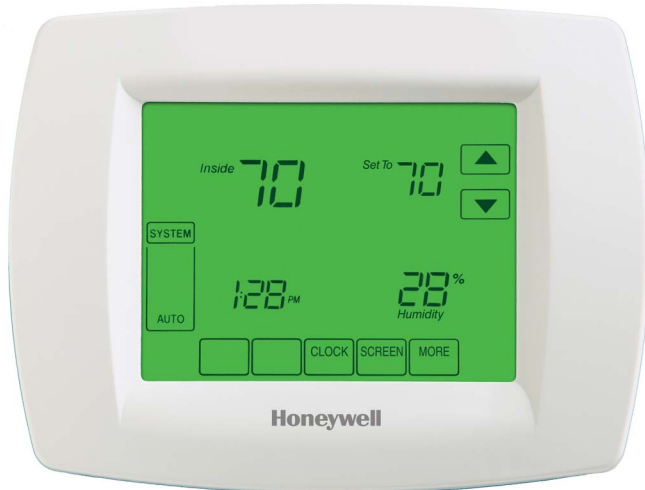# Honeywell

BACnet® Fixed Function Thermostat

FOR FAN COIL/HEAT PUMP/CONVENTIONAL SYSTEMS

TABLE OF CONTENTS

APPLICATION

Honeywell's BACnet® Fixed Function Thermostat, BACnet FF, is a configurable device with 19 pre-loaded applications. The thermostat is a communicating, intelligent sensor-controller combination with built-in temperature and humidity sensors used to control applications such as roof top units, fan-coil units and heat pumps. The thermostat communicates over an MS/TP LAN so it operates as a fully-functioning BACnet controller and easily integrates with the building automation system. The two available models are TB3026B and TB3026B-W, which includes a wireless sensor option (wireless sensors sold separately).

More Information
To learn more about these products, visit
http://customer.honeywell.com
- BACnet Fixed Function Thermostat Installation Instructions (Form No. 31-00093)
- BACnet Fixed Function Thermostat Specification Data (Form No. 31-00096)
- BACnet Fixed Function Thermostat WEBs-AX Configuration Wizard Guide (Form No. 31-00097)
- BACnet Fixed Function Thermostat System Engineering Guide (Form No. 31-00098)

QUICK LOOKUP APPLICATION SELECTION TABLES

Table 1. Fan Coil Unit (4 Pipe) Applications

Application	# 6	# 7	# 8	# 9	# 17
Fan	On/Off or VFD	On/Off or VFD	Three Speed or VFD	Three Speed or VFD	Three Speed
Cooling Valve	Three Point Floating	Three Point Floating	Two Position Open/Close	Two Position Open/Close	Analog
Heating Valve	Three Point Floating	Three Point Floating	Two Position Open/Close	Two Position Open/Close	Analog
Auxiliary Electric Heater	No	No	No	Yes	No
Economizer	Analog	Analog	Analog	Analog	Three Point Floating
Space Sensor (10K Type II Thermistor)	Optional	No	No	No	Optional
OAT Sensor (10K Type II Thermistor)	Optional	No	No	No	No
Supply Air Temp Sensor (10K Type II Thermistor)	Required for Economizer Control	Required for Economizer Control	Required for Economizer Control	Required for Economizer Control	Optional
Occupancy Detection	Optional via Standby Switch	Optional Via Door, Window Sensors or PIR	Optional Via Door, Window Sensors or PIR	Optional Via Door, Window Sensors or PIR	Optional Via Door, Window Sensors or PIR
Condensate Alarm	Optional	No	No	No	No

Note: If there is no space temperature sensor connected to an input, then DDC within the BACnet FF will default to using the internal sensor stored at AV-104.
Note: For all applications using the TB3026B-W, then additional I/O is available:
   3 x wireless PIR
   8 x wireless door/window sensors

Table 2. Fan Coil Unit (2 Pipe) Applications

Application	# 11	# 12	# 13	# 14	# 15	# 16	# 18
Fan	Three Speed or VFD	Three Speed or VFD	Three Speed or VFD	Three Speed or VFD	Three Speed or VFD	Three Speed or VFD	On/Off or VFD
Cooling Valve	Three Point Floating or Analog	Three Point Floating or Analog	Three Point Floating or Analog	Two Position Open/Close or Analog	Two Position Open/Close or Analog	Two Position Open/Close or Analog	Two Position Open/Close, Three Point Floating, or Analog
Heating Valve							
Auxiliary Electric Heater	No	No	Yes	No	No	Yes	Yes
Economizer	No	No	No	No	No	No	No
Space Sensor (10K Type II Thermistor)	Optional	No	No	No	No	No	No
OAT Sensor (10K Type II Thermistor)	No	No	No	No	No	No	No
Supply Air Temp Sensor (10K Type II Thermistor)	No	No	No	No	No	No	Optional
Supply Water Sensor (Strap On 10K Type II Thermistor)	No	No	Yes	Yes	No	Yes	Yes
Occupancy Detection	Optional Via Door, Window Sensors or PIR						
Condensate Alarm	No	No	No	No	No	No	No

Table 3. Heat Pump Applications

Application	# 0	# 1	# 2	# 3	# 10
Fan	On/Off or VFD	On/Off or VFD	On/Off or VFD	On/Off or VFD	3 speed or VFD
Compressor	Yes	Yes	Yes	Yes	Yes
Reversing Valve	Yes	Yes	Yes	Yes	Yes
Air or Water Sourced	Air	Water	Air	Water	Air
Auxiliary Electric Heater.	One Stage	One Stage	Two Stage	Two Stage	One Stage
Economizer	Three Point Floating or Analog	Three Point Floating or Analog	Analog	Analog	Analog
Space Sensor (10K Type II Thermistor)	Optional	Optional	Optional	Optional	Optional
OAT Sensor (10K Type II Thermistor)	Optional	Optional	Optional	Optional	Optional
Supply Air Temp Sensor (10K Type II Thermistor)	Required for Economizer Control	Required for Economizer Control	Required for Economizer Control	Required for Economizer Control	Required for Economizer Control
Occupancy Detection	Optional Via Door, Window Sensors or PIR				
Condensate Alarm	Optional	Optional	Optional	Optional	Optional

Table 4. Air Conditioning Unit Applications

Application	# 4	# 5
Fan	On/Off or VFD	On/Off or VFD
Compressor	One	Two
Auxiliary Electric Heater	One Stage	Two Stages
Economizer	Three Point Floating or Analog	
Space Sensor (10K Type II Thermistor)	Optional	Optional
OAT Sensor (10K Type II Thermistor)	Optional	Optional
Supply Air Temp Sensor (10K Type II Thermistor)	Required for Economizer Control	Required for Economizer Control
Occupancy Detection	Optional Via Door, Window Sensors or PIR	
Condensate Alarm	Optional	Optional

APPLICATION 0 – HEAT PUMP (AIR TO AIR)

SINGLE STAGE ELECTRIC HEAT

PIR/Door/Window Sensor
(optional)

Space or Outside
Temperature Sensor
(optional)

Condensate Sensor
(optional)

Supply
Temperature Sensor
(required for economizer
control)

Inputs
AI-0:: Space Sensor or Outside Air
Sensor (optional)

AI-2:: Supply Air Sensor (optional,
required for economizer control)

BI-1:: PIR/Door/Window Sensor
(optional)

BI-2:: Condensate Sensor (optional)

Outputs
BO-0:: Fan

BO-1:: Heat Pump Compressor

BO-2:: Reversing Valve

BO-3:: Electric Heat (optional)

BO-4:: Economizer Open (optional for
floating control)

BO-5:: Economizer Close (optional for
floating control)

AO-0:: Economizer (optional analog)
0-10V or 4-20mA

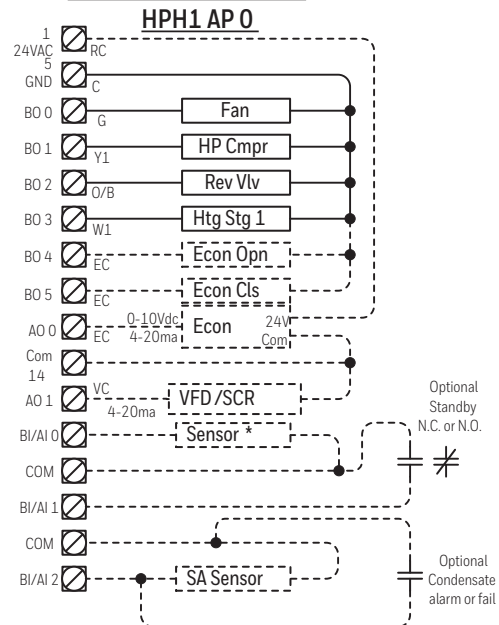AO-1:: Fan Speed Control (optional)
4-20mA VFD/SCR

Note: Any I/O listed as "optional" will
require a BV to be set. Refer to the
sequence of operations outlined in
the BACnet FF Thermostat System
Engineering Guide, 31-00098.

Features and Notes
- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- One stage of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- Electric heat is enabled when heating demand is > 65%.
- To configure AI-0 as a sensor set the following parameters.

Controller Terminations
HPH1 AP 0

* Optional space or outside temperature sensor.

	BV-47 (PS)	BV-32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

APPLICATION 1 – HEAT PUMP (AIR TO WATER)

SINGLE STAGE ELECTRIC HEAT

Inputs

AI-0:: Space Sensor or Outside Air Sensor (optional)

AI-2:: Supply Air Sensor (optional, required for economizer control)

BI-1:: PIR/Door/Window Sensor (optional)

BI-2:: Condensate Sensor (optional)

Outputs

BO-0:: Fan

BO-1:: Heat Pump Compressor

BO-2:: Reversing Valve

BO-3:: Electric Heat (optional)

BO-4:: Economizer Open (optional for floating control)

BO-5:: Economizer Close (optional for floating control)

AO-0:: Economizer (optional analog) 0-10V or 4-20mA

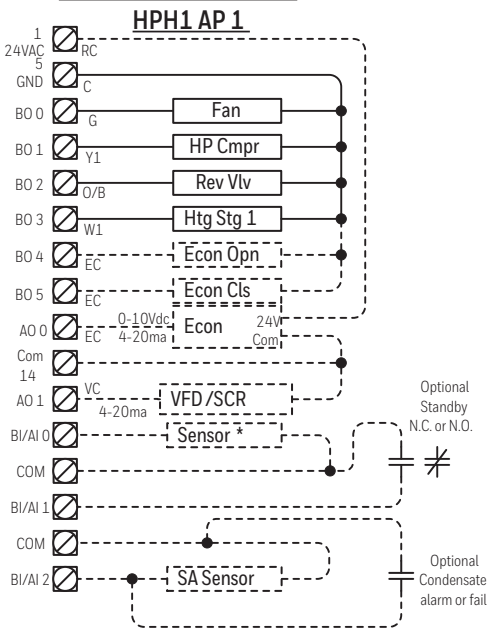AO-1:: Fan Speed Control (optional) 4-20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- One stage of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- Electric heat is enabled when heating demand is > 65%.
- Set BV-31 to active by the BMS to indicate that there is water flow.
- To configure AI-0 as a sensor set the following parameters.

Controller Terminations HPH1 AP 1

* Optional space or outside temperature sensor.

