INSTRUCTION MANUAL

Gas-Fired Heater

with

NovaTouch™ PLC Interface

Models: GFH-500
GFH-750
GFH-1000

 Document: GFH-NT 500-1000 IM 14 DEC 2016

NOVATEC™
Part of the MAGUIRE Family

Novatec, Inc. 222 E. Thomas Ave. Baltimore, MD 21225 | www.novatec.com

Phone: 410-789-4811
Toll Free: 800-938-6682
Main Fax: 410-789-4638

Parts Email: parts@novatec.com
Service Email:service@novatec.com
Sales Email: sales@novatec.com

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All information in this Instruction Manual is subject to change without notice.

NOTES:

Please record the following information, which is specific to this piece of equipment, in the space provided. Our Parts/Service Department will need these numbers to properly respond to any of your requests.

Instruction Manual: GFH-NT 500-1000 IM 14 DEC 2016

Model #: _____

Serial # _____

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1.0 ENGINEERING DATA

1.1 APPLICABLE DRAWINGS

DESCRIPTION	GFH-500	GFH-750
Electrical	TBD	GFH-1000-021D1-3
Mechanical	GFH-500-000D (2 Sheets)	GFH-750-000D (2 Sheets)

DESCRIPTION	GFH-1000	Future
Electrical	GFH-1000-021D1-3	
Mechanical	2-1258-006D1-2	

1.2 TYPICAL OPERATIONAL PARAMETERS

DESCRIPTION	GFH-500	GFH-750	GFH-1000	Future
Process Airflow (SCFM)	500	750	1000	
Process Outlet Air Temp (max.) (F)	400	400	400	
Flue Exhaust Temp (max) (typical) (F)	400	400	400	

1.3 UTILITIES - ELECTRICAL

DESCRIPTION	GFH-500	GFH-750	GFH-1000	Future
Voltage	460/3/60	460/3/60	460/3/60	
Total Connected Amperage	1.4	2.9	2.9	
Total KVA	1.1	2.3	22.3	
Combustion Blower FLA	0.73	2.3	2.3	
Combustion Blower HP	0.38	1.15	1.15	

1.4 UTILITIES – NATURAL GAS

DESCRIPTION	GFH-500	GFH-750	GFH-1000	Future
Supply Pressure (MAX) (PSI/"WC)	5.0/140	5.0/140	5.0/140	
Supply Pressure (MIN) (PSI/"WC)	1.0/28	1.0/28	1.0/28	
Supply Connection (" NPT)	3/4	3/4	3/4	
Max. Burner Capacity (MMBTU)	0.5	0.5	0.75	
Max. BTU Input (BTU)	180,000	260,000	350,000	
Flue Connection (" OD)	4	4	4	

1.5 INSTRUMENT SETTINGS AND DATA

DESCRIPTION	GFH-500	GFH-750
Combustion High Temp Limit Switch (deg. F)	600	600
Main Gas regulator Pressure (“WC)	20-28	20-28
Pilot Gas Regulator Pressure (“WC)	12-14	12-14
Pilot Flame Signal Strength (VDC)	5.0-11.0	5.0-11.0
Main Flame Signal Strength (VDC)	5.0-11.0	5.0-11.0
Purge Time (seconds)	60	60
Trial for Ignition Time (seconds)	10	10
Combustion Blower SP, LF, @ Tap A (“WC)	9.0	7.0
Combustion Blower SP, HF, @ Tap A (“WC)	11.5-12.5	11.5-12.5
Gas SP, LF, @ Tap B (“WC)	6.5-8.0	6.5-8.0
Gas SP, HF, @ Tap B (“WC)	9.5-12.5	9.5-12.5
Low Gas Pressure Switch (“WC)	16	16
High Gas Pressure Switch (“WC)	36	36
Combustion Air Proof Switch (APS) (“WC)	2.0	2.0
Process Blower Off Delay Timer (minutes)	2.0	2.0

DESCRIPTION	GFH-1000	Future
Combustion High Temp Limit Switch (deg. F)	600	
Main Gas regulator Pressure (“WC)	20-28	
Pilot Gas Regulator Pressure (“WC)	12-14	
Pilot Flame Signal Strength (VDC)	5.0-11.0	
Main Flame Signal Strength (VDC)	5.0-11.0	
Purge Time (seconds)	60	
Trial for Ignition Time (seconds)	10	
Combustion Blower SP, LF, @ Tap A (“WC)	7.0	
Combustion Blower SP, HF, @ Tap A (“WC)	11.5-12.5	
Gas SP, LF, @ Tap B (“WC)	6.5-8.0	
Gas SP, HF, @ Tap B (“WC)	9.5-12.5	
Low Gas Pressure Switch (“WC)	16	
High Gas Pressure Switch (“WC)	36	
Combustion Air Proof Switch (APS) (“WC)	2.0	
Process Blower Off Delay Timer (minutes)	2.0	

2.0 GETTING STARTED SUMMARY FOR EXPERIENCED AND QUALIFIED TECHNICIANS

If you are experienced and qualified, starting and operating the gas heater is simple and easy. Connect the gas line and flue to the heater. Apply the correct power and interlock wiring (field supplied) between the desiccant dryers main control box and the GFH control box. Check for the proper rotation of the motors. Install the process thermocouple into the hopper inlet duct and turn the burner on. Adjust the temperature controller set point as needed and you are ready to go.

The purpose of the preceding getting started summary is to illustrate the basic installation and operating procedures. The details for the above summary are shown on the following pages. All personnel, including those experienced and qualified, should read carefully the entire instruction manual. **DO NOT OPERATE THIS GAS HEATER UNLESS THIS INSTRUCTION MANUAL IS COMPLETELY UNDERSTOOD.**

2.1 WARNINGS

WARNING

Before using this equipment, read in detail the various manufacturers' bulletins found in this instruction manual. They contain information in regards to the safe installation and operation of this equipment and the devices used on the gas heater assembly. The warnings and cautions should be understood and followed before operating this equipment.

WARNING

As with any gas appliance at home or work, if you detect the odor of gas, immediately:
Turn off the manual shut off valve.
Contact a qualified technician to determine and repair the gas leak as necessary.

WARNING

Your Novatec GFH Series Natural Gas Fired Process Heater is equipped with safety devices for your protection. **Do not** override these devices. Only qualified personnel should make adjustments and repairs.

