury or death.



Indicates the risk of contact with voltage / amperage that may lead to serious injury or death



Indicates that the materials being used are susceptible to combustion



Indicates the risk of contact with moving components that may lead to serious injury or death.



Indicates that the system or component should be grounded before proceeding with use or repair.



Indicates the use of lit cigarettes or cigars is prohibited, because the materials being used are susceptible to combustion.



Indicates that the materials and/or the process being performed can lead to ignition and explosion.



A recommendation for the use of Personal Protective Equipment (PPE) before using or repairing the product.

Polymer Matrix Materials: Advanced Composites

Potential health hazards associated with the use of advanced composites can be controlled through the implementation of an effective industrial hygiene and safety program.

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_1.html#t_iii:1_1

Resins		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Epoxy resins	Skin, lungs, eyes	Contact and allergic dermatitis, conjunctivitis
Polyurethane resins	Lungs, skin, eyes	Respiratory sensitization, contact dermatitis, conjunctivitis
Phenol formaldehyde	Skin, lungs, eyes	As above (potential carcinogen)
Bismaleimides (BMI)	Skin, lungs, eyes	As above (potential carcinogen)
Polyamides	Skin, lungs, eyes	As above (potential carcinogen)
Reinforcing materials		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Aramid fibers	Skin (lungs)	Skin and respiratory irritation, contact dermatitis (chronic interstitial lung disease)
Carbon/graphite fibers	Skin (lungs)	As noted for aramid fibers
Glass fibers (continuous filament)	Skin (lungs)	As noted for aramid fibers
Hardeners and curing agents		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Diaminodiphenylsulfone	N/A	No known effects with workplace exposure
Methylenedianiline	Liver, skin	Hepatotoxicity, suspect human carcinogen
Other aromatic amines		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Meta-phenylenediamine (MPDA)	Liver, skin (kidney, bladder)	Hepatitis, contact dermatitis (kidney and bladder cancer)
Aliphatic and cyclo-aliphatic amines	Eyes, skin	Severe irritation, contact dermatitis
Polyaminoamide	Eyes, skin	Irritation (sensitization)
Anhydride	Eyes, lungs, skin	Severe eye and skin irritation, respiratory sensitization, contact dermatitis

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

MEKP is among the more hazardous materials found in commercial channels. The safe handling of the “unstable (reactive)” chemicals presents a definite challenge to the plastics industry. The highly reactive property which makes MEKP valuable to the plastics industry in producing the curing reaction of polyester resins also produces the hazards which require great care and caution in its storage, transportation, handling, processing and disposal. MEKP is a single chemical. Various polymeric forms may exist which are more or less hazardous with respect to each other. These differences may arise not only from different molecular structures (all are, nevertheless, called “MEKP”) and from possible trace impurities left from the manufacture of the chemicals, but may also arise by contamination of MEKP with other materials in its storage or use. Even a small amount of contamination with acetone, for instance, may produce an extremely shock-sensitive and explosive compound.



WARNING

Contamination with promoters, materials containing promoters (such as laminate sandings), or with any readily oxidizing material (such as brass or iron) will cause exothermic redox reactions which can be explosive in nature. Heat applied to MEKP or heat buildup from contamination reactions can cause the material to reach its Self-Accelerating Decomposition Temperature (SADT).

Researchers have reported measuring pressure rates-of-rise well over 100,000 psi per second when certain MEKP's reach their SADT. For comparison, the highest-pressure rate-of-rise listed in NFPA Bulletin NO.68, “Explosion Venting”, is 12,000 psi per second for an explosion of 12% acetylene and air. The maximum value listed for a hydrogen explosion is 10,000 psi per second. Some forms of MEKP, if allowed to reach their SADT, will burst even an open topped container. This suggests that it is not possible to design a relief valve to vent this order of magnitude of pressure rate-of-rise. The user should be aware that any closed container, be it a pressure vessel, surge chamber, or pressure accumulator, could explode under certain conditions. There is no engineering substitute for care by the user in handling organic peroxide catalysts. If, at any time, the pressure relieve valve on top of the catalyst tank should vent, the area should be evacuated at once and the fire department called. The venting could be the first indication of a heat, and therefore, pressure build-up that could eventually lead to an explosion. Moreover, if a catalyst tank is sufficiently full when the pressure relief valve vents, some catalyst may spray out, which could cause eye injury. For this reason, and many others, anyone whose job puts them in an area where this vented spray might go, should always wear full eye protection even when laminating operations are not taking place.

Safety in handling MEKP depends to a great extent on employee education, proper safety instructions, and safe use of the chemicals and equipment. Workers should be thoroughly informed of the hazards that may result from improper handling of MEKP, especially regarding contamination, heat, friction and impact. They should be thoroughly instructed regarding the proper action to be taken in the storage, use, and disposal of MEKP and other hazardous materials used in the laminating operation. In addition, users should make every effort to:

- Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.
- Keep MEKP away from heat, sparks, and open flames.
- Prevent contamination or MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum, and non-stainless steels.

- Never add MEKP to anything that is hot, since explosive decomposition may result.
- Avoid contact with skin, eyes, and clothing. Protective equipment should be worn at all times. During clean-up of spilled MEKP, personal safety equipment, gloves, and eye protection must be worn. Firefighting equipment should be at hand and ready.
- Avoid spillage, which can heat up to the point of self-ignition.
- Repair any leaks discovered in the catalyst system immediately, and clean-up the leaked catalyst at once in accordance with the catalyst manufacturer's instructions.
- Use only original equipment or equivalent parts from Magnum Venus Products in the catalyst system (i.e.: hoses, fitting, etc.) because a dangerous chemical reaction may result between substituted parts and MEKP.
- Catalyst accumulated from the purging of hoses or the measurement of fluid output deliveries should never be returned to the supply tank, such catalyst should be diluted with copious quantities of clean water and disposed of in accordance with the catalyst manufacturer's instructions.

The extent to which the user is successful in accomplishing these ends and any additional recommendations by the catalyst manufacturer determines largely the safety that will be present in his operation.

Clean-Up Solvents and Resin Diluents



WARNING

A hazardous situation may be present in your pressurized fluid system! Hydro carbon solvents can cause an explosion when used with aluminum or galvanized components in a closed (pressurized) fluid system (pump, heaters, filters, valves, spray guns, tanks, etc.). An explosion could cause serious injury, death, and/or substantial property damage. Cleaning agents, coatings, paints, etc. may contain Halogenated Hydrocarbon solvents. Some Magnum Venus Products spray equipment includes aluminum or galvanized components and will be affected by Halogenated Hydrocarbon solvents.

There are three key elements to the Halogenated Hydrocarbon (HHC) solvent hazard.

- | | |
|--|--|
| 1. The presence of HHC solvents. | 1,1,1 – Trichloroethane and Methylene Chloride are the most common of these solvents. However, other HHC solvents are suspect if used; either as part of paint or adhesives formulation, or for clean-up flushing. |
| 2. Aluminum or Galvanized Parts. | Most handling equipment contains these elements. In contact with these metals, HHC solvents could generate a corrosive reaction of a catalytic nature. |
| 3. Equipment capable of withstanding pressure. | When HHC solvent contact aluminum or galvanized parts inside a closed container such as a pump, spray gun, or fluid handling system, the chemical reaction can, over time, result in a build-up of heat and pressure, which can reach explosive proportions. When all three elements are present, the result can be an extremely violent explosion. The reaction can be sustained with very little aluminum or galvanized metal; any amount of aluminum is too much. |

- The reaction is unpredictable. Prior use of an HHC solvent without incident (corrosion or explosion) does NOT mean that such use is safe. These solvents can be dangerous alone (as a clean-up or flushing agent) or when used as a component or a coating material. There is no known inhibitor that is effective under all circumstances. Mixing HHC solvents with other materials or solvents such as MEKP, alcohol, or toluene may render the inhibitors ineffective.
- The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. The possible presence of water in reclaimed solvents could also feed the reaction.
- Anodized or other oxide coatings cannot be relied upon to prevent the explosive reaction. Such coatings can be worn, cracked, scratched, or too thin to prevent contact. There is no known way to make oxide coatings or to employ aluminum alloys to safely prevent the chemical reaction under all circumstances.
- Several solvent suppliers have recently begun promoting HHC solvents for use in coating systems. The increasing use of HHC solvents is increasing the risk. Because of their exemption from many state implementation plans as Volatile Organic Compounds (VOCs), their low flammability hazard, and their not being classified as toxic or carcinogenic substances, HHC solvents are very desirable in many respects.



WARNING

Do not use Halogenated Hydrocarbon (HHC) solvents in pressurized fluid systems having aluminum or galvanized wetted parts.

Magnum Venus Products is aware of NO stabilizers available to prevent HHC solvents from reaction under all conditions with aluminum components in closed fluid systems. HHC solvents are dangerous when used with aluminum components in a closed fluid system.

- Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon solvents.
- Magnum Venus Products recommends that you contact your solvent supplier regarding the best non-flammable clean-up solvent with the heat toxicity for your application.
- If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.
- Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.
- You should only allow enough solvent for one day's use in your laminating area.
- NO SMOKING signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.
- Adequate ventilation (as covered in OSHA Section 1910.94 and NFPA No.91) is important wherever solvents are stored or used, to minimize, confine and exhaust the solvent vapors.
- Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

Catalyst Diluents

Magnum Venus Products spray-up and gel-coat systems currently produced are designed so that catalyst diluents are not required. Magnum Venus Products therefore recommends that diluents not be used to avoid possible contamination which could lead to an explosion due to the handling and mixing of MEKP and diluents. In addition, it eliminates any problems from the diluent being contaminated through rust particles in drums, poor quality control on the part of the diluents suppliers, or any other reason. If diluents are absolutely required, contact your catalyst supplier

and follow his instructions explicitly. Preferably the supplier should premix the catalyst to prevent possible “on the job” contamination while mixing.



WARNING

If diluents are not used, remember that catalyst spillage and gun, hose, and packing leaks are potentially more hazardous since each drop contains a higher concentration of catalyst and will therefore react more quickly with overspray and the leak.

Cured Laminate, Overspray and Laminate Sandings Accumulation

- Remove all accumulations of overspray, Fiberglass Reinforced Plastic (FRP) sandings, etc. from the building as they occur. If this waste is allowed to build up, spillage of catalyst is more likely to start a fire; in addition, the fire would burn hotter and longer.
- Floor coverings, if used, should be non-combustible.
- Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, oversprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent spillage and leakage, you should:

- | | |
|--|---|
| 1. Maintain your Magnum Venus Products System. | Check the gun several times daily for catalyst and resin packing or valve leaks. REPAIR ALL LEAKS IMMEDIATELY. |
| 2. Never leave the gun hanging over or lying inside the mold. | A catalyst leak in this situation would certainly damage the part, possibly the mold, and may cause a fire. |
| 3. Inspect resin and catalyst hoses daily for wear or stress at the entry and exits of the boom sections and at the hose and fittings. | Replace if wear or weakness is evident or suspected. |
| 4. Arrange the hoses and fiberglass roving guides so that the fiberglass strands DO NOT rub against any of the hoses at any point. | If allowed to rub, the hose will be cut through, causing a hazardous leakage of material which could increase the danger of fire. Also, the material may spew onto personnel in the area. |

Toxicity of Chemicals

- Magnum Venus Products recommends that you consult OSHA Sections 1910.94, 1910.106, 1910.107 and NFPA No.33, Chapter 14, and NFPA No.91.
- Contact your chemical supplier(s) and determine the toxicity of the various chemicals used as well as the best methods to prevent injury, irritation and danger to personnel.
- Also determine the best methods of first aid treatment for each chemical used in your plant.

Equipment Safety

Magnum Venus Products suggest that personal safety equipment such as EYE GOGGLES, GLOVES, EAR PROTECTION, and RESPIRATORS be worn when servicing or operating this equipment. Ear protection should be worn when operating a fiberglass chopper to protect against hearing loss since noise levels can be as high as 116 dB (decibels). This equipment should only be operated or serviced by technically trained personnel!

**CAUTION**

Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON OR AN ANIMAL.