	BV-47 (PS)	BV-32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

31-00099—02

APPLICATION 2 – HEAT PUMP (AIR TO AIR)

TWO STAGES ELECTRIC HEAT

Inputs

AI-0:: Space Sensor or Outside Air Sensor (optional)

AI-2:: Supply Air Sensor (optional, required for economizer control)

BI-1:: PIR/Door/Window Sensor (optional)

BI-2:: Condensate Sensor (optional)

Outputs

BO-0:: Fan

BO-1:: Heat Pump Compressor

BO-2:: Reversing Valve

BO-3:: Electric Heat Stage 1

BO-4:: Electric Heat Stage 2

BO-5:: Not used

AO-0:: Economizer (optional analog) 0-10V or 4-20mA

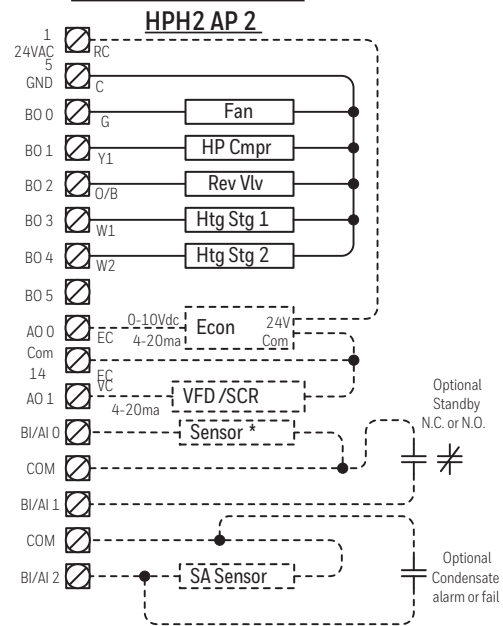AO-1:: Fan Speed Control (optional) 4- 20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

PIR/Door/Window Sensor (optional)

Space or Outside Temperature Sensor (optional)

Condensate Sensor (optional)

Supply Temperature Sensor (required for economizer control)

Features and Notes

- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- Two stages of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- First stage of electric heat is enabled when heating demand is > 65%.
- Second stage of electric heat is enabled when heating demand is > 75%.
- To configure AI-0 as a sensor set the following parameters.

Controller Terminations
HPH2 AP 2

* Optional space or outside temperature sensor.

	BV-47 (PS)	BV-32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

APPLICATION 3 – HEAT PUMP (AIR TO WATER)

TWO STAGES ELECTRIC HEAT

MS/TP Network

Digital

PIR/Door/Window Sensor
(optional)

Space or Outside
Temperature Sensor
(optional)

Condensate Sensor
(optional)

Supply
Temperature Sensor
(required for economizer
control)

Inputs
AI-0:: Space Sensor or Outside Air
Sensor (optional)
AI-2:: Supply Air Sensor (optional,
required for economizer control)
BI-1:: PIR/Door/Window Sensor
(optional)
BI-2:: Condensate Sensor (optional)

Outputs
BO-0:: Fan
BO-1:: Heat Pump Compressor
BO-2:: Reversing Valve
BO-3:: Electric Heat Stage 1
BO-4:: Electric Heat Stage 2
BO-5:: Not used
AO-0:: Economizer (optional analog)
0-10V or 4-20mA
AO-1:: Fan Speed Control (optional)
4- 20mA VFD/SCR

Note: Any I/O listed as "optional" will
require a BV to be set. Refer to the
sequence of operations outlined in
the BACnet FF Thermostat System
Engineering Guide, 31-00098.

Features and Notes
- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- Two stages of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- First stage of electric heat is enabled when heating demand is > 65%.
- Second stage of electric heat is enabled when heating demand is > 75%.
- Set BV-31 to active by the BMS to indicate that there is water flow.

- To configure AI-0 as a sensor set the following parameters.

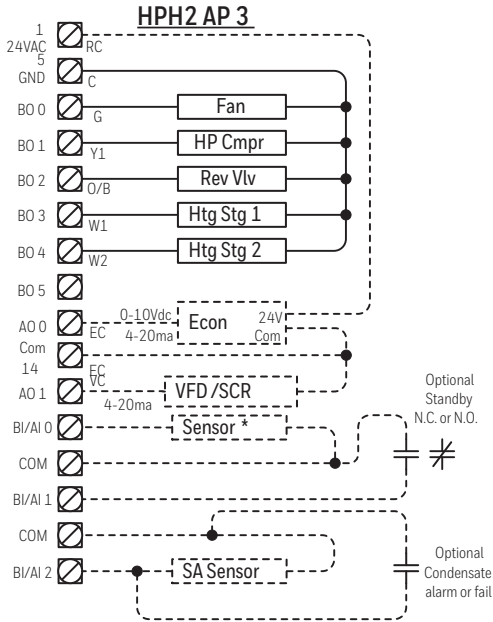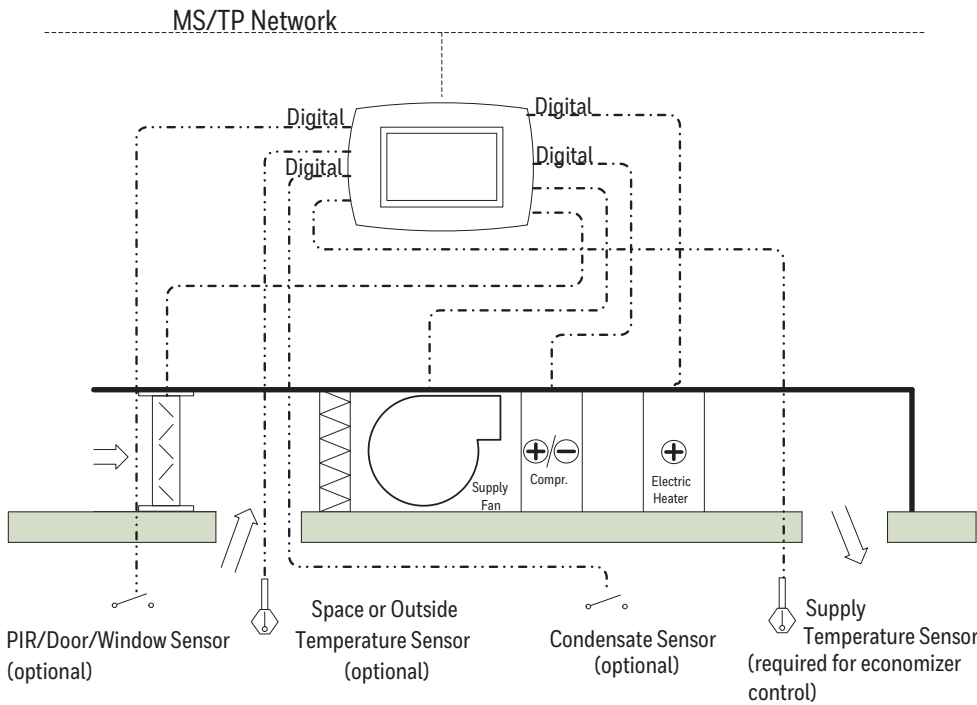|	BV-47 (PS)	BV-32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

Controller Terminations
HPH2 AP 3

* Optional space or outside temperature sensor.

APPLICATION 4 – AIR CONDITIONING UNIT

COMPRESSOR, SINGLE STAGE ELECTRIC HEAT

Inputs

AI-0:: Space Sensor or Outside Air Sensor (optional)

AI-2:: Supply Air Sensor (optional, required for economizer control)

BI-1:: PIR/Door/Window Sensor (optional)

BI-2:: Condensate Sensor (optional)

Outputs

BO-0:: Fan

BO-1:: Compressor

BO-2:: Not used

BO-3:: Electric Heat (optional)

BO-4:: Economizer Open (optional for floating control)

BO-5:: Economizer Close (optional for floating control)

AO-0:: Economizer (optional analog) 0- 10V or 4-20mA

AO-1:: Fan Speed Control (optional) 4-20mA

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes
- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- One stage of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- Electric heat is enabled when heating demand is > 65%.
- To configure AI-0 as a sensor set the following parameters.
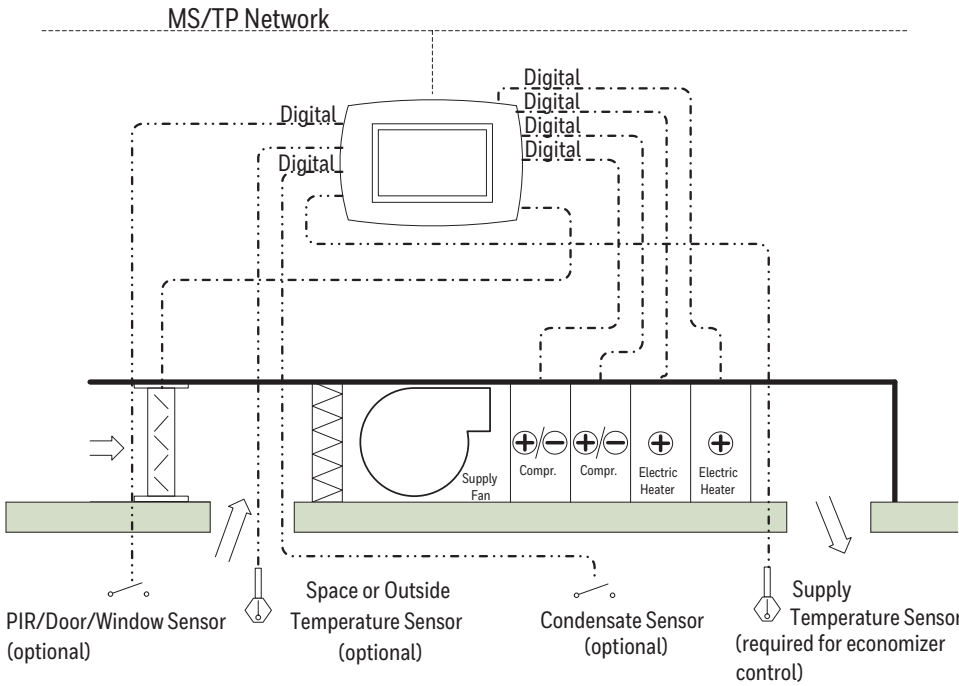
Controller Terminations
A1H1 AP 4
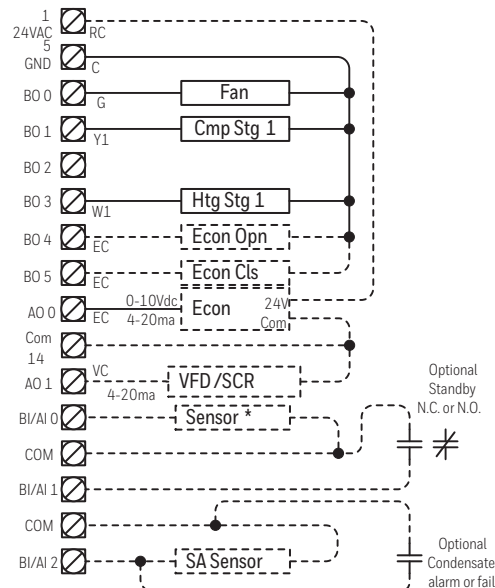
* Optional space or outside temperature sensor.

	BV-47 (PS)	BV-32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

APPLICATION 5 – AIR CONDITIONING UNIT

TWO STAGE COMPRESSOR, TWO STAGE ELECTRIC HEAT

Inputs

AI-0:: Space Sensor or Outside Air Sensor (optional)

AI-2:: Supply Air Sensor (optional, required for economizer control)

BI-1:: PIR/Door/Window Sensor (optional)

BI-2:: Condensate Sensor (optional)

Outputs

BO-0:: Fan

BO-1:: Compressor Stage 1

BO-2:: Compressor Stage 2

BO-3:: Electric Heat Stage 1 (optional)

BO-4:: Electric Heat Stage 2 (optional)

BO-5:: Not used

AO-0:: Economizer (optional analog) 0-10V or 4-20mA

AO-1:: Fan Speed Control (optional) 4-20mA

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Standby mode enables power saving if no motion is detected while in occupancy.
- If condensation is detected, the compressor is held off with the optional condensate input.
- By default the economizer control is set for analog. To use three point floating control set a value in AV-63 (Economizer Stroke Time).
- The economizer control requires a supply air sensor connected to AI-2:.
- Two stages of auxiliary heating.
- Use 10K Type II Thermistor sensors for analog inputs.
- First stage of electric heat is enabled when heating demand is > 65%.
- Second stage of electric heat is enabled when heating demand is > 75%.
- Set BV-31 to active by the BMS to indicate that there is water flow.

