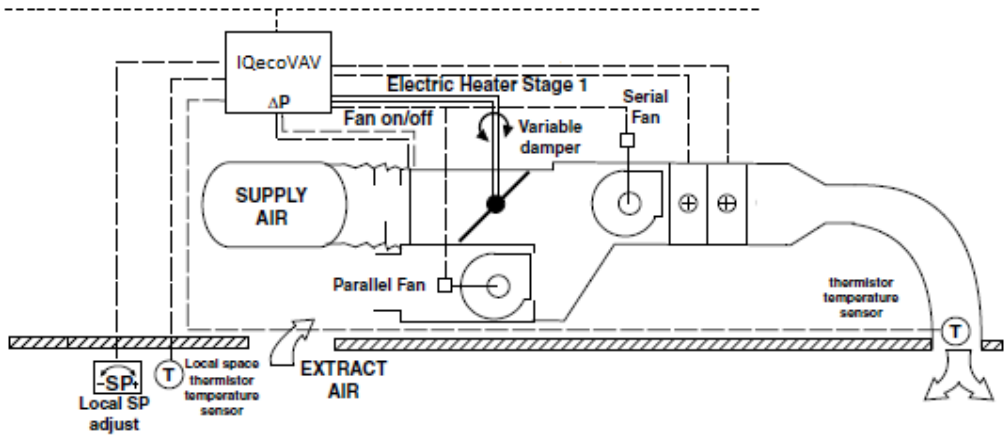
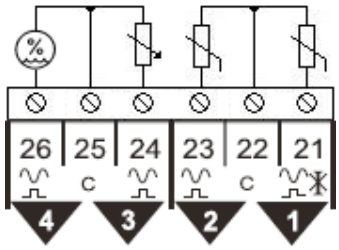


Fan Coil Unit - Variable Air Volume - 2 Stage Electric Heating.

The IQeco variable air volume standard strategy controls a proportional damper, an on/off fan (either serial or parallel), and two stages of electric heating in response to a thermistor temperature sensor with a local setpoint knob. The 2E strategy is for on/off electric heating. The strategy is designed to work with TB/TS Trend Thermistor Room Sensors. The strategy supports the fitting of a WMB Room Display module without further configuration.

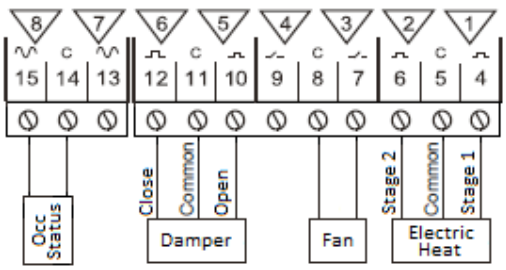
The strategy is designed for use with an IQecoVAV/P and IQecoVAV/P/A.
Order code: IQEVAVP/P/BAC/VAV2E/24VAC or IQEVAVPA/P/BAC/VAV2E/24VAC.



The following real sensors and digital inputs are connected to the input channels and their values can be monitored by text comms (including IC Comms).

Real Sensors
IN1: "Local Discharge Air Temp" (S21), the thermistor temperature sensor reading for the discharge air.
IN2: "Local Space Temperature" (S22), the thermistor temperature sensor reading for the space.
IN3: "Local Setpoint Adjust" (S23), the local setpoint adjustment potentiometer value scaled in the range -0.5 to +0.5. This generates a setpoint trim in the range -1°C to +1°C or -1°F to +1°F when the knob "Offset Range" (K3) value is set to 2.
IN4: "Local Humidity Sensor" (S24), the humidity sensor configured as a 4-20mA input.
IN8: "Air Differential Pressure" (S28), the on board pressure sensor scaled 0 to 375Pa or 0 to 1.5inwc.

Outputs



OUT 1: "Heating Stage 1" (D1), this output is used drive a relay to switch power for the electric heating stage 1.

OUT 2: "Heating Stage 2" (D2), this output is used drive a relay to switch power for the electric heating stage 2.
OUT 3: "Fan" (D3), this output is used switch power for the fan.
OUT 5,6: "VAV Damper" (D5), these outputs are connected to a raise/lower (floating point) actuator to raise (open) and lower (close) respectively.
OUT 8: "Occupation Status" (D8), this output is used to drive the occupation status on the TBTS/KOS or a SRMV relay.

Default Operation

The behaviour of the strategy before any configuration of knobs as switches is as follows:

The default occupancy state of the strategy is unoccupied.

In most cases when the controller is powered on the fan outputs will not operate as the space temperature used for control will be within the deadband for the unoccupied state.

There are 2 ways to take the strategy out of the unoccupied state:

1. Set Knob "Remote Occupancy" (K11) to 0.
2. Use the service button to put the unit into occupied. Details are in "Service Button - Occupancy" section of the strategy datasheet.

The fan output may not be operating for the following reasons:
a. The fan anti cycling strategy is active. Once switched off the fan will not start for 5 minutes.
b. Changes to the knobs and switches from the defaults are overriding the fan control.
c. The occupancy state is unoccupied.

WallBus Interface Eco

This Standard Strategy can be used with WMB Units which provide Temperature, Humidity, DewPoint and CO2 values to internal Strategy Sensor Modules.

When adding WMB Units to the system, 963, IQview8 and IQview4 and other User displays will discover these Sensor Modules and display them in their lists.
WMB units which do not support Humidity or CO2 values will send a value of 0 to the 963 and user displays.

To stop the User Display from showing any one Sensor Module delete the lable string in that module.
For example to prevent the User Display from showing Humidity, delete the label ($ parameter) in sensor 32.
You can delete parameters in fixed strategies using one of these methods: parameter viewer in SET system view, live adjust in SET drawing view or by a text comms message such as S32($="").
You cannot change connections between modules in this fixed strategy.

The Strategy can operate with the new RS-WMB, RD-WMB and RV-WMB sensors which are detailed inTA201348. It can also operate with the older version of RD-WMB.

The new WMB sensors are available with options for:
Temperature - RD-WMB T, RS-WMB T, RV-WMB T
Temperature and Humidity RD-WMB TH, RS-WMB TH, RV-WMB TH
Temperature, Humidity and CO2 RD-WMB THC and RS-WMB THV.

The Strategy is designed to operate with RD, RS and RV of all the available types.

Sensors which do not support Humidity or CO2 will continue to scroll through all the variables with a display of 0 unless the input in the interface module is deleted.

For RD-TH, RS-TH, RV-TH sensors
Delete the PVid in t2I10V to prevent the RD displaying CO2 with the value 0

For RD-T, RS-T, RV-T sensors
Delete the PVid in t2I10V to prevent the RD displaying CO2 with the value 0
Delete the PVid in t2I6V to prevent the RD or RV displaying Humidity with the value 0
Delete the PVid in t2I11Vto prevent the RD or RV displaying Outside Air Temperature with the value 0

The RV sensors have configuration settings such as button graphics and CO2 thresholds. The Strategy does not allow you to link these settings to strategy. Configuration settings for RV can only be made through the display. See Trend Data sheet TA201354.
For RV and RD meters you can display CO2 from a remote controller by setting up an IC comms to Sensor 34 and deleting the PVid in t2O4 so that the value in S34 is not overwritten.
This standard solution does not support a CO2 sensor hard wired to the controller.

Knobs Switches <21

The following knobs and switches are grouped by the role they are intended to play within the strategy. They can be monitored and changed by text comms (including IC Comms). Some can be monitored using display and directory modules (e.g. using IQView):

Modules Role

1-10 Adjustments - Items the users may want to change.
11-20 Remote Control - Items that are expected to receive IC Comms e.g. frost protection.
21-30 Overrides - Items that enable control to be overridden e.g. heating override.
31-40 Settings - Items that should be set up during commissioning.
41-50 Options - Items that select an option or behaviour e.g. serial parallel fan.
51-60 Energy - Items related to energy.

Adjustments
K1 'Pushbutton PIR Timeout', this knob defines the time in minutes for which the activation of the pushbutton/PIR input overrides the unit into the occupied state. The default value is 30 minutes.
K2 'Setpoint Adjust Timeout', this knob defines the time in minutes for which any setpoint trim will be applied to the setpoint. The default value is 60 minutes.
K3 'Offset Range', this knob is used to define the range of 'Local Setpoint Adjust' (S23). The 'Local Setpoint Adjust' (S23) is scaled to give a range of -0.5 to +0.5; this is multiplied by the 'Offset Range' to give the setpoint trim which is applied to the 'Remote Setpoint'(K14) to produce the 'Setpoint' (S3). The default value is 2°C or 2°F producing a value between -1°C to +1°C or -1°F to +1°F.
K4 'OCC Deadband', this knob defines the difference between the heating and cooling setpoints during occupation. The default value is 1°C or 2°F.
K5 'NOCC Deadband', this knob defines the difference between the heating and cooling setpoints during non-occupation. The default value is 25°C or 45°F.
K6 'Standby Deadband', this knob defines the difference between the heating and cooling setpoints during standby. The default value is 8°C or 15°F.
K7 'Heating Setpoint', this knob defines the heating setpoint when separate setpoints are selected using switch 'HeatCool Setpoint 1=Separate' (W36). The default value is 19.5°C or 67°F.
K8 'Cooling Setpoint', this knob defines the cooling setpoint when separate setpoints are selected using switch 'HeatCool Setpoint 1=Separate' (W36). The default value is 20.5°C or 69°F.
W1 'Unit Bypass Request 1=Active', this switch is set to ON if the unit is in bypass and can be used to put the unit into or out of bypass. The default state is OFF.
W2 'Electric Heat 1=Enabled', this switch when set to ON enables the control of the electric heater. The default state is ON.

Remote Control
K11 'Remote Occupancy', this knob defines unit's occupancy state: 0(Occupied), 1(Unoccupied), 2(Bypass), 3(Standby). It can be overridden into bypass (equivalent to Occupied within the unit) from any occupation state by the pushbutton or from standby by the PIR. The state is overridden to unoccupied by the switch 'Remote Shutdown 1=Shutdown' (W11) or the window contact (IN24). The definition of the occupancy states are detailed below under Occupancy States. The default value is 1(Unoccupied).
K12 'Remote Space Temperature', this knob is used instead of input 'Local Space Temperature' (S22) when the input has an out of limits or read alarm. It can also be used by setting switch 'Temperature Select 1=Remote' (W34) to ON. The default value is 22°C or 71°F.
K13 'Remote Setpoint Offset', this knob is used instead of input 'Local Setpoint Adjust' (S23) to provide the setpoint trim. It is added to the 'Remote Setpoint' (K14) when the input (S23) has an out of limits or read alarm. It can also be used by setting switch 'SP Offset Select 1=Remote' (W35). The default value is 0°C or 0°F.
K14 'Remote Setpoint', this knob is combined with the setpoint trim to provide the 'Setpoint' (S3). The default value is 22°C or 71°F.
K20 'Air Energy', this knob sets the energy value for the air flow used to calculate the energy consumption of the unit. The default value is 0.002 kW/l/s or 0.000995 Btu/s/cfm.
W11 'Remote Shutdown 1=Shutdown', this switch when set to ON forces the unit into the unoccupied state, disables cooling, only allows sub-zero heating, and disables fabric protection during non-occupation. The default state is OFF.
W13 'Boost Mode 1=Boost', this switch when set to ON forces the unit into bypass unless overridden by switch 'Remote Shutdown 1=Shutdown' (W11). It also forces the unit to maximum cooling (zero heating). The default state is OFF.
W14 'DP Auto Zeroing 1=Active', this switch when set to ON enables the strategy to calculate the offset required to zero the sensor 'Air Differential Pressure' (S28). The strategy automatically resets the switch to OFF. The default state is OFF.

Knobs Switches 21 - 40

Overrides
K21 'Heating Override Value', this knob sets the value used to drive the heating output when switch 'Heating Override 1=Enabled' (W21) is enabled. The default value is 0%.
K23 'Damper Override Value', this knob sets the value used to drive the damper output when switch 'Damper Override 1=Enabled' (W23) is enabled. The default value is 50%.
K29 'Fan Override Value 0=Off 1=On', this knob sets the value used to switch the fan output when switch 'Fan Override 1=Enabled' (W27) is enabled. The value 0 is OFF and 1 is ON. The default value is 0.
W21 'Heating Override 1=Enabled', this switch when set to ON enables heating override and the heating valve output is set to the value on the knob 'Heating Override Value'' (K21). The default state is OFF.
W23 'Damper Override 1=Enabled', this switch when set to ON enables damper override and the damper output is set to the value on the knob 'Damper Override Value'' (K23). The default state is OFF.
W27 'Fan Override 1=Enabled', this switch when set to ON enables fan to be overriden and the fan outputs are set to the speed selected on the knob 'Fan Override Value 0=Off 1=On' (K29). The default value is OFF.
W28 'Water Balance 1=Enabled', this switch when set to ON forces all valve outputs to 100%. The default state is OFF.

Settings
K31 'Fan Anti Cycle Time', this knob defines the time in minutes that the fan must be OFF before restarting to ensure maximum number of starts per hour is not exceeded. The default value is 5 minutes (maximum of 12 starts per hour).
K32 'Stage 2 Heat Delay', this knob defines the time delay, after the first stage of heating is enabled before the second stage of heating is enabled. The default value is 5 minutes.
K33 'Minimum Air Flow Setpoint', this knob defines the minimum airflow permitted by the VAV damper. Eighty-five percent of the minimum airflow is required to enable the electric heater. The default value is 50 lps or 200 cfm.
K34 'Maximum Air Flow Setpoint', this knob defines the maximum airflow permitted by the VAV damper. The default value is 300 lps or 700 cfm.

