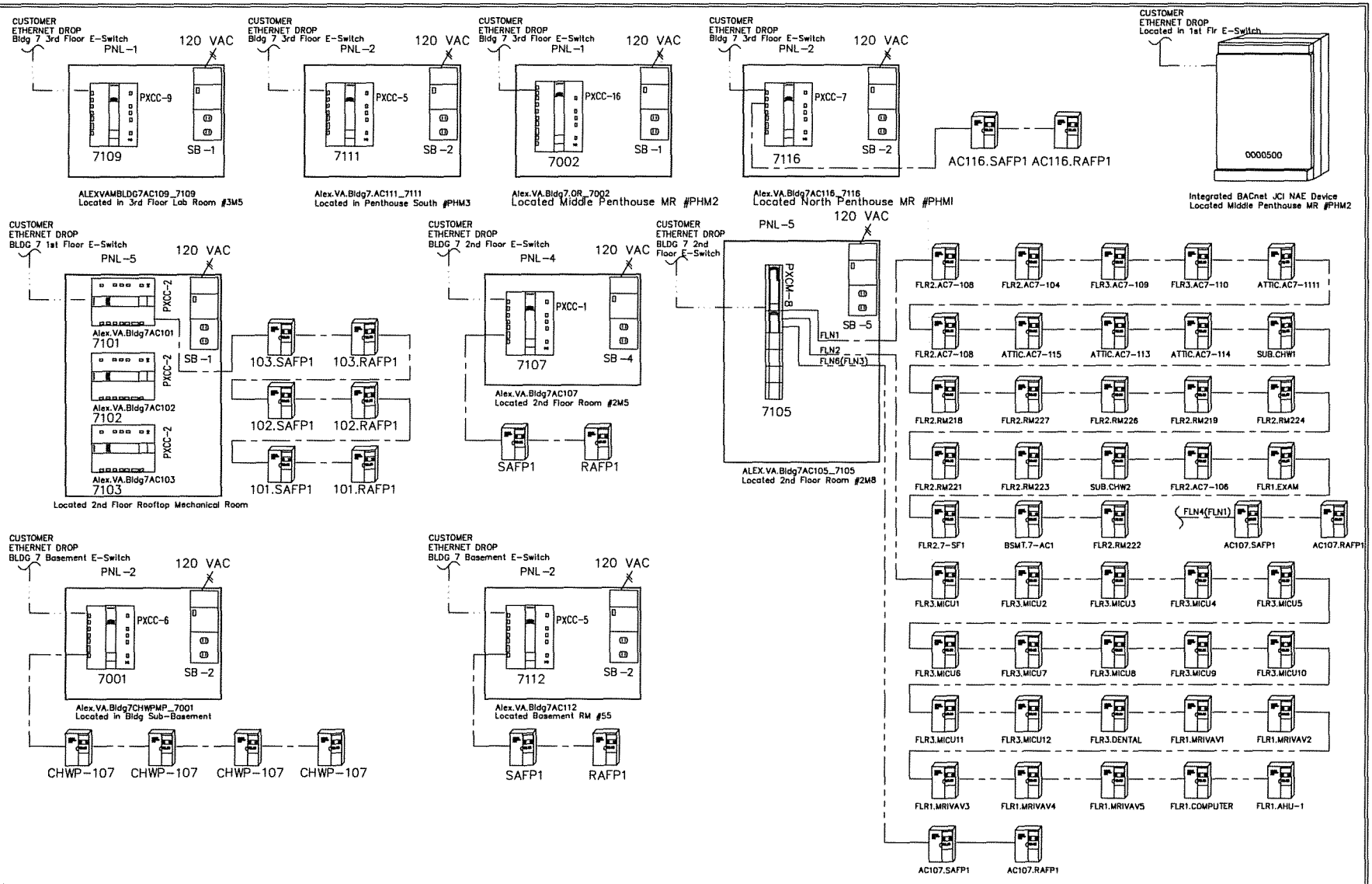
SIEMENS

BUILDING 7: AS-BUILT



REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/30/12

BLDG 7: RISER

440P-081912
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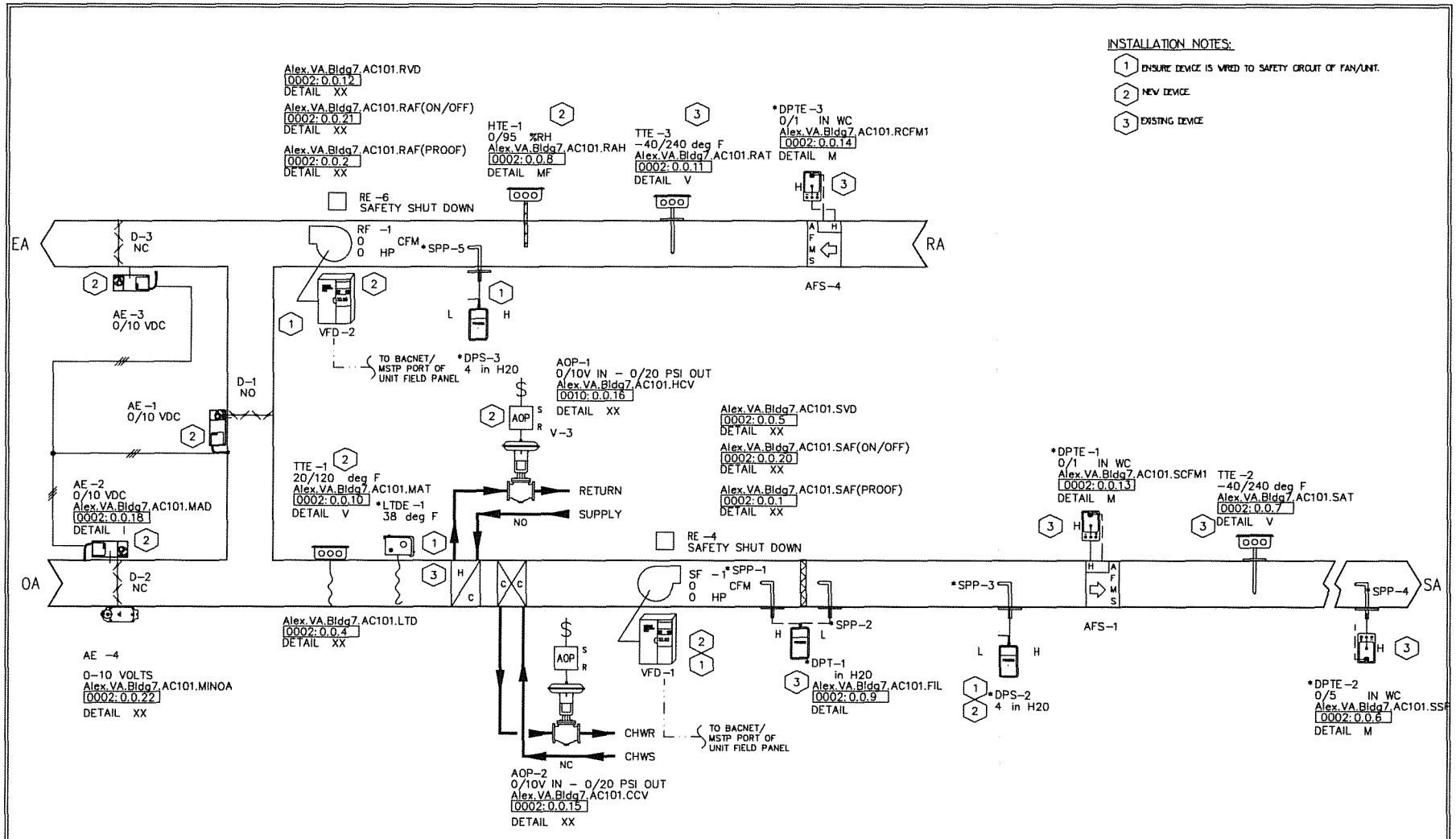

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0010	Alex.VA.Bldg7.AC111_7111	Alex.VA.Bldg7.AC111
0002	BACDev_7101	Alex.VA.Bldg7AC101

REVISION HISTORY

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BLDG 7: AC-101

440P-081912

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
AE 4	1	GMA161.1P	SIEMENS	154004	MOD SR 24V,62LBIN,PLM
AFS 1-4	4	ZZZ	N/A	N/A	N/A
AOP 1-2	2	545-113	SIEMENS	149 277	AOP -TRANSDUCER(SHORT BRACKET)
D					SEE DAMPER SUBMITTAL
HTE 1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF 1	1	N/A	N/A	N/A	N/A
SF 1	1	N/A	N/A	N/A	N/A
TTE 1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE 2-3	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V					SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7-101

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre-filter, chilled water cooling coil, hot water pre-heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes. Within the Occupied mode, the system can enter the Warm-Up mode when the space temperature is below set point or the Cool-Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm-Up or Cool-Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm-Up, Cool-Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de-energized, as sensed by the status switch, the return fan shall be de-energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75?F, or the mixed air temperature is less than 45?F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm-Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm-Up mode, the outdoor air damper opens to its minimum position.

During warm-up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm-Up mode more than once per day.

Cool-Down Mode
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/21/12

BLDG 7: AC-101 BOM & SEQ

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damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool-down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

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BLDG 7: AC-101 BOM & SEQ

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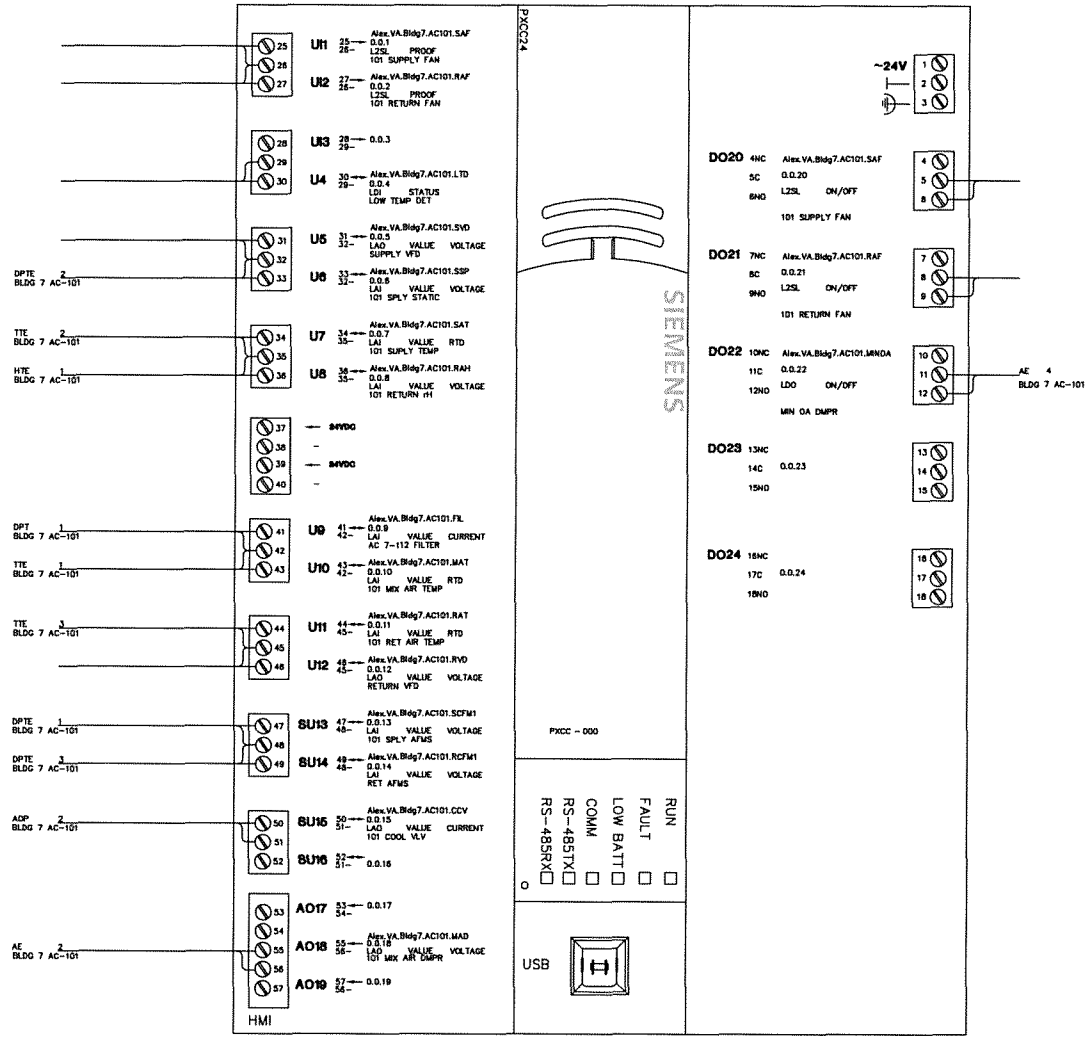