CAUTION

Only qualified technicians should install the gas and flue lines. Local and national codes need to be followed.

WARNING

Only clean filtered process air should enter the heat exchanger. Plastic dust, regrind and or pellets will clog the heat exchanger and would represent a fire hazard. The heat exchanger is not easily cleaned and may have to be replaced if contaminated. Do not operate the gas fired heater assembly if plastic dust, regrind or pellets have entered the exchanger as this condition may cause a fire.

WARNING

The user has the responsibility for establishing a program of inspection, testing, and maintenance with documentation performed at least annually for every gas safety component (Reference NFPA 86 – Ovens and Furnaces, 5-2.5.2)

3.0 INTRODUCTION

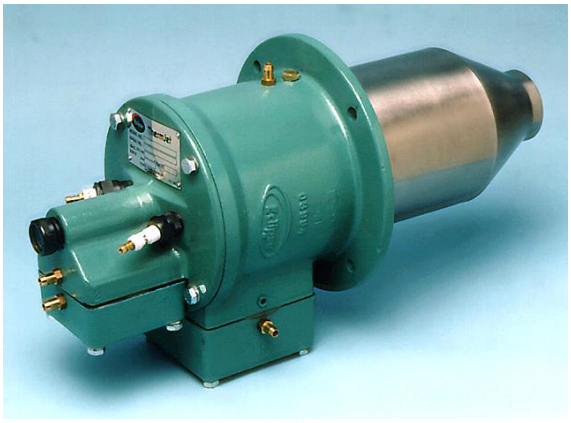
NOVATEC's highly efficient indirect fired gas heater is designed to be a more economical, durable alternative to electrically heated units. Like all Novatec products, the GFH-Series heaters incorporate rigorous design and manufacturing standards as well as the highest quality materials. The gas heater complies with NFPA-86 standards and utilizes components that carry UL and FM markings. IRI Gas Trains and other options are available. The Control Panel is UL/C-UL Classified and includes a Disconnect Switch. At the heart of every Novatec GFH-Series heater is a gas burner manufactured by Eclipse, Inc., who is the acknowledged leader in the industrial process air heating systems.

The fixed air burner's unique features include a high turndown temperature range, which allows for the processing of a variety of resins requiring different drying temperatures. The system includes a heavy-duty stainless steel heat exchanger. This advance design typically provides operating efficiencies up to and above 90% depending on conditions, and results in a cool flue temperature. It totally isolates combustion products from the process air stream. The GFH series components that are exposed to extreme heat are manufactured to the highest standard, which guarantee low maintenance and a longer life. The result is a safe, more cost-effective, indirect fired gas dryer.

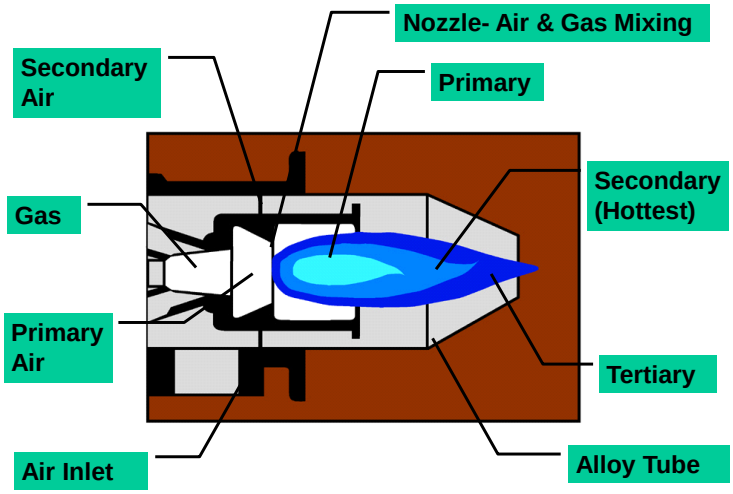
FEATURES

- Safety
- NFPA 86 Gas Train
- UL/C-UL Classified
- Disconnect Switch
- Interface Equipment PHH, CDM, CD, MPC or NPD
- Reduces energy costs
- Up to 90% efficiency
- Stainless Steel Heat Exchanger
- Stainless Steel Combustion Chamber
- Low combustion chamber temperature assures high efficiency and reduced emissions
- Eclipse Nozzle Mixing Burner
- 2 year Warranty
- High density industrial insulation assures maximum efficiency and lower case temperature
- Total isolation of combustion air from process air
- Precise temperature control maintained across a full range of temperature settings while maintaining up to 90% efficiencies
- Low flue temperatures are the result of highly efficient heat transfer

3.1 ELIPSE BURNER

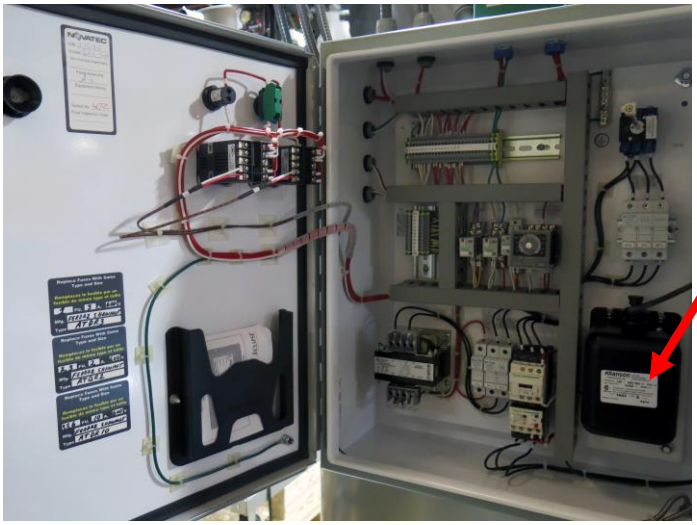


Typical Eclipse Burner



Sketch - Cross-section of Nozzle Mixing Burner

3.2 CONTROL PANEL



4.0 UNPACKING

Caution should be exercised to see that the equipment is not handled roughly. The crate must be removed carefully. The machine must not be used to pry against when removing the crate. The gas-fired heater is usually shipped completely assembled and requires no further attention prior to installation.

5.0 GENERAL INSPECTION

When the unit is unpacked, make a visual inspection looking for missing parts or damage, which may have occurred during shipment. All electrical and mechanical connections should be checked for tightness, as vibration during transit may cause them to loosen.

