

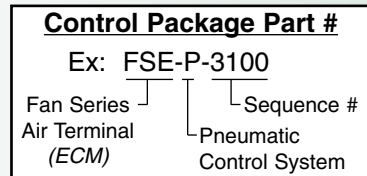
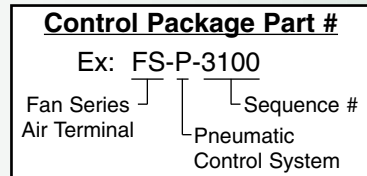
Table 46: QST / EST Pneumatic Control Strategies

| Control Package Number | | Pressure Independent | Direct Acting Thermostat | Reverse Acting Thermostat | Damper Normally Open | Damper Normally Closed | VAV Cooling | CV Cooling | CV Fan | Electric Heat - Step | Hot Water Heat | Night Shut-Down | Night Cycling |
|------------------------|------------|----------------------|--------------------------|---------------------------|----------------------|------------------------|-------------|------------|--------|----------------------|----------------|-----------------|---------------|
| QST | EST | | | | | | | | | | | | |
| FS-P-3100 | FSE-P-3100 | ● | ● | | ● | ● | | | ● | ○ | ○ | | |
| FS-P-3200 | FSE-P-3200 | ● | ● | | ● | ● | | | ● | ○ | ○ | | |
| FS-P-3300 | FSE-P-3300 | ● | | ● | ● | ● | | | ● | ○ | ○ | | |
| FS-P-3400 | FSE-P-3400 | ● | | ● | ● | ● | | | ● | ○ | ○ | | |
| FS-P-3140 | FSE-P-3140 | ● | ● | | ● | ● | | | ● | ○ | ○ | ● | ● |
| FS-P-3240 | FSE-P-3240 | ● | ● | | ● | ● | | | ● | ○ | ○ | ● | ● |
| FS-P-3340 | FSE-P-3340 | ● | | ● | ● | ● | | | ● | ○ | ○ | ● | ● |
| FS-P-3440 | FSE-P-3440 | ● | | ● | ● | ● | | | ● | ○ | ○ | ● | ● |
| FS-P-3160 | FSE-P-3160 | ● | ● | | ● | ● | | | ● | ○ | ○ | ● | |
| FS-P-3260 | FSE-P-3260 | ● | ● | | ● | ● | | | ● | ○ | ○ | ● | |
| FS-P-3360 | FSE-P-3360 | ● | | ● | ● | ● | | | ● | ○ | ○ | ● | |
| FS-P-3460 | FSE-P-3460 | ● | | ● | ● | ● | | | ● | ○ | ○ | ● | |

● - Standard
○ - Optional

Notes:

1. Pressure Independent: Includes Actuator, Fan PE switch, plus volume regulator
2. VAV CV fan: cooling only, fan runs continuously
3. Constant Volume - regulates primary air without T-stat reset (except heating).
4. Setback - fan/heat cycle during primary air shutdown
5. Shutdown - fan/heat locked-out during primary shutdown



**Pressure Independent
VAV Cooling / Constant Volume Fan
Optional Hot Water or Electric Heating**

Control Packages

Model QST

FS-P-3100 – FS-P-3400 (pneumatic)
FS-A-5000 – FS-A-5004 (analog)

Model EST

FSE-P-3100 – FSE-P-3400 (pneumatic)
FSE-A-5000 – FSE-A-5004 (analog)

Sequence of Operation

As the room air temperature increases above the thermostat setpoint, the actuator operates the terminal damper in response to the controller signal towards the open position, up to the maximum primary airflow setting. Respectively, the proportion of recirculated plenum air is decreased, while keeping the discharge volume constant.

As the room air temperature decreases below the thermostat setpoint, the actuator operates the terminal damper in response to the controller signal towards the closed position down to the minimum primary airflow setting. Respectively, the proportion of recirculated plenum air is increased, while keeping the discharge volume constant.

The controller signal is determined by comparing the signals from the thermostat and flow sensor to provide the required primary airflow regardless of the inlet static pressure conditions

