

OPERATING INSTRUCTIONS MANUAL

(Please retain for future reference)

For

FMA-2300 GAS CONSTRUCTION HEATER

(Automatic Modulating Direct Fired Heater Intended for Outdoor/Indoor Use)

CERTIFIED FOR USE IN CANADA AND U.S.A.

As per Standard ANSI Z83.7 2011/10/01 Ed: 2

CSA 2.14 2011 Ed: 2 Gas Fired Construction Heaters Unvented/Unattended Type.



**FLAGRO INDUSTRIES LIMITED
ST. CATHARIES, ONTARIO
CANADA**

GENERAL HAZARD WARNING:

FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER, CAN RESULT IN DEATH, SERIOUS BODILY INJURY AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND/OR ELECTRICAL SHOCK.

ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.

IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABELS, ETC. CONTACT THE MANUFACTURER.

WARNING:

FIRE, BURN, INHALATION, AND EXPLOSION HAZARD. KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER OR CARDBOARD, A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS.

WARNING:

NOT FOR HOME OR RECREATIONAL VEHICLE USE.

WARNING:

INTENDED USE IS PRIMARILY THE TEMPORARY HEATING OF BUILDINGS UNDER CONSTRUCTION, ALTERATION, REPAIR OR EMERGENCIES ONLY.

ALWAYS PROVIDE ADEQUATE VENTILATION. 1 SQ. IN. OF FRESH AIR MUST BE SUPPLIED FOR EVERY 1000 BTUH OF HEAT.

**This heater is designed and approved for use as a construction heater under ANSI Z83.7 2011 and CSA 2.14 2011 Gas Fired Construction Heaters
We cannot anticipate every use which may be made of our heaters. CHECK WITH YOU LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT APPLICATIONS.**

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

MAIN CONTROL FUNCTIONS:

Variable Frequency Drive: This heater is equipped with a VFD “Variable Frequency Drive” to control the primary fan acceleration & de-acceleration to allow a clean burner ignition and proper cfm.

Low Fire Start: This feature ensures the burner is lite at low fire before the heater engages the modulating setting.

FreezeStat: The FreezeStat continuously monitors a pre-set discharge air temperature. When the discharge air temperature is below the freezestat set-point, the pre-set timer of (60 seconds) engages and shuts down the burner and blower. Reasons: A failure in the system has occurred. Burner flame went out, problem with fuel supply, not proving air or high limit switch engaged.

Mild Weather Stat: The Mild Weather Stat continuously monitors a pre-set discharge air temperature. When the ambient air temperature is higher than the Mild Weather Stat temperature, the burner will turn off and the fan will continue to blow air. Once the ambient temperature drops below the pre-set Wild Weather Stat, the burner will lite.

High Pressure Switch: The high pressure switch monitors fuel supply flow. If the system is supplied with too much fuel pressure, the system will shut down.

Remote Thermostat:

The remote thermostat must be plugged into the thermostat receptacle on the heater, placed in the area you are trying to heat and set to a desired temperature. You must also set the thermostat temperature dial on the heater.

The function of the remote thermostat is to sense the temperature in the area you are trying to heat. When the temperature in the area drops below the remote thermostat set-point, the heater will modulate to maintain a discharge temperature to a maximum of 200 Degrees at full CFM. The heater will continue to run on modulating mode until the remote thermostat set point is achieved.

Once the remote thermostat temperature is achieved, the heater will switch to low fire mode; where the heater will run at a lower CFM and lower discharge temperature.

RATING INFORMATION

| | | |
|-------------------|---|--|
| Model Number | - | FMA-2300 |
| Input btuh | - | LP 620,000 MIN. 2,300,000 MAX. NG 320,000 MIN. 2,300,000 MAX. |
| Fuel | - | Natural Gas or Propane |
| Inlet Pressure | - | Natural Gas: 5psi Propane: 5psi |
| Manifold Pressure | - | Natural Gas: 3.00" W.C. Propane: 2.20" W.C. |
| Ignition | - | Hot Surface Ignition (HSI) Thermostat Control |
| Air Circulation | - | 15,000cfm (Modulating Mode) 8,300cfm (low fire) |
| Fuel Consumption | - | 106 lbs/hr 1900 cfh |
| Approved | - | cETLus listed |

INSTALLATION:

The installation of this heater for use with natural gas shall conform with local codes or, in the absence of codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54 and the Natural Gas and Propane Installation Code, CSA B149.1.

