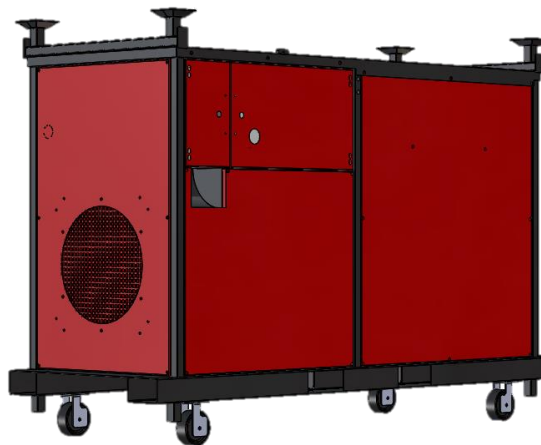




NG/LP DIRECT FIRED SPACE HEATER: BLAZE DF1600
WWW.CAMPOEQUIPMENT.COM



REPORT # 0367GH009S



Installation Instructions-Manual-Maintenance-Parts List

CAUTION: DO NOT TAMPER WITH HEATER OR ITS CONTROLS. CALL A QUALIFIED SERVICE TECHNICIAN

Retain manual for future reference May 19, 2021

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

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6 Carson Court, Brampton, ON, CANADA, L6T 4P8
Tel: (905) 793-2525 | Fax: (905) 793-8768 | www.campoequipment.com



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: NOT FOR HOME OR RECREATIONAL VEHICLE USE.

The heater is designed and approved for use as a construction heater in accordance with Standard ANSI Z83.7-2017 • CSA 2.14-2017, UL 733-2013. **CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE ANY 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.

This manual covers operating instructions, operator related maintenance instructions, specifications, and service information. This manual should be considered a permanent part of the *Blaze DF1600* and must always remain with the heater.



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 COMBUSTIBLE PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS.

WARNING
Air Quality Hazard

- Do not use this heater for heating human living quarters.
- Use of direct-fired heaters in the construction environment can result in exposure to levels of CO, CO₂, and NO₂ considered to be hazardous to health and potentially life threatening.
- Do not use in unventilated areas
- Know the signs of CO and CO₂ poisoning
 - Headaches, stinging eyes
 - Dizziness, disorientation
 - Difficulty breathing, feels of being suffocated
- Proper ventilation air exchange (OSHA 29 CFR 1926.57) to support combustion and maintain acceptable air quality shall be provided in accordance with OSHA 29 CFR Part 1926.154, ANSI A10.10 Safety Requirements for Temporary and Portable Space Heating Devices and Equipment used in the Construction Industry or the Natural Gas and Propane Installation Codes CSA B149.1
 - Periodically monitor levels of CO, CO₂ and NO₂ existing at the construction site – at the minimum at the start of the shift and after 4 hours.
 - Provide ventilation air exchange, either natural or mechanical, as required to maintain acceptable indoor air quality

USA 8-Hr Time weighted average
(OSHA 29 CFR 1926.55 App A)

CO	50 ppm
CO ₂	5000 ppm
NO ₂	

USA – Ceiling Limit
(Short Term Exposure Limit = 15 minutes)

CO	
CO ₂	
NO ₂	5 ppm

Canada 8-hr time weighted average
WorkSafe BC OHS Guidelines Part 5.1
and Ontario Workplaces Reg 833

25 ppm
5000 ppm
3 ppm (Reg 833)

Canada STEL (15 minutes Reg 833/1 hour
WSBC) WorkSafe BC OHS Guidelines Part 5.1
and Ontario Workplaces Reg 833

100 ppm
15000 ppm (WSBC)
30000 ppm (Reg 833)
1.0 ppm (WorkSafeBC)
5.0 ppm (Reg 833)

- Ensure that the flow of combustion and ventilation air exchange cannot become obstructed.
- As the building 'tightens up' during the construction phases ventilation may need to be increased.

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FOREWORD

This Operator's Service Manual is intended to familiarize you with the operation of and necessary service information for the *BLAZE DF1600* gas fired model. Please read this manual thoroughly before operating the Blaze DF1600.

This manual uses the words **WARNING**, **CAUTION**, and **NOTE** to emphasize certain information. **WARNING** identifies personal safety related information; therefore, be sure to read the directive because it deals with the possibility of personal injury. **CAUTION** identifies heater-related information; therefore, be sure to read the directive because it deals with the possibility of damaging part or parts of the Blaze DF1600. **NOTE** identifies supplementary information worthy of attention.

This manual covers operating instructions, operator related maintenance instructions, specifications, and service information. This manual should be considered a permanent part of the Blaze DF1600 and must remain with the heater at the time of resale. If additional service information is desired, either contact your local dealer or write or phone:

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(ECOBLAZE)

6 Carson Court
Brampton, ON,
Canada L6T 4P8
Tel: (905)793-2525
Fax: (905) 793-8768
www.campoequipment.com

LIMITED WARRANTY

Campo Equipment CO.LTD and accessories are warranted to the original retail purchaser. No warranty is transferable to any subsequent owner. The warranty period is one year from the date of purchase. The warranty covers all defects in material and workmanship insofar as they are of Campo Equipment CO. LTD, manufacture. This warranty is limited to the

furnishing of new parts only, in the event the original part is determined to be defective by Campo Equipment CO.LTD.