6.0 GAS LINE & FLUE INSTALLATION

Only qualified technicians familiar with local and national codes should install the gas line and the flue. The exhaust flue should be as short as possible. A typical installation would include a drip leg.

Caution: Check for gas leaks using appropriate devices.

7.0 ELECTRICAL INSTALLATION

Connect the proper power supply (check nameplate) through a main line disconnect (field supplied) to terminal connections L1, L2, L3 and ground in the control cabinet. This is only power required as the unit is completely pre-wired and supplied with a control voltage transformer to supply 110 volts to the control circuit. Connect the interlock wiring from the desiccant dryer main control panel to the gas heater control panel as shown on the electrical schematics for each assembly. Verify the correct rotation of the combustion blower assembly with the directional labels on the unit. Install the process thermocouple in the hopper inlet duct. Refer to the electrical wiring schematics for complete details.

8.0 PROCESS HIGH TEMPERATURE LIMIT

A process high temperature limit switch (PHTL) with display has been supplied with the gas heater. It requires a manual reset if tripped. The process high temperature limit thermocouple for this device is mounted in the process air outlet duct on the gas heater. The high temperature limit switch will shut down the gas heater on an over-temperature condition. In normal operation, the PHTL indicates "**SAFE**". If the temperature exceeds the high temp limit, the display will indicate the actual temperature and "**OP1**" on the limit controller will be illuminated. Press the "**RESET**" button on the high temp limit switch to reset the circuit. If the temperature is below the limit value, the "**SAFE**" display will return. "**OP1**" is displayed until the "**RESET**" has been pressed.

CAUTION: The gas heater should be turned off if the process blower motor is off for a period of time exceeding two minutes. If no process air is flowing through the gas heater, excessive combustion temperatures made occur even when the gas heater is in "low heat mode" (LF). This may cause the combustion high temperature limit switch to trip, and/or could result in over temperature process air being delivered to the hopper when the process blower is re-started, which may cause melting of the material in the hopper. Extreme caution should be used to prevent this condition. Optional controls have been added to automatically shut down the gas heater if the conditions described above are present in lieu of manually turning the gas heater off. If the process blower maximum off delay time elapses, the operator manually resets the circuit by toggling the gas heater burner off-on switch.

Shutting down of the gas heater is necessary as described above because the heat exchanger is very efficient. With no process air flow, the pilot alone will transfer a large amount of heat to the process side, so that when the process air is restored this built up heat would be released into the process air, resulting in the over temperature condition. The process blower maximum off delay prevents this from happening.

Process and Combustion High Temperature Limit Switch with Display (PHTL and CHTL)

9.0 COMBUSTION HIGH TEMPERATURE LIMIT

A combustion high temperature limit switch (CHTL) with display has been supplied with the gas heater. It requires a manual reset if tripped. The combustion high temperature limit thermocouple for this device is mounted in the flue outlet duct on the gas heater. The high temperature limit switch will shut down the gas heater on an over-temperature condition. In normal operation, the CHTL indicates "**SAFE**". If the temperature exceeds the high temp limit, the display will indicate the actual temperature and "**OP1**" on the limit controller will be illuminated. Press the "**RESET**" button on the high temp limit switch to reset the circuit. If the temperature is below the limit value, the "**SAFE**" display will return. "**OP1**" is displayed until the "**RESET**" has been pressed.

10.0 SEQUENCE OF OPERATION

A control box is attached to the gas fired process heater assembly. It contains the combustion motor starter, ignition transformer, burner controller, and “Power” pilot light. The gas fired heater assembly, along with the desiccant dryer and drying hopper makes a complete drying system. There are two control boxes in this system. The first one is located on the desiccant dryer. The second one is located on the gas heater. The process temperature set point is programmed with the NOVATOUCH PLC Touch Panel that is located on the desiccant dryer. The process blower on the dryer is electrically interlocked with the gas-fired Process Heater. If the process blower turns off, the gas fired process heater will go to low fire (low heat mode). If the process blower is off for longer than two minutes, the burner will automatically be turned off. Restarting the burner requires the system to be manually reset. This is done by toggling the Gas Heater Start Contact from the NOVATOUCH PLC Controller on the desiccant dryers Main control box to the off position and then back on to reset the process blower maximum off delay circuit.

1.0 When the main disconnect switch (1DISC) is closed, the control transformer (1T) is energized along with the "Power" pilot light (1LT) on the gas heater control panel.

2.0 The burner controller (flame controller) (FCR) is energized. The process blower on the desiccant dryer should be on to start the gas-fired heater. If the process blower is not on, the process blower maximum off delay circuit may elapse, and the flame controller will stop the sequence.

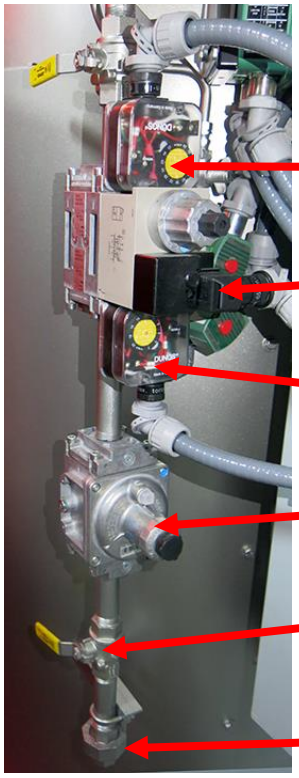
2.1 The Gas Heater Start Contact from the NOVATOUCH PLC desiccant dryer control must be closed to start the burner. This contact is also toggled off and then on to reset the process blower maximum off delay circuit if the process blower is off for more then 2 minutes.

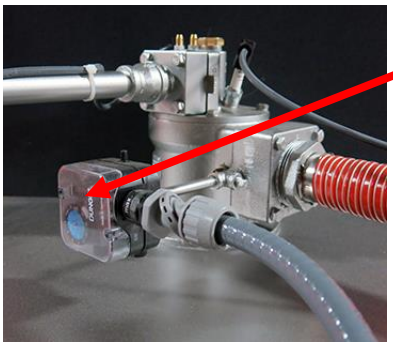
2.2 If the Safety Interlocks, consisting of the gas heater start contact (CR), the low gas pressure switch (LGPS), the high gas pressure switch (HGPS), the combustion air high temperature limit switch (CHTL), the process air high temperature limit switch (PHTL), the Dryer Process Blower maximum off delay timer contact (1TDRA), and the combustion blower motor starter overload contact (1OL), are all closed, the combustion blower will be energized by the burner controller. If the combustion air pressure switch (APS) is closed, the air purge will begin. A neon indicator light will be on and is visible through the clear plastic cover on the LGPS and HGPS when these switches are closed. The burner controller controls the air purge. The total purge time is 1 minute.