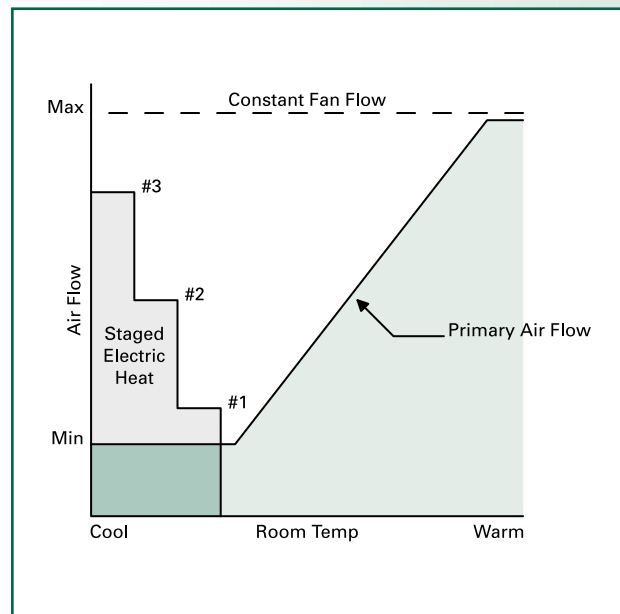
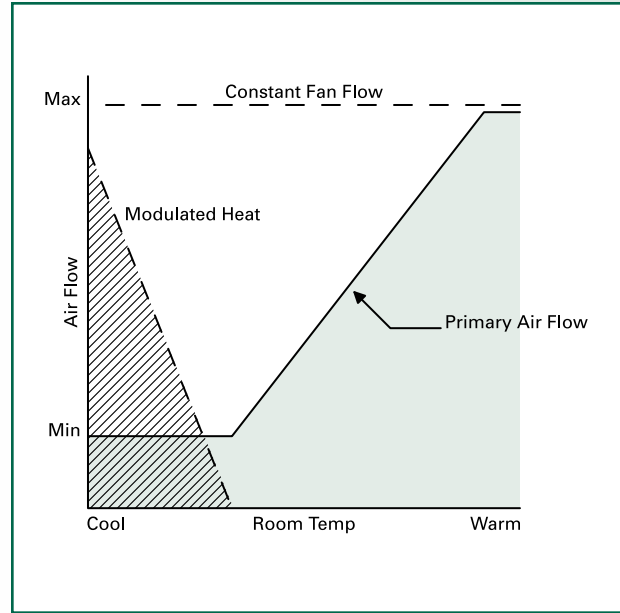
On units provided with heating coils, heat is activated as the temperature continues to fall below the thermostat setpoint after having reached the minimum primary airflow setting. Primary airflow remains at the minimum setting while in the heating mode.

If power is lost to the QST, the electronically controlled primary damper stops at its last commanded position.

Control Package Contents

All pneumatic control packages listed above include the damper actuator and pressure independent controller. Pneumatic thermostats are not included.

All electronic control packages listed above include the damper actuator, pressure independent controller, transformer and room thermostat. A trigger relay is provided with all electronic control packages where a hot water valve (on-off, by others) or up to three stages of electric heat are included.



**Pressure Independent
VAV Cooling / Constant Volume Fan with
Night Setback and Shutdown
Optional Hot Water or Electric Heating**

Control Packages

Model QST

FS-P-3140 – FS-P-3440 (pneumatic)
FS-A-5020 – FS-A-5024 (analog)

Model EST

FSE-P-3140 – FSE-P-3440 (pneumatic)
FSE-A-5020 – FSE-A-5024 (analog)

Sequence of Operation

Same as (VAV Cooling / CV Fan)

In addition, setback occurs when the AHU is off, and the duct pressure switch senses no duct pressure, and turns the QST fan off. During setback condition, the QST fan is cycled on and off by the thermostat. As the temperature drops, the QST fan will energize, providing 100% induction air (damper remains at minimum position).