The warranty does not include transportation costs, labour for inspecting, repairing, or replacing original parts, or consequential damages. It also does not cover any damage because of negligence, accident, misuse, or abuse. Campo Equipment CO.LTD shall not be liable for delays caused by defects, for consequential damages, or for any other damages, charges, or expenses of any nature. All parts not manufactured by Campo Equipment CO.LTD. are warranted insofar as warranted by the manufacturer of such parts.

SPECIFICATIONS

Model Number	DF1600
Width.....	31.5" (80.01cm)
Length.....	92" (233.68 cm)
Height	58.67"(149.02cm)
Weight	992.00 lbs. (449.96Kg)
Supply panel.....	23.125"x27" (Rectangular)
Blower Motor	3.5Hp (2.57 Kw)
Heated Air Output.....	9452 CFM (315.42 m ³ /min)
Manifold Pressure" W.C.....	2.5" LP and 5.6" NG
High pressure switch to be adjusted for manifold pressure	
Minimum/Maximum Supply Pressure "W.C...10/14	
Pilot Pressure	3.6" W.C
Maximum BTU Input	1,600,000
Kcal/h	403193.2
Minimum BTU Input LP.....	326289
Kcal/h	822223
Minimum BTU Input NG.....	324538
Kcal/h	81782

Power supply : 1PH or 3PH 230V 40A

This unit is equipped with constant voltage system. It is activated when voltage is lower than 208v or higher than 240v.

Minimum 4 X 420lb cylinders are to be used. Cylinder supply system must be arranged to provide for vapor withdrawal from the operating cylinder.

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HEATER USAGE

The primary intended use of this heater is to provide temporary heating for buildings under construction, alteration or repair.

VENTILATION INFORMATION

DF series heaters require a constant intake supply of clean, fresh air.

WARNING

The flow of combustion or ventilation air must not be obstructed in any manner.

WARNING

The heated air MUST NOT be re-circulated through the heater. The heated work area must be ventilated to ensure that all air present in the workspace can be displaced continuously with fresh heated air.

WARNING

If dizziness or drowsiness is experienced by any personnel, evacuate the area. Check the oxygen level in the heated workspace and make corrections to the ventilation system as needed.

CLEARANCE FROM COMBUSTIBLE MATERIALS

Combustible materials and materials which give off an explosive or volatile vapor must not be stored or located in the main discharge air stream of the heater. Since all materials have a different flash point, it is imperative that the discharge air temperature be checked at the location where any combustible material will be stored. Make sure the air temperature is well below the material flash point.

Under no circumstance should any combustible material be stored in the airstream within 15 feet (4.57 m) of the air discharge port or within 6" (15.2cm) of the top, sides or ends of the heater.

WARNING

This heater must be placed at least 10 Ft (3.05M) from any LP-Gas Container. The discharge air stream of this heater must not be directed toward any LP-Gas container within 20 Ft (6.1M).

WARNING

Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored or used.

CODES

When installing this heater on a job site, the installation must conform to all local codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and National Gas and Propane Installation Code, CSA B149.1 if the unit is to burn natural gas. The installation must conform to all 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 National Gas and Propane Installation Code, CSA B149.1 if the unit is to burn vapor propane. The installation must be inspected prior to the first start-up of the heater.

LEVELING HEATER

The heater should be installed on a surface that is as level as possible. Insure that the wheels are locked, and heater does not rock after leveling the heater. If the heater is not leveled proper it will not work.

WARNING

Do not block the heater too high of the ground. Also, use care when leveling the heater. Keep hands and feet away from any portion of the heater being raised.

WIRING

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The required voltage and amperage for each heater is listed in the SPECIFICATIONS section of the manual and are also listed on the heater identification plate attached to the heater. If the heater needs to be operated on a voltage other than that indicated by these decals, consult the factory for instructions. If a voltage change has been made, re-label the heater as such. For Safety reasons, as well as preventing damage to the heater, NEVER leave the wrong decal in place. No information is better than the wrong information. The heater must be wired (at every installation) according to the voltage and amperage required. **A qualified electrician must wire the heater appropriately according to the wiring diagram and local, state, and national codes. The heater must be electrically grounded in compliance with the National Electrical Code, ANSI/NFPA 70 and CSA C22.1, Canadian Electrical Code Part I.**

GAS CONNECTIONS AND SUPPLY

WARNING

Only qualified gas fitting personnel shall connect or disconnect fuel supply lines to supply tanks and or gas mains and the heater gas inlet manifold.

