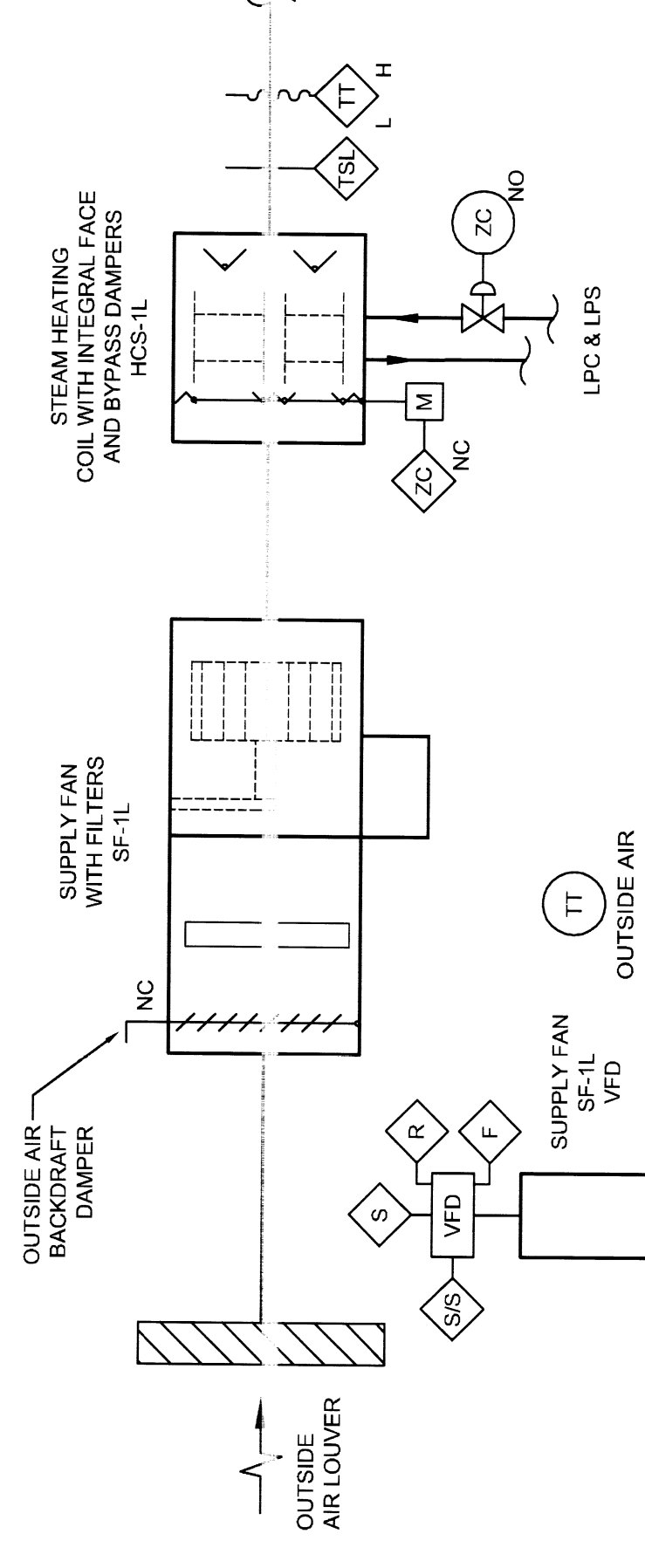


LAUNDRY EXHAUST MAKE-UP AIR SYSTEM



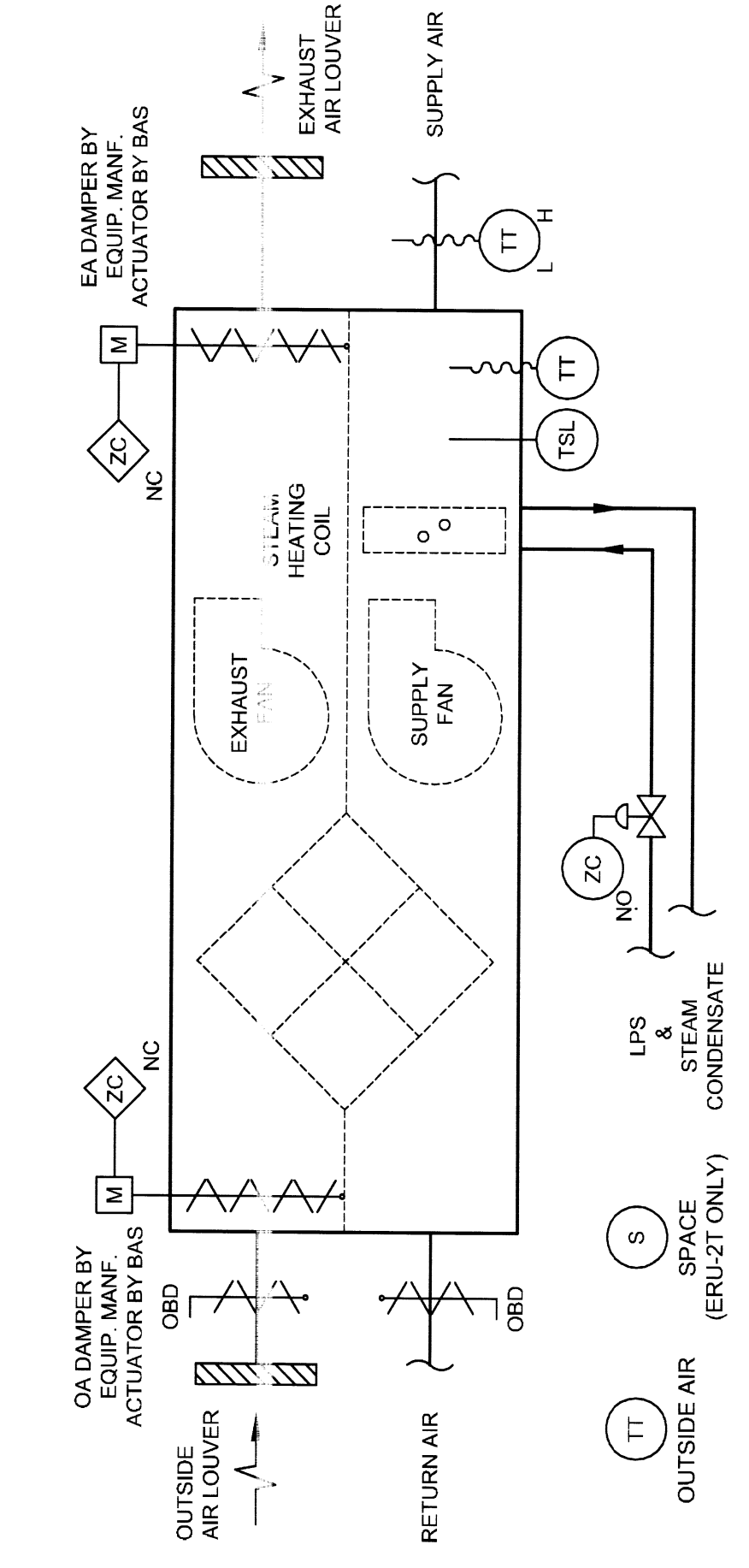
LAUNDRY EXHAUST MAKE-UP AIR POINTS LIST

SYSTEM COMPONENTS	POINT TYPE	SYSTEM SOFTWARE / CONTROL					REMARKS
		ALARM / SAFETIES	FUNCTION	MODULATE	SHUT DOWN	DATA / MONITOR	
FAN:							
VFD ENABLE	BO						
VFD FAULT	BI	X					
VFD SPEED			X				
HEATING COIL :							
CONTROL VALVE	AO			X			
FREESTAT STATUS (AIR)	BI	X					
LEAVING AIR TEMPERATURE	BI	X					
DRYER STATUS (6):							
FAN SPEED CONTROL	BI				X		
OUTSIDE AIR TEMPERATURE	AI						