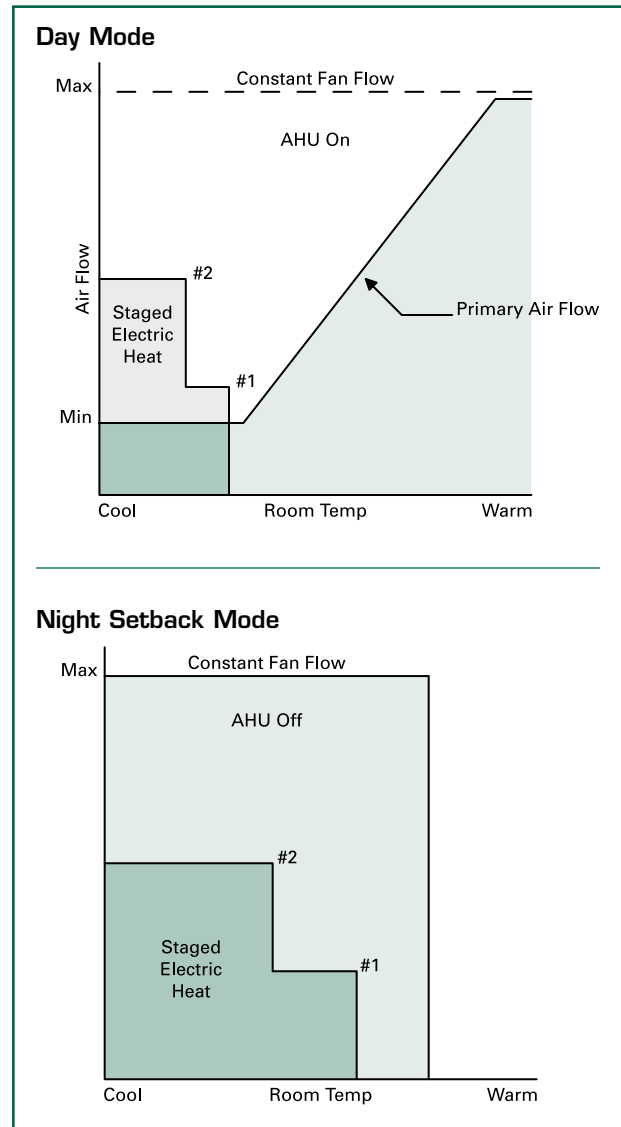
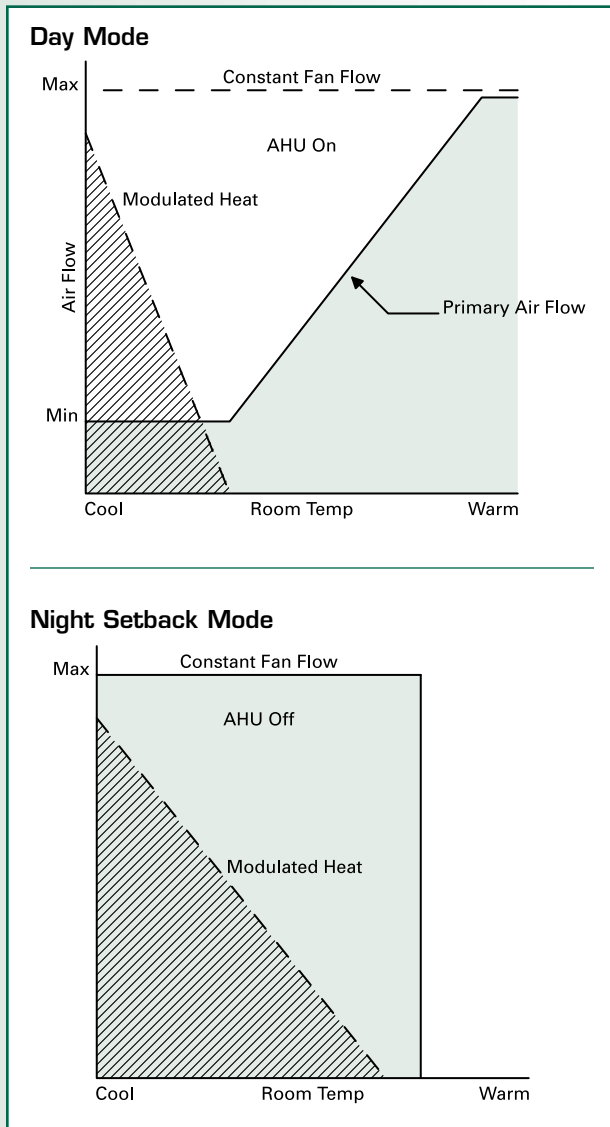
On units provided with heating coils, heat is activated as the temperature continues to fall below the thermostat set-point only after the QST fan is on. As the space temperature rises, both the optional heat and QST will be shut off sequentially.

If power is lost to the QST, the electronically controlled primary damper stops at its current position.

Control Package Contents

All pneumatic control packages listed above include the damper actuator, PE fan switch, fan relay, duct pressure switch and pressure independent controller. Pneumatic thermostats are not included.

All electronic control packages listed above include the damper actuator, duct pressure switch, fan relay, pressure independent controller, transformer and room thermostat. A trigger relay is provided with all electronic control packages where a hot water valve (on-off, by others) or up to two stages of electric heat are included.



**Pressure Independent
VAV Cooling / Constant Volume Fan with
Night Shutdown
Optional Hot Water or Electric Heating**

Control Packages

Model QST

FS-P-3160 – FS-P-3460 (pneumatic)
FS-A-5040 – FS-A-5044 (analog)

Model EST

FSE-P-3160 – FSE-P-3460 (pneumatic)
FSE-A-5040 – FSE-A-5044 (analog)

Sequence of Operation

Same as above (VAV Cooling / CV Fan)

In addition, shutdown occurs when the AHU is off, and the duct pressure switch senses no duct pressure, and turns the QST fan off.

On units provided with heating coils, heat is activated as the temperature continues to fall below the thermostat set-point. As the space temperature rises, the optional heat will be shut off.

Control Package Contents

All pneumatic control packages listed above include the damper actuator, fan relay, duct pressure switch and pressure independent controller. Pneumatic thermostats are not included. All electronic control packages listed above include the damper actuator, duct pressure switch, fan relay, pressure independent controller, transformer and room thermostat. A trigger relay is provided with all electronic control packages where a hot water valve (on-off, by others) or up to three stages of electric heat are included.

