

RTU COOLED ROOFTOP UNITS

RTU CONTROLLER SHALL COMMUNICATE DIRECTLY TO THE BAS

ALL RTU ZONE SETPOINTS FROM THE BAS ARE AS FOLLOWS

MARK	AREA SERVED	OCCUPIED		UNOCCUPIED		HUMIDITY	NOTES
		(2) SCHEDULE	COOLING SETPOINT (*F +/-0.5°F)	(2) SCHEDULE	COOLING SETPOINT (*F +/-0.5°F)		
RTU 39	VISION CENTER	6AM-10PM	73	10PM-5AM	78		

- (1) SET PHARMACY RTU SENSOR TO ALLOW +/- 3 DEG F USER SPACE SETPOINT ADJUSTMENT
- (2) ADJUSTMENTS TO SCHEDULES WILL NEED TO BE MADE IF THE STORE IS NOT OPEN 24/7.
- (3) VESTIBULE RTU OPERATION SHALL BE LOCKED OUT BETWEEN 40°F AND 85°F AMBIENT.

SUPPLY FAN OPERATION

FOR RTUS IDENTIFIED IN THE MECHANICAL SCHEDULE TO BE 'CONT' FAN CONTROL, THE BAS SHALL ENERGIZE THE SUPPLY FAN TO OPERATE CONTINUOUSLY IN OCCUPIED MODE ONLY. IN UNOCCUPIED MODE, THE OEM CONTROLLER SHALL ENERGIZE THE SUPPLY FAN TO OPERATE ONLY ON A CALL FOR HEATING OR COOLING.

FOR RTUS IDENTIFIED IN THE MECHANICAL SCHEDULE TO BE 'AUTO' FAN CONTROL, THE OEM CONTROLLER SHALL ENERGIZE THE SUPPLY FAN TO OPERATE ONLY ON A CALL FOR HEATING OR COOLING.

FOR RTUS WITH VARIABLE SPEED FAN OPERATION, THE FAN SPEED SHALL BE CONTROLLED BY THE OEM CONTROLLER BASED ON AMOUNT OF OPERATING COMPRESSOR CAPACITY. VARIABLE SPEED FAN CONTROL SHALL RANGE LINEARLY OR IN DISCRETE STAGES FROM MINIMUM SETTING UP TO DESIGN AIRFLOW AS DETERMINED BY OEM BASED ON COMPRESSOR CAPACITY CONTROL. SUPPLY FAN SPEED DURING ECONOMIZER OPERATION SHALL BE CONTROLLED BY THE OEM CONTROLLER AND SHALL BE AT DESIGN AIRFLOW FROM MECHANICAL SCHEDULE.

OUTSIDE AIR DAMPER OPERATION

WHEN THE SUPPLY FAN IS OFF, THE OUTSIDE AIR DAMPER SHALL GO TO THE 0% OPEN POSITION. UNLESS OPERATING IN ECONOMIZER MODE, WHEN THE SUPPLY FAN IS ON THE OUTSIDE AIR DAMPER SHALL GO TO THE MINIMUM POSITION SET BY TEST AND BALANCE PER THE OUTSIDE AIR QUANTITY ON THE MECHANICAL SCHEDULE AND IS ADJUSTABLE FROM 0 TO 100%.

ECONOMIZER COOLING OPERATION (ECONOMIZER ENABLED)

UPON AN ECONOMIZER ENABLE SIGNAL FROM THE BAS TO THE OEM CONTROLLER AND A CALL FOR COOLING BASED ON SPACE TEMPERATURE SENSOR INPUT TO THE OEM CONTROLLER, ECONOMIZER COOLING SHALL BE ENERGIZED AND THE OEM CONTROLLER SHALL MODULATE THE OUTSIDE AIR AND RETURN AIR DAMPERS TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 45 DF. THE UNIT SHALL RUN IN ECONOMIZER MODE FOR A MINIMUM OF 10 MINUTES AFTER THE ECONOMIZER DAMPER HAS MODULATED TO THE 100% OPEN POSITION BEFORE ENERGIZING THE FIRST STAGE MECHANICAL COOLING. THE OEM CONTROLLER SHALL DISABLE MECHANICAL COOLING WHEN OUTSIDE AIR TEMPERATURE FROM THE OEM OUTDOOR AIR SENSOR IS LESS THAN 45 DF.

IF THE SPACE TEMPERATURE INCREASES TO +/- 0.5 DEG ABOVE SPACE COOLING SETPOINT AND THE ECONOMIZER DAMPER HAS BEEN 100% OPEN FOR A MINIMUM OF 10 MINUTES, THE OEM CONTROLLER SHALL ENERGIZE FIRST STAGE MECHANICAL COOLING AND MAINTAIN THE OUTSIDE AIR DAMPER AT THE 100% OPEN POSITION.