- To configure AI-0 as a sensor set the following parameters.

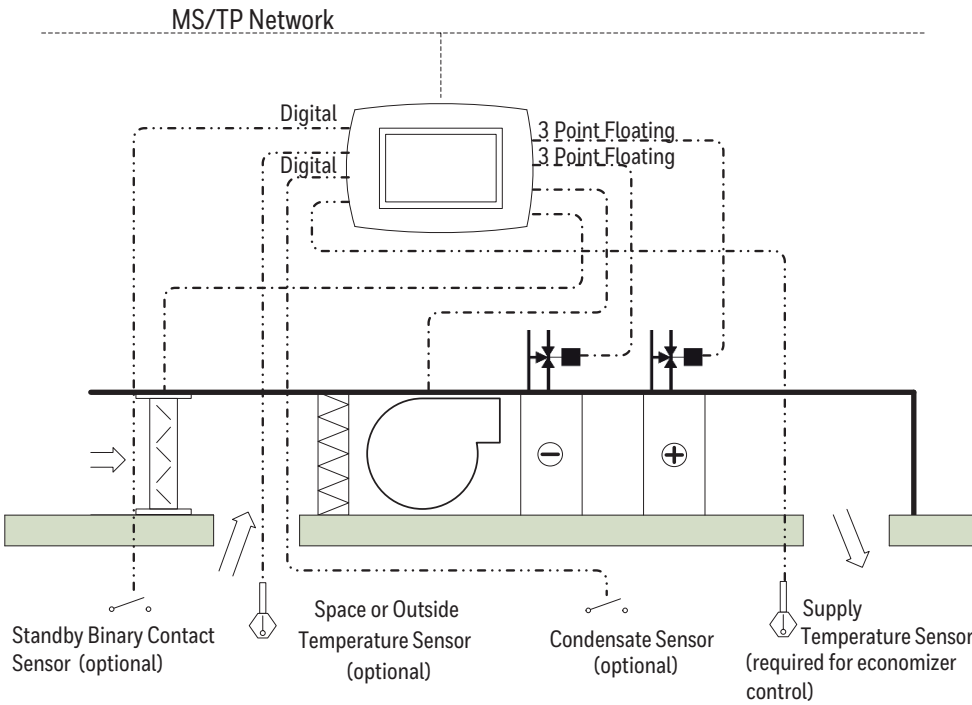|	**BV-47 (PS)**	**BV-32 (Sr)**
Space Temperature	Off	On
Outside Temperature	On	Off

Controller Terminations
A2H2 AP 5
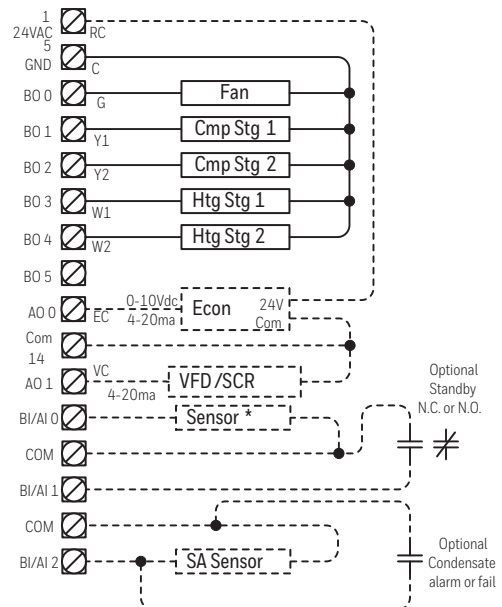
* Optional space or outside temperature sensor.

APPLICATION 6 – FAN COIL UNIT – 4 PIPE

THREE POINT FLOATING COOLING AND HEATING

MS/TP Network

Digital

Digital

3 Point Floating

3 Point Floating

Standby Binary Contact Sensor (optional)

Space or Outside Temperature Sensor (optional)

Condensate Sensor (optional)

Supply Temperature Sensor (required for economizer control)

Inputs

AI-0:: Space Sensor or Outside Air Sensor (optional)

AI-2:: Supply Air Sensor (optional, required for economizer control)

BI-1:: PIR/Door/Window Sensor (optional)

BI-2:: Condensate Alarm (optional)

Outputs

BO-0:: Fan

BO-1:: Cooling Valve Open

BO-2:: Cooling Valve Close

BO-3:: Heating Valve Open

BO-4:: Heating Valve Close

BO-5:: Not used

AO-0:: Economizer (optional analog) 0–10V or 4–20mA

AO-1:: Fan Speed Control (optional) 4–20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.
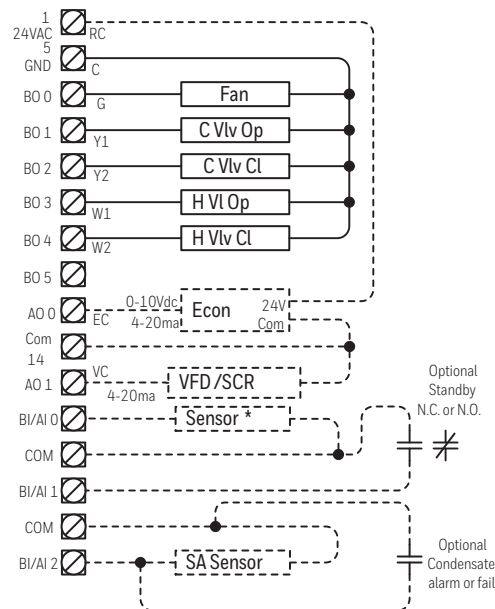
Features and Notes

- Three modes of schedule control set by AV–123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan can be either on/off or analog variable speed control.
- Analog economizer control is defaulted to disabled.
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- AI-0 Can be configured for either Space or Outside Temp sensor.
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use a 10K Type II Thermistor Sensor for AI-0 and AI-2 Inputs.

- To configure AI-0 as a sensor set the following parameters.

	BV–47 (PS)	BV–32 (Sr)
Space Temperature	Off	On
Outside Temperature	On	Off

Controller Terminations
4PFC AP 6

Terminal		Label
1 24VAC		RC
5 GND		C
BO 0		G — Fan
BO 1		Y1 — C Vlv Op
BO 2		Y2 — C Vlv Cl
BO 3		W1 — H Vl Op
BO 4		W2 — H Vlv Cl
BO 5		
AO 0		EC — 0-10Vdc/4-20ma Econ 24V Com
Com 14		
AO 1		VC 4-20ma — VFD/SCR
BI/AI 0		Sensor *
COM		
BI/AI 1		
COM		
BI/AI 2		SA Sensor

Optional Standby N.C. or N.O.

Optional Condensate alarm or fail
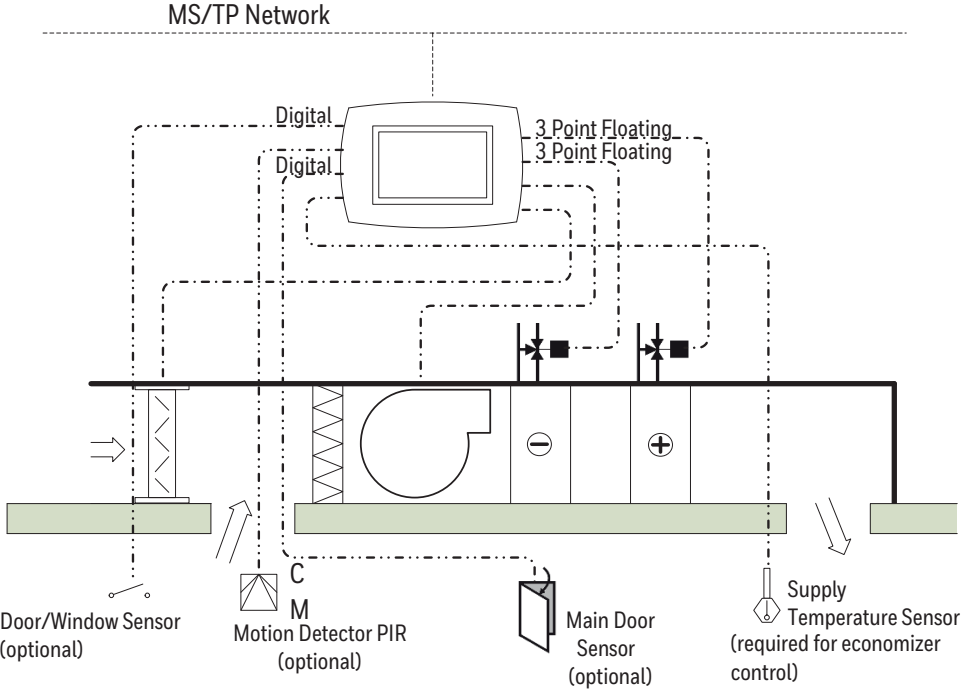
* Optional space or outside temperature sensor.

APPLICATION 7 – FAN COIL UNIT – 4 PIPE

DOOR SENSOR, THREE POINT FLOATING COOLING AND HEATING

Inputs

AI-2:: Supply Air Sensor (optional, required for Economizer control)

BI-0:: PIR Motion Sensor (optional)

BI-1:: Door/Window Sensor (optional)
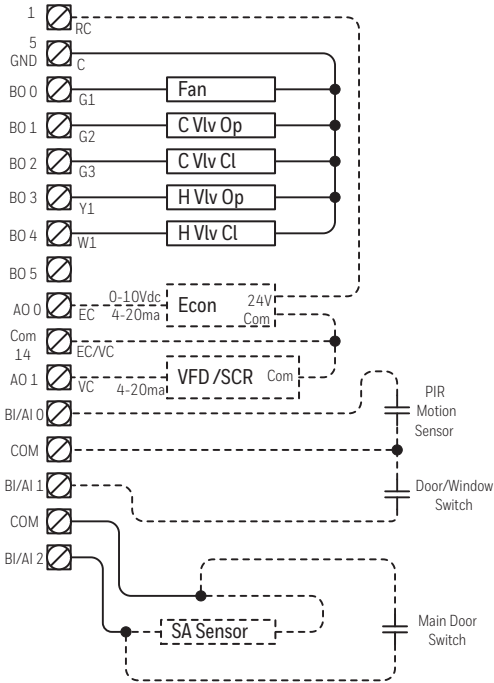
BI-2:: Main Door Sensor (optional)

Outputs

BO-0:: Fan

BO-1:: Cooling Valve Open

BO-2:: Cooling Valve Close

BO-3:: Heating Valve Open

BO-4:: Heating Valve Close

BO-5:: Not used

AO-0:: Economizer (optional analog) 0–10V or 4–20mA

AO-1:: Fan Speed Control (optional) 4–20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.
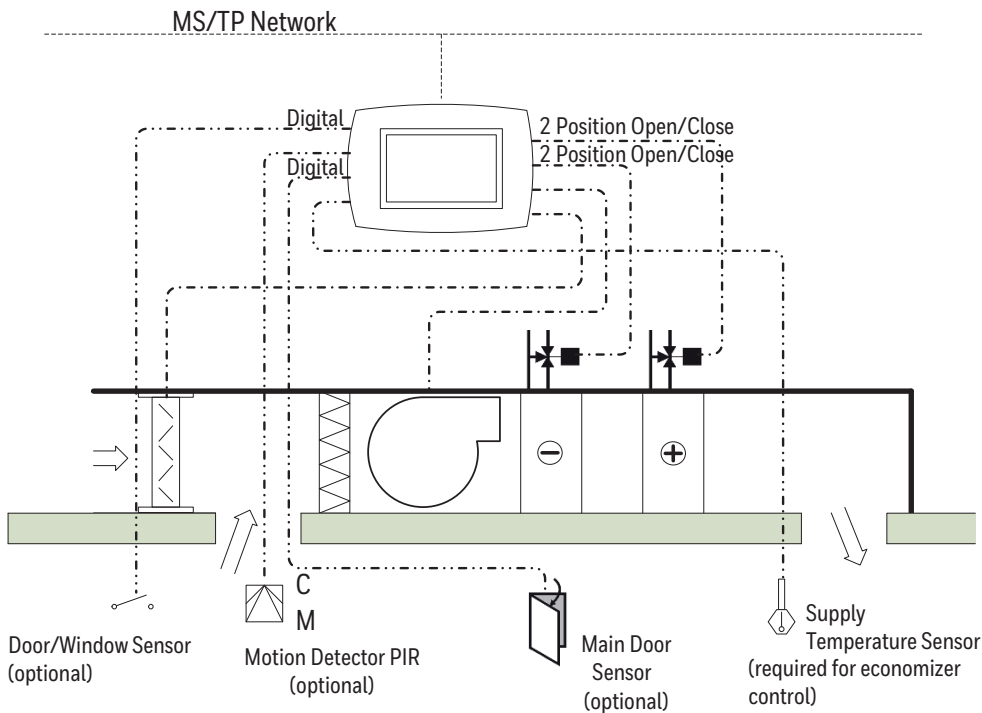
Features and Notes

- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan can be either on/off or analog variable speed control.
- Analog economizer control is defaulted to disabled.
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use a 10K Type II Thermistor Sensor for AI-2 Input.
- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.