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BLDG 7: AC-101

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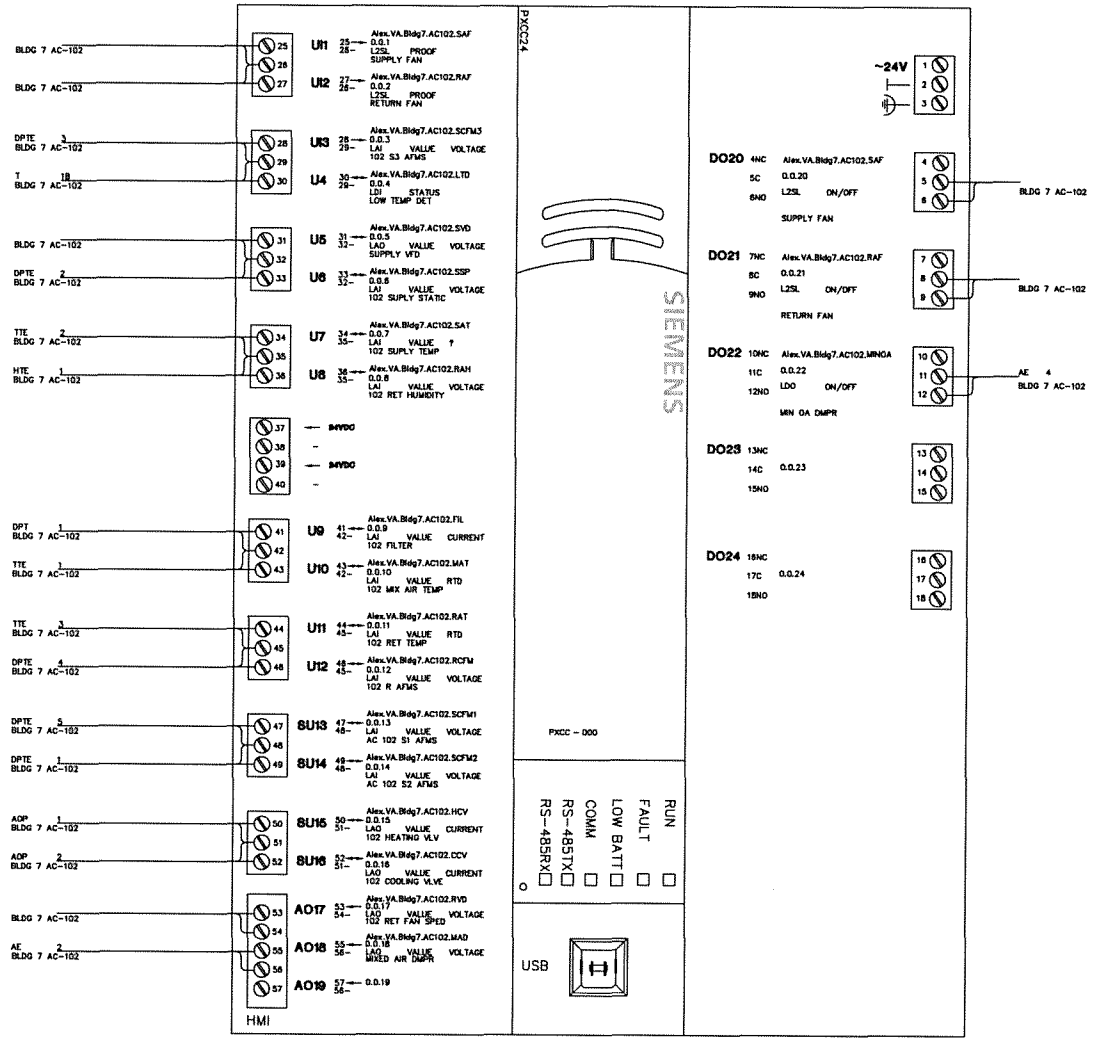

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Bldg 7: AC-102

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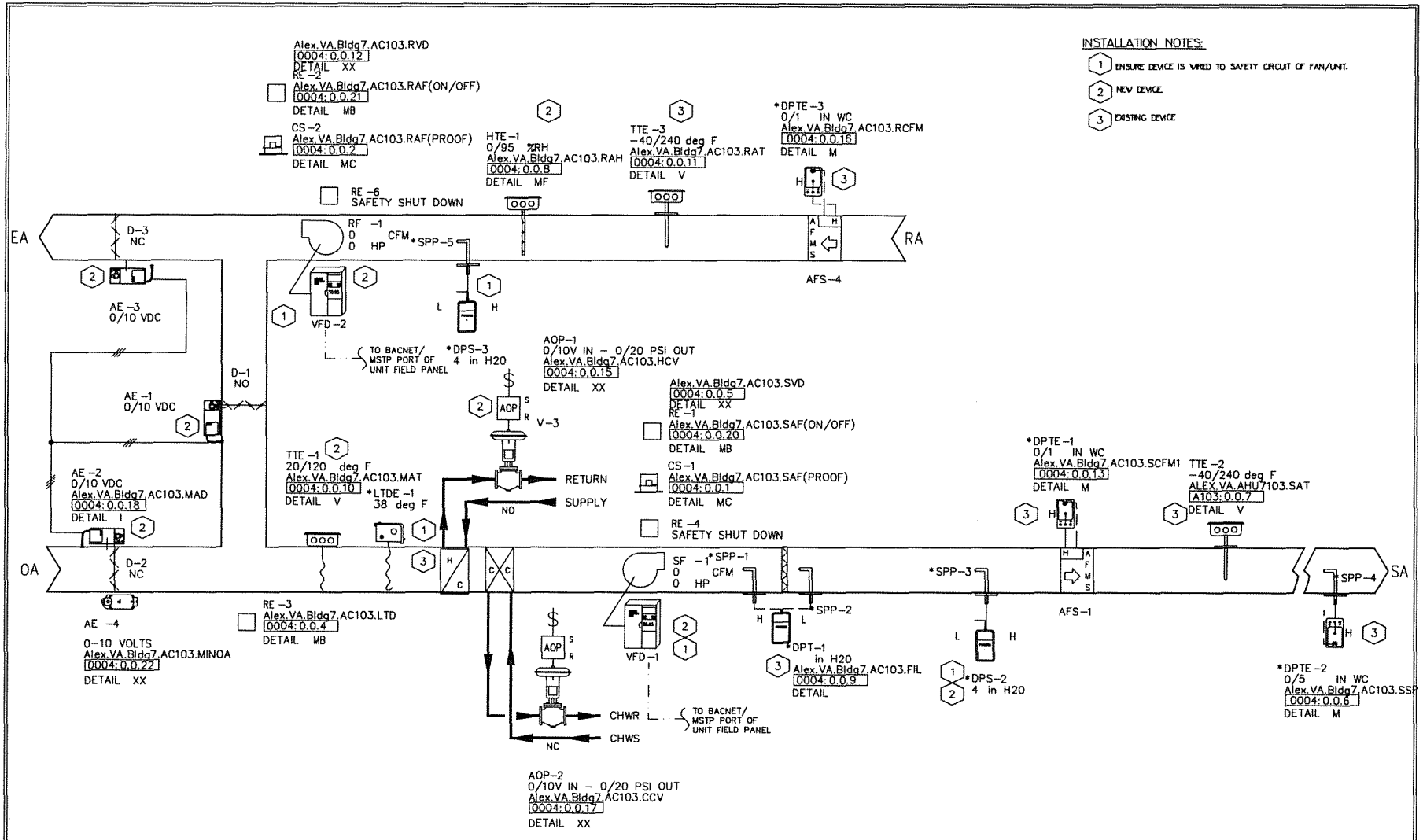

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0004	BACDev_7103	Alex.VA.Bldg7AC103

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1	4/30/2012	DMP	AS BUILT DRAWING

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BLDG 7: AC-103

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
AE 4	1	GMA161.1P	SIEMENS	154004	MOD SR 24V,62LBIN,PLM
AFS 1-4	4	ZZZ	N/A	N/A	N/A
AOP 1-2	2	545-113	SIEMENS	149 277	AOP -TRANSDUCER(SHORT BRACKET)
CS 1-2	2	H908	VERIS	1006cut005	CURRENT SW SPLITCORE-ADJ W/LED
D					SEE DAMPER SUBMITTAL
HTE 1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
RE 1-4	4	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF 1	1	N/A	N/A	N/A	N/A
SF 1	1	N/A	N/A	N/A	N/A
TTE 1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE 2-3	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V					SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7-103

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre-filter, chilled water cooling coil, hot water pre-heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes. Within the Occupied mode, the system can enter the Warm-Up mode when the space temperature is below set point or the Cool-Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm-Up or Cool-Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm-Up, Cool-Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de-energized, as sensed by the status switch, the return fan shall be de-energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75°F, or the mixed air temperature is less than 45°F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm-Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm-Up mode, the outdoor air damper opens to its minimum position.

During warm-up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm-Up mode more than once per day.

Cool-Down Mode
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air

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1	4/30/2012	DMP	AS BUILT DRAWING

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BLDG 7: AC-103 BOM & SEQ

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damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool-down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

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1	4/30/2012	DMP	AS BUILT DRAWING

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				04/24/12

BLDG 7: AC-103 BOM & SEQ

440P-081912

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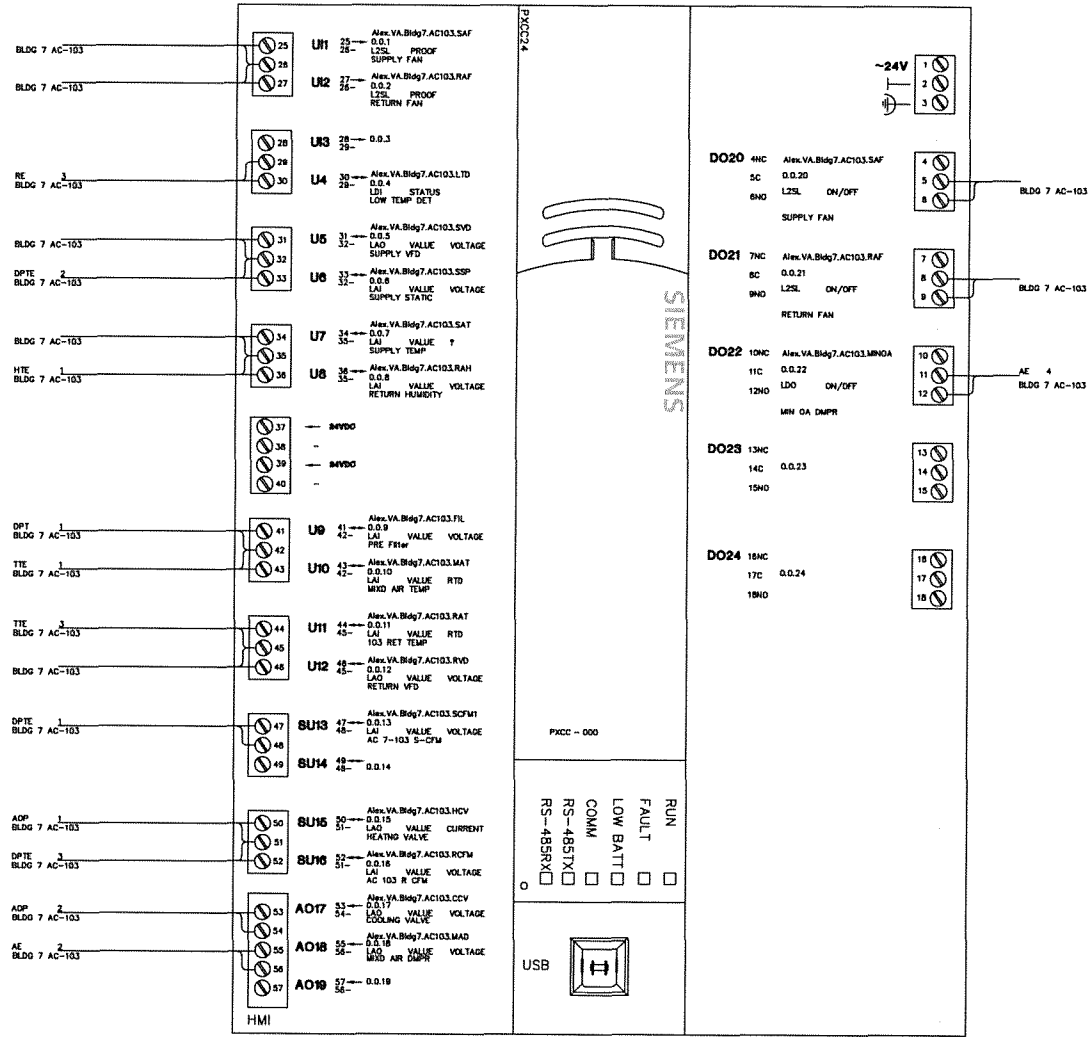