IF THE SPACE TEMPERATURE CONTINUES TO INCREASE AFTER MECHANICAL COOLING IS ENERGIZED, THE OEM CONTROLLER SHALL CONTINUE TO ENERGIZE ADDITIONAL STAGES OF MECHANICAL COOLING IN 0.5 DEG F INCREMENTS OF SPACE TEMPERATURE, IF AVAILABLE.

IF THE CUTOUT TEMPERATURE FOR ANY STAGE OF COOLING IS NOT REACHED WITHIN 15 MINUTES, THE NEXT STAGE OF COOLING SHALL BE ENERGIZED TO SATISFY THE CUTOUT TEMPERATURE.

COOLING STAGES SHALL DE-ENERGIZE AS THE COMPRESSOR CUTOUT TEMPERATURES ARE SATISFIED IN 0.5 DEGREE INCREMENTS.

COOLING STAGES		
STAGE #	ON	OFF
ECONOMIZER	SP+5	SP-5
1	SP+1.0	SP
2	SP+1.5	SP+5
3 & 4	SP+2.0	SP+1.0

COOLING OPERATION (ECONOMIZER DISABLED)

IF THERE IS NO ECONOMIZER ENABLE SIGNAL FROM THE BAS TO THE OEM CONTROLLER AND UPON A CALL FOR COOLING BASED ON THE SPACE TEMPERATURE SENSOR INPUT TO THE OEM CONTROLLER, THE OEM CONTROLLER SHALL ENERGIZE FIRST STAGE MECHANICAL COOLING AND MODULATE THE OUTSIDE AIR DAMPER TO THE MINIMUM POSITION.

IF THE SPACE TEMPERATURE CONTINUES TO INCREASE AFTER MECHANICAL COOLING IS ENERGIZED, THE OEM CONTROLLER SHALL CONTINUE TO ENERGIZE ADDITIONAL STAGES OF MECHANICAL COOLING IN 0.5 DEG INCREMENTS OF SPACE TEMPERATURE, IF AVAILABLE.

IF THE CUTOUT TEMPERATURE FOR ANY STAGE OF COOLING IS NOT REACHED WITHIN 15 MINUTES, THE NEXT STAGE OF COOLING SHALL BE ENERGIZED TO SATISFY THE CUTOUT TEMPERATURE.

COOLING STAGES SHALL DE-ENERGIZE AS THE COMPRESSOR CUTOUT TEMPERATURES ARE SATISFIED IN 0.5 DEGREE INCREMENTS.

COOLING STAGES		
STAGE #	ON	OFF
1	SP+5	SP-5
2	SP+1.0	SP
3	SP+1.5	SP+5
4	SP+2.0	SP+1.0

HEATING OPERATION

UPON A CALL FOR HEATING BASED ON THE SPACE TEMPERATURE SENSOR INPUT TO THE OEM CONTROLLER, THE OEM CONTROLLER SHALL ENERGIZE FIRST STAGE HEATING AND MODULATE THE OUTSIDE AIR DAMPER TO THE MINIMUM POSITION.

IF THE SPACE TEMPERATURE CONTINUES TO DECREASE AFTER ENERGIZING HEATING, THE OEM CONTROLLER SHALL CONTINUE TO ENERGIZE ADDITIONAL STAGES HEATING IN 0.5 DEG INCREMENTS OF SPACE TEMPERATURE, IF AVAILABLE.

IF THE CUTOUT TEMPERATURE FOR ANY STAGE OF HEATING IS NOT REACHED WITHIN 15 MINUTES, THE NEXT STAGE OF HEATING SHALL BE ENERGIZED TO SATISFY THE CUTOUT TEMPERATURE.

HEATING STAGES SHALL DE-ENERGIZE AS THE HEATER CUTOUT TEMPERATURES ARE SATISFIED IN 0.5 DEGREE INCREMENTS.

HEATING STAGES		
STAGE #	ON	OFF
1	SP+5	SP-5
2	SP+1.0	SP
3	SP+1.5	SP+5
4	SP+2.0	SP+1.0

RTU PROTECTION
ALL EQUIPMENT SAFETY SEQUENCES, I.E. COMPRESSOR RESET, GAS BURNER RESET, ETC SHALL BE CONTROLLED BY THE OEM CONTROLLER.

ALARMS
THE RTU CONTROLLER SHALL COMMUNICATE ALL RTU ERROR CODES TO THE BAS.