SEQUENCE OF OPERATION

- A. GENERAL:
- DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE 68 DEGREES.
 - WHEN OAT IS BELOW 45 DEGREES, PRIORS TO ENERGIZING THE FAN THE STEAM HEATING COIL SHALL OPEN AND WARM UP THE HEATING COIL TUBE MATERIAL.
 - FAN SPEED CONTROL: FAN SPEED SHALL BE 100 PERCENT.
 - WHEN FAN SPEED IS 100 PERCENT, PROVIDE BY MECH CONTRACTOR RESPONSES.
 - STATUS (OPERATION). DRYER OPERATION SHALL SIGNAL THE VFD TO INCREASE OR DECREASE THE FAN SPEED IN ORDER TO PROVIDE REQUIRED MAKE-UP AIR FOR THE DRYER EXHAUST SYSTEM.
 - INSTALL CURRENT TRANSDUCERS ON EACH OF THE CLOTHES DRYERS (6) IN THE LAUNDRY ROOM. IF ANY OF THE DRYERS OPERATE, AS MEASURED BY THE CURRENT TRANSDUCERS, THE FAN SHALL OPERATE, AND ITS SPEED SHALL BE MODULATED AS DESCRIBED TO PROVIDE MAKE-UP AIR TO THE CLOTHES DRYERS ARE OPERATING; FAN SHALL BE OFF.
 - COORDINATE DRYER EXHAUST RATES AND MAKE-UP AIR FAN SPEED REQUIRED WITH THE BALANCING CONTRACTOR TO PROVIDE SPACE BALANCE. THE FAN SPEED SHALL BE INCREASED OR DECREASED PROPORTIONALLY TO INCREASE OR DECREASE THE REQUIRED MAKE-UP AIR TO THE SPACE.
- SEQUENCE OF OPERATION
- C. DISCHARGE AIR TEMPERATURE CONTROL - INTEGRAL FACE AND BYPASS DAMPERS SHALL MODULATE AS REQUIRED AND STEAM HEATING CONTROL VALVE SHALL BE OPEN TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.
- D. THE FOLLOWING SAFETIES SHALL SHUT THE FAN DOWN AND PROVIDE AN ALARM WITHIN THE LAUNDRY ROOM SPACE. EACH SAFETY SHALL BE RESET MANUALLY.
 - VFD FAULT
 - HEATING COIL FREEZE STAT (AIR)
 - TEMPERATURE DROPS BELOW 39 DEGREES.
- E. THE FOLLOWING SHALL PROVIDE AN ALARM ; FAN SHALL CONTINUE TO OPERATE:
 - IF DISCHARGE AIR TEMPERATURE LIMITS (LOW OR HIGH) ARE EXCEEDED. TEMPERATURE LOW LIMIT SHALL BE 50 DEGREES. TEMPERATURE HIGH LIMIT SHALL BE 110 DEGREES.

ENERGY RECOVERY UNIT



ENERGY RECOVERY UNIT (ERU) POINTS LIST

SYSTEM COMPONENTS	POINT TYPE	SYSTEM SOFTWARE / CONTROL					REMARKS
		ALARM / SAFETIES	FUNCTION	MODULATE	SHUT DOWN	DATA / MONITOR	
SUPPLY FAN:							
START/STOP	BO		X				
STATUS	BI	X					
EXHAUST FAN:							
START/STOP	BO		X				
STATUS	BI	X					
HEATING COIL :							
ERU-1L & 1T CONTROL VALVE	AO			X			
ERU-2T CONTROL VALVE	AO			X			
FREESTAT STATUS (AIR)	BI	X					
LEAVING AIR TEMPERATURE	BI	X					
OUTSIDE AIR DAMPER	BO			X			
EXHAUST AIR DAMPER	BO			X			
DISCHRG AIR TEMP. (IN DUCTWORK)	AI	X					
OUTSIDE AIR TEMPERATURE	AI						

SEQUENCE OF OPERATION

- A. GENERAL:
- WHENVER THE ENERGY RECOVERY UNIT IS SHUT DOWN BY COMMAND OF THE BAS, THE HEATING COIL SHALL DISCONNECTS ALL CONTROL DEVICES ASSOCIATED WITH THE ERU SHALL REVERT TO THEIR NORMAL (NON-POWERED) POSITION AS NOTED ON THE POINTS DIAGRAM.
 - FAN SPEED CONTROL - FANS SHALL OPERATE CONTINUOUSLY DURING OCCUPIED HOURS. SUPPLY AND EXHAUST FAN SPEEDS SHALL BE CONSTANT VOLUME.
 - OCCUPIED, THE SUPPLY SHALL START AND ERU WILL REMAIN IN RECIRCULATION MODE (100 PERCENT RETURN AIR). AFTER 30 SECONDS THE OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL OPEN AND THE EXHAUST FAN SHALL START.
 - ERU-1L & 1T DISCHARGE AIR TEMPERATURE CONTROL - STEAM HEATING CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.
 - REGARDLESS OF ERU OPERATION OR OCCUPANCY SCHEDULE, WHEN OAT IS BELOW 45 DEGREES THE HEATING COIL DAMPER (UNIT OPERATES IN FULL) SHALL MODULATE. THE STEAM CONTROL VALVE ASSOCIATED WITH THE HEATING COIL TO MAINTAIN A MINIMUM OF 55 F.
- D. ERU-2T SPACE TEMPERATURE (HEATING) CONTROL:
- OCCUPIED, SUPPLY AND EXHAUST FAN SHALL OPERATE. OAD AND EAD SHALL BE OPEN. WHEN SPACE TEMPERATURE FALLS BELOW THE SET POINT HEATER CONTROL VALVE SHALL OPEN. WHEN SPACE TEMPERATURE IS 3 DEGREES ABOVE SET POINT, THE HEATER CONTROL VALVE SHALL CLOSE.
 - UNOCCUPIED, WHEN SPACE TEMPERATURE FALLS BELOW THE SET POINT TEMPERATURE THE OAD & EAD SHALL REMAIN CLOSED. EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL ENERGIZE. THE ERU SHALL PERFORM THE RECIRCULATION MODE (100 PERCENT RETURN AIR). HEATER CONTROL VALVE SHALL OPEN WHEN SPACE TEMPERATURE IS 5 DEGREES ABOVE SET POINT, THE HEATER CONTROL VALVE SHALL CLOSE AND THE SUPPLY FAN SHALL BE OFF.
- E. DEFROST CONTROL: WHEN OUTSIDE AIR TEMPERATURE IS BELOW 23 DEGREES, PERIODICALLY CLOSE THE OUTSIDE AIR DAMPER (UNIT OPERATES IN FULL) TO PREVENT FROST. THE HEAT EXCHANGER FREE FROM FROST.
- F. REGARDLESS OF ERU OPERATION OR OCCUPANCY SCHEDULE, WHEN OAT IS BELOW 45 DEGREES THE HEATING COIL DAMPER (UNIT OPERATES IN FULL) SHALL MODULATE. THE STEAM CONTROL VALVE ASSOCIATED WITH THE HEATING COIL TO MAINTAIN A MINIMUM OF 55 F.

GENERAL NOTES:

- REFER TO SPECIFICATIONS, MECHANICAL DETAILS, AND MECHANICAL SCHEDULES FOR ADDITIONAL REQUIREMENTS.
 - DDC CONTROLLERS SHALL PROVIDE BACNET OR LON/TALK DATA COMMUNICATION PROTOCOL FOR INTEGRATION WITH BUILDING AUTOMATION SYSTEM (BAS).
 - BAS CONTRACTOR SHALL PROVIDE HARDWARE, WIRING, PROGRAMMING, AND TESTING SERVICES. THE BAS CONTRACTOR SHALL PROVIDE ALL CONTROL SEQUENCES (INCLUDED EQUIPMENT FURNISHED WITH PACKAGED CONTROLLERS) TO THE OPERATORS WORKSTATION/CAMPUS BAS.
 - WHERE APPLICABLE, BAS CONTRACTOR SHALL INSTALL REMOTE SENSORS AND COORDINATE INTERFACE WITH EQUIPMENT MANUFACTURER PACKAGED CONTROLLER(S) TO PROVIDE COMPLETE SYSTEM OPERATION.
 - BAS CONTRACTOR SHALL PROVIDE SENSORS AND OTHER DEVICES AS NOTED IN THESE DRAWINGS. THE BAS CONTRACTOR SHALL COORDINATE ALL INSTALLATION LOCATIONS WITH THE MECHANICAL CONTRACTOR TO INSURE MANUFACTURERS RECOMMENDED UPSTREAM AND DOWNSTREAM DISTANCES ARE PROVIDED FOR PROPER OPERATION.
- GENERAL NOTES CONTINUED:
- OCCUPIED AND UNOCCUPIED BUILDING SCHEDULES SHALL BE COORDINATED WITH THE OWNER.
 - ALL SETPOINTS SHALL BE ADJUSTABLE. ALL TEMPERATURES LISTED ARE FAHRENHEIT AND SHALL BE ADJUSTABLE.
 - ALL TEMPERATURE SENSORS LOCATED IN MECHANICAL EQUIPMENT OR DUCTWORK SHALL BE AVERAGING TYPE. SENSORS SHALL BE CALIBRATED TO THE MANUFACTURER'S READING TYPE. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 - FAIL-SAFE POSITIONS ARE POSITIONS THAT DEVICES SHALL GO TO WHEN DE-ENERGIZED. "NO" - NORMALLY OPEN. "NC" - NORMALLY CLOSED. "NC" - IS NORMALLY CLOSED, POWERED OPEN.
 - ALL WIRING SHALL BE CONCEALED IN WALLS AND ABOVE CEILING. EXPOSED OR SURFACE MOUNTED WIRE MOLD FOR NEW WIRING IN FINISHED AREAS IS UNACCEPTABLE.
 - POINTS LISTS ARE FOR INFORMATION PURPOSES ONLY. THE BAS CONTRACTOR SHALL PROVIDE ANY ADDITIONAL POINTS NEEDED TO PROVIDE THE WRITTEN SEQUENCES OF OPERATION INDICATED ON THESE DRAWINGS.

SEQUENCE OF OPERATION CONTINUED:

- D. ERU-2T SPACE TEMPERATURE (HEATING) CONTROL:
- OCCUPIED, SUPPLY AND EXHAUST FAN SHALL OPERATE. OAD AND EAD SHALL BE OPEN. WHEN SPACE TEMPERATURE FALLS BELOW THE SET POINT HEATER CONTROL VALVE SHALL OPEN. WHEN SPACE TEMPERATURE IS 3 DEGREES ABOVE SET POINT, THE HEATER CONTROL VALVE SHALL CLOSE.
 - UNOCCUPIED, WHEN SPACE TEMPERATURE FALLS BELOW THE SET POINT TEMPERATURE THE OAD & EAD SHALL REMAIN CLOSED. EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL ENERGIZE. THE ERU SHALL PERFORM THE RECIRCULATION MODE (100 PERCENT RETURN AIR). HEATER CONTROL VALVE SHALL OPEN WHEN SPACE TEMPERATURE IS 5 DEGREES ABOVE SET POINT, THE HEATER CONTROL VALVE SHALL CLOSE AND THE SUPPLY FAN SHALL BE OFF.
- E. DEFROST CONTROL: WHEN OUTSIDE AIR TEMPERATURE IS BELOW 23 DEGREES, PERIODICALLY CLOSE THE OUTSIDE AIR DAMPER (UNIT OPERATES IN FULL) TO PREVENT FROST. THE HEAT EXCHANGER FREE FROM FROST.
- F. REGARDLESS OF ERU OPERATION OR OCCUPANCY SCHEDULE, WHEN OAT IS BELOW 45 DEGREES THE HEATING COIL DAMPER (UNIT OPERATES IN FULL) SHALL MODULATE. THE STEAM CONTROL VALVE ASSOCIATED WITH THE HEATING COIL TO MAINTAIN A MINIMUM OF 55 F.

SEQUENCE OF OPERATION CONTINUED:

- G. THE FOLLOWING SAFETIES SHALL SHUT THE ERU DOWN AND PROVIDE AN ALARM WITHIN THE ADJACENT ROOM; FANS SHALL CONTINUE TO OPERATE:
- IF DISCHARGE AIR TEMPERATURE LIMITS (LOW OR HIGH) ARE EXCEEDED. TEMPERATURE LOW LIMIT SHALL BE 50 DEGREES. TEMPERATURE HIGH LIMIT SHALL BE 110 DEGREES.
 - HEATING COIL FREEZE STAT (AIR)
 - TEMPERATURE DROPS BELOW 45 DEGREES.
- H. THE FOLLOWING SHALL PROVIDE AN ALARM WITHIN THE ADJACENT ROOM; FANS SHALL CONTINUE TO OPERATE:
- IF DISCHARGE AIR TEMPERATURE LIMITS (LOW OR HIGH) ARE EXCEEDED. TEMPERATURE LOW LIMIT SHALL BE 50 DEGREES. TEMPERATURE HIGH LIMIT SHALL BE 110 DEGREES.
 - ERU-2T: IF SPACE TEMPERATURE IS 10 DEGREES BELOW THE HEATING SETPOINT FOR 10 MINUTES.

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UNIVERSITY OF MASSACHUSETTS
 FACILITIES PLANNING DIVISION
 LEWIS HALL & HATCHER HALL
 FINISH UPGRADE 2011
 MECHANICAL CONTROLS

REV. NO.	DESCRIPTION	BY	APPD.	DATE

DATE	PROJECT NO.	CONTRACT NO.

DRN.	BC	SCALE	AS NOTED	SHEET	OF

CHK.	N.L.	DRAWING NUMBER	LEWIS & THATCHER