Controller Terminations
4PFC AP 7

APPLICATION 8 – FAN COIL UNIT – 4 PIPE

DOOR SENSOR, LOW/MEDIUM/HIGH SPEED FAN. TWO POSITION COOLING AND HEATING

MS/TP Network

Digital
Digital
2 Position Open/Close
2 Position Open/Close

C
M

Door/Window Sensor (optional)

Motion Detector PIR (optional)

Main Door Sensor (optional)

Supply Temperature Sensor (required for economizer control)

Inputs
AI-2:: Supply Air Sensor (optional, required for Economizer control)
BI-0:: PIR Motion Sensor (optional)
BI-1:: Door/Window Sensor (optional)
BI-2:: Main Door Sensor (optional)

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: Cooling 2 Position Valve
BO-4:: Heating 2 Position Valve
BO-5:: Not used
AO-0:: Economizer (optional analog) 0-10V or 4-20mA
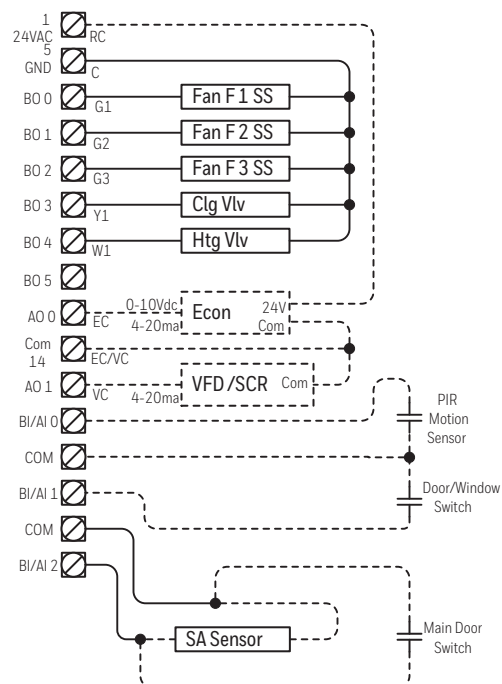AO-1:: Fan Speed Control (optional) 4-20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
    - Low Speed – at 20% demand (adjustable in AV-46)
    - Medium Speed – at 40% demand (adjustable in AV-85)
    - High Speed – at 70% demand (adjustable in AV-89)
    - Fan speed deadband set at 2%
- Analog economizer control is defaulted to disabled.
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use a 10K Type II Thermistor Sensor for AI-2 Input.

- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.

Controller Terminations
4PFC AP 8

1 24VAC	RC	
5 GND	C	
BO 0	G1	Fan F 1 SS
BO 1	G2	Fan F 2 SS
BO 2	G3	Fan F 3 SS
BO 3	Y1	Clg Vlv
BO 4	W1	Htg Vlv
BO 5		
AO 0	EC	0-10Vdc/4-20ma Econ 24V Com
Com 14	EC/VC	
AO 1	VC	VFD/SCR 4-20ma Com
BI/AI 0		PIR Motion Sensor
COM		
BI/AI 1		Door/Window Switch
COM		
BI/AI 2		Main Door Switch
	SA Sensor	

APPLICATION 9 – FAN COIL UNIT – 4 PIPE

DOOR SENSOR, LOW/MEDIUM/HIGH SPEED FAN. TWO POSITION COOLING AND HEATING WITH AUXILIARY HEATING
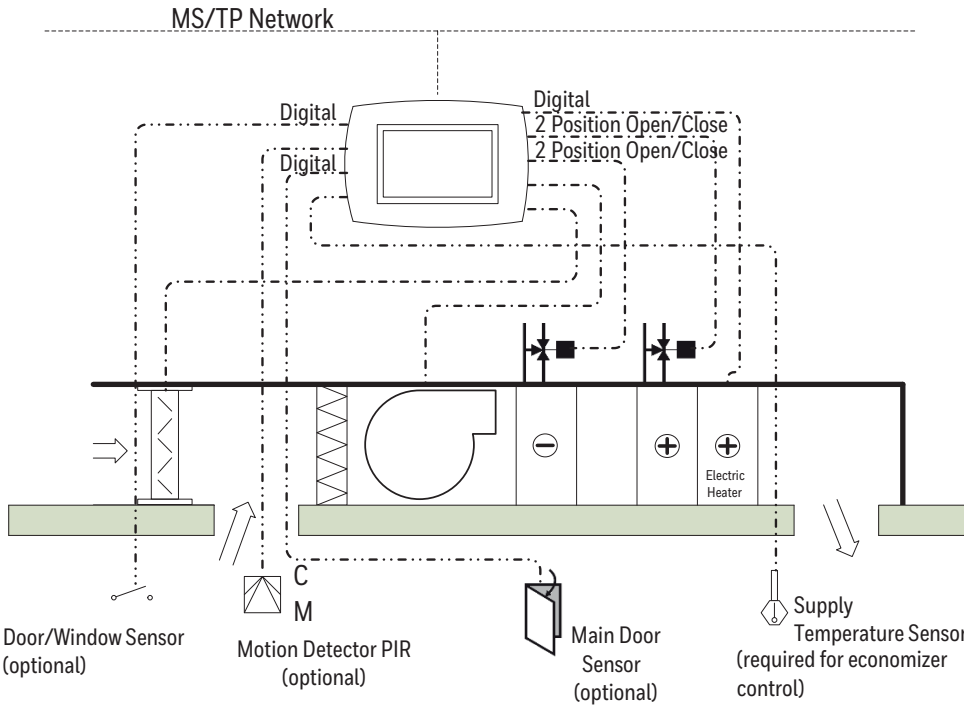
Inputs

AI-2:: Supply Air Sensor (optional, required for Economizer control)

BI-0:: PIR Motion Sensor (optional)

BI-1:: Door/Window Sensor (optional)

BI-2:: Main Door Sensor (optional)

Outputs

BO-0:: Fan Low Speed

BO-1:: Fan Medium Speed

BO-2:: Fan High Speed

BO-3:: Cooling 2 Position Valve

BO-4:: Heating 2 Position Valve

BO-5:: Auxiliary Heat

AO-0:: Economizer (optional analog) 0–10V or 4–20mA

AO-1:: Fan Speed Control (optional) 4–20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
  - Low Speed – at 20% demand (adjustable in AV-46)
  - Medium Speed – at 40% demand (adjustable in AV-85)
  - High Speed – at 70% demand (adjustable in AV-89)
  - Fan speed deadband set at 2%
- Analog economizer control is defaulted to disabled.
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- Electric heater is enabled if heating demand exceeds 75%.
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
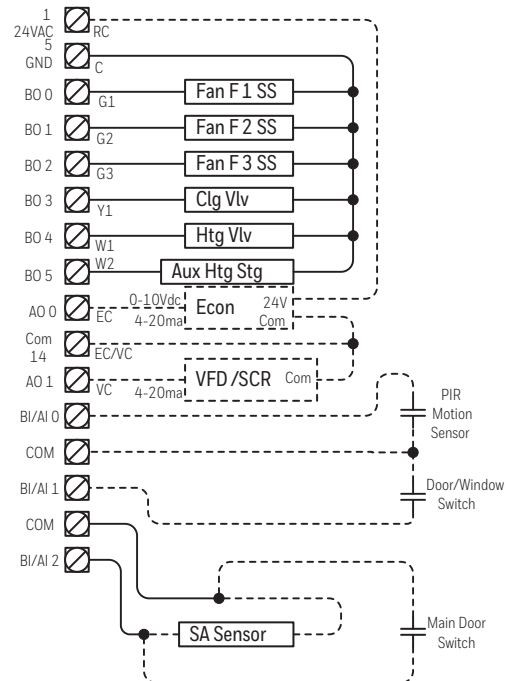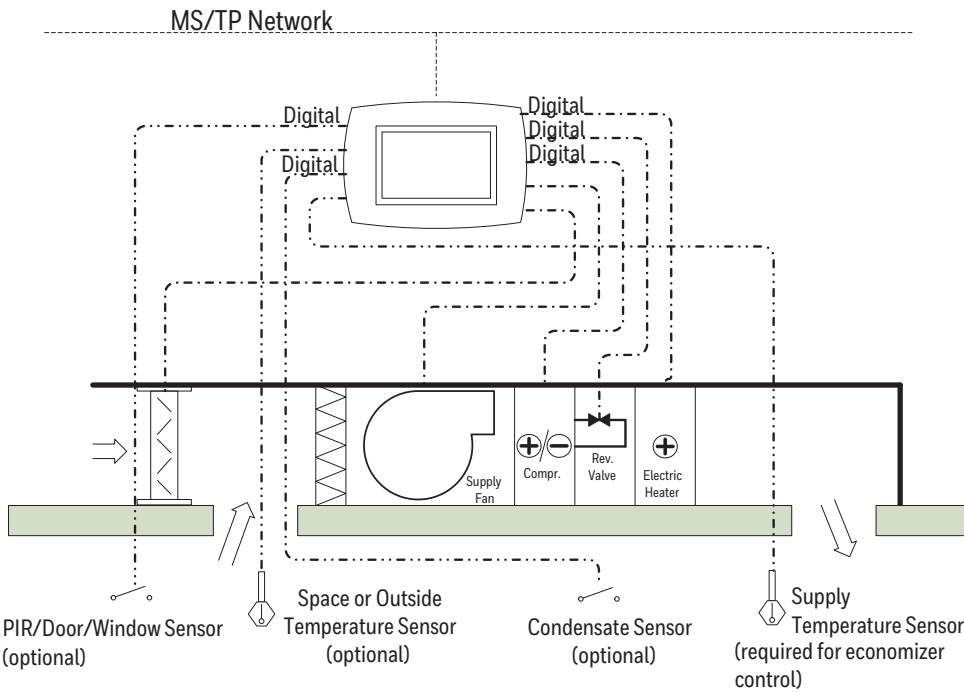- Use a 10K Type II Thermistor Sensor for AI-2 Input.

- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.

Controller Terminations 4PFC AP 9

APPLICATION 10 – HEAT PUMP (AIR TO AIR)

SINGLE STAGE ELECTRIC HEAT AND 3 SPEED FAN

Inputs
AI-0:: Space Sensor or Outside Air Sensor (optional)
AI-2:: Supply Air Sensor (optional, required for Economizer control)
BI-1:: PIR/Door/Window Sensor (optional)
BI-2:: Condensate Sensor (optional)

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: Heat Pump Compressor
BO-4:: Reversing Valve
BO-5:: Auxiliary Heat
AO-0:: Economizer (optional analog) 0-10V or 4-20mA
AO-1:: Fan Speed Control (optional) 4-20mA VFD/SCR

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes
- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
    - Low Speed – at 20% demand (adjustable in AV-46)
    - Medium Speed – at 40% demand (adjustable in AV-85)
    - High Speed – at 70% demand (adjustable in AV-89)
    - Fan speed deadband set at 2%
- Analog economizer control is defaulted to disabled.
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- Electric heater is enabled if heating demand exceeds 75%.
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use a 10K Type II Thermistor Sensor for AI-2 Input.
- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.