All unions and valves must be checked for tightness and proper operation before the initial start-up of the heater. Use Sherlock 5-second leak (of the proper temperature) or soapy water on all connections to be sure they are tight. Replace or tighten any connection as necessary.

The supply gas hose being used must be protected from traffic, building materials, and contact with hot surfaces both during usage and while in storage.

The supply gas hose 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 supply gas hose must be replaced with a manufacture's authorized replacement part only.

See the Service Parts section of this manual for the appropriate replacement part.

OPERATING GAS PRESSURES

Minimum inlet pressure - 10 inches W.C (0.36 PSI) Maximum inlet pressure – 14 inches W.C (0.50 PSI))

OPERATING INSTRUCTIONS

Pre-Start Checklist

Before attempting to start the Blaze DF1600, several important checks of the heater and heater system are critical to safe, efficient, and dependable usage. Many potential problems can be avoided by proper maintenance and attention. The heater should be inspected before each use, and at least annually by a qualified service personnel.

1. Familiarize yourself with this Operation / Service Manual.
2. Check the entire heater for any sign of physical damage.
3. Check for obstructions to the air intake and discharge of the heater. Remove anything that will obstruct or restrict airflow. The heated work area must be ventilated to ensure that all air present in the workspace can be displaced continuously with fresh heated air. The heater air intake must be supplied with clean, fresh outside air always.
4. Check incoming voltage.
5. Check the entire heater for loose nuts, bolts, and electrical connections. Be sure the blower mounting bolts are tight.
6. Check Flame Rod to be sure it is clean. (See Maintenance section of this Manual.)

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7. Check that the gas type and inlet pressures agree with that stated on the DF1600 Identification Plate. This plate may indicate both Natural Gas and LP.
8. Check all unions and valves for tightness and proper operation. Tighten or replace as necessary. Use Sherlock 5-second leak (of proper temperature) or soapy water on all NEW connections to be sure they are tight.
9. Service and make all adjustments before starting heater.
10. All area surrounding the heater must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids.

Starting Heater

NOTE: Do all items in the PRE-START CHECKLIST before starting the heater.

ATTENTION: Gas and electrical connections must conform to all local area codes.

1. Check Heater Identification Plate and decals for correct supply voltage and phase.

WARNING

Only a qualified electrician shall connect or disconnect all electrical power cords.

CAUTION: Power supply cord must be adequate for total unit power requirements and distance to primary power source.

2. This appliance receives 1 Phase or 3 Phase 208 to 240 V supply must be available.

INSTALLATION:

Single Phase	Three Phase
Up to 100' 3 # 6	Up to 100' 4 # 8
Up to 200' 3 # 4	Up to 200' 4 # 6
Up to 300' 3 # 3	Up to 300' 4 # 4

NOTE: To power up the heater inside the power supply compartment there are four CAM locks and a 3 Phase, 250V, 30 Amp male plug, use either one of them. When using the plug make sure that the CAM locks have caps on them. The main power switch should be in the

“OFF” positions. This power source must include a “Short Circuit” protection device such as a circuit breaker or fusible.

With all connections secure, including grounds, energize the heater. Place the main power switch to on position that should illuminate the green neon light and should energize the RTC DFC+ Controller.

WARNING

Only qualified gas fitting personnel shall connect or disconnect fuel supply lines to supply tanks and or gas mains and the heater gas inlet manifold.

Note: Do not attempt to manually light the pilot.

1. Connect fuel supply line to manifold inlet. Turn on the gas supply at source and check for leaks at all connections.
2. Open all valves between fuel supply and gas manifold inlet valve, and then open gas manifold inlet valve.
3. Place the heat/Fan switch to “HEAT” position if running without thermostat and if running with the thermostat leaving the heat/Fan switch to ‘HEAT’ position plug in the thermostat in to the remote stat receptacle. Then blower will start and purge the unit for a pre-set time (2-5 sec.) before the ignition sequence will begin.
4. Once the pilot flame has been established, the main flame will come on and will begin to adjust as needed to maintain the discharge air temperature at the pre-set temperature.

NOTE: Air may be trapped in the gas supply line and the gas manifold. A second or third trial for ignition may be necessary to purge all the air from the system. If a flame is not established during the first trial for ignition. Simply turn of the main switch and turn it back on that would reset the entire system.

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5. The DFC+ will always display the current discharge air temperature. Press any arrow key to change the discharge setpoint temperature. Press any arrow key to change the discharge setpoint temperature. Once an arrow key is pressed, the LED will display the text for the current setpoint temperature. Use the down or up key to set a new discharge temperature, then press the middle key to save the changes made. If a key is not pressed for 10 seconds, the DFC+ will exit without saving. When adjusting the set point range, the set point cannot surpass the set Low and High values. That is 120°F to 250°F.

WARNING

If unit fails to ignite or function properly; disconnect fuel and power supplies and contact authorized service personnel.

NOTE: If the blower does not turn on, check the control braker (The "Power" indicator light will confirm that the control braker is good) or make sure the VFD is energized.