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BLDG 7: AC-103

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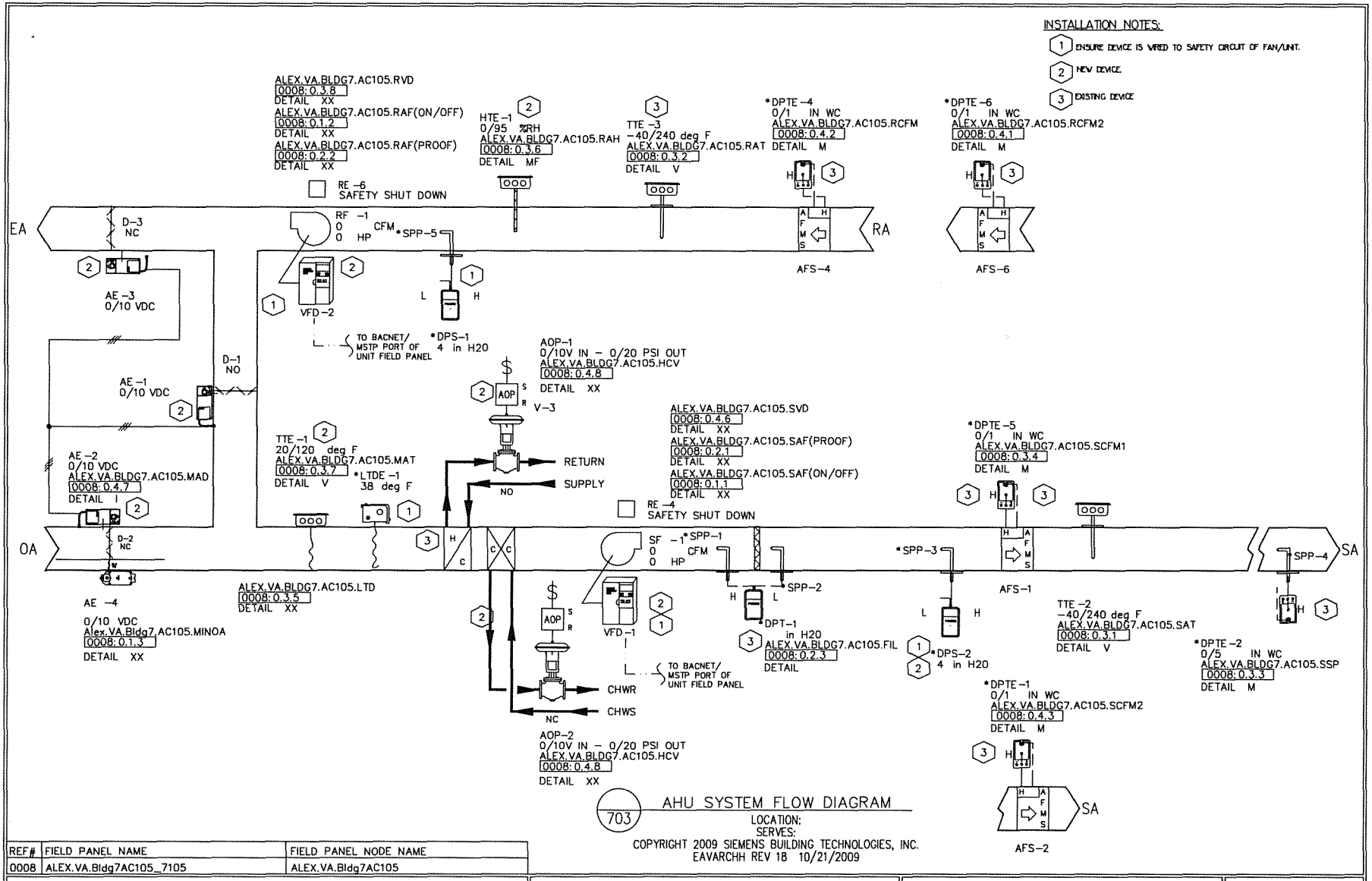

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0008	ALEX.VA.Bldg7AC105_7105	ALEX.VA.Bldg7AC105

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Control Device		Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices						
AE	1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
AE	4	1	GMA161.1P	SIEMENS	154004	MOD SR 24V,62LBIN,PLM
AFS	1-2	2	ZZZ	N/A	N/A	N/A
AFS	4	1	ZZZ	N/A	N/A	N/A
AFS	6	1	ZZZ	N/A	N/A	N/A
AOP	1-2	2	545-113	SIEMENS	149 277	AOP -TRANSDUCER(SHORT BRACKET)
D						SEE DAMPER SUBMITTAL
HTE	1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
RE	4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE	6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF	1	1	N/A	N/A	N/A	N/A
SF	1	1	N/A	N/A	N/A	N/A
TTE	1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE	2-3	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V						SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7-105

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre-filter, chilled water cooling coil, hot water pre-heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes. Within the Occupied mode, the system can enter the Warm-Up mode when the space temperature is below set point or the Cool-Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm-Up or Cool-Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm-Up, Cool-Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de-energized, as sensed by the status switch, the return fan shall be de-energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75?F, or the mixed air temperature is less than 45?F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm-Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm-Up mode, the outdoor air damper opens to its minimum position.

During warm-up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm-Up mode more than once per day.

Cool-Down Mode

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

SIEMENS

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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/24/12

BLDG 7: AHU 7-105 BOM & SEQ

440P-081912

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The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool-down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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BLDG 7: AHU 7-105 BOM & SEQ

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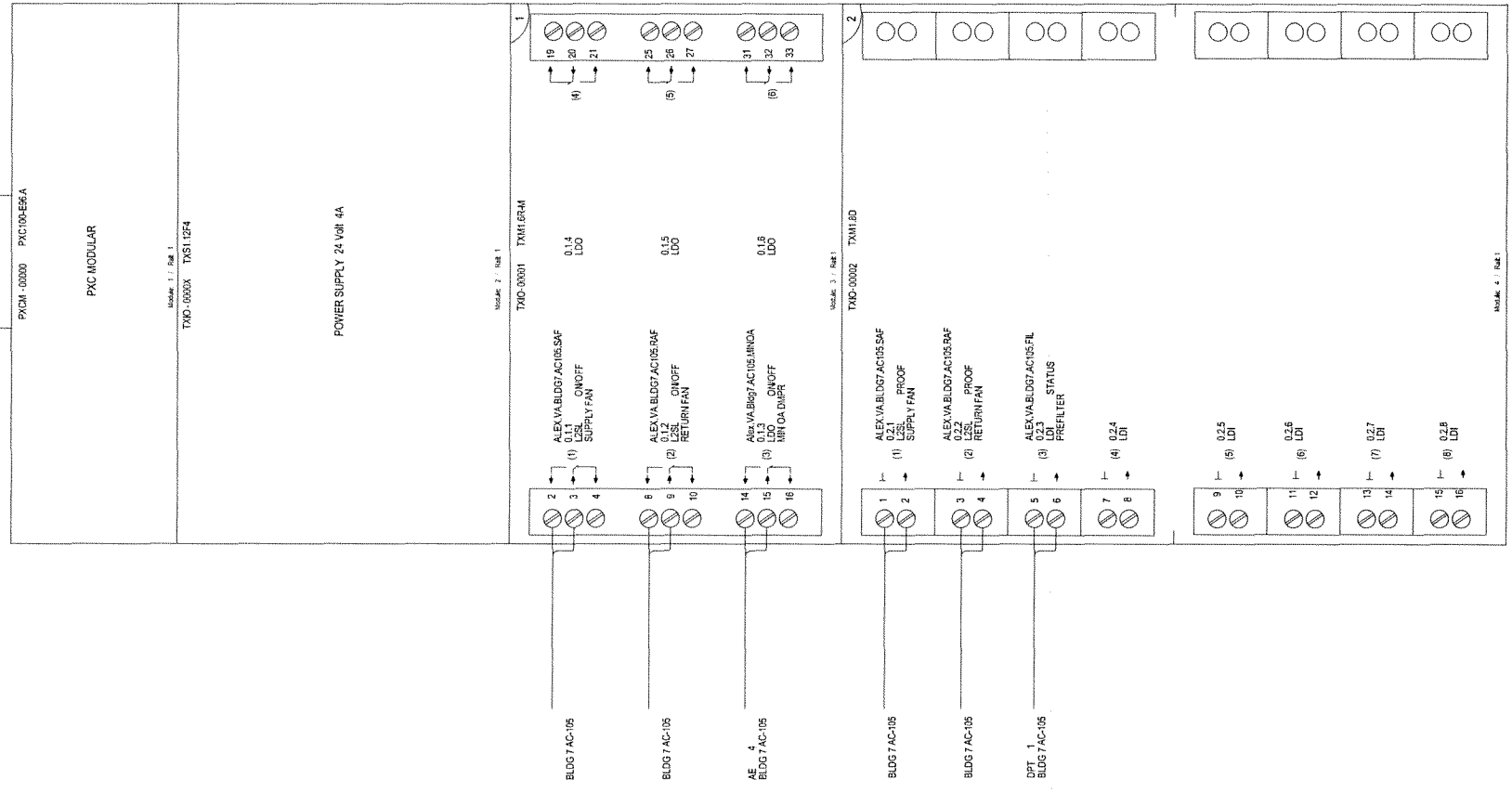