K35 ‘Heating Air Flow Setpoint’, this knob defines the airflow used when heating. If no heating airflow is specified it should be set the same as knob ‘Minimum Air Flow Setpoint’ (K33). The default value is 50 lps or 200 cfm.
K36 ‘k Constant’, this knob set the box constant used to convert the square root of the pressure into a volume flow rate. The value is either supplied by the VAV box manufacturer or can be found empirically and must be configured into the controller. The default value is 1 or 1000.
W31 ‘Service Button Mode 1=Enabled’, this switch when set to ON allows the service button to be used as an input into the strategy. The default state is ON.
W32 ‘Overrides 0=Disabled 1=Enabled’, this switch when set to ON allows the strategy overrides to be used. The default state is ON.
W34 ‘Temperature Select 1=Remote’, this switch when set to ON forces the strategy to use the value from knob ‘Remote Space Temperature‘ (K12) and not sensor ‘Local Space Temperature’ (S22). The default state is OFF.
W35 ‘SP Offset Select 1=Remote’, this switch when set to ON forces the control to use the value from knob ‘Remote Setpoint Offset‘ (K13) and not sensor ‘Local Setpoint Adjust’ (S23). The default state is OFF.
W36 ‘HeatCool Setpoint 1=Separate’, this switch when set to ON enables the control to use separate setpoints for heating and cooling use knobs ‘Heating Setpoint’ (K7) and ‘Cooling Setpoint’ (K8). The default state is OFF.
W37 ‘Pushbutton TETS KO 1=Fitted’, this switch when set to ON allows the control to utilise the override pushbutton operation of the TB/TS/KO range of thermistor room temperature sensors. The default state is OFF.
W38 ‘DP Zeroing 0=Auto 1=Manual’, this switch when set to ON inhibits switch ‘DP Auto Zeroing 1=Active’ (W14) setting the offset for sensor ‘Air Differential Pressure’ (S28). The sensor offset must then be set manually. The default state is OFF.

Knobs Switches >41

Options
W42 ‘0=Pushbutton 1=PIR ‘, this switch is only used when switch ‘Pushbutton TETS KO 1=Fitted’ (W37) is set to ON. Then the switch when set to ON treats the out of limits alarm for sensor ‘Local Setpoint Adjust’ (S23) as a passive infrared detector and when set to OFF treats it as a pushbutton. The default state is OFF.
W43 ‘Fan 0=Parallel 1=Series’, this switch selects the type of fan control used. The default state is OFF (fan is parallel).
W44 ‘Heating 0=1_Stage 1=2_Stage’, this switch selects the number of heating stages that are controlled. The default state is ON (2 stages)

Energy
K51 ‘ECO Mode Deadband Increase’, this knob defines the value that will be added to the existing deadbands when switch ‘Operating Mode 0=Comfort 1=ECO’ (W51) is set to ON. The default value is 3°C or 7°F.
W51 ‘Operating Mode 0=Comfort 1=ECO’, this switch when set to ON enables the control to operate in eco mode and increase the deadband by the value on knob ‘ECO Mode Deadband Increase’ (K51). The default state is ON.
K52 ‘Power Conversion Factor’, this knob defines the scaling factor that will be multiplied with the heat meter module output to produce kW. 1kW = 0.948608 Btu/s. The default value is 1 when using kW and 0.948608 when using Btu/s.
W52 ‘Energy Meter 1=Reset’, this switch when set to ON will reset the energy meter. Once set the control automatically resets the switch to OFF. The default state is OFF.

Pushbutton PIR Operation

When Switch ‘Pushbutton TETS KO 1=Fitted’ is set to ON the external Sensor ‘Local Setpoint Adjust’ out of limits alarm is used to as the input for PIR or pushbutton override
In pushbutton mode (Switch ‘OFF=Pushbutton ON=PIR’ set to OFF) the out of limits alarm forces the unit into Bypass from any state for the time set on Knob ‘Pushbutton PIR Timeout’. In PIR mode (Switch ‘OFF=Pushbutton ON=PIR’ set to ON) the out of limits alarm will override the unit from Occupied or Standby into Bypass for at least the time set on Knob ‘Pushbutton PIR Timeout’. Within the unit, the Bypass condition is treated the same as Occupied so that although Sensor ‘Occupancy’ shows separate Occupied and Bypass states, if Bypass is set to on then Inputs ‘Unit In Bypass’ and ‘Unit Occupied’ will both be ON.
In both pushbutton and PIR modes the Switch ‘Unit Bypass Request ON=Active’ can be used to stop or start the bypass condition.

Commissioning Details
1. If override is provided by TB/TS/KO set Switch ‘Pushbutton TETS KO 1=Fitted’ to 1 and set Switch ‘0=Pushbutton 1=PIR’ to 0.
2. Set the time of Knob ‘Pushbutton PIR Timeout’ for the length of the bypass period required.

Tip.
PIR’s cannot be used if the input ‘Local Setpoint Adjust’ is required. A PIR can be used if a resistor (5.6 kohm) is fitted to input ’Local Setpoint Adjust’ with the PIR contact in parallel. Then Switches ‘SP Offset Select 1=Remote’, ‘Pushbutton TETS KO 1=Fitted’ and ‘0=Pushbutton 1=PIR’ must be set to 1.

Occupancy State

The unit operates in either Occupied, Unoccupied, Bypass, and Standby modes as determined by the ‘Remote Occupancy’ setting.

Occupied: The unit is on for normal operation and controls to a user defined setpoint. This is Comfort mode as defined in the European standard EN15500.
Unoccupied: The unit is off, no fan, heating or cooling. The PIR has no effect although the override pushbutton will override the unit into bypass. This is Building Protection mode as defined in the European standard EN15500.
Bypass: The unit has been put into occupation by the override pushbutton or the PIR (occupancy sensor).
Standby: The unit is activated to reduce its energy consumption. In this mode either the override pushbutton or the PIR will put the unit back into occupied. This is Economy mode as defined in the European standard EN15500.

Within the unit the Bypass condition is treated the same as Occupied but both Inputs ‘Unit In Bypass’ and ‘Unit Occupied’ will be set to ON.

When Switch ‘Remote Shutdown 1=Shutdown’ is set to ON it will override the unit into unoccupied.

Technical Description
When Switch ‘Remote Shutdown 1=Shutdown’ is set to 1 it will override the unit into unoccupied and disable heating and cooling. The required occupancy states are decoded to digital signals. 0 = Occupied, 1 = Unoccupied, 2 = Bypass, 3 = Standby. The unit can also be put in to occupancy using the service pin.

Discharge and Space Temp

Technical Description
With external sensor ‘Local Discharge Air Temp’ fitted the sensor value is gated through to internal sensors ‘Discharge Air Temperature’. The internal sensor 'Space Temperature' will use the value of either the external sensor 'Room Display Space Temp', when a Room Display module is fitted, or the value from external sensor ‘Local Space Temperature’, if fitted. If the external sensor has a ‘Read’ or ‘Out of limit' alarm the value of input F on the respective gate module will be displayed on the internal sensor.

Setting switch ‘Temperature Select 1=Remote’ to 1 forces the internal sensor ‘Space Temperature’ to use the value on input F of the gate module ‘Actual space temperature’.

Heating Cooling Setpoints

The heating and cooling setpoints can be configured to be separately adjusted or calculated. The selected setpoints have half the current deadband applied as defined by the occupation state. The value of the deadband is increased when not in occupation. The setpoint can also have an offset (trim) adjustment made locally, that will increase or decrease the required setpoint.

Eco Features
Local offset adjustment is valid for an adjustable time after which it is ignored until a change of the offset value is detected.
The size of the deadband is increased when the unit is in ECO mode.

Technical Description
The setpoint is calculated from Knob ‘Remote Setpoint’ unless Switch ‘HeatCool Setpoint 1=Separate’ is set to 1 when Function ‘Selected heat setpoint’ and Function ‘Selected cool setpoint’ use Knobs ‘Heating Setpoint’ and ‘Cooling Setpoint’ respectively for they values.
The ‘Heat setpoint’ is calculated by subtracting half the deadband, selected by the mode of occupation, from the value on Function ‘Selected heat setpoint’ and adding any value on Function ‘Setpoint offset’. The ‘Cool setpoint’ is calculated by adding half the deadband, selected by the mode of occupation, to the value on Function ‘Selected cool setpoint’ and adding any value on Function ‘Setpoint offset’. The ‘Heat setpoint’ and ‘Cool setpoint’ are each halved and combined to provide the ‘Setpoint’.

The normal operation of ‘Setpoint offset’ with the external Sensor ‘Local Setpoint Adjust’ fitted is for the sensor value to be gated through Function ‘Selected setpoint offset’ and the value of Knob ‘Offset Range’ to be gated through Function ‘Selected offset range’. If the sensor has a ‘Read’ or ‘Out of limit’ alarm or Switch ‘SP Offset Select 1=Remote’ is set to 1 the strategy gates through the value of Knob ‘Remote Setpoint Offset’ on Function ‘Selected setpoint offset’ and a value of 1 through Function ‘Selected offset range’.

If a Room Display module is fitted the strategy will automatically use the value on Knob 'Room Display Setpoint' to calculate any change in setpoint and feed this through as the offset value.

Any change in the offset value is detected by the strategy and will start Logic timer ‘Adjustment active’. The offset value on Function ‘Selected setpoint offset’ is gated through Function ‘Active setpoint offset’ it is then scaled using the value on Function ‘Selected offset range’. Function ‘Setpoint offset’ value is added to the ‘Minimum setpoint’ and ‘Maximum setpoint’ to provide the ‘Heat setpoint’ and ‘Cool setpoint’ respectively and is set to 0 after the time set on Knob ‘Setpoint Adjust Timeout’ has expired.

Heating Cooling Demands

Heating and cooling demands are calculated by comparing the space temperature with the relevant setpoint. If the space temperature is below the heating setpoint a heating demand is created and if the space temperature is above the cooling setpoint a cooling demand is generated, the greater the difference the larger the demand. To prevent hunting of the heating and cooling demands a deadband is employed to ensure a change equal to half the deadband is detected before a demand is generated or removed.

Technical Description
Both heating and cooling sides are controlled by different control loops. Heating and cooling loops are enabled whenever ‘Unit interrupt’ is set to 0.
Switch ‘Boost Mode 1=Boost’ when set to 1 overrides the unit into occupation and produces maximum cooling (zero heating).

The heating loop compares the ‘Actual space temperature’ with the ‘Heating setpoint’. The proportional + integral (P+I) loop will modulate the heating output to maintain a constant space temperature. As the temperature decreases below the heating setpoint the heating output will modulate open. The heating output will be modulated closed as the temperature increases above the heating setpoint. The loop output is limited to the range 0 to 100%.

The cooling loop compares the ‘Actual space temperature’ with the ‘Cooling setpoint’. The proportional + integral (P+I) loop will modulate the cooling output to maintain a constant space temperature. As the temperature increases above the cooling setpoint the

cooling output will be modulated open. The cooling output will be modulated closed as the temperature decreases below the cooling setpoint. The loop output is limited to the range 0 to 100%.

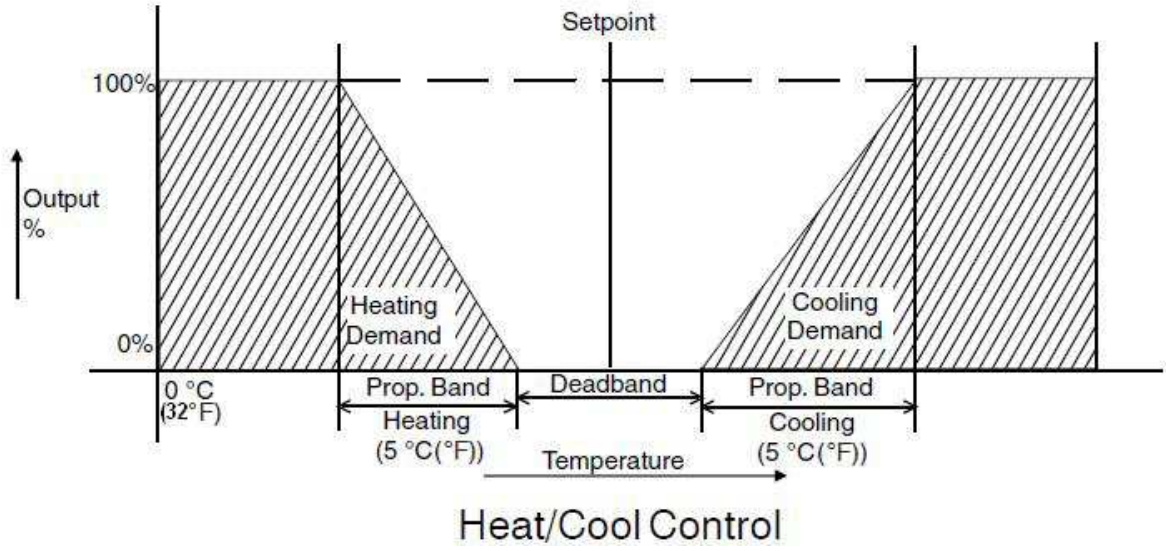
Error, E = setpoint - **Space Temp**

$$LoopOutput = G(E) + \int \frac{G(E)}{I}.dt$$

Where G = Loop gain
I = Integral time constant

The integral time constant is the time for which the loop output will have added to it an amount equal to product of the error and the gain (i.e. equal to the proportional part) under conditions of constant error. So if the error stays the same for the integral time constant, the loop output will double and will be 2G(E). The loops have the following default settings: heat loop gain = 20, cool loop gain = -20, both loop integral time constants = 0 minutes. These settings can be changed by text comms.

The output from the loops (ignoring the integral action) is illustrated by the chart below:



The heating loop will not operate until the 'Actual space temperature' drops below the 'Heating setpoint' by half the deadband e.g. Setpoint 20°C(70°F) deadband 1° = 20-0.5 = 19.5°C (70-0.5 = 69.5°F) during occupation. Similarly for cooling it must rise above the 'Cooling setpoint' by half the deadband. The loop gains are set to ±20 by default which gives proportional bands of 5°C(°F) i.e. 100/20. When set to defaults, during occupation, this will give 100% heat at 12.5°C (64.5°F), and 100% cool at 25.5°C (75.5°F) ignoring the effect of the integral term.

The loop outputs are added together and then split into separate heating and cooling outputs to prevent simultaneous heating and cooling. When the heating or cooling loop operate a respective 'Heating required' or 'Cooling required' signal will be set to 1. The 'Heating required' or 'Cooling required' signals are reset to 0 when the 'Actual space temperature' rises above or falls below the respective setpoint by more than half the deadband.

Air Flow Setpoint

As the cooling demand varies between 0 and 100%, the cooling airflow setpoint varies between 'Minimum Air Flow Setpoint' and 'Maximum Air Flow Setpoint. The 'Air Flow Setpoint' is normally the cooling airflow setpoint but if the temperature is below the heating setpoint, the 'Heating Air Flow Setpoint' is used. This provides the minimum air required for heating. The 'Air Flow Setpoint' is used to set the required position of the VAV damper.

