Heated Nitrogen Generator

Installation & Operations Manual

TABLE OF CONTENTS

Contents

NOTICE

THE INFORMATION IN THIS MANUAL HAS BEEN CAREFULLY CHECKED AND IS BELIEVED TO BE ACCURATE. HOWEVER, NO RESPONSIBILITY IS ASSUMED FOR INACCURACIES.

SAFETY GUIDELINES

Before operating, maintaining or servicing any integrated thermal system, please read all of the technical and safety literature for your product. Guidelines for setup, operation, and maintenance are outlined in this manual, however please refer to your local electrical code as necessary. Also, see Chapter 6 of the NEC for relevant sections as it applies to mounting locations and hazardous environments.

1. GENERAL PRODUCT DESCRIPTION

The unit is a self-contained, “plug and spray” heated nitrogen system used in spray painting and coating applications. The unit is connected between the compressed air supply and the spray gun. The system components include the following:

- Nitrogen Generator
- Thermal Process Unit (heater)
- Heated Hose

The N2 unit generates Nitrogen from the compressed air received from the compressor. The thermocouple monitors the nitrogen temperature using a thermal sensor. The sensor provides feedback to a PID control scheme for tight temperature regulation.
The heater supplies the required heat as per the preset conditions to the heated hose. The heated hose maintains the temperature to the spray gun.

All components are housed in a powder coated steel enclosure.

The heater system includes a temperature controller, necessary terminal blocks, low voltage circuitry, safety and solid-state relays.

The Nitrogen generator consists of a manifold filtration technology as well as molecular membrane separators.

2. FEATURE DESCRIPTIONS

Nitrogen Generator:

Gauges monitor the pressure at the following points:

1. Inlet — Compressed Air IN pressure
2. F1 — Water Separator
3. F2 — Coalescent Filter
4. F3 — Active Carbon Filter 1
5. F4 — Active Carbon Filter 2
6. F5 — Active Carbon Filter 3
7. N2 Out — Nitrogen OUT pressure

The high performance nitrogen separation membranes generate Nitrogen for supply to the heater as required for the spray-painting process

WARNING

NEVER OPEN THE NITROGEN GENERATOR ENCLOSURE WHILST THE UNIT IS PRESSURIZED. REMOVE ALL AIR HOSE CONNECTIONS FROM THE NITROGEN GENERATOR BEFORE OPENING THE UNIT FOR SERVICE.

Heater:

ALARMS

Red alarm status indicator light included on front panel. Using relays, alarm de-energizes heater circuit during fault condition.

CONTROLS

Each unit includes a microprocessor based process controller. Non-volatile memory within the controller protects against data or configuration loss during power outages. Alarm event defined within controller memory. Alarm indications include process high and signal break.

Controller output signal fires solid-state relay (SSR), which controls power to the heater. SSR utilizes zero-cross technology to minimize electric noise levels within the panel. SSR mounted on a heat sink to dissipate heat away from its base.

INDICATORS

TEMPERATURE CONTROLLER is capable of displaying key pieces of data in operation mode. The main screen includes the process value and the setpoint variable. The alarm display shows the status of the event alarm.

SENSOR BREAK – The TEMPERATURE CONTROLLER includes a sensor break or open alarm. This alarm indicates that the Process thermocouple is either open or not connected. The Temperature controller continually monitors the thermocouple input. If the controller detects a thermocouple break, the process value will display **UUUU** or **LLLL** and power output will go to zero.

3. NITROGEN GENERATOR INSTALLATION

The nitrogen generator can be wall mounted up to a recommended height of 1 meter / 3 feet (top of enclosure). The unit may also be floor mounted as required. It is not necessary to bolt the unit to the floor.