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/23/12

Bldg 7: AC-105

440P-081912

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			05/01/11	04/23/12

Bldg 7: AC-105

7030

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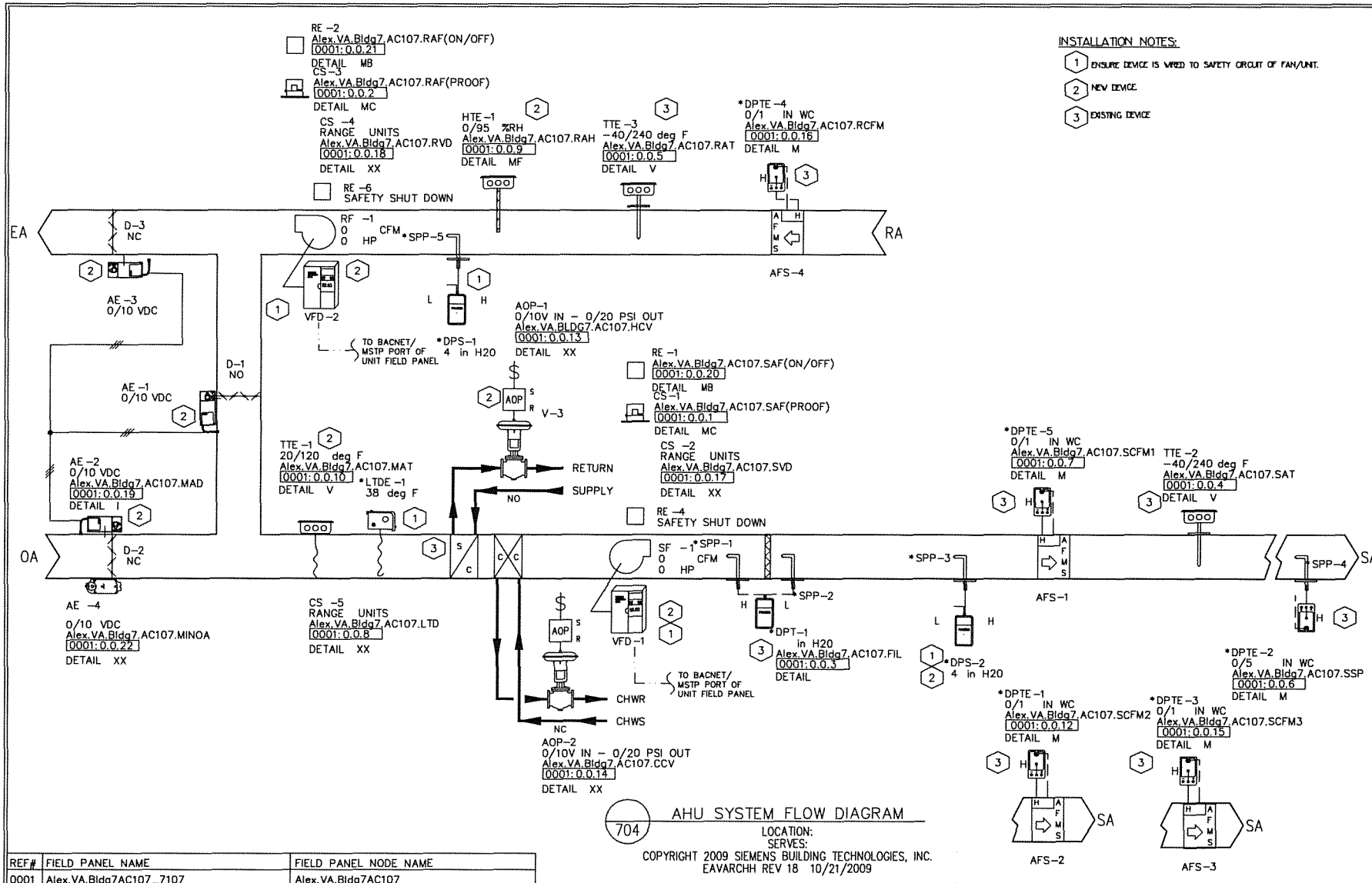

704 AHU SYSTEM FLOW DIAGRAM

LOCATION:
SERVES:

EAVARCHH REV 18 10/21/2009

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0001	Alex.VA.Bldg7AC107_7107	Alex.VA.Bldg7AC107

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1	4/30/2012	DMP	AS BUILT DRAWING

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BLDG 7: AC-107

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Control Device		Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices						
AE	1–3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AFS	1–4	4	ZZZ	N/A	N/A	N/A
AOP	1	1	545–113	SIEMENS	149 277	AOP –TRANSDUCER(SHORT BRACKET)
D						SEE DAMPER SUBMITTAL
HTE	1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4–20MA
RE	4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE	6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF	1	1	N/A	N/A	N/A	N/A
SF	1	1	N/A	N/A	N/A	N/A
TTE	1	1	544–342–24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE	2–3	2	544–339–18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V						SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7–107

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre–filter, chilled water cooling coil, hot water pre–heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes. Within the Occupied mode, the system can enter the Warm–Up mode when the space temperature is below set point or the Cool–Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm–Up or Cool–Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm–Up, Cool–Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de–energized, as sensed by the status switch, the return fan shall be de–energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two–thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75?F, or the mixed air temperature is less than 45?F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm–Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm–Up mode, the outdoor air damper opens to its minimum position.

During warm–up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm–Up mode more than once per day.

Cool–Down Mode
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool–down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper

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1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/01/11

BLDG 7: AC-107 BOM & SEQ

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limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

REVISION HISTORY			
1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/01/11

BLDG 7: AC-107 BOM & SEQ

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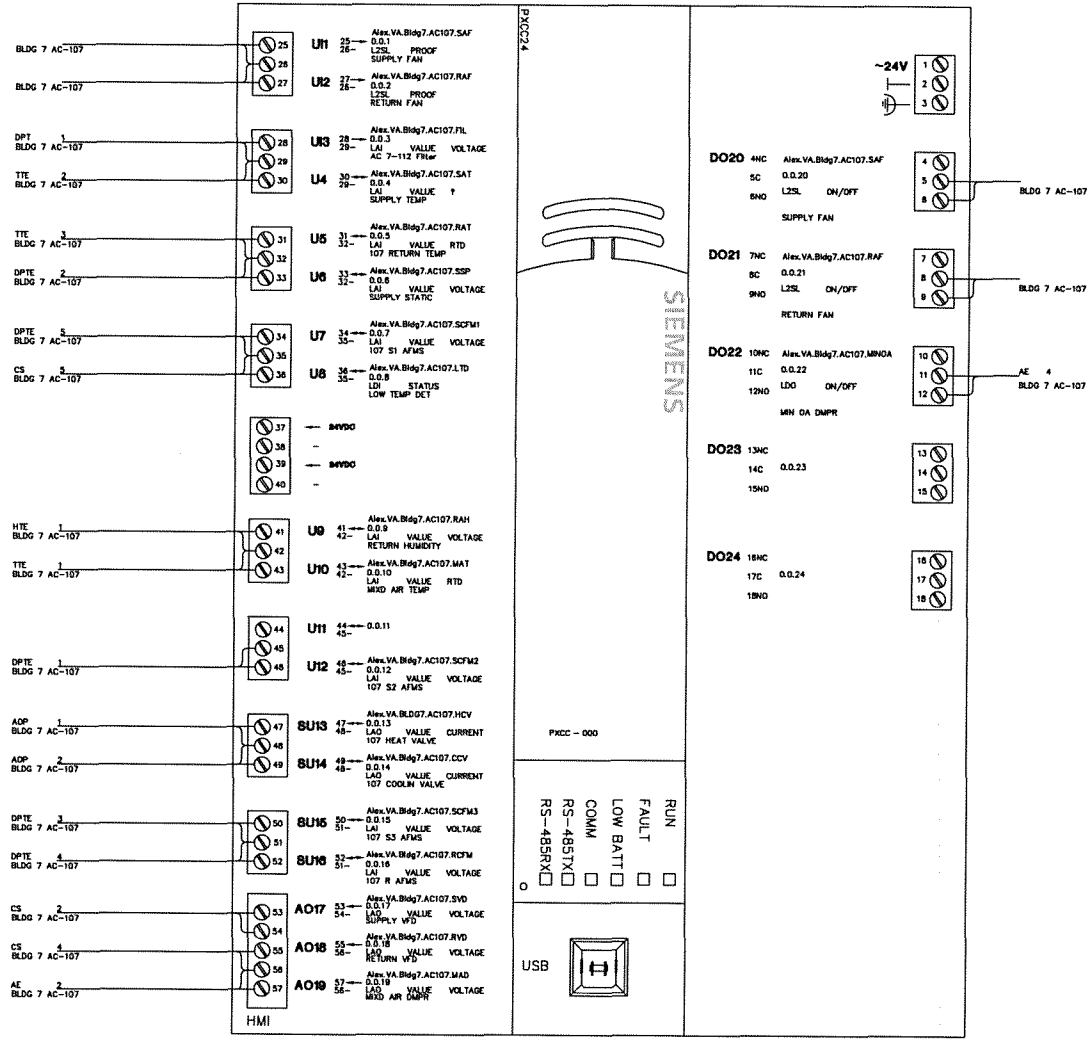

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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			05/01/11	04/23/12

BLDG7: AC-107

440P-081912

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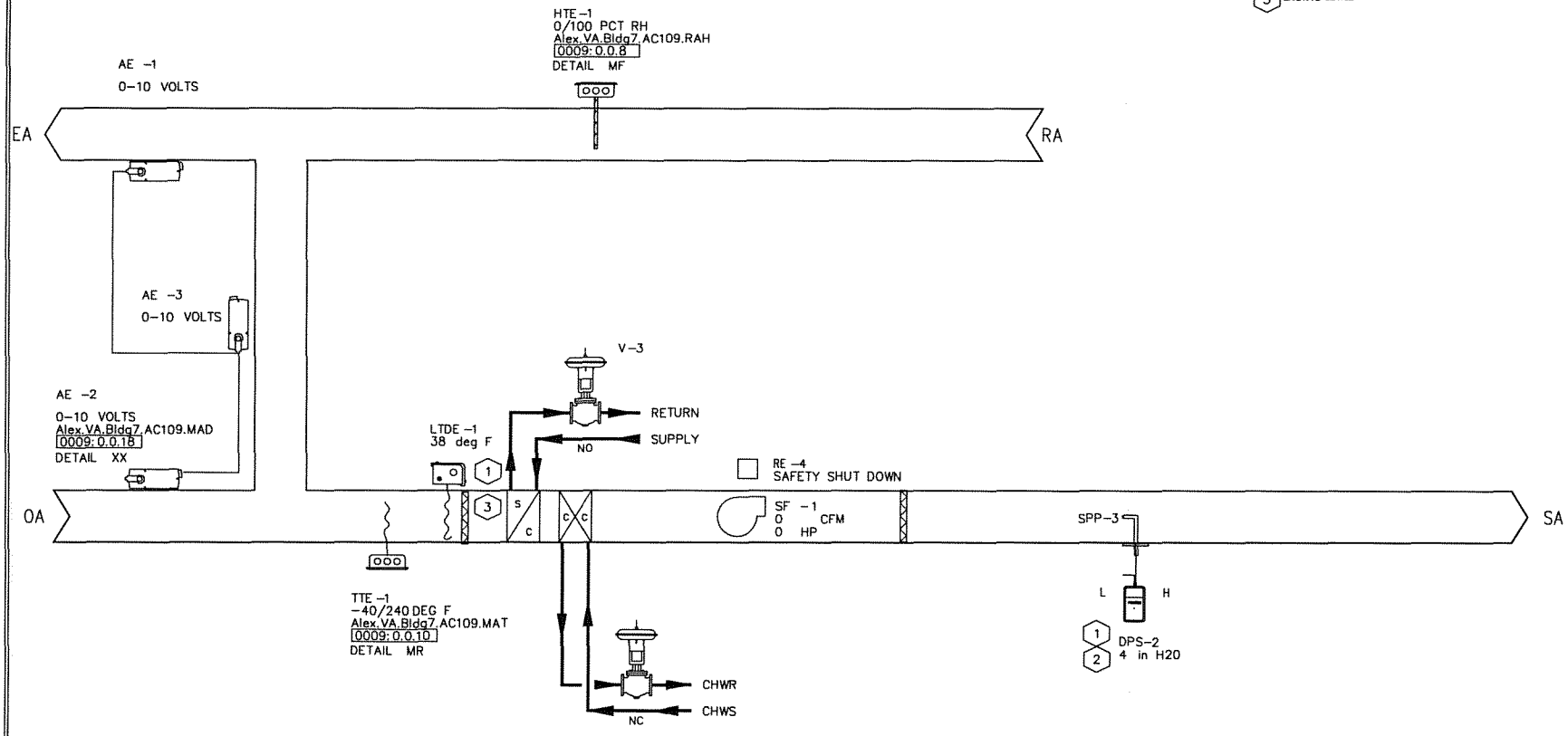
INSTALLATION NOTES:

1. ENSURE DEVICE IS WIRED TO SAFETY CIRCUIT OF FAN/UNIT.
2. NEW DEVICE.
3. EXISTING DEVICE.



VALVE CONTROL AND START STOP BY JCI METASYS

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0009	ALEXVAMBLDG7AC109_7109	ALEXVAMBLDG7AC109

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/30/12

BLDG 7: AC-109

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA161.1P	SIEMENS	154001	MOD(V) SR,24V, MED. PLNM
CS 1	1	H908	VERIS	1006cut005	CURRENT SW SPLITCORE-ADJ W/LED
DPS 2	1	141-0575	SIEMENS	155 052	AIR FLOW SWITCH.05/12 MAN REST
HTE 1	1	538 893	N/A	N/A	N/A
LTDE 1	1	134-1504	SIEMENS	155 016	T'STAT, LOW TEMP,15/55,MANUAL
RE 1	1	RH2B-UL-AC24VKIT	IDEC	1202cut016	RELAY&SOC,GP DPDT AC24V W/LED
RE 4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
SF 1	1	N/A	N/A	N/A	N/A
SPP 3	1	269-062	SIEMENS	N/A	PR269 ACCESSORY, SENSING TUBE
TTE 1	1	544 342	N/A	N/A	N/A
V					SEE VALVE SUBMITTAL

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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BLDG 7: AC-109 BOM

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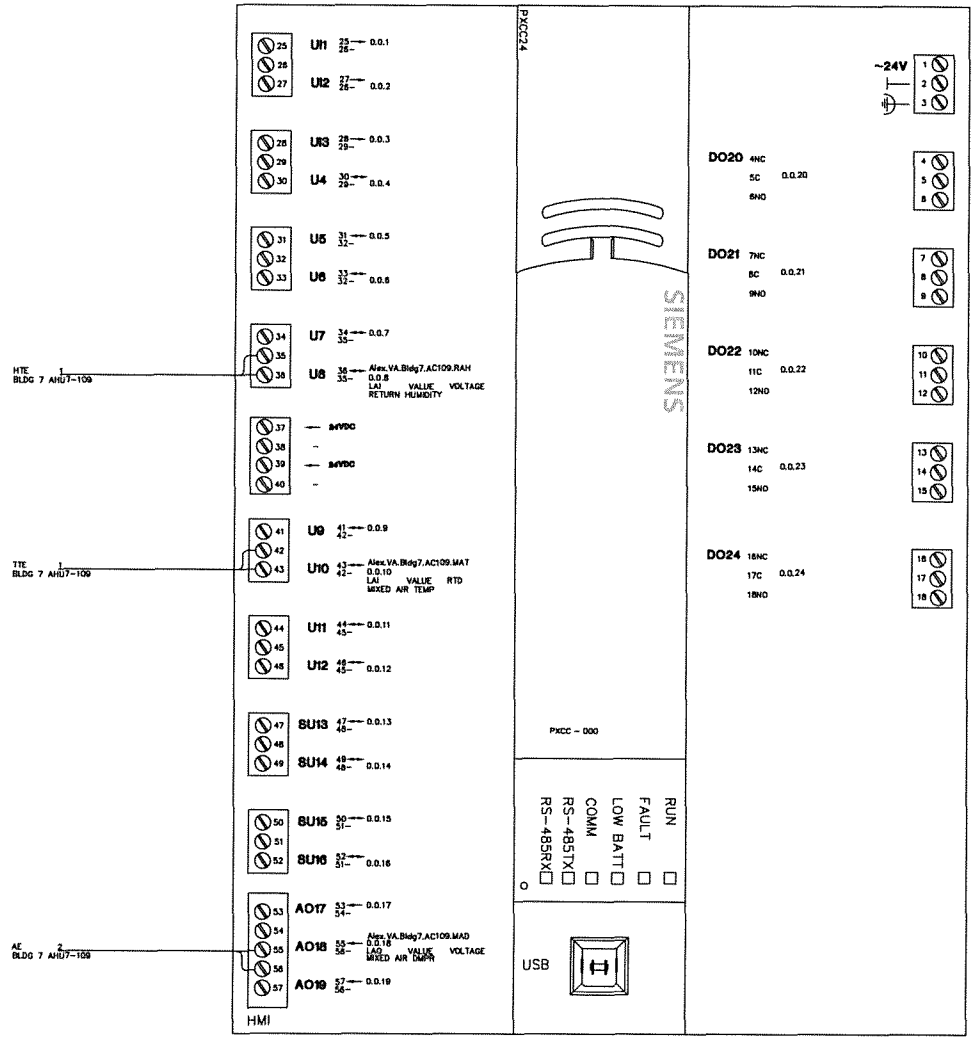

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440P-081912

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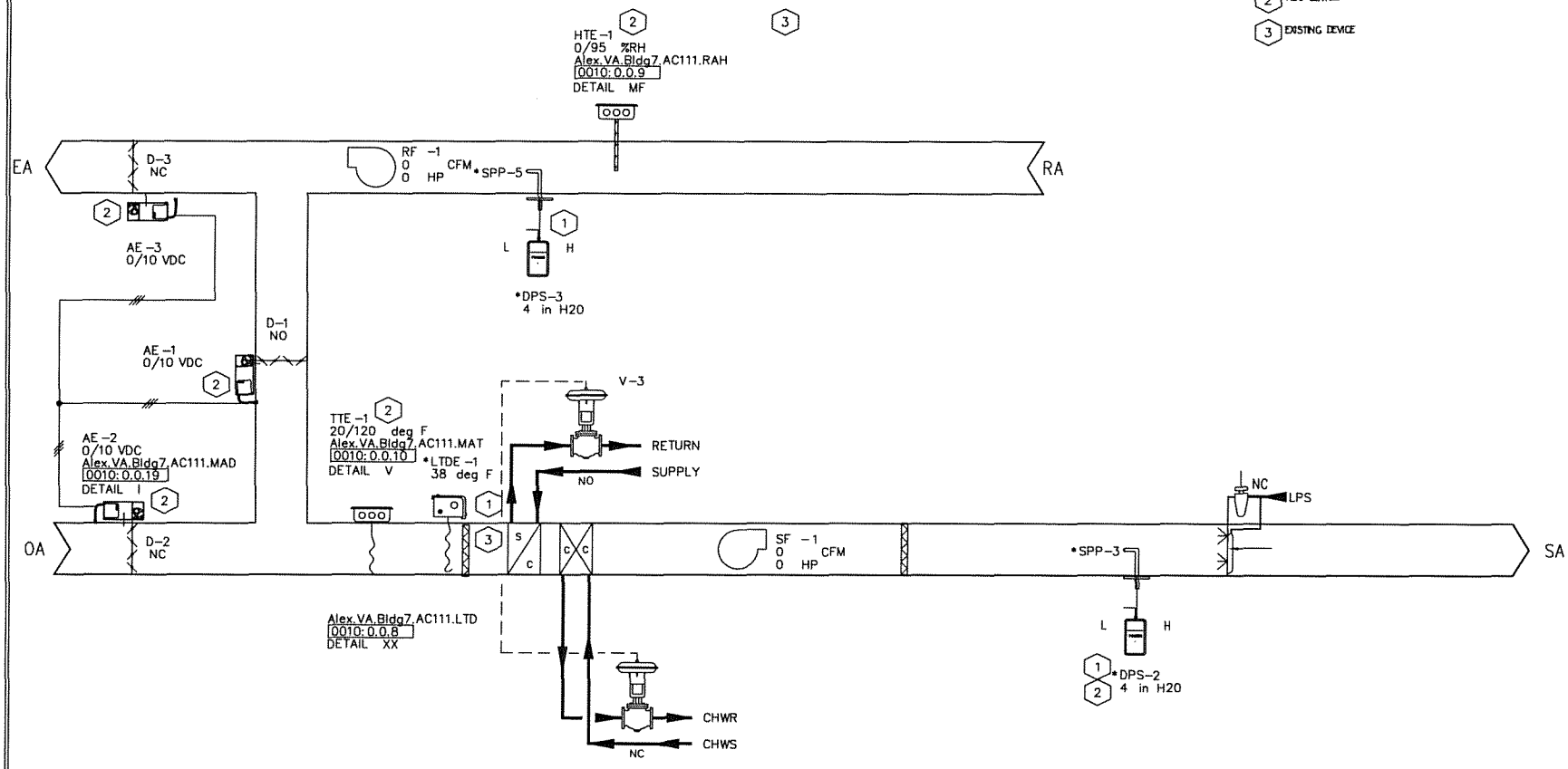
INSTALLATION NOTES:

1. ENSURE DEVICE IS WIRED TO SAFETY CIRCUIT OF FAN/UNIT.
2. NEW DEVICE.
3. EXISTING DEVICE



VALVE CONTROL AND START STOP BY JCI METASYS

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0010	Alex.VA.Bldg7.AC111_7111	Alex.VA.Bldg7.AC111

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

SIEMENS

SIEMENS INDUSTRIES INC.
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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/30/12

BLDG 7: AC-111

440P-081912
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
D					SEE DAMPER SUBMITTAL
HTE 1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
TTE 1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
V					SEE VALVE SUBMITTAL

Economizer Control

When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75F, or the mixed air temperature is less than 45F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/23/12

BLDG 7: AC-111

44OP-081912

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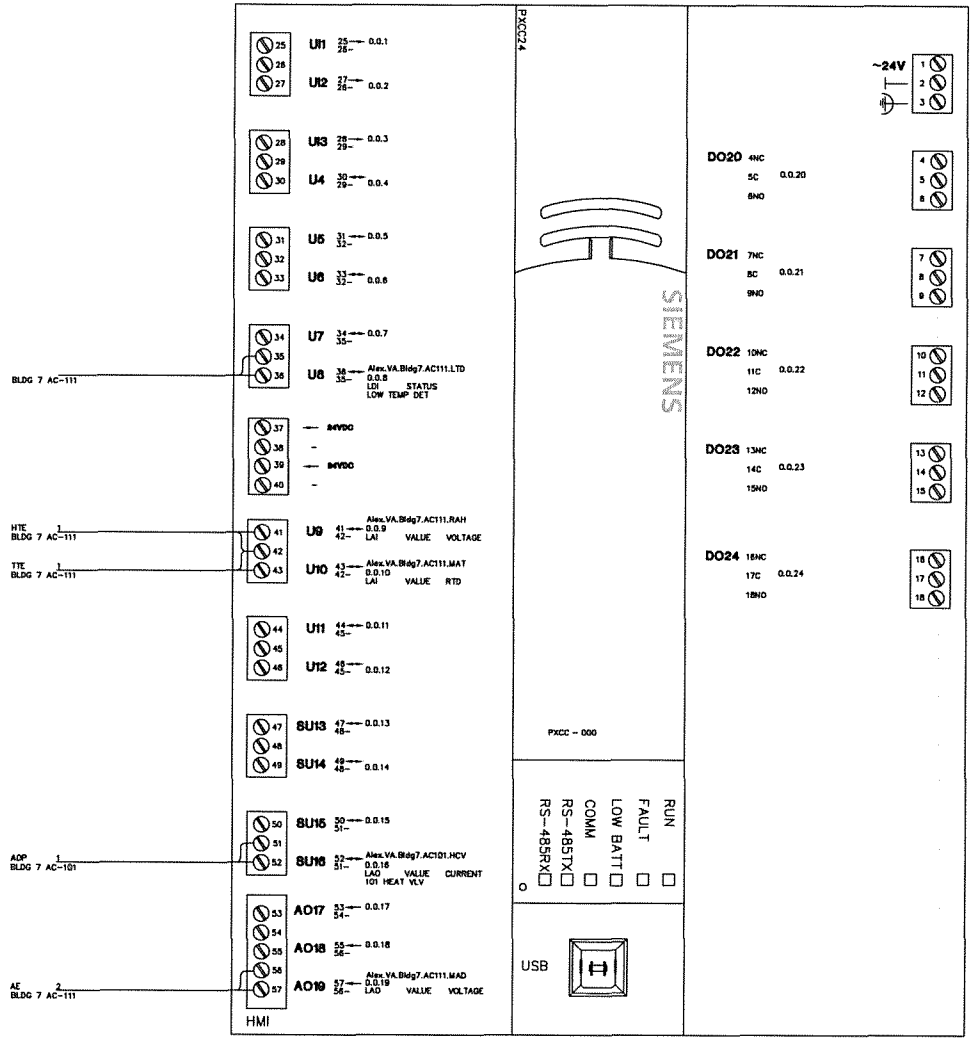