Technical Description
The actual air flow is compared with the 'Heating Air Flow Setpoint' to produce a 'Air available for heating' signal.

Commissioning Details
1. Set the 'Minimum Airflow Setpoint'
2. Set the Maximum Air Flow Setpoint'
3. Set the Heating Air Flow Setpoint'

VAV Damper Demand

The volume of air supplied is modulated between the 'Minimum Air Flow Setpoint' and the 'Maximum Air Flow Setpoint' depending on the cooling or heating demand. These setpoint values are configured during commissioning and should not be changed.

Technical Description

The damper is closed if there is no cooling and the unit is Unoccupied but for other conditions it is modulated according to the difference between the ‘Air flow’ and the ‘Air flow setpoint select’ value that is generated depending on the cooling or heating demand. The damper position may be overridden to any position, providing Switch 'Overrides 0=Disabled 1=Enabled' is set to 1, by setting switch ‘Damper Override 1=Enabled’ to 1 and Knob ‘Damper Override Value’ to the required position.

The ‘Air flow’ is calculated from the ‘Air Differential Pressure’ sensor input using the box ‘k Constant’ and the following formula that relates to the duct supply volume;

$$\text{Volume} = k\sqrt{p}$$

Volume = l/s (cfm), k = a constant for the box p = Pressure Pa (inwc)
The value of the ‘k Constant’ is either supplied by the VAV box manufacturer or determined during factory testing or commissioning and will be different for different types and sizes of box and for different inlet connections.

The ‘Air Differential Pressure’ sensor can be set to be auto zeroed when switch ‘DP Auto Zeroing 1=Active’ is set to 1 by setting switch ‘DP Zeroing 0=Auto 1=Manual' to 0. If the zeroing is set to manual i.e. switch ‘DP Zeroing 0=Auto 1=Manual' is 1, the zeroing value must be entered in the F parameter of function ‘DP offset value’ .

Commissioning Details
1. Calibrate the differential pressure sensor to zero, by setting switch ‘DP Zeroing 0=Auto 1=Manual'. For auto set switch ‘DP Auto Zeroing 1=Active’, and manual enter zeroing value in the F parameter of function ‘DP offset value’.
2. Set the box ‘k Constant’.

Fan Control

If configured as a series fan the fan is enabled when a heating or cooling demand is active. If configured as parallel fan the fan is enabled when a heating demand is active. The actual fan status is displayed on the sensor ‘Actual Fan Speed Off-On’ where 0 = OFF, 1 = ON. The fan has an anti cycling timer to protect the fan from excessive restarts.

Technical Description
The type of fan fitted can be selected by Switch "Fan 0=Parallel 1=Series". A parallel fan is enabled for a heating demand (as it sucks in the extract/hot air), whereas a serial fan is enabled for both heating or cooling demands (as it sucks in both extract/hot air and supply/cool air). Both types of fan are on for heating when "Fan enabled" and "Heating required" signals are set to 1. A serial fan will also be on when "Cooling required" signal is set to 1, during this state the fan is overridden off by "Unit interrupt" signal being set to 1. The fan is also enabled if the "Electric heat run on required" signal is set to 1 irrespective of the heating or cooling demands.

The fan control has an anti cycling timer that delays the time to restart after the fan stops thus preventing unwanted cycling of the fan, the delay time is set using Knob "Fan Anti Cycle Time".

The fan control can be overridden, providing Switch 'Overrides 0=Disabled 1=Enabled' is set to 1, by setting Switch ‘Fan Override 1=Enabled’ to 1 and adjusting Knob ‘Fan Override Value 0=Off 1=On’ to the required value. The anti cycle timer still operates under these circumstances.

Commissioning Details
1. Knob "Fan Anti Cycle Time" requires setting to ensure the minimum off time required for anti cycling the fan. 5 minutes = 12 starts per hour.

Electric Heating

The electric heating, if enabled and if there is sufficient air flow, will be switched ON in stages depending on the heating demand. Once a stage is ON it will not be switched OFF until the demand has fallen 10% below the switch on demand.

Technical Description
For the electric heating to operate Switch "Electric Heat 1=Enabled" must be set to 1 and the "Air available for heating" signal, that indicates the minimum air flow is available, must also be set to 1. The switching levels for the heating stages is dependant on the fan type selected by Switch "Fan 0=Parallel 1=Series". Once the "Heating required" signal in set to 1 and the "Heat demand" rises above 15% (35% for parallel fan), the "Heat stage 1 enabled" signal is set to 1. As the "Heat demand" further increases above 55% (65% for parallel fan), the "Heat stage 2 enabled" signal is set to 1. As the "Heat demand" falls below 45% (55% for parallel fan) "Heat stage 2 enabled" signal is set to 0, and as it further falls to below 5% (25% for parallel fan) "Heat stage 1 enabled" signal is set to 0. If Switch "Heating 0=1_Stage 1=2_Stage" is set to 0 "Heat stage 2 enabled" signal will always be 0. The heating control delays the second stage for the time set on Knob "Stage 2 Heat Delay" to enable the first stage to satisfy the demand. The heating demand can be overridden, providing Switch 'Overrides 0=Disabled 1=Enabled' is set to 1 by setting Switch "Heating Override 1=Enabled" to 1 and setting the required value on Knob "Heating Override Value".

Commissioning Details
1.The Knob "Stage 2 Heat Delay" requires setting to ensure the delay before stage 2 can be enabled.
2. The Logic "Electric heat run on required" must be check to ensure that when 1 the air flow remains active.
3. Set Switch "Heating 0=1_Stage 1=2_Stage" to required stages.

Service Button - Occupancy

Pressing the service button in a predefined sequence, when in service button mode, can initiate behaviour in the strategy to change the occupancy state to occupied or unoccupied. The function is only available if Switch 'Service Button Mode 1=Enabled' is set to ON. For a full description of service pin mode refer to the Trend publication TE201089 IQeco Configuration Manual Issue 2 or greater. The service button press sequence for the required behaviour is as follows;

Required Action	Phase 1	Phase 2	Phase 3
Occupied for the Lan	No Press	No Press	Press
Unoccupied for the Lan	Press	No Press	Press
Occupied for the Unit	No Press	Press	Press
Unoccupied for the Unit	Press	Press	Press

Technical Description
The service button can be used to initiate behaviour designed in the strategy; to achieve this behaviour the controller must be put into service button mode. Service button mode has 5 stages Entry, Phase 1, Phase 2, Phase 3 and Exit.

Entry - Press and hold the service button for 2 to 5 seconds. When the service button is released a rapidly flashing comms LED (green) for one second indicates entry into 'service button mode'. When the flashing stops this indicates the start of Phase 1.

Phase 1 - This stage lasts 3 seconds and during this time if the service button is not pressed it will mean that an ON condition is required. If it is pressed then an OFF condition is required. At the end of this stage the comms LED (green) will flash once to confirm no press and twice to confirm a press. The end of the flashing indicates the start of phase 2.

Phase 2 - This stage lasts 3 seconds and during this time if the service button is not pressed it will mean that the selection in Phase 1 should be applied to the LAN and if it is pressed then it will be applied to the UNIT. At the end of this stage the comms LED (green) will flash once to confirm no press and twice to confirm a press. The end of the flashing indicates the start of phase 3.

Phase 3 - This stage lasts 3 seconds and during this time if the service button is not pressed it will mean that a Water Balance selection is required and if it is pressed then it will indicate that an Occupancy selection is required. At the end of this stage the comms LED (green) will flash once to confirm no press and twice to confirm a press. The end of the flashing indicates the start of the Exit stage.

Exit - This stage lasts for 3 seconds and starts with a rapidly flashing comms LED (green). During this stage if the service button is not pressed then the service button mode will expire without any further action. The service button must be pressed to confirm the selections made in phases 1, 2 and 3. Once pressed the LED will go out for the remainder of the stage and the virtual input channel selected by the choices made during phases 1, 2 and 3 will go ON for one pass of the sequence table. The virtual input channel is allocated to a Digital Input module to make it available to be used by the strategy. At the end of this stage the service button mode will be automatically exited and the LED and service button return to their normal operation.

Virtual Energy Meter

An estimation of the unit's energy consumption is calculated by the controller and can be viewed on Sensor 'Unit Energy Meter'. The consumption is measured over a 30 minute period starting from 0 and increasing until the end of the period when the value is stored in the controller. The controller stores the last 200 values and these can be viewed from suitable displays or supervisory software e.g. IQView and 963. The calculation totals the estimated energy used by the air supplied and the energy consumed by the fan and by the loads switched by the relay output. The accuracy of the calculation depends on the values configured in the controller however the default values supplied provide for a like for like comparison between similar units.

Technical Description
The estimated calculations use the Air Energy value and the Actual air flow. This power is then added to the power of the fan and using an integrator module the power consumed is calculated over the period of 15, 30 (default) or 60 minutes depending on the configuration of the strategy.

Air Flow estimation formula.
Power = Air Energy x Air Flow
Power kW = Air Energy kW/l/s * Air Flow l/s
Power Btu/s = Air Energy Btu/s/cfm * Air Flow cfm

To improve the accuracy of the estimation the following parameters should be configured with the correct value for the unit:

Function module	Parameter	Units
'Fan duty'	F	kW
'Heater 1 energy'	F	kW
'Heater 1&2 energy'	F	kW

The period the integrator uses for the calculation can be changed by amending the arguments in parameter K on Logic module 'Meter reset': F = 15 minutes, G = 30 minutes and H = 60 minutes. If the Logic is changed then the period parameter P on plot module 'Unit Energy Meter' should also be changed to match: 1 = 15 minutes, 7 = 30 minutes and 0 = 60 minutes.
Useful conversions:
1 kW = 0.948608 Btu/s
1 hp = 0.7074163 Btu/s
1 Btu/h/3600 = 1 Btu/s

Commissioning Details
1. Set the values of the duty for the fan.
2. Set the values of the duty for the electric heaters.
3. Confirm the Air Energy value is received from the main plant.

Humidty IC Comms and Alarms

Technical Description
The Humidity Sensor input provide 4-20mA, this is rescaled to provide 0-100%rh. By changing the values for E and F on function "Input rescaled" the range of any 4-20mA sensor can be accommodated.

The IC Comms are configured for master slave operation between two IQecos directed to standard knobs and switches one or all of the following: Space Temperature, Setpoint and Occupancy. The IC Comms modules use attribute 3 and to prohibit unwanted communications are, by default, disabled.

One alarm group route and destination modules are configured to send Trend text alarms to address 1 on the local lan, this would normally be the IQ3/BINC VCNC port 10001. To prohibit unwanted alarms the route, by default, is disabled.

Analogue node 99 is provided so a value can be placed in it to indicate the state of the unit during commissioning and witnessing. The meaning of the value is user defined. It is suggested a bit state approach be used where values 1, 2, 4, 8 ,16 etc each indicating a separate operation. Summing the values provide a state of the unit.
Suggested values:

1 =	Addressed,
2 =	Attributes Set,
4 =	Pre-commissioned,
8 =	Commissioned,
16 =	Witnessed,
32 =	Backed up,
64 =	(TBC) ,
128 =	Has a Problem.

An exampled of its use. e.g 11 = 1+2+8 = Addressed, Attributes Set and Commissioned.

Digital Input 'Strategy Override 1=Active' when 1 indicates that one of the outputs is being overridden by the strategy and not in normal control.

Commissioning Details
1. For master slave configuration configure attribute 3 and enabled IC Comms if master unit.
2. If alarms are required configure alarm destination address and enable alarm route.
3. Set the value in A99 to indicate the state of the commissioning.
4. Configure the Humidty sensor if not scaled 0 - 100 by setting E and F on function "Input recaled".
5. If the Occupation Status output is to drive a SRMV change E on function 'TBTS KOS status indication' to 0.

Trend Control Systems Limited
Albery House, Springfield Road, Horsham, West Sussex, RH12 2PQ, UK. Tel:+44 (0)1403 211888 Fax:+44 (0)1403 241608 www.trendcontrols.com

Trend Control Systems USA
6670 185th Avenue NE, Redmond, Washington 98052, USA. Tel: (425)897-3900, Fax: (425)869-8445 www.trendcontrols.com

Trend Control Systems
Albery House,
Springfield Road,
Horsham.
RH12 2PQ

Telephone: **+44 (0)1403 211888**
Fax: **+44 (0)1403 240271**
Email: **ts@trendcontrols.com**

Address Module	
Identifier	
Attribute F	
Attribute G	
Alarm Lan	**0**
Alarm Address	**0**
Controller Version	
Serial Number	
Strategy Name	**FCU VAV 2E**
Product Order Code	

Issue	Revision	Project Change Note / Comments	Pages Affected	Date Approved	Approved By
0	1				
1	0				
2	0				
3	0		Page 2, 7, 9, 10 Added new interface to WMB sensors		

Notes

The IQeco variable air volume standard strategy controls a proportional damper, an on/off fan (either serial or parallel), and two stages of electric heating.

The control responses to a thermistor temperature sensor with a local setpoint knob.

The 2E strategy is for on/off electric heating.