- To configure AI-0 as a sensor set the following parameters.

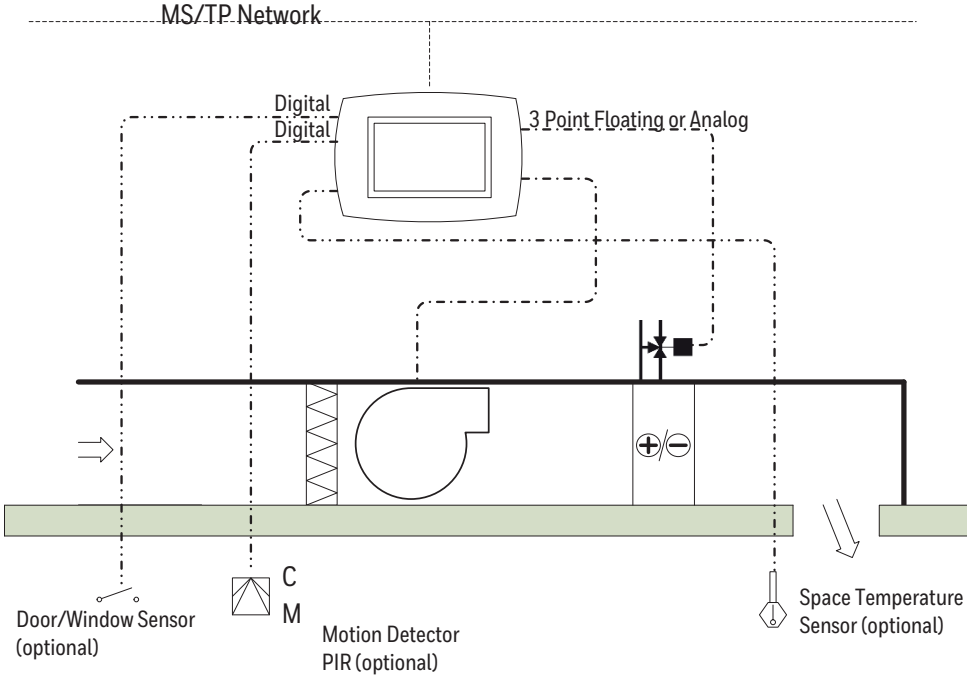|	**BV-47 (PS)**	**BV-32 (Sr)**
Space Temperature	Off	On
Outside Temperature	On	Off

Controller Terminations
HPH1 AP 10
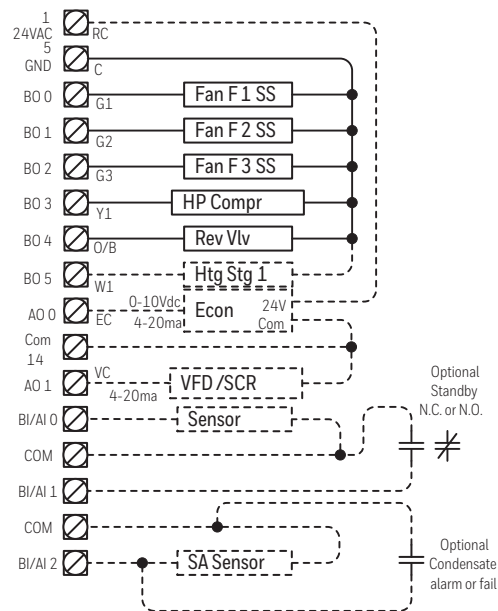
* Optional space or outside temperature sensor.

APPLICATION 11 – FAN COIL UNIT – 2 PIPE

LOW/MEDIUM/HIGH SPEED FAN. THREE POINT FLOATING OR ANALOG COOLING OR HEATING, REMOTE SPACE TEMPERATURE SENSOR

Inputs
AI-2:: Space Temp Sensor (optional)
BI-0:: Motion Detector PIR (optional)
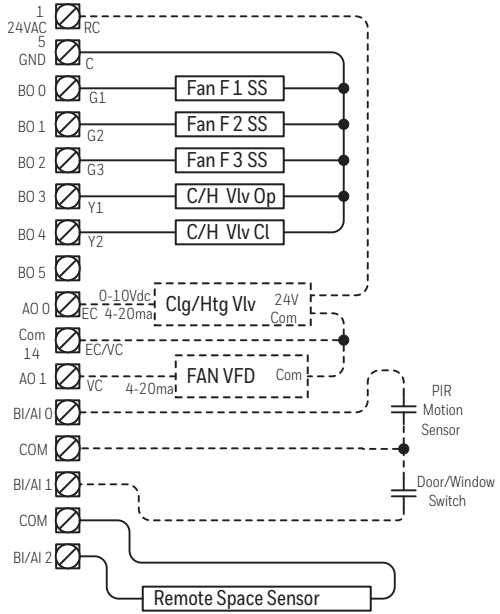BI-1:: Door/Window Sensor (optional)

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: Cooling or Heating Valve Open
BO-4:: Cooling or Heating Valve Close
BO-5:: Not Used
AO-0:: Analog Modulating Cooling or Heating Valve 0-10V or 4-20mA
AO-1:: Fan Speed Control (optional) 4-20mA VFD
Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.
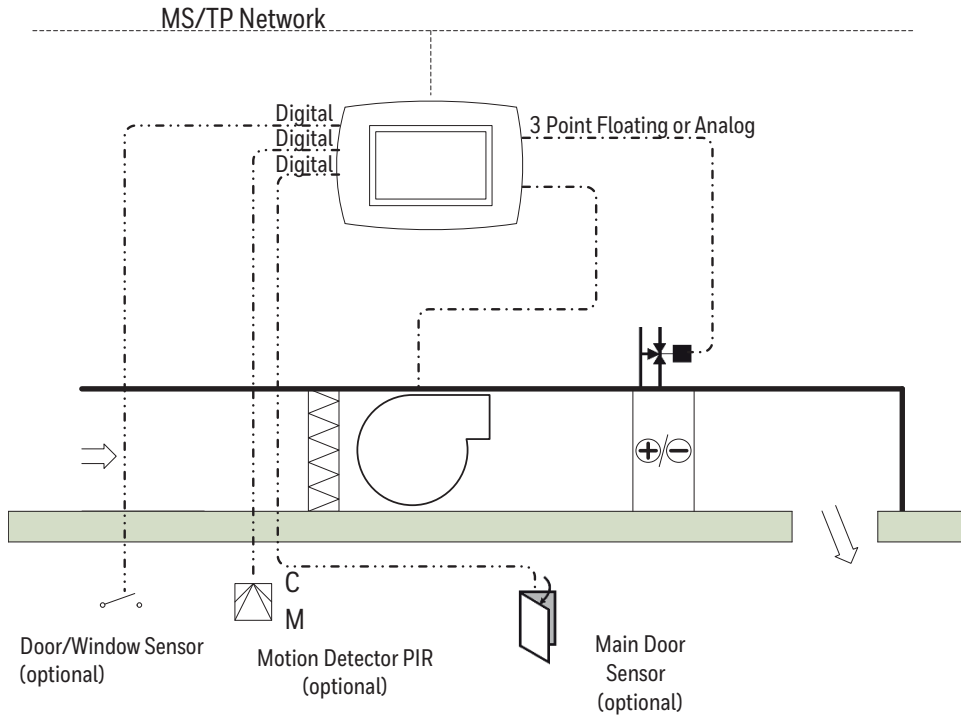
Features and Notes
- Three modes of schedule control set by AV-123 –
     0 = Single point with offset during occupancy,
     1 = Dual setpoint residential – wake, leave, return & sleep,
     2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
     Low Speed – at 20% demand (adjustable in AV-46)
     Medium Speed – at 40% demand (adjustable in AV-85)
     High Speed – at 70% demand (adjustable in AV-89)
     Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
- Use a 10K Type II Thermistor Sensor for AI-2 Input.
- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.

**Controller Terminations
2PFC AP 11**

APPLICATION 12 – FAN COIL UNIT – 2 PIPE

DOOR SENSOR, LOW/MEDIUM/HIGH SPEED FAN. THREE POINT FLOATING OR ANALOG COOLING OR HEATING

Inputs
BI-0:: Motion Detector PIR (optional)
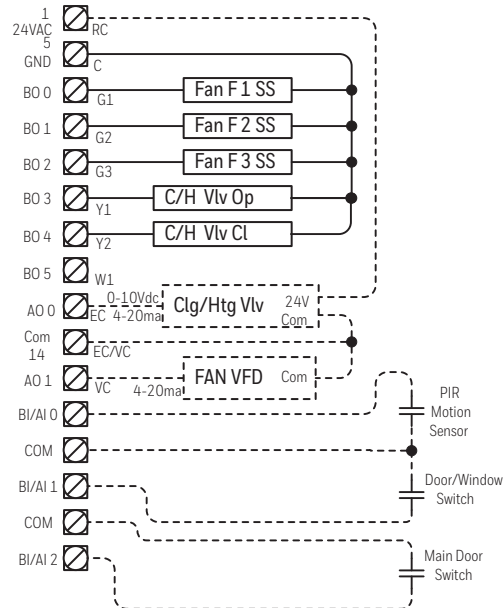BI-1:: Door/Window Sensor (optional)
BI-2:: Main Door Sensor (optional)
Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: Cooling or Heating Valve Open
BO-4:: Cooling or Heating Valve Close
BO-5:: Not Used
AO-0:: Analog Modulating Cooling or Heating Valve 0-10V or 4-20mA
AO-1:: Fan Speed Control (optional) 4- 20mA VFD
Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes
- Three modes of schedule control set by AV-123 –
    0 = Single point with offset during occupancy,
    1 = Dual setpoint residential – wake, leave, return & sleep,
    2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
    Low Speed – at 20% demand (adjustable in AV-46)
    Medium Speed – at 40% demand (adjustable in AV-85)
    High Speed – at 70% demand (adjustable in AV-89)
    Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
- If the BACnet FF detects that the door or window contact is open during occupancy for a period longer than what is defined in the standby delay (AV-20) it will put the unit into standby mode.
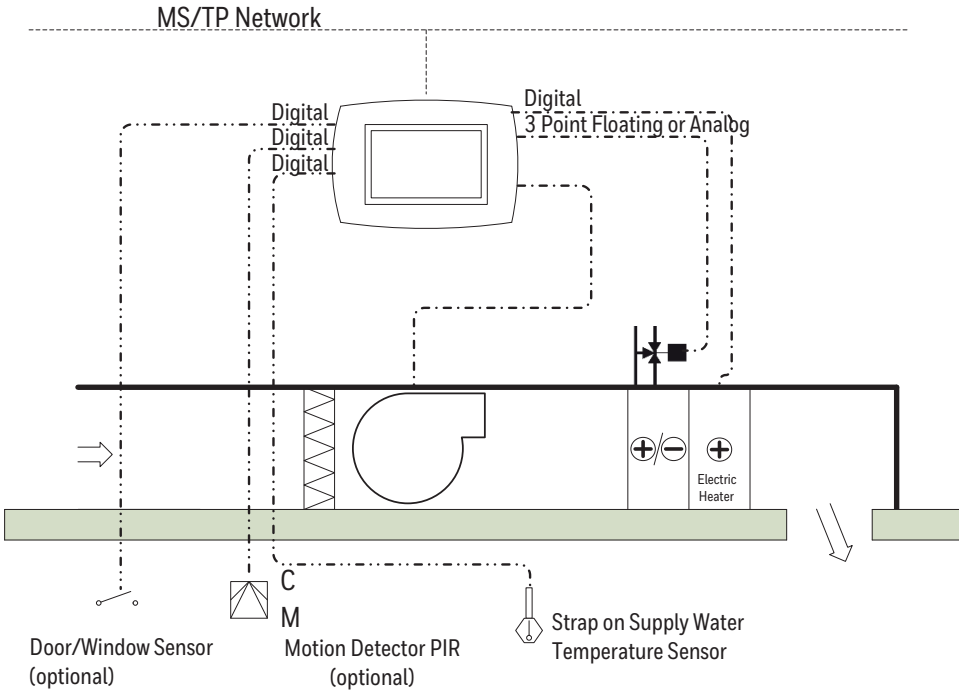
Controller Terminations
2PFC AP 12