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/23/12

BLDG 7: AC-111

440P-081912
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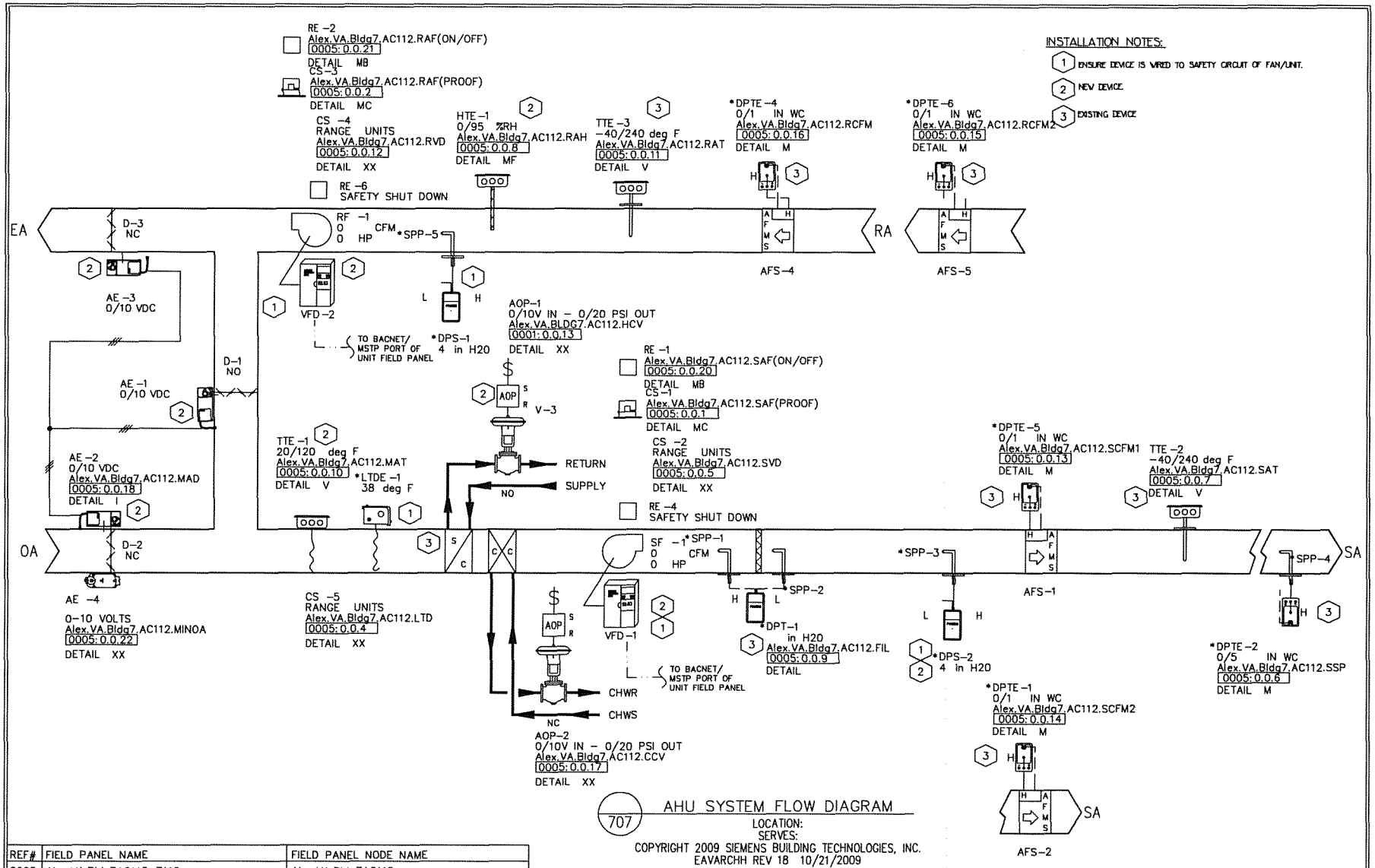

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0005	Alex.VA.Bldg7AC112_7112	Alex.VA.Bldg7AC112

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

SIEMENS
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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/23/12

BLDG 7: AC-112

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Control Device		Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices						
AE	1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
AE	4	1	GMA161.1P	SIEMENS	154004	MOD SR 24V,62LBIN,PLM
AFS	1-2	2	ZZZ	N/A	N/A	N/A
AFS	4-5	2	ZZZ	N/A	N/A	N/A
AOP	1-2	2	545-113	SIEMENS	149 277	AOP -TRANSDUCER(SHORT BRACKET)
CS	1	1	H908	VERIS	1006cut005	CURRENT SW SPLITCORE-ADJ W/LED
CS	2	1	ZZZ	N/A	N/A	N/A
CS	3	1	H908	VERIS	1006cut005	CURRENT SW SPLITCORE-ADJ W/LED
CS	4-5	2	ZZZ	N/A	N/A	N/A
D						SEE DAMPER SUBMITTAL
HTE	1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
RE	1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE	4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE	6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF	1	1	N/A	N/A	N/A	N/A
SF	1	1	N/A	N/A	N/A	N/A
TTE	1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE	2-3	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V						SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7-112

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre-filter, chilled water cooling coil, hot water pre-heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes.

Within the Occupied mode, the system can enter the Warm-Up mode when the space temperature is below set point or the Cool-Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm-Up or Cool-Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm-Up, Cool-Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de-energized, as sensed by the status switch, the return fan shall be de-energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75?F, or the mixed air temperature is less than 45?F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm-Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm-Up mode, the outdoor air damper opens to its minimum position.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/23/12

BLDG 7: AC112 BOM & SEQ

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During warm-up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm-Up mode more than once per day.

Cool-Down Mode
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool-down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/23/12

BLDG 7: AC112 BOM & SEQ

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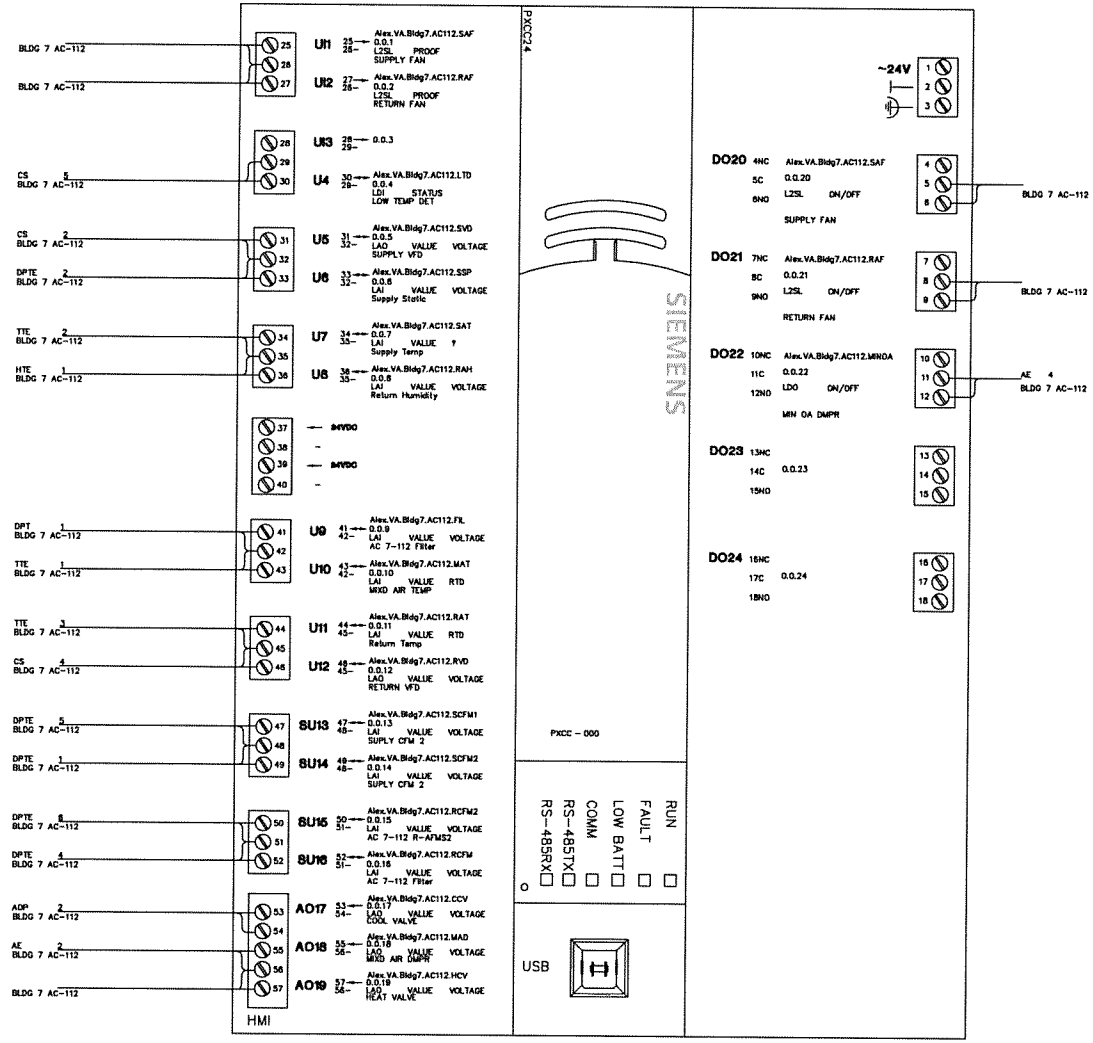

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/25/12

Bldg 7: AC-112

440P-081912

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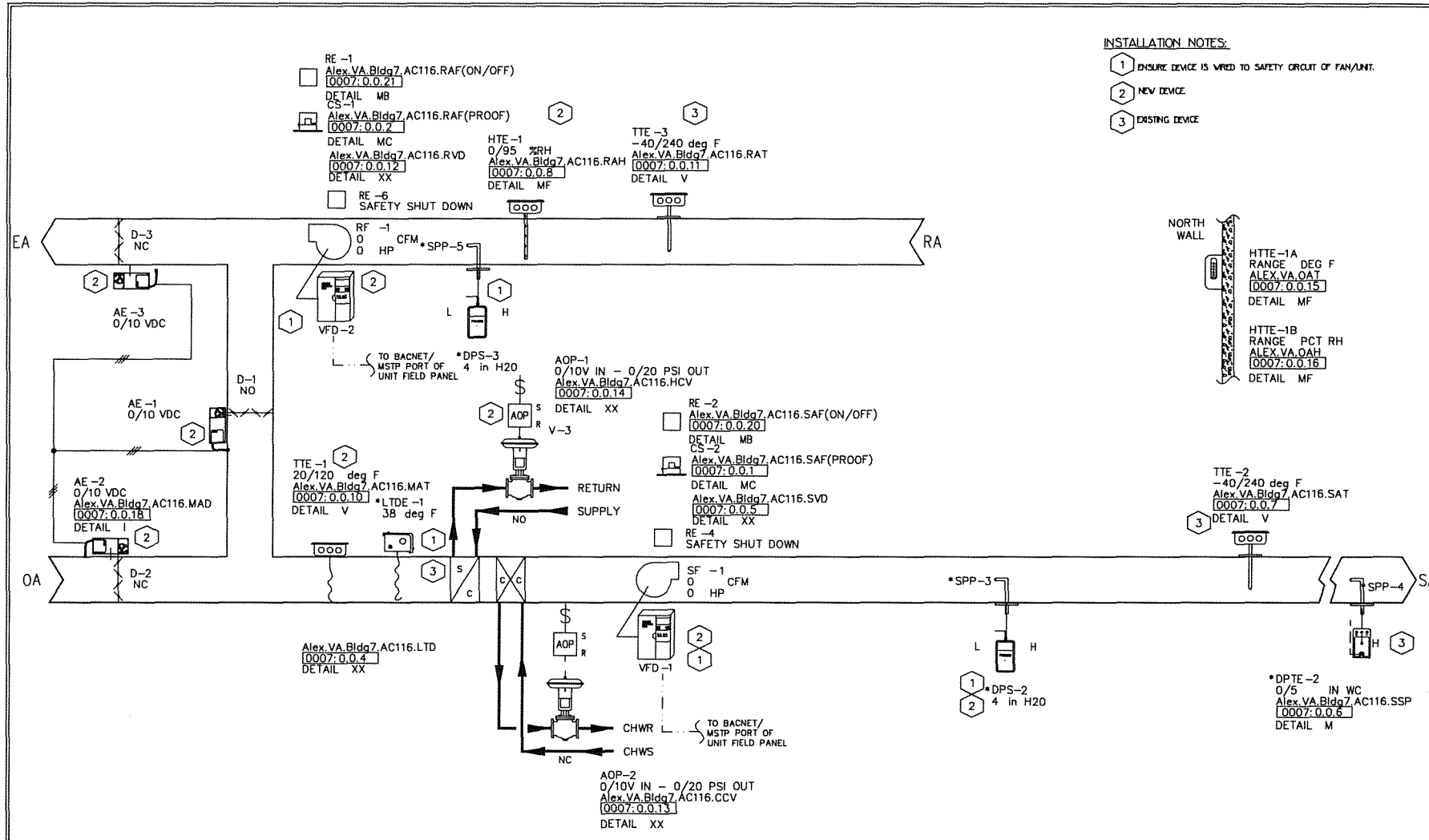

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0007	Alex.VA.Bldg7AC116_7116	Alex.VA.Bldg7AC116

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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			05/01/11	04/23/12

BLDG 7: AC-116

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA166.1U	SIEMENS	154001	MOD(V) SR,24V, MED
AFS 2-3	2	ZZZ	N/A	N/A	N/A
AOP 1-2	2	545-113	SIEMENS	149 277	AOP -TRANSDUCER(SHORT BRACKET)
CS 1-2	2	H908	VERIS	1006cut005	CURRENT SW SPLITCORE-ADJ W/LED
D					SEE DAMPER SUBMITTAL
HTE 1	1	QFM2101	SIEMENS	149991	SENSOR (DUCT) RH: 4-20MA
HTTE 1A	1	RHT2IO/A6	N/A	N/A	N/A
HTTE 1B	1	RHT-ACCS	N/A	N/A	N/A
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 4	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 6	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RF 1	1	N/A	N/A	N/A	N/A
SF 1	1	N/A	N/A	N/A	N/A
TTE 1	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
TTE 2-3	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V					SEE VALVE SUBMITTAL

RECOMMENDED SEQUENCE OF OPERATION FOR AHU 7-116

The variable volume air handling unit consists of a mixed air section with outdoor air, exhaust air and return air dampers, pre-filter, chilled water cooling coil, hot water pre-heating coil, supply and return fans with variable frequency drives. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation on a time of day basis for Occupied and Unoccupied modes. Within the Occupied mode, the system can enter the Warm-Up mode when the space temperature is below set point or the Cool-Down mode when the space temperature is above set point. (Since the terminal boxes are currently pneumatically controlled, one or more space temperature sensors need to be installed in representative areas.) The system stays in the Warm-Up or Cool-Down mode until the mode set point is satisfied. Within the Unoccupied mode, Night Heating is available when the space temperature drops below 65?F and Night Cooling is available when the space temperature rises above 85?F. The latest start time is the scheduled occupancy for the space.

The air handling unit operates in Occupied, Warm-Up, Cool-Down, Unoccupied, Night Heating, Night Cooling, and Safety modes as shown below. All suggested set points and settings are adjustable.

Whenever the supply fan is de-energized, as sensed by the status switch, the return fan shall be de-energized, the outside and relief air dampers shall be closed, the return air damper shall be open, and the heating and cooling valves shall be closed.

OCCUPIED MODE

Static Pressure and Building Pressurization Control
The supply fan shall be energized and the fan speed is modulated in order to maintain the measured static pressure at the sensor (as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct) at its set point. The static pressure set point shall reset linearly based on outside air dry bulb temperature according to a simple table statement.

Whenever the supply fan is energized, the return fan shall be energized. The return fan speed is modulated to maintain a fixed offset from the supply fan speed. The return fan variable frequency drive modulates to maintain the differential CFM set point to maintain a positive building pressure differential. The supply CFM to return CFM differential set point is 0 CFM if the outside air damper is closed.

Upon initial startup of the air handling system the supply and return fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system the supply and return fan variable frequency drives are stopped and the speed signal shall go to zero speed.

Economizer Control
When outside air enthalpy or temperature is determined to be greater than return air enthalpy or temperature, the outside air dry bulb temperature is greater than 75?F, or the mixed air temperature is less than 45?F, the economizer mode is disabled. The outside air damper is set at its minimum occupied position, the return air damper is fully opened, and the relief air damper is fully closed.

When outside air enthalpy and temperature are determined to be less than return air enthalpy and temperature by a predetermined offset, economizer mode is enabled. When enabled, the outside air, return air, and relief air dampers operate in conjunction to attempt to maintain the discharge air temperature two degrees below its set point.

CHW and HHW Valve Control
The chilled water valve modulates to maintain the discharge air temperature at its set point.
The preheat valve modulates to maintain the discharge air temperature at 45?F, independent of discharge air temperature set point.

The discharge air temperature set point is increased incrementally when supply fan speed falls below 50%, and is decreased incrementally when supply fan speed rises above 70%. The upper and lower limits of allowable temperature set points vary by AHU.
When outside air dew point temperature is above 55?F, the discharge air temperature set point should not exceed 57?F.

Warm-Up Mode
The supply and return fans start. The mixing dampers are positioned for 100% return, the cooling coil valve remains closed. The heating coil valve modulates to maintain the supply air temperature set point. If time reaches the latest start time during the Warm-Up mode, the outdoor air damper opens to its minimum position.

During warm-up mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Warm-Up mode more than once per day.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/23/12

BLDG 7: AC-116 BOM & SEQ

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Cool-Down Mode
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open up until time reaches the latest start time, at which time the outside air damper minimum position is set to its normal occupied position.

During cool-down mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 cfm when outside air damper is fully shut.

The system is prevented from entering the Cool-Down mode more than once per day.

UNOCCUPIED MODE

Unoccupied Off
The supply and return fans shall be de-energized except when operation is called for as described below. Outside air and relief dampers shall be closed and return air damper open.
When the supply fan is de-energized and the mixed air temperature is less than the Mixed Air Low Temperature Protection Set point of 40°F (adjustable), or the Low Temperature Limit trips, then the preheat coil valve shall cycle to maintain a mixed air temperature of 40°F (adjustable). When the mixed air temperature is greater than the Mixed Air Low Temperature Protection Set point of 42°F; the heating valves shall be closed. A dead band of 2°F is given to improve control.

Night Heating
The supply and return fans start with the preheat and chilled water valves closed, the outside air and relief air dampers closed, and the return air damper open to maintain a minimum space temperature of 65?F.
During Night Heating mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a 0 CFM differential with the supply.

Night Cooling
The supply and return fans start. The chilled water valve and preheat valve are controlled the same as in normal Occupied mode. Economizer control is the same as in normal occupied mode, except that the minimum outside air damper position is 0% open.
During Night Cooling mode, the supply fan VFD speed is controlled to maintain duct static pressure set point, but an upper limit of 80% speed is placed on the VFD. The return fan VFD speed controls to a CFM differential with the supply. This differential is set to 0 CFM when outside air damper is fully shut.

SAFETY

Discharge high static cutout, smoke detectors in the supply and return air streams, and supply and return fan VFD fault alarms de-energize the supply and return fans upon activation. Under this condition, when the outside air temperature is less than 45 ?F, the preheat valve modulates to maintain the mixed air temperature at 45?F and the chilled water valve opens. When the outside air temperature is 45?F or above, the preheat valve and the chilled water valve close. The outside air and relief air dampers close and the return air damper opens.

A low temperature detector in the discharge of the heating coil de-energizes the supply and return fans when temperatures below 38 degrees F (3 degrees C) are sensed. The chilled water and preheat valves open. The outside air and relief air dampers close and the return air damper opens.

Current switches are installed on the load side of the supply and return fan VFDs. The DDC system uses the switches to confirm the fans are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. The DDC system generates a VFD trouble alarm independent from the fan status.

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
				04/23/12

BLDG 7: AC-116 BOM & SEQ

440P-081912

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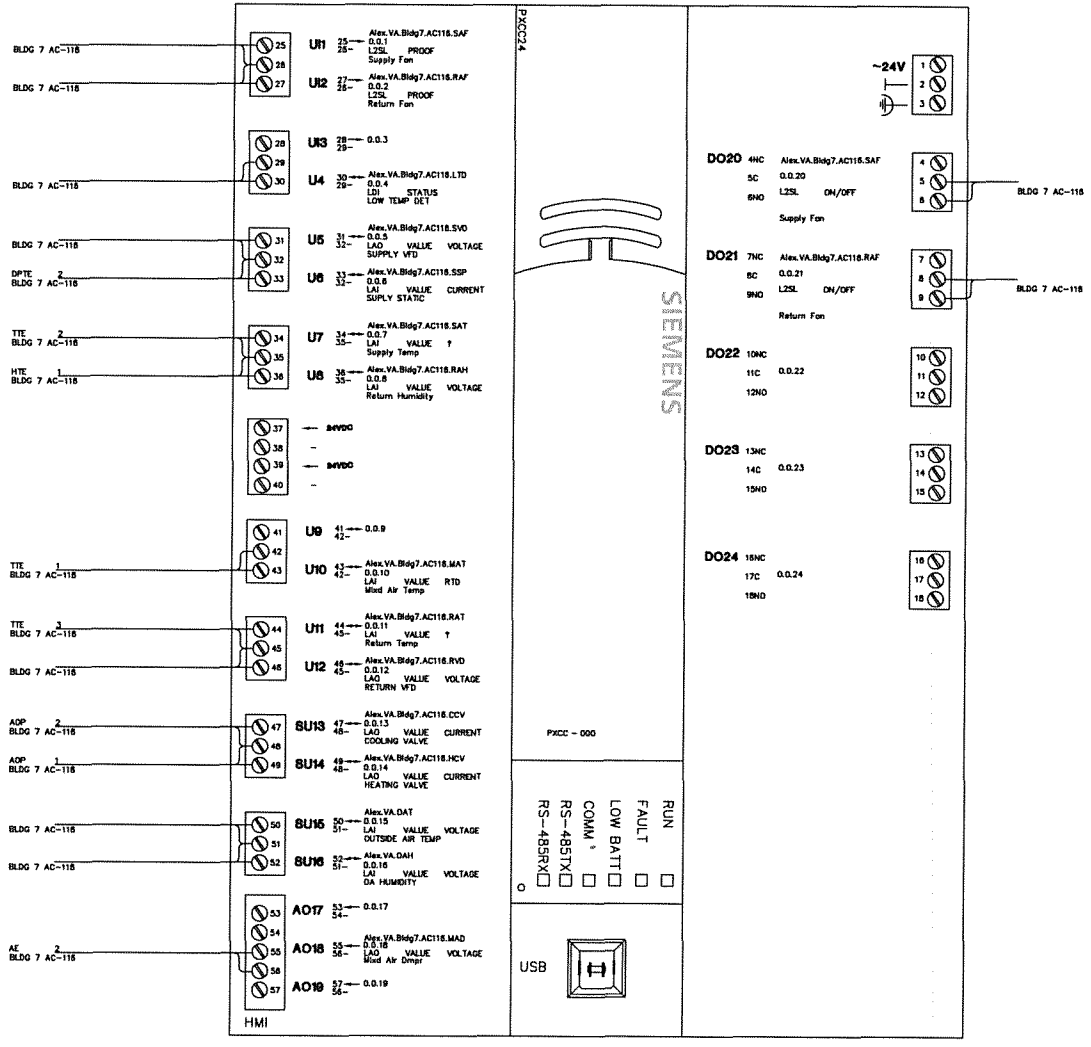

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

SIEMENS

SIEMENS INDUSTRIES INC.
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104 ANNONCE STREET
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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/24/12

