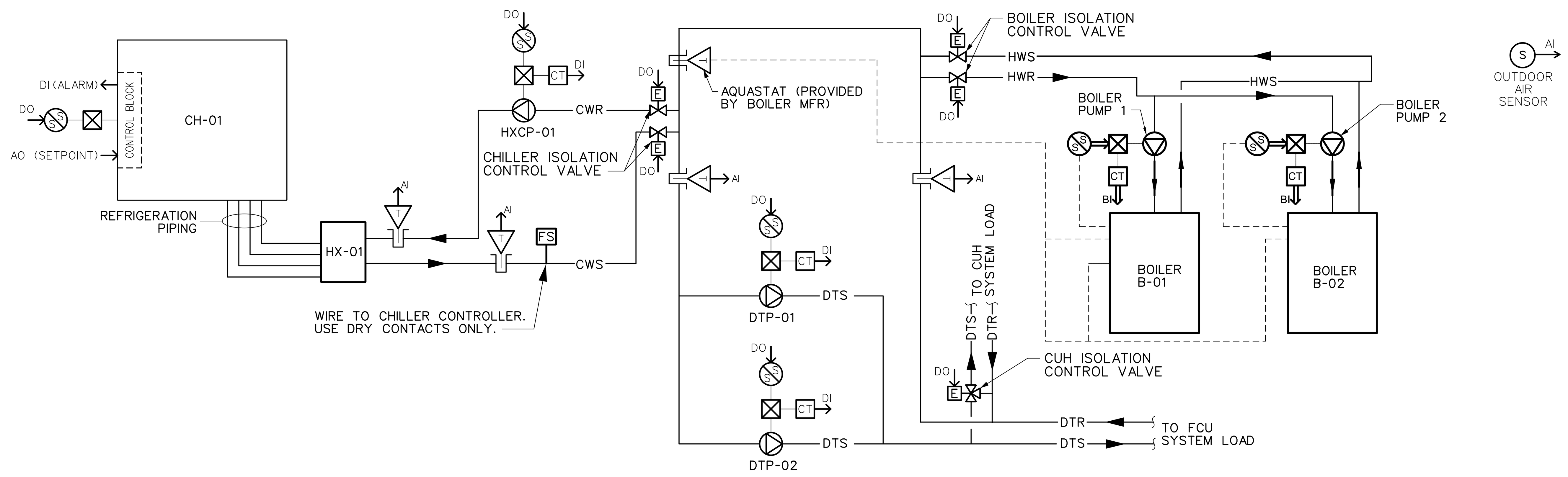


DUAL TEMPERATURE WATER SYSTEM

THE SYSTEM SHALL BE ENABLED AT ALL TIMES UNLESS SHUTDOWN ON ALARMS OR SAFETIES.

HOT WATER LOOP PUMPS (DTP-01 & DTP-02) DUAL TEMPERATURE WATER PUMPS RUN CONDITIONS: THE DUAL TEMPERATURE WATER PUMPS SHALL BE ENABLED WHENEVER:

- THE LEAD PUMP SHALL BE ENABLED WHENEVER THE OUTSIDE AIR TEMPERATURE IS LESS THAN 54 DEG F (ADJ) OR ABOVE 60 DEG F (ADJ).
- THE STANDBY PUMP SHALL BE ENABLED WHENEVER THE LEAD PUMP IS IN ALARM.

TO PREVENT SHORT CYCLING, THE PUMP SHALL RUN FOR A MINIMUM TIME AND BE OFF FOR A MINIMUM TIME (BOTH USER ADJUSTABLE).

THE DESIGNATED LEAD PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):

- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:

DUAL TEMPERATURE WATER PUMP 1
- FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

DUAL TEMPERATURE WATER PUMP 2
- FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

DUAL TEMPERATURE WATER TEMPERATURE MONITORING:

THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- DUAL TEMPERATURE WATER SUPPLY.
- DUAL TEMPERATURE WATER RETURN.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH DUAL TEMPERATURE WATER SUPPLY TEMP: IF THE DUAL TEMPERATURE WATER SUPPLY TEMPERATURE IS GREATER THAN 180F (ADJ.).
- LOW DUAL TEMPERATURE WATER SUPPLY TEMP: IF THE DUAL TEMPERATURE WATER SUPPLY TEMPERATURE IS LESS THAN 40F (ADJ.).

BOILER SYSTEM RUN CONDITIONS:*THE BOILER SYSTEM SHALL BE ENABLED TO RUN WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 54F (ADJ.).