**DANGER**

Contaminated catalyst may cause fire or explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free from dirt, grease, or resin. Clean catalyst system components with clean water daily.

**DANGER**

Eye, skin, and respiration hazard. The catalyst MEKP may cause blindness, skin irritation, or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.

Treatment of Chemical Injuries

**CAUTION**

Refer to your catalyst manufacturer's safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury.

Precautions include:

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or if swallowed.
2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.
3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

**WARNING**

Contact your doctor immediately in the event of an injury. If the product's MSDS includes first aid instructions, administer first aid immediately after contacting a doctor.

Fast treatment of the outer skin and eyes that contact chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment may be incorrect for some chemicals; you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

Emergency Stop Procedure

In an emergency, follow these steps to stop a system:

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the “OFF” or closed position.

Note ***The “open” or “on” position is when the ball valve handle is parallel (in line) with the ball valve body. The “closed” or “off” position is when the ball valve handle is perpendicular (across) the ball valve body.***

2. Turn all system regulators to the “OFF” position (counter-clockwise) position.
3. Verify / secure the catalyst relief line, located on the catalyst relief valve.
4. Verify / secure the resin return line, located on the resin filter.
5. Place a container under the resin pump ball valve to catch ejected resin.
6. Locate the ball valve on the resin pump.
7. Rotate the ball valve 90 degrees to the “On” or open position.

Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance.

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path should be 1 meg ohm (10^6 ohms) or less.



CAUTION

Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see National Fire Protection Association (NFPA) 77, titled “Recommended Practice on Static Electrical”. Refer especially to section 7-7 titled “Spray Application of Flammable and Combustible Materials”.

Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP Clean Flow Heater (CFH). The following procedures are included:

- Step-by-step assembly and disassembly
- Installation and operation instructions



Please read this manual carefully and retain for future reference. Follow the steps in the order given, otherwise you may damage the equipment or injure yourself.

The MVP Clean Flow Heater (CFH) is designed to allow higher flow rates, give better control over temperature change, and allow for easy maintenance. Simply adjust the temperature control to the desired level to maintain the temperature indicated on the external thermometer.

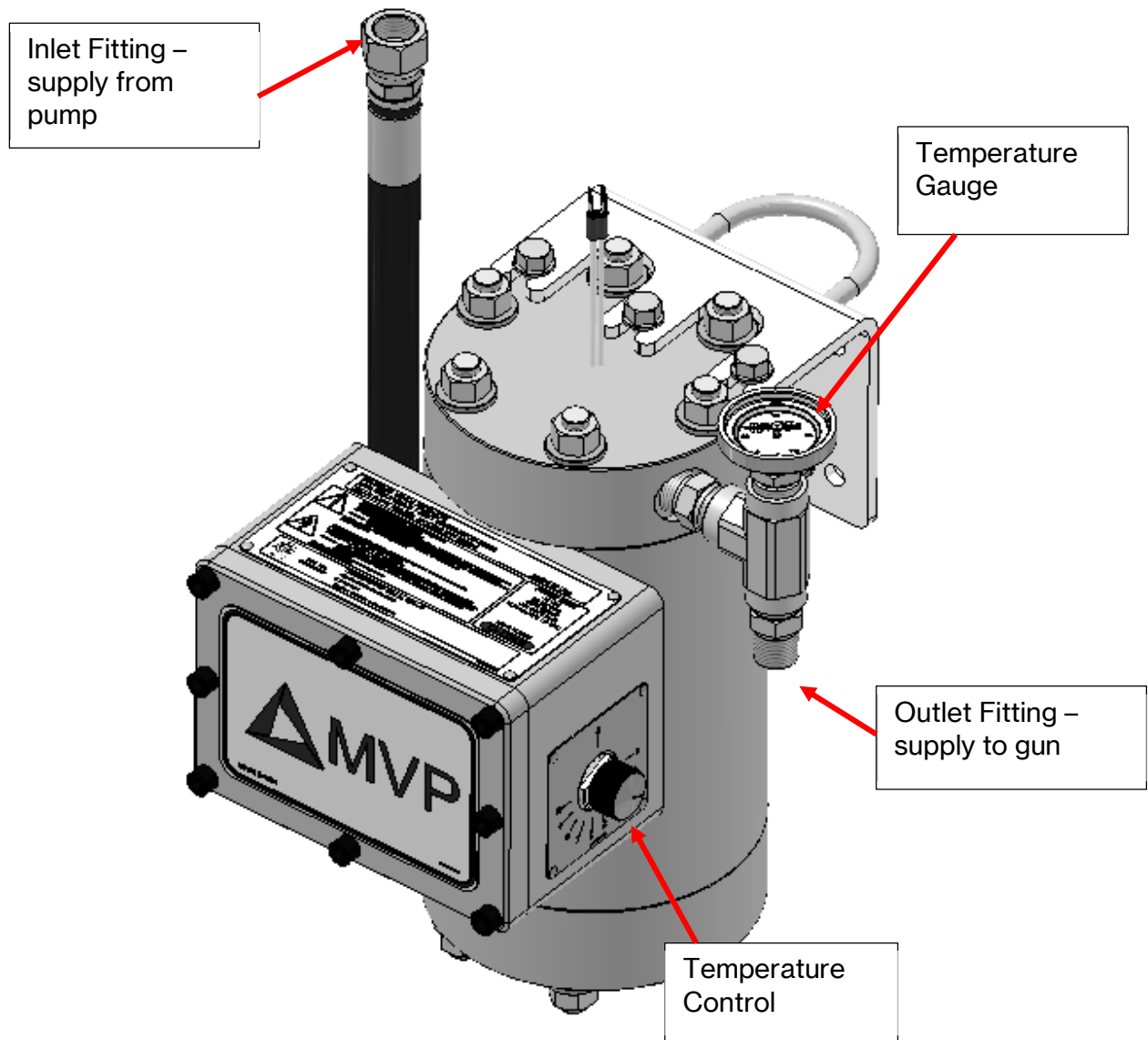
There is a fluid filled bulb and capillary tube placed near the heater core to maintain a stable and constant temperature. The thermal limiter in the circuit is a safety feature that breaks the circuit to the heating element if the heater block temperature exceeds a safe level.

Models

There are several models of MVP's Clean Flow Heater (CFH). For accuracy of parts ordering and maintenance, refer to the appropriate part drawing for your specific model.

Overview

Below helps identify the main components and controls the operator needs to know for proper operation for the unit.



**WARNING**

This product was designed and tested for use with products common to the Fiberglass Reinforced Plastics (FRP) industry such as resins, epoxies, urethanes, and vinyl esters. The CFH has not been designed to work with other fluids such as water.

Specifications

CFH-2110-1	
Dimensions	13.75" x 11.25" x 9.75"
Weight	49 lbs
Voltage Tolerance	110 VAC, 1 PH @ 15.30 A, 1500 W
Max Working Fluid Pressure	3000 psi
Max Fluid Temperature	140° F
Wetted Parts	303/304 Stainless Steel, Carbon Steel, Zinc Plated Steel, Aluminum, PTFE, UHMWPE, Chemically Resistant O-rings

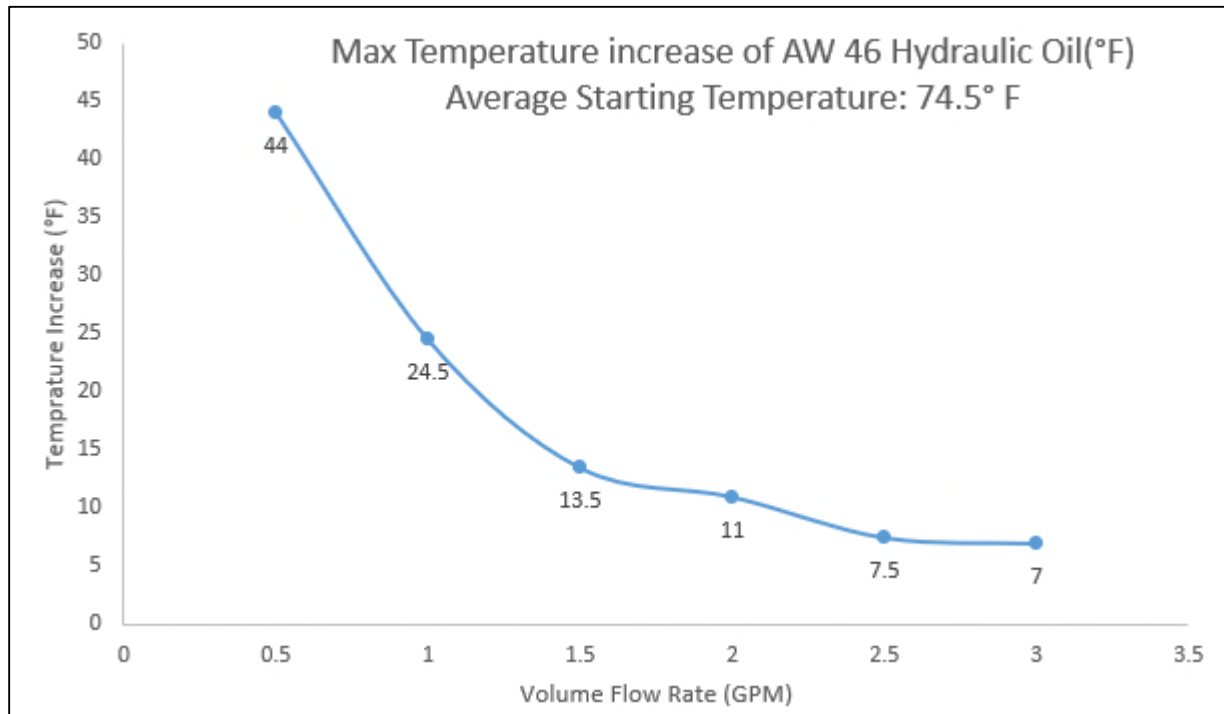
CFH-2220-1	
Dimensions	13.75" x 11.25" x 9.75"
Weight	49 lbs
Voltage Tolerance	220 - 240 VAC, 1 PH @ 7.57 – 6.94 A, 1500 W
Max Working Fluid Pressure	3000 psi
Max Fluid Temperature	140° F
Wetted Parts	303/304 Stainless Steel, Carbon Steel, Zinc Plated Steel, Aluminum, PTFE, UHMWPE, Chemically Resistant O-rings

CFH-4000-1	
Dimensions	18.5" x 11.25" x 9.75"
Weight	61 lbs
Voltage Tolerance	220 - 240 VAC, 1 PH @ 15.15 – 13.88 A, 3000 W
Max Working Fluid Pressure	3000 psi
Max Fluid Temperature	140° F
Wetted Parts	303/304 Stainless Steel, Carbon Steel, Zinc Plated Steel, Aluminum, PTFE, UHMWPE, Chemically Resistant O-rings

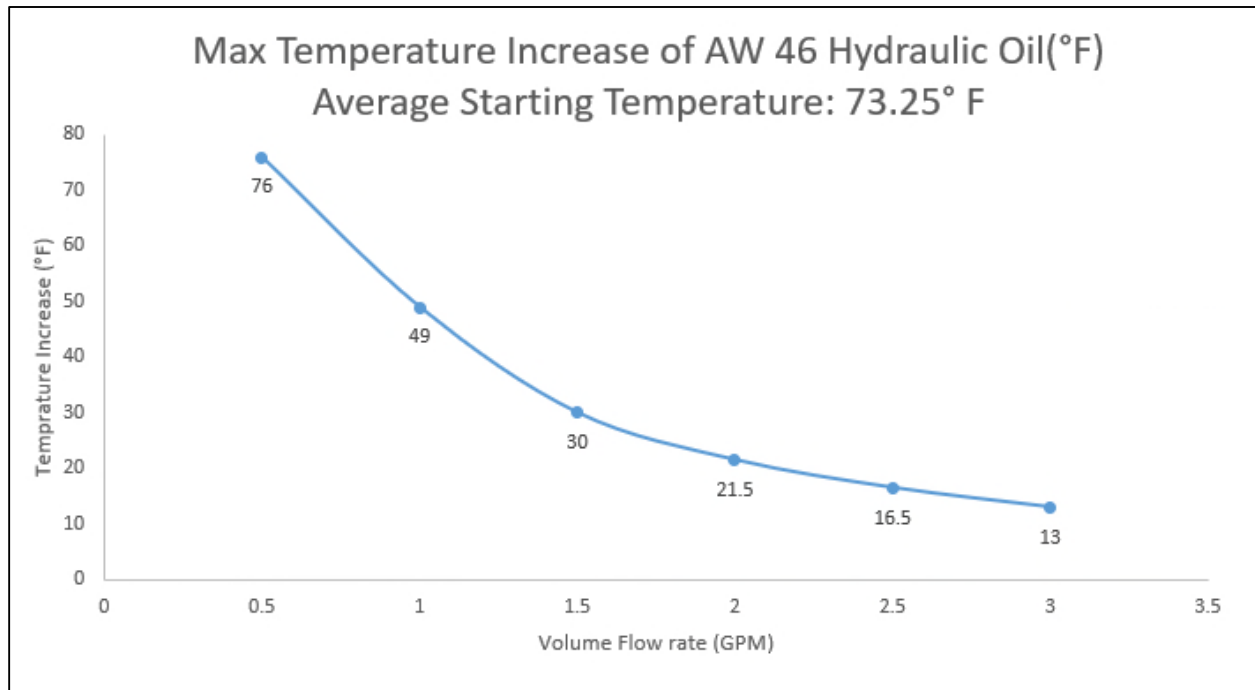
Wire Specification	
Wire Type	THHN
Voltage Rating	600V
Temperature Rating	194°F
Wire Gauge	AWG 14 (Ground AWG 12)

CFH Heat Loss Data

CFH-2110



CFH-4000



Installing and Connecting

The MVP Clean Flow Heater (CFH) comes with hardware to mount to a 2" column, which is standard on most MVP systems.

The heater outlets and inlets are ½" NPT pipe fittings. The jumper hose that is supplied has -08 JIC fittings on both ends. Fittings to install the jumper hose to the pump and connect the existing resin hose to the outlet of the heater may need to be purchased separately.

Contact your nearest MVP Technical Service Representative for additional information if needed.



CAUTION

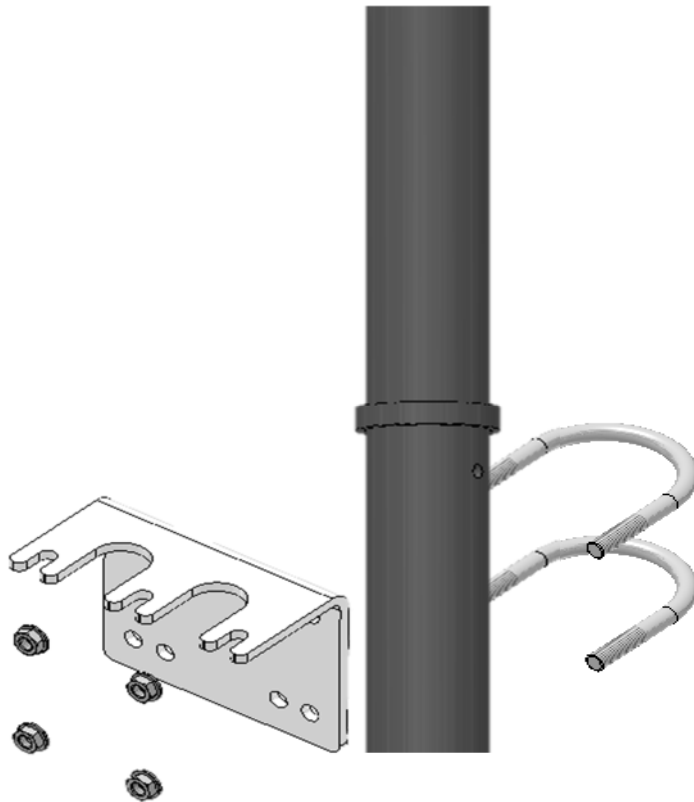
The Clean Flow Heater has been designed and test to work with MVP products in enclosed (indoor) environments that are well ventilated.



DANGER

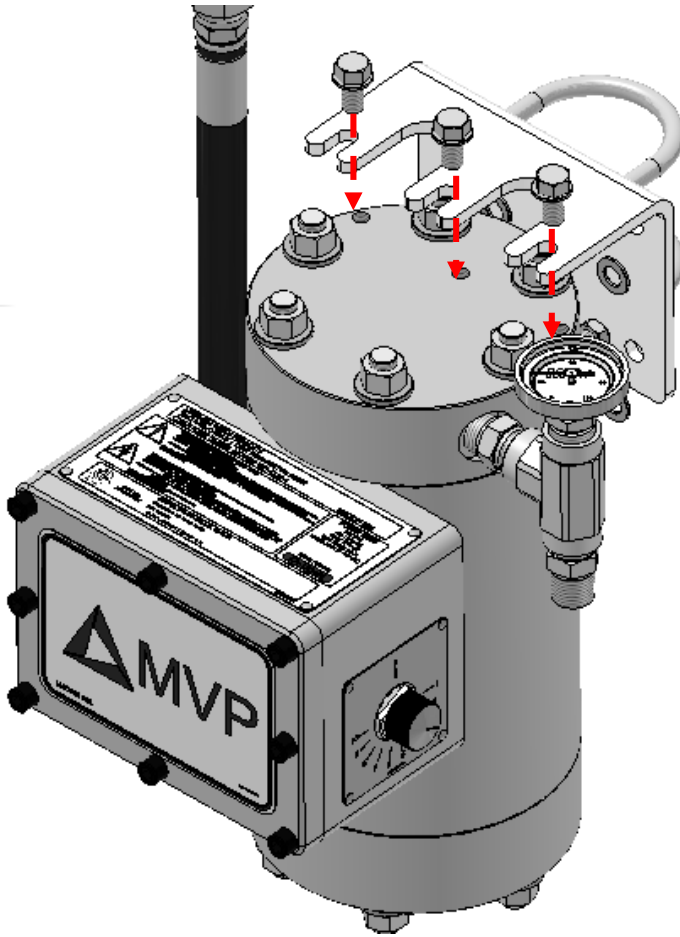
The Clean Flow Heater should not be installed or used near open flames, sparks, or flammable material storage.

1. Use the supplied U-brackets, washers, and hex nuts to secure the heater mounting bracket to the frame of the system on which the heater is to be used.



2. Torque the hex nuts to 17 ft/lbs.

3. Use the supplied hex bolts and washers to secure the top of the heater to the mounting bracket.



4. Torque the mounting nuts to 17 ft/lbs.
5. Connect supply line from the pump to the inlet fitting on the heater.

Connect Incoming Power

6. Connect incoming power to the flying leads from the bottom of the electrical box in accordance with local code and jurisdiction.



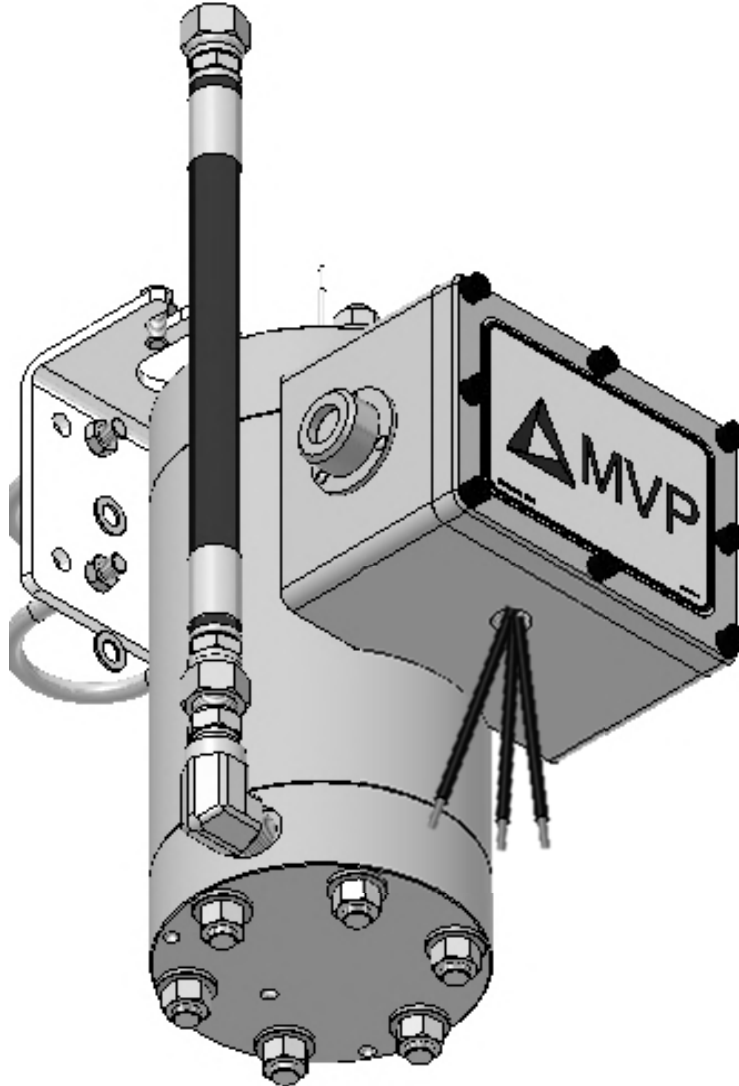
WARNING

Because of the variety of electrical codes in various parts of the world, MVP does not supply electrical connectors. A qualified electrician should make the electrical connection in accordance with the codes of the local jurisdiction. Failure to do so voids all warranty and liability directed at MVP or its subsidiaries.

The end user is responsible for ensuring that the end product or system complies with all relevant laws in the country where it is to be used and that all documentation is adhered to.

**DANGER**

The Clean Flow Heater should only be used on grounded electrical circuits.



Operating Heater

1. Set the temperature control knob to mid-position or the desired setting (if known).

Note *Using heat with polyester resin systems allows control of the spray pattern through reduced viscosity while breaking up material particles, giving more desirable wetting characteristics. Material can be controlled with $\pm 3^{\circ} F$ in continuous use.*



WARNING

DO NOT exceed 135° F (57° C) outlet temperature. Use the gauge to monitor operating temperature.

2. Operate your resin system as normal.
3. If the spray pattern is too coarse or narrow, set the heat higher and spray again.
4. If the spray pattern is too fine and thin, set the heat lower and spray again.
5. Once resin in the hose is replaced by resin in the heater, determine if block heat is now properly set.

Note ***Proper setting will vary with ambient room temperature, flow rates, and characteristics of each resin or gelcoat used.***

6. Continue to operate at the desired temperature.
7. If you are using highly promoted resins, when you are ready to stop pumping shut off power to the heater and then pump cool resin through to avoid gelling in the block.



WARNING

CFH internal pressure NOT TO EXCEED 3000 psi.

Maintaining Heater



CAUTION

To provide continued protection against the risk of electric shock, disconnect the power supply before flushing or cleaning the CFH. A licensed and experienced electrician should always perform checks on the electrical system.

1. Inspect hoses attached to the heater for wear or damage and replace once a year.
2. Check heater and hoses for leaks daily upon start-up.

Flushing the System

1. Verify the heater is turned off and at room temperature.
2. Disconnect power from the unit.
3. Connect the inlet hose to a container or jug of solvent.



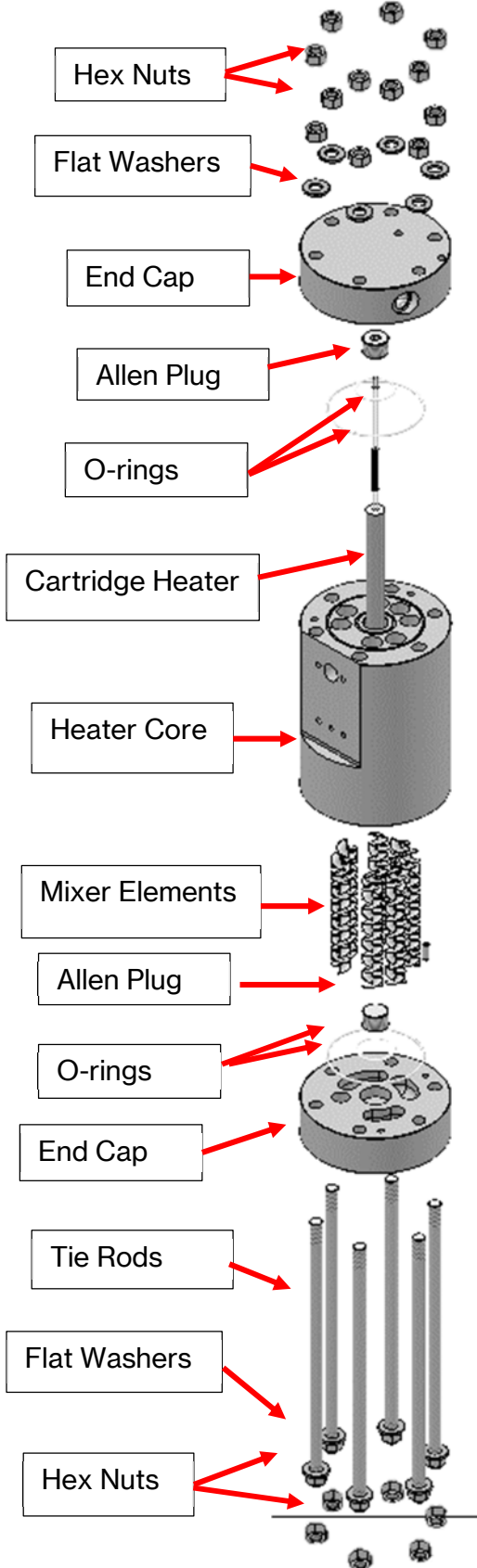
WARNING

Always disconnect power prior to performing maintenance. Never flush with solvent until heater has cooled to room temperature.

Do not exceed 250 psi.

4. Place the outlet hose in a waste pail to collect the used solvent.

5. Flush the heater until the exiting solvent is clear in color.
6. Reconnect the fittings.



Disassembling and Cleaning

1. Verify the heater is turned off and is at room temperature.
2. Disconnect power from the unit.
3. Remove the tie rod nuts and tie rods.

Note *There are two sets of tie rod nuts on each end.*

4. Remove both end cap assemblies.



CAUTION

Do not lay end caps on the fluid porting side. This could damage the surface and render the end cap unusable.

5. Remove the mixer elements.
6. Using a bottle brush and solvent, clean each fluid channel and end cap.
7. Remove and replace both O-rings in each end of the heater core.

Note *Each time you disassemble the heater, replace the O-rings to maintain the integrity of the seal.*

8. If you need to remove or replace the cartridge heater, remove the Allen plugs from the core to access it.
9. Remove the electrical box enclosure lid and disconnect the cartridge heater wiring.

Note *A certified electrician should be used when servicing a CFH.*

10. Apply thermal paste to the cartridge heater and reinstall into the heater core as applicable, with the wiring routed through the hole in the front of the core.

11. Insert the Allen plugs in each end and torque to 54 ft/lbs.

12. Connect the cartridge heater according to Figure 1.

13. Install the mixer elements.

14. Reinstall both end cap assemblies.

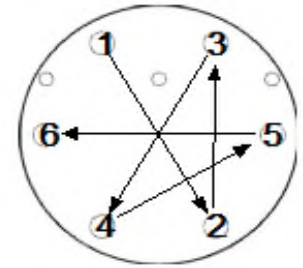
15. Insert the tie rods and apply anti-seize compound to the threads.

16. Secure with the tie rod nuts.

17. Following the sequence shown below, torque the first set of tie rod nuts in three steps:

- Torque to 10 ft/lbs
- Torque to 40 ft/lbs
- Torque to 70 ft/lbs

18. Add the second set of tie rod nuts and torque each nut in the same sequence to 70 ft/lbs.



END CAP
TORQUE PATTERN

Troubleshooting

The most common problems with the equipment can be diagnosed by analyzing the cured part.

Note *A certified electrician should be used when servicing a CFH.*

System Troubleshooting		
Symptom	Possible Cause	Remedy
Material flow blockage or leak	Heater is blocked	Remove end caps and thoroughly clean resin passages. Make sure the passages in the end caps are clean. Clean fittings into and out of the heater.
	Heater assembly is leaking	Remove end caps and inspect O-rings. Clean O-ring grooves thoroughly and replace O-rings as needed.
		Check that perimeter end cap bolts are correctly torqued according to instructions. Note <i>Brush anti-seize on the tie rods to fill the threads before torquing the nuts.</i>
Loss of electrical current or heat	Indicator light is not sequencing during operation	Verify that the light is receiving the correct voltage. If the voltage is good, replace the PCB.
	Open fuse	Remove the lid to the electrical enclosure and check all fuses to make sure none have activated. If so, replace.
	Loose wire	Check all connections for loose or disconnected terminals and remedy as needed.
	Thermostat controlled function is not working	Disconnect wires and check continuity through the thermostat when it is cool. If there is no continuity, the thermostat is faulty and must be replaced.
	Thermal limiter failed	Note <i>Unit is set to trip at approximately 135°F.</i> Once fuses and rest of circuit has checked out, disconnect wires and check continuity through the thermal limiter when it is cool. If there is no continuity through the switch when cool (room temp/approx. 70°F), it is faulty and must be replaced.

System Troubleshooting		
Symptom	Possible Cause	Remedy
	Cartridge heater failed	If all components to this point check out, cartridge heating element is faulty. Check heater for leakage to ground and continuity through element. Replace cartridge.

Electrical Box Assembly

If you need to check the interior components of the electrical box, refer to the following wiring diagram.

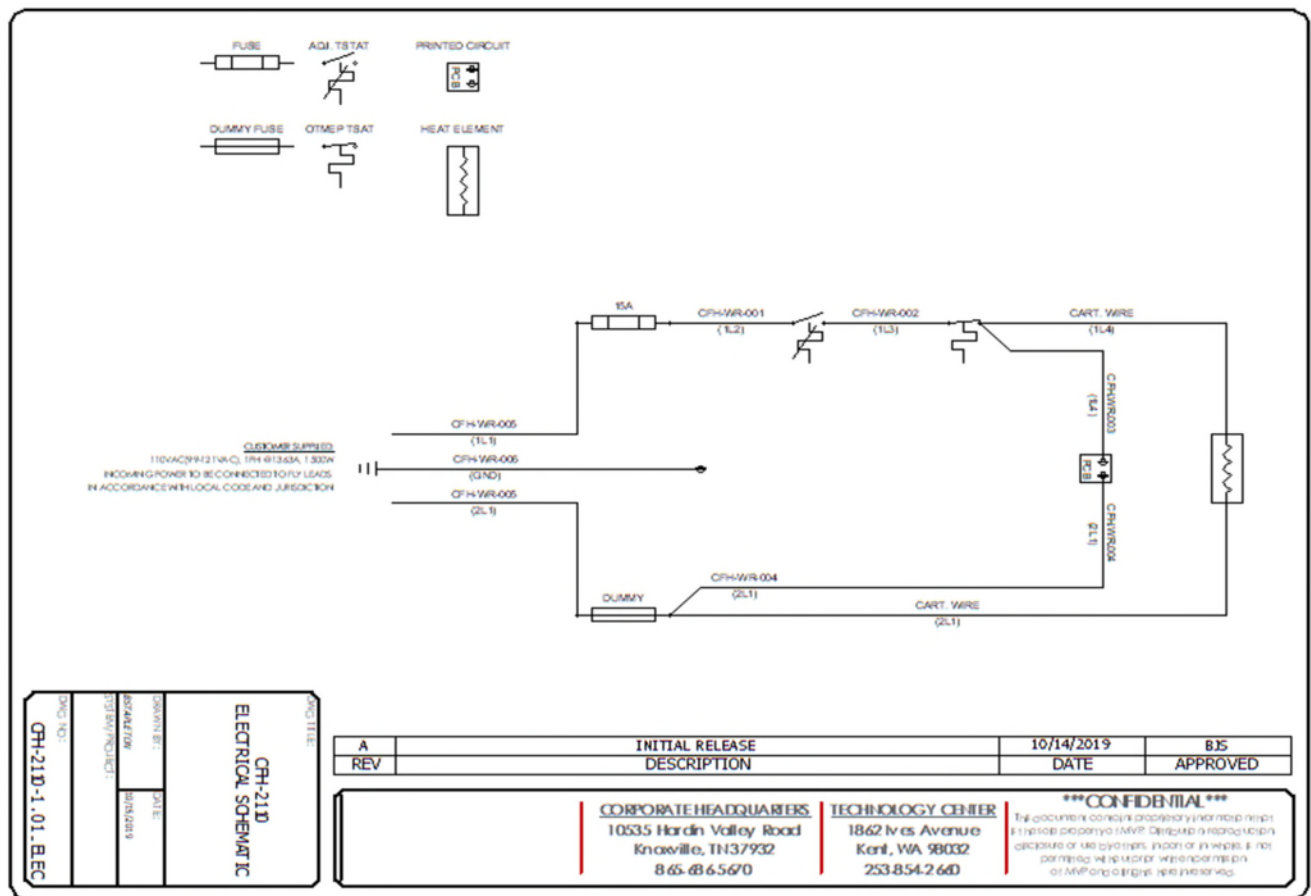


Figure 1. Wiring Diagram

If you need to replace the sight glass, torque the NPT fitting to 54 ft/lbs. The self-tapping screws that hold the sight glass housing in place must be torqued to 6 in/lbs.

Note *If you need to open the electrical box when servicing the heater, you must torque the enclosure lid properly when putting back in place.*

- To reinstall the electrical box cover, check to make sure the surface is clean and free from defects.

2. Torque the lid screws to 10 ft/lbs, then again to 15 ft/lbs in the order shown in Figure 2.

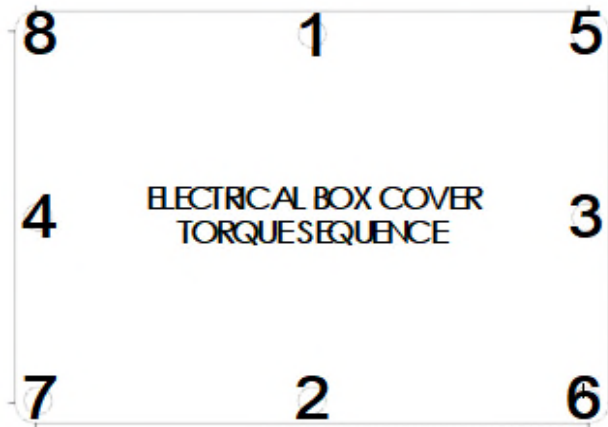


Figure 2

If you need to remove the electrical box from the side of the heater core, reattach using cap screws torqued to 10 ft/lbs, then again to 15 ft/lbs.

Torque Specifications

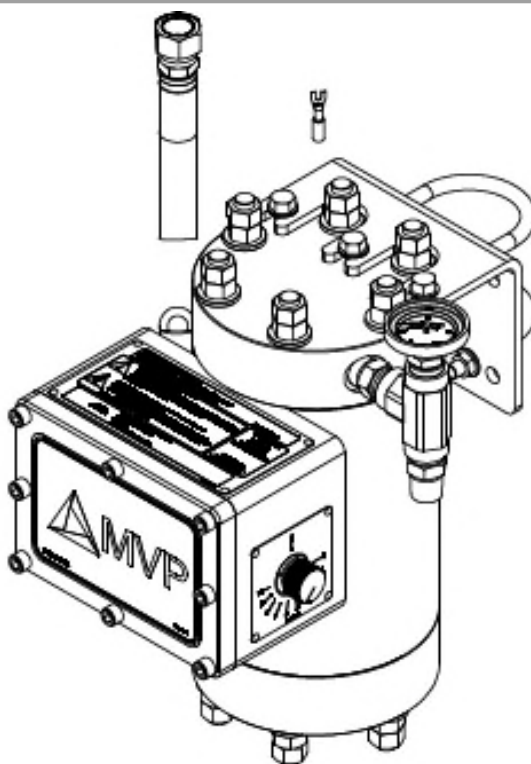
The following fasteners are used in the heater assembly. Each fastener must be torqued to the proper specification as shown.

CFH Torque Specifications	
Fastener	Toque Value
6-32	6 IN/LBS
8-32	12 IN/LBS
10-32	20 IN/LBS
5/16-18	10 FT/LBS, 15 FT/LBS
3/8-16	17 FT/LBS
1/2-20 (FIRST SET)	10 FT/LBS, 40 FT/LBS, 70 FT/LBS
1/2-20 (SECOND/LOCK SET)	70 FT/LBS
3/4 NPT	54 FT/LBS

Parts Drawings

The following illustrated breakdowns are included for reference when servicing the equipment.

Parts Drawings	
Part Number	Description
CFH-2110-1	110 Volt Basic Clean Flow Heater
CFH-2220-1	220 Volt Basic Clean Flow Heater
CFH-4000-1	Basic Clean Flow Heater



<i>SPECIFICATIONS</i>	
DIMENSIONS	13.75" [350MM] X 11.25" [290MM] X 9.75" [250MM]
WEIGHT	APPROX. 49 LBS [22.25KG]
VOLTAGE (TOLERANCE), AMP, WATTS	110VAC(99-121VAC), 1PH @15.30A, 1500W
TEMPERATURE	MAXIMUM 140F [60C]
MAXIMUM PRESSURE	3000PSI [206 BAR]
WETTED PARTS	303/304 STAINLESS STEEL, CARBON STEEL, ZINC PLATED STEEL, ALUMINIUM, PTFE, UHMWPE, CHEMICALLY RESISTANT O-RINGS
WIRE SPECIFICATION	WIRE TYPE - THHN VOLTAGE RATING - 600V TEMP RATING - 194°F AWG 14 (GROUND AWG 12)

THIS UNIT IS ETL CERTIFIED

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HEATER MUST BE INSTALLED BY CUSTOMER IN ACCORDANCE WITH LOCAL CODE AND JURISDICTIONS

MAGNUM VENUS PRODUCTS

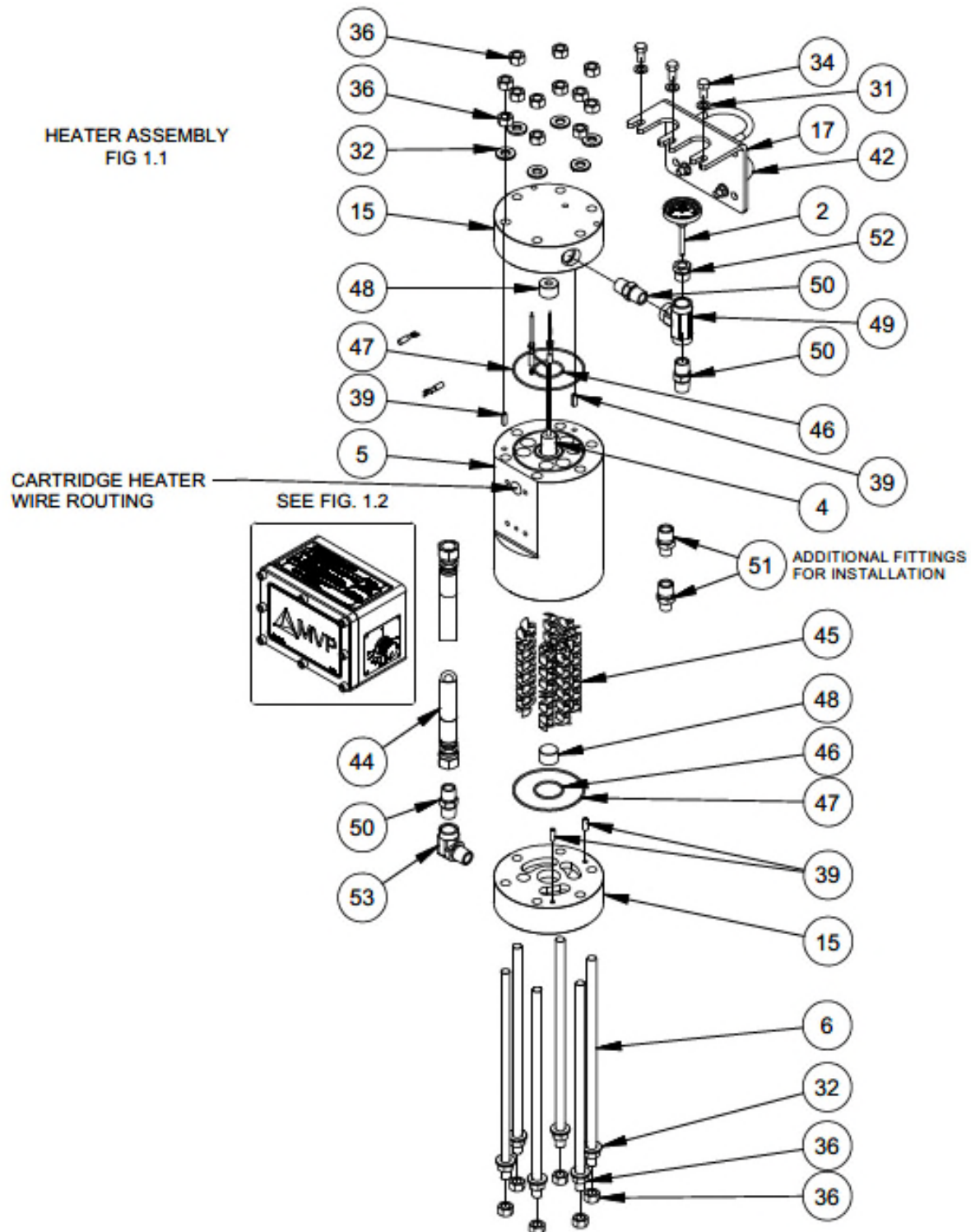
110 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2110-1

REV: A

SHEET 1 / 5

10/10/2019



MAGNUM VENUS PRODUCTS

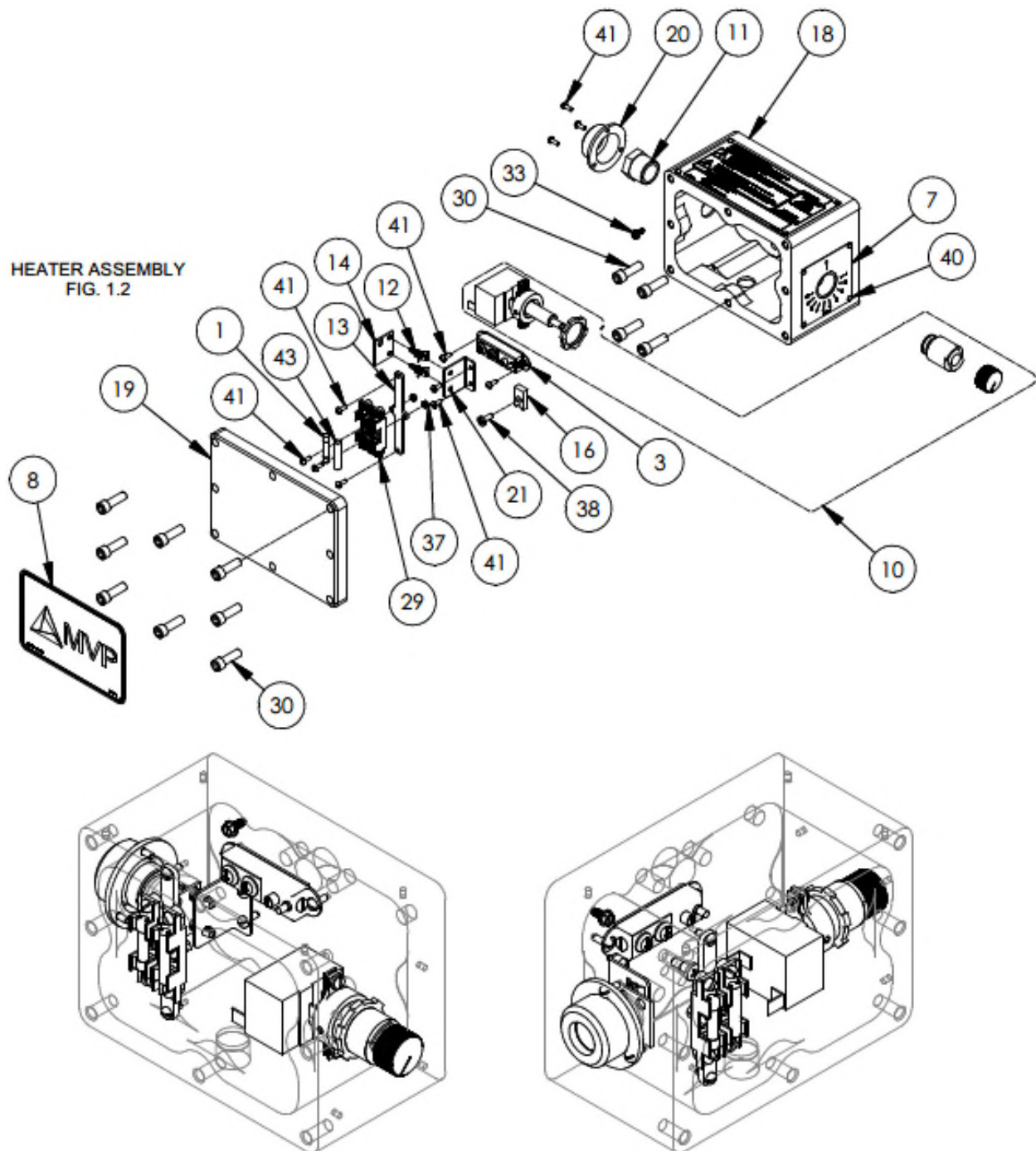
110 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2110-1

REV: A

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MAGNUM VENUS PRODUCTS

110 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2110-1

REV: A

SHEET 3 / 5

10/10/2019

PARTS LIST			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	09603	1	FUSE 15 AMP
2	9212-1-1	1	THERMOMETER
3	9804-1-1	1	THERMOSTAT
4	CFH-2010-01	1	CARTRIDGE HEATER, SHORT
5	CFH-2020	1	HEATER CORE, SHORT
6	CFH-2079	6	TIE ROD
7	CFH-3053	1	THERMOSTAT PLATE
8	CFH-3054	1	LOGO PLATE
9	CFH-3055	1	CFH-2110-1 DATA PLATE, 110VAC
10	CFH-3061-01	1	THERMOSTAT ASSEMBLY
11	CFH-3064	1	GLASS SIGHT
12	CFH-3065	2	MALE SNAP SPACER
13	CFH-3074	1	FUSE BRACKET
14	CFH-3077	1	PILOT LIGHT PCB
15	CFH-3078	2	END CAP
16	CFH-3086	1	CLAMP
17	CFH-3089	1	MOUNT BRACKET
18	CFH-3096	1	ELECTRICAL BOX
19	CFH-3097	1	LID-ELECTRICAL BOX
20	CFH-3098	1	WINDOW HOUSING
21	CFH-3099	1	PCB BRACKET
22	CFH-WR-001	1	14GA X 3.50IN, FOD TO RTT
23	CFH-WR-002	1	14GA X 3.50IN, FOD TO RTT
24	CFH-WR-003	1	16GA X 3.50IN, RTT TO FLYING LEAD
25	CFH-WR-004A	1	16GA X 3.50IN, RTT TO FLYING LEAD
26	CFH-WR-005	1	14GA X 24.00IN, RTT TO FLYING LEAD
27	CFH-WR-006	1	12GA X 24.00IN, RTT TO FLYING LEAD
28	CFH-WR-007	1	14GA X 24.00IN, RTT TO FLYING LEAD
29	E-FB-101	1	FUSE BLOCK
30	F-CS-05C-16	12	CAP SCREW
31	F-FW-06	7	FLAT WASHER
32	F-FW-08-Z	12	FLAT WASHER
33	F-GS-832-04	1	GROUND SCREW GREEN
34	F-HB-06C-12	3	HEX BOLT
35	F-HN-06C	4	HEX NUT
36	F-HN-08F-GR8	24	HEX NUT
37	F-HN-632	2	6-32 HEX NUT
38	F-PH-1032-08	1	
39	F-RP-04-12-SS	4	ROLL PIN
40	F-SN-04-03	8	SCREW NAIL
41	F-ST-632-06	11	SELF TAPPING SCREW
42	F-UB-06C-40	2	U-BOLT
43	FUS-ABC-DUM-1	1	DUMMY FUSE 1/4" x 1 1/4"
44	HAW-0888-3	1	High Pressure Hose Assy. 36 in.
45	MPD-9750-03	7	MIXER ELEMENT
46	O-T-127	2	O-RING
47	O-T-154	2	O-RING
48	PF-AP-12	2	ALLEN PLUG
49	PF-FT-08	1	1/2 NPTF TEE
50	PF-HN-08	3	HEX NIPPLE
51	PF-HN-08-06	2	HEX NIPPLE
52	PF-RB-08-04	1	REDUCER BUSHING
53	PF-SE-08	1	1/2 NPT STREET EBOW

MAGNUM VENUS PRODUCTS

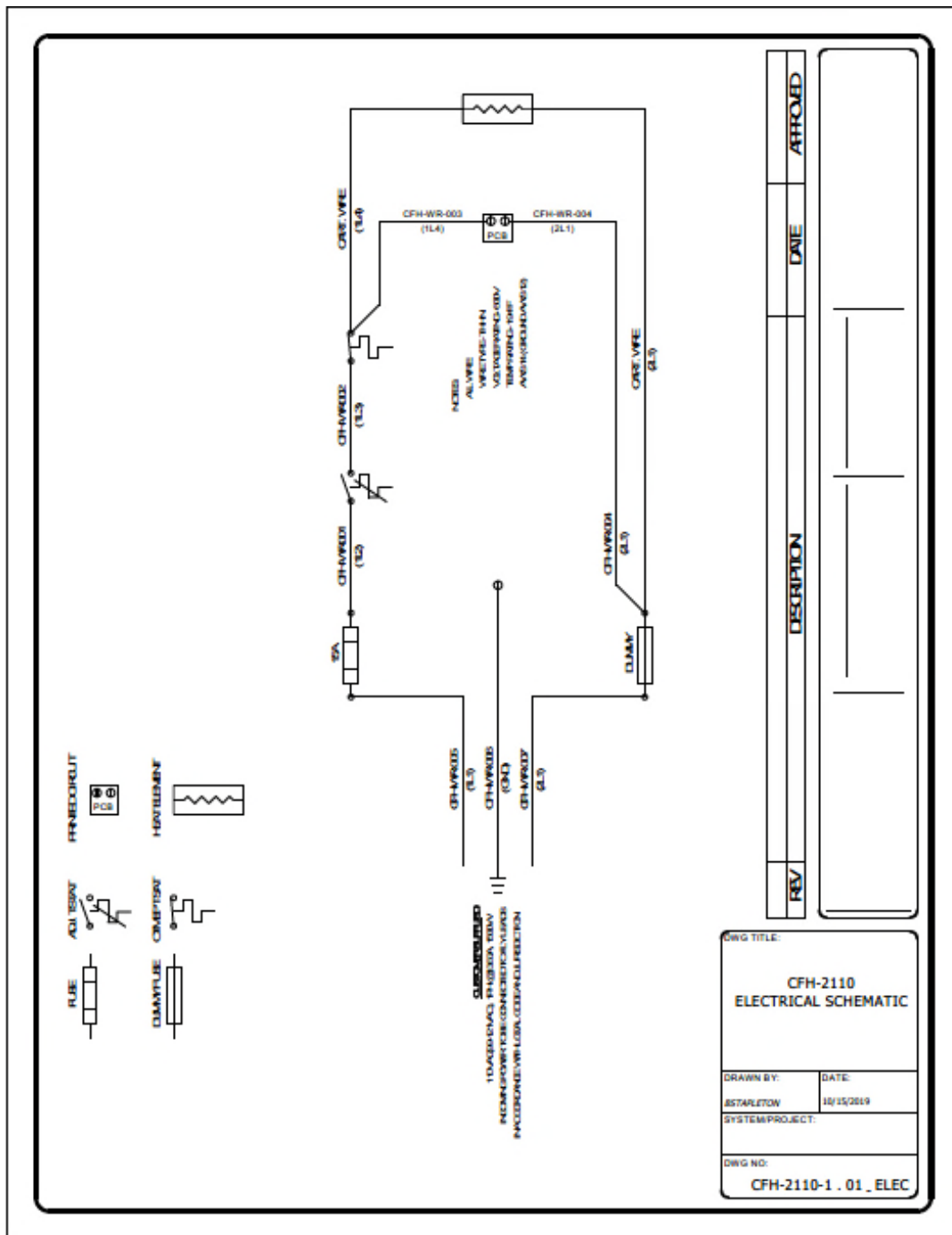
110 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2110-1

REV: A

SHEET 4 / 5

10/10/2019



MAGNUM VENUS PRODUCTS

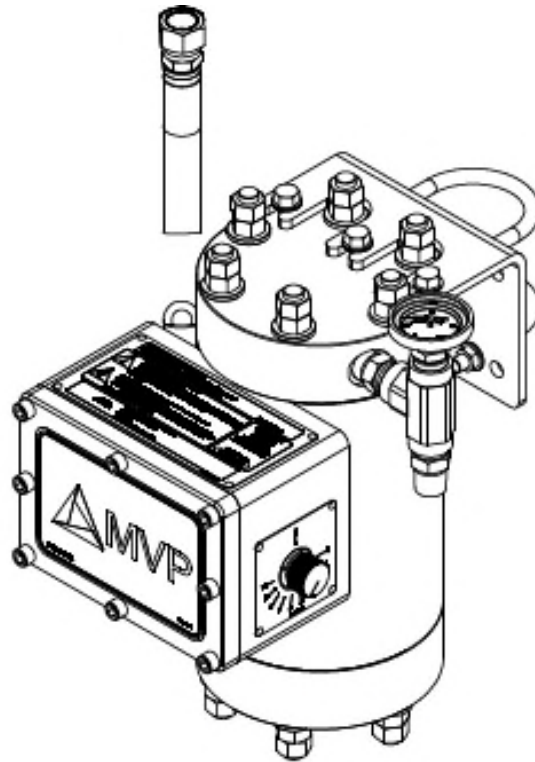
110 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2110-1

REV: A

SHEET 5 / 5

10/10/2019



SPECIFICATIONS	
DIMENSIONS	13.75" [350MM] X 11.25" [290MM] X 9.75" [250MM]
WEIGHT	APPROX. 49 LBS [22.25KG]
VOLTAGE (TOLERANCE), AMP, WATTS	220/240VAC(198-264VAC), 1PH @7.57/6.94A, 1500W
TEMPERATURE	MAXIMUM 140F [60C]
MAXIMUM PRESSURE	3000PSI [206 BAR]
WETTED PARTS	303/304 STAINLESS STEEL, CARBON STEEL, ZINC PLATED STEEL, ALUMINIUM, PTFE, UHMWPE, CHEMICALLY RESISTANT O-RINGS
WIRE SPECIFICATION	WIRE TYPE - THHN VOLTAGE RATING - 600V TEMP RATING - 194°F AWG 14 (GROUND AWG 12)

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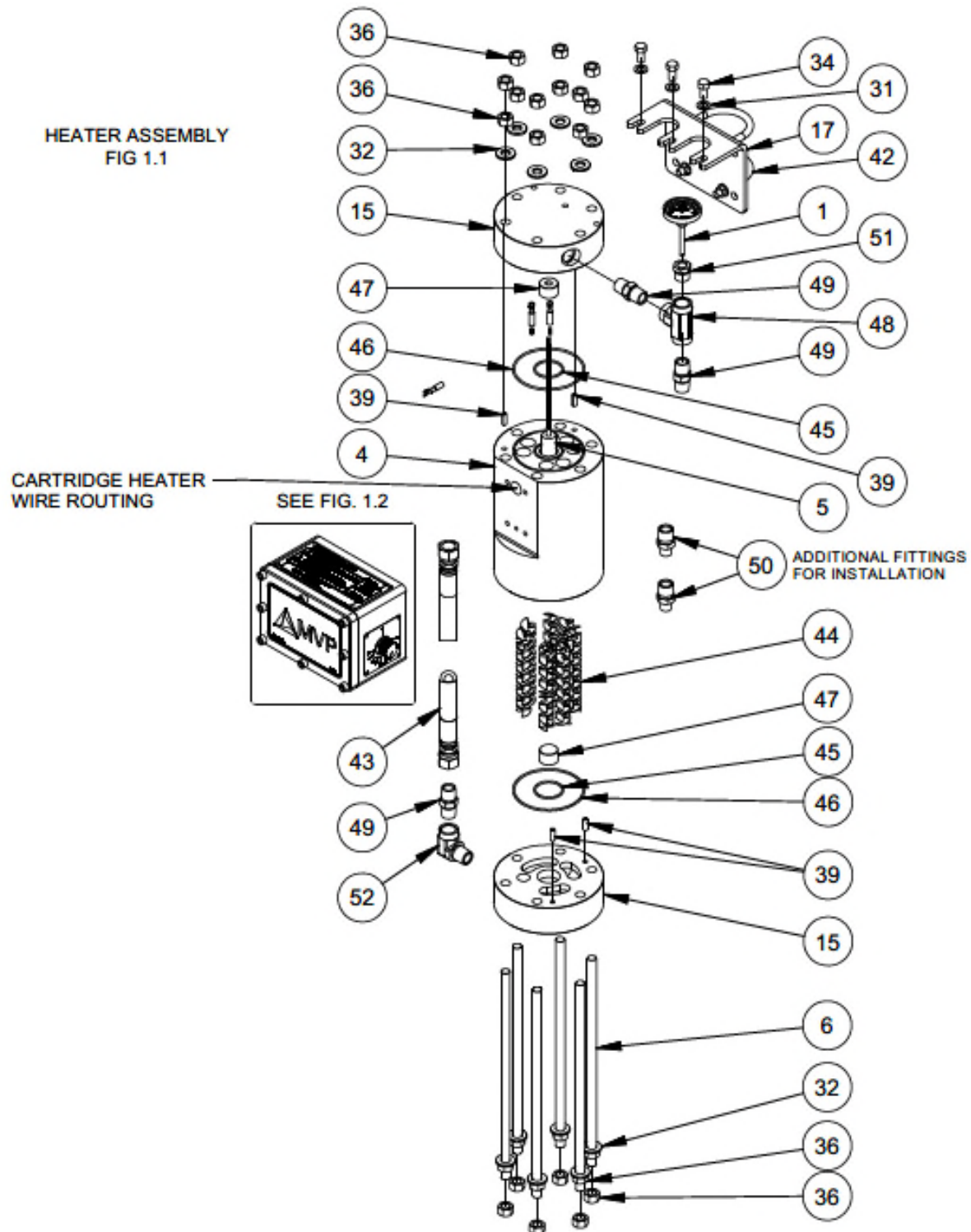
220/240 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2220-1

REV: A

SHEET 1 / 5

11/22/2019



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220/240 VAC HEATER, SHORT (ETL CERTIFIED)