2.3 If the CR, LGPS, HGPS, CHTL, PHTL, 1TDRA, and 1OL are not closed, the sequence will not begin and the “Interlocks Closed” green LED on the flame controller will not be on. If any or all open after the flame is on, the flame will go out, the green “Interlocks Closed” LED will be off, and the sequence will not start until they are closed.

Pilot Gas Train

Main Gas Train





3.0 After 1 minute of air purging, the automatic 10 seconds trial for ignition is initiated. Simultaneously, the pilot gas solenoid valves (1SOL & 3SOL) and the ignition transformer (2T) are energized so that the igniter gives off a continuous spark. If a flame is detected by the flame rod within the 10-second period, the ignition transformer is de-energized (The pilot gas solenoids remain open). A red LED located in the flame signal test port on the flame controller will glow. The dual modular main gas safety shutoff valves are simultaneously energized. The dual modular main gas safety shutoff valves (2SOL) open slowly so that the pilot is not overloaded. The APS remains closed. The neon indicator light (see section 2.2) in the LGPS and HGPS will remain on.

4.0 If a problem occurs, the burner controller will lock out the sequence. The "Flame Failure" red LED on the flame controller will glow. The flame controller must be manually reset to start another sequence. The reset button is located on the flame controller. Complete operational details for the flame controller can be found in the Veri-Flame Purge Flame Monitoring Controller Series 5602 & 5605 bulletin located elsewhere in this manual

5.0 If the combustion high temperature limit with Display (CHTL) opens, it must be manually reset to initiate another complete cycle, starting with the air purge sequence (item 2.1). The reset button is located on the CHTL. The flame controller must also be reset.

6.0 If the process air high temperature limit switch (PHTL) opens, it must be manually reset to initiate another complete cycle, starting with the air purge sequence (item 2.1). The reset button is located on the PHTL. The flame controller must also be reset.

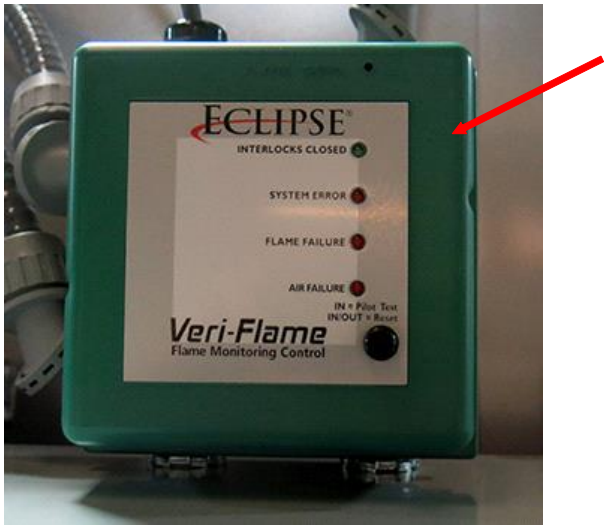
7.0 The temperature of the process air is controlled by the NOVATOUCH PLC Controls that is located in the desiccant dryers main control box. A 4-20 ma signal is sent to the modulating actuator that controls the main gas automatic butterfly valve in a range from closed (15 degrees) to open (90 degrees).

8.0 If the Desiccant Dryers Process Blower Motor is not running the main gas automatic butterfly valve will be driven to the closed position (LF). If the process blower remains off for longer then 2 minutes, the process blower maximum off delay timer contact will open, shutting down the burner. Toggling the gas heater start contact from the NOVATOUCH PLC controls located at the desiccant dryer resets the

process blower maximum off delay circuit.

9.0 If the burner controller detects an alarm, it turns the burner off and closes the "Alarm" Interface Contact (3CR) to the NOVATOUCH PLC. The NOVATOUCH PLC Display on the desiccant dryer will indicate the gas heater alarm

10.0 When the flame is on, and conditions are normal, the "Flame On" Interface Contact (2CR) to the NOVATOUCH PLC on the desiccant dryer will be closed. The NOVATOUCH PLC Display will indicate the flame is on.



Burner Controller with manual reset and indicator LED's

The burner is controlled and monitored by the burner controller as shown on the electrical schematic. The manufacture's bulletin for the burner controller is located elsewhere in this manual.

11.0 PROCESS TEMPERATURE ADJUSTMENT

The process air temperature is set by adjusting the Process Temperature Set point on the NOVATOUCH PLC Controls on the desiccant Dryer. Note that adjusting the set point under 100__ F disables the Flame On Alarm, allowing the Gas fired heater to be shut down by its own disconnect switch while the dryer continues to operate

Complete details on operating the NOVATOUCH PLC controls can be found in the manual that is supplied separately.

12.0 GAS HEATER SETUP PROCEDURES

NOTE: The gas heater has been fully adjusted at the factory and field adjustments are usually not necessary. These procedures are shown only as a reference should it become necessary to make field adjustments. **Only qualified technicians should make these adjustments.** Field adjustments may be necessary to compensate for installation variations or if components are replaced. **Adjustments in addition to those shown may be needed. The information in this manual is provided as a guideline for professionals with knowledge of gas heating appliances, and therefore does not include specific instructions to cover every situation.**

Set the main gas trim valve full open. Turn the pilot gas-metering valve to full open. Adjust the main and pilot regulators to half-open. Adjust the combustion blower damper half-open.

Set/check/adjust air and gas pressures as required using a water manometer or other appropriate apparatus according to the procedures that follow. Check for gas leaks at all connections with gas leak detector fluid or suitable electronic device.

Make sure the gas is turned off when test plugs are removed to install temporary fittings and when the plugs are re-installed after testing. Some adjustments are made with the flame on as noted. The others are made with the flame off and only the blowers energized.

The burner is controlled and monitored by the burner controller as shown on the electrical schematic. The manufacture's bulletin for the burner controller is located elsewhere in this manual.

1.0 ADJUST COMBUSTION AIR PRESSURE SWITCH (APS)

1.1 The APS is open when the heater is off or if combustion airflow is not present. The switch should be adjusted to the setting as shown in the Engineering Data section under Instrument Settings.

2.0 ADJUST LOW GAS PRESSURE SWITCH (LGPS)

2.1 The LGPS is open if the main gas pressure is low. The switch should be adjusted to 16" WC. The neon indicator will glow (visible through the clear plastic cover on the switch) when the switch is closed.

3.0 ADJUST HIGH GAS PRESSURE SWITCH (HGPS)

3.1 The HGPS is open if the main gas pressure is low. The switch should be adjusted to 36" WC. The neon indicator will glow (visible through the clear plastic cover on the switch) when the switch is closed.

4.0 ADJUST COMBUSTION AIR STATIC PRESSURE

4.1 Connect a manometer to tap A. (Reference SK-946A)

4.2 Adjust the damper on the combustion blower discharge to achieve the static pressure (± 0.5" WC) as shown in the Engineering Data section under Instrument Settings.

4.3 Lock the damper in place.

5.0 ADJUST MAIN GAS STATIC PRESSURE

5.1 **The flame is on for this setting.** Connect a manometer to tap B. (Reference SK-946A)

5.2 Adjust the main gas regulator to achieve the static pressure (± 0.5" WC) as shown in the Engineering Data section under Instrument Settings.

6.0 FLUE ANALYSIS

6.1 **The flame is on for this test.** With a combustion analyzer, measure the oxygen content of the flue exhaust. It should be greater than 0% when the automatic main gas valve is fully open. When the burner is at set point with little modulation of the automatic main gas valve, the readings are typically in the 1 to 16% range. Good flue analysis and performance is achieved by balancing the combustion air and the amount of gas. Small adjustments should be all that is required if all the parameters are within a normal range.

7.0 GAS HEATER CHECK LIST

7.1 After the gas heater has been properly installed and adjusted, complete a Gas Heater Check List for each heater. A blank copy of a typical Check List can be found in this manual. Keep the record in a safe place as it provides useful information to help adjust the gas heater if it becomes necessary to replace component.

13.0 MAINTENANCE AND INSPECTION

It is recommended that maintenance and inspection is done on a scheduled basis. Maintenance requirements will naturally vary widely for each installation and with specific operating conditions. It is suggested that a complete inspection be performed with necessary maintenance at the end of the first week, the first month, the first three months, and the first six months. These inspections will be indicative of how often future maintenance will be necessary. Suggested maintenance and inspection items are shown on the following pages.

WARNING

The user has the responsibility for establishing a program of inspection, testing, and maintenance with documentation performed at least annually for every gas safety component (Reference NFPA 86 – Ovens and Furnaces, 5-2.5.2)

EVERY MONTH

A. Inspect the combustion air filter. Clean or replace as required.

B. Check for gas leaks using an approved leak detector.

EVERY 3 MONTHS

A. Units equipped with ball bearing motors are factory greased and should be re-lubricated with

High-grade ball bearing grease.

NOTE: Most units are equipped with permanently lubricated bearings and no lubrication is required. All motors should be examined on an individual basis.

When adding lubricant:

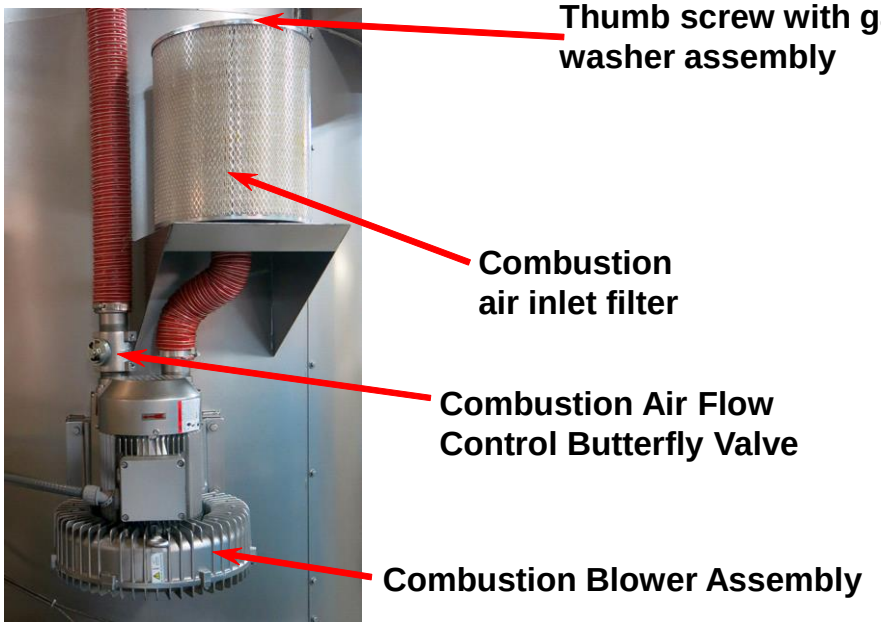
1. Remove filler plugs at the bearings and install grease fittings suitable to your grease gun. Also remove the drain plugs at the bearings.
2. Add ball bearing grease until all of the old grease is expelled through the drain hole.
3. Run motor with drain plug removed to eliminate excess grease.
4. Clean and replace drain plugs.

B. Check motor(s) amperage

C. Check all electrical connections to make sure that they have not become loose, especially those connections at motor starters.

D. Check all mechanical connections i.e. collar setscrews, etc., to make sure that they have not become loose.

Clean Burning and durable Nozzle Mixing Burner



13.1 GAS VALVE ACTUATOR CW ADJUSTMENT AND PROGRAMMING

The gas butterfly valve rotary actuator is a keypad programmable, direct coupled, modulating motor that has been fully programmed at the factory. It has been set at the factory to rotate 75 degrees CW from minimum to maximum position depending on the 4-20 ma signal received from the temperature controller. The gas butterfly valve rotates a maximum of 75 degrees from full closed to full open. The Low Fire (LF) closed position is 15 degrees and the High Fire (HF) full open position is 90 degrees.

If the actuator needs to be replaced, the new one will need to be setup as follows:

1.0 Provide temporary power to the actuator and drive it to the minimum position.
2.0 Set the actuator's shaft rotation direction to CW (as viewed while facing the actuator's keypad) to match that of the butterfly valve.
    2.1 Press the **ENTER** key; the message "SC" will appear on the display.
    2.2 Press the **UP** or **DOWN** key until the number "10" appears in the display.
    2.3 Press the **RESET** key to complete the sequence.
3.0 Set the actuator's lowest shaft travel position (Low Fire Stop) (LF).
    3.1 Press the **ENTER** key; the message "SC" will appear on the display.
    3.2 Press the **UP** or **DOWN** key until the number "15" appears on the display.
    3.3 Press the **RESET** key; the message "PG" will appear on the display.
    3.4 Press the **DOWN** key; the message "LF" will appear on the display.
    3.5 Press the **UP** or **Down** key until the number "15" ("15" degree of shaft rotation) appears on the display.
    3.6 Press the **RESET** key to complete the sequence.
4.0 Set the actuator's highest shaft travel position (High Fire Stop) (HF).
    4.1 Press the **ENTER** key; the message "SC" will appear on the display.
    4.2 Press the **UP** or **DOWN** key until the number "15" appears on the display.
    4.3 Press the **RESET** key; the message "PG" will appear on the display
    4.4 Press the **UP** key; the message "HF" will appear on the display.
    4.5 Press the **UP** or **DOWN** key until the number "90" ("75" degree of shaft rotation, 15 degree starting position plus 75 degree of rotation) appears on the display.
    4.6 Press the **RESET** key to complete the sequence.
5.0 Set the actuator's shaft position when control signal is zero (Control Signal Loss) (LO)
    5.1 Press the **ENTER** key; the message "SC" will appear on the display.
    5.2 Press the **UP** or **DOWN** key until the number "12" appears on the display.
    5.3 Press the **RESET** key; the message PG will appear on the display.
    5.4 Press the **DOWN** key; the message "LO" will appear on the display.
    5.5 Press the **UP** or **DOWN** key until the number "15" ("15" degree shaft position) appears on the display (reference 3.0 above)
    5.6 Press the **RESET** key to complete the sequence.
6.0 Remove temporary power.
7.0 Install the coupling to the actuator shaft with a 3 mm slotted spring pin. Insert the coupling onto the shaft and align the coupling's drive hole with the shaft hole. Press the spring pin through the coupling and shaft.
8.0 Verify that the rotation direction for the butterfly valve and actuator shaft match while the butterfly valve is in its minimum position.
9.0 Place the actuator in the orientation by which it will be attached to the mounting bracket. Slide the actuator and coupling assembly onto the butterfly valve shaft and attach carefully. Take precaution not to move the butterfly valve from its minimum position setting.
10.0 Attach a M6 X 16 mm hex head bolt with flat and lock washers through the bracket to the actuator. Install the screw through the coupling, making sure it is in alignment with the hole in the butterfly valve.

11.0 Securely tighten the screw on the coupler.
12.0 Confirm the position and tightness of all connections.
13.0 Make all electrical connections and apply power.
14.0 Verify that the stroke motion is smooth over its entire range and that all parameters are correct.
15.0 Adjust the process Temperature above ambient. Check that the actuator opens the gas butterfly valve to within 2 degrees of full open but not more than the maximum rotation of the butterfly valve, which is 75 degrees. Adjust if necessary

There are other actuator parameters that are not used. Refer to the manufacturer's bulletin located in the back section of this manual for further details.

A helpful parameter when setting up the actuator is to change the operational mode from automatic (based on the 4-20 ma input) to manual (actuator shaft position set by manually pushing the **UP** or **DOWN** keys.

CAUTION: If you place the actuator in manual mode as described below, return to automatic mode before operating the gas fired heater. Do not leave the gas fired process heater unattended when in manual mode.

16.0 To place the actuator in manual mode (Manual Position Select):
16.1 Press the **ENTER** key; the message "SC" will appear on the display.
16.2 Press the **UP** or **DOWN** key until the number "05" appears in the display.
16.3 Press the **RESET** key to complete the sequence.
17.0 To return to automatic mode (Signal Input Select):
17.1 Press the **ENTER** key; the message "SC" will appear on the display.
17.2 Press the **UP** or **DOWN** key until the number "06" appears in the display.
17.3 Press the **RESET** key to complete the sequence.

Below is a summary listing of the actuators setup parameters requiring adjustment and the factory settings. Refer to the manufacture's instruction manual in the back section of this manual for complete details.
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13.2 ACTUATOR PARAMETER FACTORY SETUP SUMMARY

Parameter Selection	Code Setting	Factory Setting
Low Fire Stop (LF)	15 Down	15°
High Fire Stop (HF)	15 UP	90°
Control Signal Loss (LO)	12 Down	15°
Automatic Signal Input Select	06	Yes
Clockwise (CW) Rotation	10	Yes

Gas Valve Actuator- Microprocessor Based

13.3 REGULATOR SPRING RANGE

MAIN GAS REGULATOR (DUNGS FRI MODULAR STYLE)

SPRING COLOR	RANGE (IN. OF WATER)	RANGE (mbar)
Brown	1 - 3.6	2.5 - 9
White	2 - 5	5 – 13
Orange	2.8 - 8	7 – 20
Blue	4 - 12	10 – 30
Red	10 – 22	25 – 55
Yellow	12 – 28	30 – 70
Black	24 – 40	60 – 110
Pink	40 – 60	100 - 150

PILOT GAS REGULATOR (R400S)

SPRING COLOR	RANGE (IN. OF WATER)	RANGE (mbar)
Brown	1 – 3.5	2 – 9
Plated	3 – 6	7 – 15
Pink	3 – 8	7 – 20
Violet	4 – 12	10 – 30
Blue	5 –12	12 – 30
Red	10 - 22	25 – 55

14.0 PARTS LISTS

PARTS LIST
Model GFH-500
Assembly P/N 11391-XX
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Airflow Switch (APS)	96-0270
2	High Temp Limit Switch w/ Display	12085
1	Actuator, Metering Gas Valve, 4-20 ma, w/ LED Display	09720
2	Relay, DPDT	00864
1	Ignition Transformer	07268
1	Burner Controller Assembly (FCR)	96-0283
1	Base, Burner Controller	97-0825
1	Control Transformer, 250VA	97-2705
1	Motor Starter, Combustion Air	00841
1	Burner, Complete Assy., 0.5 MMBTU	97-0803
1	Gas Train, 3/4”, Complete Assy. w/ Switches	97-0810
1	Relay, SPDT	03704
1	Filter, Combustion Blower,	09011
1	Valve, 3/4" NPT Gas Metering	95-1975
3	Fuse, 2 amp	06436
2	Fuse, 2 amp	05369
1	Timer	97-0848

PARTS LIST (Continued)
Model GFH-500
Assembly P/N 11391-XX
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Blower Assembly, 0.38 Hp	09715
10 Ft.	Ignition/Flame Rod Cable, Silicon, (Order per foot)	94-0140
1	Regulator, 3/4” NPT, Main Gas, Modular	98-0582
1	Main Gas Valve, 3/4” NPT, Dual Body, Modular	98-0584
1	Low Main Gas Pressure Switch, Modular, 2-20” WC	98-0586
1	High Main Gas Pressure Switch, Modular, 12-60” WC	98-0587
2	Position Indicator, Modular Gas Valve	98-0589
2	Flange with O-Ring, 3/4” NPT Modular Gas Valve	98-0590
1	Regulator, Pilot Gas, 3/8 “ NPT, Square Body	10428
1	Shutoff/Adjustable Orifice Valve, Pilot Gas, 1/4 NPT	98-0580
2	Pilot Gas Shutoff Solenoid Valve, 115 VAC, 3/8 NPT	98-0581
2	Main Gas Shutoff Ball Valve with Test Port, 3/4” NPT	95-1973
1	Mounting Kit for 09720 Actuator w/bracket/shaft coupler	09721
1	Spark Plug, Gas Burner	98-0577
1	Flame Rod, Gas Burner	98-0578
1	Combustion Air Flow Butterfly Valve, 1-1/2” NPT	94-1804
2	Rajah Fitting, 90 Deg., Flame Rod and Spark Plug	07269

PARTS LIST
Model GFH-750
Assembly P/N 09725-XX
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Airflow Switch (APS)	96-0270
2	High Temp Limit Switch w/ Display	12085
1	Actuator, Metering Gas Valve, 4-20 ma, w/ LED Display	09720
2	Relay, DPDT	00864
1	Ignition Transformer	07268
1	Burner Controller Assembly (FCR)	96-0283
1	Base, Burner Controller	97-0825
1	Control Transformer, 250VA	97-2705
1	Motor Starter, Combustion Air	00826
1	Burner, Complete Assy. 0.5 MMBTU	97-0803
1	Gas Train, 3/4”, Complete Assy. w/ Switches	97-0810
1	Relay, SPDT	03704
1	Filter, Combustion Blower,	09420
1	Valve, 3/4" NPT Gas Metering	95-1975
3	Fuse, 4 amp	05356
2	Fuse, 2 amp	05369
1	Timer	97-084

PARTS LIST (Continued)
Model GFH-750
Assembly P/N 09725-XX
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Blower Assembly, 1.15 Hp	09704
10 Ft.	Ignition/Flame Rod Cable, Silicon, (Order per foot)	94-0140
1	Regulator, 3/4” NPT, Main Gas, Modular	98-0582
1	Main Gas Valve, 3/4” NPT, Dual Body, Modular	98-0584
1	Low Main Gas Pressure Switch, Modular, 2-20” WC	98-0586
1	High Main Gas Pressure Switch, Modular, 12-60” WC	98-0587
2	Position Indicator, Modular Gas Valve	98-0589
2	Flange with O-Ring, 3/4” NPT Modular Gas Valve	98-0590
1	Regulator, Pilot Gas, 3/8 “ NPT, Square Body	10428
1	Shutoff/Adjustable Orifice Valve, Pilot Gas, 1/4 NPT	98-0580
2	Pilot Gas Shutoff Solenoid Valve, 115 VAC, 3/8 NPT	98-0581
2	Main Gas Shutoff Ball Valve with Test Port, 3/4” NPT	95-1973
1	Mounting Kit for 09720 Actuator w/bracket/shaft coupler	09721
1	Spark Plug, Gas Burner	98-0577
1	Flame Rod, Gas Burner	98-0578
1	Combustion Air Flow Butterfly Valve, 1-1/2” NPT	94-1804
2	Rajah Fitting, 90 Deg., Flame Rod and Spark Plug	07269

PARTS LIST
Model GFH-1000
Assembly P/N 05-1205
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Airflow Switch (APS)	96-0270
2	High Temp Limit Switch w/ Display	12085
1	Actuator, Metering Gas Valve, 4-20 ma, w/ LED Display	09720
2	Relay, DPDT	00864
1	Ignition Transformer	07268
1	Burner Controller Assembly (FCR)	96-0283
1	Base, Burner Controller	97-0825
1	Control Transformer, 250VA	97-2705
1	Motor Starter, Combustion Air	00826
1	Burner, Complete Assy., 0.75 MMBTU	97-0804
1	Gas Train, 3/4”, Complete Assy. w/ Switches	97-0810
1	Relay, SPDT	03704
1	Filter, Combustion Blower,	09420
1	Valve, 3/4" NPT Gas Metering	95-1975
3	Fuse, 4 amp	05356
2	Fuse, 2 amp	05369
1	Timer	97-084

PARTS LIST (Continued)
Model GFH-1000
Assembly P/N 05-1205
(Quantities shown for one assembly)

QTY	DESCRIPTION	PART NUMBER
1	Combustion Blower Assembly, 1.3 Hp	98-0555
10 Ft.	Ignition/Flame RodCable, Silicon, (Order per foot)	94-0140
1	Regulator, 3/4” NPT, Main Gas, Modular	98-0582
1	Main Gas Valve, 3/4” NPT, Dual Body, Modular	98-0584
1	Low Main Gas Pressure Switch, Modular, 2-20” WC	98-0586
1	High Main Gas Pressure Switch, Modular, 12-60” WC	98-0587
2	Position Indicator, Modular Gas Valve	98-0589
2	Flange with O-Ring, 3/4” NPT Modular Gas Valve	98-0590
1	Regulator, Pilot Gas, 3/8 “ NPT, Square Body	10428
1	Shutoff/Adjustable Orifice Valve, Pilot Gas, 1/4 NPT	98-0580
2	Pilot Gas Shutoff Solenoid Valve, 115 VAC, 3/8 NPT	98-0581
2	Main Gas Shutoff Ball Valve with Test Port, 3/4” NPT	95-1973
1	Mounting Kit for 09720 Actuator w/bracket/shaft coupler	09721
1	Spark Plug, Gas Burner	98-0577
1	Flame Rod, Gas Burner	98-0578
1	Combustion Air Flow Butterfly Valve, 1-1/2” NPT	94-1804
2	Rajah Fitting, 90 Deg., Flame Rod and Spark Plug	07269