The installation of this heater for use with propane tank or cylinder shall conform with Local codes or, in the absence of local codes, with the Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58 and the Natural Gas and Propane Installation Code, CSA B149.

This heater must be located at least 10ft (3m) from any propane gas cylinder. This heater shall not be directed toward any propane gas container within 20ft (6m).

CLEARANCE TO COMBUSTIBLES:

TOP: 4 ft FRONT: 16 ft SIDES: 2 ft REAR: 4 ft

CONNECTING THE HEATER TO A PROPANE SOURCE:

The heater must be located at least; 6 ft (1.83m) in the USA; or 10 ft (3m) in Canada from any propane gas container.

If Propane cylinder(s) are used to supply the heater, no cylinder(s) smaller than 500 GAL. capacity shall be used. This cylinder (s) must supply a vapor withdrawal only.

1. All cylinder(s) connections must be made using a wrench to tighten the fitting.
2. Be sure that the cylinder(s) valve(s) are in the closed position when connecting or disconnecting the cylinder(s).
3. A soap and water solution must be applied to all connections in order to leak check the system.

The gas must be turned off at the propane supply cylinder(s) when the heater is not in use. When the heater is to be stored indoors, the connection between the propane supply cylinder(s) and the heater must be disconnected and the cylinders removed from the heater and stored in accordance with Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58 and CSA B149.1, Natural Gas and Propane Installation Code.

PIPING:

The heater must be installed by a qualified gas technician following local codes published by the authority having jurisdiction. Sizing of supply piping must be determined using the length of pipe run as well as total btuh rating of the appliance(s). Appropriate piping tables must be used to determine size of supply piping dependant on the length of run from source.

PRESSURES:

| | | |
|----------------------|-----|---------------|
| HIGH FIRE PRESSURES: | LP: | 2.20 IN. WC. |
| | NG: | 3.00 IN. WC. |
| LOW FIRE PRESSURES: | LP: | - 0.5 IN. WC. |
| | NG: | 0.012 IN. WC. |

This heater must be supplied by pressures indicated on the approval label. Over pressure may cause controls to fail.

DO NOT supply this unit with more than **5 PSI**

Note: A first stage regulator must be installed directly on the supply tank(s)

FUEL:

This heater will operate on propane or natural gas. The manifold pressures are listed on the approval label. Ensure that the proper pressure settings are achieved depending on the fuel being supplied.

A fuel selector valve is located on the manifold of the heater. Ensure that this valve is in the proper position depending on the fuel being used. DO NOT operate the heater with the valve in the incorrect position.

HOSES:

All hoses used to connect the heater to the fuel supply, must be a Type 1 approved propane / natural gas hose assemblies.

ELECTRICAL:

WARNING Electrical Grounding Instructions

This appliance is equipped with a grounded receptacle for your protection against shock hazard and should be plugged directly into a properly grounded plug. The electrical grounding of the heater shall be in compliance with the National electrical Code, ANSI/NFPA 70, or CSA C221.1, Canadian Electrical Code Part I.

**THIS APPLIANCE IS ABLE TO RECEIVE 3 PHASE POWER.
575V SUPPLY MUST BE AVAILABLE.**

**POWER SUPPLY:
THREE PHASE: 575V, 15 AMP BREAKERS OR 15AMP TIME DELAY
FUSE, 10/4 AWG AT 100FT MAX.**

This heater is equipped with a VFD "Variable Frequency Drive" to control the primary fan acceleration & de-acceleration. The VFD has been password protected to prevent improper use. If access to the VFD control is required for troubleshooting, please contact Flagro at 905-685-4243.