APPLICATION 13 – FAN COIL UNIT – 2 PIPE

DOOR SENSOR, LOW/MEDIUM/HIGH SPEED FAN. THREE POINT FLOATING OR ANALOG COOLING OR HEATING AND ELECTRIC HEATER

MS/TP Network

Digital
Digital
Digital
Digital
3 Point Floating or Analog

Electric
Heater

Door/Window Sensor
(optional)

C
M
Motion Detector PIR
(optional)

Strap on Supply Water
Temperature Sensor

Inputs
BI-0:: Motion Detector PIR (optional)
BI-1:: Door/Window Sensor (optional)
AI-2:: Supply Water Temperature Sensor

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: Cooling or Heating Valve Open
BO-4:: Cooling or Heating Valve Close
BO-5:: Auxiliary Heating
AO-0:: Analog Modulating Cooling or Heating Valve 0-10V or 4-20mA
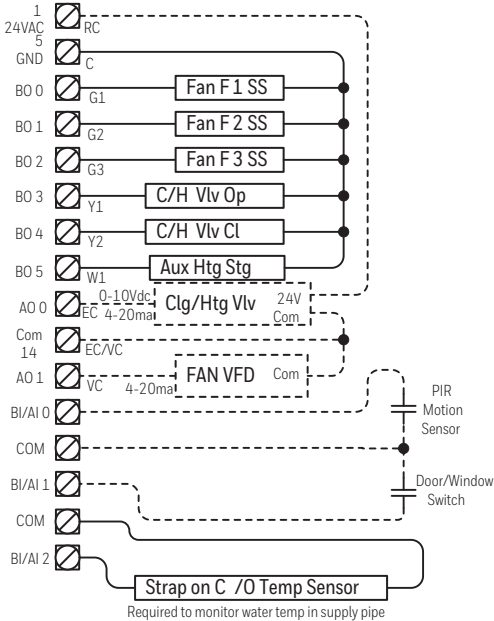AO-1:: Fan Speed Control (optional) 4-20mA VFD
Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
    0 = Single point with offset during occupancy,
    1 = Dual setpoint residential – wake, leave, return & sleep,
    2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Electric heater is enabled if the heating demand is > 70%
- Fan speed selected upon the following settings -
    Low Speed – at 20% demand (adjustable in AV-46)
    Medium Speed – at 40% demand (adjustable in AV-85)
    High Speed – at 70% demand (adjustable in AV-89)
    Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
- Use a 10K Type II Thermistor sensor for the strap on water supply temperature.

Controller Terminations 2PFC AP 13

Terminal	Label	Device
1 24VAC 5	RC	
GND	C	
BO 0	G1	Fan F 1 SS
BO 1	G2	Fan F 2 SS
BO 2	G3	Fan F 3 SS
BO 3	Y1	C/H Vlv Op
BO 4	Y2	C/H Vlv Cl
BO 5	W1	Aux Htg Stg
AO 0	EC 0-10Vdc 4-20ma	Clg/Htg Vlv 24V Com
Com 14	EC/VC	
AO 1	VC 4-20ma	FAN VFD Com
BI/AI 0		PIR Motion Sensor
COM		
BI/AI 1		Door/Window Switch
COM		
BI/AI 2		Strap on C /O Temp Sensor

Required to monitor water temp in supply pipe

31-00099—02

APPLICATION 14 – FAN COIL UNIT – 2 PIPE

WATER TEMP SENSOR, LOW/MEDIUM/HIGH SPEED FAN. TWO POSITION OR ANALOG COOLING OR HEATING

Inputs

BI-0:: Motion Detector PIR (optional)

BI-1:: Door/Window Sensor (optional)

AI-2:: Supply Water Temperature Sensor

Outputs

BO-0:: Fan Low Speed

BO-1:: Fan Medium Speed

BO-2:: Fan High Speed

BO-3:: 2 Position Open/Close Cooling/Heating Valve

BO-4:: Not used

BO-5:: Not used

AO-0:: Analog Modulating Cooling or Heating Valve 0-10V or 4-20mA

AO-1:: Fan Speed Control (optional) 4-20mA VFD

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
    - Low Speed – at 20% demand (adjustable in AV-46)
    - Medium Speed – at 40% demand (adjustable in AV-85)
    - High Speed – at 70% demand (adjustable in AV-89)
    - Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
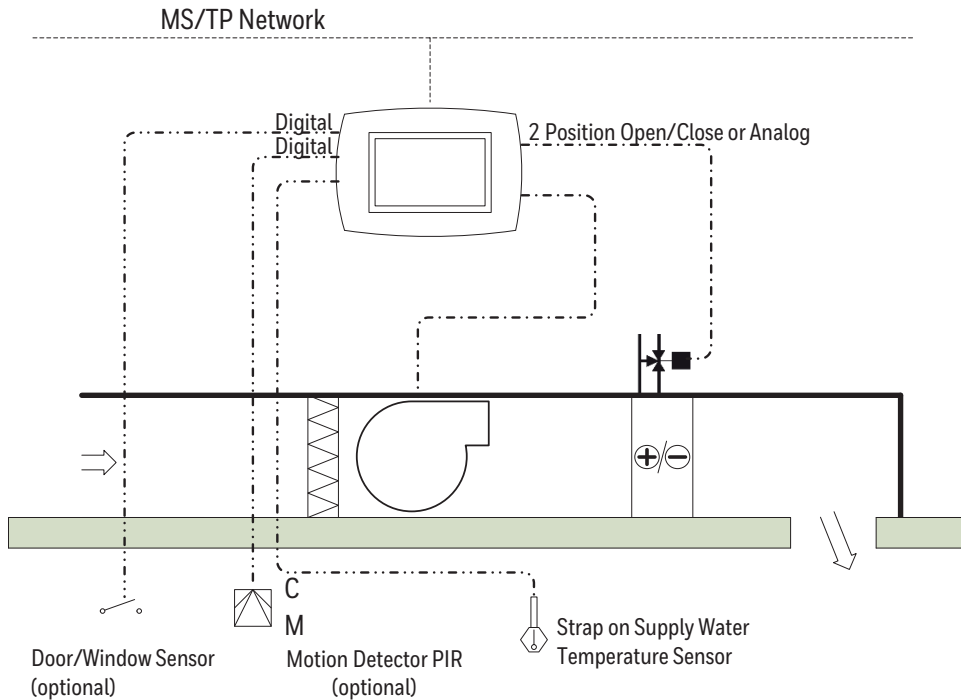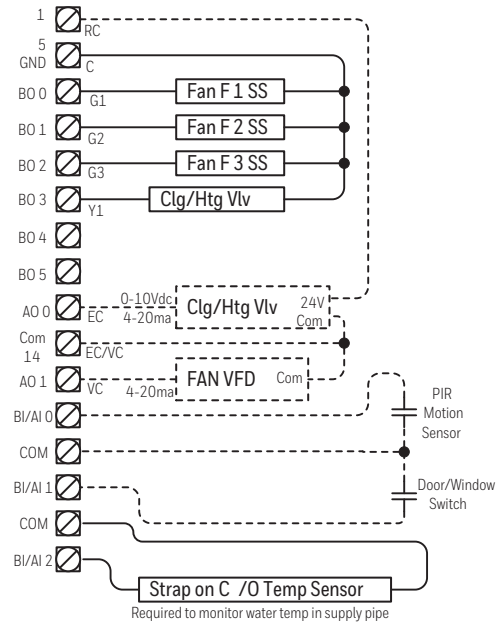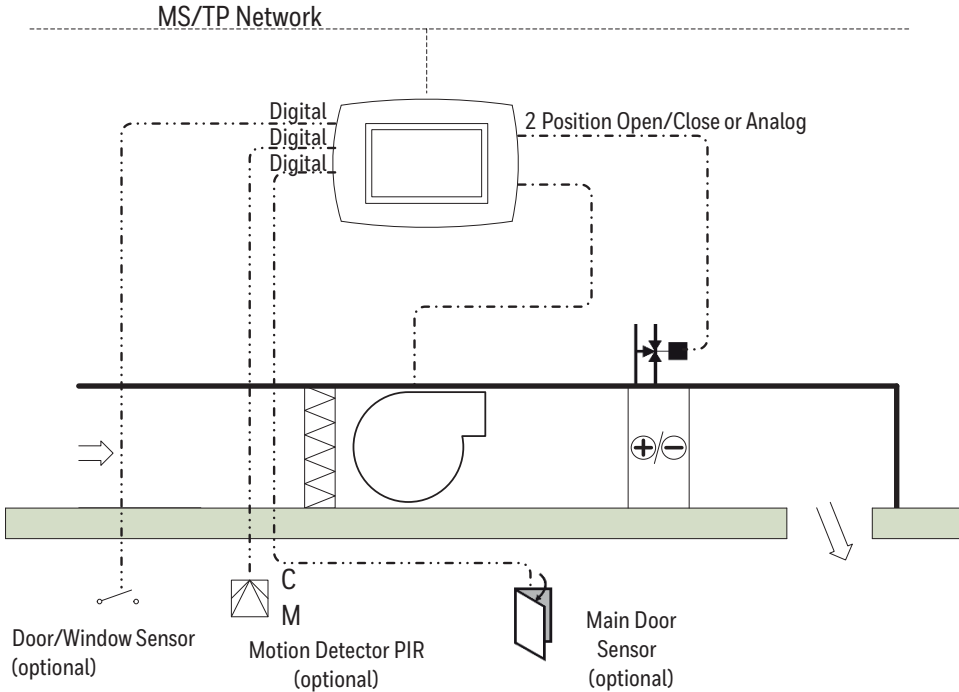- Use a 10K Type II Thermistor sensor for the strap on water supply temperature.