NOTE: Placing the Main switch in the "OFF" position will automatically reset the heater if the control is in a lock out condition. If the burner still does not ignite, use the following sequence of steps:

1. Make sure the gas pressure is adequate.
2. Check to make sure all manual valves are open between the fuel source and the burner.
3. Check to make sure the proper voltage is supplied to the heater.

WARNING

A qualified electrician must make the adjustments.

4. Check to be sure the air proving switch sensor tubes are clear of any obstructions.

NOTE: Listen to hear the pilot solenoid valve click. If the click is not heard, the solenoid valve may not be opening and may be defective. Sparking should also be present at the spark igniter in the burner If the click is heard and

pressure is registered, move the main switch to the "OFF" position and place the Heat/Fan switch in the "center" position. Lockout power to the heater and check the following:

1. Check the igniter for corrosion and proper separation. Be sure the insulator is not cracked and is properly seated in the burner. Check the connections for clean, dry, and tight contact. Check the ignition wire for cuts and cracks that may allow the spark voltage to jump to ground before the igniter. Also check that the ignition wire is securely fastened to the ignition transformer high voltage terminal.
2. Check the burner ports for obstructions. Remove any obstruction.
3. Check the electrical system including wiring, connections, switches, and major electrical components.
4. Check the input voltage and phase to the heater; adequate voltage and proper phase is necessary for proper function.
5. Restore power to the heater and place the Main switch in the "ON" position then place the Heat/Fan switch to 'HEAT' position and allow the heater to go through its start up.

NOTE: If the burner does not ignite after the start up, see TROUBLESHOOTING section.

NOTE: The thermostat must be set above ambient.

Stopping Heater

NOTE: if the heater is being stopped for an extended period.

1. Turn manual inlet valve to OFF position.
2. Place Main switch to "ON" position and Heat/Fan switch to "FAN" position as well.

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3. Allow the heater to cool down for several minutes; then place the Main switch and Heat/Fan switch to "OFF" position.
4. Turn off the gas supply at the LP-Gas cylinder or gas main inlet when the heater is not in use.

Extended Storage

If the heater is to be shut down for an extended period, the fuel lines should be cleared from the primary source to the burner. Clear the lines by (with the heater running) closing the valve at the primary source and allowing the heater to draw the pressure out of the lines. Allow the pressure to bleed out of the lines until the burner stops; then place the Main Switch in the "OFF" position. Close all manual valves. Disconnect all power and fuel supply lines and cover all air and fuel line openings.

CAUTION: Never close manual valves at the primary source and heater inlet at the same time unless all fuel has been bled out of the lines. Fuel trapped between the primary source and the heater in the supply lines will be subjected to expansion dependent upon ambient air conditions. Excessive pressure build-up could occur in the supply line and lead to line failure. Consult your local gas supplier for proper piping and gas codes.

When storing the heater indoors the gas connection between the heater and the supply cylinder must be disconnected.

Preparing After Extended Storage

Several days or weeks before the heater will be used, attention should be paid to properly preparing the heater for service. Since the heater is an important element of your operation, it only makes sense that a certain amount of time is necessary to prepare the heater. The DF1600 should be inspected annually by qualified service personnel.

WARNING

Make sure the heater is de-energized before servicing.

1. Check the igniter for corrosion, damage, (cracked insulator, etc.), and proper separation. Make sure that it is secure in the burner. Replace any igniter beyond repair.
2. Check the burner gas ports for corrosion and any obstructions. (See burner Maintenance Section for cleaning instructions.)
3. Check the flame rod to be sure it is clean. Remove any scale or build-up of foreign matter.
4. Check for wax buildup in the manifold lines.
5. Check the wiring for broken wires or loose connections. Tighten or replace as necessary.
6. Check the entire heater for any visual damage. Repair or replace any damaged components.
7. Check all unions and valves for leakage or damage. Tighten or replace as necessary.
8. Do all items in the PRE-START CHECKLIST; then start the heater to ensure proper operation.

Control Functions and Applications

Switches and Devices:

MAIN SWITCH

ON Position: **POWER TO RTC DFC+ & VFD**

- Activates the VFD and supplies power to control circuit

OFF Position: **POWER OFF**

- Turns off the power of entire heater.

HEAT/FAN SWITCH TO FAN

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FAN/RIGHT Position: **FAN ON**

- Activates the fan and supplies power to control circuit.

CENTRE Position: **TURN FAN OFF**

- Turns off the fan.

HEAT/FAN SWITCH TO HEAT

HEAT/LEFT Position: **BURNER ON**

- Activates the burner circuit & fan.

CENTRE Position: **STOP's the burner and cuts off the fan limit opens.**

Belimo and RTC Modulating System and DFC+ Integrated Gas Fired Heating control

This system is made up of 3 main components, a variable gas valve or regulator, a discharge air temperature sensor, and an amplifier (DFC+) to control them all.