HEATER SET UP:

- MAKE SURE HEATER IS ON A LEVEL SURFACE AND MEETS CLEARANCE TO COMBUSTIBLES REQUIREMENTS.
- KEEP FRESH-AIR INTAKE AND HEATED-AIR DISCHARGE CLEAR OF OBSTRUCTION
- PROVIDE PROPER CLEARANCE TO ALLOW ACCESS TO VESTIBULE, BLOWER AND MOTOR COMPARTMENTS
- HEATER MUST DRAW 100% FRESH OUTSIDE AIR.
- MAINTAIN A MAXIMUM VOLTAGE DIFFERENTIAL **OF +/- 10% WHILE** HEATER IS RUNNING.
- ENSURE HOSE IS PROTECTED FROM HOT SURFACE AND TRAFFIC AREAS.
- DO NOT HANDLE, MOVE OR SERVICE HEATER WHILE IN OPERATION, CONNECTED TO POWER SUPPLY OR WHILE HOT.
- PERFORM LEAK TEST ON ALL PIPING AND HOSE CONNECTIONS

SETTING MANIFOLD PRESSURE:

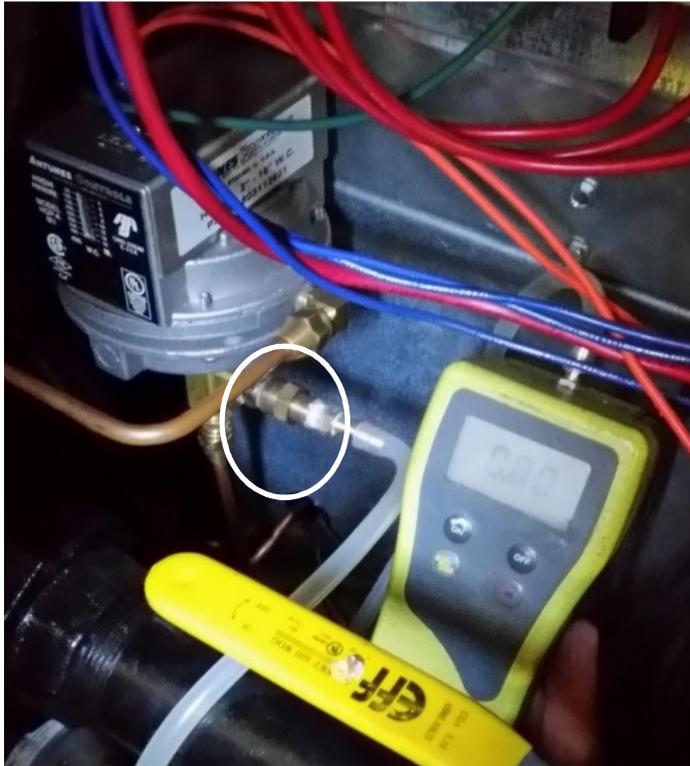
- OPEN MAIN CONTROL DOOR, IDENTIFY THE MODULATING VALVE AND REMOVE BLUE COVER.



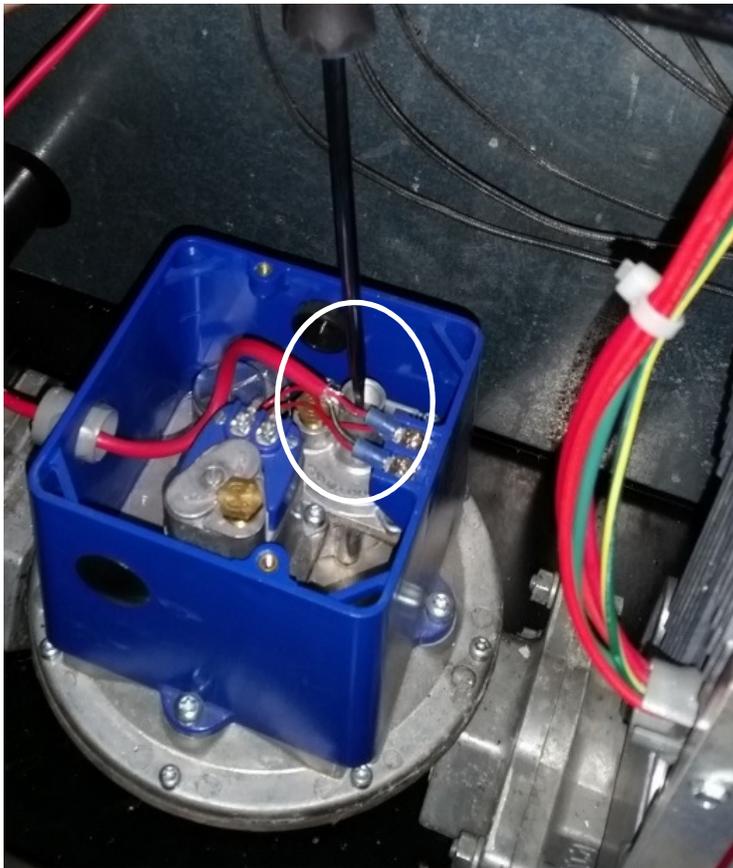
- DISCONNECT WIRES FROM BOTH **RTD PORTS** ON CONTROLLER (5TH & 6TH WIRE FROM THE BOTTOM LEFT SIDE)



