

## Dual Gas Train Installations

In some applications, the use of two GTI gas trains may be preferred due to engine configuration and/or gas flow requirements. The Bi-Fuel System can successfully be configured with dual gas trains; however, there are a number of technical considerations that must be addressed prior to installation and start-up.

### FUEL BALANCE

When utilizing dual gas trains, consideration must be given to the possibility of unbalanced gas delivery to the converted engine. Specifically, for engines configured with two turbo-compressors feeding separate (discrete) air manifolds or aftercoolers, steps should be taken to ensure that a shutdown of one gas train will not result in gas being supplied to one engine bank only. In order to guard against this condition, it is recommended that the user install a “balance line” between gas train outlets such that an inadvertent shutdown of one gas train will result only in a decreased supply of gas to both engine banks (overall gas substitution will decrease; however, the engine will continue to operate normally). It is suggested that the balance line be installed between the outlets of the gas train gas solenoid valves (GTI Part No. GSV005/6) using equivalent sized piping (DN65 or DN80 as applicable). The balance line will function to equalize the engine vacuum between gas trains resulting in uniform gas flow to each engine bank when both trains are functioning and also to ensure continued gas supply to each engine bank (at a reduced total rate) should one gas train fail. For engines configured with two turbo-compressors feeding a common aftercooler or air manifold, the balance line may be utilized if desired to equalize flow from each gas train during normal operation; however, installation of the balance line is not generally required since the mixing of combustion air downstream of the individual turbo-compressors (in the common air-intake or aftercooler system) will prevent unbalanced gas delivery to each engine bank in the event of a single gas train failure.

### GAS SOLENOID VALVE

The use of a second gas train requires supplying power to two (2) Gas Solenoid Valves (GTI Part No. GSV005/6). For applications using either the GPN2000V or GPN2010V model control panels, +/- 24 volts must be supplied to the second Gas Solenoid Valve using an additional Fuel Harness (GTI part no. 693124-1) which is not supplied as standard. The additional fuel harness should be connected to the GPN2000V or GPN2010V customer terminal strip using the SOL + and SOL – contacts. Both the GPN2000V and GPN2010V model control panels are equipped with 2 control relays rated for 6 amps of supply power each, which is sufficient to power two (2) Gas Solenoid Valves. A small wiring modification to the control panels CR3 relay is required. See the wiring detail for dual gas train applications on page 3.

### **REGULATOR OUTPUT PRESSURE (ROP)**

The use of a second gas train requires monitoring of one additional channel of ROP (Regulator Output Pressure). For GPN2000V model control panels, the monitoring of the additional ROP channel is accomplished by “daisy-chaining” the first and second ROP pressure switches together in series such that an ROP fault on either gas train will result in a “Safety Shutdown” of the Bi-Fuel System. The additional wires required for connection of the second ROP switch are contained in the Fuel Harness (GTI part no. 693124-1) mentioned above. GPN2010V model control panels are configured with dedicated ROP1 and ROP2 contacts on the customer terminal strip; however, the additional Fuel Harness (GTI part no. 693124-1) is still required to connect the second ROP switch.

### **GAS SUPPLY PRESSURE (GSP)**

For GPN2000V model control panels, the monitoring of GSP (Gas Supply Pressure) is limited to one (1) channel. It is suggested that the single GSP sensor be installed in a location that is common to both gas trains; however, this may not be practical in all installations and consideration should be given to fuel balance issues (as described above) in the event one gas train fails. GPN2010V model control panels are configured with GSP1 and GSP2 contacts on the customer terminal strip. One (1) additional Fuel Harness (GTI part no. 693124-1) and one (1) additional GSP sensor (GTI part no. 691201-15) are required to install and monitor GSP on the second gas train.

### **GAS CONTROL VALVE**

The use of a second gas train may require supplying power and control signals to two (2) Gas Control Valves (GTI Part No. 690225-1 or 690230-1) if the Bi-Fuel System has been configured for Dynamic Gas Control operation or alternately, has been configured with Gas Control Valves in lieu of mechanical Gas Power Valves. For applications using either the GPN2000V or GPN2010V model control panels equipped with a Stepper Motor Controller (GTI part no. 691156-1), use of a second Gas Control Valve requires an additional Gas Valve Harness (GTI part no. 693124-1) which is not supplied as standard. Both Gas Control Valves should be connected to the GPN2000V or GPN2010V Stepper Motor Controller Board using the appropriate contacts such that both Gas Control Valves are controlled in parallel. Both the GPN2000V and GPN2010V model control panels are equipped with 2 control relays rated for 6 amps of supply power each, which is sufficient to power two (2) Gas Solenoid Valves. A small wiring modification to the control panels CR3 relay is required. See the wiring detail for dual gas train applications on page 3.

### **START-UP AND COMMISSIONING**

Regardless of the engine configuration and/or use of a balance line between gas trains, it is strongly recommended that all dual gas train installations be tested for proper engine operation on one gas train during the start-up and commissioning process. Each gas train should be “failed” individually at normal engine loading to ensure that the loss of a single gas train will not result in improper engine operation.

**WIRING MODIFICATION FOR DUAL GAS TRAINS**