15.0 TYPE IV GAS HEATER CHECK LIST

Site _____ Date _____

Model _____ Serial No _____

Technician _____

Ref Gas Train/Test Port Drawings (if applicable) _____

Section I

Type of gas _____

Combustion air switch (APS) setting _____

Low gas pressure switch (LGPS) setting _____

High gas pressure switch (HGPS) setting _____

Combustion high temp limit (CHTL) setting _____

Proof of Closure Sw. (POC) adjusted (if appl.) _____

Extended purge timer setting (if applicable) _____

Main gas trim valve position _____

Pilot gas train valve position _____

Supply voltage _____

Combustion motor FLA _____

Gas static pressure at Tap B @ HF _____

Air static pressure at Tap A @ HF _____

Main gas supply pressure to appliance _____

Main gas pressure regulator setting _____

Pilot gas pressure regulator setting _____

Flame strength (pilot only) _____

Flame strength (pilot & main @ LF) _____

Flame strength (pilot & main @ HF) _____

Combustion blower damper position _____

SECTION 2

	Pass	Fail
With power off, verify all electrical connections are tight.	o	o
With no flame (WNF), check the combustion blower for the proper rotation.	o	o
WNF, disconnect the flame rod wire and attempt to start the burner. The flame should go out (FO), and the flame controller (FC) should go into a lock out condition (LO).	o	o
WNF, disconnect the spark plug wire and attempt to start the burner. The flame should not start, and the FC should go into LO.	o	o
With flame on (WFO), check for gas leaks.	o	o
WFO, visually observe blue flame at low fire (LF).	o	o
WFO, visually observe blue flame at high fire (HF).	o	o
WFO, press test/reset button on flame controller (FCR). You should observe FO and LO, which requires it to be reset before allowing restart. The two main safety shut-off valves should be closed as observed by the position indicator (PI) or POC switch on each valve.	o	o
WFO, press test button on the APS; you should observe FO, LO, and PI or POC switch.	o	o
WFO, turn the gas supply off; you should observe FO, LO, and PI or POC switch.	o	o

Comments

SECTION 3

Actuator Parameter Settings

Parameter Selection	Code Setting	Factory Setting	Your Setting
Low Fire Stop (LF)	15 Down	15°	
High Fire Stop (HF)	15 UP	90°	
Control Signal Loss (LO)	12 Down	15°	
Automatic Signal Input Select	06	Yes	
Clockwise (CW) Rotation	10	Yes	

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This Space for NOTES

16.0 WARRANTY – NOVATEC, INC. - Effective Date 21 SEPT 2016

NOVATEC, INC. offers COMPREHENSIVE PRODUCT WARRANTIES on all of our plastics auxiliary equipment. We warrant each NOVATEC manufactured product to be free from defects in materials and workmanship, under normal use and service for the periods listed under **"Warranty Period".** The obligation of Novatec, under this warranty, is limited to repairing or furnishing, without charge, a similar part to replace any part which fails under normal use due to a material or workmanship defect, within its respective warranty period. It is the purchaser's responsibility to provide Novatec with immediate written notice of any such suspected defect. Warranted replacement parts are billed and shipped freight pre-paid. The purchaser must return the suspect defective part, freight prepaid and with identifying documentation to receive full credit for the part returned. Novatec shall not be held liable for damages or delay caused by defects. No allowance will be made for repairs or alterations without the written consent or approval of Novatec.

The provisions in equipment specifications are descriptive, unless expressly stated as warranties. The liability of Novatec to the purchaser, except as to title, arising out of the supplying of the said equipment, or its use, whether based upon warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided. All such liability shall terminate upon the expiration of said warranty periods. Novatec shall not in any event be held liable for any special, indirect or consequential damages. Commodities not manufactured by Novatec are warranted and guaranteed to Novatec by the original manufacturer and then only to the extent that Novatec is able to enforce such warranty or guaranty. Novatec, Inc. has not authorized anyone to make any warranty or representation other than the warranty contained here. Non-payment of invoice beyond 90 days will invalidate the warranty. A renewed warranty can be purchased directly from Novatec.

Please note that we always strive to satisfy our customers in whatever manner is deemed most expedient to overcome any issues in connection with our equipment.

Warranty Period:
Note: All warranty periods commence with the shipment of the equipment to the customer.

GFH Series Gas Fired Burners = 5 Years

Exclusions: Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: hoses, desiccant, filters, filter elements, wiper seals, gaskets, dew point sensors, infrared lamps, motors, internal solenoids, fuses and motor brushes. Use with abrasive materials will void the warranty of any standard product. Wear resistant options may be available to extend usable service life with abrasive materials. Novatec reserves the right to limit the warranty if the customer installs replacement parts that do not meet the specifications of the original parts supplied by Novatec.

***Specific Exclusions:**

1. NovaDrier warranty is void if coalescing filters are not replaced on a 6-month or yearly basis (per instruction manual) and/or membrane has been exposed to ozone.
2. NovaWheel NW-400 and up Control warranty is 2-years. All other NovaWheel Controls, warranty is 1-year
3. NovaVac Dryer -The ability of the canisters to hold vacuum will be compromised if the vacuum seal edge is damaged from mishandling. We do not warranty canisters damaged from improper handling. We do, however, warranty the seals.
4. LOAD CELLS on our WSB's are covered by Novatec standard warranty as long as they have not been damaged from improper handling.
5. Velocity Control Valve warranty is voided if unit is placed in direct material flow.

This warranty shall not apply to equipment:

1. Repaired or altered without written approval of NOVATEC unless such repair or alteration was, in our judgment, not responsible for the failure
2. Which has been subject to misuse, negligence, accident or incorrect wiring by others
3. Warranty is void if processing rates exceed manufacturer-recommended levels or if damage is caused by ineffective power isolation and/or power spikes/sags or incorrect installation.

Note: All conditions and content of this warranty are subject to change without notice.