- CONNECT A MANOMETER TO THE TEST PORT ON THE HIGH PRESSURE SWITCH, USE SMALL WRENCH TO REMOVE BRASS PLUG



- REFER TO START UP INSTRUCTIONS TO START HEATER TO SET PRESSURES. THIS PROCESS NEEDS TO BE CONDUCTED QUICKLY, **OTHER WISE THE HEATER MAY GO OUT ON HIGH LIMIT.**
- ADJUST PRESSURE TO SET POINT BY USING A SCREW DRIVER AND ADJUSTING THE SET SCREW ON THE VALVE
LP: 2.20 IN. WC.
NG: 3.00 IN. WC



- TURN BURNER SWITCH TO THE “OFF” POSITION AND LET THE BLOWER RUN FOR A FEW MINUTES TO COOL DOWN HEATER
- TURN BLOWER SWITCH TO THE “OFF” POSITION
- RECONNECT THE 2 RTD WIRES ON THE CONTROLLER
- HEATER IS READY TO OPERATE, CONTINUE TO “**START UP INSTRUCTIONS**”

START UP INSTRUCTIONS:

1. CONNECT POWER SUPPLY- 575V 3 Phase Power (SEE RATING PLATE)
2. CONNECT PROPER FUEL SUPPLY – PROPANE OR NATURAL GAS (SEE RATING PLATE FOR PRESSURES)
3. ENSURE FUEL SELECTOR VALVE IS IN THE PROPER FUEL POSITION
4. THERMOSTAT MUST BE PLUGGED INTO HEATER

The remote thermostat should be placed in the area you are trying to heat and set to a desired temperature. You must also set the thermostat temperature dial on the heater. The function of the remote thermostat is to sense the temperature in the area you are trying to heat. When the temperature in the area drops below the remote thermostat set-point, the heater will modulate maintain a discharge temperature to a maximum of 200 Degrees at full CFM. The heater will continue to run on modulating mode until the remote thermostat set point is achieved.

Once the remote thermostat temperature is achieved, the heater will modulate to low fire mode; where the heater will run at a lower CFM and lower discharge temperature.

5. OPEN FUEL SUPPLY VALVE AT FUEL SOURCE AND TURN FUEL VALVE ON HEATER TO THE “ON” POSITION.
6. TURN THE BLOWER SWITCH TO THE “ON” POSITION. GREEN LIGHT WILL TURN ON, MEANS HEATER IS PROVEN AIR.
7. TURN THE BURNER SWITCH TO THE “ON” POSITION. THIS WILL ENGAGE THE START UP SEQUENCE ON THE CONTROLLER. AFTER 17 SECONDS, IGNITION WILL OCCUR. ONCE IGNITION OCCURS, HEATER WILL BE IN A 60 SECOND LOW FIRE START UP.
8. SET TEMPERATURE DIAL TO DESIRED SET POINT.