RTU LOAD ALARM LIST	
ERROR CODE	FROM OEM CONTROLLER TO BAS
4	SMOKE ALARM
5	AIR FLOW SWITCH
20	INPUT ERROR, PHASE LOSS OR VFD FAIL
74	ZONE SENSOR PROBLEM

COMMUNICATION DATA POINT LIST
THE RTU CONTROLLER AND BAS SHALL TRANSFER THE COMMUNICATION DATA POINTS BASED ON THE FOLLOWING SCHEDULE.

LENOVO RAC68 COMMUNICATION DATA POINT LIST		
FROM BAS TO RTU CONTROLLER - ANALOG OUTPUTS		
101	APPLICATION MODE CONTROL	NONE
102	OUTDOOR AIR MIN POS CONTROL	PERCENT
104	OCCUPANCY SCHEDULER CONTROL	NONE
108	SPACE DEHUMIDIFICATION SETPT	PERCENT
114	EMERGENCY OVERRIDE CONTROL	NONE
129	SET ECONOMIZER OUTDOOR AIR SUITABLE	NONE
130	HEATING OCCUPIED SETPOINT	DEG F
131	COOLING OCCUPIED SETPOINT	DEG F
132	HEATING UNOCCUPIED SETPOINT	DEG F
133	COOLING UNOCCUPIED SETPOINT	DEG F
FROM RTU CONTROLLER TO BAS - ANALOG INPUTS		
232	UNIT STATUS	NONE
239	SPACE TEMPERATURE	DEG F
240	DISCHARGE AIR TEMPERATURE	DEG F
241	EFFECTIVE OCCUPANCY	NONE
243	LOCAL SPACE TEMPERATURE	DEG F
244	OUTSIDE AIR DAMPER	PERCENT
245	HEAT PRIMARY	PERCENT
247	COOL PRIMARY	PERCENT
248	ECONOMIZER ENABLED	PERCENT
260	SUPPLY FAN STATUS	PERCENT
252	SPACE TEMPERATURE SETPT (EFF)	DEG F
255	MOST RECENT ERROR 1	NONE
256	MOST RECENT ERROR 2	NONE
257	MOST RECENT ERROR 3	NONE
258	MOST RECENT ERROR 4	NONE
259	MOST RECENT ERROR 5	NONE
274	SPACE CO2 SENSOR (EFF)	PPM
275	SPACE HUMIDITY (EFF)	PERCENT
278	DEHUMIDIFICATION SETPT (EFF)	PERCENT
279	DEHUMIDIFICATION STATUS	NONE
281	RETURN AIR TEMPERATURE	DEG F

ECONOMIZER OPERATION (ES1 WITHOUT MUTERS AHUS AND ENTHALPY WIRE FROM EXISTING CONTROLLER)
THE ES1 SHALL SEND AN ECONOMIZER ENABLE SIGNAL TO THE RTU OEM CONTROLLER WHEN AN ECONOMIZER ENABLE SIGNAL IS RECEIVED FROM THE LINGO XE/EP2 CONTROLLER THRU XIO-44-B ON BACKET.

THE LINGO XE/EP2 CONTROLLER SHALL SEND AN ECONOMIZER ENABLE SIGNAL WHEN BOTH THE FOLLOWING OUTSIDE AIR CONDITIONS ARE MET.
OUTSIDE DRY BULB TEMPERATURE > 5 DEG F AND < 88 DEG F
OUTSIDE WETBULB TEMPERATURE > 5 DEG DP AND < 48 DEG DP