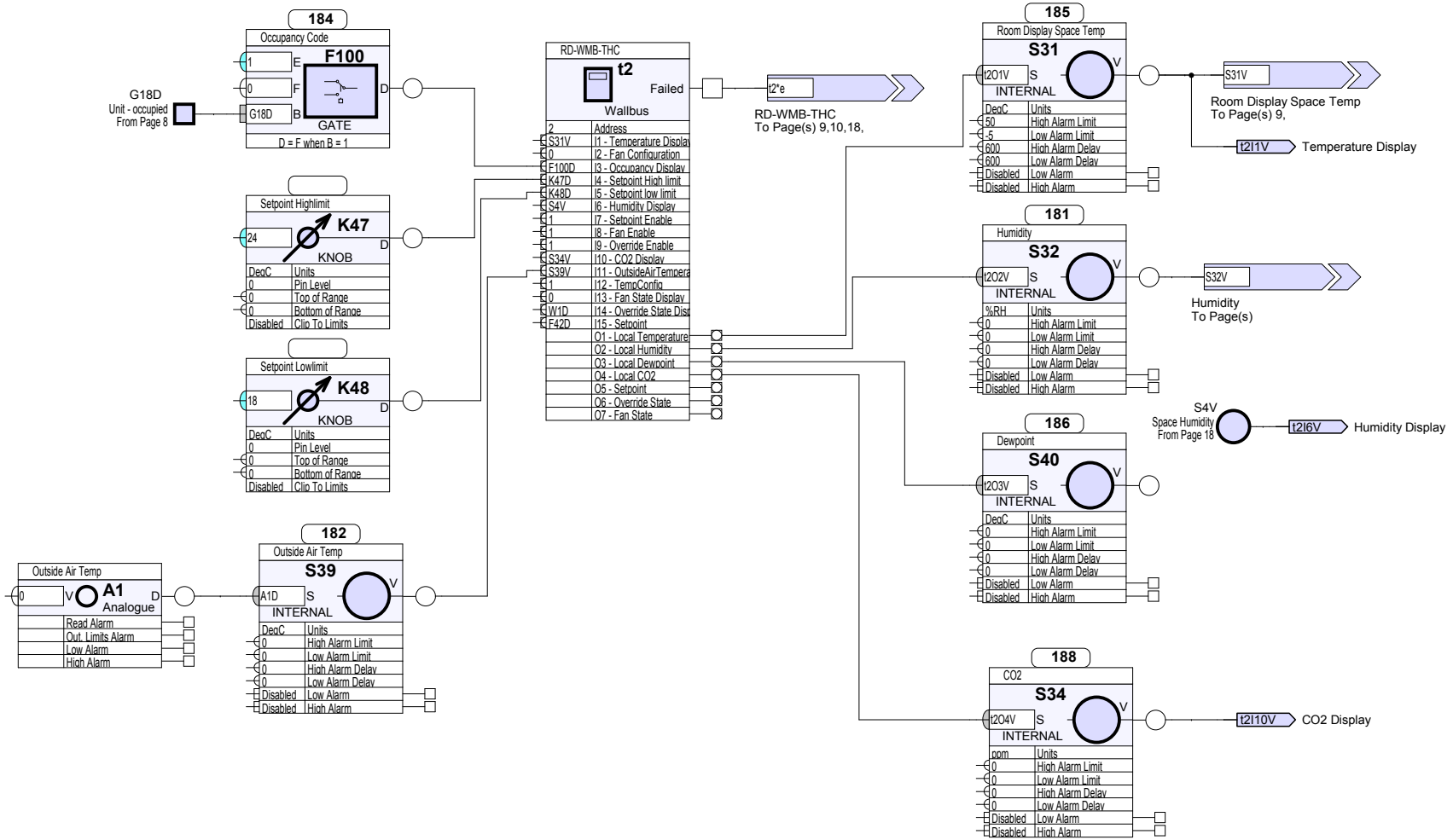
The strategy also supports the fitting of a WMB Room display module without further configuration.

Site GUID:	{31009522-BE09-4A36-BEC3-9EA8ABCDD52D}		
Project:	IQeco_Standard_Strategies_v3.2.1		
Client:			
Details:	Variable Air Volume Unit Proportional damper On/Off fan (either serial or parallel) Two stages of electric heat		
Drawn By:	Engineer		
Engineer:			
Controller Type:	IQeco VAV-P		
Project Number:	1	**Date:**	4/15/2016
Outstation: 012	**Lan:** 009	**Page:**	01 of 18

IQeco VAV 2 Stage Electric 03 31

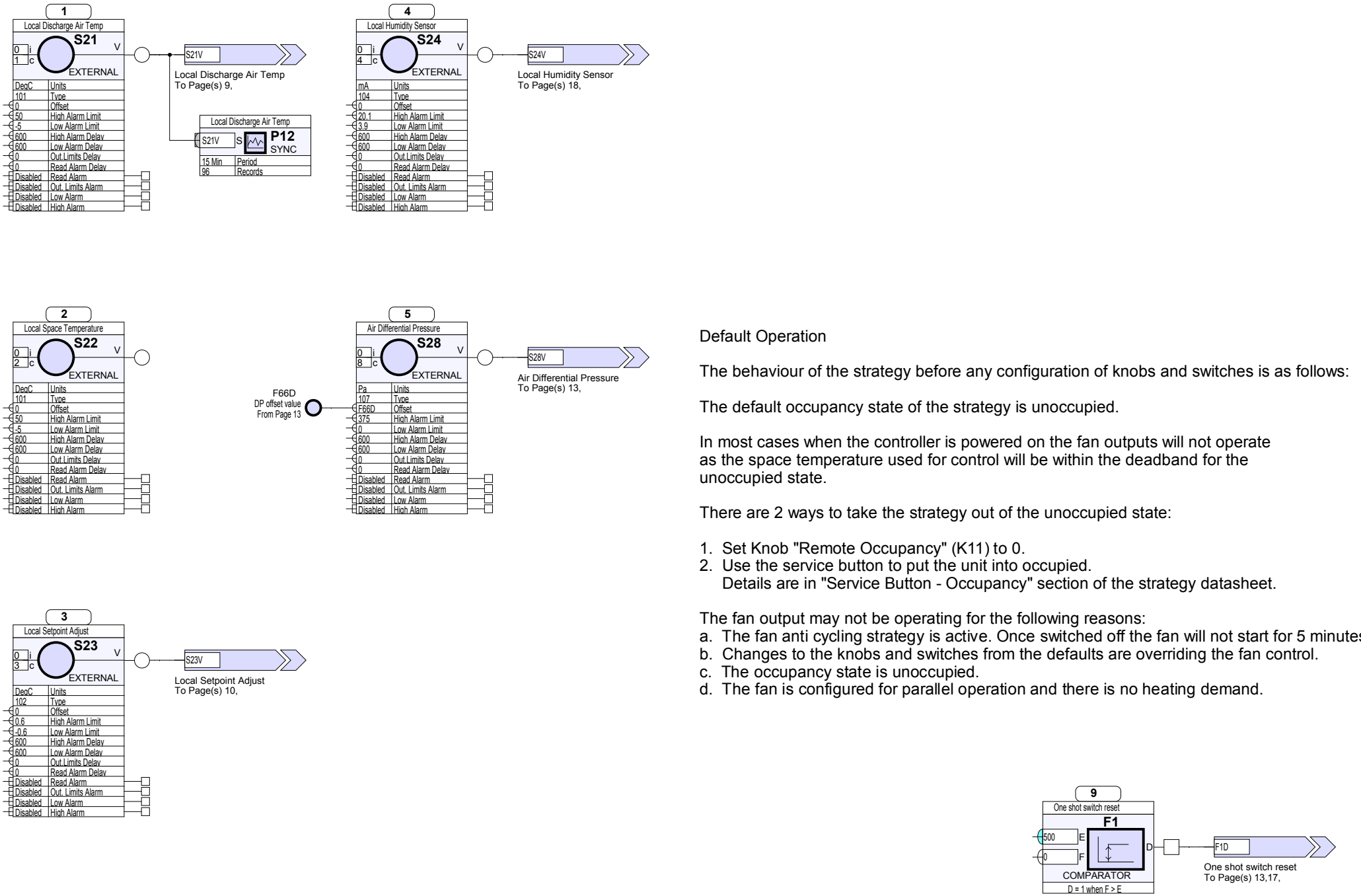
Strategy pages

Interface module for WMB Displays



For RS-WMB, RD-WMB refer to Data Sheet TA201348. For RV-WMB refer to Data Sheet TA201354 for more information

Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number: 1	Date: 4/15/2016
SET-009-012-02	WallBus Interface Eco		D60D 3201 DA65 8FD9 921A 697A 87	3	00		Outstation: 012	Page: 02 of 18



Default Operation

The behaviour of the strategy before any configuration of knobs and switches is as follows:

The default occupancy state of the strategy is unoccupied.

In most cases when the controller is powered on the fan outputs will not operate as the space temperature used for control will be within the deadband for the unoccupied state.

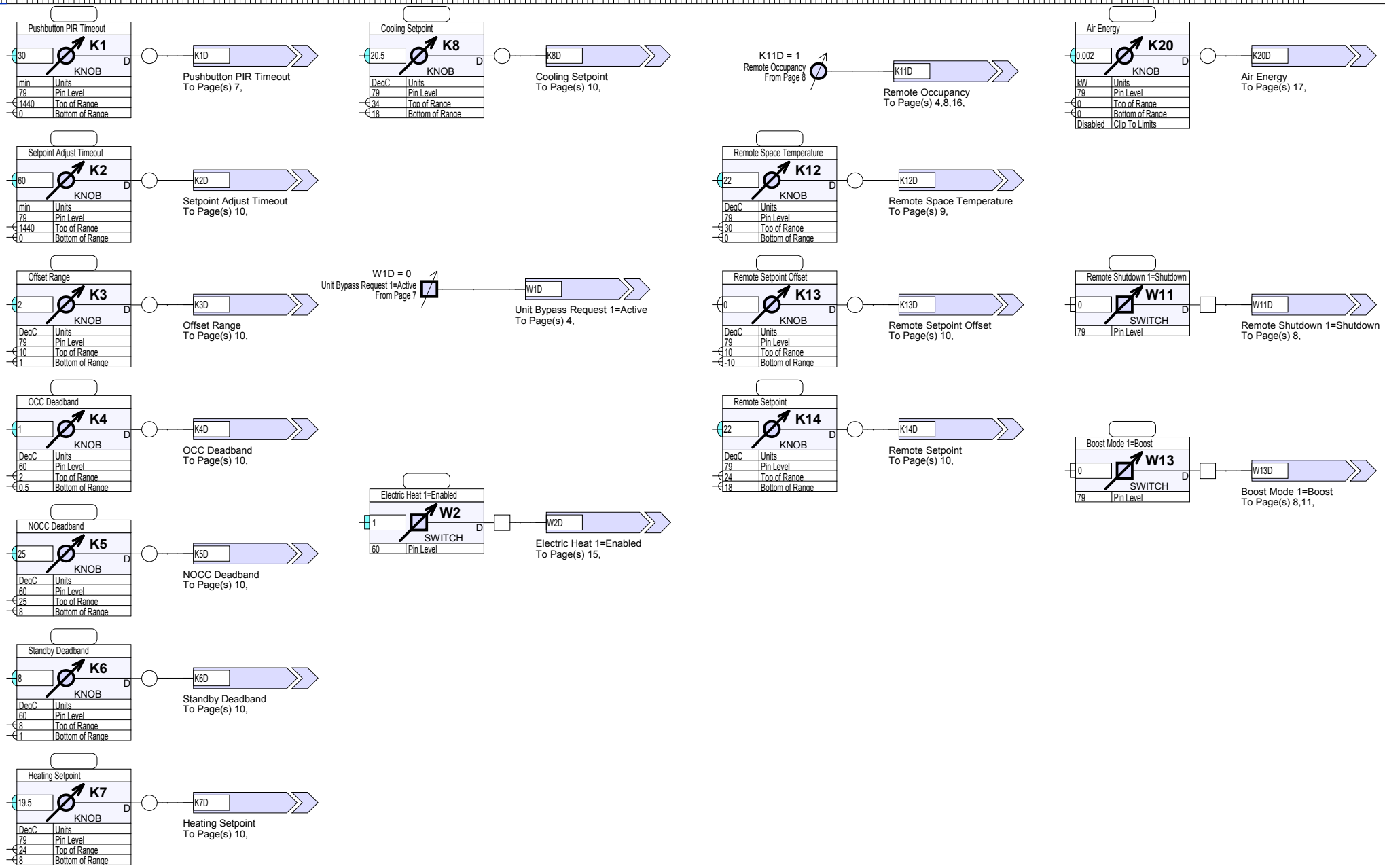
There are 2 ways to take the strategy out of the unoccupied state:

1. Set Knob "Remote Occupancy" (K11) to 0.
2. Use the service button to put the unit into occupied.
   Details are in "Service Button - Occupancy" section of the strategy datasheet.

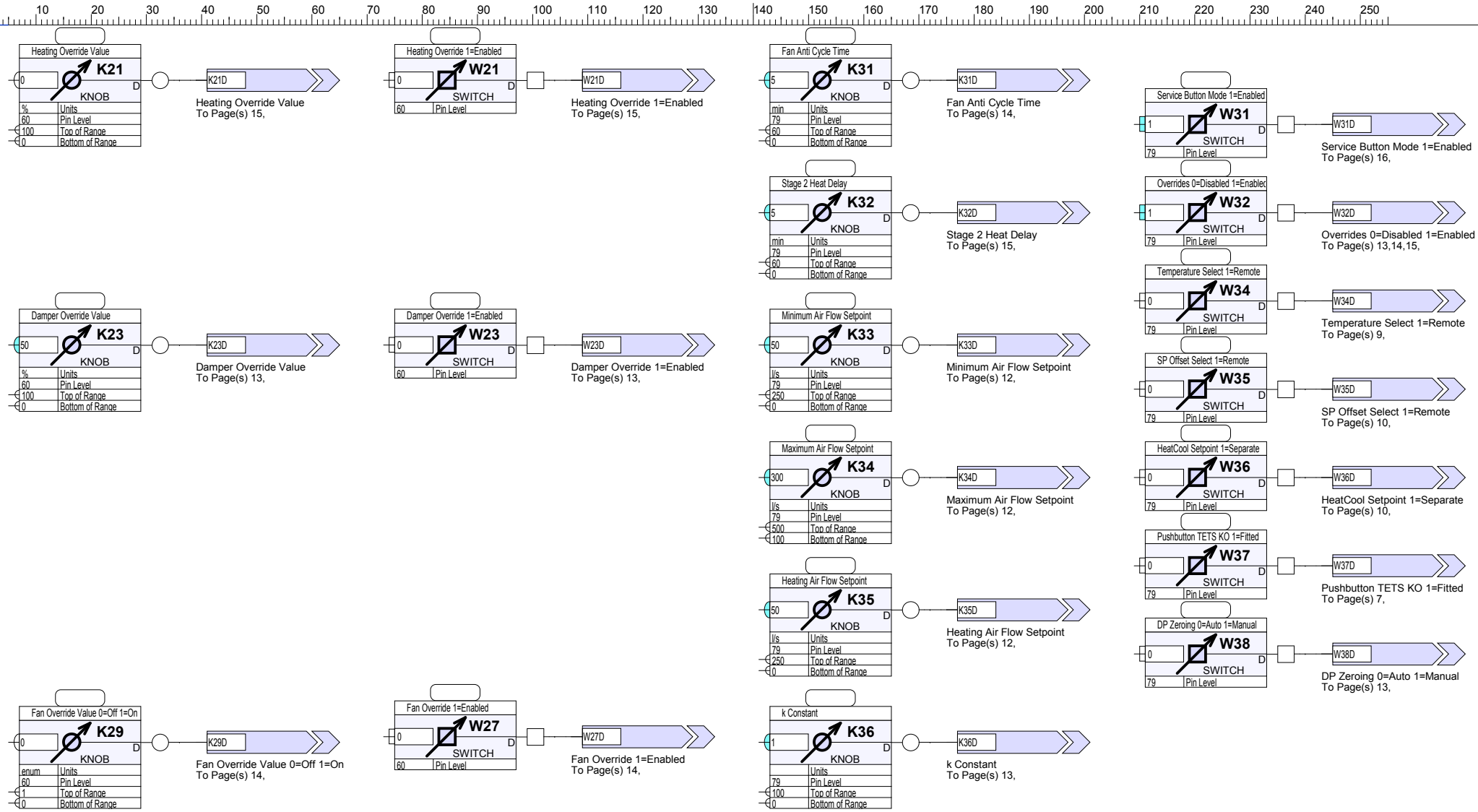
The fan output may not be operating for the following reasons:

a. The fan anti cycling strategy is active. Once switched off the fan will not start for 5 minutes.
b. Changes to the knobs and switches from the defaults are overriding the fan control.
c. The occupancy state is unoccupied.
d. The fan is configured for parallel operation and there is no heating demand.

