SEQUENCE OF OPERATION

Vote Based Auto Changeover Bypass VAV with Programmable Wireless Thermostats

GEN III controller wires to the HVAC unit with legacy style connections Y1, Y2, W1, W2, OB, G, R. Once every minute the controller communicates to each damper via RS485 connection daisy chained along with 24 V of power wired damper to damper. Each damper is equipped with a damper board ID and synced to its wireless programmable thermostat, installed within 100 feet of the communicating damper board in the system.

The *GEN III* is an auto changeover, vote based VVT system. As thermostats call for heating or cooling, votes are tallied at the *GEN III* controller; and, based on the majority of votes received, the HVAC unit operates in the mode of majority votes. If majority changes, the system controller will automatically initiate a changeover sequence with built in time delays to protect the equipment before changing over to the new mode of operation.

When the last calling zone is satisfied in either heat or cool mode, the *GEN III* controller will terminate the HVAC outputs after the next "poll"; and the blower output will be de-energized (unless controller is configured for constant fan) after a 4-minute purge cycle. During the purge cycle no heat or cool calls are recognized.

The wireless zone thermostats control and modulate the zone dampers based on variance from set point to a position that will match the supply load to the demand requirement. When the HVAC unit is running, if a zone thermostat is not calling or is calling for the opposite mode, its corresponding damper fully closes. When the HVAC unit is not running, the thermostats open to the Vent mode to provide ventilation, if the indoor blower fan is running continuously.

While the HVAC unit is running, the capacity control LAT device monitors the leaving air temperature from the HVAC unit and will cycle the HVAC unit to maintain the air temperature with a preset range to eliminate coil freeze-up and premature heat exchanger failure. When the system is in the heating mode and a majority vote changes to cooling, a changeover timer begins and will run heating for 5 minutes or until heat call is satisfied and then cycle into a changeover purge. After a 4-minute purge cycle, Cooling is turned on until the cool call is satisfied or there is a majority vote for heat received by the *GEN III* controller. If all calls have been satisfied, after the 4 minute off delay, dampers will modulate to approximately 40% open position for ventilation mode.

The system fan/blower operation can be configured for ON or intermittent Auto operation. The controllers are shipped from the factory for Auto fan operation. The only time the fan will run is when there is a call from the controller for heating or cooling. If the system is configured for fan ON operation, the fan will run continuously during occupied time and intermittently during unoccupied time.

All zone thermostats are synced or paired with its respective modulating zone damper, which is equipped with antenna and communicating damper board. One zone thermostat in the system shall be enabled as the Monitor thermostat and synced with the *GEN III* controller to interact and initiate control decisions for the system. The Monitor shall establish global or individual schedules for the system, lock thermostats individually and provide minimal local adjustment, establish master temperature settings individually or globally for the system, and provide diagnostic functions to streamline system troubleshooting. Air balance shortcuts, along with password protection, are also enabled at the Monitor thermostat. Sleep and energy saving modes are available to extend battery life and enhance operation.

Voting demand strategy can be enhanced by adding Priority votes or by giving a NULL vote to individual thermostats in the system, thereby weighting certain zones more than others. Priority votes allow you to select 0, 1, 2, or 3 additional votes for a thermostat that has unusual loads, like a conference room. A change to 0 for priority in that zone stat configuration will create a NULL vote for HEAT/COOL and will not allow the stat to place a call for heat or cool, but will allow damper operation based on system mode of operation, HEAT/COOL/VENT.

The *GEN III* provides effective temperature control and minimizes wiring issues by using wireless programmable zone thermostats. No computer or software tools are required for installation, commissioning or servicing the system.