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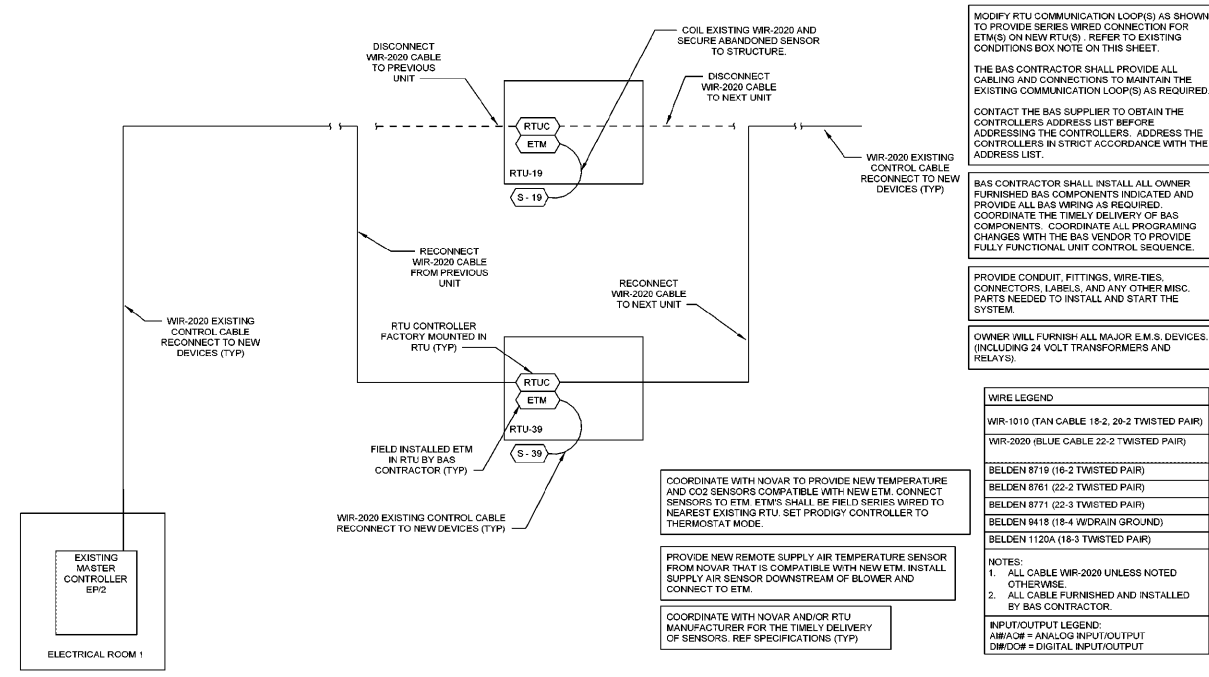
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MODIFY RTU COMMUNICATION LOOP(S) AS SHOWN TO PROVIDE SERIES WIRED CONNECTION FOR ETM(S) ON NEW RTU(S). REFER TO EXISTING CONDITIONS BOX NOTE ON THIS SHEET.

THE BAS CONTRACTOR SHALL PROVIDE ALL CABLING AND CONNECTIONS TO MAINTAIN THE EXISTING COMMUNICATION LOOP(S) AS REQUIRED.

CONTACT THE BAS SUPPLIER TO OBTAIN THE CONTROLLERS ADDRESS LIST BEFORE ADDRESSING THE CONTROLLERS. ADDRESS THE CONTROLLERS IN STRICT ACCORDANCE WITH THE ADDRESS LIST.

BAS CONTRACTOR SHALL INSTALL ALL OWNER FURNISHED BAS COMPONENTS INDICATED AND PROVIDE ALL BAS WIRING AS REQUIRED. COORDINATE THE TIMELY DELIVERY OF BAS COMPONENTS. COORDINATE ALL PROGRAMMING CHANGES WITH THE BAS VENDOR TO PROVIDE FULLY FUNCTIONAL UNIT CONTROL SEQUENCE.

PROVIDE CONDUIT, FITTINGS, WIRE-TIES, CONNECTORS, LABELS, AND ANY OTHER MISC. PARTS NEEDED TO INSTALL AND START THE SYSTEM.

OWNER WILL FURNISH ALL MAJOR E.M.S. DEVICES. (INCLUDING 24 VOLT TRANSFORMERS AND RELAYS).

WIRE LEGEND

- WIR-1010 (TAN CABLE 18-2, 29-2 TWISTED PAIR)
- WIR-2020 (BLUE CABLE 22-2 TWISTED PAIR)
- BELDEN 8719 (16-2 TWISTED PAIR)
- BELDEN 8761 (22-2 TWISTED PAIR)
- BELDEN 8771 (22-3 TWISTED PAIR)
- BELDEN 9418 (18-4 W/DRAIN GROU/ND)
- BELDEN 1120A (18-3 TWISTED PAIR)

NOTES:
1. ALL CABLE WIR-2020 UNLESS NOTED OTHERWISE.
2. ALL CABLE FURNISHED AND INSTALLED BY BAS CONTRACTOR.

INPUT/OUTPUT LEGEND:
A/I/A/O = ANALOG INPUT/OUTPUT
D/I/D/O = DIGITAL INPUT/OUTPUT

COORDINATE WITH NOVAR TO PROVIDE NEW TEMPERATURE AND CO2 SENSORS COMPATIBLE WITH NEW ETM. CONNECT SENSORS TO ETM. ETM(S) SHALL BE FIELD SERIES WIRED TO NEAREST EXISTING RTU SET PRODIGY CONTROLLER TO THERMOSTAT MODE.

PROVIDE NEW REMOTE SUPPLY AIR TEMPERATURE SENSOR FROM NOVAR THAT IS COMPATIBLE WITH NEW ETM. INSTALL SUPPLY AIR SENSOR DOWNSTREAM OF BLOWER AND CONNECT TO ETM.

COORDINATE WITH NOVAR AND/OR RTU MANUFACTURER FOR THE TIMELY DELIVERY OF SENSORS. REF SPECIFICATIONS (TYP)