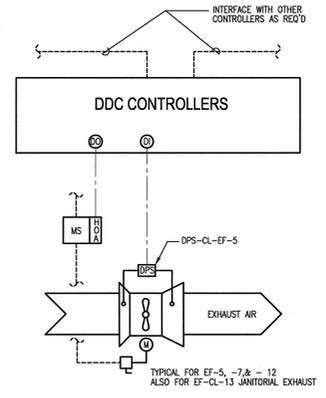


CONTROL POINT LIST - COOLING AND HEATING FAN COIL UNITS											
CENTRAL LAB OFFICE BUILDING	CONNECTED POINTS						SOFTWARE		APPLICATIONS		
	OUTPUT DIGITAL	OUTPUT ANALOG	INPUT DIGITAL	INPUT ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG			
POINT DESCRIPTION											
FAN COIL UNITS	X										
START/STOP	X										
STATUS		X									
CHILLED WATER CONTROL VALVE			X								
SPACE TEMPERATURE				X							
EXHAUST FAN	X										
START/STOP	X										
STATUS		X									

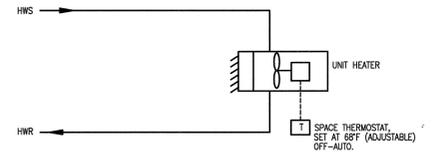
CONTROL POINT LIST - COOLING ONLY FAN COIL UNITS											
CENTRAL LAB OFFICE BUILDING	CONNECTED POINTS						SOFTWARE		APPLICATIONS		
	OUTPUT DIGITAL	OUTPUT ANALOG	INPUT DIGITAL	INPUT ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG			
POINT DESCRIPTION											
FAN COIL UNITS	X										
START/STOP	X										
STATUS		X									
CHILLED WATER CONTROL VALVE			X								
SPACE TEMPERATURE				X							
EXHAUST FAN	X										
START/STOP	X										
STATUS		X									



SEQUENCE OF OPERATION

GENERAL: EXHAUST FANS SHALL BE ENERGIZED THROUGH THE DDC CONTROL SYSTEM AND SHALL RUN CONTINUOUSLY. FAN OPERATING STATUS, AS ESTABLISHED BY A DIFFERENTIAL PRESSURE SWITCH, SHALL BE REPORTED AT THE DDC CENTRAL CONTROL STATION.

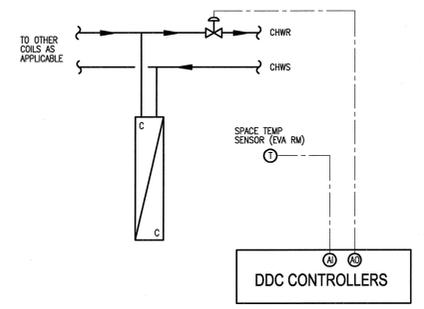
TYPICAL TOILET EXHAUST FAN CONTROL



SEQUENCE OF OPERATION

UNIT HEATER TEMPERATURE CONTROL
 THIS SYSTEM CONSISTS OF A UNIT HEATER WITH A HEATING COIL WHICH CIRCULATES AIR THROUGH A COIL TO PROVIDE HEAT TO THE SPACE SERVED. THE HEATING COIL MEDIUM IS UNCONTROLLED (NO VALVE).
 SPACE THERMOSTAT HAS A MANUAL "OFF-AUTO" SWITCH. WHEN THE SWITCH IS INDEXED TO "OFF", THE UNIT HEATER FAN MOTOR IS DE-ENERGIZED. WHEN THE SWITCH IS INDEXED TO "AUTO", THE FAN STARTS WHEN THE SPACE TEMPERATURE FALLS BELOW THE THERMOSTAT SETPOINT.