The discharge air temp sensor is mounted in an air mixing tube, located near the discharge air side of the heater. Its function is to provide temperature information to the amplifier (DFC+). This information is used by the amplifier to control the "MAX" air temp portion of the amplifier.

The Belimo or RTC Modulating System provides for continuous, steady heat, at the rate required. It does not stop the heater at any time.

The modulator is the device that does the actual increasing and decreasing of gas flow to the burner. An electromagnet controls how much gas can pass through the modulator. The more voltage that is applied to the magnet, the more gas that can pass through. The modulator is typically full open when a voltage of about 24-volts DC is applied from the amplifier. Minimum flame results from zero volts DC. **The DF1600 heater has a minimum BTU input rating of 324538 BTUs on NG (81782 Kcal) and 326289 BTUs (82223 Kcal) on LP.**

The Belimo Modulating System has been pre-set at the factory to insure this input. No field adjustment of this set point is required.

Conventional Remote Thermostat

The optional remote thermostat (if used) connects to the remote thermostat receptacle on the heater. The difference is that when this device is used, the heater delivers a constant high temperature which is set on the SP of the RTC DFC+ Controller, until the set temperature on the conventional thermostat is reached. At that time, the heater goes to 120°F and keeps the temperature balanced until the temperature at the thermostat falls below the set temperature. The heater then goes back to the thermostat mode delivers high temperature air.

To use this device, select and position the thermostat at a location that will represent a good average room temperature inside the structure to be heated that will not be directly affected by the heated air discharge from the heater. Route the plug end of the cord to the heater and plug into the special receptacle located on the heater control panel.

The thermostat assembly comes with a 50-foot cord with a plug, as standard.

The adjustment range is from 40° to 110° F. (5° to 43° C.). To use the thermostat, plug in the remote thermostat to the designated REMOTE STAT receptacle then dial up or down or setting it to the desired room temperature to be maintained.

MAINTENANCE

WARNING

For your own safety, Lockout electrical power before attempting any service procedures to prevent accidental start-up.

Burner

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Proper maintenance of the burner is critical for efficient trouble-free operation. The burner of every Campo heater is tested before shipment, however, changes in altitude, fuel, temperature, and humidity will affect the performance and efficiency of the burner. Also, the burner should be checked at least annually (preferably before the start of the heating season) for efficient burning.

1. Shut the system down totally, disconnecting or locking out power supply so there can be no accidental start-up during inspection.
2. Inspect the burner carefully, including upstream and downstream sides of mixing plates as well as burner body face. Any accumulation of scale or foreign material on either side of the mixing plates should be removed with a wire brush. Check visually that no holes in the mixing plates are blocked. If any burner ports are plugged (even partially) clear them with a piece of wire or a #47 drill bit (2mm).

WARNING

Do not enlarge burner ports or performance may be drastically affected.

If any mixing plates are loose or missing fasteners, tighten/replace as necessary.

Always use zinc plated or stainless fasteners.

3. Observe flame pattern and, if necessary, take steps to correct obstructed ports. The velocity and distribution of the air across the burner is pre-set at the factory and should be changed by authorized service personnel only.

Igniter

To start ignition, the igniter must be adjusted properly and must not be damaged or defective. Periodically the igniter should be inspected for damage, corrosion, and separation. To inspect and adjust the igniter, use the following procedure:

1. Remove the igniter from the burner.

2. Visually inspect the igniter for corrosion and damage to the insulator and tip.
3. Consult the Specification Sheet for proper spacing and position.

Pressure Regulator

WARNING

Unqualified service personnel must not make any adjustments on the regulators!

The pressure regulator on the manifold functions to reduce the supply of gas to the burner. There is one pressure regulator on the main line.

To adjust the main line regulator pressure, remove the cap of the regulator; then either turn the adjusting screw out to decrease pressure or turn the adjusting screw in to increase pressure. Do not make any adjustment on the regulators without knowing what you are doing and having the proper gauges attached. Also, do not bottom the adjusting screw.

The heater is designed to operate with a line pressure upstream of the Maxitrol RV81, of 10 to 14 W.C. (2.24kPa to 3.48kPa). For maximum efficiency and safety, the regulator must not be adjusted above this pressure. The Belimo or RTC modulating valve varies the gas flow of gas to the burner to maintain the pre-set discharge air temperature and has been set at the factory for optimum performance. Field adjustments are not required.

CAUTION: Damaged or defective regulators must be replaced. Also, never exceed the pressure specifications listed.

TESTING ELECT. COMPONENTS

Common sense and careful thought can make troubleshooting of electrical problems much less complicated. Remembering that electricity

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must have a completed path for it to work is the first necessary understanding. Secondly, search for the problem by looking at the most obvious solution first; then look toward the more complicated solutions. Use the appropriate wiring diagram as a guide for isolating the problem.

If ignition problems of the burner are encountered, for instance, use the following example as a guide.

1. Check the breakers and switches.
2. Check gas supply lines and manual valves, and fuel availability.
3. Check for proper output voltage from power source.
4. Check to be sure all wire connections are tight.
5. Remove the electrode and check its condition. If worn, replace. If improperly adjusted, adjust the separation and extension to within specifications.

The following is the method for testing major electrical components.

WARNING

A qualified electrician should perform all tests, replacements, and adjustments.

Testing the Main Switch

Before assuming the Control Switch to be defective, check the breaker to be sure it is good. Secondly, be sure to check the wiring connections and wires to be sure the connections are tight, and wires are good. Remember that the blower must be operating properly for the burner to operate. The switch can be tested using an ohmmeter.

To test, use the following procedure:

1. Disconnect the main power supply, open the Electrical Compartment.
2. Set the ohmmeter in the continuity test mode.

3. With the main switch in OFF position, place one tester lead on the common contact and one tester lead on the contact relative to the switch position. Place the switch to "ON" position. The meter must show continuity.
4. With the HEAT/FAN switch in 'HEAT' position, place one tester lead on the common contact and one tester lead on the contact relative to the switch position. The meter must show continuity on the relative contact.

Intermittent Pilot Gas Ignition Control

- Natural or LP gas
- Pilot burner ignition using an external ignitor
- Flame rectification circuit to monitor flame presence.
- Monitoring of 120V, pilot, and main gas valve.
- Five LED indicators for:
 - Running interlock
 - Recycle/airflow
 - Trial for ignition
 - Flame
 - Alarm

WARNING

Never touch the flame rod or the wire leading to it while power is ON. The amplifier charges the flame rod with approximately 300 volts AC. Serious personal injury could result!

Testing Air Pressure Differential Switch

The DF1600 uses an air pressure differential switch to confirm that the main blower is moving enough air through the heater.

This switch must be activated before the burner will ignite. The switch senses the difference between the velocity developed by the blower.

Any restrictions beyond the set point limit of the switch to the inlet of the heater will cause the switch to open and shut the burner off. All discharge duct work must be removed before testing the switch.

1. Check the sensing tube from the "HIGH" port on the switch body to the port right under the switch for kinks or obstructions.

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Insure the sensing line is connected to the switch. The “HIGH” port sensing tube is located perpendicular and facing into the air stream.

2. To test if the switch is functioning, disconnect and insulate wires leading to the switch N.O. contacts. Connect an ohmmeter or continuity light to the switch N.O. contacts. Place the Heat/Fan switch to “FAN” position. The ohmmeter should read low resistance or the continuity light should come on. When the blower is stopped the light should go out and the resistance reading should be high. If the contacts remain closed regardless of the blower status, the air switch must be replaced. **Contact the factory in the event the switch must be replaced. Only factory authorized personnel can replace and calibrate the air switch.**

Testing High Limit Switch

The High limit switch is a solid-state device. When the output contacts are operating properly, the limit switch will allow the heater to run when the Heat/Fan switch is placed in the “Heat” position, as long as the air temperature at the limit sensor is below the “HIGH LIMIT that is 150°F”.

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TROUBLESHOOTING

NOTE: Before replacing any component, test according to instructions in this manual. This trouble shooting guide will say replace, but replacement should occur only after appropriate testing.

TROUBLESHOOTING DF1600 DIRECT FIRED HEATER		
PROBLEM	CONDITION	REMEDY
Blower Motor does not run. (Blower mode)	1. No current to heater.	1. Turn breaker – safety switch ON.
	2. Voltage insufficient	2. Check incoming supply.
	3. Wiring – connections disconnected – loose – broken.	3. Connect – tighten – replace wiring connections.
	4. Main Switch OFF – Defective.	4. Turn Control toggle Switch ON – replace Switch.
	5. Defective VFD.	5. Check to see if there is power to the VFD.
Burner does not ignite.	1. Voltage insufficient.	1. Check incoming supply.
	2. Electrode – disconnected – adjusted incorrectly – defective.	2. Connect – adjust - replace electrode.
	3. Air Proving Sw. Disconnected – defective.	3. Connect – Replace Air Proving Sw.
	4. Tilt switch Disconnected, or Unit is not on a level surface or defective.	4. Connect—Replace Tilt Switch or Level the Unit.
	5. Fan Over heat switch is open.	5. Check to see if the unit is not running on low voltage or fan is not over heating.
	6. Insufficient Gas delivery.	6. Fill tank – open valves – replace solenoid valves.
	7. Regulators adjusted incorrectly – defective.	7. Adjust – replace regulators.
	8. Burner gas ports – obstructed – damaged.	8. Clean ports – replace burner.
	9. Flame sensor – damaged – defective.	9. Replace Flame Sensor.
Burner stops during usage.	1. Heater overheating.	1. Check to see if modulating valve is not stuck.
	2. Power interrupted.	2. Restore power.
	3. Gas Burner ports obstructed.	3. Clean – replace burner.