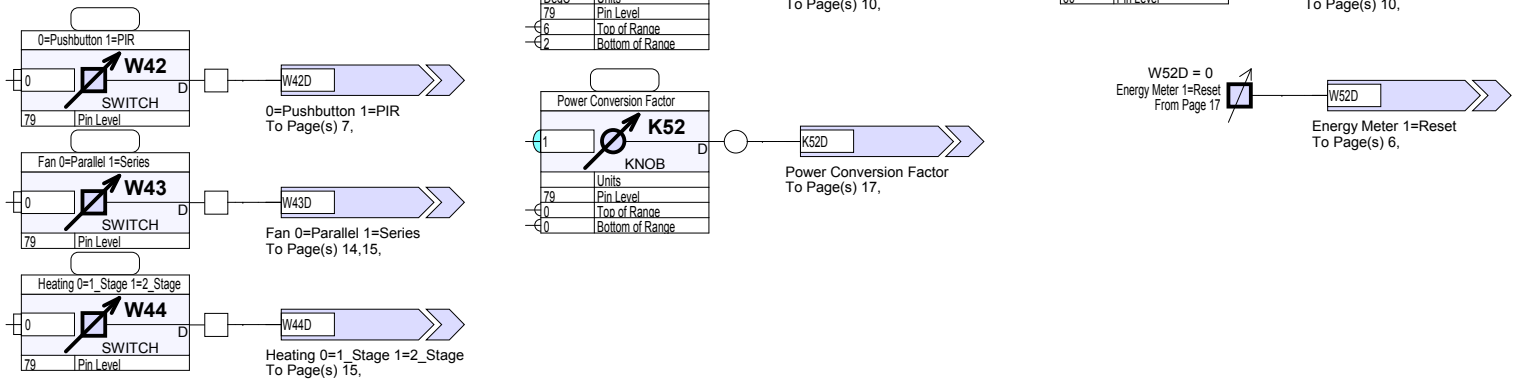
Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number:	Date:
SET-009-012-03	Real Inputs		D60D 3201 DA65 8FD9 921A 697A 87	3	00		1	4/7/2016
							Outstation: 012	Page: 03 of 18



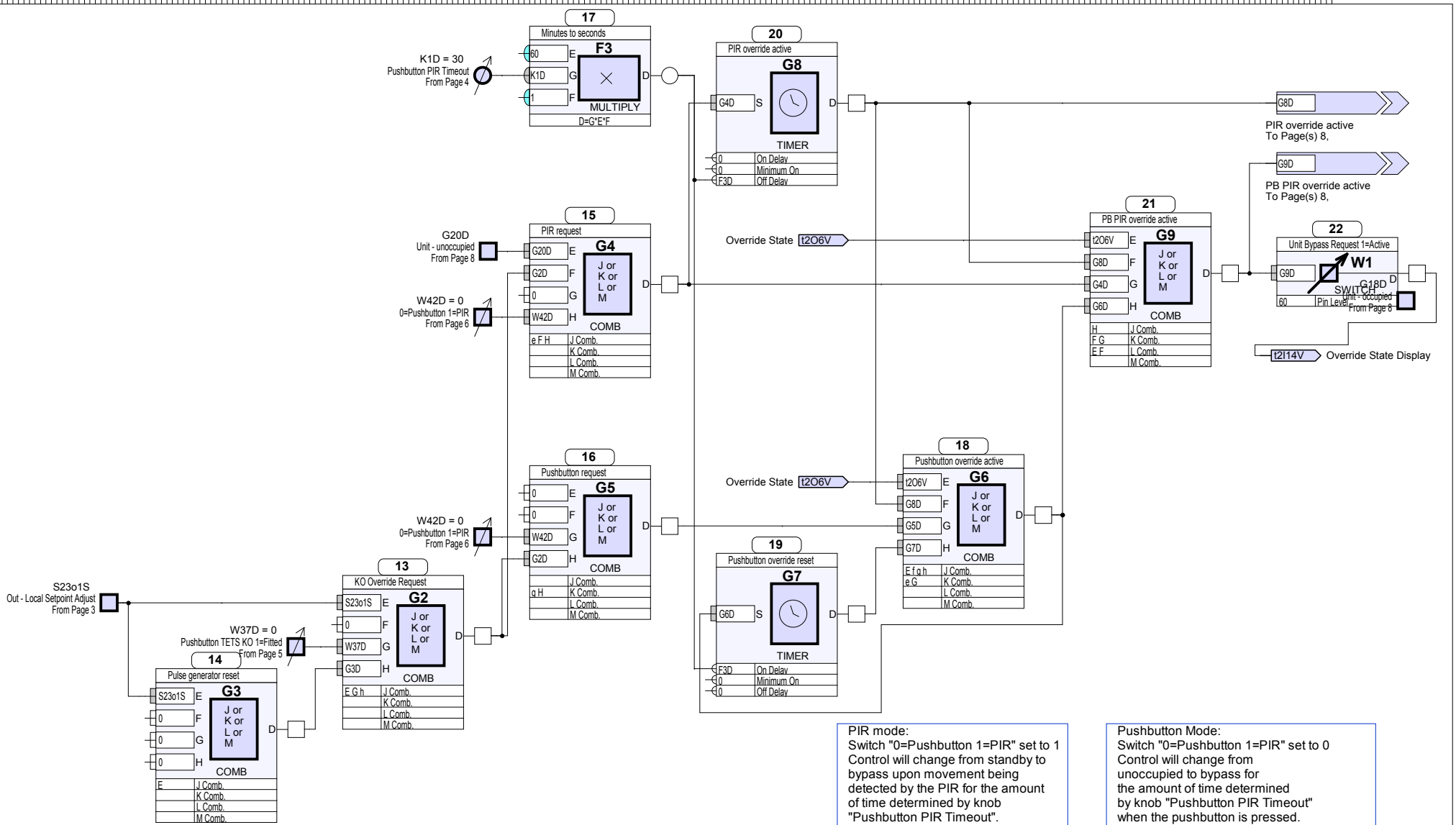
Drawing Reference	Page Details	SET Strategy		Issue	Revision	Checked By	Project Number:	1	Date:	3/31/2016
SET-009-012-04	Knobs Switches <21	Designed By:	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	3	00		Outstation:	012	Page:	04 of 18



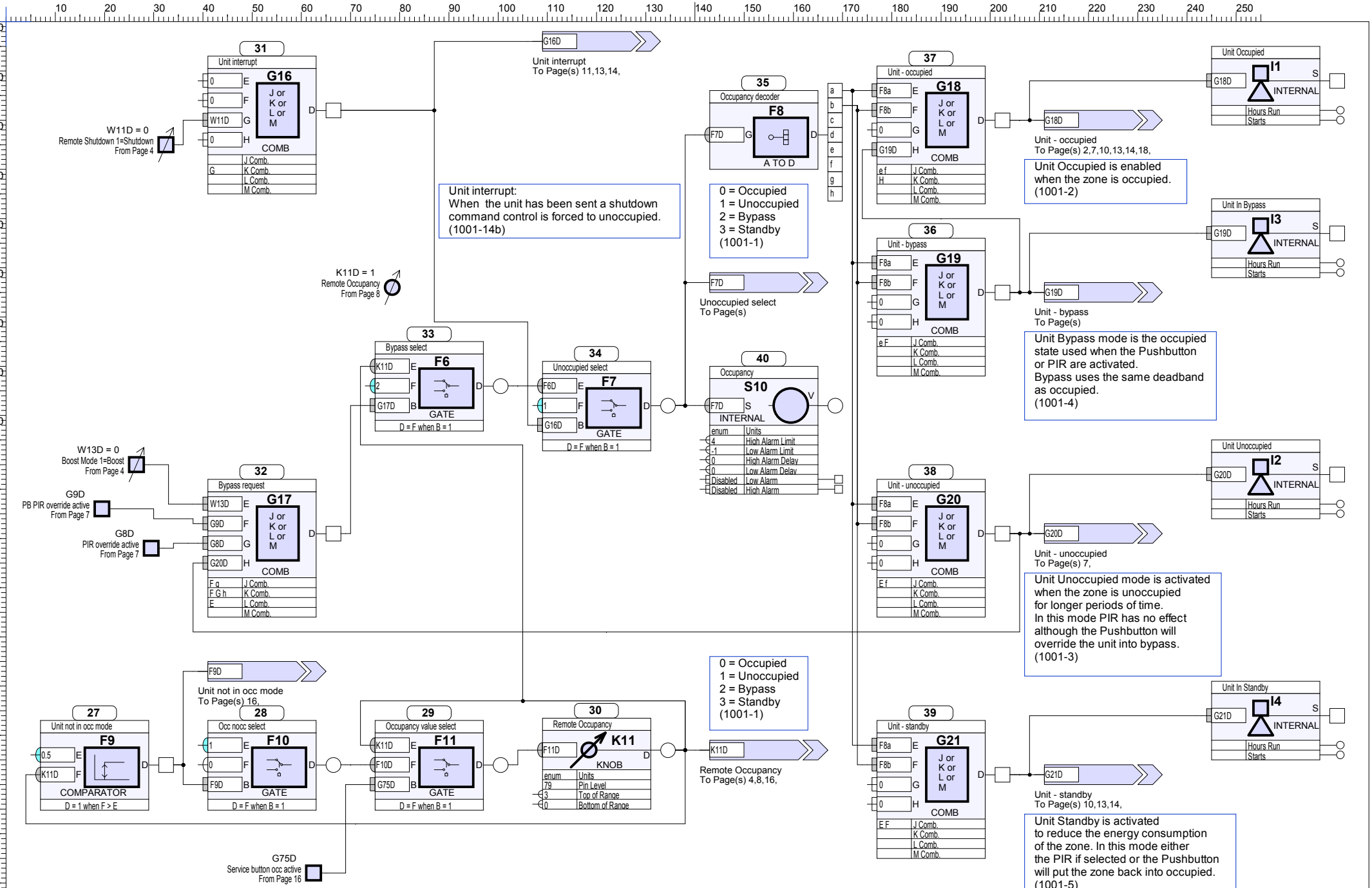
Drawing Reference SET-009-012-05	**Page Details** Knobs Switches 21 - 40	**SET Strategy** **Designed By:**	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	**Issue** 3	**Revision** 00	**Checked By**	**Project Number:** 1 **Outstation:** 012	**Date:** 3/31/2016 **Page:** 05 of 18



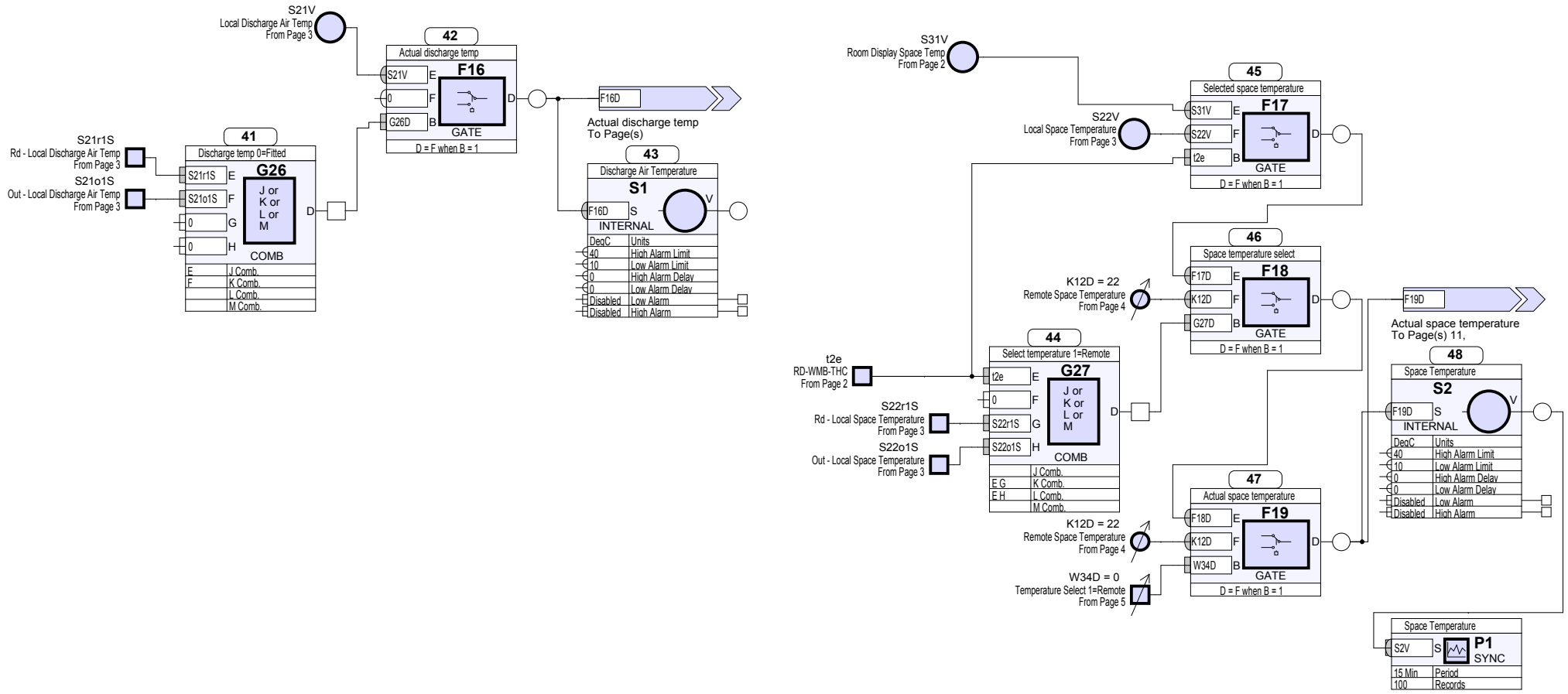
Drawing Reference SET-009-012-06	**Page Details** Knobs Switches >41	**SET Strategy** **Designed By:**	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	**Issue** 3	**Revision** - 00	**Checked By**	**Project Number:** 1 / **Outstation:** 012	**Date:** 3/31/2016 / **Page:** 06 of 18



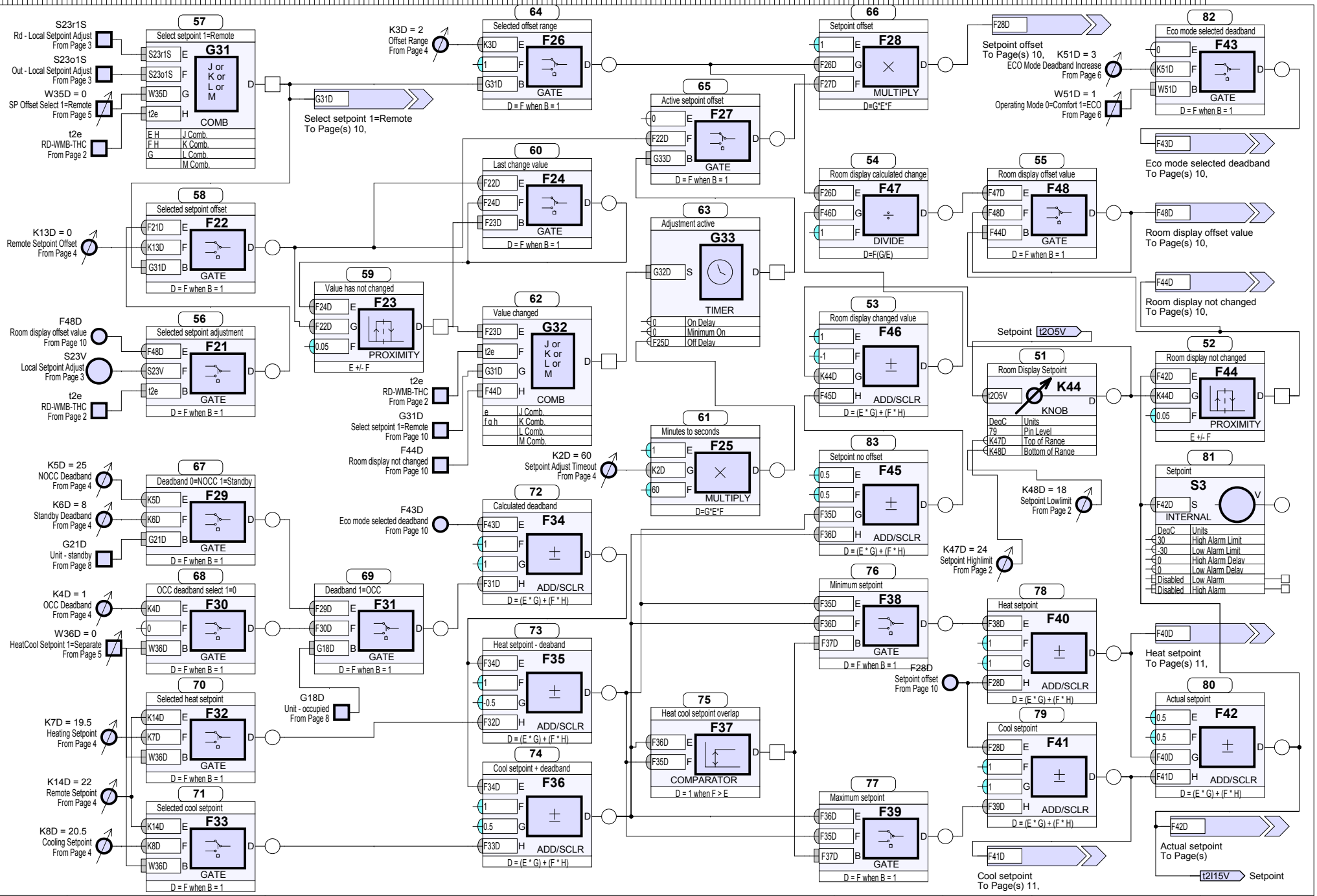
Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue - Revision	Checked By	Project Number: 1	Date: 3/31/2016
SET-009-012-07	Pushbutton PIR Operation		D60D 3201 DA65 8FD9 921A 697A 87	3 - 00		Outstation: 012	Page: 07 of 18



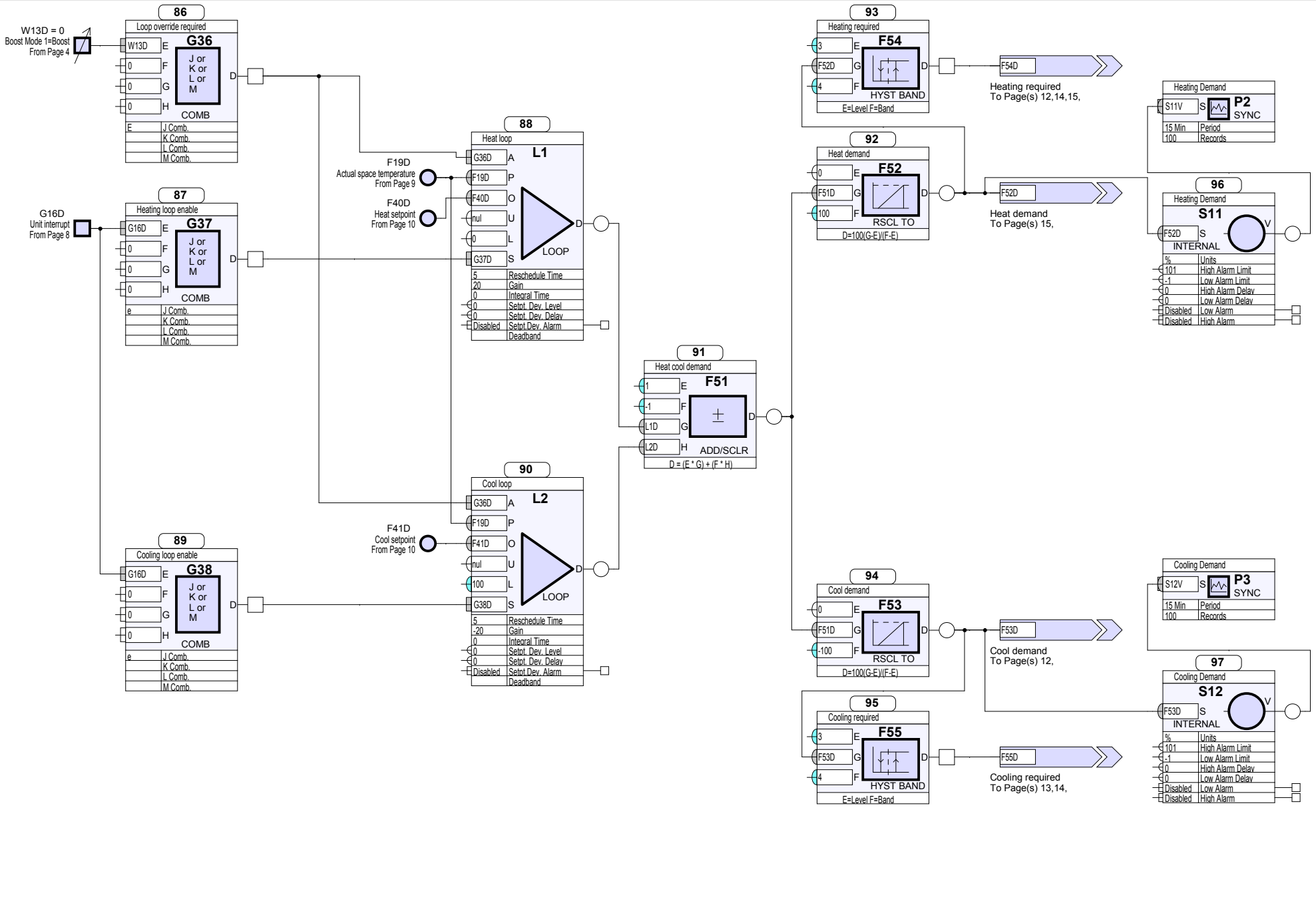
Drawing Reference SET-009-012-08	**Page Details** Occupancy State	**SET Strategy** **Designed By:**	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	**Issue** 3	**Revision** 00	**Checked By**	**Project Number:** 1 **Outstation:** 012 **Date:** 3/31/2016 **Page:** 08 of 18



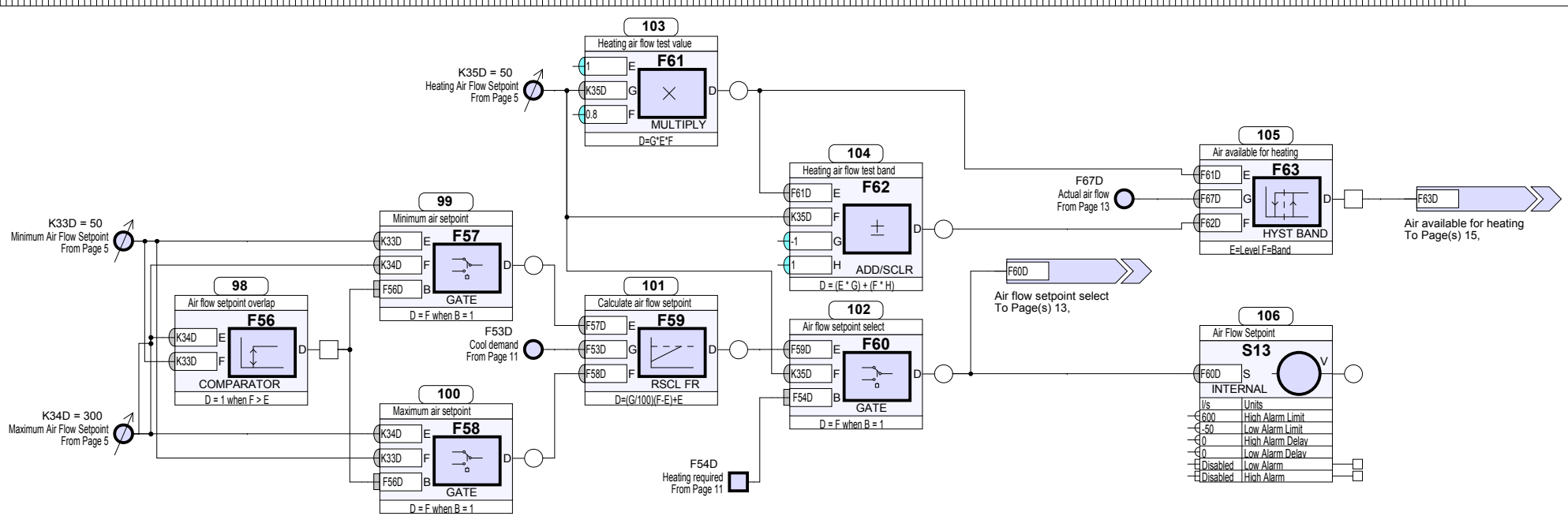
Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue - Revision	Checked By	Project Number:	Date:
SET-009-012-09	Discharge and Space Temp		D60D 3201 DA65 8FD9 921A 697A 87	3 - 00		Outstation: 012	Page: 09 of 18



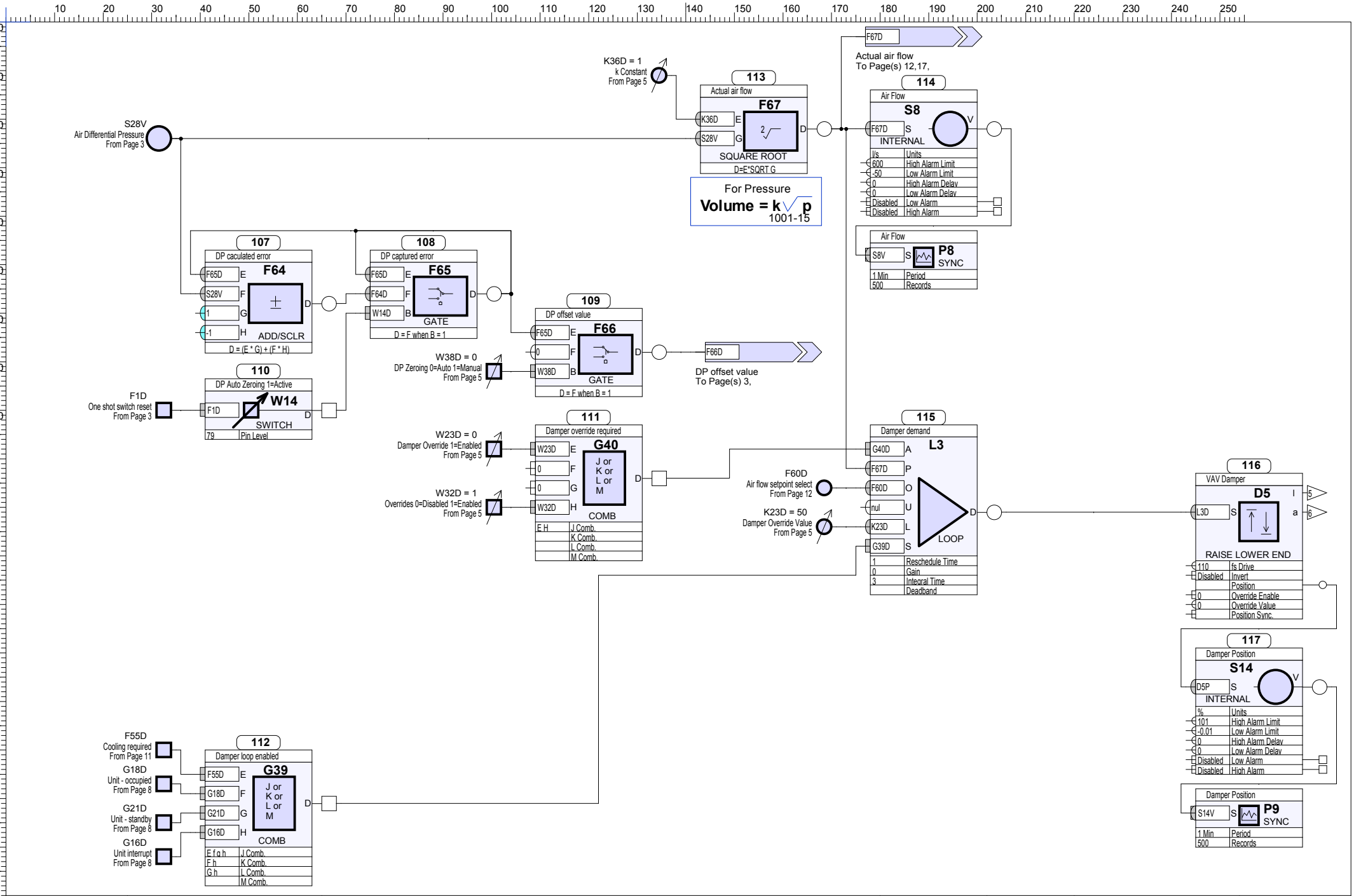
Drawing Reference	Page Details	SET Strategy	Trend Control Systems	Issue	Revision	Checked By	Project Number: 1	Date: 3/31/2016
SET-009-012-10	Heating Cooling Setpoints	Designed By:	D60D 3201 DA65 8FD9 921A 697A 87	3	- 00		Outstation: 012	Page: 10 of 18



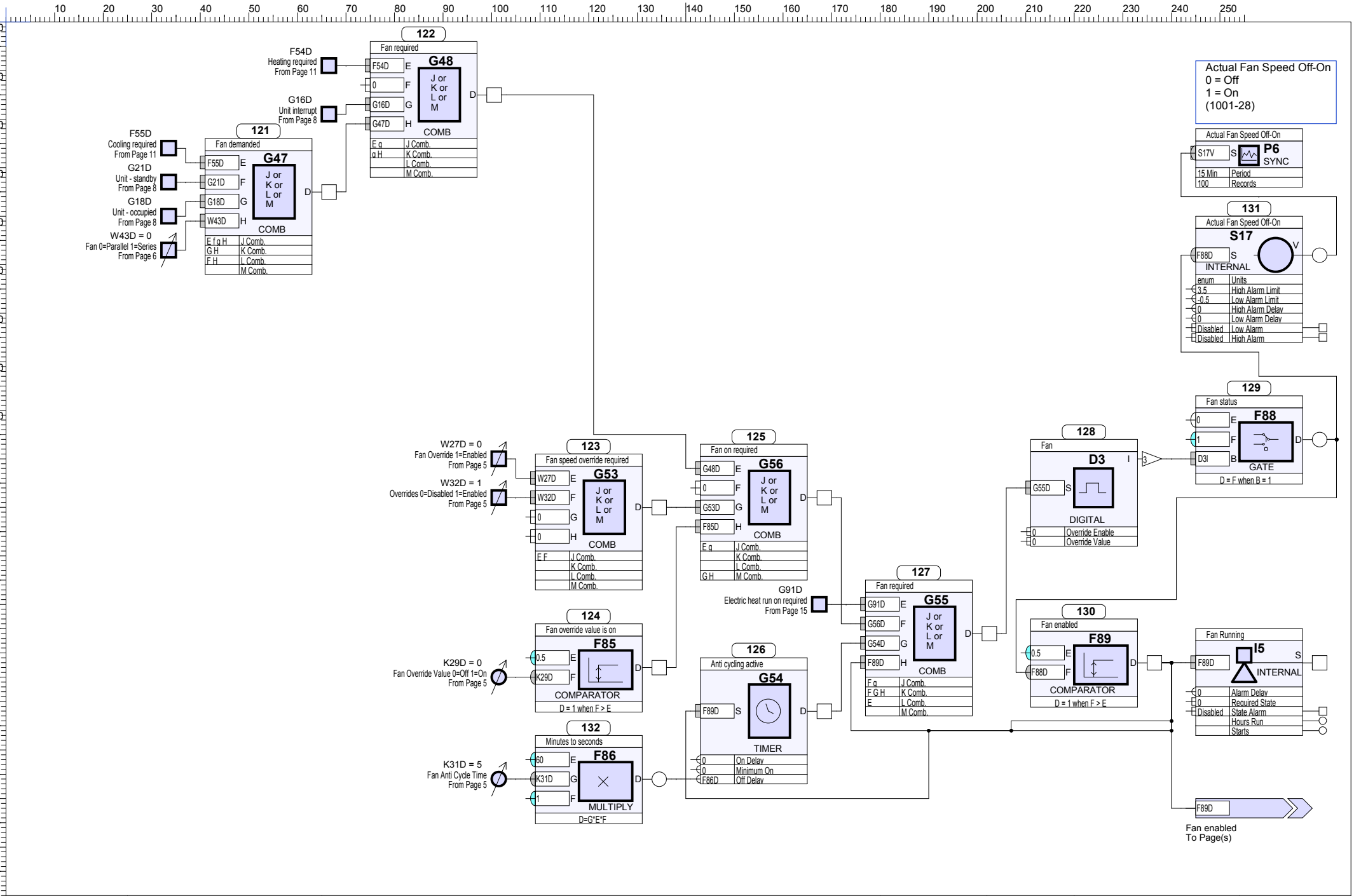
Drawing Reference SET-009-012-11	**Page Details** Heating Cooling Demands	**SET Strategy Designed By:**	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	**Issue** 3	**Revision** 00	**Checked By**	**Project Number:** 1 **Outstation:** 012 **Date:** 3/31/2016 **Page:** 11 of 18



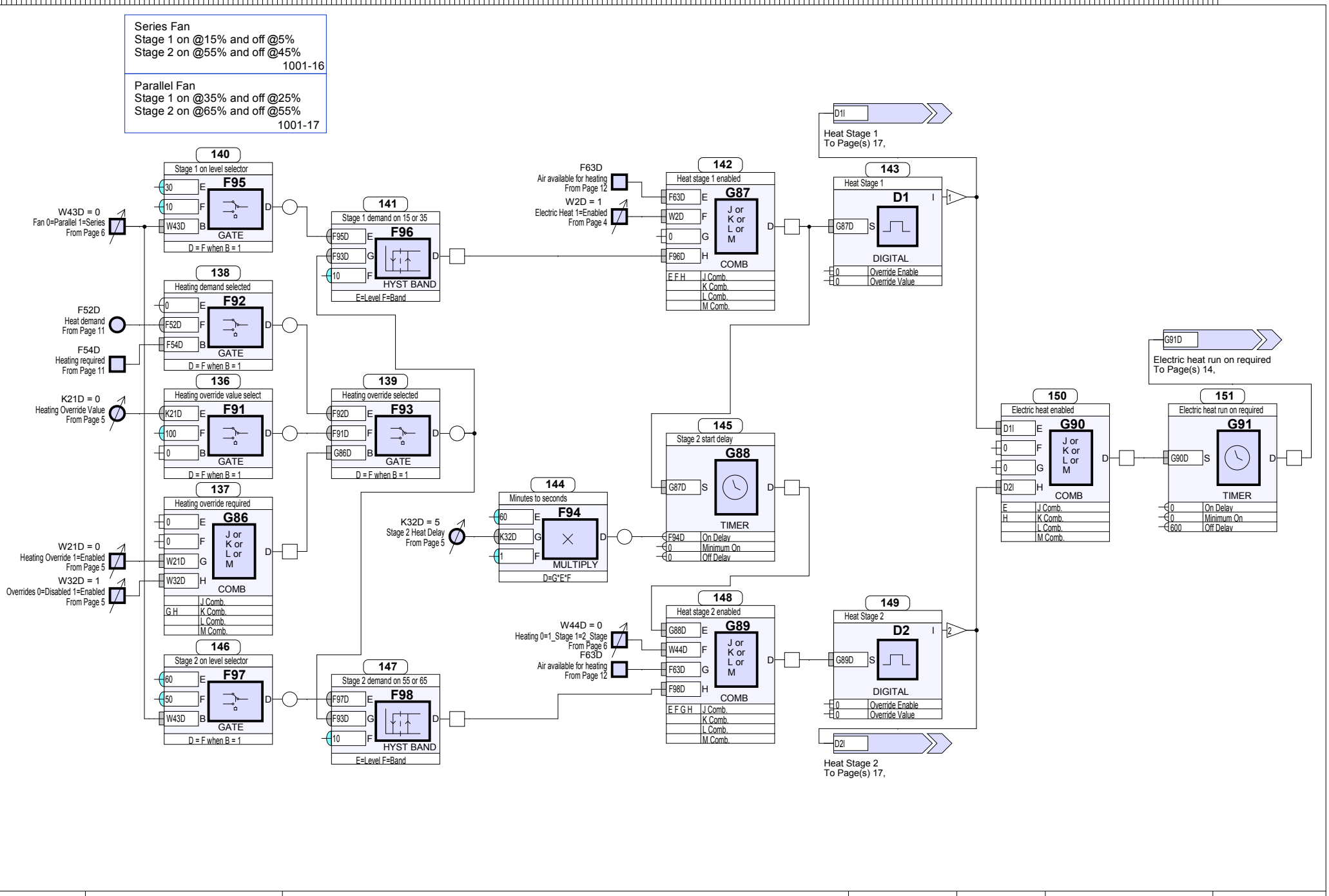
Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number:	Date:
SET-009-012-12	Air Flow Setpoint		D60D 3201 DA65 8FD9 921A 697A 87	3	00		1	3/31/2016
							Outstation: 012	Page: 12 of 18



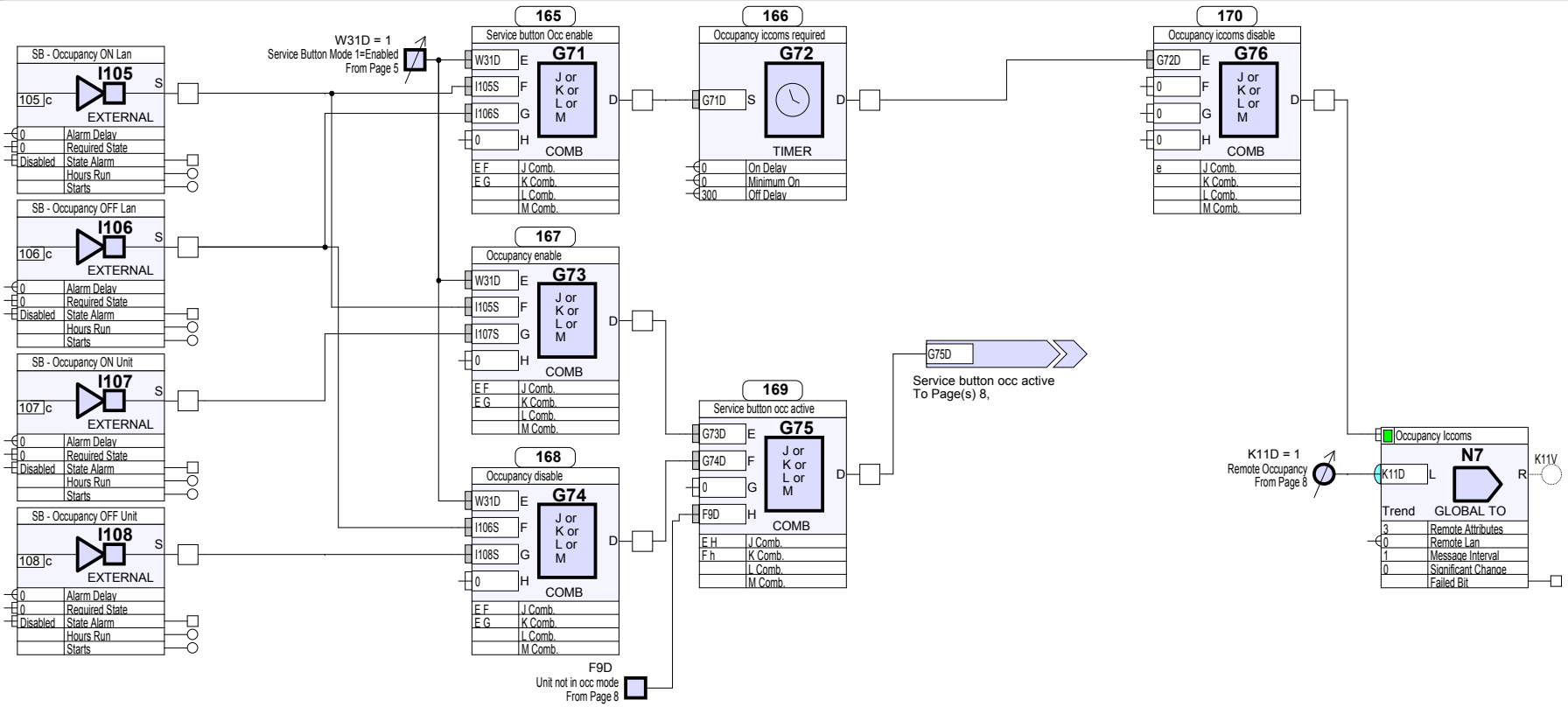
Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number: 1	Date: 3/31/2016
SET-009-012-13	VAV Damper Demand		D60D 3201 DA65 8FD9 921A 697A 87	3	00		Outstation: 012	Page: 13 of 18



Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number: 1	Date: 3/31/2016
SET-009-012-14	Fan Control		D60D 3201 DA65 8FD9 921A 697A 87	3	00		Outstation: 012	Page: 14 of 18



Drawing Reference	Page Details	SET Strategy		Issue	Revision	Checked By	Project Number:	1	Date:	3/31/2016
SET-009-012-15	Electric Heating	Designed By:	**Trend Control Systems** D60D 3201 DA65 8FD9 921A 697A 87	3	- 00		Outstation:	012	Page:	15 of 18

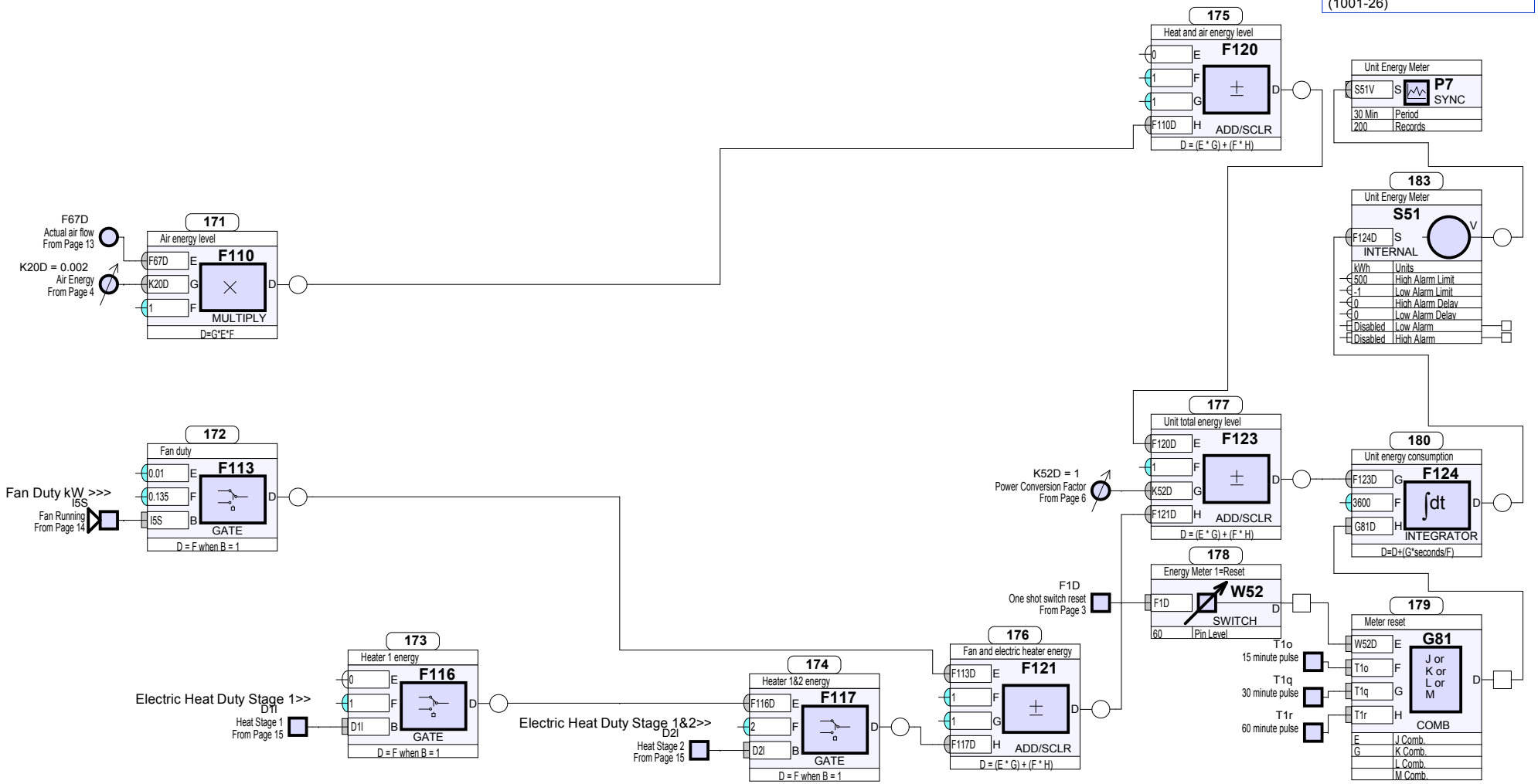


Required Action	Phase 1	Phase 2	Phase 3
Occupied for the Lan	No Press	No Press	Press
Unoccupied for the Lan	Press	No Press	Press
Occupied for the Unit	No Press	Press	Press
Unoccupied for the Unit	Press	Press	Press

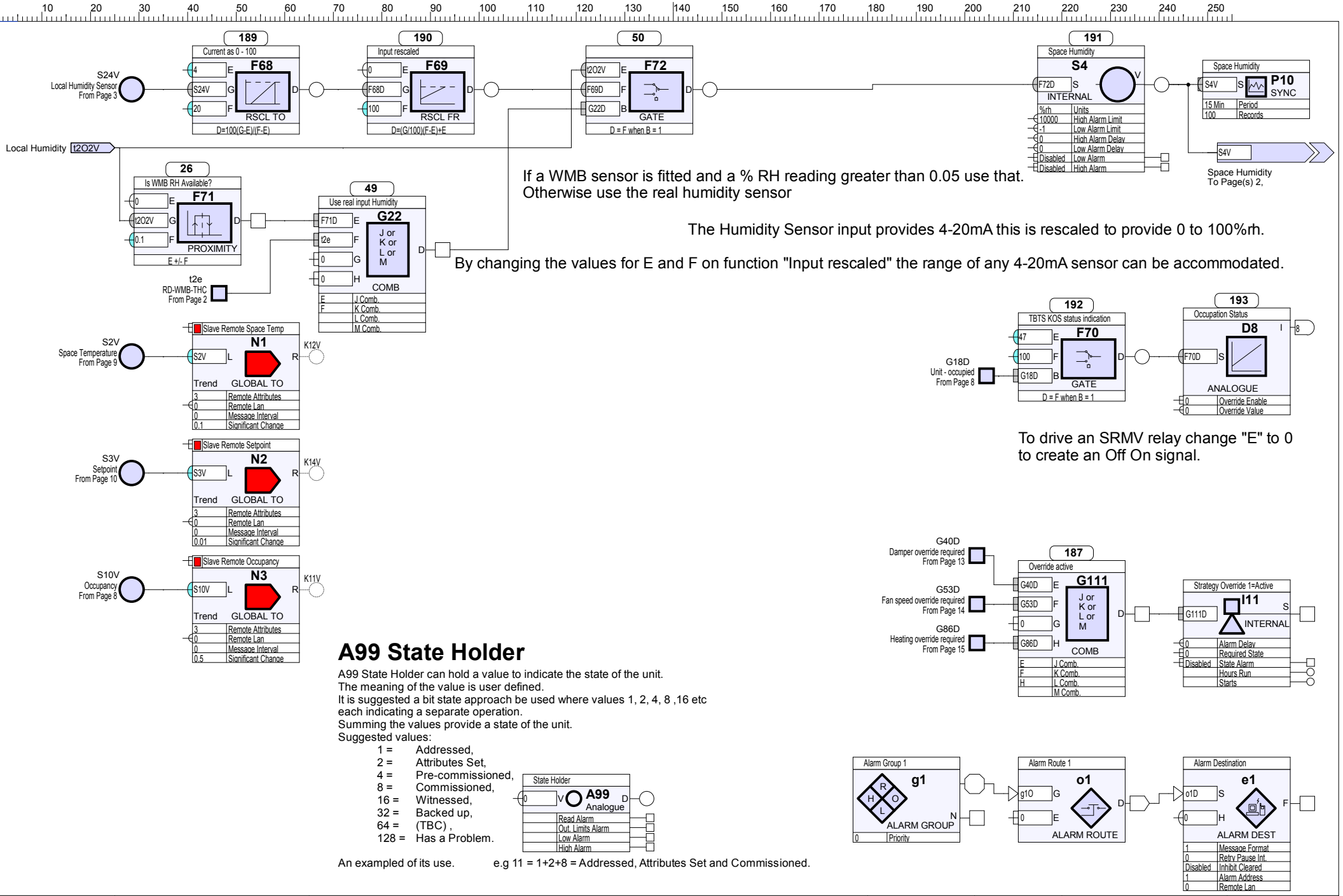
Power Air = Air Energy * Air Flow

Power kW = Air Energy kW/l/s * Air Flow l/s
Power Btu/s = Air Energy Btu/s/cfm * Air Flow cfm

1 kW = 0.948608 Btu/s
1 hp = 0.7074163 Btu/s
1 Btu/h/3600 = 1 Btu/s
(1001-26)



Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number:	Date:
SET-009-012-17	Virtual Energy Meter		D60D 3201 DA65 8FD9 921A 697A 87	3	00		1	3/31/2016
							Outstation: 012	Page: 17 of 18



Drawing Reference	Page Details	SET Strategy Designed By:	Trend Control Systems	Issue	Revision	Checked By	Project Number:	Date:
SET-009-012-18	Humidty IC Comms and Alarms		D60D 3201 DA65 8FD9 921A 697A 87	3	00		1	4/15/2016
							Outstation: 012	Page: 18 of 18

Address Module	
Identifier	
Attribute F	
Attribute G	
Alarm Lan	0
Alarm Address	0
Controller Version	
Strategy Name	FCU VAV 2E
Revision	3

BACnet Application Module	
Device Instance	0
Manual Device Instance	0
Send I-Am at Startup	Disabled

MSTP	
Max Info Frames	10

Sensor Number	Type	Label	Units	S.E.T. Part Number	Offset	Source	I/O Channel
1	2	Discharge Air Temperature	DegC			F16D	
2	2	Space Temperature	DegC			F19D	
3	2	Setpoint	DegC			F42D	
4	2	Space Humidity	%rh			F72D	
8	2	Air Flow	l/s			F67D	
10	2	Occupancy	enum			F7D	
11	2	Heating Demand	%			F52D	
12	2	Cooling Demand	%			F53D	
13	2	Air Flow Setpoint	l/s			F60D	
14	2	Damper Position	%			D5P	
17	2	Actual Fan Speed Off-On	enum			F88D	
21	1	Local Discharge Air Temp	DegC	101 - 10k Therm DegC Tl	0		1
22	1	Local Space Temperature	DegC	101 - 10k Therm DegC Tl	0		2
23	1	Local Setpoint Adjust	DegC	102 - Knob TB 0.5deg trir	0		3
24	1	Local Humidity Sensor	mA	104 - Current 4-20mA	0		4
28	1	Air Differential Pressure	Pa	107 - Onboard DP 375Pa	F66D		8
31	2	Room Display Space Temp	DegC			t2O1V	
32	2	Humidity	%RH			t2O2V	
34	2	CO2	ppm			t2O4V	
39	2	Outside Air Temp	DegC			A1D	
40	2	Dewpoint	DegC			t2O3V	
51	2	Unit Energy Meter	kWh			F124D	

Dig In Number	Label	I/O Channel	Source
1	Unit Occupied	0	G18D
2	Unit Unoccupied	0	G20D
3	Unit In Bypass	0	G19D
4	Unit In Standby	0	G21D
5	Fan Running	0	F89D
11	Strategy Override 1=Active	0	G111D
105	SB - Occupancy ON Lan	105	
106	SB - Occupancy OFF Lan	106	
107	SB - Occupancy ON Unit	107	
108	SB - Occupancy OFF Unit	108	

Knob Number	Label	Units	Value	Max. Level	Min. Level	Pin Level
1	Pushbutton PIR Timeout	min	30	1440	0	79
2	Setpoint Adjust Timeout	min	60	1440	0	79
3	Offset Range	DegC	2	10	1	79
4	OCC Deadband	DegC	1	2	0.5	60
5	NOCC Deadband	DegC	25	25	8	60
6	Standby Deadband	DegC	8	8	1	60
7	Heating Setpoint	DegC	19.5	24	8	79
8	Cooling Setpoint	DegC	20.5	34	18	79
11	Remote Occupancy	enum	F11D	3	0	79
12	Remote Space Temperature	DegC	22	30	0	79
13	Remote Setpoint Offset	DegC	0	10	-10	79
14	Remote Setpoint	DegC	22	24	18	79
20	Air Energy	kW	0.002	0	0	79
21	Heating Override Value	%	0	100	0	60
23	Damper Override Value	%	50	100	0	60
29	Fan Override Value 0=Off 1=On	enum	0	1	0	60
31	Fan Anti Cycle Time	min	5	60	0	79
32	Stage 2 Heat Delay	min	5	60	0	79
33	Minimum Air Flow Setpoint	l/s	50	250	0	79
34	Maximum Air Flow Setpoint	l/s	300	500	100	79
35	Heating Air Flow Setpoint	l/s	50	250	0	79
36	k Constant		1	100	0	79
44	Room Display Setpoint	DegC	t2O5V	K47D	K48D	79
47	Setpoint Highlimit	DegC	24	0	0	0
48	Setpoint Lowlimit	DegC	18	0	0	0
51	ECO Mode Deadband Increase	DegC	3	6	2	79
52	Power Conversion Factor		1	0	0	79

Switch Number	Label	Status	Pin Level State
1	Unit Bypass Request 1=Active	G9D	60
2	Electric Heat 1=Enabled	1	60
11	Remote Shutdown 1=Shutdown	0	79
13	Boost Mode 1=Boost	0	79
14	DP Auto Zeroing 1=Active	F1D	79
21	Heating Override 1=Enabled	0	60
23	Damper Override 1=Enabled	0	60
27	Fan Override 1=Enabled	0	60
31	Service Button Mode 1=Enabled	1	79
32	Overrides 0=Disabled 1=Enabled	1	79
34	Temperature Select 1=Remote	0	79
35	SP Offset Select 1=Remote	0	79
36	HeatCool Setpoint 1=Separate	0	79
37	Pushbutton TETS KO 1=Fitted	0	79
38	DP Zeroing 0=Auto 1=Manual	0	79
42	0=Pushbutton 1=PIR	0	79
43	Fan 0=Parallel 1=Series	0	79
44	Heating 0=1_Stage 1=2_Stage	0	79
51	Operating Mode 0=Comfort 1=ECO	1	60
52	Energy Meter 1=Reset	F1D	60