**Controller Terminations
2PFC AP 14**

APPLICATION 15 – FAN COIL UNIT – 2 PIPE

LOW/MEDIUM/HIGH SPEED FAN. 2 POSITION OR ANALOG COOLING OR HEATING

Inputs
BI-0:: Motion Detector PIR (optional)
BI-1:: Door/Window Sensor (optional)
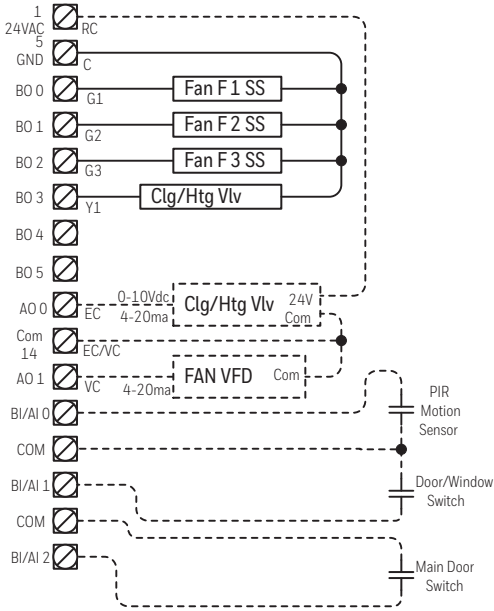BI-2:: Main Door Sensor (optional)

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: 2 Position Open/Close
      Cooling/Heating Valve
BO-4:: Not used
BO-5:: Not used
AO-0:: Analog Modulating Cooling or
      Heating Valve 0-10V or 4-20mA
AO-1:: Fan Speed Control (optional)
      4-20mA VFD

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.
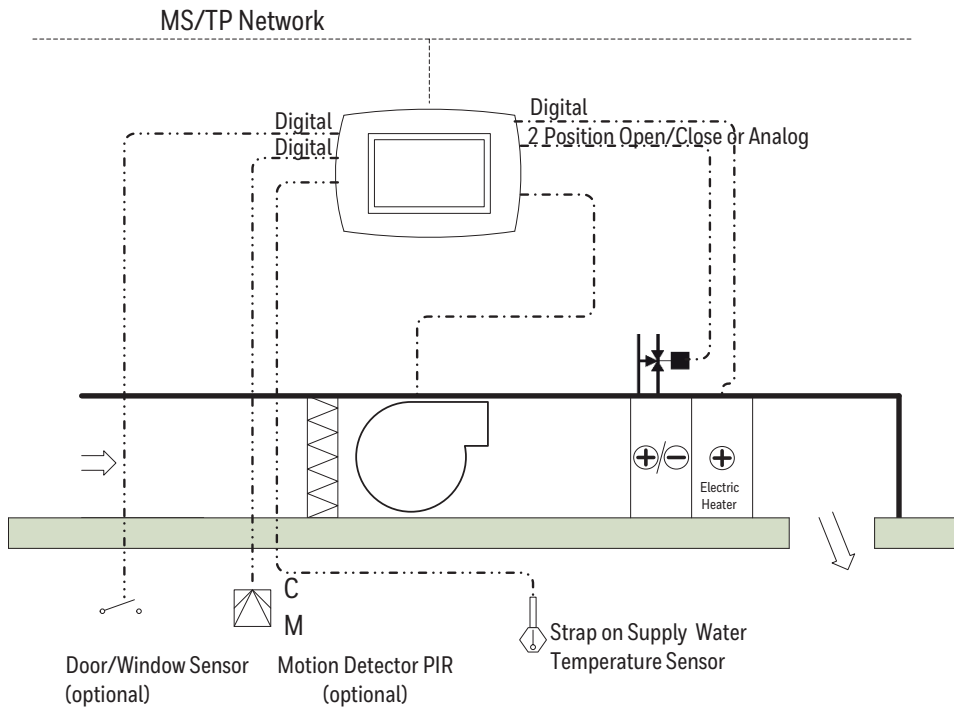
Features and Notes
- Three modes of schedule control set by AV-123 –
    0 = Single point with offset during occupancy,
    1 = Dual setpoint residential – wake, leave, return & sleep,
    2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
    Low Speed – at 20% demand (adjustable in AV-46)
    Medium Speed – at 40% demand (adjustable in AV-85)
    High Speed – at 70% demand (adjustable in AV-89)
    Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
- AV-23 is used to determine if the water temperature sensor (AV-15 sourced from the BMS) is to be utilized
    0 = No,
    1 = cooling,
    2 = heating.

**Controller Terminations
2PFC AP 15**

APPLICATION 16 – FAN COIL UNIT – 2 PIPE

LOW/MEDIUM/HIGH SPEED FAN. 2 POSITION OR ANALOG COOLING OR HEATING AND ELECTRIC HEAT

MS/TP Network

Digital
Digital
Digital
2 Position Open/Close or Analog

Electric Heater

C
M

Door/Window Sensor (optional)

Motion Detector PIR (optional)

Strap on Supply Water Temperature Sensor

Inputs
BI-0:: Motion Detector PIR (optional)
BI-1:: Door/Window Sensor (optional)
AI-2:: Supply Water Temperature Sensor

Outputs
BO-0:: Fan Low Speed
BO-1:: Fan Medium Speed
BO-2:: Fan High Speed
BO-3:: 2 Position Open/Close Cooling/Heating Valve
BO-4:: Not used
BO-5:: Electric Auxiliary Heating
AO-0:: Analog Modulating Cooling or Heating Valve 0-10V or 4-20mA (optional)
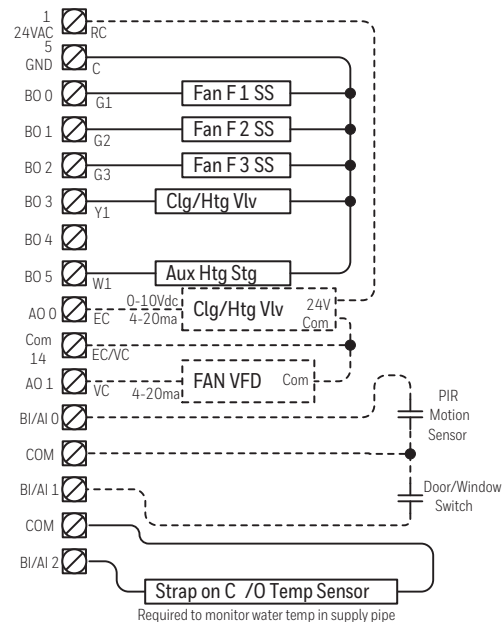AO-1:: Fan Speed Control (optional) 4-20mA VFD

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
    - 0 = Single point with offset during occupancy,
    - 1 = Dual setpoint residential – wake, leave, return & sleep,
    - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Cooling or heating is disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Electric heater is enabled if the heating demand is > 70%
- Fan speed selected upon the following settings -
    Low Speed – at 20% demand (adjustable in AV-46)
    Medium Speed – at 40% demand (adjustable in AV-85)
    High Speed – at 70% demand (adjustable in AV-89)
    Fan speed deadband set at 2%
- Humidity control can be enabled for un-occupancy (BV-53).
- Use a 10K Type II Thermistor sensor for the strap on water supply temperature.

Controller Terminations
2PFC AP 16

1 24VAC	RC	
5 GND	C	
BO 0	G1	Fan F 1 SS
BO 1	G2	Fan F 2 SS
BO 2	G3	Fan F 3 SS
BO 3	Y1	Clg/Htg Vlv
BO 4		
BO 5	W1	Aux Htg Stg
AO 0	EC	0-10Vdc 4-20ma Clg/Htg Vlv 24V Com
Com 14	EC/VC	
AO 1	VC	4-20ma FAN VFD Com
BI/AI 0		PIR Motion Sensor
COM		
BI/AI 1		Door/Window Switch
COM		
BI/AI 2		Strap on C /O Temp Sensor

Required to monitor water temp in supply pipe

APPLICATION 17 – FAN COIL UNIT – 4 PIPE

PIR SENSOR, ANALOG COOLING AND HEATING, THREE POINT FLOATING ECONOMIZER

Door/Window Sensor (optional)

Motion Detector PIR (optional)

Space Temperature or Supply Temperature Sensor
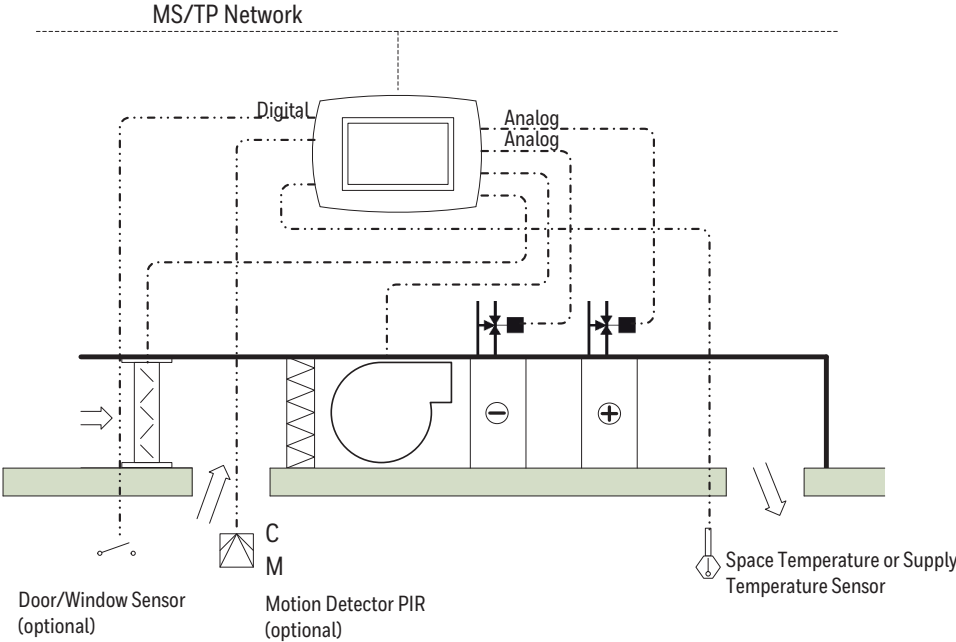
Inputs

AI-2:: Space Temperature Sensor (Optional, or could be a Supply Air Temperature Sensor, required for economizer control).

BI-0:: PIR Motion Sensor (optional)

BI-1:: Door/Window Sensor (optional)

Outputs

BO-0:: Fan Low Speed

BO-1:: Fan Medium Speed

BO-2:: Fan High Speed

BO-3:: Not used

BO-4:: Economizer Open

BO-5:: Economizer Close

AO-0:: Analog Modulating Cooling Valve 0-10V or 4-20mA (optional)

AO-1:: Analog Modulating Heating Valve 0-10V or 4-20mA (optional)

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes

- Three modes of schedule control set by AV-123 –
  - 0 = Single point with offset during occupancy,
  - 1 = Dual setpoint residential – wake, leave, return & sleep,
  - 2 = Dual setpoint with offset occupancy.
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in Occupancy mode (AV-17).
- Fan speed will ramp between 0-100% depending on cooling and heating demands
- Fan speed selected upon the following settings -
  - Low Speed – at 20% demand (adjustable in AV-46)
  - Medium Speed – at 40% demand (adjustable in AV-85)
  - High Speed – at 70% demand (adjustable in AV-89)
  - Fan speed deadband set at 2%
- Economizer requires a supply air sensor connected to AI-2.
- The cooling and heating valves can be controlled by either a cooling and heating signal or via the supply air temperature (BV-15).
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use a 10K Type II Thermistor Sensor for AI-2 Input.

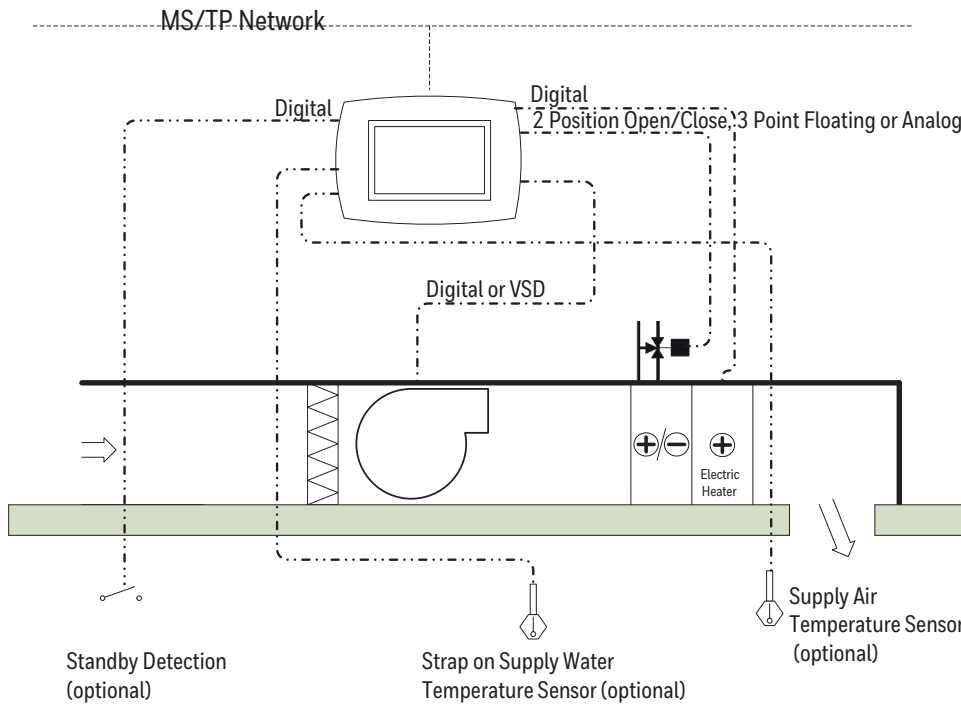- To configure AI-2 as a sensor set the following parameters.