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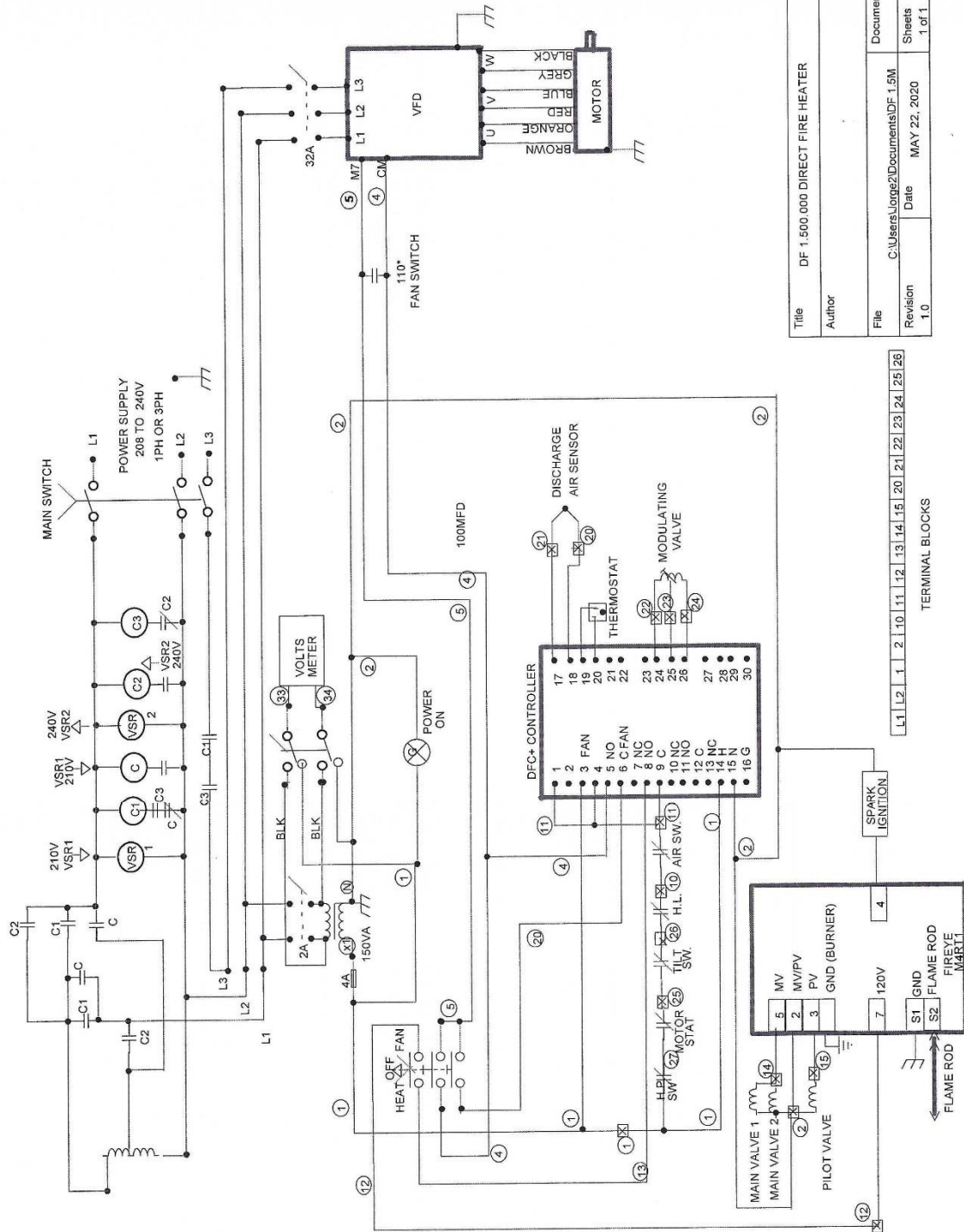
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	4. Air proving switch defective.	4. Replace Air Proving Sw.
	5. Flame rod dirty – defective.	5. Clean, Replace Flame Rod.
	6. Inadequate fuel delivery.	6. Fill Tank – replace regulators, valves – check gas lines for obstructions.

TROUBLESHOOTING DF1600 DIRECT FIRED HEATER

PROBLEM	CONDITION	REMEDY
Heater overheating	1. Gas pressure excessive.	1. Adjust – replace regulator.
	2. RTC Discharge Temperature Sensor defective.	2. Replace sensor, troubleshoot modulation system.