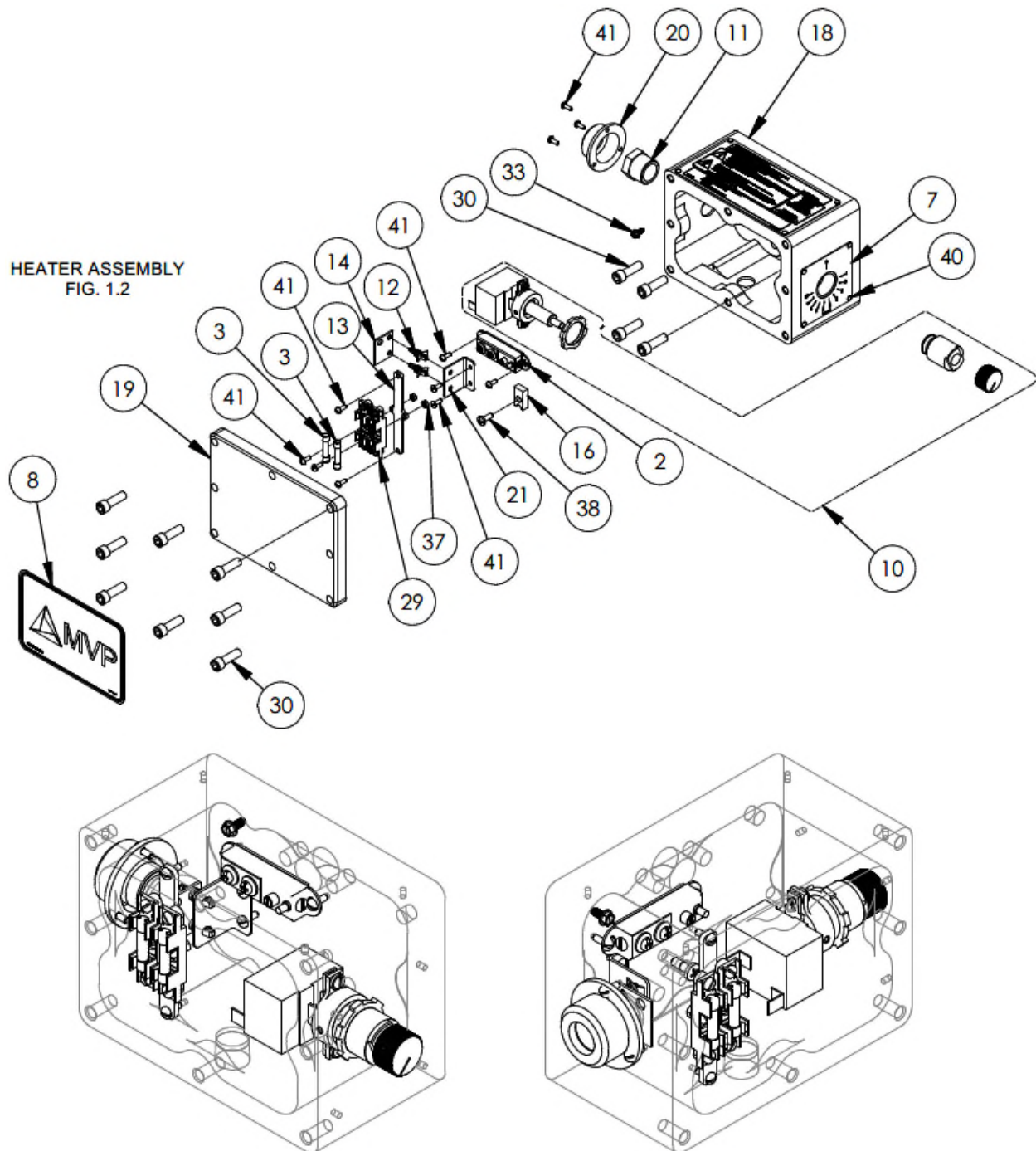
CFH-2220-1

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SHEET 2 OF 2

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HEATER ASSEMBLY
FIG. 1.2



MAGNUM VENUS PRODUCTS

220/240 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2220-1

REV: A

SHEET 3 / 5

11/22/2019

PARTS LIST			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	9212-1-1	1	THERMOMETER
2	9804-1-1	1	THERMOSTAT
3	9809-2-1	2	FUSE 10 AMP
4	CFH-2020	1	HEATER CORE, SHORT
5	CFH-2040-01	1	CARTRIDGE HEATER, SHORT
6	CFH-2079	6	TIE ROD
7	CFH-3053	1	THERMOSTAT PLATE
8	CFH-3054	1	LOGO PLATE
9	CFH-3056	1	CFH-2220-1 DATA PLATE, 220/240VAC
10	CFH-3061-01	1	THERMOSTAT ASSEMBLY
11	CFH-3064	1	GLASS SIGHT
12	CFH-3065	2	MALE SNAP SPACER
13	CFH-3074	1	FUSE BRACKET
14	CFH-3077	1	PILOT LIGHT PCB
15	CFH-3078	2	END CAP
16	CFH-3086	1	CLAMP
17	CFH-3089	1	MOUNT BRACKET
18	CFH-3096	1	ELECTRICAL BOX
19	CFH-3097	1	LID-ELECTRICAL BOX
20	CFH-3098	1	WINDOW HOUSING
21	CFH-3099	1	PCB BRACKET
22	CFH-WR-001	1	14GA X 3.50IN, FQD TO RTT
23	CFH-WR-002	1	14GA X 3.50IN, FQD TO RTT
24	CFH-WR-003	1	16GA X 3.50IN, RTT TO FLYING LEAD
25	CFH-WR-004B	1	16GA X 3.50IN, RTT TO FLYING LEAD
26	CFH-WR-005	1	14GA X 24.00IN, RTT TO FLYING LEAD
27	CFH-WR-006	1	12GA X 24.00IN, RTT TO FLYING LEAD
28	CFH-WR-007	1	14GA X 24.00IN, RTT TO FLYING LEAD
29	E-FB-101	1	FUSE BLOCK
30	F-CS-05C-16	12	CAP SCREW
31	F-FW-06	7	FLAT WASHER
32	F-FW-08-Z	12	FLAT WASHER
33	F-GS-832-04	1	GROUND SCREW GREEN
34	F-HB-06C-12	3	HEX BOLT
35	F-HN-06C	4	HEX NUT
36	F-HN-08F-GR8	24	HEX NUT
37	F-HN-632	2	6-32 HEX NUT
38	F-PH-1032-08	1	
39	F-RP-04-12-SS	4	ROLL PIN
40	F-SN-04-03	8	SCREW NAIL
41	F-ST-632-06	11	SELF TAPPING SCREW
42	F-UB-06C-40	2	U-BOLT
43	HAW-0888-3	1	High Pressure Hose Assy. 36 in.
44	MPD-9750-03	7	MIXER ELEMENT
45	O-T-127	2	O-RING
46	O-T-154	2	O-RING
47	PF-AP-12	2	ALLEN PLUG
48	PF-FT-08	1	1/2 NPTF TEE
49	PF-HN-08	3	HEX NIPPLE
50	PF-HN-08-06	2	HEX NIPPLE
51	PF-RB-08-04	1	REDUCER BUSHING
52	PF-SE-08	1	1/2 NPT STREET EBOW

MAGNUM VENUS PRODUCTS

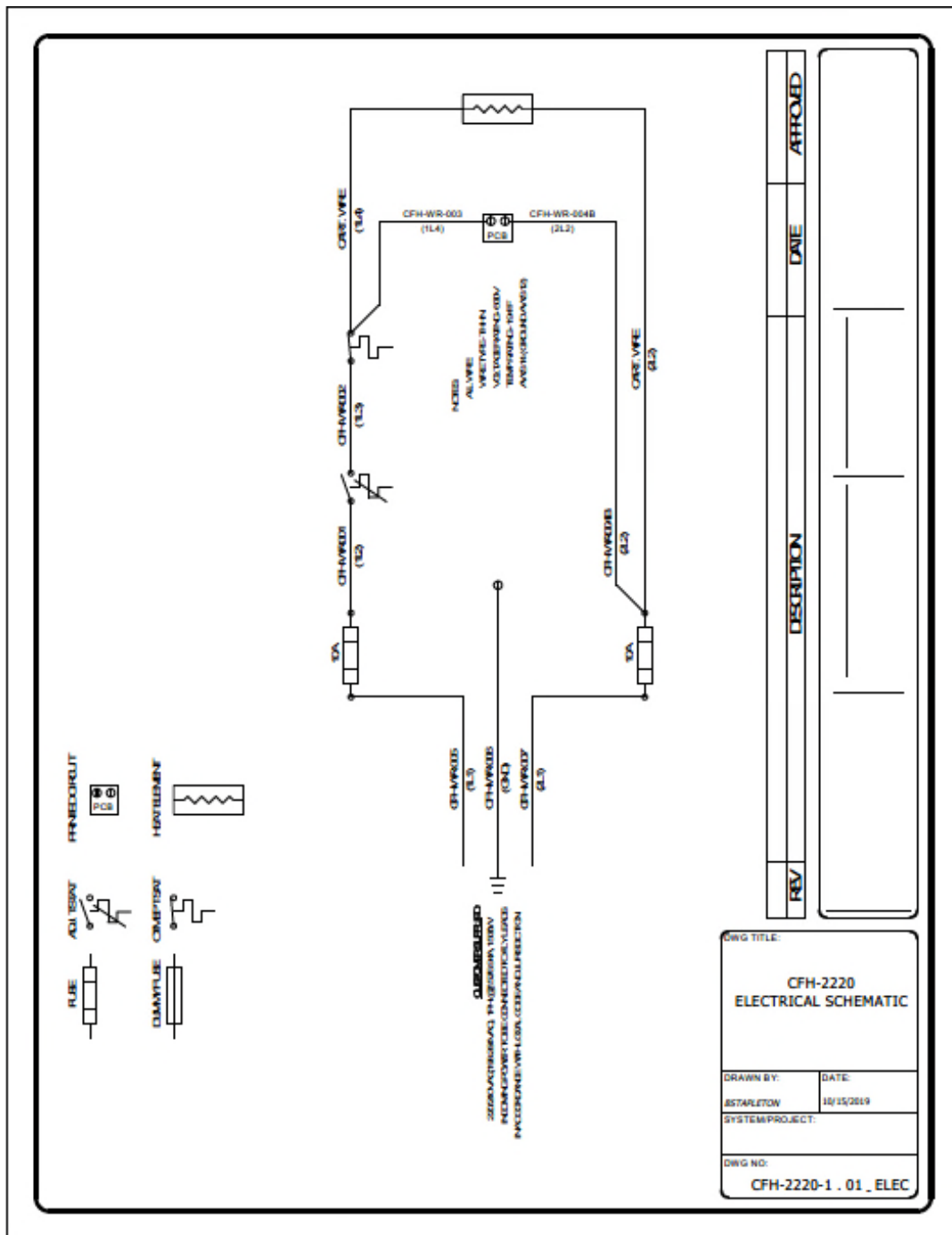
220/240 VAC HEATER, SHORT (ETL CERTIFIED)

CFH-2220-1

REV: A

SHEET 4 / 5

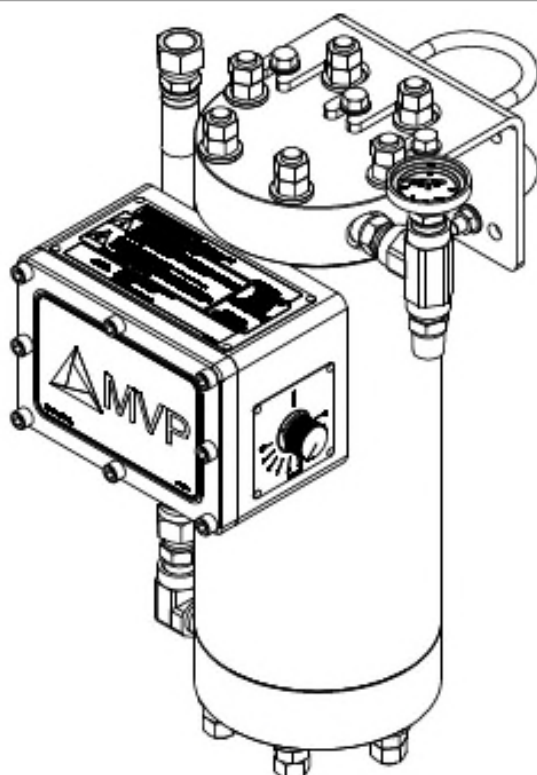
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MAGNUM VENUS PRODUCTS

