



# SPECIAL FURNACE CO INC

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## MPN SERIES

### APPLICATIONS

The MPN atmosphere mixing panel is designed to mix nitrogen or argon with small percentages of natural gas or propane for use in neutral hardening. The small percentage of carbonaceous gas maintains a neutral carbon potential with most tool steels. The carbon based gas also dissociates into some free hydrogen and carbon monoxide which helps prevent oxidation along with the protective inert gas. The atmosphere mixture is normally kept below (or close to) the LEL (lower explosive limit) of the combustible gas. This is done by an inert gas low flow switch and limiting valve for combustible gas. The LEL of natural gas (mostly methane) is 5% and propane is about 2.5%. Concentrations of these gases below these limits will not support combustion in air, let alone in inert gas. Although this atmosphere mix will not produce a totally bright finish, it will result in a hard part that is not decarburized. The control of the carbon potential is strictly manual with this system. This is because the small amount of carbon monoxide present does not lend itself to accurate readings of the carbon levels with an oxygen probe and carbon controller. Should such automatic control be desired or necessary a nitrogen / methanol or endothermic atmosphere will be necessary. (See NM Series and EN Series Bulletins.) The advantage of the MPN Series mixing panel is low cost and the fact that the atmosphere is not classified as combustible. It is important to operate a furnace with this system with adequate ventilation. It is highly recommended to have a fan for circulating the furnace atmosphere to prevent stratification which can lead to element attack and the need for higher than necessary carbon levels.

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### NITROGEN / NATURAL GAS OR PROPANE ATMOSPHERE MIX PANEL FOR NEUTRAL HARDENING

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### FEATURES

#### ATMOSPHERE SPARGER

The natural gas or propane is injected into the furnace through a 330 alloy sparger which is located inside the furnace. This sparger helps dissociate the combustible gas before it actually enters the furnace interior. In addition, it helps inject the gas into the furnace under pressure so that it mixes better with the nitrogen for more even process results.

#### INERT GAS FLOW CONTROL

The inert gas line includes a manual shut off ball valve, pressure regulator, pressure relief valve, pressure gauge, flowmeter with regulating valve, normally open solenoid shut off valve, and check valve.

#### NATURAL GAS OR PROPANE GAS FLOW CONTROL

The natural gas or propane line includes a manual shut off valve, pressure regulator, pressure gauge, normally closed solenoid for automatic shut off, flowmeter with regulating valve, limiting valve and a special check valve with very low cracking pressure.

#### LIMITING VALVE FOR NATURAL GAS

A high flow limit valve on the combustible gas line limits the amount of combustible gas that can flow.

#### ELECTRIC SHUT OFF OF GASES

The natural gas or propane and the inert gas can be shut off from the main electrical control panel with push button control switches.

#### LOW TEMPERATURE ALARM

The control has a temperature based alarm which is set at 1400°F (760°C) below which combustible gas can't flow. This is the most important safety system.

#### INERT GAS LOW FLOW ALARM

The inert gas has a low flow switch to shut off combustibles if inert gas flow is not sufficient to dilute the natural gas or propane to below the Lower Explosive Limit.

#### DOOR INTERLOCK ALARM

There is a door interlock switch which prevents combustible gas from flowing unless the door is closed.

#### BURN OFF

A burn off is located at the outlet port of the furnace. This is a pilot burner with automatic shut off system in case of flame out condition. Ignition can be manual or electric.

#### FLOW CONTROL PANEL

A floor standing flow control panel contains all the flow train components. This panel is constructed of 10 gauge steel from the floor to the top of the panel. The panel has an open back for easy

maintenance and 12" deep side panels for protection of the components and neat appearance.

#### FITTINGS AND PIPING

Pipe is copper. Fittings are brass flare type NPT fittings where possible. These are easy to disassemble for maintenance work and are extremely tight.

#### ATMOSPHERE INSTRUCTIONS

A very complete instruction manual, specifically written for the atmosphere system, is included. This includes a theory of operation of all major systems and subsystems, full maintenance instructions and schedules, component lists, component instructions and data sheets, emergency procedures, cautions, and start up and shut down procedures. A complete flow schematic of the atmosphere system is provided.

## OPTIONS

- **FLAME CURTAIN:** Automatically controlled flame curtain to reduce oxygen inrush. Requires 1 psi natural gas pressure. (Can be specified for propane also.) Includes natural gas fed pilot light with its own regulator to prevent pressure feedback from flame curtain. Gas turns off automatically if pilot goes off. Includes manual safety override to light the flame curtain. The flame curtain is activated when the door opens. Uses compressed air for combustion air.
- **DOOR PURGE TIMER:** It is an advantage to be able to automatically fast purge the furnace whenever the door is opened. To do this L&L offers an optional door purge which includes a check valve, properly sized flowmeter and adjustment valve, solenoid shut off valve and delay timer. Every time the door switch is opened, the purge valve opens. When the door is closed again, a delay timer is triggered which keeps the purge solenoid valve open for a preset period of time (0-15 minutes is typical).
- **ATMOSPHERE SAMPLE PORT:** An alloy sample port is provided. There is a ball valve to close this off when not in use. This is used to sample the atmosphere for dew point content.
- **DEW POINT ANALYZER:** A Panametrics or Eastern Instruments dew point analyzer can indicate furnace dew point.
- **FURNACE PRESSURE GAUGE:** A pressure gauge reads internal furnace pressure from 0" to 1" W.C.

## START UP SERVICE

L&L will provide a service technician to do the following:

- **Go over the installation carefully to make sure everything is reconnected properly.**
- **Properly set all alarms, flow switches, etc.**
- **Leak test entire atmosphere system.**
- **Review electrical installation and reconnections.**
- **Go over furnace itself and make any necessary adjustments and minor repairs.**
- **Start up furnace and run bake out cycle.**
- **Review operation, adjustment and maintenance procedures for the controls, atmosphere system, and furnace with customer's operation and maintenance personnel.**

Customer is responsible for initial reassembly of furnace, electrical hook up, atmosphere supplies and hook up to MPN flow panel. Any process testing is responsibility of customer. Price for above service can be quoted as a fixed price or on a per diem charge plus expenses.