WIRING DIAGRAM:



Title	DF 1,500,000 DIRECT FIRE HEATER
Author	
File	C:\Users\logez\Documents\DF-1.5M
Revision	1.0
Date	MAY 22, 2020
Document	
Sheets	1 of 1

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Service parts	
Part #	Description
C70061	ON/OFF DISCONNECT YELLOW SWITCH BASE 32 AMP
C80033	ON/OFF DISCONNECT YELLOW SWITCH HANDLE
C70062	ON/OFF DISCONNECT SHAFT EXTENSION
C50263	2 POLE 32A BREAKER
C50264	1 POLE 32A BREAKER
C80181	2A 2P BREAKER
C80182	4A 1P BREAKER
C80183	150VA 208/230V - 120V XTMR. TRANSFORMER
C20023	Toggle Switch
C78889	Digital Panel Mounted Voltmeter
C70064	3 POSITION SWITCH
C70069	FIXING COLLAR
C70067	N.O. CONTACT BLOCK
C70028	VFD
C70137	R Fan 500
C90025	Power On Indicator Light GREEN
C90029	Outlet for Plug
C70052	TILT SWITCH
C82036	Spark Controller
C80186	MAIN CONTROLLER
C82163	Actuator ball valve 1 1/2" NPT
C80916	12" Discharge Air-tube
C60139	Temperature Sensor c/w Stew
C82164	Bracket Assy Kit 1/2"
C82165	MODULATING ACTUATOR
C60136	1/4" ASCO Pilot Valve
C82037	120V Solenoid Valve
C50155	AIR SWITCH
C90041	High Limit Switch
C90037	Fan Over-ride Switch
C82038	MALE FLANGE INLET
C70046	TERMINAL BLOCK
C70048	TERMINAL BLOCK END STOP
C70047	TERMINAL BLOCK END PLATE
C70072	Flip lid cover housing
C82043	GAS IGNITOR
C50131	Black Cam Lock

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C50132	Red Cam Lock
C50133	Blue Cam Lock
C50134	Green Cam Lock
C82044	CAM LOCK CAPS BLK
C82045	CAM LOCK CAPS RED
C82046	CAM LOCK CAPS BLUE
C82047	CAM LOCK CAPS GREEN
C82048	MIDCO BURNER 3FT.
C80117	1.5" X 6" Pipe Nipple
C82049	1 1/2 x 4 nipple
C80121	1.5" X 3" Pipe Nipple
C80115	1.5" X 2" Pipe Nipple
C80114	1.5" Elbow
C80124	1.5" Street Elbow
C80123	1.5" Union
C82050	1 1/2 x 1 1/2 x 3/4 T section
C82051	3/4 to 1/4 reducer
C60143	1" 1/2" X 1/4" Nipple
C82052	1/4 elbow
C80913	1/4" NPT x 1/4" 90 component male elbow
C82053	1 1/2" MAIN VALVE
C82054	Maxitrol Pressure Regulator
C82055	1 1/2" ASCO Solenoid Valve
C60137	1/4" Maxitrol pressure regulator
C60129	57.5" Copper Tubing
C50251	High Pressure Switch
C70041	RELAY
C70042	RELAY BASE
C82057	HEATER FRAME
C82058	PANEL
C82059	TOP COVER
C82060	BURNER SHROUD 1
C82061	BURNER SHROUD 2
C82062	BURNER SHROUD FRONT PLATE
C82063	PANEL
C82064	TRAIN DOOR
C82065	ELECTRIC DOOR RIGHT
C82066	ELEC DOOR LEFT
C82067	CAN LOCK PLATE
C80021	MOUNT BRKT (TILT SWITCH)

C82069	PANEL ASSEMBLY
C82070	ELECTRIC PANEL FRONT ASSEMBLY
C82071	CONTROL BACK PLATE ASSEMBLY
C82072	Louver bar
C60190	Louver Plate
C82074	RECEPTACLE BOX
C82075	ADAPTER PLATE
C82076	WIRE CHANNEL
C82077	INNER BURNER SHROUD 1
C82078	INNER BURNER SHROUD 2
C82079	BURNER SHROUD BRACKET SMALL
C82080	R 500 MOUNT ASSY
C82081	BURNER SHROUD BRACKET LONG
C82082	BURNER SHROUD BRACKET BOTTOM
C82083	BURNER SHROUD TOP BRACKET
C82084	SUPPLY PANEL RECTANGULAR ASSY
C82087	Serial Number (variable data)
C82088	Warning-Use with Propane or Natural Gas Only
C82090	Caution-supply cord
C82091	Caution-door panel-closed
C82092	caution- adequate ventilation
C82093	General Hazard Warning
C82094	Warning Max Inlet Pressure
C82095	Position Heater Properly before use
C82096	Wiring Diagram
C82097	DF 1600 logo
C82098	Decal-Campo Logo 16.50"
C82099	Decal - Train Compartment
C82100	Decal - Electrical Control Panel Compartment
C82101	Decal - Power Supply Compartment
C82102	Decal - Power Supply Instructions
C82103	Buttons
C82166	Decal - Ductwork
C82104	Complete Kit DF1600
C82085	E 500 FAN MOUNT ASSY
C82086	E 560 FAN MOUNT ASSY
C82111	1 1/2" BUTTERFLY VALVE
C82112	2-10V MODULATING ACTUATOR

C82056	1 1/2" RTC ball valve
C82040	Contactora
C82041	Transformer
C82042	RELAY 240A
C50242	Aux. Contact N.O. 50A
C60205	Decal ductwork
C82340	DECAL - HEATER SMOKING