CAUTION

DO NOT ATTEMPT TO LIGHT THE HEATER MANUALLY

MAINTENANCE:

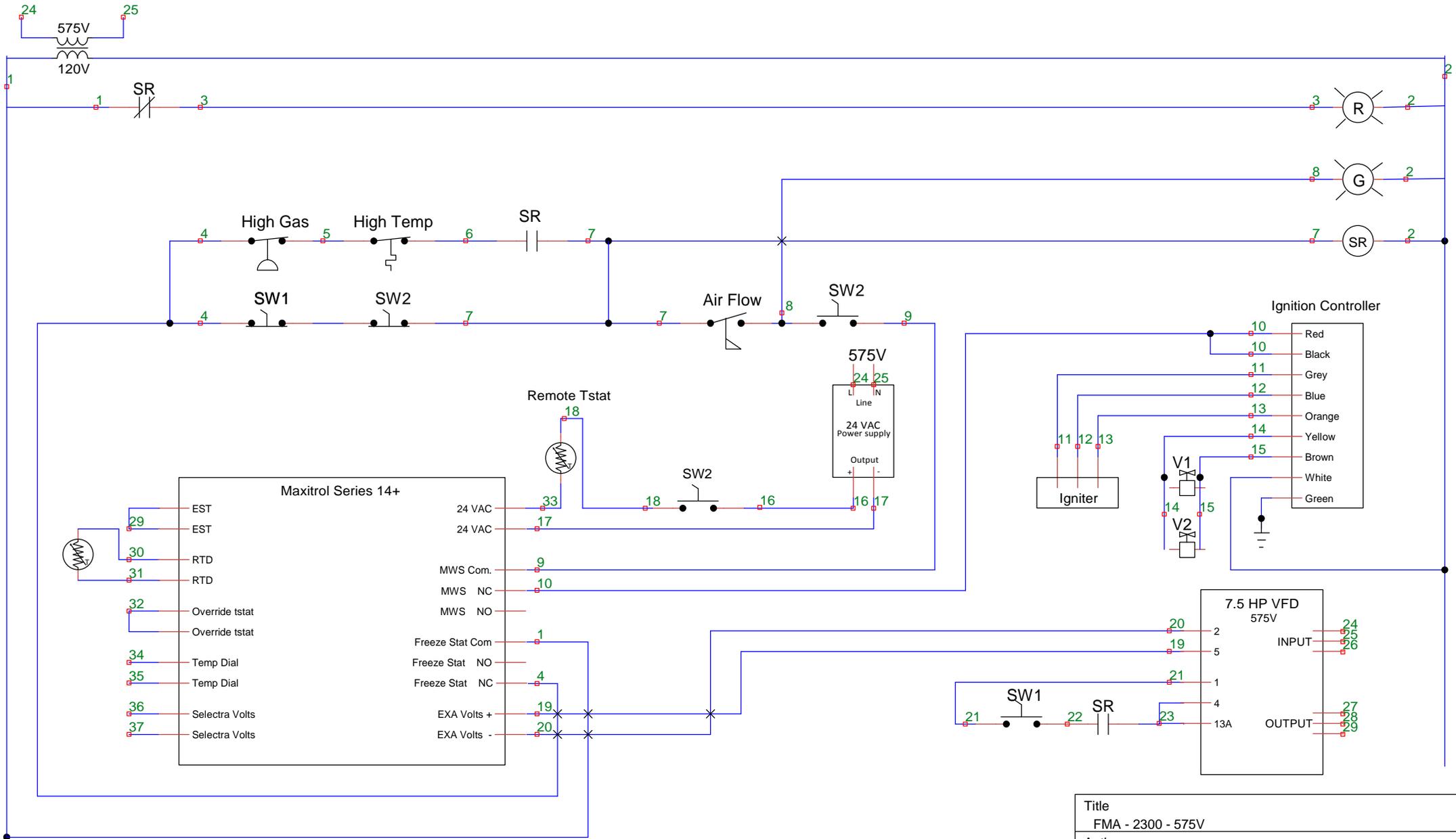
1. Every construction heater should be inspected before each use, and annually by a qualified service person.
2. The hose assembly shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or the hose is cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be that specified by the manufacturer.
3. The appliance must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids.
4. The flow of combustion and ventilation air must not be obstructed. Be sure to check the fan assembly and ensure that the motor and blade are operating properly.
5. Compressed air should be used to keep components free of dust and dirt build up. Note: Do not use the compressed air inside any piping or regulator components.

