

HFS Model

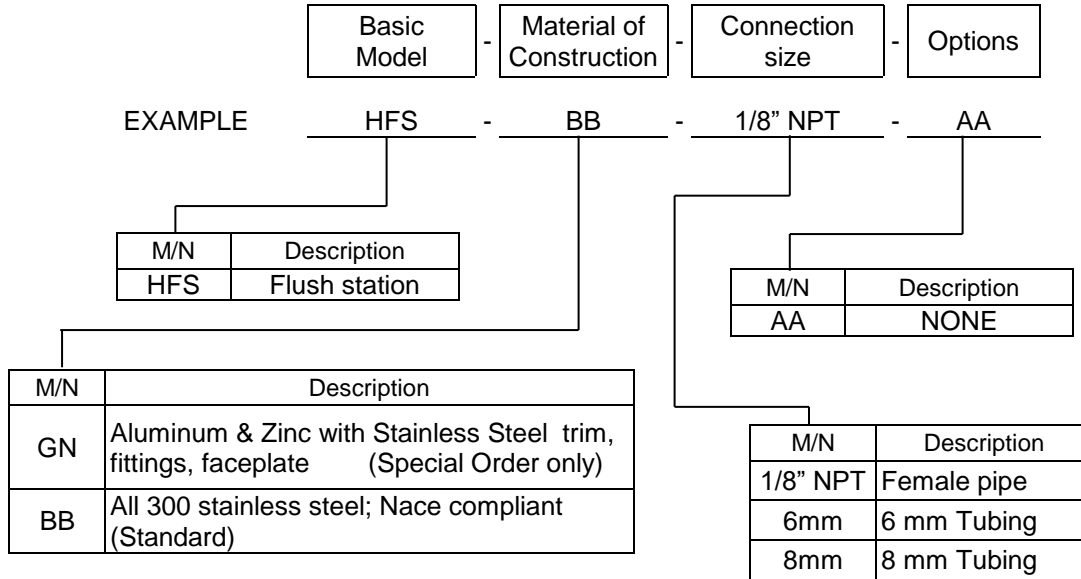
Installation, Operation and Maintenance Manual



Delta Controls
CORPORATION

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MODEL HFS FLUSH GAS CONTROL STATION MODEL NUMBERING SYSTEM



SPECIFICATIONS

FLOW RANGE:	1 TO 17 LPH
PRESSURE INDICATOR:	0-60 PSIG (0-4 bar); ALL STAINLESS STEEL.
PRESSURE CONTROL RANGE:	2 TO 50 PSIG (0.14 TO 3.4 BAR)
FILTER:	5 MICRON SINTERED POLYPROPYLENE
DRAIN:	MANUAL VALVE
FLOW METER BODY:	STAINLESS STEEL
PRESSURE CONTROL BODY:	STAINLESS STEEL
CONNECTION FITTINGS:	STAINLESS STEEL
FACE PLATE:	STAINLESS STEEL
FASTENERS & 2" PIPE CLAMPS:	STAINLESS STEEL
SUPPLY PRESSURE:	60 TO 250 PSIG (4 to 17 BAR)
SUPPLY GAS:	NITROGEN

REPLACEMENT AND SPARE PARTS

P/N 24-098AA	PRESSURE CONTROL UNIT, ZINC BODY
P/N 24-098BB	PRESSURE CONTROL UNIT, ALL S.S.
P/N 24-106AA	5 MICRON FILTER ELEMENT
P/N 24-111BB	OVERHAUL KIT FOR 24-098
P/N 12-056TT	PRESSURE INDICATOR, ALL S.S.
P/N 24-185Z0	17LPH FLOW INDICATOR / CONTROL UNIT; ALUMINUM BODY
P/N 24-185Z1	17LPH FLOW INDICATOR / CONTROL UNIT; ALL S.S.