BLDG7: AC-116 MICU

440P-081912

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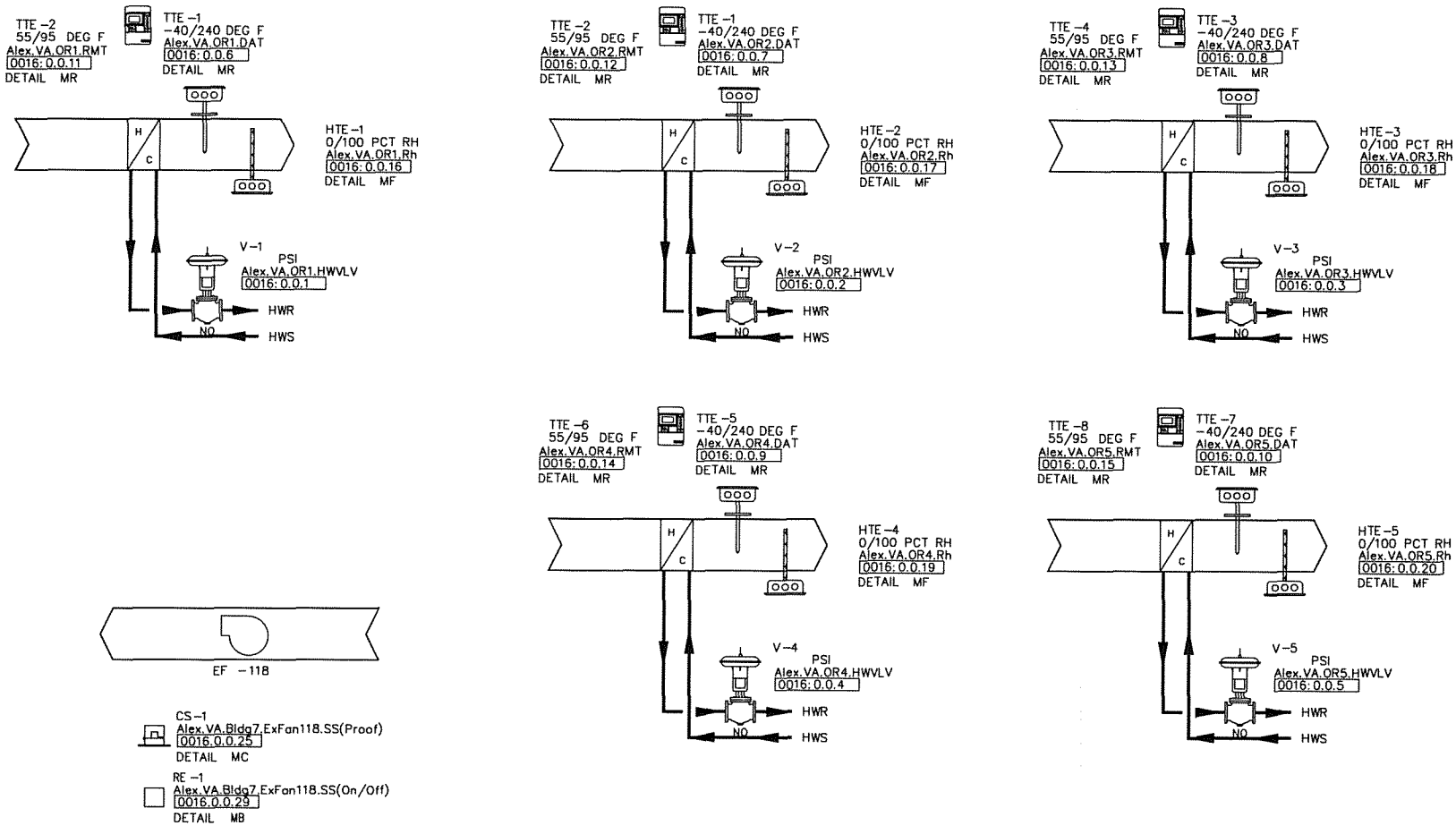

ALL EXISTING DEVICES

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0016	Alex.VA.Bldg7.OR_7002	Alex.VA.Bldg7.OR

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/30/12

BLDG 7: Operating Rooms

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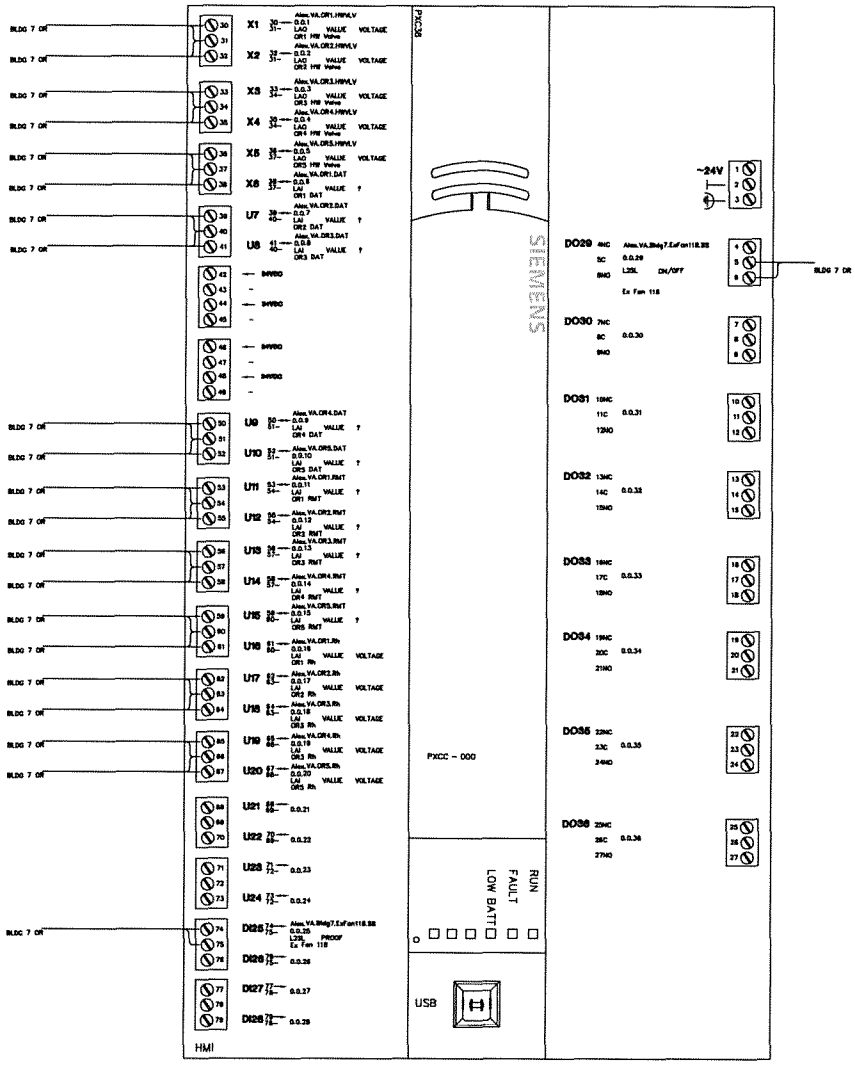

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
			05/01/11	04/25/12

Bldg 7, Operating Room

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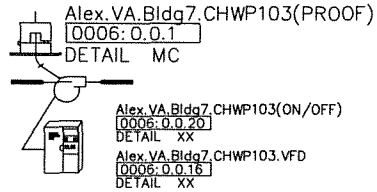

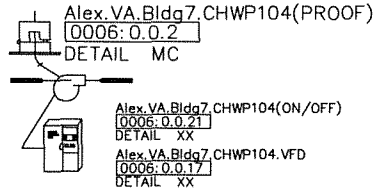

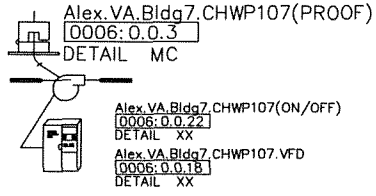

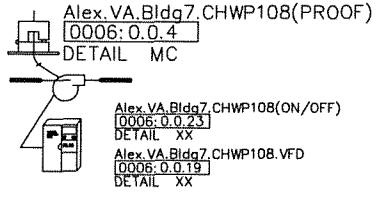

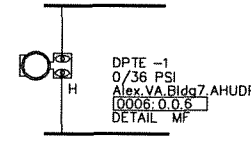

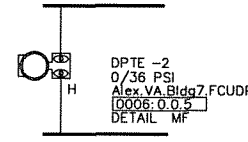

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0006	Alex.VA.Bldg7CHWPMP_7001	Alex.VA.Bldg7CHWPMP

REVISION HISTORY

1	4/30/2012	DMP	AS BUILT DRAWING

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VA MEDICAL CTR RETRO
ALEXANDRIA, LA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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BLDG 7: CHW PUMPS

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DPTE 1-2	2	2024D3A12A2S1B4	N/A	N/A	N/A

The secondary chilled water system consists of chilled water pumps with individual variable frequency drives. The system is DDC controlled with electric actuation.

The system operates as follows (All suggested set points and settings are adjustable.):

Secondary Chilled Water Pump Alternation
Secondary chilled water pumps alternate to equalize runtime. Selection of the lead pump is evaluated on a weekly basis. The pump with the least runtime is the lead pump. The pump with the most runtime is the lag pump.

Secondary Chilled Water Pump Control
When the chilled water system is on (indicated by a chilled water pump being on), the lead secondary chilled water pump starts. The variable frequency drive modulates pump speed to maintain system differential pressure of 20 PSI as sensed near the end of the secondary piping run. If the system differential pressure is below set point and the lead pump is at 100% speed for a time interval of 15 minutes, the lag pump starts. With both pumps on, the variable frequency drives are modulated in unison to maintain system differential pressure. If the system differential is at set point and both pumps are on and at 45% speed for a time interval of 15 minutes the lag pump is stopped.

The DDC system uses current switches to confirm the lead pump is in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. If the lead pump goes into alarm, the lag pump starts.

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BLDG 7: CHW PUMPS BOM

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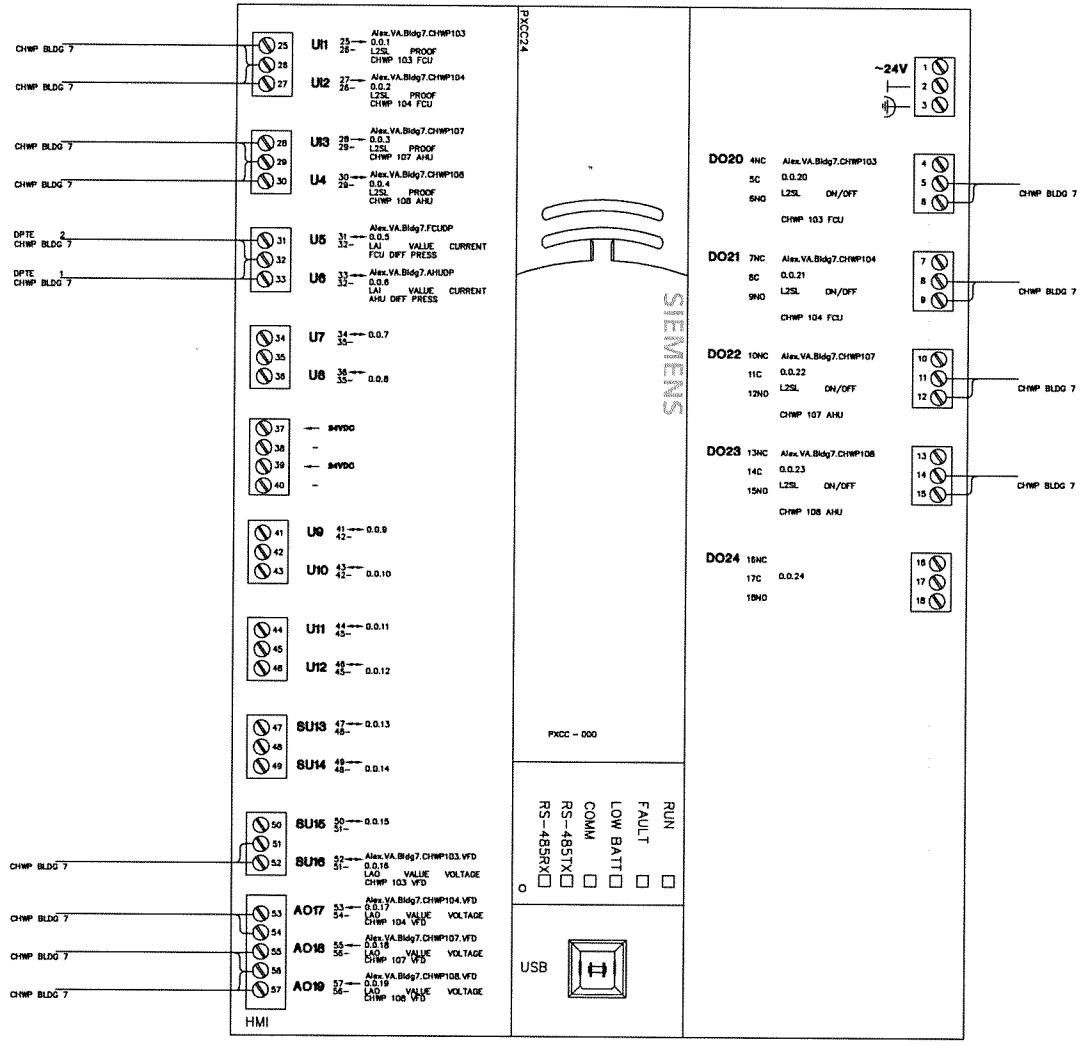

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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BLDG 7: CHW PUMPS

440P-081912
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