220/240 VAC HEATER, SHORT (ETL CERTIFIED) CFH-2220-1

REV: A SHEET 5 / 5 11/22/2019



SPECIFICATIONS	
DIMENSIONS	18.50" [470MM] X 11.25" [290MM] X 9.75" [250MM]
WEIGHT	APPROX. 61 LBS [27.75KG]
VOLTAGE (TOLERANCE), AMP, WATTS	220/240VAC(198-264VAC), 1PH @15.15/13.88A, 3000W
TEMPERATURE	MAXIMUM 140F [60C]
MAXIMUM PRESSURE	3000PSI [206 BAR]
WETTED PARTS	303/304 STAINLESS STEEL, CARBON STEEL, ZINC PLATED STEEL, ALUMINIUM, PTFE, UHMWPE, CHEMICALLY RESISTANT O-RINGS
WIRE SPECIFICATION	WIRE TYPE - THHN VOLTAGE RATING - 600V TEMP RATING - 194°F AWG 14 (GROUND AWG 12)

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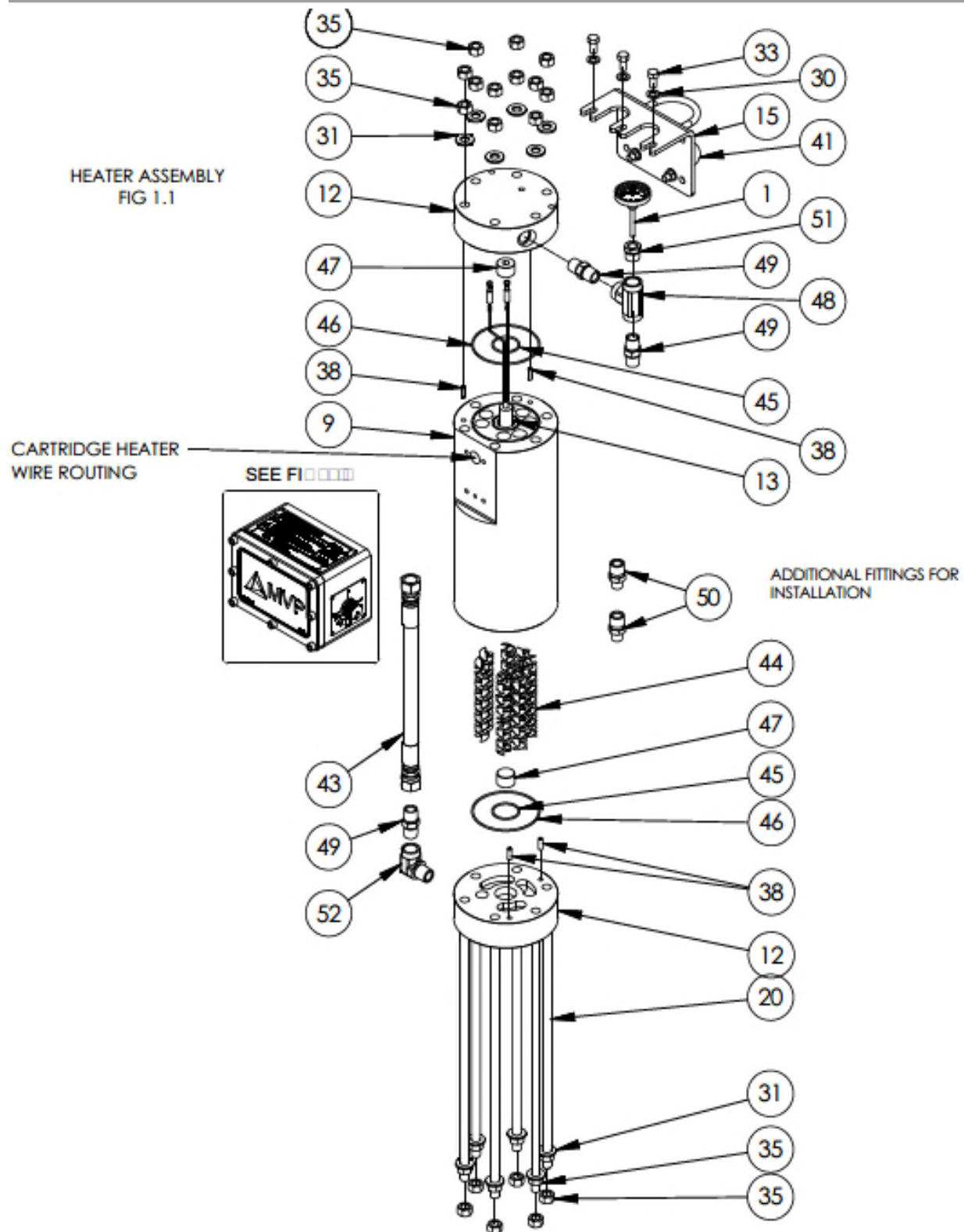
220/240 VAC HEATER, TALL (ETL CERTIFIED)

CFH-4000-1

REV: A

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11/22/2019



MAGNUM VENUS PRODUCTS

220/240 VAC HEATER, TALL (ETL CERTIFIED)

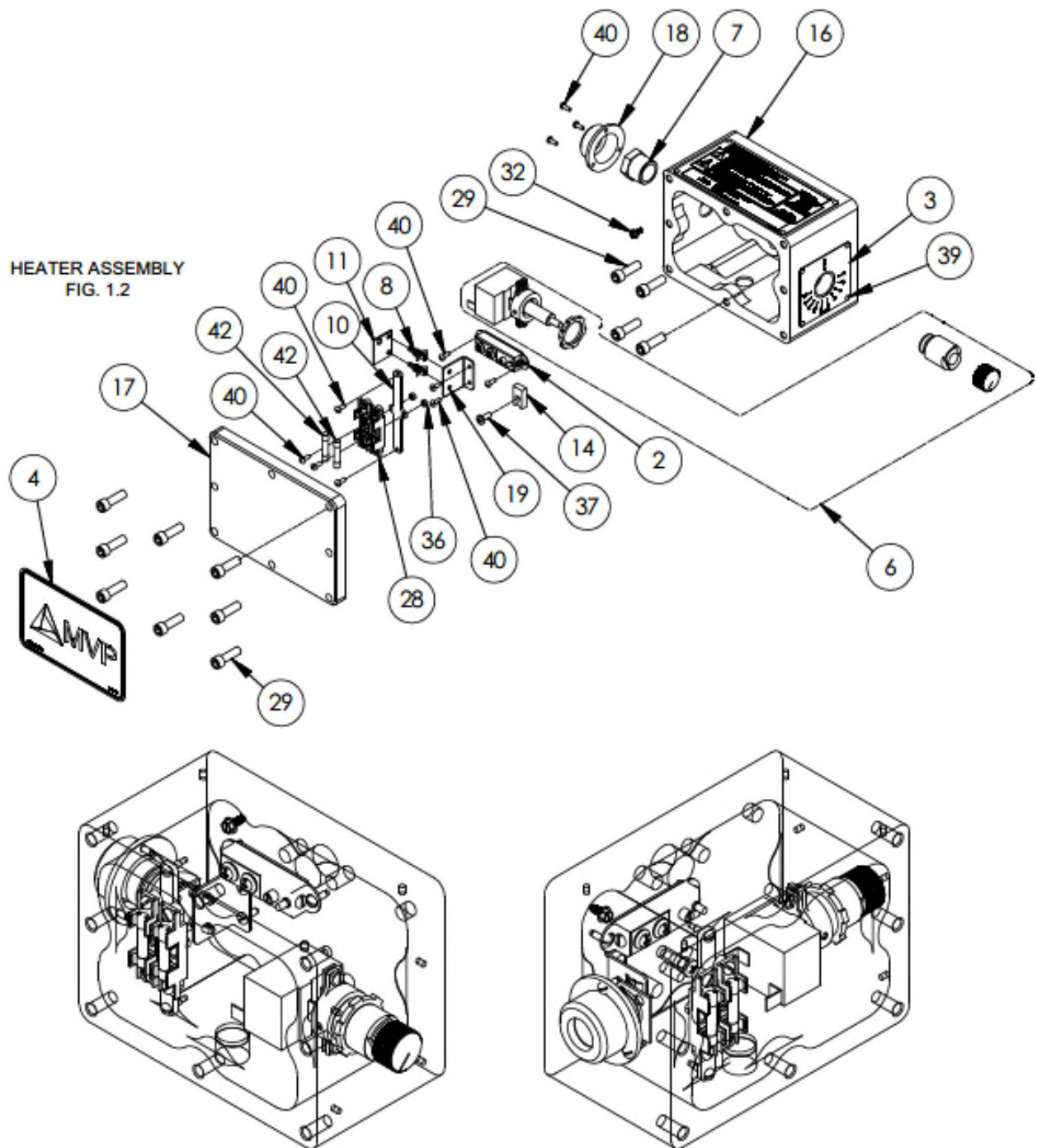
CFH-4000-1

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HEATER ASSEMBLY
FIG. 1.2



MAGNUM VENUS PRODUCTS

220/240 VAC HEATER, TALL (ETL CERTIFIED)

CFH-4000-1

REV: A

SHEET 3 / 5

11/22/2019

PARTS LIST			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	9212-1-1	1	THERMOMETER
2	9804-1-1	1	THERMOSTAT
3	CFH-3053	1	THERMOSTAT PLATE
4	CFH-3054	1	LOGO PLATE
5	CFH-3057	1	CFH-4000-1 DATA PLATE, 220/240VAC
6	CFH-3061-01	1	THERMOSTAT ASSEMBLY
7	CFH-3064	1	GLASS SIGHT
8	CFH-3065	2	MALE SNAP SPACER
9	CFH-3070	1	HEATER CORE, LONG
10	CFH-3074	1	FUSE BRACKET
11	CFH-3077	1	PILOT LIGHT PCB
12	CFH-3078	2	END CAP
13	CFH-3081-01	1	CARTRIDGE HEATER, LONG
14	CFH-3086	1	CLAMP
15	CFH-3089	1	MOUNT BRACKET
16	CFH-3096	1	ELECTRICAL BOX
17	CFH-3097	1	LID-ELECTRICAL BOX
18	CFH-3098	1	WINDOW HOUSING
19	CFH-3099	1	PCB BRACKET
20	CFH-4079	6	TIE ROD
21	CFH-WR-001	1	14GA X 3.50IN, FQD TO RTT
22	CFH-WR-002	1	14GA X 3.50IN, FQD TO RTT
23	CFH-WR-003	1	16GA X 3.50IN, RTT TO FLYING LEAD
24	CFH-WR-004B	1	16GA X 3.50IN, RTT TO FLYING LEAD
25	CFH-WR-005	1	14GA X 24.00IN, RTT TO FLYING LEAD
26	CFH-WR-006	1	12GA X 24.00IN, RTT TO FLYING LEAD
27	CFH-WR-007	1	14GA X 24.00IN, RTT TO FLYING LEAD
28	E-FB-101	1	FUSE BLOCK
29	F-CS-05C-16	12	CAP SCREW
30	F-FW-06	7	FLAT WASHER
31	F-FW-08-Z	12	FLAT WASHER
32	F-GS-832-04	1	GROUND SCREW GREEN
33	F-HB-06C-12	3	HEX BOLT
34	F-HN-06C	4	HEX NUT
35	F-HN-08F-GR8	24	HEX NUT
36	F-HN-632	2	6-32 HEX NUT
37	F-PH-1032-08	1	
38	F-RP-04-12-SS	4	ROLL PIN
39	F-SCN-4-03	8	SCREW NAIL
40	F-STS-632-06	11	SELF TAPPING SCREW
41	F-UB-06C-40	2	U-BOLT
42	FUS-ABC-20R	2	20 AMP FUSE
43	HAW-0888-3	1	High Pressure Hose Assy. 36 in.
44	MPD-9750-03	14	MIXER ELEMENT
45	O-T-127	2	O-RING
46	O-T-154	2	O-RING
47	PF-AP-12	2	ALLEN PLUG
48	PF-FT-08	1	1/2 NPTF TEE
49	PF-HN-08	3	HEX NIPPLE
50	PF-HN-08-06	2	HEX NIPPLE
51	PF-RB-08-04	1	REDUCER BUSHING
52	PF-SE-08	1	1/2 NPT STREET EBOW

MAGNUM VENUS PRODUCTS

220/240 VAC HEATER, TALL (ETL CERTIFIED)

CFH-4000-1

REV: A

SHEET 4 / 5

11/22/2019

CFH-4000-1

11/22/2019



CORPORATE HEADQUARTERS

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