PARTS LIST FOR FMA-2300

575V

| Part Number | Part Description | |
|-------------|--|--|
| FMA-502 | 120V .HSI IGNITION BOARD | |
| FMA-503 | 24" WIRING HARNESS | |
| FMA-509 | TERMINAL STRIP (19 REQUIRED) | |
| FMA-509A | END CAPS FOR TERMINAL STRIP (2 REQUIRED) | |
| FMA-511 | RED LED LIGHT MODULE C/W MOUNT | |
| FMA-511A | RED LED LENS (COVER ONLY) | |
| FMA-512 | GREEN LED LIGHT MODULE C/W MOUNT | |
| FMA-512A | GREEN LED LENS (COVER ONLY) | |
| FMA-516 | PILOT BRACKET KIT ASSEMBLY | |
| FMA-518 | TEMPERATURE SELECTOR 120-170F | |
| FMA-519 | DIAL KIT | |
| FMA-520 | DISCHARGE AIR TEMP SENSOR | |
| FMA-521 | 12" MIXING TUBE | |
| FMA-523 | DISCHARGE AIR TEMP CONTROLLER | |
| FMA-525 | HOT SURFACE IGNITOR (.HSI) | |
| S-410 | HIGH LIMIT 250F | |
| S-414 | AIR PRESSURE SWITCH | |
| FV-414B | THERMOSTAT CONNECTOR | |
| FLE-639A | NC-CONTACT BLOCK (DUST RESISTANT) (2 REQUIRED) | |
| FLE-640A | NO-CONTACT BLOCK (DUST RESISTANT) (3 REQUIRED) | |
| FV-727 | 3PH 30AMP PLUG END | |
| FV-729 | 3PH 30AMP RECEPTACLE | |
| FMA-2301 | HIGH PRESSURE SWITCH 2-16"WC | |
| FMA-2302A | 575V/24V 75VA TRANSFORMER | |
| FMA-2303 | 3PH 600V 30AMP BREAKER | |
| FMA-2303A | PANEL MOUNT HANDLE OPERATOR | |
| FMA-2304 | 2 POSITION SWITCH (2 REQUIRED) | |
| FMA-2304A | MOUNTING COLLAR (2 REQUIRED) | |
| FMA-2305 | ON/OFF ACTUATOR | |
| FMA-2305A | ACTUATOR VALVE BODY | |
| FMA-2306 | INTERMEDIATE HARDWARE KIT | |
| FMA-2307 | INLET/OUTLET FLANGE KIT | |

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| FMA-2308 | 1-1/2" SOLENOID VALVE | |
| FMA-2309 | BLOWER ASSEMBLY | |
| FMA-2310 | 3.5-FT HMA-2A BURNER | |
| FMA-2311 | MODULATING REGULATOR VALVE | |
| FMA-2312 | DOOR LATCH ASSEMBLY (4 REQUIRED) | |
| FMA-2313A | 7.5 HP 213T 575V MOTOR | |
| FMA-2314 | 213T MOTOR SLIDE PLATE | |
| FMA-2315A | 7.5 HP 575V VFD | |
| FMA-2316 | 5.7" DIA PULLEY | |
| FMA-2317 | SPLIT TAPER BUSHING | |
| FMA-2318 | 10.5" DIA PULLEY | |
| FMA-2319 | 68" V-BELT | |
| FMA-2320 | HIGH TEMP 1-3/8" BORE PILLOW BLOCK (2 REQUIRED) | |
| FMA-2321 | RELAY FOR FMA-2300 | |
| FMA-2321A | RELAY BASE FOR FMA-2300 | |
| FMA-2322 | DISTRIBUTION BLOCK | |
| FMA-2323A | 575V/120V 500VA TRANSFORMER | |
| FMA-2324 | FUEL SELECTOR VALVE C/W LOCKING HANDLE | |
| FLE-621 | GROUNDING BLOCK | |
| 800 | LIQUID FILLED GAUGE 0-15 PSI | |
| 2103-H-CGA | FUEL SHUT OFF VALVE | |



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| Title FMA - 2300 - 575V | | |
| Author Flagro Industries | | |
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