TO PREVENT SHORT CYCLING, THE BOILER SYSTEM SHALL RUN FOR AND BE OFF FOR MINIMUM ADJUSTABLE TIMES (BOTH USER DEFINABLE), UNLESS SHUTDOWN ON SAFETIES OR OUTSIDE AIR CONDITIONS.

THE BOILER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

BOILER ISOLATION CONTROL VALVES:
- THE BOILER ISOLATION VALVES ON THE HWS AND HWR PIPES SHALL OPEN WHENEVER THE BOILER SYSTEM IS ENABLED.

CUH ISOLATION CONTROL VALVE:
- THE CUH ISOLATION VALVES ON THE HWS AND HWR PIPES SHALL OPEN WHENEVER THE BOILER SYSTEM IS ENABLED.

HOT WATER PUMP:

THE HOT WATER PUMP SHALL RUN ANYTIME THE BOILER IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.

HOT WATER PUMP:

THE HOT WATER PUMP SHALL RUN ANYTIME THE BOILER IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HOT WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- HOT WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- HOT WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

BOILER PUMP 1:*THE BOILER PUMP 1 SHALL RUN ANYTIME BOILER 1 IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- BOILER PUMP 1 FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- BOILER PUMP 1 RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- BOILER PUMP 1 RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER-DEFINABLE LIMIT.

BOILER PUMP 2:*THE BOILER PUMP 2 SHALL RUN ANYTIME BOILER 2 IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.*

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- BOILER PUMP 2 FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- BOILER PUMP 2 RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- BOILER PUMP 2 RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER-DEFINABLE LIMIT.

BOILER LEAD/LAG OPERATION:

THE BOILERS SHALL OPERATE IN A LEAD/LAG FASHION WHEN CALLED TO RUN AND FLOW IS PROVEN.
- THE LEAD BOILER SHALL RUN FIRST.
- THE LAG BOILER SHALL RUN SECOND.
- ON FAILURE OF THE LEAD BOILER, THE LAG BOILER SHALL RUN AND THE LEAD BOILER SHALL TURN OFF.

THE DESIGNATED LEAD AND LAG BOILERS SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS: (USER SELECTABLE):
- MANUALLY THROUGH A SOFTWARE SWITCH
- IF BOILER RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- BOILER 1
  FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
  RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
  RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
- BOILER 2
  FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
  RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
  RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
- LEAD BOILER FAILURE: THE LEAD BOILER IS IN FAILURE AND THE LAG BOILER IS ON.

HOT WATER SUPPLY TEMPERATURE SETPOINT:

THE BOILER SHALL MAINTAIN A HOT WATER SUPPLY TEMPERATURE SETPOINT BASED ON OUTSIDE AIR TEMPERATURE. THE OUTSIDE AIR TEMPERATURE RISE FROM 0 DEG F (ADJ) TO 50 DEG F (ADJ) THE HOT WATER SUPPLY SETPOINT SHALL RESET DOWNWARDS FROM 140 DEG F (ADJ) TO 110 DEG F (ADJ).

PRIMARY HOT WATER TEMPERATURE MONITORING:

THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- PRIMARY HOT WATER SUPPLY.
- PRIMARY HOT WATER RETURN.

CHILLER - RUN CONDITIONS:

THE CHILLER SHALL BE ENABLED TO RUN WHENEVER:

-THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 64 DEG. F (ADJ.).

TO PREVENT SHORT CYCLING, THE CHILLER SHALL RUN FOR AND BE OFF FOR MINIMUM ADJUSTABLE TIMES (BOTH USER DEFINABLE), UNLESS SHUTDOWN ON SAFETIES OR OUTSIDE AIR CONDITIONS.

THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

CHILLED WATER PUMP (HXCP-01):

THE CHILLED WATER PUMP SHALL RUN ANYTIME THE CHILLER IS CALLED TO RUN.

THE CHILLED WATER PUMP SHALL START PRIOR TO THE CHILLER BEING ENABLED AND SHALL STOP ONLY AFTER THE CHILLER IS DISABLED. THE CHILLED WATER PUMP SHALL THEREFORE HAVE:
- A USER ADJUSTABLE DELAY ON START.
- AND A USER ADJUSTABLE DELAY ON STOP.

THE DELAY TIMES SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- CHILLED WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- CHILLED WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- CHILLED WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

CHILLER:

THE CHILLER SHALL BE ENABLED A USER ADJUSTABLE TIME AFTER PUMP STATUSES ARE PROVEN ON. THE CHILLER SHALL THEREFORE HAVE A USER ADJUSTABLE DELAY ON START.