MODEL HFS FLUSH GAS CONTROL STATION

FUNCTION

The Model HFS Flush Gas Control Station is utilized in conjunction with the Delta Controls Model HTP and HTX Thermocouple. The HFS provides several essential functions necessary for the proper operation and long service life of the thermocouple. The primary functions are:

- (1) Provides a very low and constant amount of flush gas flow through the thermocouple assembly. The gas flow removes corrosive and contaminating atoms and molecules, which migrate through the ceramic thermowell. This is done before they can react or interact with the thermocouple element(s), causing corrosion and subsequent measurement errors and eventual failure.
- (2) Provides a controlled positive pressure in the thermocouple assembly, which must be higher than the reactor operating pressure. This guarantees that reaction gases cannot leak into the thermocouple body in the event that there are any tiny cracks in the ceramic components or seals. The increased pressure differential discourages migration through the walls of the thermocouple's primary thermowell.
- (3) Provides a very fine (5 micron) filtration of all incoming flush gas. This prevents plugging of the gas passages inside the thermocouple. It also provides a trap with a drain valve to catch water droplets and condensables that may be in the gas supply stream. Introduction of liquids into the thermocouple will cause reading errors, shorten its life or even cause outright failure. This effect is due to flashing of the liquid, which cools the sensor, and thermal shocks, which may crack or break the ceramic element protectors.
- (4) Provides accurate reliable control of the thermocouple pressurizing and flushing functions.
- (5) Provides a single place at the reactor where the operator can regularly monitor and verify proper operation of the flush gas stream. Instrumentation labels indicating correct setpoints are on the HFS faceplate.
- (6) Many years of Delta Controls field experience has resulted in the optimum design, configuration, and materials of construction to achieve proper flush gas control. Easy to understand marking and labeling eliminates installation and piping errors and reduces the possibility of improper operation.

INSTALLATION AND MOUNTING

Install the HFS at eye level (approximately 5 Feet [1.5 M] above the floor), to allow for ease of observation and operation. This allows the operator to regularly verify that the purge is operating properly.

A vertical 2" pipe stand provides an ideal mounting for the HFS, which is furnished with two clamps for securing it to the pipe. A common way to erect the 2" pipe is to weld or clamp it to a handrail or the process equipment support structure.

The HFS may also be mounted on a vertical surface. To do this, discard the pipe clamps, drill 4 7/16" (11 mm) holes through the surface and secure the HFS with 3/8" (9mm) bolts.

PIPING

The HFS is normally connected to the thermocouple and flush gas supply stream with 1/4in tubing. Other sizes, including equivalent metric sizes, may be used providing that the connection adapters on the HFS and thermocouple are compatible.

The ports on the HFS are clearly marked as to what should be connected to each of them. Tubing may enter and leave from bottom, top, right side, left side or any combination thereof. The tubing run should be installed neatly and be easy to follow and understand. Make the runs straight as possible and support them well for best long term operating results.

It is essential that the “HFS to Thermocouple” line is connected to the inlet purge connection of the thermocouple. Reversing the connections may result in eventual thermocouple failure.

OPERATING

Set the Pressure - Set the pressure to approx 5 psi (0.35 bar) above the maximum furnace operating pressure which is normally 5-8 psi (0.35 – 0.55 bar). Therefore, a pressure setting of 12-15 psi (0.83 – 1.0 bar) is satisfactory.

Set the Flow Rate - Set the flow rate control to a flow rate of about 10 LPH. No other adjustments are required. These setpoints must be continuously maintained. It serves no purpose to increase either the flow rate or the pressure beyond the recommended settings. Increased flow will cause the thermocouple to read erroneous low; increased pressure only increases the chance of leakage.

If either the pressure or flow is disrupted beyond few a days, corrosion of the thermocouple elements may begin, which will gradually cause inaccurate readings over time. Left uncorrected, eventual failure of the thermocouple will result.

FLUSH GAS COOLING EFFECT

“Does the gas flow over the thermocouple junctions cool them and cause inaccurate readings?” The answer to this commonly asked question is, “practically speaking, no”. Tests indicate that at the recommended flow rate, the cooling effect is negligible.

In order to determine the cooling effect, first observe the indicated operating temperature. Then, turn the control valve on the flowmeter clockwise to reduce the flow rate to 0LPH. Wait 3 minutes and observe the operating temperature and compare it with the temperature reading before shutting off the gas flow.

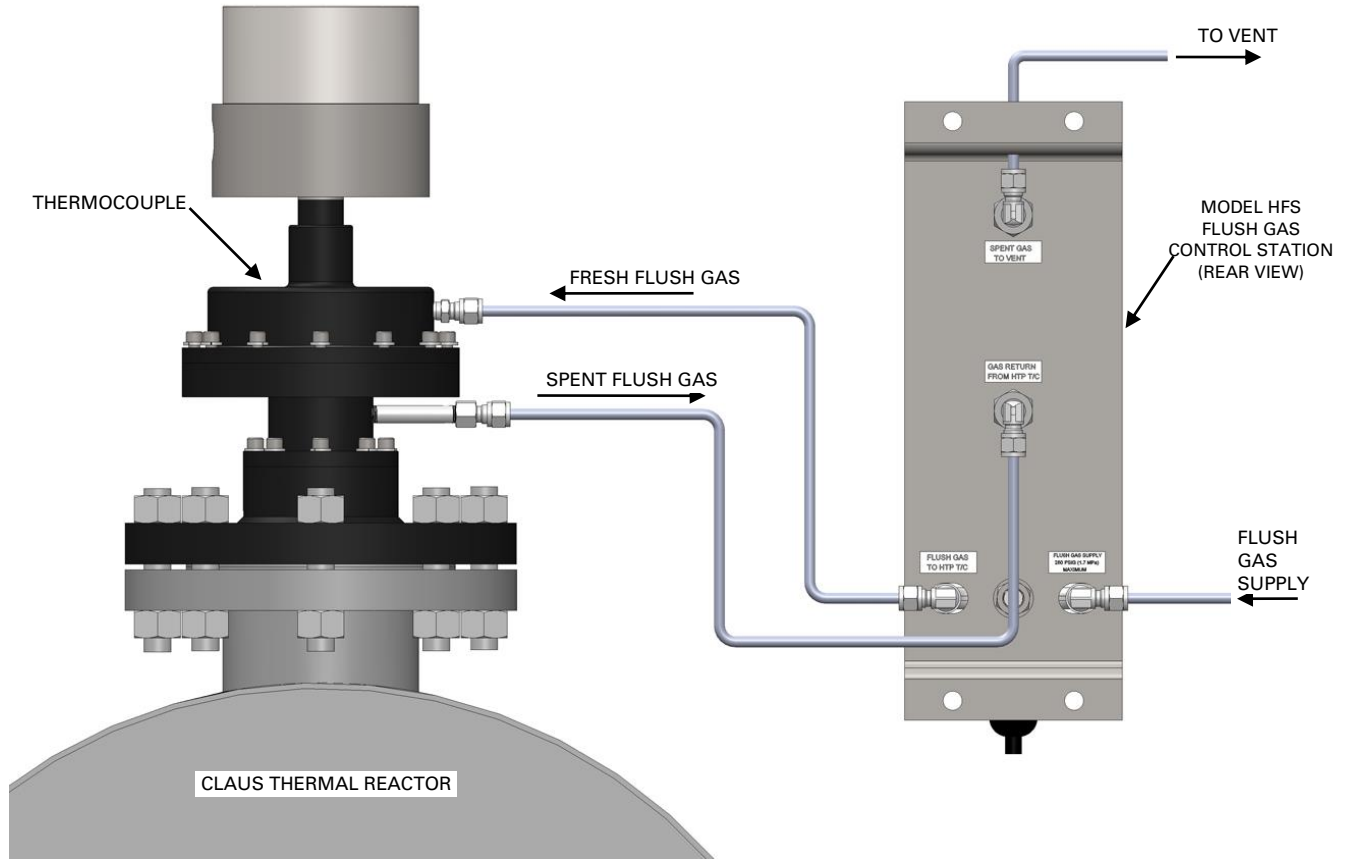
Make sure to return the gas flow to 10LPH.

MAINTENANCE

The operator is to observe the pressure indicator and flow rate indicator during each shift to verify that the system is operating properly.

On a weekly basis, the filter bowl drain valve should be opened slightly to verify that the supply gas remains dry. If any liquid is observed, open this valve on a daily basis. If traces of liquids are observed, correct the source of the problem.

Liquids of any type in the flush gas can damage the thermocouple; hydrocarbons entering the flush gas passages may cause failure of the thermocouple.



MODEL HFS FLUSH GAS STATION
TYPICAL CONNECTION TO THERMOCOUPLE