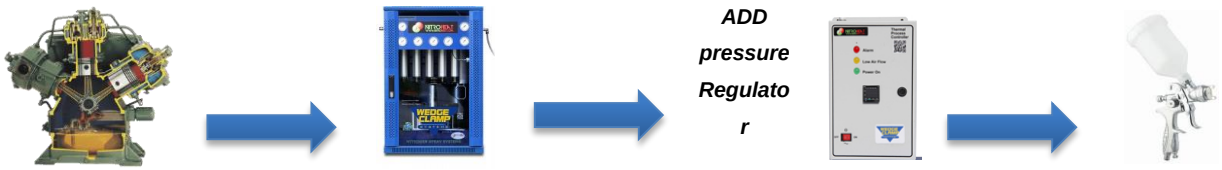
Important:

CONNECTORS

Supply cleaned filtered compressed air to the input connector.

Input connector ½" NPT female fitting.

Output connector ½" NPT female fitting.



ALLOW COMPRESSED AIR TO RUN THROUGH THE NITROGEN GENERATOR FOR A MINIMUM OF 3 MINUTES BEFORE CONNECTING TO HEATER UNIT.

Connect to heater unit and monitor pressure gauges

Pressure Switch Setting

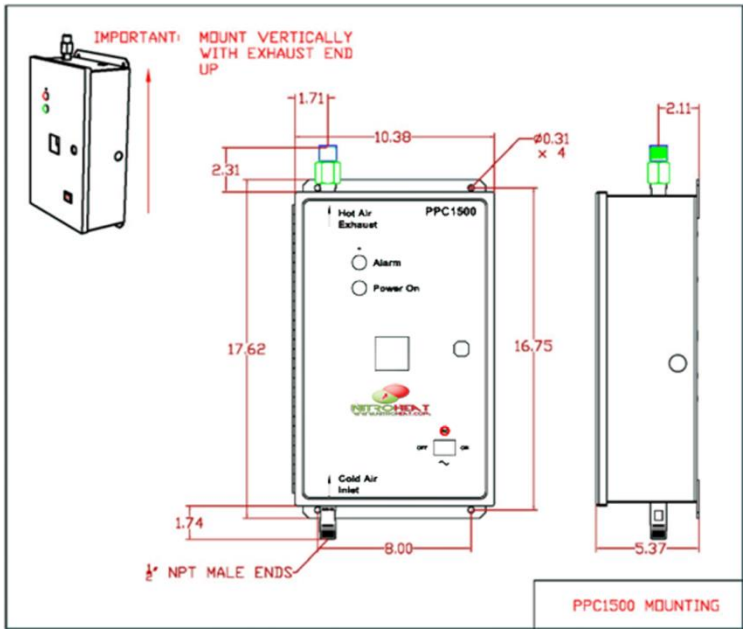
	The pressure switch controls the operation of the solenoid within the Nitrogen Generator. The solenoid is OPEN when Nitrogen is being produced and being used in the spray painting process. The solenoid closes when Nitrogen is not required. SET – This is the pressure that the solenoid will CLOSE. Set the pressure to at least 20% below the compressed air IN pressure. RESET – This is the pressure that the solenoid will OPEN. Adjust the reset pressure to at least 10psi below the SET pressure

4. HEATER CONNECTION GUIDE

1) Connect INLET (supply line from nitrogen system) to bottom ½" NPT Male fitting
2) Connect EXHAUST (line to spray gun) to top ½" NPT Male fitting
3) Ensure that the AC power switch on the front of the enclosure is OFF
4) Connect incoming electrical power to INPUT LINE, INPUT NEUTRAL and AC GROUND at terminal connections on lower right of main Printed Circuit Board inside enclosure.
5) Ensure jumpers on main Printed Circuit Board are in proper configuration for 120VAC incoming power.

5. HEATER MOUNTING LOCATION

Mount the heater enclosure vertically to an appropriate surface where the ambient temperature is approximately room temperature, to aid in heat dissipation. It should not be located near any other heat producing equipment such as ovens or steam pipes.