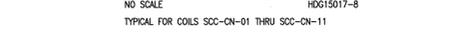
TYPICAL UNIT HEATER CONTROL



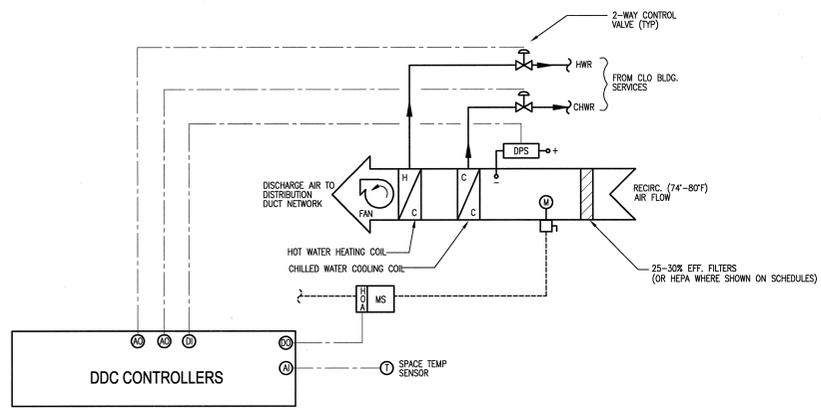
SEQUENCE OF OPERATION

TEMPERATURE CONTROL: A SPACE TEMPERATURE SENSOR SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE CHILLED WATER, 2-WAY CONTROL VALVES AS REQUIRED TO MAINTAIN THE DESIRED SPACE TEMPERATURE.

TYPICAL EVA RM - SENSIBLE COOLING COIL CONTROL DIAGRAM



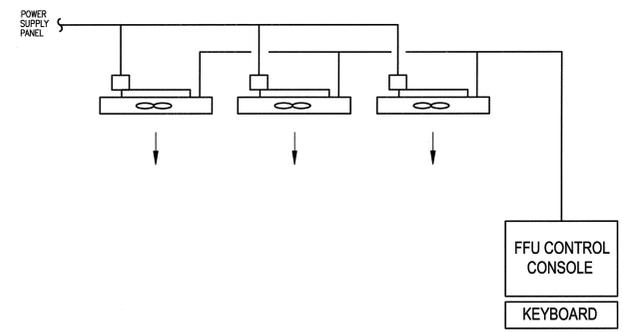
TEMPERATURE CONTROL: A SPACE TEMPERATURE SENSOR SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE CHILLED WATER, 2-WAY CONTROL VALVES AS REQUIRED TO MAINTAIN THE DESIRED SPACE TEMPERATURE.



SEQUENCE OF OPERATION

GENERAL: THE FAN COIL UNITS SHALL BE ENERGIZED THROUGH THE DDC CONTROL SYSTEM AND SHALL RUN CONTINUOUSLY. FAN OPERATING STATUS, AS ESTABLISHED BY A DIFFERENTIAL PRESSURE SWITCH, SHALL BE REPORTED AT THE DDC CENTRAL CONTROL STATION.
 TEMPERATURE CONTROL: A SPACE TEMPERATURE SENSOR SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE HOT WATER AND CHILLED WATER, 2-WAY CONTROL VALVES AS REQUIRED TO MAINTAIN THE DESIRED SPACE TEMPERATURE.

TYPICAL FAN-COIL CONTROL DIAGRAM

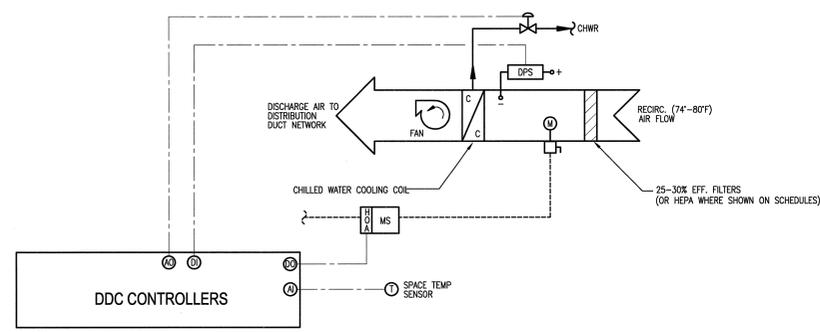


SEQUENCE OF OPERATION

ALL FAN FILTER UNITS (FFU) SHALL BE INDEPENDENTLY ADDRESSABLE TO ESTABLISH OPERATING STATUS, SPEED AND FLOW.