THE DELAY TIME SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.

THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- CHILLER FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- CHILLER RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- CHILLER RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

CHILLER ISOLATION CONTROL VALVES:
- THE CHILLER ISOLATION VALVES ON THE CWS AND CWR PIPES SHALL OPEN WHENEVER THE CHILLER SYSTEM IS ENABLED.

CHILLER CHILLED WATER SUPPLY SETPOINT:

THE CHILLER SHALL MAINTAIN A CHILLED WATER SUPPLY TEMPERATURE SETPOINT AS DETERMINED BY ITS OWN INTERNAL CONTROLS.

CHILLED WATER TEMPERATURE MONITORING:

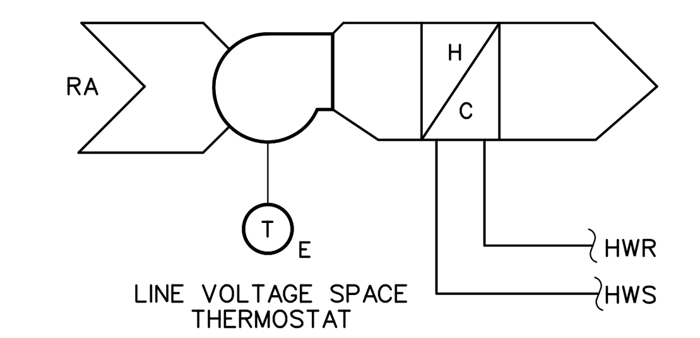
THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- CHILLED WATER SUPPLY.
- CHILLED WATER RETURN.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH CHILLED WATER SUPPLY TEMP: IF THE CHILLED WATER SUPPLY TEMPERATURE IS GREATER THAN 55 DEG. F (ADJ.).

LOW CHILLED WATER SUPPLY TEMP: IF THE CHILLED WATER SUPPLY TEMPERATURE IS LESS THAN 38 DEG. F (ADJ.).

1 (M801) DUAL TEMPERATURE WATER SYSTEM CONTROL SEQUENCE

SCALE: NOT TO SCALE

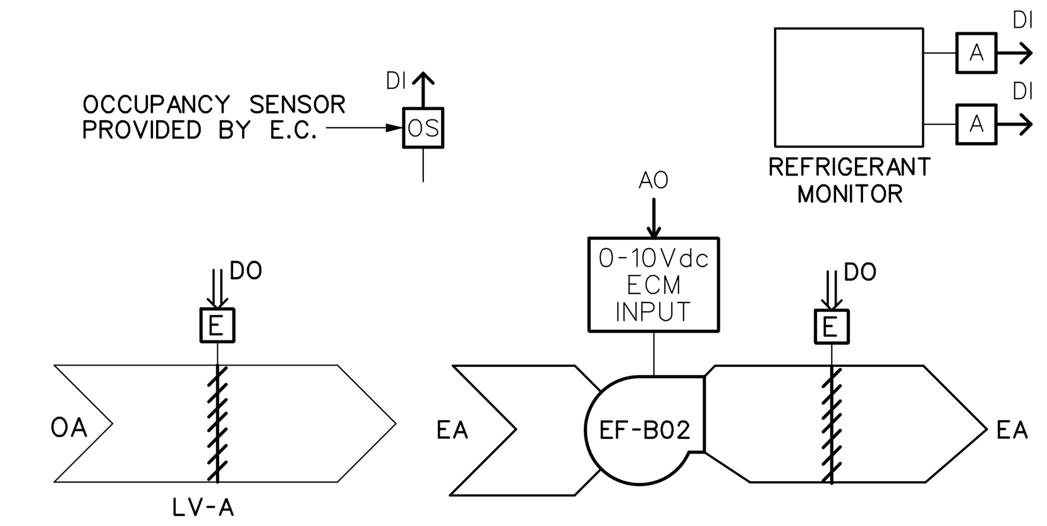


UNIT HEATER & CABINET HEATER CONTROLS SEQUENCE:

A. THE FAN SHALL CYCLE ON AND OFF TO MAINTAIN THE SPACE TEMPERATURE SET POINT OF 60°F (ADJ.).

2 (M801) UNIT & CABINET UNIT HEATER CONTROL SEQUENCE

SCALE: NOT TO SCALE



SYSTEM SUMMARY							
	POINTS SCHEDULE						
	AI	AO	DI	DO	A	I	
DESCRIPTION	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	ALARM	INTERLOCK	TIME SCHEDULING
LV-A OUTSIDE AIR DAMPER				●		●	●
EF-B02 FAN SPEED		●		●		●	●
EF-B02 FAN STATUS			●		●		
LV-B EXHAUST AIR DAMPER				●		●	●
OCCUPANCY SENSOR	●				●		
REFRIGERANT MONITOR ALARM			●		●	●	
REFRIGERANT MONITOR FAILURE			●		●	●	