6. HEATER OPERATION

1. Turn on the heater.
2. Adjust temperature as per the following *suggested* temperatures:
   a. Base
      i. Water 155 – 160F
      ii. Solvent 120 – 125F
   b. Clear Coat
      i. Fast Hardener 110 – 115F
      ii. Medium Hardener 115 – 120F
      iii. Slow Hardener 120 – 125F
3. When power is supplied to the unit you will see the following values:
   a. PV - process value displays the temperature inside the hose.
   b. SV - set value is the temperature that you set for the operations you choose.
4. Increase and decrease the temperature using the up and down arrows
5. The “AM” button remembers the last 2 set value points that you used. Hold down the “AM” to toggle between these values.

7. HEATER SPECIFICATIONS

SPECIFICATIONS	
Incoming Power	120 VAC @ 15 amps, 50-60 Hz
Maximum Heater Rating	750W, 120 VAC, 1Ø
Maximum Operating Pressure	120 PSIG
Inlet Air Connection	1/2" NPT Male
Exit Air Connection	1/2" NPT Male
Enclosure	17.62" L X 10.38" W X 5.50" H
Enclosure Material	Powder Coated Steel
Heater Material	Stainless Steel
Weight	23 lbs
Alarms	High Temperature Alarm
Temperature Stability	+/- 1.5% of Control Set point
Maximum Airflow	30 SCFM
Air Filtration	40 microns at exhaust
Thermal Feedback	Type 'J' Thermocouple
Process Control	PID
Output Temperature Range	65˚F - 220˚F

Figure 1: Specifications and Operating Range

8. MAINTENANCE

HEATER:

THE HEATER UNIT DOES NOT CONTAIN ANY COMPONENTS THAT CAN BE MAINTAINED BY THE USER – PLEASE CONTACT YOUR DISTRIBUTOR FOR ANY HEATER MAINTENANCE AND SERVICE.

NITROGEN GENERATOR:

The pre filters (water, coalescent and 3 x active carbon) need to be replaced every 800 hours of use or six months. This service interval can vary based on the quality of the input compressed air. The cleaner the compressed air input, the longer the filter life.

CHECK PRESSURE DIFFERENTIAL ON GAUGES BEFORE REPLACEMENT.

MINIMUM PRESSURE DIFFERENTIAL IS 5psi

REMOVE COMPRESSED AIR SUPPLY AND DE-PRESSURIZE SYSTEM BEFORE ANY SERVICE PROCEDURE

Filter replacement
1. Remove filter caps using a filter wrench.
2. Remove filter cartridge from F2 to F5
3. Blow out / vacuum the filter housing
4. Insert new filter cartridges
5. Replace cap
6. Supply compressed air
7. Check gauges for pressure differential (5psi)

WARNING

NEVER OPEN THE NITROGEN GENERATOR ENCLOSURE WHILST THE UNIT IS PRESSURIZED. REMOVE ALL AIR HOSE CONNECTIONS FROM THE NITROGEN GENERATOR BEFORE OPENING THE UNIT FOR SERVICE.

NITROHEAT NH1

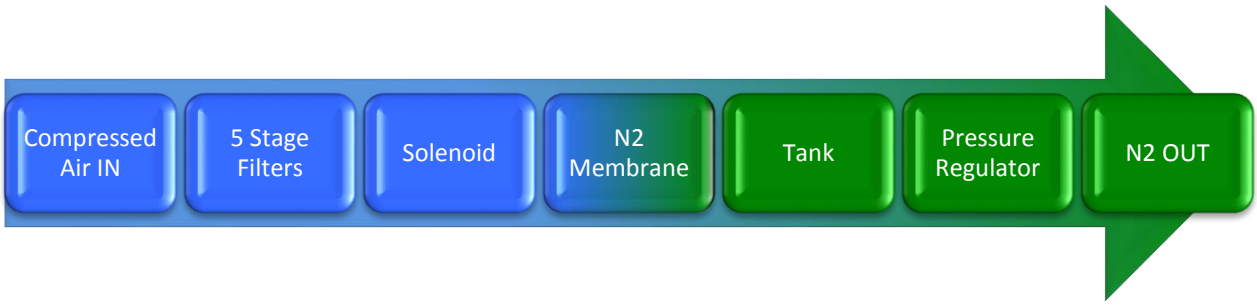
SPECIFICATIONS

Equipment Description

The NH1 Nitrogen Generator from NITROHEAT® is a high performance filtration unit that cleans and separates the gases in compressed air to harness the available nitrogen to be used in industrial applications. The system consists of the following components:

1. 5 stage pre-filter – used to clean the compressed air
2. Electrical solenoid – 24V solenoid used to shut off supply of compressed air to the Nitrogen membrane when the nitrogen receiver tank is full.
3. LED indicators – visual indication of the power state as well as the flow of nitrogen and the tank status.
4. Pressure gauges – visual indicator of the pressure of the system from inlet to pressure differential between filter and outlet nitrogen pressure.
5. Timer – active only when flow of nitrogen is detected and used as an indicator for service of the filter elements.
6. Pressure Switch – controls the solenoid as per the user presets.

Nitrogen Generator	
Model	NH1
Separation Technology	Membrane
Electrical Requirements	110 / 220 VAC 50-60Hz
Max Inlet Pressure	145psi
Max Operating Pressure	140psi
Pressure Drop	< 5 psi
Pressure Switch	145psi max
Max Flow Rate	28CFM
Phthalate-Free	YES
Hydrocarbon-Free	YES
Purity	Up to 98%
Inlet Connection	½" FNPT
Outlet Connection	½" FNPT
Dimensions (H x W x D) (")	54 x 24 x 24
Weight (Shipping)	210lbs
Power Consumption	165W
Current Draw	1.5A
Ambient Temperature Range	36°F – 122°F
Compressed Air Temp Range	36°F – 122°F
Atmospheric Dew-point Range	-20°F to -80°F
Pre Filtration	5 Stage
Inlet Residual Oil Content	< 0.01 mg/m3
Inlet Particle Pre-filtration	0.01 Micron
RH of Compressed Air	<100% (Non-condensing)
Particles > 0.01 Micron	None with Pre filtration



NITROHEAT TPC 750

SPECIFICATIONS

Equipment Description

The NITROHEAT® TPC750 is a high performance thermal process controller that is used to heat the nitrogen produced by the NITROHEAT® nitrogen generation equipment. The TPC750 is accompanied by the NITROHEAT® NHH 36 – a heated hose used to maintain the temperature of the Nitrogen through the length of the hose. The system consists of the following components:

1. 750W heating unit
2. Automatic flow control switch
3. LED indicators – visual indication of the power state as well as the flow of nitrogen
4. Alarm indicator – visual indicator activated in the event that the system overheats with automatic controller cut-off
5. Internal Solid State Relay – to control the heater and the heated hose

6. Temperature controller – used to adjust the required temperatures of the unit
7. Built in thermostats to control the power to the heater
8. Built in power cut off for overheating with automatic relay cut off.
9. Heated Hose Controller – controls the temperature of the heated hose
10. Internal Hose thermocouple – temperature feed back from the heated hose

Thermal Process Controller	
Model	TPC 750
Wattage	750
Electrical Requirements	110 / 220 VAC 50-60Hz
Max Inlet Pressure	140psi
Max Operating Pressure	120psi
Pressure Drop	< 5 psi
Pressure Switch	145psi max
Max Flow Rate	CFM
Enclosure	Nema 1
Explosion Proof Enclosure (optional	NEMA 4, 7, 9
Dimensions (H x W x D) (“)	16 (H) x 10 (W) x 6 (D)
Inlet Connection	½” MNPT
Outlet Connection	½” MNPT
Weight (Shipping)	28lbs
Current Draw	12.5A
Ambient Temperature Range	36°F – 122°F