TYPICAL FFU CONTROL DIAGRAM

NO SCALE HDG15017-8

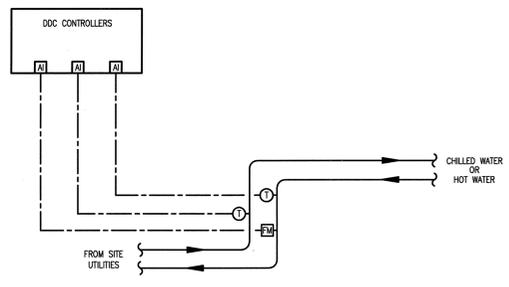


SEQUENCE OF OPERATION

GENERAL: THE FAN COIL UNITS SHALL BE ENERGIZED THROUGH THE DDC CONTROL SYSTEM AND SHALL RUN CONTINUOUSLY. FAN OPERATING STATUS, AS ESTABLISHED BY A DIFFERENTIAL PRESSURE SWITCH, SHALL BE REPORTED AT THE DDC CENTRAL CONTROL STATION.
 TEMPERATURE CONTROL: A SPACE TEMPERATURE SENSOR SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE CHILLED WATER, 2-WAY CONTROL VALVES AS REQUIRED TO MAINTAIN THE DESIRED SPACE TEMPERATURE.

TYPICAL CONTROL DIAGRAM - COOLING ONLY

NO SCALE HDG15017-8

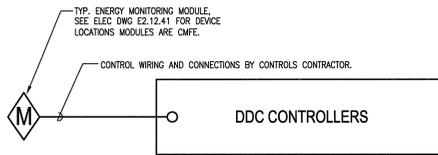


SEQUENCE OF OPERATION

1) GENERAL: TEMPERATURE SENSORS IN THE SUPPLY AND RETURN LINES, AS WELL AS A FLOW METER IN THE RETURN LINE SHALL PROVIDE UTILITY MONITORING DATA TO THE CONTROL SYSTEM.

BTU ENERGY MONITORING

NO SCALE APPLIES TO HOT WATER AND CHILLED WATER LINES. SEE DRAWINGS H7.11.40 AND H7.11.41.



ENERGY MONITORING SYSTEM

NO SCALE

REV	DATE	DESCRIPTION	DSN	CHK	DEPT	DATE	PE	DATE	P.A.	DATE	REQ	DATE	UTB	DATE	RPE	RPE NO	DATE	ST	CV	EC	EE	EM	IE	M	PD	SE	AR
0		CERTIFIED FOR CONSTRUCTION - 12/9/02				12/9/02																					

REV	DATE	DESCRIPTION
1	12/9/02	DATE

GEN. DRAWING NUMBER: 8610

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 UT-BATTELLE, LLC, Oak Ridge, Tennessee

PROJECT NAME: CENTER FOR NANOPHASE MATERIALS SCIENCES
 MISCELLANEOUS EQUIPMENT CONTROL DIAGRAMS-1

1	48	49	50	PLANT	BLDG	FL	SH.	OF	TYPE	CLASS
3	H	X	X	8	8610		1	1	D	U
51	52	53	A/E	DRAWING NUMBER:	H8.11.45	REV				

SECTION AND DETAIL KEY	NUMBER OF SECTION OR DETAIL	DRAWING ON WHICH SECTION OR DETAIL IS SHOWN OR TAKEN

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 ENGINEERING PROCEDURE

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