	BV-47 (PS)	**BV-32 (Sr)**
Space Temperature	Off	On
Outside Temperature	On	Off

Controller Terminations
4PFC AP 17
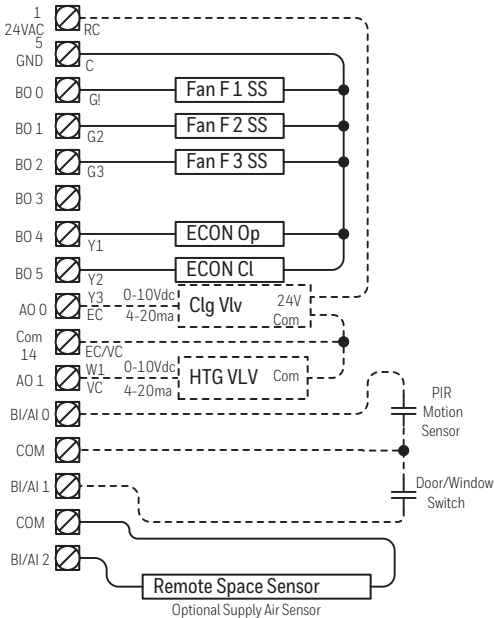
APPLICATION 18 – FAN COIL UNIT – 2 PIPE

TWO POSITION, THREE POINT FLOATING, OR ANALOG COOLING OR HEATING VALVE, ELECTRIC HEATER, ON/OFF OR VFD FAN

Inputs

BI-1:: PIR/Door/Window Sensor (optional)

AI-0:: Supply Air Temperature

AI-2:: Supply Water Temperature Sensor

Outputs

BO-0:: Fan On/Off

BO-1:: Not Used

BO-2:: Cooling/Heating Valve 2 Position Open/Close

BO-3:: Cooling/Heating Valve Open 3 Point Floating

BO-4:: Cooling/Heating Valve Close 3 Point Floating

BO-5:: Auxiliary Electric Heating Coil

AO-0:: Analog Modulating Cooling or Heating Valve 0–10V or 4–20mA (optional)

AO-1:: Fan Speed Control (optional) 4–20mA

Note: Any I/O listed as "optional" will require a BV to be set. Refer to the sequence of operations outlined in the BACnet FF Thermostat System Engineering Guide, 31-00098.

Features and Notes
- BACnet MS/TP compliant.
- English or metric units.
- Outputs are disabled if BV-2 is off.
- Disable operator access via the display to the schedule by setting BV-102 to off.
- Onboard Schedule can be enabled or disabled (BV-40).
- Heating and cooling are disabled if the fan is off.
- Use up and down arrows on the display to force the unit into occupancy for four hours.
- Setpoint mode emulates residential thermostat operation.
- Fan can be set to run continuously or cycle on and off for heating or cooling demands while in occupancy mode (AV-17).
- Fan control is either start/stop or variable speed control.
- The cooling or heating valve can be controlled by either a cooling or heating signal or via the supply air temperature (BV-15).
- Humidity control can be enabled for un-occupancy (BV-53).
- If door or window contacts are open longer than the delay time (AV-20) the unit goes into standby mode.
- Humidity control can be enabled for un-occupancy (BV-12 & BV-53).
- Use 10K Type II Thermistor sensors for the water and supply air temperature sensors.

Controller Terminations
2PFC AP 18
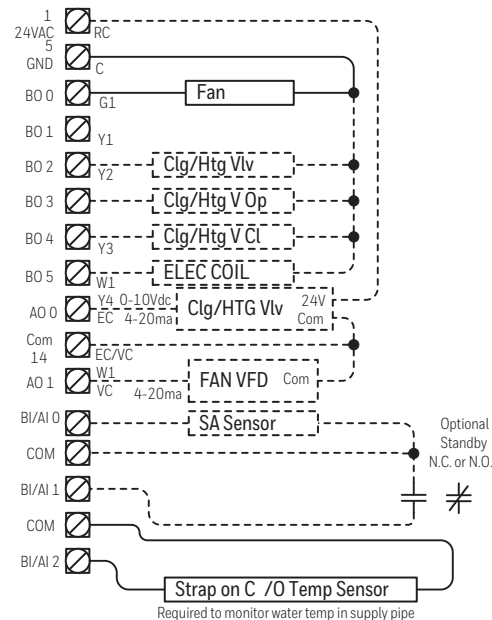
FIELD SERVICE MODE SETTINGS

Items listed below are in order of display via the "Field Service Mode" on the BACnet FF Screen.

Service Code	Object Instance	Default Value	Range	Purpose/Function	Applications parameter applies to.
UC	AV-95	85	45.0 to 99.0	Unnoccupied Cooling Setpoint	All
UH	AV-96	55	45.0 to 84.5	Unnoccupied Heating Setpoint	All
CO	AV-93	2	0.0 to 20.0	Cooling Offset	All
HO	AV-94	1	0.0 to 20.0	Heating Offset	All
CS	AV-99	Calculated From AV-90		Occupied Cooling Setpoint	All
HS	AV-100	Calculated From AV-90		Occupied Heating Setpoint	All
AL	AV-97	4	0 to 9.5	Override Limit (hours)	All
HI	AV-91	78	0.0 to 127.0	Setpoint High Limit	All
LO	AV-92	62	0.0 to 89.5	Setpoint Low Limit	All
SP	AV-90	70	Restricted to range set by AV-92 & AV-91.	Occupant Selected Space Temperature Setpoint.	All
AP	AV-49	Set this to select the required Application		Application Selection range 0 to 18	All
OE	BV-2	Off	Set to On after completing all other settings.	Enable Outputs	All
HC	BV-21	Off	On = Heating. Off = Cooling.	Reversing Valve Action Heating-Cooling.	0-3, 10
FC	AV-17	1	1 = Fan runs continuous, 2 = Fan Cycles with Heating, 3 = Fan Cycles with Cooling.		All
CC	AV-26	12	1 to 1440	AC-HP Compressor Cycle Time (mins)	0-3,10
CO	AV-27	3		AC-HP Compressor Minimum On Runtime (mins)	0-3,10
CF	AV-18	3		AC-HP Compressor Minimum Off Runtime (mins)	0-3,10
Hc	AV-28	3	1 to 1440	Heating Stages Cycle Time (mins) (if set to 0 or less this will disable heating)	0-5,9,10,13,16,18
h0	AV-29	1		Heating Stages Minimum runtime (mins)	0-5,9,10,13,16,18
hF	AV-80	1		Heating Stages Minimum Off runtime (minutes)	0-5,9,10,13,16,18
2C	AV-37	3	1 to 1440	2 Position Valve Cycle Times (mins)	8,9,14-16,18
2c	AV-38	1		2 Position Valves Minimum runtime (mins)	8,9,14-16,18
c5	AV-64	0	0 to 180	Cooling Valve Stroke Time. (seconds)	6-9,11-18
h5	AV-65	0	0 to 180	Heating Valve Stroke Time. (seconds)	6-9,11-18
2P	AV-34	1	1=On/Off. 2=Analog to Binary	2 Position Valve Mode	8,9,14-16,18
FA	BV-55	Off	On/Off	Enable Fan Control display	All
cL	AV-70	55		Cooling Lockout Temp	All
hL	AV-72	62		Heating Lockout Temp	All
P5	BV-47	Off	On/Off	Off = Enable AI-0 input as a Space Temperature Sensor, On = use the internal BACnet FF sensor (AV-104).	0-6,10,17
Sr	BV-32	Off	On/Off	On = Enable AI-0 input as Space Temperature, Off = OAT	0-6,11,17
F1	AV-46	20	Set by DDC AV-80 minus 2%	Auto Fan Start Demand %	All
F5	AV-5	0		Fan stop delay (seconds)	All
F2	AV-85	0		Medium Speed Fan Setpoint	All
F3	AV-89	0		High Speed Fan Setpoint	All
uL	BV-3	Off	On/Off	Reverse Standby Logic.	All
50	AV-19	4	0 to 12	Standby Heating SetPoint	All

LIST OF MAIN DEVICE OBJECTS

Not accessed via the touchscreen. These are set up with default values.

Fan Control		Zone Control	
Device Object	**Label**	**Device Object**	**Label**
AV-39	Fan Speed Demand (Analog) %	AV-103	Outside Air Temp
AV-5	Fan Stop Delay (Sec)	AV-104	Space Temp from (BMS)
AV-82	Fan Runtime	AV-12	Supply Air Temp
AV-85	Medium Speed Fan Start SP	AV-123	Schedule Module
AV-86	Filter Runtime	AV-36	Space Temp used for PI Calc
AV-89	High Speed Fan Start SP	BV-124	System Auto Selected
BV-16	Filter Alarm	BV-133	Enable Internal Schedule
BV-5	Fan Status	BV-32	Enable Remote Sensor (AI-2)
BV-59	Fan Auto - On	BV-4	In Standby Mode
BV-72	Fan 3 speed – Low	BV-40	Occupied Command
BV-73	Fan 3 speed – Medium	BV-47	Enable Remote Sensor (AI-0)
BV-74	Fan 3 speed – High	BV-56	Enable BMS Scheduling
BV-80	Enable Fan Speed Control	**Heating and Cooling Signals**	
Compressor Control		AV-0	Heating Signal
AV-21	Compressor 1 Starts	AV-1	Cooling Signal
AV-22	Compressor 2 Starts	AV-105	Sensed Humidity
AV-40	AC HP Mode Control	AV-13	Heating Valve Demand
AV-68	AC HP Compr Start Demand %	AV-18	AC-HP Compr. Min Off (mins)
AV-69	AC HP Compr Stop Demand %	AV-27	AC-HP Compr. Min On (mins)
AV-81	Runtime HP Comressor (App 10)	AV-41	Heat Signal Proportional Gain
AV-87	Runtime Cooling Stage 1	AV-42	Heating Signal Integral Gain
AV-88	Runtime Cooling Stage 2	AV-43	Cool Signal Proportional Gain
BV-21	Reverse Valve Action, 1 = cool	AV-44	Cooling Signal Integral Gain
BV-22	1 = Cooling Locked Out	AV-57	Calc. Compr. Off time (sec)
BV-27	1 = Heating Locked Out	AV-58	Calc. Compr. Cycle time (sec)
BV-6	HP Fun Request	AV-59	Calc. Compr. Mins on (sec)
BV-7	Fan Request (AC Cooling)	AV-8	Cooling Valve Demand
BV-31	WS HP Water Loop OK	AV-83	Runtime Heat Stage 1
Economizer Control		AV-84	Runtime Heat Stage 2
AV-10	Economizer Position	BV-1	1 = In Heating Mode
AV-63	Econ. Damper Stroke Time	BV-12	1 = Dehum Mode is On
AV-60	Supply Air Low temp Limit	BV-52	RH Fan Circ Cycle time (mins)
AV-66	Econ. Min. Position	BV-27	Heating Lockout
AV-11	Float Point Econ. Position	BV-28	Cooling Lockout
BV-20	Supply Air Low Limit Alarm	BV-24	Supply Temperature Valid
Occupancy/Standby		**Residential Mode**	
BV-4	In Standby Mode	AV-129	Sets the number of occupancy periods, 2 = wake and sleep, 4 = wake, leave, return and sleep.
BV-63	Door Open		
BV-62	No Motion Since Door Closed		
BV-149	Wireless Installed	NOTE: This is a selection of some of the device objects. For the full list refer to the BACnet FF Thermostat System Engineering Guide, 31-00098.
BV-67	Occupied		
BV-60	Window/Door Open (Wireless)		
BV-61	No Motion Since Dr Clsd (Wireless)		
AV-20	Standby Delay (Sec)		
BV-81	Hotel Mode		

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