MECHANICAL EXHAUST FAN EF-B02, LV-B AND LV-A DAMPERS SEQUENCE:

1. GENERAL EXHAUST MODE:
   WHEN THE CHILLER ROOM BECOMES OCCUPIED AS SENSED BY ROOM OCCUPANCY SENSOR, EXHAUST FAN EF-B02 SHALL ENERGIZE AND THE ECM MOTOR SHALL RAMP TO 200 CFM, THE LV-A OUTSIDE AIR DAMPER AND LV-B EXHAUST AIR DAMPER SHALL FULLY OPEN.
   WHEN THE CHILLER ROOM BECOMES UNOCCUPIED AS SENSED BY ROOM OCCUPANCY SENSOR, THE EXHAUST FAN SHALL DEENERGIZE AND THE LV-B EXHAUST AND LV-A OUTSIDE AIR DAMPERS SHALL CLOSE.

2. EMERGENCY MODE:
   WHEN THE LOCAL REFRIGERANT MONITOR DETECTOR DETERMINES THAT A REFRIGERANT LEAK HAS DEVELOPED, THE BAS SHALL ENERGIZE EXHAUST FAN EF-B02 AND THE ECM MOTOR SHALL RAMP TO 1000 CFM AND THE ASSOCIATED EXHAUST AIR DAMPER AND LV-A OUTSIDE AIR DAMPER SHALL FULLY OPEN AND AN ALARM SHALL BE SEND TO THE MONITOR SYSTEM AND THE BAS.

3 (M801) CHILLER ROOM EXHAUST SEQUENCE OF OPERATION

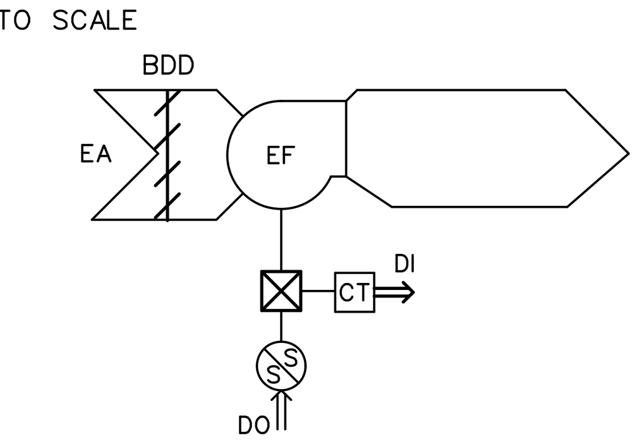
SCALE: NOT TO SCALE

DUCTLESS SPLIT SYSTEM CONTROL SEQUENCE:.

1. GENERAL: UNIT SHALL BE CONTOLLED BY FACTORY PACKAGED CONTROLS TO MAINTAIN SPACE TEMPERATURE SET POINT COOLING: 75 DEGREES F AND HEATING: 70 DEGREES F (ADJUSTABLE)

4 (M801) DUCTLESS SPLT CONTROL SEQUENCE

SCALE: NOT TO SCALE



SYSTEM SUMMARY							
	POINTS SCHEDULE						
	AI	AO	DI	DO	A	I	
DESCRIPTION	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	ALARM	INTERLOCK	TIME SCHEDULING
TIME OF DAY SCHEDULE							
FAN START/STOP				●			●
FAN STATUS			●		●		

TOILET EXHAUST FAN CONTROLS SEQUENCE:

1. WHEN THE BUILDING IS SCHEUDLED TO BE OCCUPIED, THE DDC SHALL START THE EXHAUST FAN AND IT SHALL RUN CONTINUOUSLY.
2. WHEN BUILDING IS SCHEDULED TO BE UNOCCUPIED, THE FAN SHALL BE OFF.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   A. EXHAUST FAN FAULT.

5 (M801) TOILET EXHAUST FAN CONTROL SEQUENCE

SCALE: NOT TO SCALE

BID SET 9-18-20

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M/E Project #: 203095
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DATE: 9/18/2020
REVISED:

PROJECT NO: 203095
DESIGNED BY: CDM
DRAWN BY: WRW
CHECKED BY: RSA
SCALE: AS NOTED
NOTES:

MECHANICAL CONTROLS

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SHEET NO:

M801

OF: