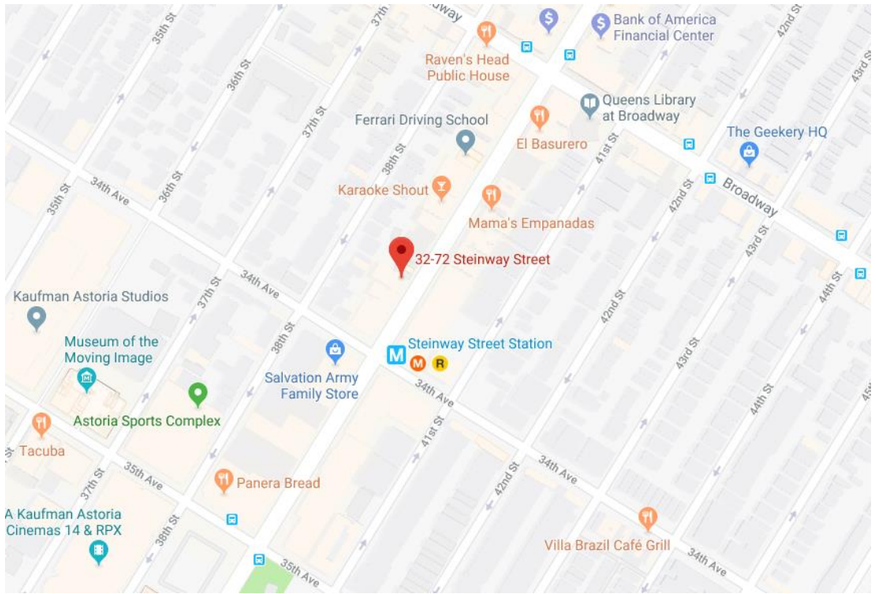
TITLE PAGE

SAMPLE PROJECT – DISTECH CONTROLS

BUILDING AUTOMATION SYSTEM

MAP TO SITE



ENGINEER:-

CONTRACTOR: -

SUBMISSION: MM/DD/YYYY

GENERAL NOTES

1. ALL POWER WIRING 120 VAC AND ABOVE BY ELECTRICAL CONTRACTOR.

TEMPERATURE CONTROL LEGEND:

- MOUNTED ON PANEL FACE
- MOUNTED INSIDE PANEL
- ③ CONTROL TUBE #3
- PNEUMATIC TUBING
- WIRING
- 6 TERMINAL BLOCK #6
- SV SOLENOID VALVE
- CONTROL VALVE, 2-WAY
- CONTROL VALVE, 3-WAY
- PARALLEL BLADED DAMPER
- OPPOSED BLADED DAMPER
- AB SIGNAL LINE INSIDE PANEL

ABBREVIATIONS:

AFMS- AIR FLOW MEASURING STATION
C- COMMON PORT
CCP- CENTRAL CONTROL PANEL
CR- CONTROL RELAY
CS- CURRENT SWITCH
DA-DAMPER ACTUATOR
DPRO- DAMPER OUTPUT
DPRS- DAMPER STATUS
DPS- DIFFERENTIAL PRESSURE SWITCH
DPT- DIFFERENTIAL PRESSURE TRANS
EA- EXHAUST AIR
ES- END SWITCH, POSITION SWITCH
FS- FLOW SWITCH
FSD- FIRE & SMOKE DAMPER
H- HUMIDISTAT
HC- MOTOR STARTER HOLDING COIL
HI- HUMIDITY INDICATOR
HL- HIGH LIMIT HUMIDISTAT
HS- HIGH SIGNAL SELECTOR
HT- HUMIDITY TRANSMITTER
LCP- LOCAL CONTROL PANEL
LS- LOW SIGNAL SELECTOR
MA- MIXED AIR
MOD-MOTER OPERATED DAMPER
NC- NORMALLY CLOSED
NCP- NETWORK CONTROL PANEL
NO- NORMALLY OPEN
OA -OUTSIDE AIR
OL'S- MOTOR STARTER OVERLOADS
PC- PRESSURE CONTROLLER
PE- PRESSURE TOGGLE SWITCH
PI- PRESSURE INDICATOR
PL- PILOT LIGHT
PR- PNEUMATIC RELAY
PT- PRESSURE TRANSMITTER
RC- RECEIVER CONTROLLER
RR- REVERSING RELAY
RT- ROOM THERMOSTAT
S- SWITCH
SD- SMOKE DETECTOR
S/W- SUMMER/ WINTER SIGNAL
T- THERMOSTAT
TS- TEMPERATURE SENSOR
TC- TIME CLOCK
TDR- TIME DELAY RELAY
THL- TEMPERATURE HIGH LIMIT THERMOSTAT
TI- TEMPERATURE INDICATOR
TLL- TEMPERATURE LOW LIMIT THERMOSTAT
TR- TRANSDUCER
TT- TEMPERATURE TRANSMITTER
TX- TRANSFORMER
V- VALVE
WB- WET BULB
WU- WARM-UP SIGNAL

HVAC SYSTEM LEGEND:

- MOTOR OPERATED DAMPER
- FIRE & SMOKE DAMPER (BY OTHERS)
- PH / C PREHEAT COIL
- FRZ FREEZESTAT
- C / C COOLING COIL
- DT DUCT MOUNTED TEMPERATURE SENSOR
- RH / C REHEAT COIL
- T IMMERSION TYPE TEMPERATURE SENSOR
- H / C HEATING COIL
- DSD DUCT MOUNTED SMOKE DETECTOR
- D / X DIRECT EXPANSION COIL
- SPT STATIC PRESSURE TRANSMITTER
- FAN
- PUMP
- MANUAL VALVE
- DT DH DUCT MOUNTED TEMPERATURE & HUMIDITY COMBINED SENSOR
- DH DUCT MOUNTED HUMIDITY SENSOR
- FS WATER FLOW SWITCH
- ROOM TEMPERATURE
- DT AVERAGING TYPE TEMPERATURE SENSOR
- AIR FLOW MEASURING STATION
- FILTER
- CR1 CONTROL RELAY

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC

32-72 Steinway St,
Astoria, NY 11103

(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

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NETWORK RISER PAGE 1

MAIN MUSEUM UPPER LVL-PERISTYLE

EOL

UP-4-2
ECB-300 ADDR: 10
DI: 110110
FCU-13
LOCATION: UPPER LEVEL PERISTYLE

UP-4
ECB-300 ADDR: 09
DI: 110109
FCU-12
LOCATION: UPPER LEVEL PERISTYLE

BACNET MS/TP NO. 1101

MAIN MUSEUM ATTIC-EAST

EOL

AE-3
ECB-300 ADDR: 20
DI: 110220
AHU-SKYLIGHT
ECB-600 ADDR: 19
DI: 110219
AHU-CCU
LOCATION: ATTIC EAST AHU-CCU VICINITY

W/1-IOM
ECB-600 ADDR: 18
DI: 110218
AHU-3
LOCATION: ATTIC EAST AHU-CCU VICINITY

BACNET MS/TP NO. 1102

AE-1
ECB-600 ADDR: 15
DI: 110215
AHU-12, AHU-12 REHEAT COILS
LOCATION: ATTIC EAST AHU-12 VICINITY

AE-2
ECB-600 ADDR: 16
DI: 110216
AHU-11
LOCATION: ATTIC EAST AHU-11 VICINITY

AE-4
ECB-600 ADDR: 17
DI: 110217
AHU-9
LOCATION: ATTIC EAST AHU-9 VICINITY

MAIN MUSEUM ATTIC-CENTER

EOL

AC-1 NOTE 2
LOCATION: IN ATTIC CENTER

AC-2
LOCATION: IN ATTIC CENTER

AC-3
ECB-600 ADDR: 09
DI: 110309
ATTIC UHs (PORTION OF UH-2 THRU UH-8)
LOCATION: IN ATTIC CENTER

BACNET MS/TP NO. 1103

MAIN MUSEUM ATTIC-WEST

EOL

AW-1
ECB-600 ADDR: 12
DI: 110412
ZONE 3 FCU
ECB-600 ADDR: 11
DI: 110411
ZONE 2 FCU
ECB-600 ADDR: 10
DI: 110410
ZONE 1 FCU
LOCATION: IN ATTIC WEST AHU-8 & AHU-10 VICINITY

BACNET MS/TP NO. 1104

AW-3 NOTE 2
LOCATION: IN ATTIC WEST AHU-8 & AHU-10 VICINITY

AW-4
ECB-600 ADDR: 08
DI: 110408
AHU-8, AHU-8 REHEAT COIL
LOCATION: IN ATTIC WEST AHU-8 & AHU-10 VICINITY

AW-2
ECB-600 ADDR: 09
DI: 110409
AHU-GGU
LOCATION: IN ATTIC WEST AHU-8 & AHU-10 VICINITY

ATTIC

MAIN MUSEUM GROUND FLR-PERISTYLE

BACNET MS/TP NO. 1101

MAIN MUSEUM GROUND FLR-EAST

ECB-VAVS ADDR:14
VAV-TU-9
DI: 110214
ECB-VAV ADDR:13
VAV-TU-8
DI: 110213
ECB-VAVS ADDR:12
VAV-TU-7
DI: 110212
ECB-VAVS ADDR:11
VAV-TU-6
DI: 110211
ECB-VAVS ADDR:10
VAV-TU-5
DI: 110210
ECB-VAVS ADDR:09
VAV-TU-4
DI: 110209

GE-2 NOTE 2
LOCATION: GROUND FLOOR ABOVE GREEN CONFERENCE RM CEILING

GE-1 NOTE 2
LOCATION: GROUND FLOOR ABOVE GREEN CONFERENCE RM CEILING

ECB-VAV ADDR:06
VAV-TU-1
DI: 110206
ECB-VAVS ADDR:07
VAV-TU-2
DI: 110207
ECB-VAVS ADDR:08
VAV-TU-3
DI: 110208

MAIN MUSEUM GROUND FLR-CENTER

BACNET MS/TP NO. 1103

GC-2
ECB-600 ADDR: 06
DI: 110306
AHU-S-3A/3B REHEAT COILS
LOCATION: IN GROUND FLR VAULTS AREA

GC-1
ECB-600 ADDR: 07
DI: 110307
AHU-14
ECB-400 ADDR: 08
DI: 110308
VESTIBULE CONTROL BCU-1 & DHC-VEST
LOCATION: IN GROUND FLR CARPENTERS SHOP

BACNET MS/TP NO. 1103

MAIN MUSEUM GROUND FLR-WEST

BACNET MS/TP NO. 1104

BG-1
ECB-203 ADDR: 07
DI: 110407
AHU-17
LOCATION: IN GROUND FLR ARCHIVES OFFICE AREA

BACNET MS/TP NO. 1104

GROUND FLOOR

MAIN MUSEUM BASMENT-PERISTYLE

BP-5
ECB-400 ADDR: 08
DI: 110108
AHU-S2
ECB-203 ADDR: 07
DI: 110107
STAGE VALANCE COOLING SYSTEM
LOCATION:BASEMENT PERISTYLE STAGE AREA MECH RM

BP-3
ECB-600 ADDR: 06
DI: 110106
AHU-6
LOCATION:BASEMENT PERISTYLE MECH RM

PERISTYLE -3
ECB-400 ADDR: 5
DI: 110105
HEAT EXCHANGERS-3, HWHP-1 &2
LOCATION:BASEMENT PERISTYLE MECH RM

BP-1
ECB-600 ADDR: 01
DI: 110101
AHU-13
LOCATION:BASEMENT PERISTYLE MECH RM

BP-2
ECB-203 ADDR: 02
DI: 110102
FCU-14, FCU-15
ECB-600 ADDR: 03
DI: 110103
AHU-S1
ECB-400 ADDR: 04
DI: 110104
AHU-S1 REHEAT COILS
LOCATION:BASEMENT PERISTYLE MECH RM

BACNET MS/TP NO. 1101

BACNET MS/TP NO. 1102

BACNET MS/TP NO. 1103

BACNET MS/TP NO. 1104

BACNET MS/TP NO. 1105

BACNET MS/TP NO. 1106

JACE 8000
RS-485-1
RS-485-2

NS-1 SWITCH

TO CO2 SENSORS IN ZONE

* FIELD TO VERIFY LOCATION OF JACE
* REUSE EXISTING OWS & NETWORK SWITCH

MAIN MUSEUM BASMENT-EAST

BACNET MS/TP NO. 1102

BE-3
ECB-600 ADDR: 05
DI: 110205
AHU-2 REHEAT COILS
LOCATION: BASEMENT EAST MECH RM

BE-2
ECB-600 ADDR: 04
DI: 110204
AHU-2
LOCATION: BASEMENT EAST MECH RM

BE-1
ECB-600 ADDR: 03
DI: 110203
AHU-1
LOCATION: BASEMENT EAST MECH RM

BE-4 NOTE 2
LOCATION: BASEMENT EAST MECH RM

BE-5
ECB-600 ADDR: 01
DI: 110201
AHU-4
ECB-600 ADDR: 02
DI: 110202
AHU-5
LOCATION: BASEMENT EAST MECH RM

BACNET MS/TP NO. 1102

MAIN MUSEUM BASMENT-CENTER

BC-1 NOTE 2
LOCATION: BASEMENT CENTER AHU-S-3A/B MECH RM VICINITY

BC-6
ECB-600 ADDR: 05
DI: 110305
AHU-S-3A/3B REHEAT COILS
ECB-600 ADDR: 04
DI: 110304
AHU-S-3A/3B
LOCATION: BASEMENT CENTER AHU-S-3A/B MECH RM VICINITY

BC-4
ECB-600 ADDR: 03
DI: 110303
AHU-LTU
ECB-600 ADDR: 02
DI: 110302
AHU-16
LOCATION: BASEMENT CENTER AHU-LTU MECH RM

BACNET MS/TP NO. 1103

BC-5 NOTE 2
LOCATION: BASEMENT CENTER AHU-S101 MECH RM

BC-2
ECB-600 ADDR: 01
DI: 110301
AHU-S101, AHU-S101 REHEAT COILS
LOCATION: BASEMENT CENTER AHU-S101 MECH RM

BC-3 NOTE 2
LOCATION: BASEMENT CENTER AHU-S101 MECH RM

BACNET MS/TP NO. 1103

MAIN MUSEUM BASMENT-WEST

BW-1
ECB-600 ADDR: 06
DI: 110406
AHU-10A/10B REHEAT COILS
LOCATION: BASEMENT WEST RHC-27,28 &31 VICINITY

BW-6
ECB-600 ADDR: 05
DI: 110405
AHU-7
LOCATION: BASEMENT WEST AHU-7 VICINITY

BW-5
ECB-600 ADDR: 04
DI: 110404
AHU-10A/10B
ECB-600 ADDR: 03
DI: 110403
AHU-9A/9B
LOCATION: BASEMENT WEST AHU-8A/8B VICINITY

BACNET MS/TP NO. 1104

BW-3
ECB-600 ADDR: 01
DI: 110401
AHU-8A/8B
ECB-600 ADDR: 02
DI: 110402
AHU-8A/8B REHEAT COILS
LOCATION: BASEMENT WEST AHU-8A/8B VICINITY

BW-4
LOCATION: BASEMENT WEST AHU-8A/8B VICINITY

NOTES:
1. FIELD TO VERIFY ROUTING OF BACNET MS/TP TRUNKS.
2. FIELD TO VERIFY ROUTING OF BACNET MS/TP TRUNKS FOR EMPTY PANELS.
3. NEW CONTROLLERS ARE TO BE INSTALLED IN EXISTING PANELS.

BASEMENT

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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NETWORK RISER PAGE 1

NETWORK RISER PAGE 2

MAIN MUSEUM UPPER LVL-PERISTYLE

BACNET MS/TP
NO. 1106

MAIN MUSEUM ATTIC-EAST

EOL

RHC-12A- ZN-T/H/CO2
GALLERY 06
ADDR : 10
DI: 110610

RHC-12B- ZN-T/H/CO2
GALLERY 07
ADDR : 11
DI: 110611

RHC-12C- ZN-T/H/CO2
GALLERY 08
ADDR : 12
DI: 110612

CCU-ZN-T/H/CO2
ADDR : 13
DI: 110613

CCU-ZN-T/H/CO2
ADDR : 14
DI: 110614

RHC-11E- ZN-T/H/CO2
GALLERY 10
ADDR : 09
DI: 110609

RHC-11D- ZN-T/H/CO2
GALLERY 09
ADDR : 08
DI: 110608

RHC-11C- ZN-T/H/CO2
GALLERY 05
ADDR : 07
DI: 110607

RHC-11B- ZN-T/H/CO2
GALLERY 04
ADDR : 06
DI: 110606

RHC-11A- ZN-T/H/CO2
GALLERY 03
ADDR : 05
DI: 110605

BACNET MS/TP
NO. 1106

AHU-3-ZN-T/H/CO2
WOLFE GALLERY 02A
– LOWER LEVEL
ADDR : 01
DI: 110601

AHU-9- RHC-X-ZN-T/H/CO2
GALLERY 1
ADDR : 02
DI: 110602

AHU-9- RHC-X-ZN-T/H/CO2
GALLERY 11
ADDR : 03
DI: 110603

AHU-9- RHC-X-ZN-T/H/CO2
GALLERY 35
ADDR : 04
DI: 110604

MAIN MUSEUM ATTIC-CENTER

MAIN MUSEUM ATTIC-WEST

EOL

BACNET MS/TP
NO. 1105

GGU-ZN-T/H/CO2
ADDR : 08
DI: 110509

GGU-ZN-T/H/CO2
ADDR : 09
DI: 110509

RHC-8A- ZN-T/H/CO2
GALLERY 03
ADDR : 04
DI: 110504

RHC-8B- ZN-T/H/CO2
GALLERY 04
ADDR : 05
DI: 110505

RHC-8C- ZN-T/H/CO2
GALLERY 05
ADDR : 06
DI: 110506

RHC-8D- ZN-T/H/CO2
GALLERY 09
ADDR : 07
DI: 110507

ATTIC

MAIN MUSEUM GROUND FLR-PERISTYLE

MAIN MUSEUM GROUND FLR-EAST

MAIN MUSEUM GROUND FLR-CENTER

MAIN MUSEUM GROUND FLR-WEST

GROUND FLOOR

MAIN MUSEUM BASMENT-PERISTYLE

BACNET MS/TP
NO. 1105

FROM JACE

MAIN MUSEUM BASMENT-EAST

MAIN MUSEUM BASMENT-CENTER

BACNET MS/TP
NO. 1105

RHC-101A- ZN-1-T/H/CO2
CANADAY GALLERY
ADDR : 01
DI: 110501

RHC-101A- ZN-1-T/H/CO2
CANADAY GALLERY
ADDR : 02
DI: 110502

RHC-101C- ZN-T/H/CO2
HERRICK LOBBY
ADDR : 03
DI: 110503

MAIN MUSEUM BASMENT-WEST

BASEMENT

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	JACE	JACE	JACE-8100	1	Base unit includes two isolated RS485 ports, two 10/100MB Ethernet ports, USB Backup & Restore and Wi-Fi connectivity. Up to 100 devices/5,000 point core	Vykon
2	JACE - 1 Year Maintenance		SMA-8100-1YR	1	1 Year Maintenance License	Vykon
3	RS-485 module	RS-485-1,2	NPB-8000-2X-485	2	JACE 8000 controller—add on dual port RS-485 module	Vykon

*** SUPERVISOR UPGRADE & MAINTENANCE LICENSE TO BE ORDER ON SITE.**

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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NETWORK RISER PAGE 2

NETWORK RISER SCHEDULE PAGE 1

MAIN MUSEUM Building				
Unit Tag/Equipment	**Controller**	**Level**	**Device Instance**	**Mac Address**
JACE	JACE 8000	Basement	110000	00
MS/TP TRUNK-1				
AHU-13	ECB-600	MAIN MUSEUM BASMENT PERISTYLE	110101	01
FCU-14, FCU-15	ECB-203	MAIN MUSEUM BASMENT PERISTYLE	110102	02
AHU-S1	ECB-600	MAIN MUSEUM BASMENT PERISTYLE	110103	03
AHU-S1 RHC	ECB-400	MAIN MUSEUM BASMENT PERISTYLE	110104	04
HEAT EXCHANGERS-3, HWHP-1 &2	ECB-400	MAIN MUSEUM BASMENT PERISTYLE	110105	05
AHU-6	ECB-600	MAIN MUSEUM BASMENT PERISTYLE	110106	06
VALANCE COOLING SYSTEM	ECB203	MAIN MUSEUM BASMENT PERISTYLE	110107	07
AHU-S2	ECB-400	MAIN MUSEUM BASMENT PERISTYLE	110108	08
FCU-12	ECB-300	MAIN MUSEUM UPPER LVL PERISTYLE	110109	09
FCU-13	ECB-300	MAIN MUSEUM UPPER LVL PERISTYLE	110110	10
MS/TP TRUNK-2				
AHU-4	ECB-600	MAIN MUSEUM BASMENT EAST	110201	01
AHU-5	ECB-600	MAIN MUSEUM BASMENT EAST	110202	02
AHU-1	ECB-600	MAIN MUSEUM BASMENT EAST	110203	03
AHU-2	ECB-600	MAIN MUSEUM BASMENT EAST	110204	04
AHU-2 RHC	ECB-600	MAIN MUSEUM BASMENT EAST	110205	05
VAV-TU-1	ECB-VAV	MAIN MUSEUM GROUND FLR EAST	110206	06
VAV-TU-2	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110207	07
VAV-TU-3	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110208	08
VAV-TU-4	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110209	09
VAV-TU-5	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110210	10
VAV-TU-6	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110211	11
VAV-TU-7	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110212	12
VAV-TU-8	ECB-VAV	MAIN MUSEUM GROUND FLR EAST	110213	13
VAV-TU-9	ECB-VAVS	MAIN MUSEUM GROUND FLR EAST	110214	14
AHU-12	ECB-600	MAIN MUSEUM ATTIC EAST	110215	15
AHU-11	ECB-600	MAIN MUSEUM ATTIC EAST	110216	16
AHU-9	ECB-600	MAIN MUSEUM ATTIC EAST	110217	17
AHU-3	ECB-600	MAIN MUSEUM ATTIC EAST	110218	18
AHU-CCU	ECB-600	MAIN MUSEUM ATTIC EAST	110219	19
AHU-SKYLIGHT	ECB-300	MAIN MUSEUM ATTIC EAST	110220	20
MS/TP TRUNK-3				
AHU-S101	ECB-600	MAIN MUSEUM BASMENT CENTER	110301	01
AHU-16	ECB-600	MAIN MUSEUM BASMENT CENTER	110302	02
AHU-LTU	ECB-600	MAIN MUSEUM BASMENT CENTER	110303	03
AHU-S-3A/3B	ECB-600	MAIN MUSEUM BASMENT CENTER	110304	04
AHU-S-3A/3B-RHC	ECB-600	MAIN MUSEUM BASMENT CENTER	110305	05
AHU-S-3A/3B-RHC	ECB-600	MAIN MUSEUM GROUND FLR CENTER	110306	06
AHU-14	ECB-600	MAIN MUSEUM GROUND FLR CENTER	110307	07
BCU-1 & DHC-VEST	ECB-400	MAIN MUSEUM GROUND FLR CENTER	110308	08
UH-2 TO 8	ECB-600	MAIN MUSEUM ATTIC CENTER	110309	09

LEGEND

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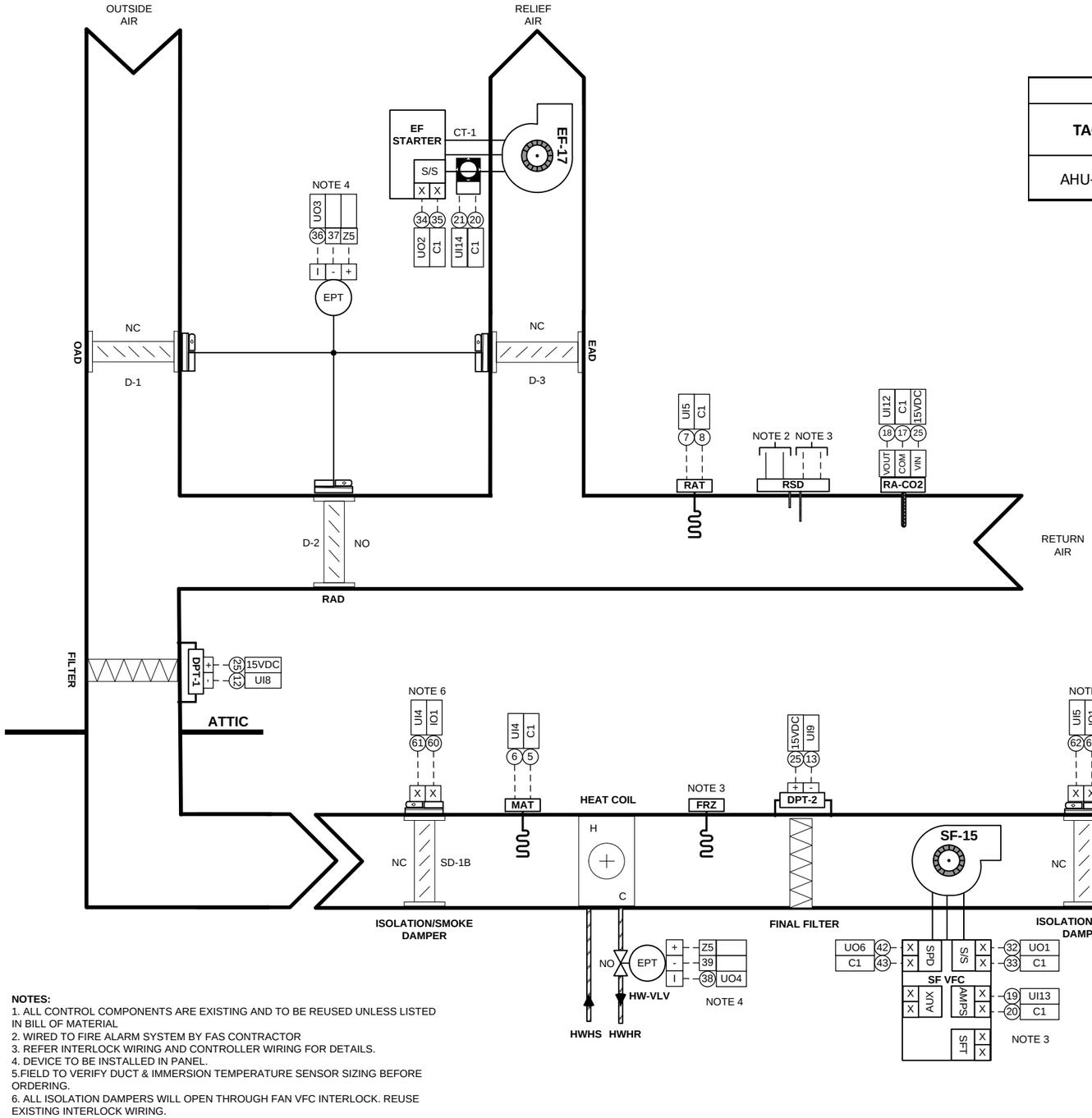
NETWORK RISER SCHEDULE PAGE 2

MAIN MUSEUM Building				
Unit Tag/Equipment	**Controller**	**Level**	**Device Instance**	**Mac Address**
MS/TP TRUNK-4				
AHU-8A / 8B	ECB-600	MAIN MUSEUM BASMENT WEST	110401	01
AHU-8A / 8B & RHC	ECB-600	MAIN MUSEUM BASMENT WEST	110402	02
AHU-9A / 9B	ECB-600	MAIN MUSEUM BASMENT WEST	110403	03
AHU-10A / 10B	ECB-600	MAIN MUSEUM BASMENT WEST	110404	04
AHU-7	ECB-600	MAIN MUSEUM BASMENT WEST	110405	05
AHU-10A / 10B RHC	ECB-600	MAIN MUSEUM BASMENT WEST	110406	06
AHU-17	ECB-203	MAIN MUSEUM GROUND FLR WEST	110407	07
AHU-8	ECB-600	MAIN MUSEUM ATTIC WEST	110408	08
AHU-GGU	ECB-600	MAIN MUSEUM ATTIC WEST	110409	09
ZONE 1 FCU	ECB-600	MAIN MUSEUM ATTIC WEST	110410	10
ZONE 2 FCU	ECB-600	MAIN MUSEUM ATTIC WEST	110411	11
ZONE 3 FCU	ECB-600	MAIN MUSEUM ATTIC WEST	110412	12
MS/TP TRUNK-5				
RHC-101A- ZN-1-T/H/CO2	ECB-600	MAIN MUSEUM BASMENT-CENTER	110501	01
RHC-101A- ZN-1-T/H/CO2	ECB-600	MAIN MUSEUM BASMENT-CENTER	110502	02
RHC-101C- ZN-T/H/CO2	ECB-600	MAIN MUSEUM BASMENT-CENTER	110503	03
RHC-8A- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110504	04
RHC-8B- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110505	05
RHC-8C- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110506	06
RHC-8D- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110507	07
GGU-ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110508	08
GGU-ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-WEST	110509	09
MS/TP TRUNK-6				
AHU-3-ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110601	01
AHU-9- RHC-X- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110602	02
AHU-9- RHC-X- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110603	03
AHU-9- RHC-X- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110604	04
RHC-11A- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110605	05
RHC-11B- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110606	06
RHC-11C- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110607	07
RHC-11D- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110608	08
RHC-11E- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110609	09
RHC-12A- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110610	10
RHC-12B- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110611	11
RHC-12C- ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110612	12
CCU-ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110613	13
CCU-ZN-T/H/CO2	ECB-600	MAIN MUSEUM ATTIC-EAST	110614	14

AHU-S1 SCHEMATIC DIAGRAM

AHU-S1 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-S1	MAIN MUSEUM BASEMENT	PERISTYLE THEATER & SUPPORT AREAS				M1.1



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

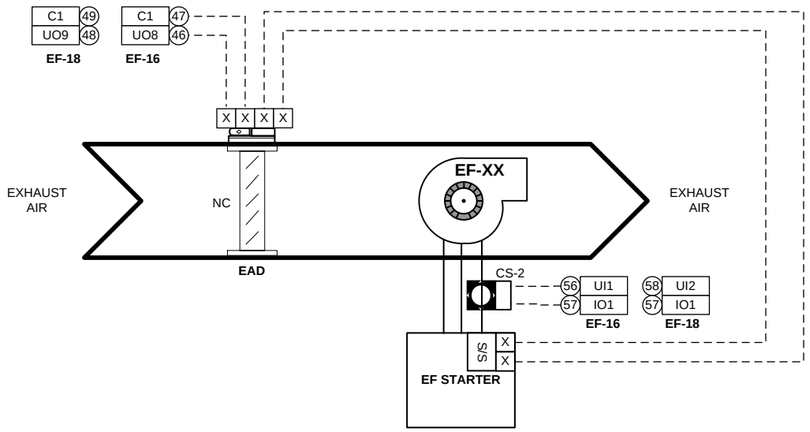
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 SCHEMATIC DIAGRAM

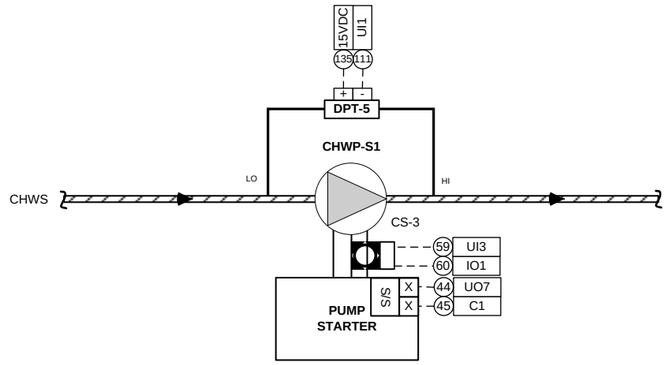
AHU-S1 MISCELLANEOUS SYSTEM SCHEMATIC DIAGRAM

AHU-S1 EF-16 AND EF-18 CONTROL

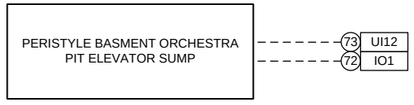
TYPICAL OF 2



CHW PUMP CHWP-S1 CONTROL



SUMP PUMP MONITORING



* SUMP PUMP MONITORING POINT FROM MECHANICAL DRAWING M1.15 LOCATION NOT FOUND ON FLOOR PLAN SO WE HAVE CONSIDERED POINT HERE

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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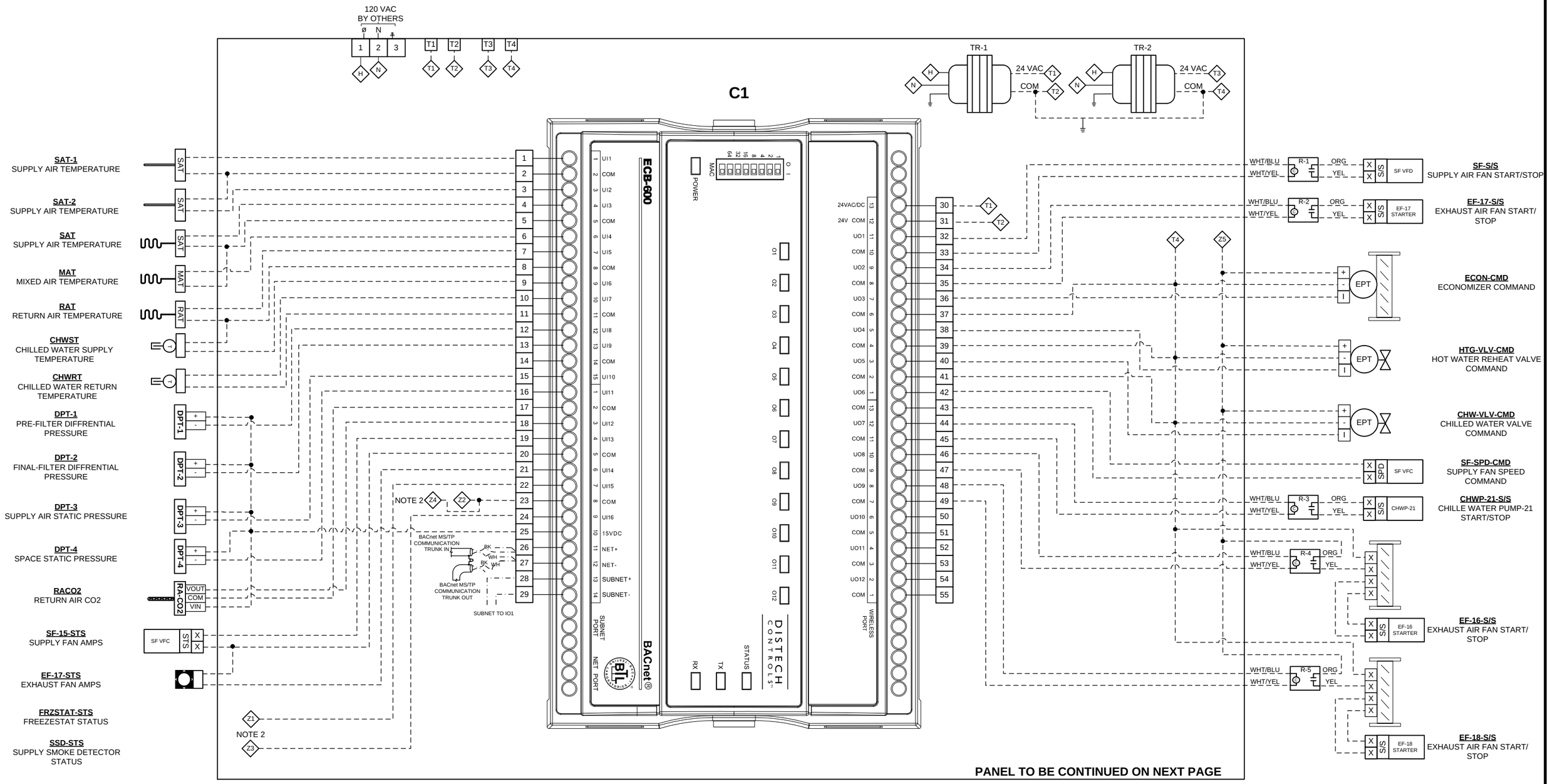
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 MISCELLANEOUS SYSTEM SCHEMATIC DIAGRAM

AHU-S1 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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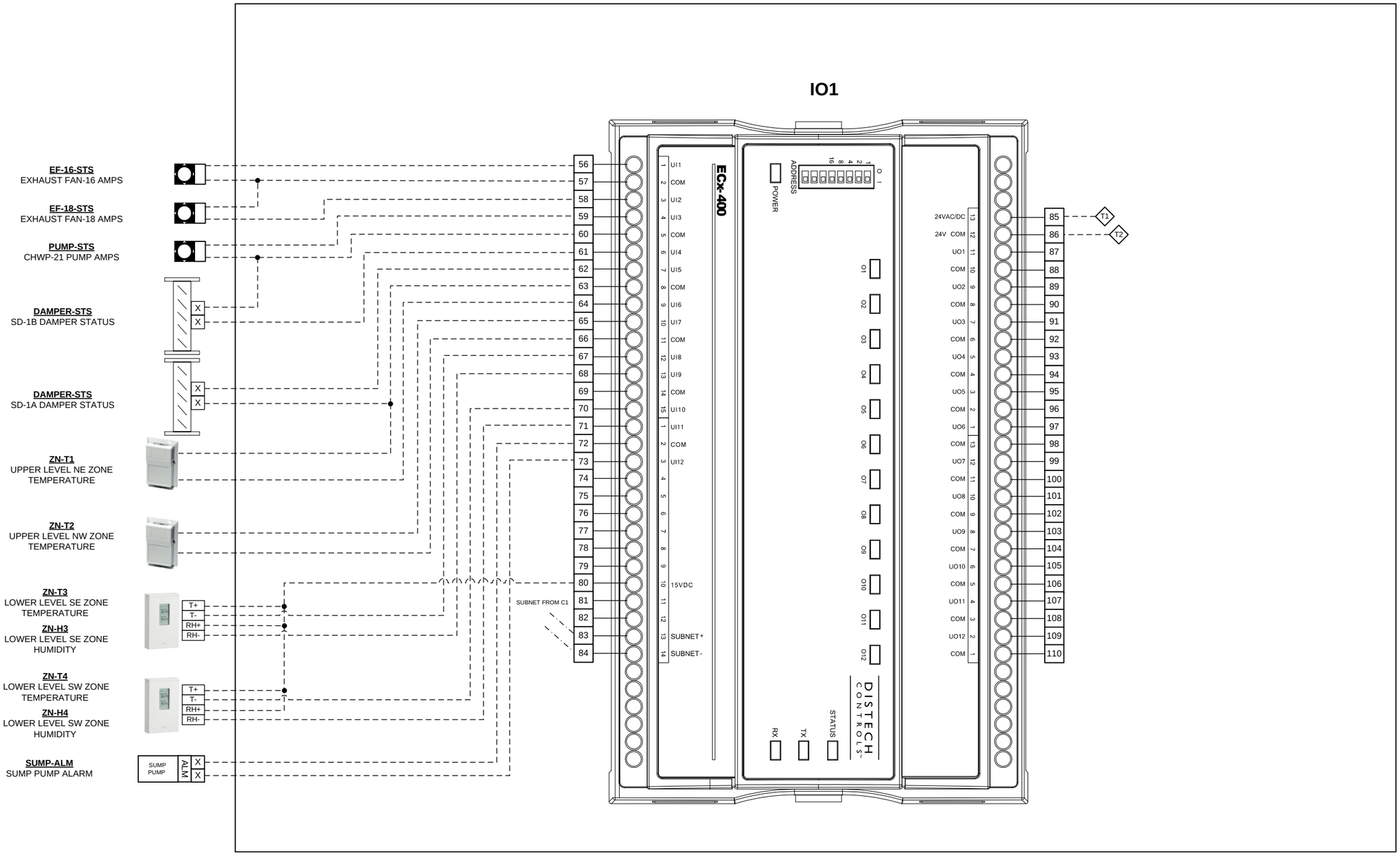
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 WIRING DIAGRAM PAGE 1

AHU-S1 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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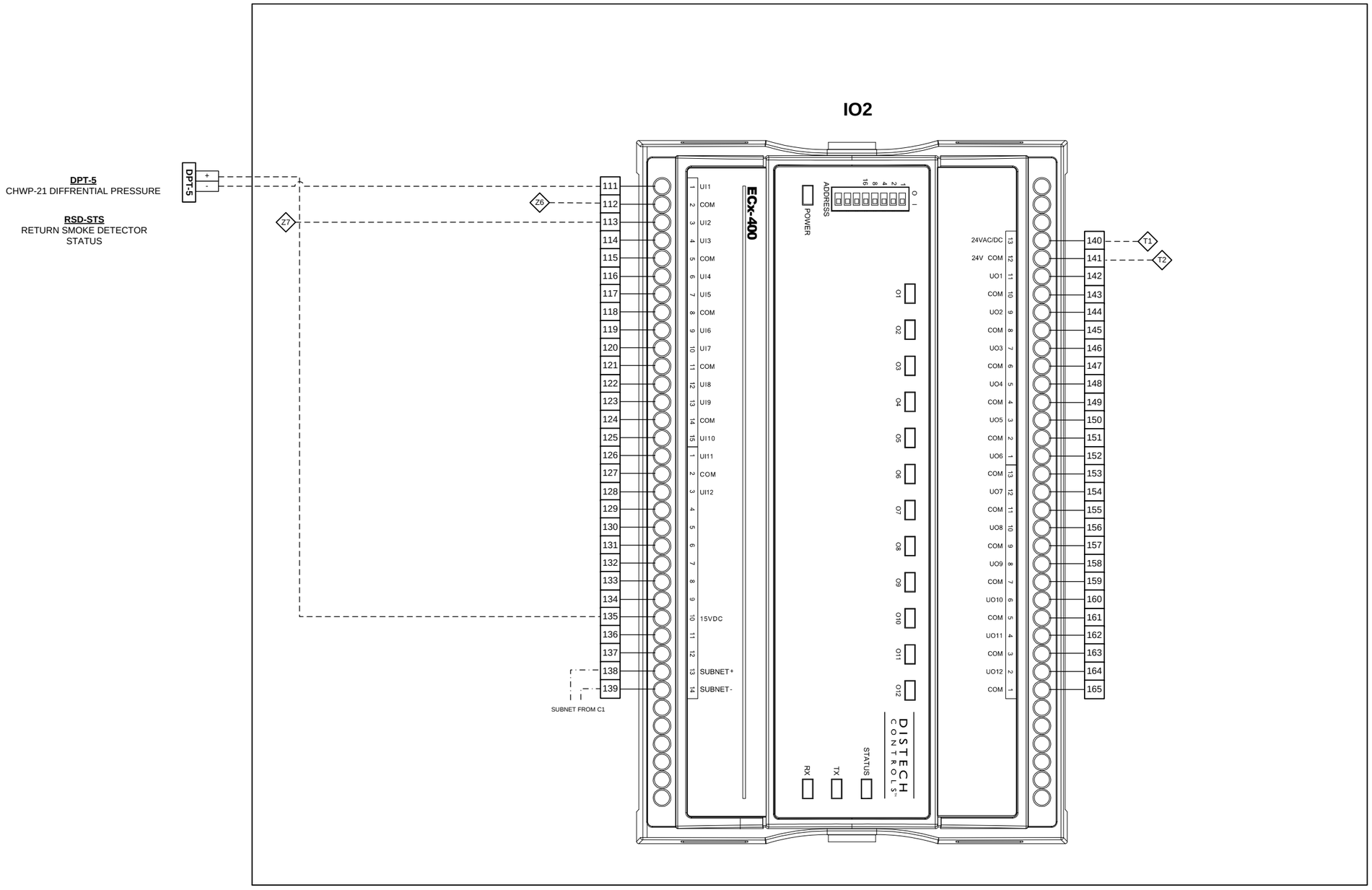
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 WIRING DIAGRAM PAGE 2

AHU-S1 WIRING DIAGRAM PAGE 3



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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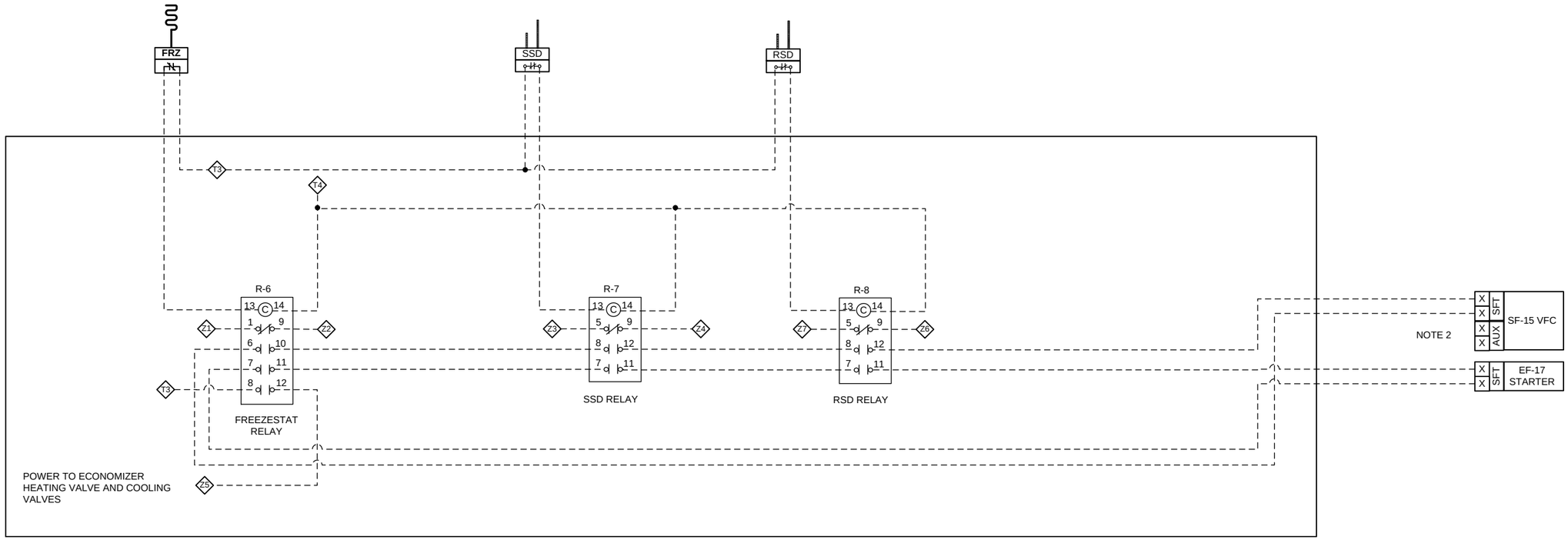
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 WIRING DIAGRAM PAGE 3

AHU-S1 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S1 SEQUENCE OF OPERATION

AHU-S1 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN AND RELATED EXHAUST FANS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM), EVENT MODE, AND NIGHT CYCLE MODE. EVENT MODE SHALL SELF-CANCEL WHEN SCHEDULED AND RETURN TO THE APPROPRIATE TIME OF DAY MODE.

4. ALL SUPPLY AND EXHAUST FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURES, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

7. TERTIARY CHWP-S1 SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT AND UPON A DEMAND FOR DEHUMIDIFICATION. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

8. WHEN SF-15 AND EF-17 ARE ACTIVATED, WIRING INTERLOCK THRU SF VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC. WHEN DDC INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

9. BASED ON BAS TIME OF DAY SCHEDULE IN OCCUPIED MODE, RESTROOM FANS EF-16 AND EF-18 SHALL RUN. IN UNOCCUPIED MODE, EF-16 AND EF-18 SHALL REMAIN OFF.

10. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

11. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

12. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

13. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

14. WHEN AHU IS RUNNING, OUTSIDE, RETURN & RELIEF AIR DAMPERS (CALLED DAMPERS HEREIN) SHALL MODULATE AS DESCRIBED. DDC SHALL POSITION DAMPERS ACCORDING TO TAB CONTRACTORS DATA TO MAINTAIN MINIMUM OA CFM.

15. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°F DB SETPOINT AND LESS THAN 44°F WB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

16. WHEN DA TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION TO MAINTAIN DA TEMP SETPOINT.

17. WHEN DA TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT MODULATE HWH COIL VALVE TO MAINTAIN DA TEMP SETPOINT.

18. WHEN DA TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HWH COIL VALVE TO MAINTAIN DA TEMP SETPOINT.

19. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

20. DDC SHALL PROVIDE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE (DAT) SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP (OAT) RESET SCHEDULE:

OAT	DAT
≤45°F	60°F
≥55°F	55°F

21. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL.

22. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MIN—MIN OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAX—MIN OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

23. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

24. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SF & EF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

25. PRE— AND FINAL FILTER STATUS(ES) SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

26. WHEN AHU IS DEACTIVATED BY DDC/EMS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS. WHEN AHU IS DEACTIVATED AND OA TEMP IS LESS THAN 45°F, DDC SHALL MODULATE THE HWH COIL VALVE TO MAINTAIN PLENUM TEMP SETPOINT OF 50°F AT THE MA TEMP SENSOR.

27. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

28. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER(S) PRESSURE	LOW MIXED AIR TEMPERATURE OVERRIDE
SUPPLY/EXHAUST FAN FAILURES	LOW DISCHARGE AIR TEMPERATURE
SMOKE DETECTOR(S)	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

AHU-S1 PERISTYLE THEATER TEMP CONTROL SEQUENCE OF OPERATION

AIR HANDLING UNIT AHU-S1 PERISTYLE THEATER TEMPERATURE CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. SPACE COOLING TEMP CONTROL SHALL BE THE AVERAGE OF THE FOUR SPACE TEMP SENSORS.

3. WHEN SPACE TEMP RISES ABOVE SPACE TEMP SETPOINT, DDC SHALL CHW COIL VALVE(S) TO MAINTAIN SPACE TEMP SETPOINT.

4. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE

HIGH SPACE TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 PERISTYLE THEATER TEMP CONTROL SEQUENCE OF OPERATION

AHU-S1 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1, IO2	CDIX-400X-00	2	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT,SAT,RAT	A/CP-FA-24'-GD	3	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Temperature Sensor	DAT	A/CP-D-8"-GD	2	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galvanised Box	ACI
5	Zone Temp Sensor	ZN-T	A/CP-R2	2	Thermistor, 10K Type II, Room Temperature sensor	ACI
6	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
7	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	2	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
8	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
9	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
10	Relay	R-1 TO R-5	RIBU1C	5	Universal field mounted Relay	Functional Devices
11	Panel Mounted Relay	R-6 To R-8	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-6 To R-8	784-4C-SKT	3	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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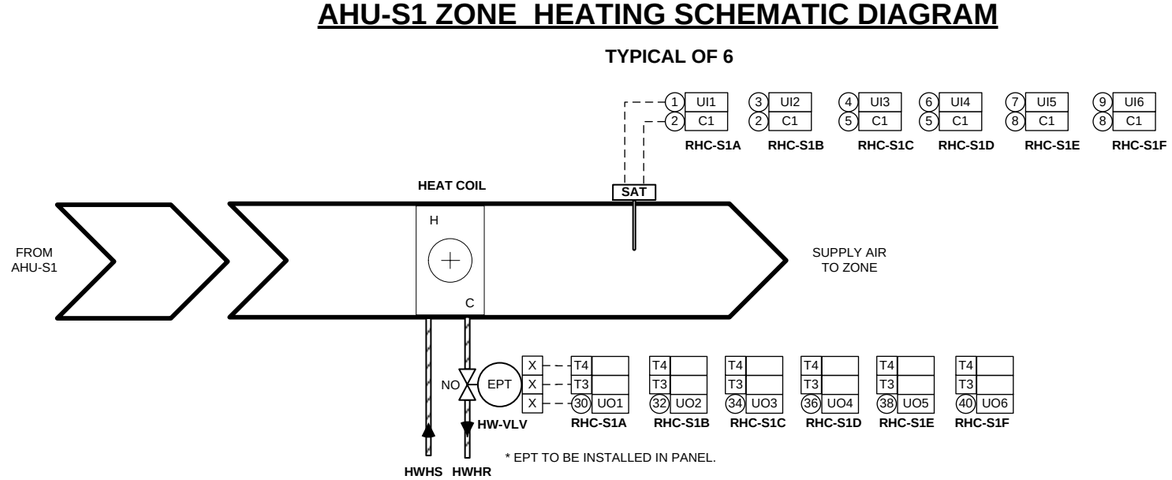
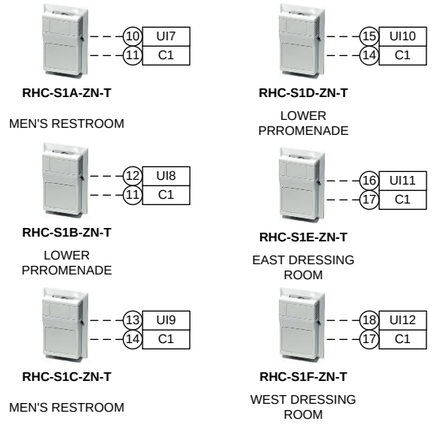
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 BILL OF MATERIAL

AHU-S1 ZONE HEATING SCHEMATIC DIAGRAM





REHEAT COIL SCHEDULE				
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED TEMP SENSORS	MECH DWG REF
1	RHC-S1A	MEN'S RESTROOM	1	M1.1
2	RHC-S1B	LOWER PRROMENADE	1	M1.1
3	RHC-S1C	WOMEN'S RESTROOM	1	M1.1
4	RHC-S1D	LOWER PRROMENADE	1	M1.1
5	RHC-S1E	EAST DRESSING ROOM	1	M1.1
6	RHC-S1F	WEST DRESSING ROOM	1	M1.1

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

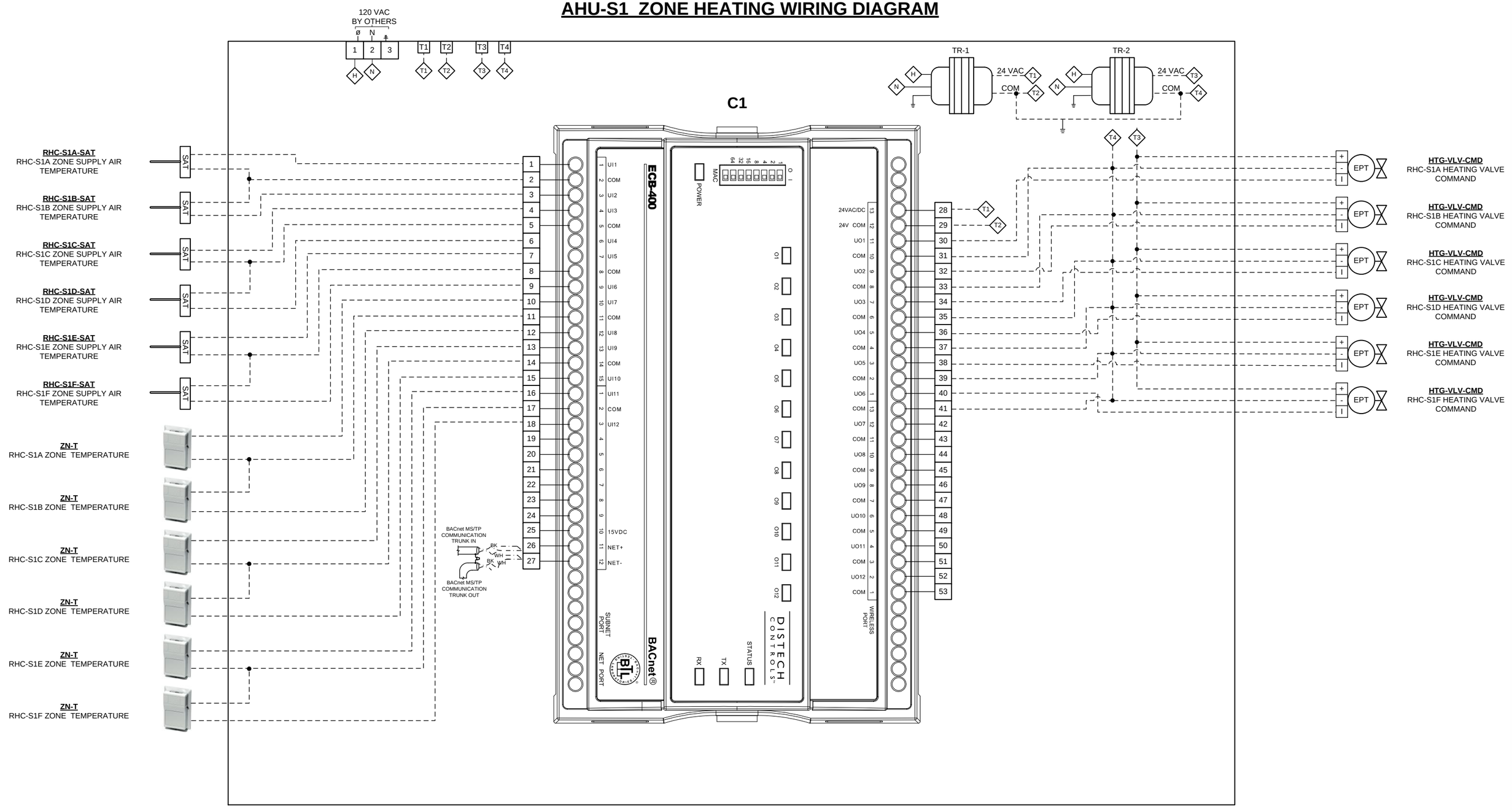
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 ZONE HEATING SCHEMATIC DIAGRAM

AHU-S1 ZONE HEATING WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 ZONE HEATING WIRING DIAGRAM

AHU-S1 ZONE HEATING BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-400X-00	1	B-AAC Programmable Controller With 12UI & 12UO	Distech
2	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	6	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
3	Zone Temp Sensor	ZN-T	A/CP-R2	6	Thermistor, 10K Type II, Room Temperature sensor	ACI
4	Electropneumatic transducer	EPT	EP313020	6	Electropneumatic transducer with manual override, 0-20 psig	Kele
5	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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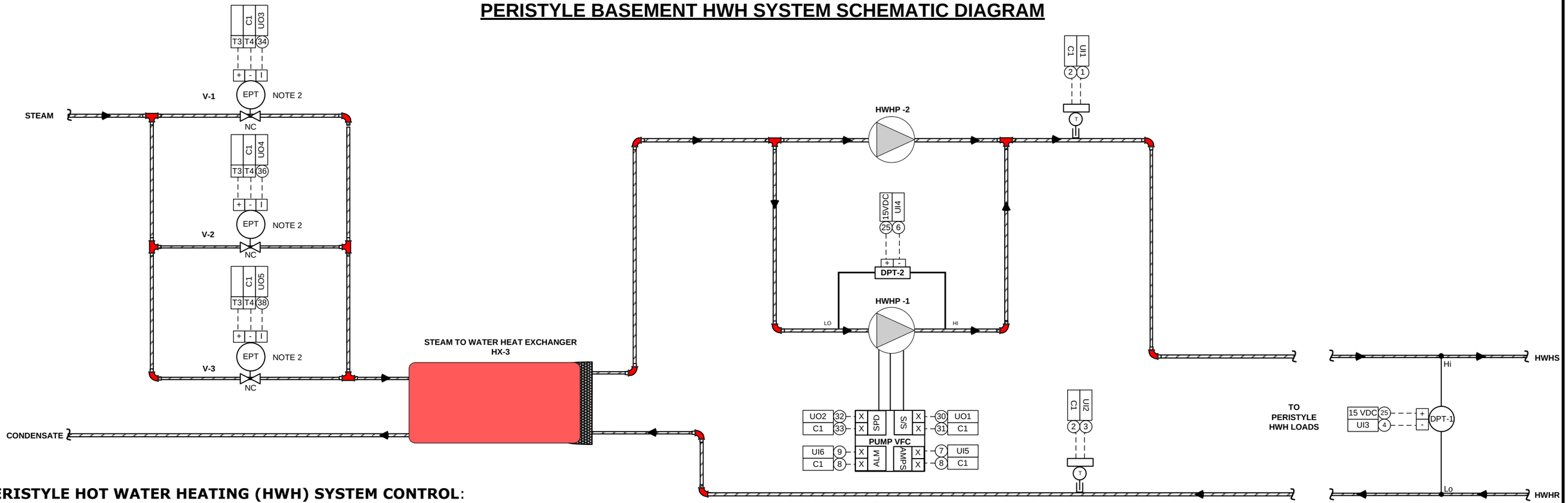
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S1 ZONE HEATING BILL OF MATERIAL

PERISTYLE BASEMENT HWH SYSTEM SCHEMATIC DIAGRAM



PERISTYLE HOT WATER HEATING (HWH) SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. HWH SYSTEM CIRCULATION PUMP HWHP-1 SHALL HAVE START/STOP CAPABIUTY FROM THE DDC SYSTEM. HWHP-1 SHALL BE SELECTED TO OPERATE WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F .

3. DDC SHALL MONITOR OPERATING STATUS OF HWHP-1 THRU DIFFERENTIAL PRESSURE TRANSMITTER (DPT). UPON PUMP FAILURE, DDC SHALL ACTIVATE FAILURE ALARM. DDC SHALL TOTALIZE HWHP-1 MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. VARIABLE FREQUENCY CONTROLLER (VFC) COMMON FAILURE ALARM FOR HWHP-1 SHALL BE MONITORED BY DDC THRU AVAILABLE CONTACTS AT RESPECTIVE HWHP-1 VFC.

5. DDC SYSTEM SHALL MODULATE HWHP-1 VFC SPEED TO MAINTAIN HWH SYSTEM DIFFERENTIAL PRESSURE SETPOINT OF 15 FT OF HEAD (ACTUAL SETPOINT TO BE DETERMINED BY BALANCE CONTRACTOR). DDC SHALL PROVIDE HWHP-1 VFC SPEED LOW LMIT CONTROL BASED ON THE PUMP MANUFACTURER'S CURVE.

6. WHEN PUMP FLOW IS PROVEN BY PUMP DPT, DDC SHALL MODULATE HEAT EXCHANGER HX-3'S THREE STEAM CONTROL VALVES IN SEQUENCE TO MAINTAIN HWHS TEMP SETPOINT AS RESET BY OUTSIDE AIR TEMP AS SHOWN ON TABLE.

7. HWHP-2 IS NOT CONTROLLED FROM THE DDC/BAS.

8. UPON INITIAL STARTUP, AFTER AN OPERATIONAL DELAY OF 30 MINUTES, THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW HWHS TEMPERATURE HIGH HWHS TEMPERATURE

HWH PUMP WC FAILURE

HWH SYSTEM SUPPLY WATER SETPOINT	
OUTSIDE AIR TEMP	HWH SUPPLY WATER RESET SETPOINT
50°F	130°F
40°F	140°F
30°F	150°F
20°F	160°F
10°F	170°F
0°F	180°F

HWH SYSTEM SUPPLY WATER SETPOINT

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

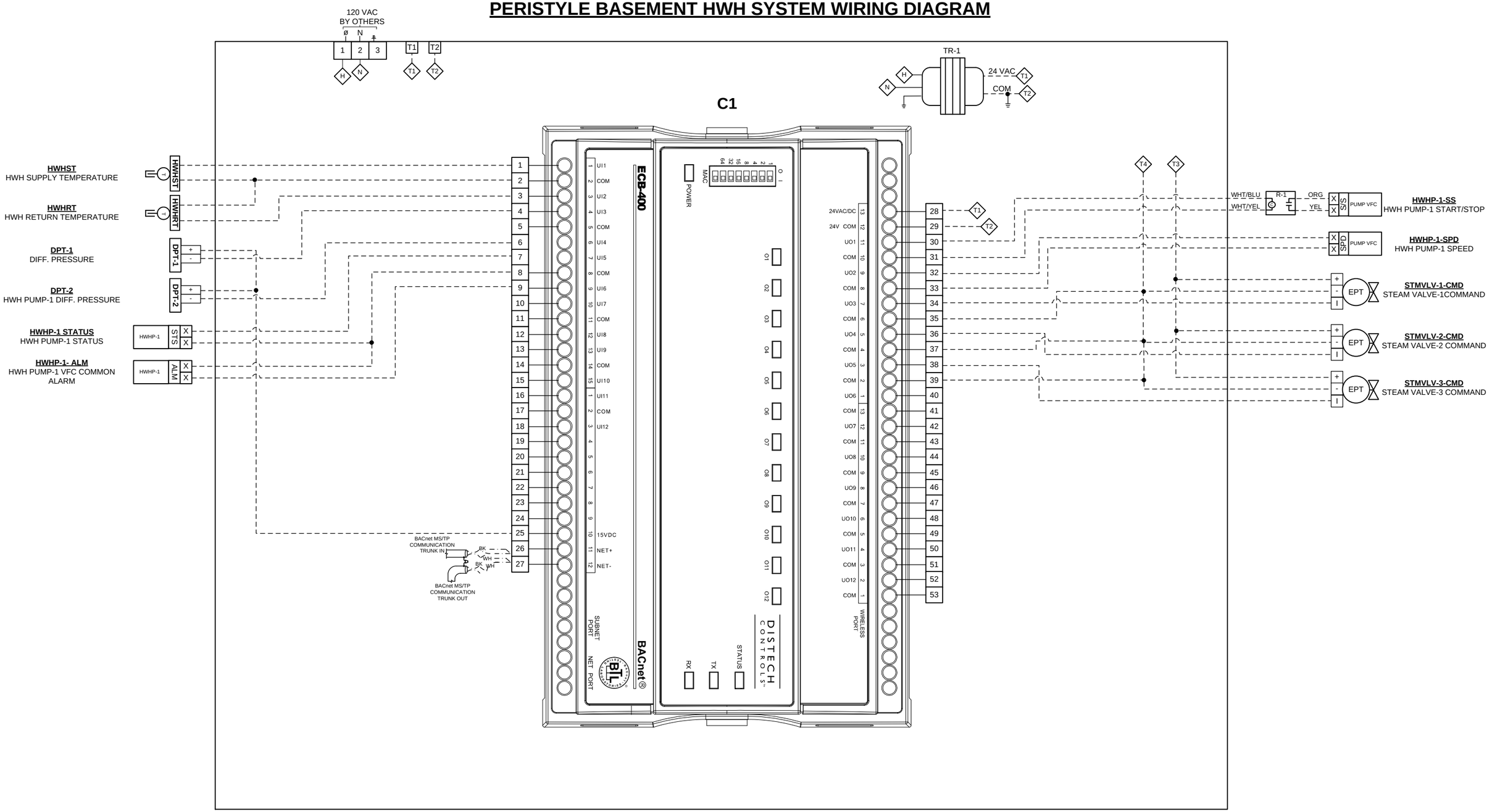
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

PERISTYLE BASEMENT HWH SYSTEM SCHEMATIC DIAGRAM

PERISTYLE BASEMENT HWH SYSTEM WIRING DIAGRAM



HWHST
HWH SUPPLY TEMPERATURE

HWHRT
HWH RETURN TEMPERATURE

DPT-1
DIFF. PRESSURE

DPT-2
HWH PUMP-1 DIFF. PRESSURE

HWHP-1 STATUS
HWH PUMP-1 STATUS

HWHP-1- ALM
HWH PUMP-1 VFC COMMON ALARM

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL PERISTYLE-3, MAIN MUSEUM BASEMENT PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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ICT SOLUTIONS, INC
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(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

PERISTYLE BASEMENT HWH SYSTEM WIRING DIAGRAM

PERISTYLE BASEMENT HWH SYSTEM BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-400X-00	1	B-AAC Programmable Controller With 12UI & 12UO	Distech
2	Immersion Temperature sensor	HWHRT, HWHST	A/CP-INW-4"-GD	2	Immersion 10 kΩ type II thermistor without well and 4" insertion	ACI
3	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
4	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
5	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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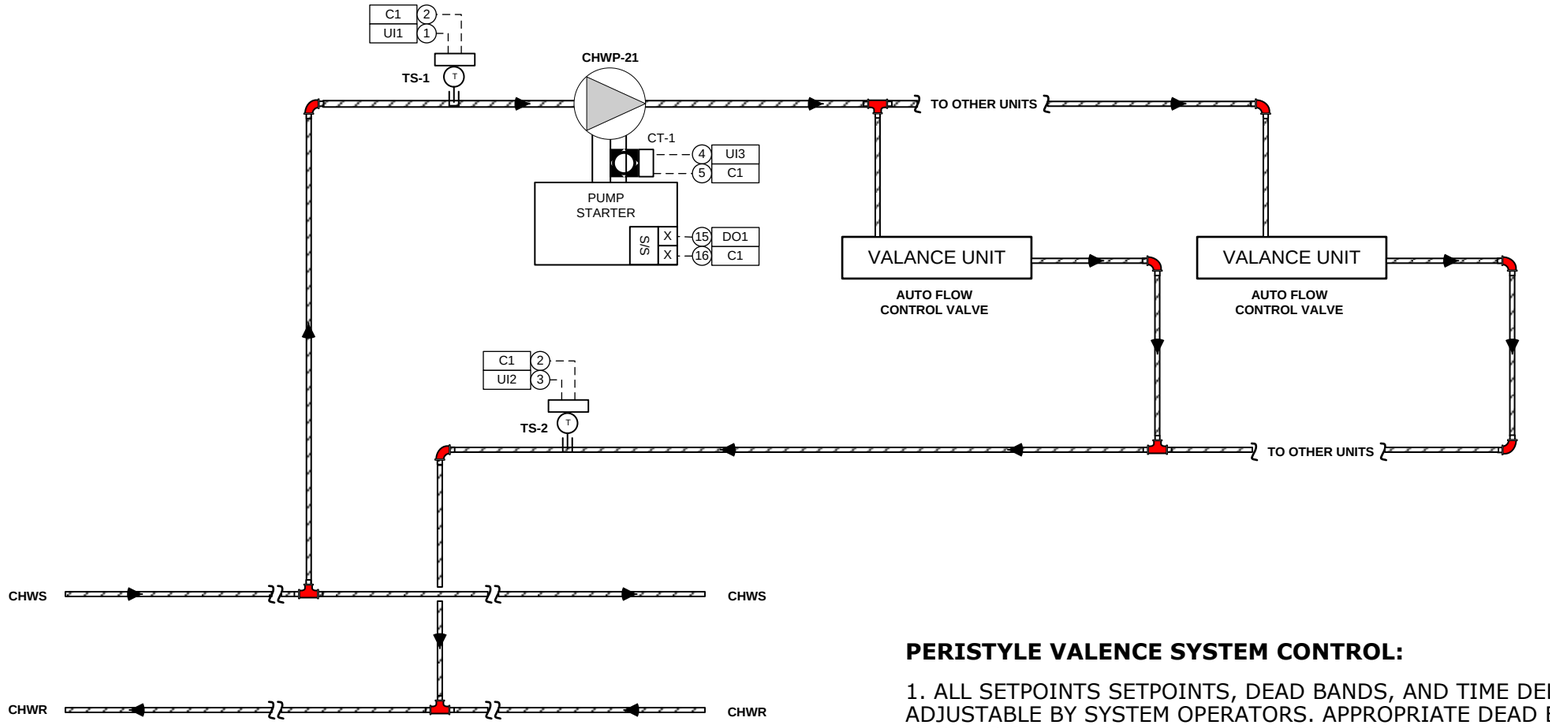
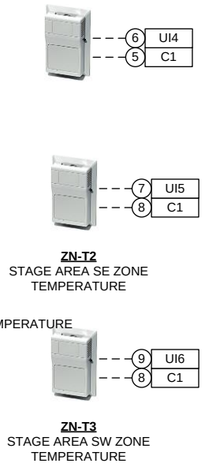
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

PERISTYLE BASEMENT HWH SYSTEM BILL OF MATERIAL

VALANCE COOLING CONTROL SCHEMATIC DIAGRAM





NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

PERISTYLE VALENCE SYSTEM CONTROL:

1. ALL SETPOINTS SETPOINTS, DEAD BANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEAD BANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CHWP-21 SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. CHWP-21 SHALL CYCLE ON/OFF AS REQUIRED TO ACHIEVE OCCUPIED OR UNOCCUPIED SPACE TEMP SETPOINT.

3. WHEN SPACE TEMPERATURE IS GREATER THAN SPACE TEMP SETPOINT, DDC SHALL COMMAND ON CHWP-21 UNTIL TEMP REACHES SETPOINT. DDC SHALL THEN COMMAND CHWP-21 OFF UNTIL THE SPACE TEMP EXCEEDS THE DEADBAND SETPOINT OF 3°F .

4. CHWP-21 STATUS SHALL BE MONITORED THRU MOTOR STATUS DEVICE BY DDC. ABNORMAL STATUS CONDITION SHALL ACTIVATE ALARM. DDC SHALL TOTALIZE PUMP RUN TIME HOURS OF OPERATION.

5. DDC SHALL MAINTAIN 72°F SPACE TEMP SETPOINT FOR OCCUPIED MODE AND 78°F FOR UNOCCUPIED MODE.

6. DDC SHALL MONITOR THE STAGE TEMP SENSORS.

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-203X-00	1	B-ASC Programmable Controller With 6UI, 3UO & 5DO	Distech
2	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
3	Zone Temp Sensor	ZN-T	A/CP-R2	3	Thermistor, 10K Type II, Room Temperature sensor	ACI
4	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
5	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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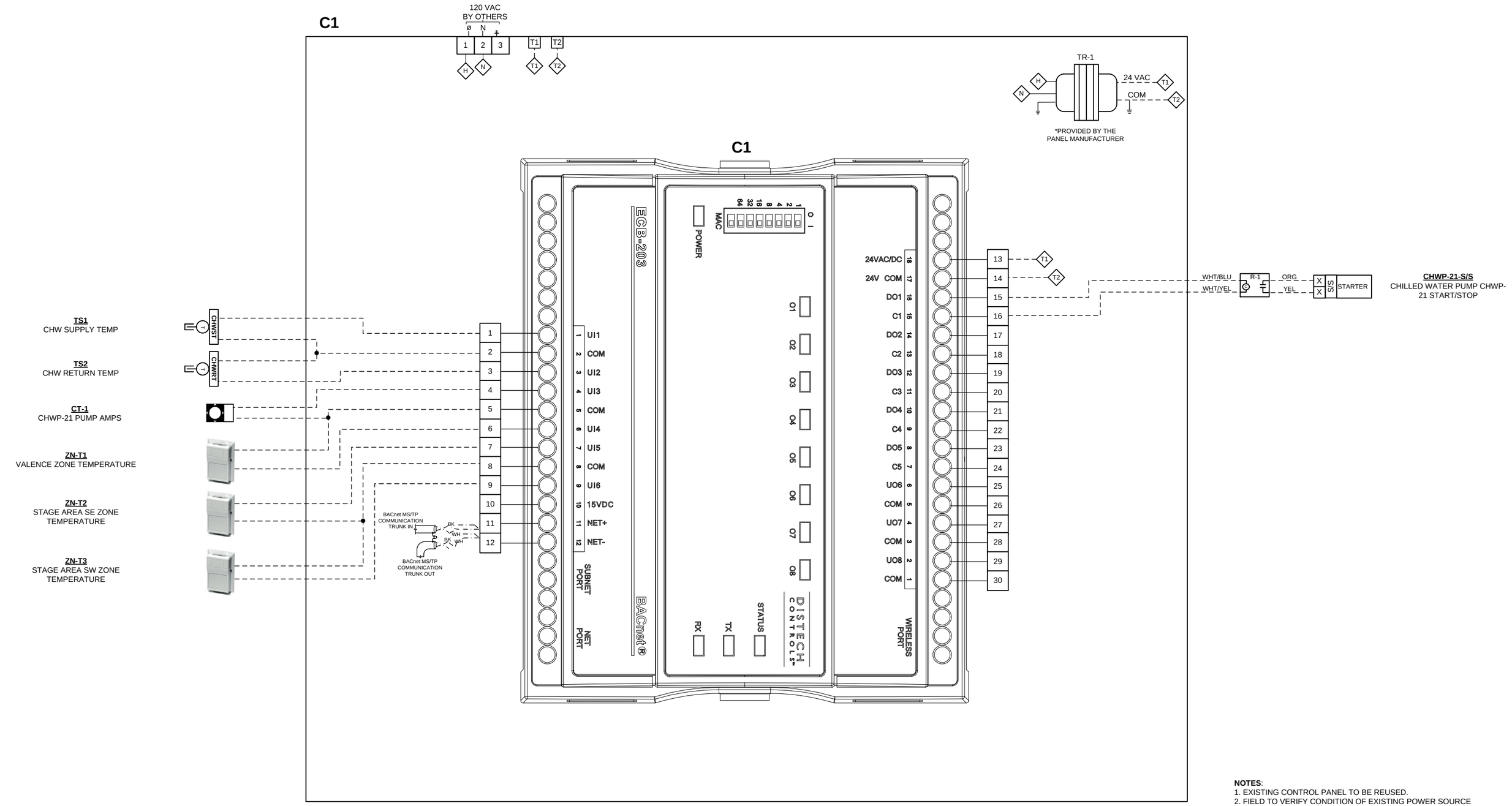
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VALANCE COOLING CONTROL SCHEMATIC DIAGRAM

VALANCE COOLING CONTROL WIRING DIAGRAM



NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-5, MAIN MUSEUM BASEMENT PERISTYLE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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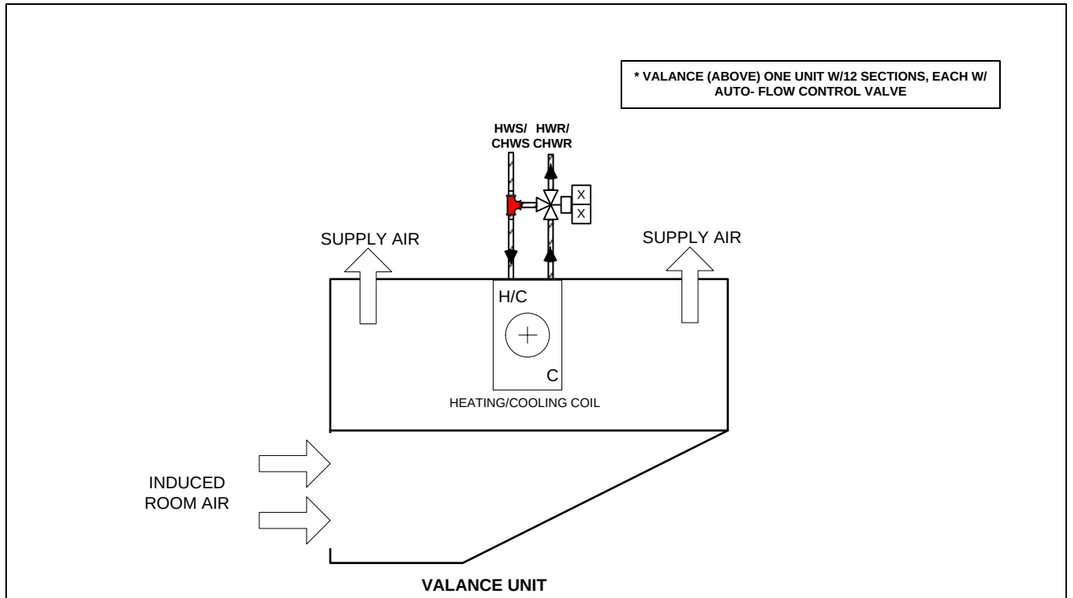
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VALANCE COOLING CONTROL WIRING DIAGRAM

VALANCE UNIT SCHEMATIC DIAGRAM

TYPICAL OF 12



LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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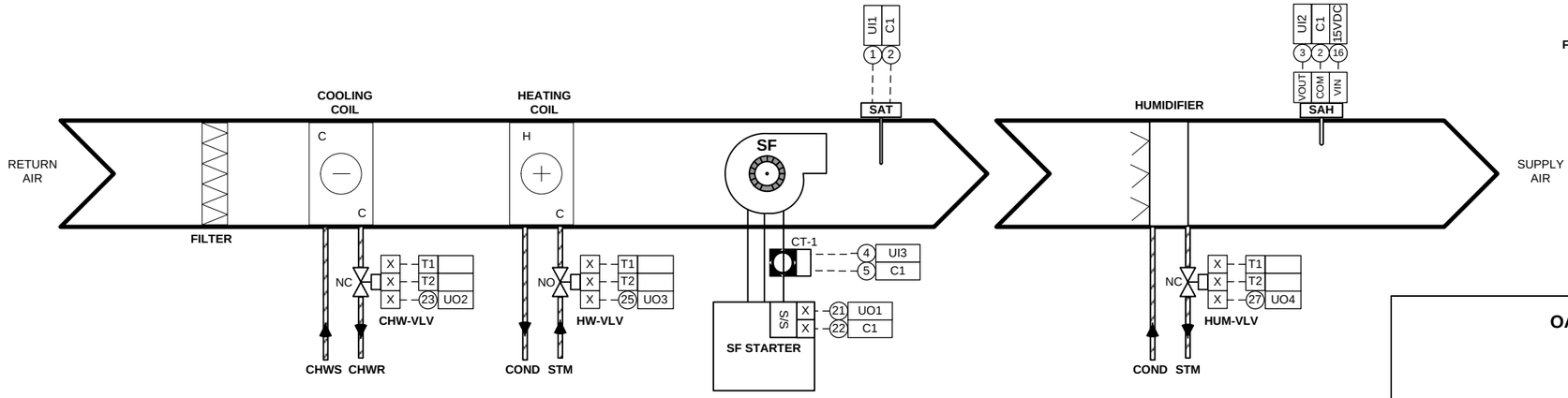
32-72 Steinway St,
Astoria, NY 11103

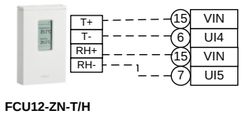
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VALANCE UNIT SCHEMATIC DIAGRAM

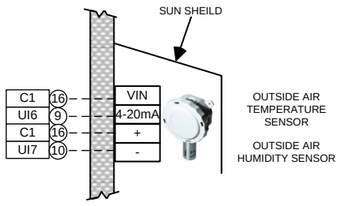
FCU-12 SCHEMATIC DIAGRAM





FCU12-ZN-T/H

OAT/H-13 SENSOR



* ON FLOOR PLAN OAH-13 SHOWN (REFERENCE DRAWING M1.10) HERE WE HAVE ADDED POINT OF OAH-13

FAN COIL UNIT SCHEDULE

ITEM #	TAG	FLOOR	LOCATION & SERVING AREA	MECH DWG REF
1	FCU-12	ATTIC	BOOK STORAGE	M-1.10

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-300X-00	1	B-AAC Programmable Controller With 10UI & 8UO	Distech
2	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
3	Duct Humidity Sensor	SAH	A/RH2-D	1	Duct Humidity Sensor, 2% Accuracy	ACI
4	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
5	Duct Humidity & Temperature Combo Sensor	OAT/H	A/RH2-CP-O-010	1	Outdoor Air Temperature & Humidity Combo Sensor	ACI
6	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
7	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

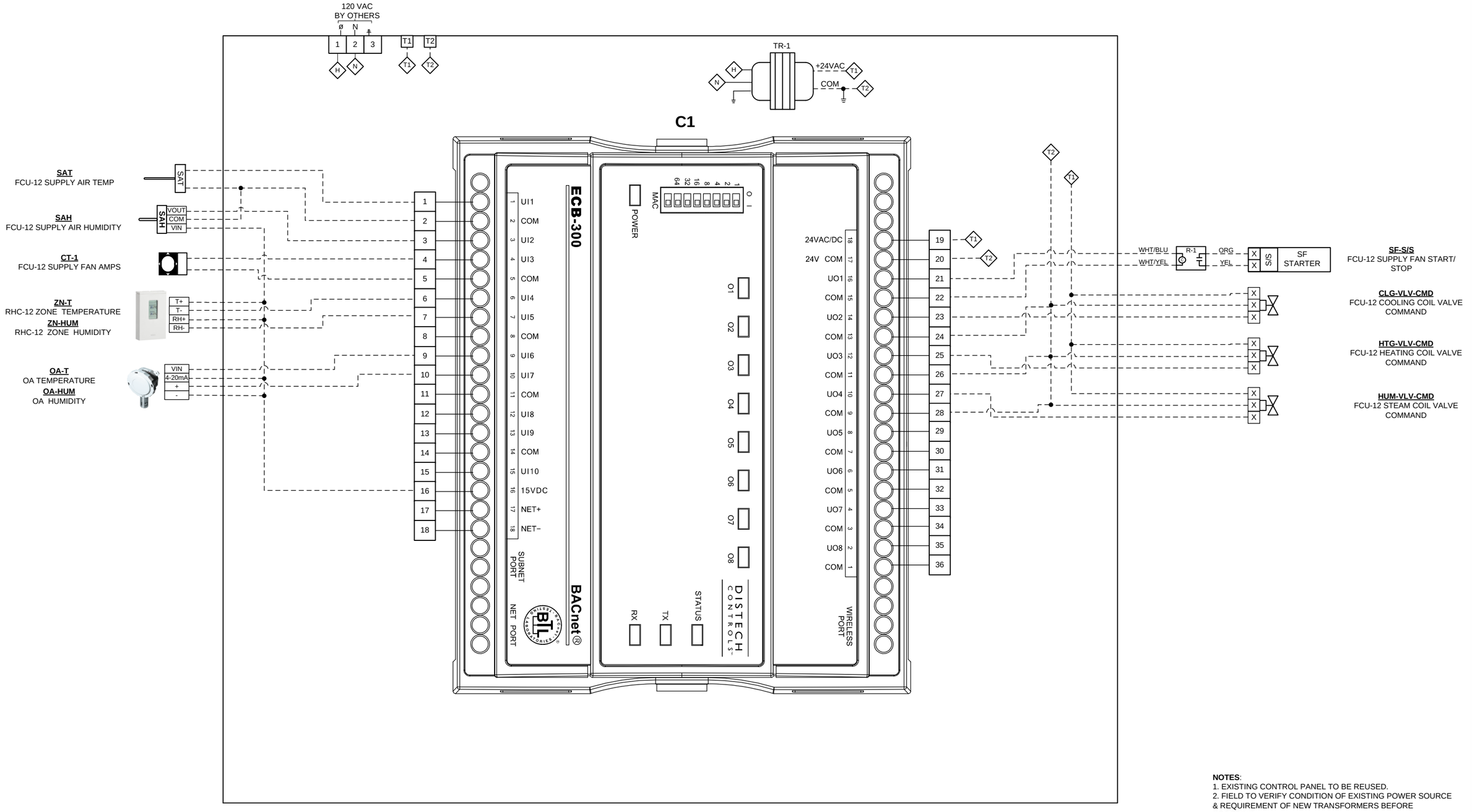
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-12 SCHEMATIC DIAGRAM

FCU-12 WIRING DIAGRAM



SAT
FCU-12 SUPPLY AIR TEMP

SAH
FCU-12 SUPPLY AIR HUMIDITY

CT-1
FCU-12 SUPPLY FAN AMPS

ZN-T
RHC-12 ZONE TEMPERATURE
ZN-HUM
RHC-12 ZONE HUMIDITY

OA-T
OA TEMPERATURE
OA-HUM
OA HUMIDITY

SF-S/S
FCU-12 SUPPLY FAN START/ STOP

CLG-VLV-CMD
FCU-12 COOLING COIL VALVE COMMAND

HTG-VLV-CMD
FCU-12 HEATING COIL VALVE COMMAND

HUM-VLV-CMD
FCU-12 STEAM COIL VALVE COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL UP-4, MAIN MUSEUM UPPER LVL-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
3 ON FLOOR PLAN OAH-13 SHOWN (REFERENCE DRAWING M1.10) HERE WE HAVE ADDED POINT OF OAH-13

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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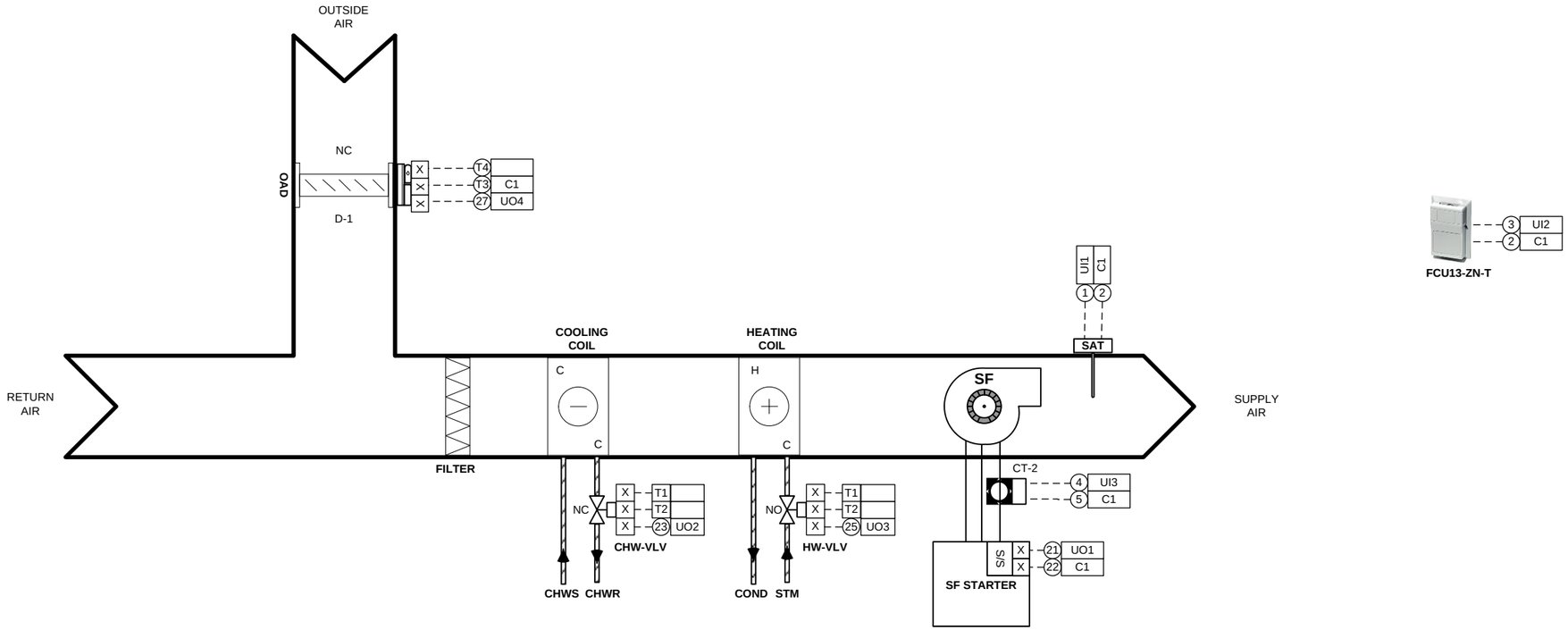
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-12 WIRING DIAGRAM

FCU-13 SCHEMATIC DIAGRAM



FAN COIL UNIT SCHEDULE				
ITEM #	TAG	FLOOR	LOCATION & SERVING AREA	MECH DWG REF
1	FCU-13	ATTIC	POJECTION CONTROL BOOTH	M-1.10

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-300X-00	1	B-AAC Programmable Controller With 10UI & 8UO	Distech
2	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
3	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
4	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
5	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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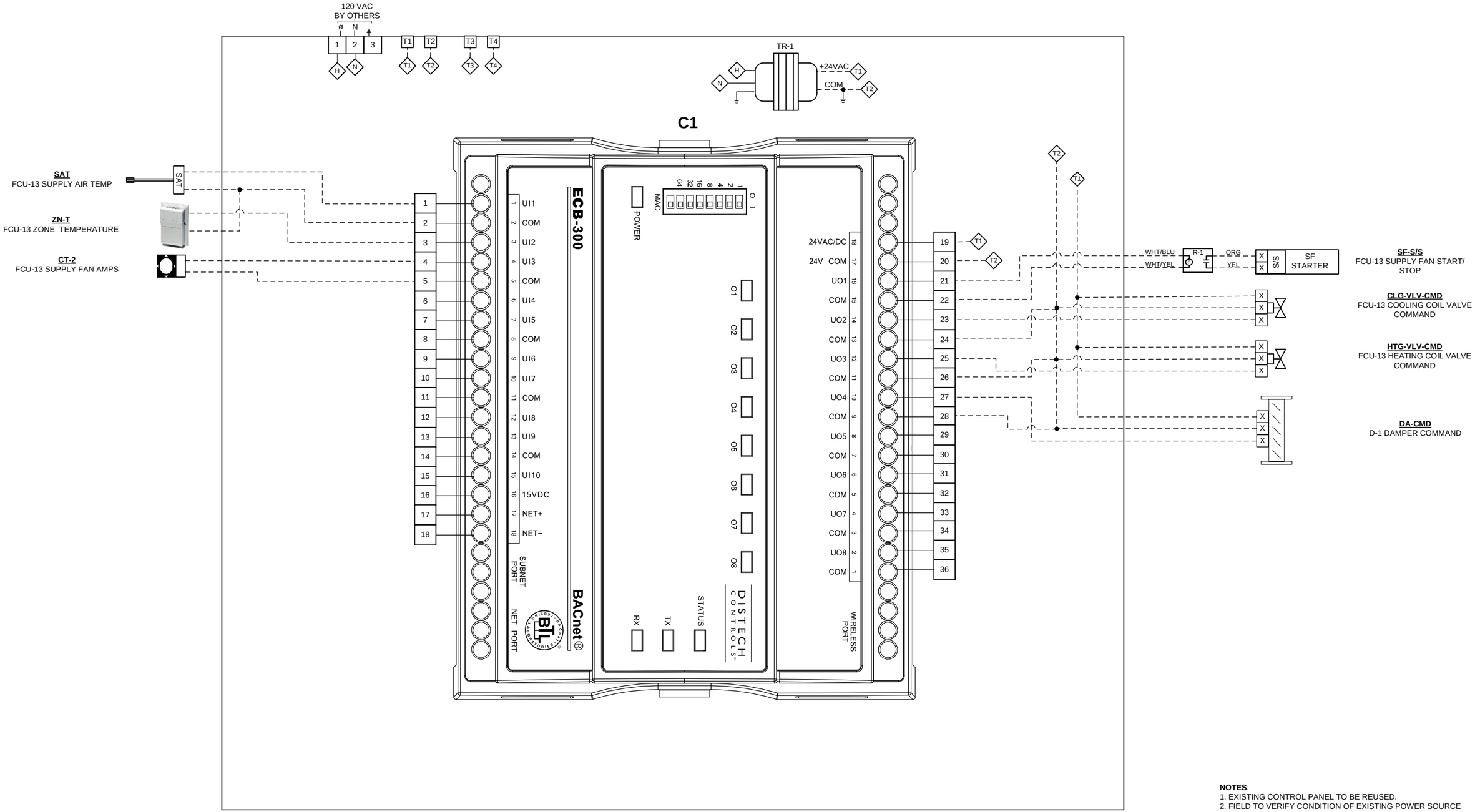
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-13 SCHEMATIC DIAGRAM

FCU-13 WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL UP-4-2, MAIN MUSEUM UPPER LVL-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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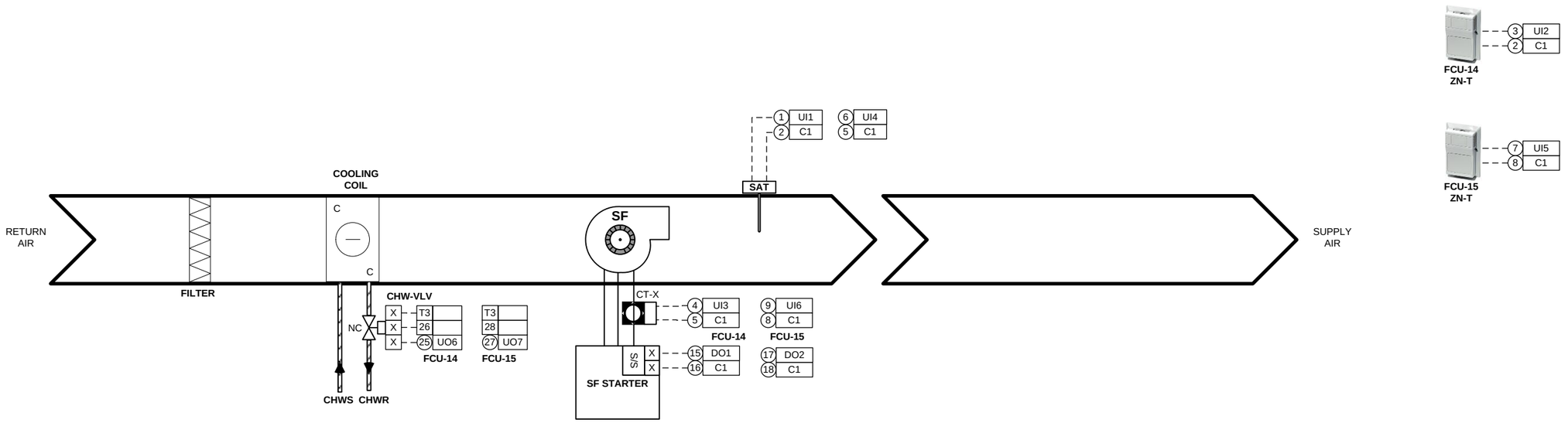
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-13 WIRING DIAGRAM

FCU-14 & 15 SCHEMATIC DIAGRAM

TYPICAL OF 2



FAN COIL UNIT SCHEDULE				
ITEM #	**TAG**	**FLOOR**	**LOCATION & SERVING AREA**	**MECH DWG REF**
1	FCU-14	MAIN FLOOR	EAST TICKET OFFICE	M-1.7
2	FCU-15	MAIN FLOOR	WEST TICKET OFFICE	M-1.7

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-203X-00	1	B-ASC Programmable Controller With 6UI, 3UO & 5DO	Distech
2	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	2	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
3	Zone Temp Sensor	ZN-T	A/CP-R2	2	Thermistor, 10K Type II, Room Temperature sensor	ACI
4	Relay	R-1, R2	RIBU1C	2	Universal field mounted Relay	Functional Devices
5	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

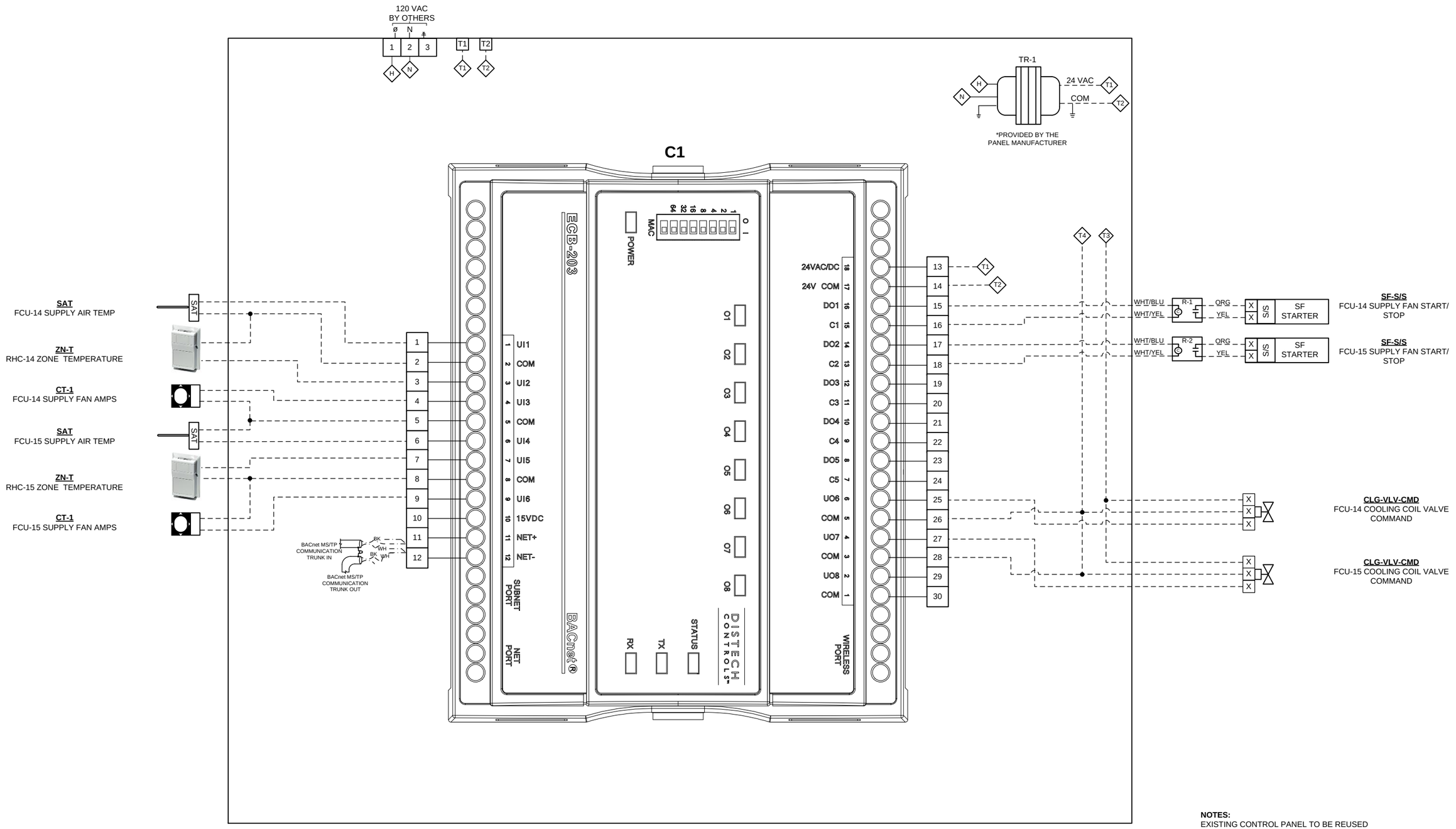
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-14 & 15 SCHEMATIC DIAGRAM

FCU-14 & FCU-15 WIRING DIAGRAM



NOTES:
EXISTING CONTROL PANEL TO BE REUSED

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-2, MAIN MUSEUM BASEMENT-PERISTYLE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU-14 & FCU-15 WIRING DIAGRAM

FCU SEQUENCE OF OPERATION

FAN COIL UNIT CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. FAN SHALL OPERATE BASED ON TIME OF DAY SCHEDULED OCCUPIED MODE AND NIGHT CYCLE MODE (EXCEPT FCU-12).

3. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU CURRENT TRANSDUCER. SF CURRENT TRANSDUCER SHALL PROVIDE FEEDBACK TO ENABLE TEMPERATURE CONTROLS. ABNORMAL STATUS CONDITION FOR SF SHALL ACTIVATE ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. **FCU-12 ONLY**

4.1. FCU SYSTEM SHALL RUN CONTINUOUSLY.

4.2. DDC SHALL MODULATE STEAM COIL VALVE TO MAINTAIN SPACE HEATING SETPOINT OF 70°F.

4.3. DDC SHALL MODULATE CHW COIL VALVE TO MAINTAIN SPACE COOLING SETPOINT OF 74°F.

4.4. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT OF 50% RH SETPOINT YEAR ROUND. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

4.5. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT. DDC SHALL MODULATE THE CHW COIL VALVE FULLY OPEN AND MODULATE THE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT UNTIL SPACE RH DECREASES PAST THE DEADBAND. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT.

5. **FCU-13 ONLY:**

5.1. IN OCCUPIED MODE, FCU SYSTEM SHALL RUN CONTINUOUSLY. DDC SHALL OPEN OA DAMPER FOR MINIMUM OUTSIDE AIR CFM.

5.2. DURING HEATING SEASON OCCUPIED MODE, DDC SHALL MODULATE THE STEAM COIL VALVE TO MAINTAIN SPACE HEATING SETPOINT OF 70°F.

5.3. DURING COOLING SEASON OCCUPIED MODE, DDC SHALL MODULATE THE CHW COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT OF 74°F.

5.4. DURING UNOCCUPIED MODE, DDC SHALL NIGHT CYCLE THE FCU TO MAINTAIN A NIGHT SETBACK TEMPERATURE OF 62°F AND NIGHT SETUP TEMPERATURE OF 82°F. DDC SHALL PROVIDE 2°F DEADBAND AROUND UNOCCUPIED SETPOINTS.

6. **FCU-14 & -15 ONLY:**

6.1. IN OCCUPIED MODE, FCU SYSTEM SHALL RUN CONTINUOUSLY.

6.2. DDC SHALL MODULATE THE CHW COIL VALVE TO MAINTAIN SPACE COOLING SETPOINT OF 74°F.

6.3. DURING UNOCCUPIED MODE, DDC SHALL NIGHT CYCLE THE FCU TO MAINTAIN A NIGHT SETUP TEMPERATURE OF 82°F. DDC SHALL PROVIDE 2°F DEADBAND AROUND UNOCCUPIED SETPOINT.

7. WHEN ANY FCU IS DEACTIVATED BY DDC OR BAS COMMAND, HEATING, COOLING, AND HUMIDIFIER VALVES SHALL CLOSE AND FAN SHALL TURN OFF.

8. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE — HIGH SPACE TEMPERATURE

LOW SPACE %RH (FCU-12 ONLY) — HIGH SPACE %RH (FCU-12 ONLY)

SUPPLY FAN FAILURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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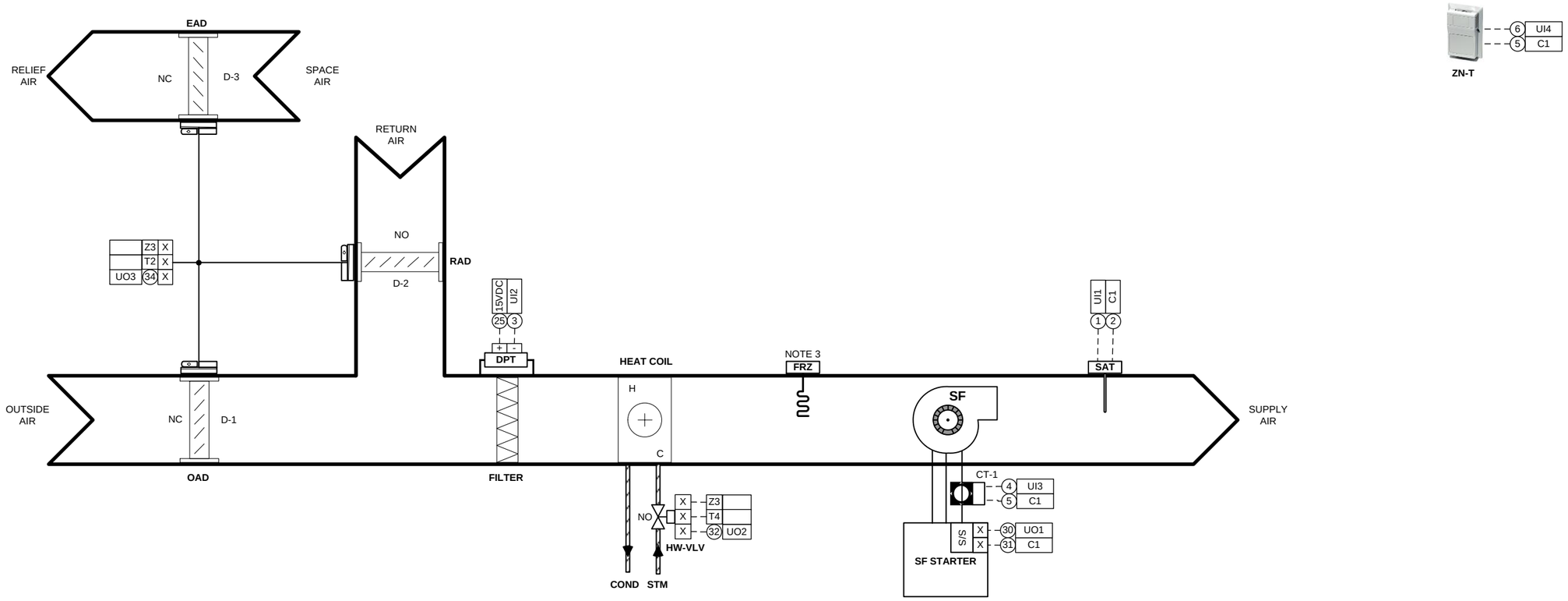
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU SEQUENCE OF OPERATION

AHU-S2 SCHEMATIC DIAGRAM



AHU-S2 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. SUPPLY FANS (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

3. WHEN UNIT IS ACTIVATED, DDC SHALL OPEN OA DAMPER TO MINIMUM OA DAMPER POSITION.

4. DDC SHALL MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT OF 70°F.

5. DDC SHALL MODULATE OA DAMPER OPEN IN ECONOMIZER MODE TO MAINTAIN SPACE TEMP SETPOINT OF 78°F.

6. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET)

7. WHEN AIR HANDLING UNIT IS DEACTIVATED OR DDC/BAS OPERATOR COMMANDED OFF, DDC SHALL COMMAND SF OFF AND CLOSE THE HEATING COIL VALVE.

AHU-S2 SCHEDULE					
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	MECH. DWG. REF.
AHU-S2	BASEMENT	ELECTRICAL ROOM			M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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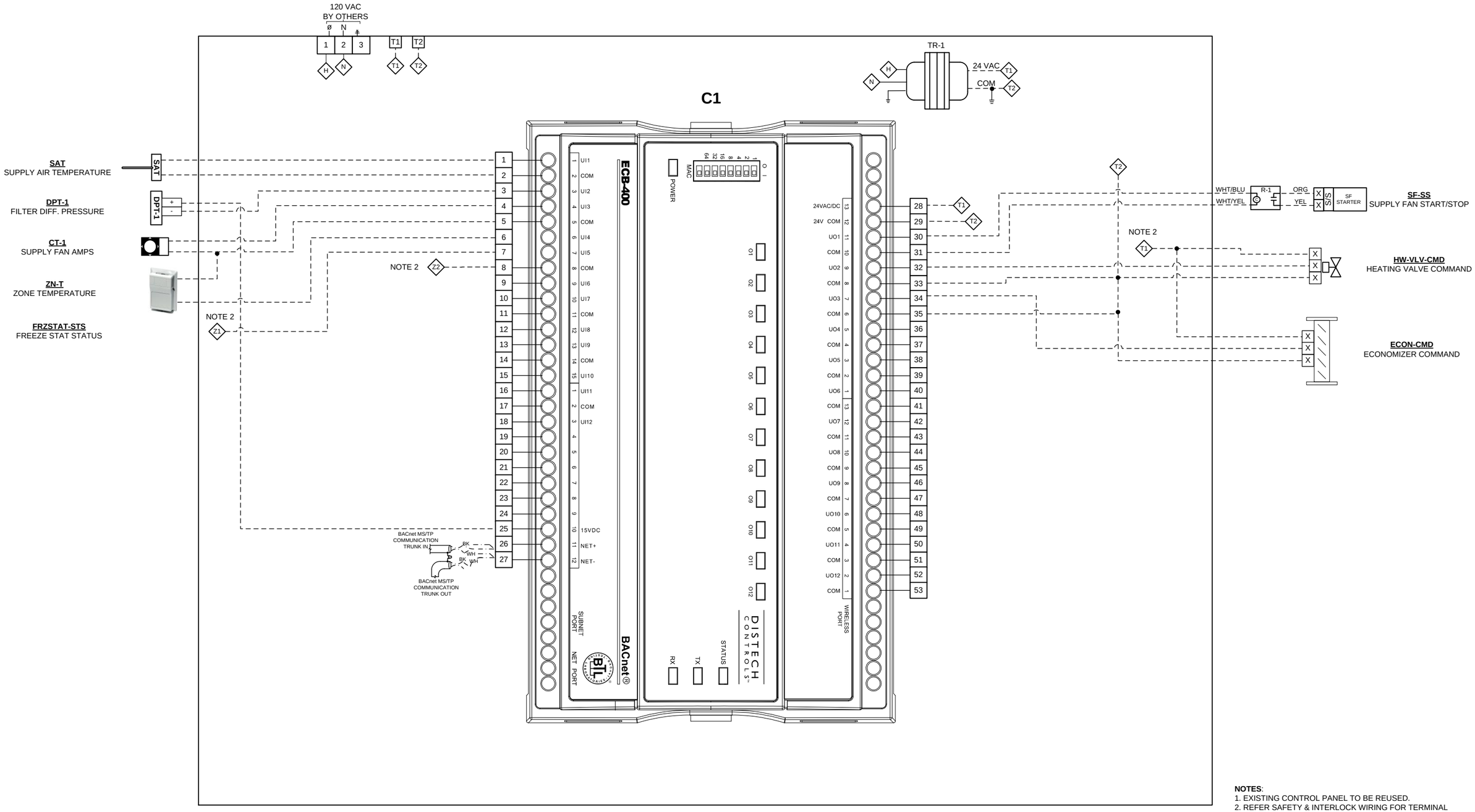
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S2 SCHEMATIC DIAGRAM

AHU-S2 WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-5, MAIN MUSEUM BASEMENT

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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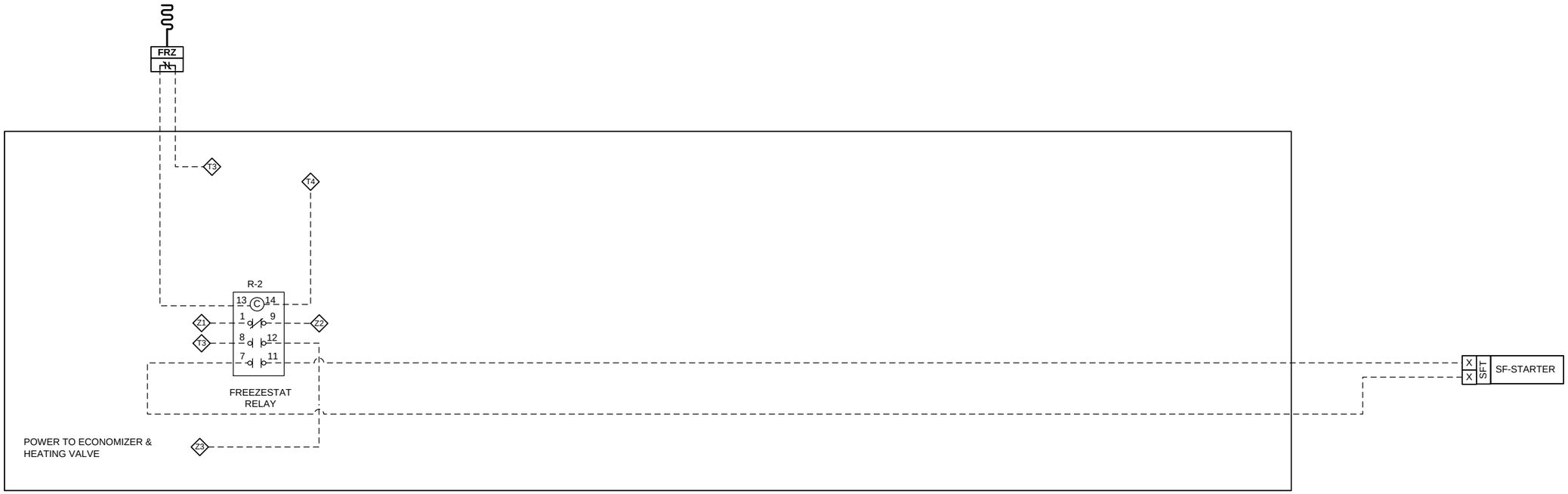
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S2 WIRING DIAGRAM

AHU-S2-INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BP-5, MAIN MUSEUM BASEMENT

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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ICT Solutions
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S2-INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S2 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-400X-00	1	B-AAC Programmable Controller With 12UI & 12UO	Distech
2	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
3	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	2	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
4	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
5	Panel Mounted Relay	R-2	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
6	Relay Socket	R-2	784-4C-SKT	1	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
7	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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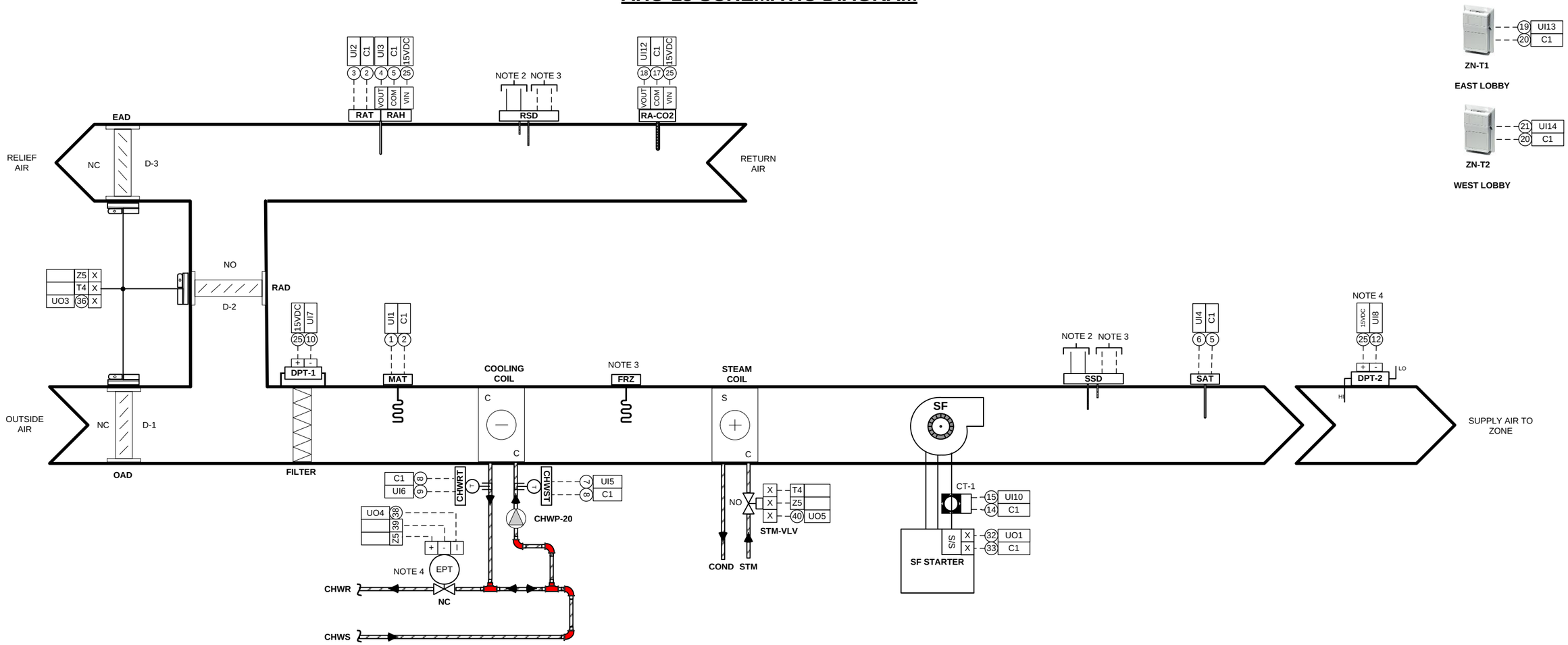
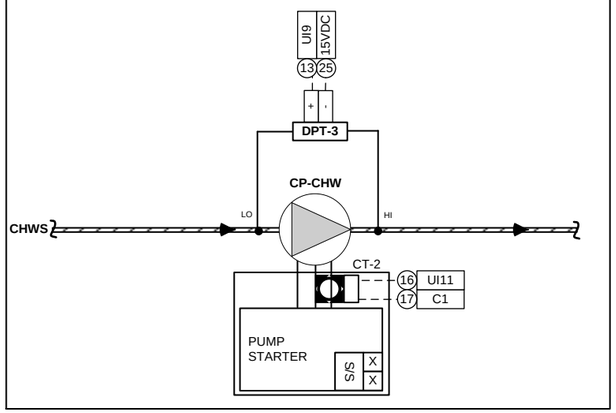
AHU-S2 BILL OF MATERIAL

AHU-13 SCHEMATIC DIAGRAM



CHW PUMP CHWP-20 CONTROL



AHU-13 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-13	MAIN MUSEUM BASMENT	PERISTYLE LOBBY				M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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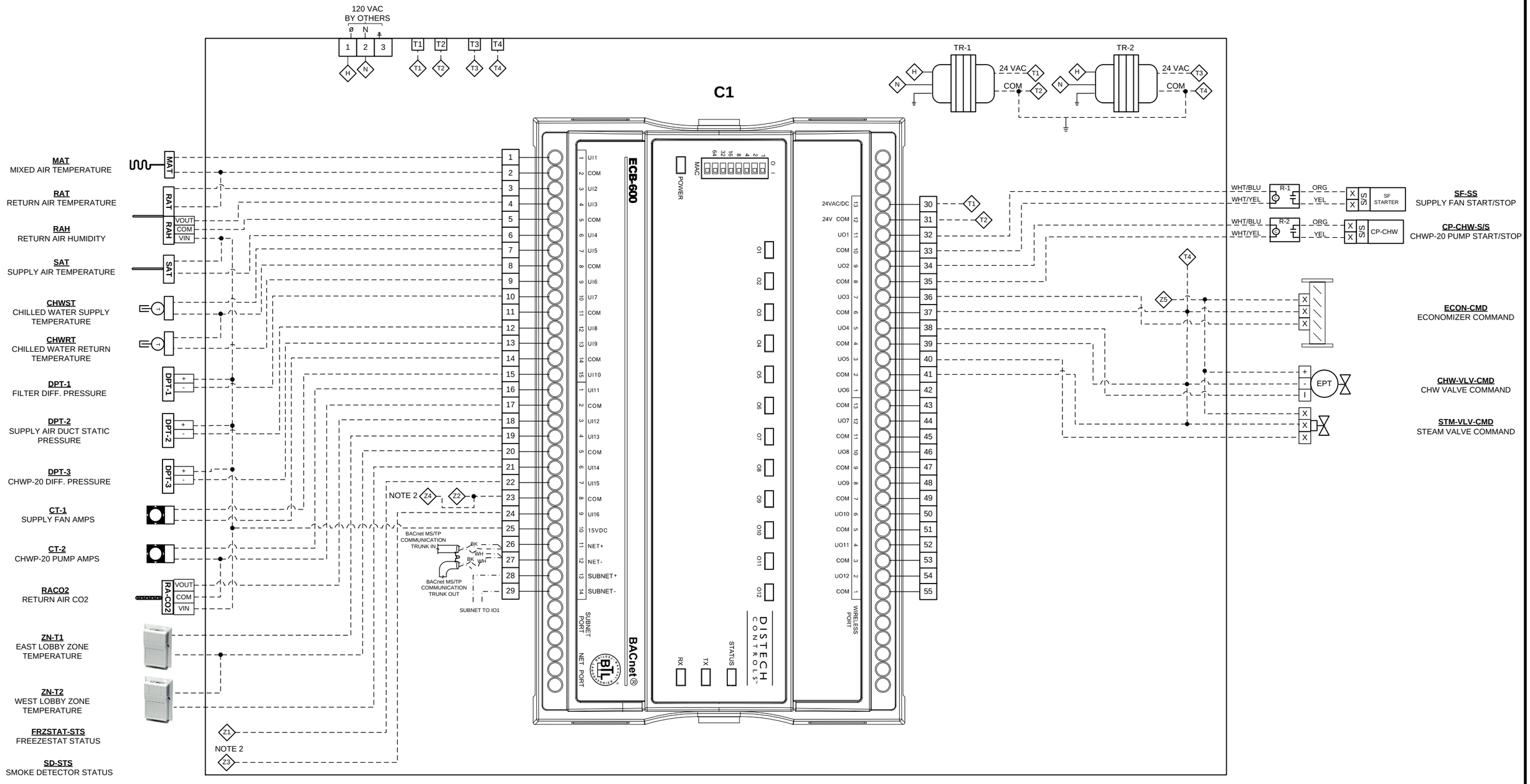
AHU-13 SCHEMATIC DIAGRAM

AHU-13 WIRING DIAGRAM



MAT
MIXED AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

RAH
RETURN AIR HUMIDITY

SAT
SUPPLY AIR TEMPERATURE

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
SUPPLY AIR DUCT STATIC PRESSURE

DPT-3
CHWP-20 DIFF. PRESSURE

CT-1
SUPPLY FAN AMPS

CT-2
CHWP-20 PUMP AMPS

RACO2
RETURN AIR CO2

ZN-T1
EAST LOBBY ZONE TEMPERATURE

ZN-T2
WEST LOBBY ZONE TEMPERATURE

FRZSTAT-STS
FREEZESTAT STATUS

SD-STS
SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

CP-CHW-S/S
CHWP-20 PUMP START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-1, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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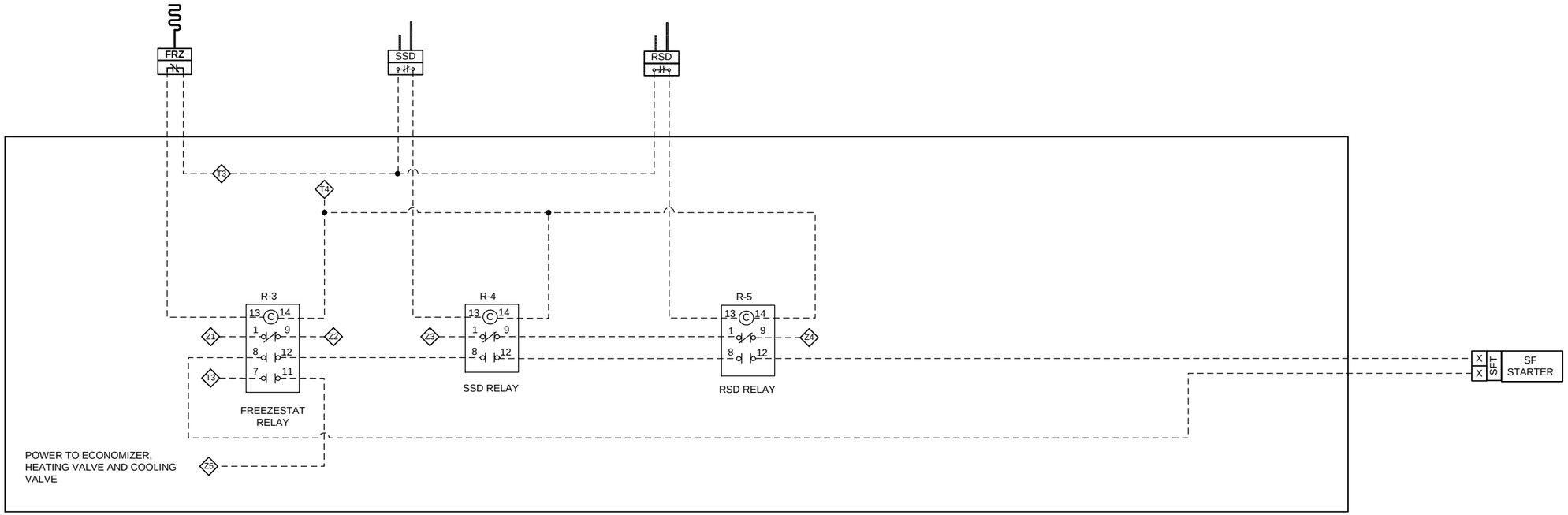
AHU-13 WIRING DIAGRAM

AHU-13 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAY TO BE INSTALLED IN EXISTING NOVAR PANEL BP-1, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
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- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-13 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-13 SEQUENCE OF OPERATION

AHU-13 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM), EVENT MODE, AND NIGHT CYCLE MODE. EVENT MODE SHALL SELF-CANCEL WHEN SCHEDULED AND RETURN TO THE APPROPRIATE TIME OF DAY MODE.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURES, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

6. TERTIARY CHWP-20 SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT AND UPON A DEMAND FOR DEHUMIDIFICATION. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

8. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

9. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

10. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

11. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°F WB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

12. SPACE TEMP CONTROL SHALL BE THE AVERAGE OF THE TWO TEMPERATURE SENSORS IN THE PERISTYLE LOBBY.

13. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION (REFER TO CO2 CONTROL), THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HWH COIL VALVE SHALL CLOSE TO THE COIL.

14. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HWH COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HWH COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

16. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

17. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE RETURN AIR RELATIVE HUMIDITY SENSOR INCREASES ABOVE RA RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB-COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB-COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT.

18. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:

HEATING UNOCCUPIED SETPOINT = 62°F

HEATING OCCUPIED SETPOINT = 70°F

COOLING OCCUPIED SETPOINT = 74°F

COOLING UNOCCUPIED SETPOINT = 82°F

19. MINIMUM OA DAMPER SETPOINT SHALL BE RESET PROPORTIONALLY BETWEEN MIN/MIN (BASE LOAD VENTILATION REQUIREMENT) AND MAX/MIN (FULL OCCUPANCY REQUIREMENT) BASED ON RETURN AIR CARBON DIOXIDE LEVEL AS FOLLOWS:

CO2	OA DAMPER MIN POSITION
600 PPM	MIN-MIN SET FOR _____CFM
1,000 PPM	MAX-MIN SET FOR ____CFM

20. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

21. DUCT SMOKE DETECTOR(S) THRU DDC INPUT SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

22. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTER. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

23. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND FAN OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND STEAM COIL VALVES TO THE COILS.

24. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

25. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE	HIGH SPACE TEMPERATURE
HIGH AIR ALTER(S) PRESSURE	SUPPLY FAN FAILURE
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	HIGH RETURN AIR CO2

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-13 SEQUENCE OF OPERATION

AHU-13 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
4	Zone Temp Sensor	ZN-T	A/CP-R2	2	Thermistor, 10K Type II, Room Temperature sensor	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
7	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
8	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
9	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
10	Panel Mounted Relay	R-3	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-3	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
12	Panel Mounted Relay	R-4, 5	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
13	Relay Socket	R-4, 5	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
14	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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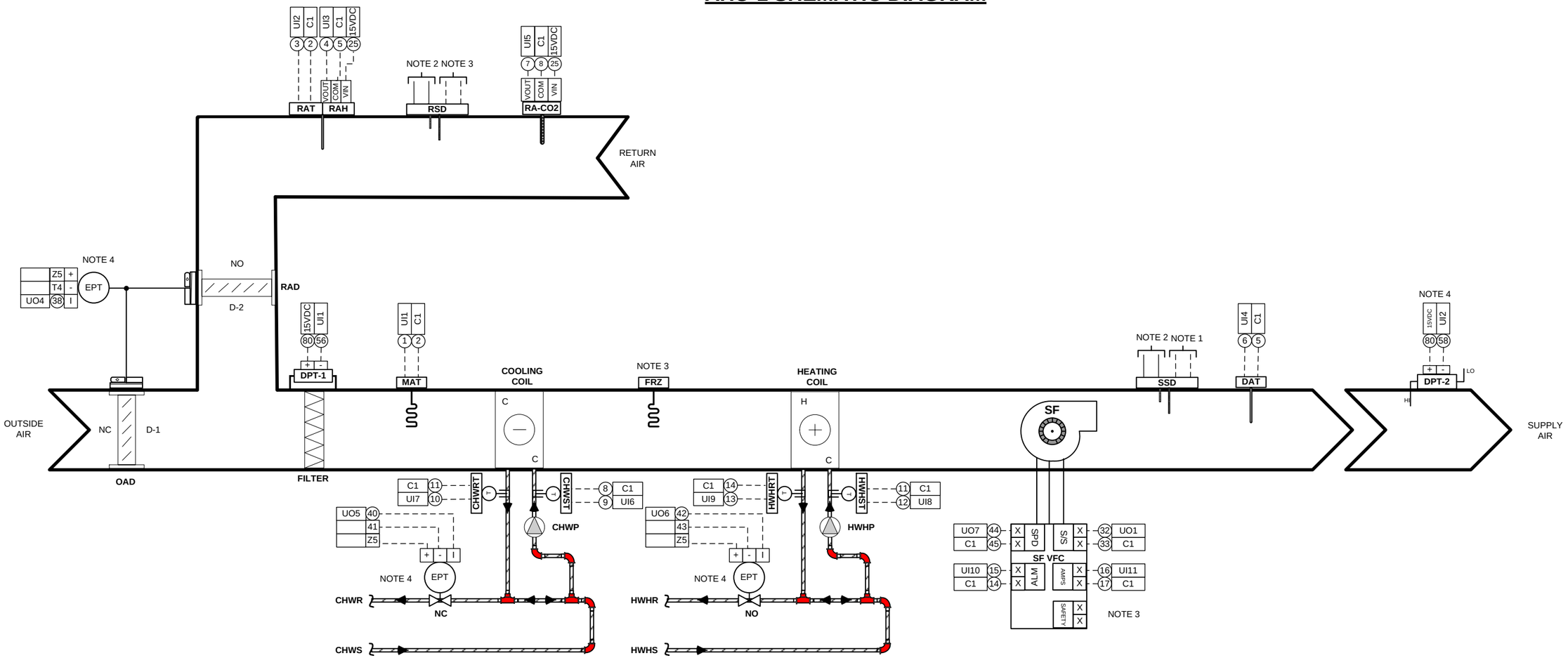
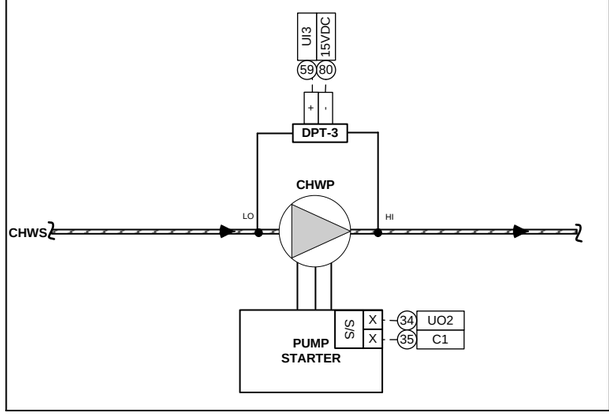
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-13 BILL OF MATERIAL

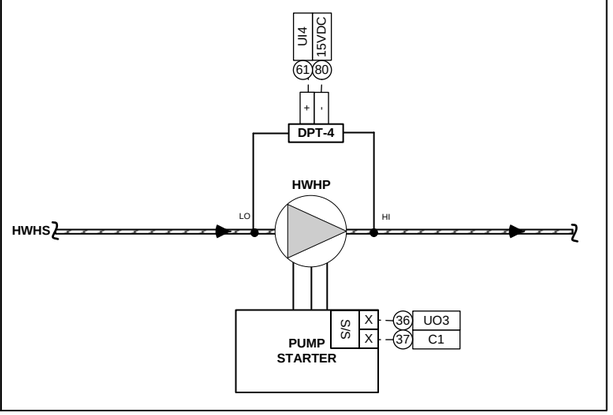
AHU-1 SHEMATIC DIAGRAM



AHU-1 CHW CIRC PUMPS



AHU-1 HWH CIRC PUMPS



AHU-1 SCHEDULE

TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-1	MAIN MUSEUM BASEMENT	GREEN ROOM, YELLOW ROOM, RED ROOM, CATERING & STORAGE ROOMS				M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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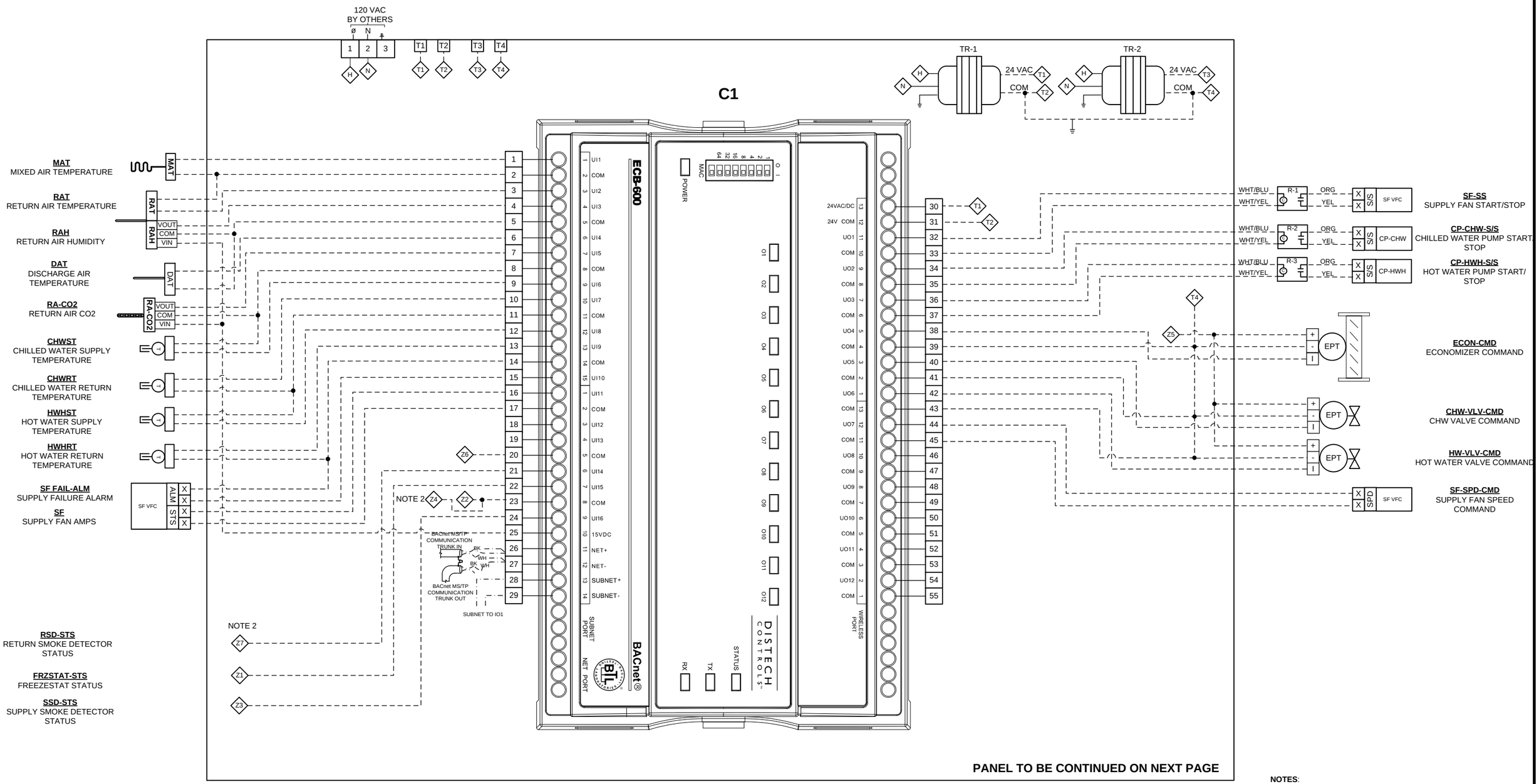
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 SHEMATIC DIAGRAM

AHU-1 WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

RAH
RETURN AIR HUMIDITY

DAT
DISCHARGE AIR TEMPERATURE

RA-CO2
RETURN AIR CO2

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

HWHST
HOT WATER SUPPLY TEMPERATURE

HWHRT
HOT WATER RETURN TEMPERATURE

SF FAIL-ALM
SUPPLY FAILURE ALARM

SF
SUPPLY FAN AMPS

RSD-STS
RETURN SMOKE DETECTOR STATUS

FRZSTAT-STS
FREEZESTAT STATUS

SSD-STS
SUPPLY SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

CP-CHW-S/S
CHILLED WATER PUMP START/STOP

CP-HWH-S/S
HOT WATER PUMP START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

HW-VLV-CMD
HOT WATER VALVE COMMAND

SF-SPD-CMD
SUPPLY FAN SPEED COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-1, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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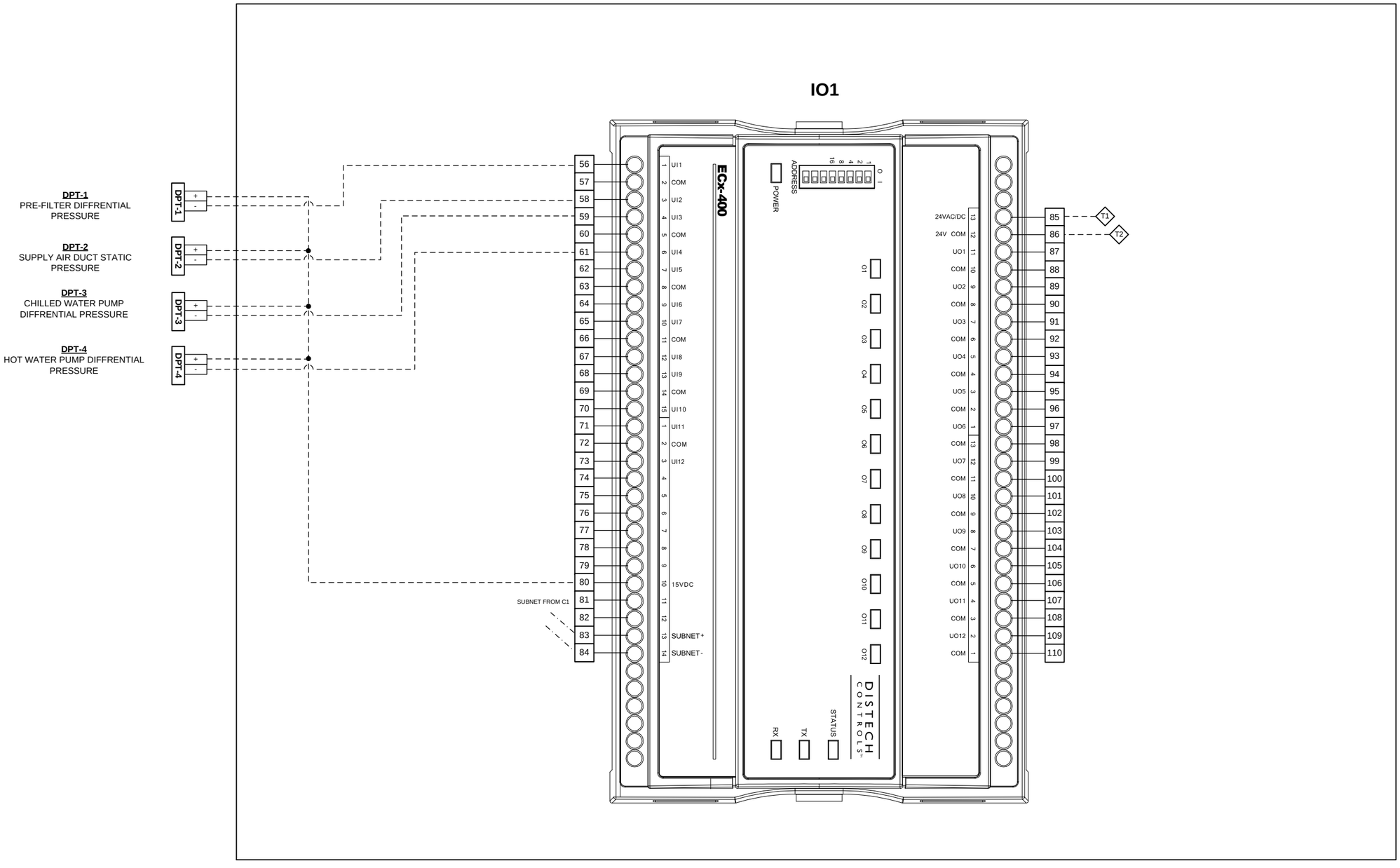
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 WIRING DIAGRAM PAGE 1

AHU-1 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-1, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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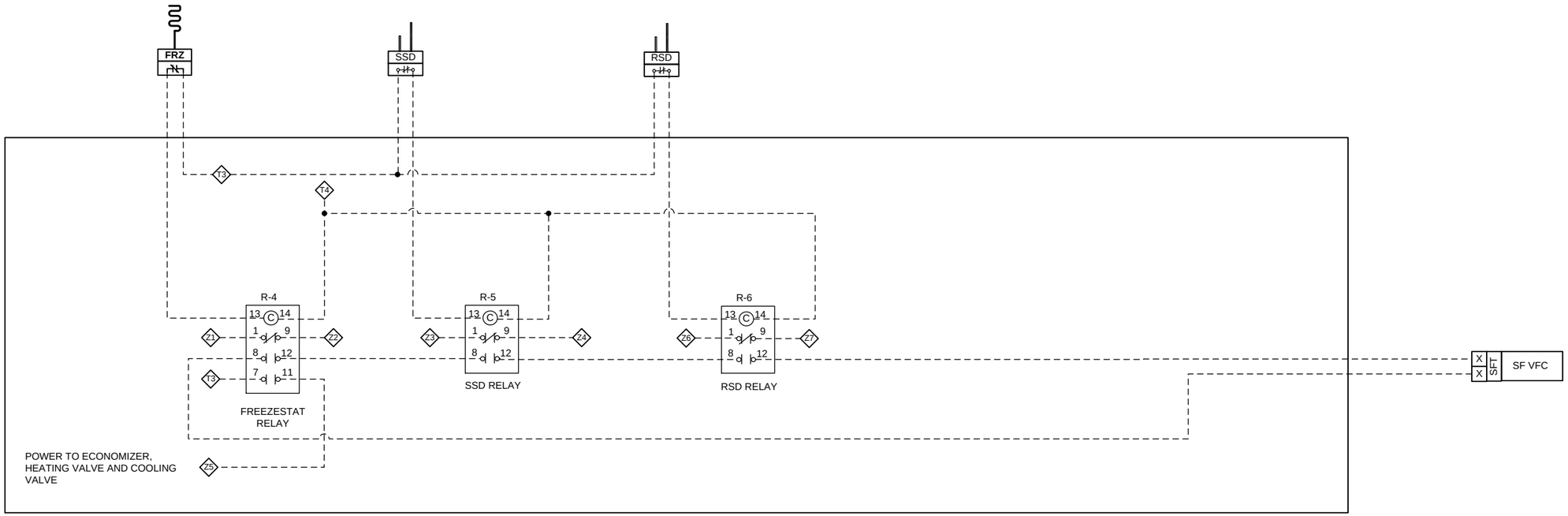
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 WIRING DIAGRAM PAGE 2

AHU-1 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BE-1, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-1 SEQUENCE OF OPERATION

AHU-1 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE. WHEN ART IS IN THE ROOM, SET TIME OF DAY SCHEDULE FOR 24X7 OPERATION. WHEN ART IS NOT IN THE ROOM, SET TIME OF DAY SCHEDULE WITH OCCUPIED SCHEDULE HOURS OF OPERATION.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

7. CHW AND HWH PUMPS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. DDC SHALL ACTIVATE THE HWH PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS BELOW 55°F SETPOINT. PUMP STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

8. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

9. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

10. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

11. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

12. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

13. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

14. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN. MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. HOT WATER COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SEIPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

16. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS T0 MAINTAIN MINIMUM OA FLOW CFM SETPOINT (REFER TO CO2 CONTROL) AND MODULATE HOT WATER COIL VALVE TO MAINTAIN DAT SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

17. DDC SHALL MAINTAIN DAT SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE

OAT	DAT
≥45°F	60°F
≤55°F	50°F

18. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SEIPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS' INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

19. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT		OA DAMPER CFM POSITION
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

20. DDC SHALL MODULATE SF VFC TO MAINTAIN SYSTEM SUPPLY AIR STATIC PRESSURE SETPOINT THAT SHALL BE RESET BASED ON DAMPER POSITION FEEDBACK FROM ASSOCIATED VAV BOX CONTROLLERS AS FOLLOWS: SETPOINT SHALL BE ADJUSTED TO ALLOW 2 SA TERMINAL UNITS TO OPERATE AT 90% OPEN DAMPER POSITION. BELOW 3 AT 90%, SETPOINT SHALL BE SLOWLY DECREASED. ABOVE 2 AT 90%, SETPOINT SHALL BE SLOWLY INCREASED. SETPOINT RANGE SHALL BE 0.5" W.G. TO 2.0" W.G. SETPOINT. STATIC PRESSURE HIGH LIMIT AT AHU WITH SETPOINT OF 3.5" W.G. SHALL PROVIDE SAFETY SHUTDOWN.

21. FREEZESTAT(S) SHALL DEACTIVATE SUPPLY FAN WHEN TEMPERATURE IS 35°F OR BELOW.

22. DUCT SMOKE DETECTOR(S) SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED. DDC SHALL PROVIDE AN ALARM TO THE BAS.

23. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

24. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FAN OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND HEATING COIL VALVES TO THE COILS.

25. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

26. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE
SUPPLY FAN VFC FAILURE
SMOKE DETECTOR(S)
LOW DISCHARGE AIR TEMPERATURE
LOW MIXED AIR TEMPERATURE OVERRIDE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 SEQUENCE OF OPERATION

AHU-1 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Duct Temperature Sensor	DAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galvanised Box	ACI
7	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
8	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
9	Relay	R-1 TO R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
10	Panel Mounted Relay	R-4	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-4	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
12	Panel Mounted Relay	R-5, 6	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
13	Relay Socket	R-5, 6	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
14	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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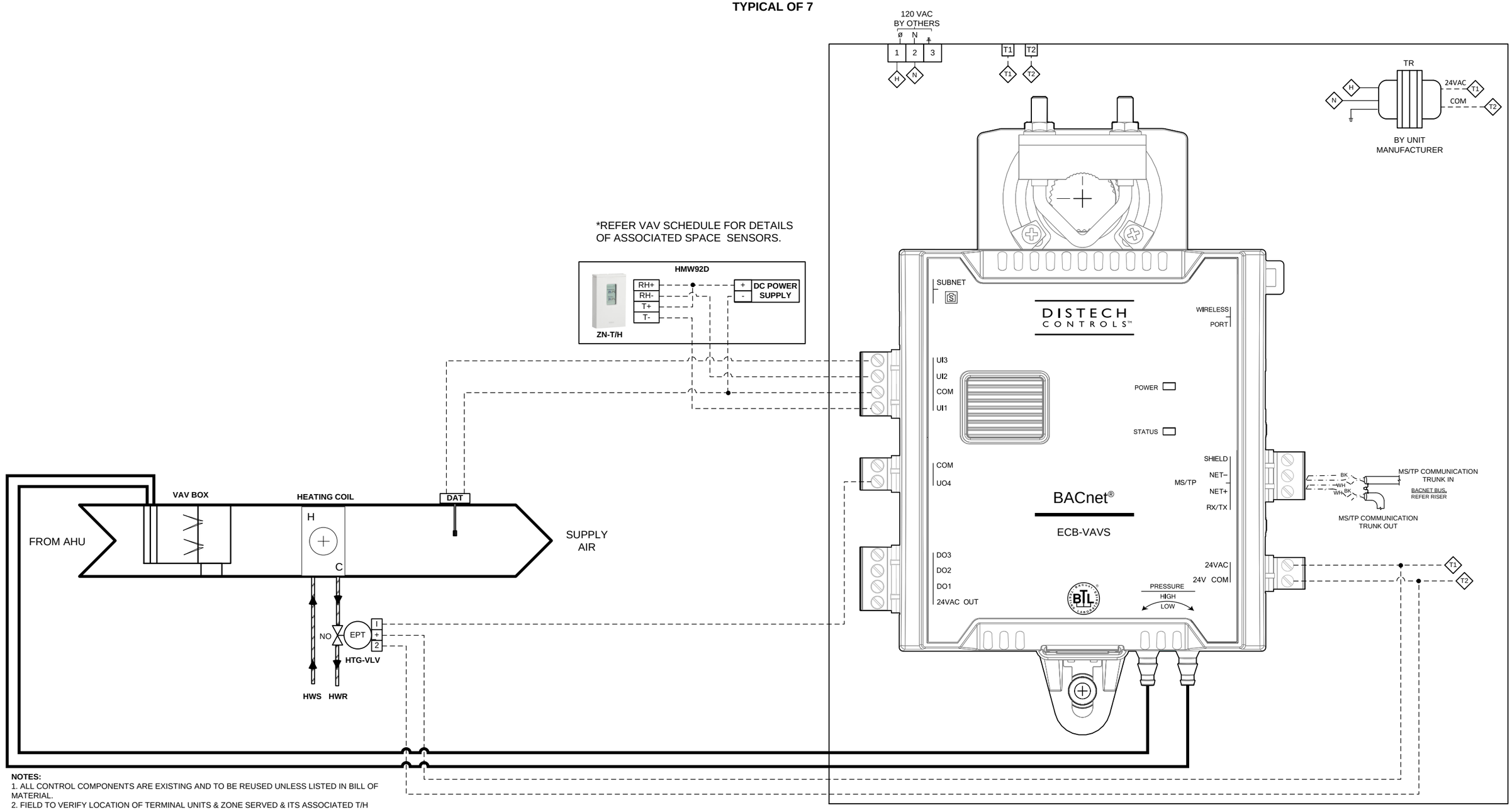
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 BILL OF MATERIAL

AHU-1 TERMINAL UNIT SCHEMATIC & WIRING DIAGRAM

TYPICAL OF 7



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL.
2. FIELD TO VERIFY LOCATION OF TERMINAL UNITS & ZONE SERVED & ITS ASSOCIATED T/H SENSOR.
3. WE HAVE CONSIDERED 6 T/H COMBO SENSORS AS ITS MENTIONED ON SCHEMATIC AS WELL AS 6 T/H SENSORS ON FP.
4. WE HAVE CONSIDERED FTR FOR TU-1 & TU-8. BECAUSE ON FLOOR PLAN RCP UNIT IS AVILABLE FOR TU-1 & TU-8 UNIT ONLY
5. IN AHU-1 AS PER FLOOR PLAN & MECHANICAL DRAWING MI.4 & M1.5 WE HAVE FOUND ONLY 6 T/H COMBO SENSORS FIELD TO DETERMINE ASSOCIATION OF TU & T/H COMBO SENSORS.
6.WE HAVE CONSIDERED RHC COILS ARE VAV-TU RHC COILS FILED TO CONFIRM

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
3. WE HAVE FOUND ONLY 6 T/H COMBO SENSORS IN AHU-1 AS PER FLOOR PLAN & MECHANICAL DRAWING M1.4 & M1.5. FIELD TO DETERMINE ASSOCIATION OF TU & T/H COMBO SENSORS.
4. WE HAVE CONSIDERED RHC COILS ARE VAV-TU RHC COILS FILED TO CONFIRM.
5. FIELD TO VERIFY QUANTITIES OF AHU-1 TERMINAL UNITS.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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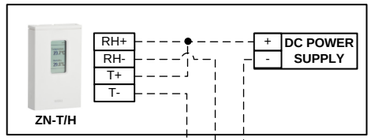
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 TERMINAL UNIT SCHEMATIC & WIRING DIAGRAM

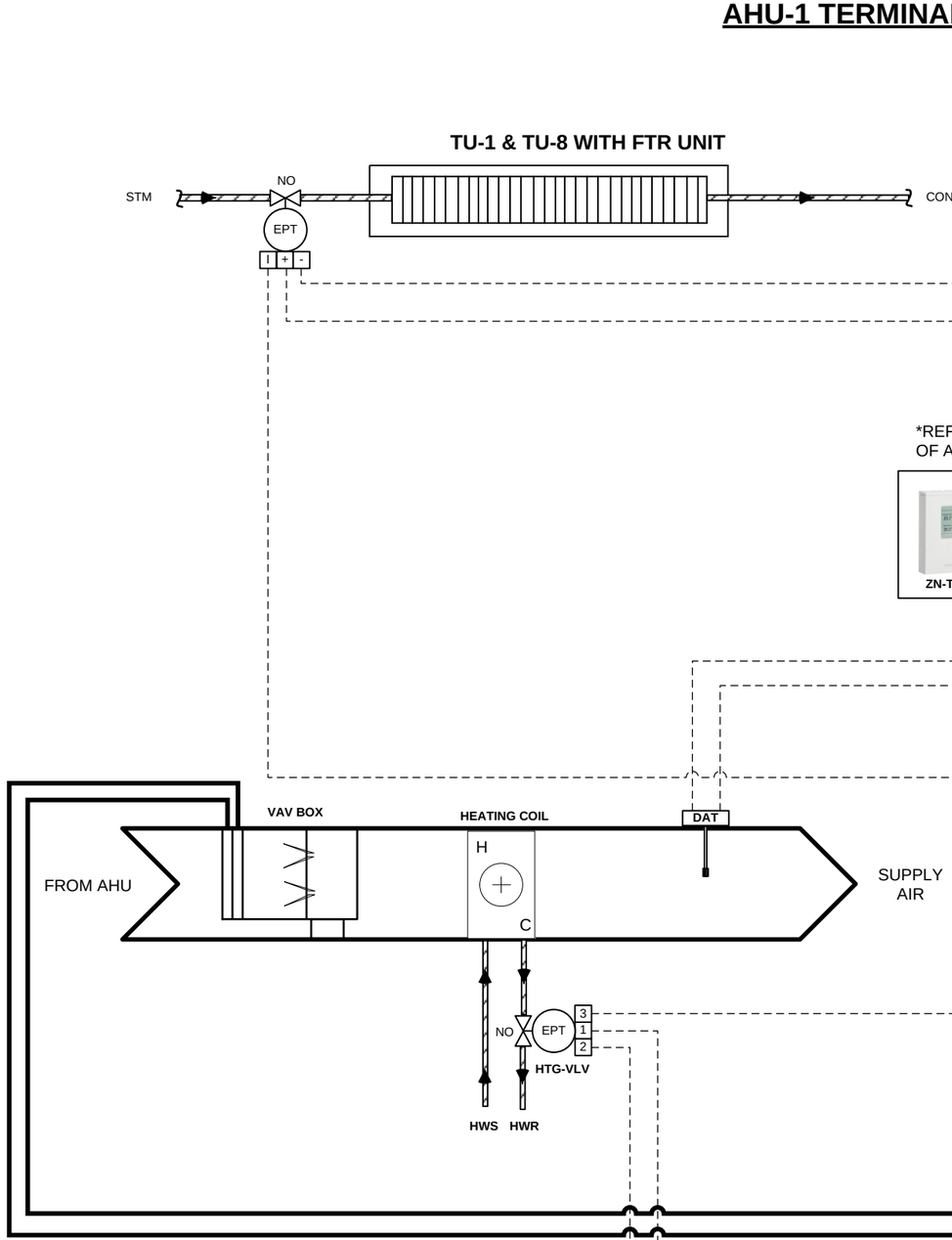
AHU-1 TERMINAL UNIT WITH FTR SCHEMATIC & WIRING DIAGRAM

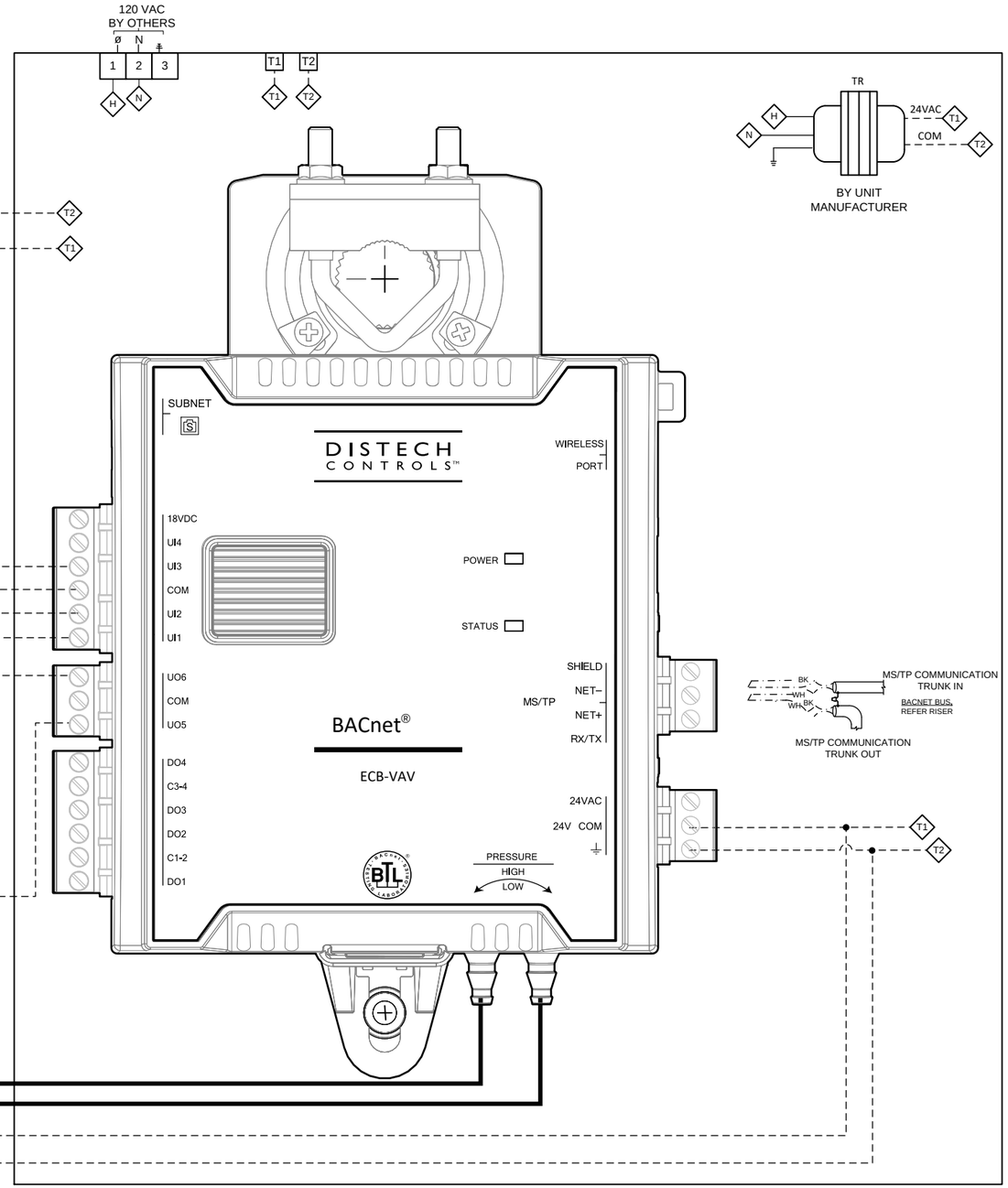
TYPICAL OF 2

TU-1 & TU-8 WITH FTR UNIT



*REFER VAV SCHEDULE FOR DETAILS OF ASSOCIATED SPACE SENSORS.





NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL.
2. FIELD TO VERIFY LOCATION OF TERMINAL UNITS & ZONE SERVED & ITS ASSOCIATED T/H SENSOR.
3. WE HAVE CONSIDERED 6 T/H COMBO SENSORS AS ITS MENTIONED ON SCHEMATIC AS WELL AS 6 T/H SENSORS ON FP.
4. WE HAVE CONSIDERED FTR FOR TU-1 & TU-8. BECAUSE ON FLOOR PLAN RCP UNIT IS AVILABLE FOR TU-1 & TU-8 UNIT ONLY
5. IN AHU-1 AS PER FLOOR PLAN & MECHANICAL DRAWING MI.4 & M1.5 WE HAVE FOUND ONLY 6 T/H COMBO SENSORS FIELD TO DETERMINE ASSOCIATION OF TU & T/H COMBO SENSORS.
6.WE HAVE CONSIDERED RHC COILS ARE VAV-TU RHC COILS FILED TO CONFIRM

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3. FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 TERMINAL UNIT WITH FTR SCHEMATIC & WIRING DIAGRAM

AHU-1 TERMINA UNIT SEQUENCE OF OPERATION

SUPPLY AIR TERMINAL UNIT CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS.

2. ALL SUPPLY AIR TERMINAL UNITS (TU) ASSOCIATED WITH A SINGLE ZONE TEMP SENSOR SHALL CONTROL IN UNISON.

3. TU VAV MINIMUM AND MAXIMUM AIRFLOW SETTINGS SHALL BE DETERMINED TRHU PRE-CONSTRUCTION MEASUREMENTS BY TAB CONTRACTOR.

4. WHEN HEATING, TU DISCHARGE AIR TEMP SENSOR SHALL PROVIDE HIGH LIMIT SETPOINT CONTROL AT 90°F DAT.

5. WHEN SPACE TEMP RISES ABOVE THE COOLING SETPOINT, TU CONTROLLER SHALL KEEP THE RADIATION/ REHEAT COIL VALVES CLOSED AND SHALL MODULATE THE SUPPLY AIRFLOW DAMPER BETWEEN ITS MINIMUM AND MAXIMUM SETTINGS.

6. TU WITHOUT REHEAT COIL: TU DDC CONTROLLER SHALL PERFORM VAV COOLING ONLY CONTROL. WHEN SPACE TEMP FALLS BELOW HEATING SETPOINT, TU CONTROLLER SHALL MODULATE TU DAMPER TO ITS MINIMUM AIRFLOW SETTING TO MAINTAIN ZONE TEMPERATURE. REFER TO TAB CONTRACTOR'S BALANCE DATA.

7. TU WITH REHEAT COIL: WHEN SPACE TEMP FALLS BELOW HEATING SETPOINT, TU CONTROLLER SHALL FIRST MODULATE TU DAMPER TOWARDS ITS MINIMUM AIRFLOW SETTING. WHEN AIRFLOW IS AT MIN, TU CONTROLLER SHALL MODULATE REHEAT COIL CONTROL VALVE TOWARDS OPEN. IF THE ZONE TEMP IS BELOW SETPOINT WITH REHEAT COIL VALVE FULL OPEN, TU CONTROLLER SHALL MODULATE THE SUPPLY AIRFLOW BETWEEN ITS MINIMUM AND MAXIMUM SETTING TO MAINTAIN ZONE TEMPERATURE.

7. TU WITH RADIATION COIL: WHEN SPACE TEMP FALLS BELOW HEATING SETPOINT, TU CONTROLLER SHALL FIRST MODULATE TU DAMPER TOWARDS ITS MINIMUM AIRFLOW SETTING. WHEN AIRFLOW IS AT MIN, TU CONTROLLER SHALL MODULATE REHEAT COIL CONTROL VALVE TOWARDS OPEN TO MAINTAIN ZONE TEMPERATURE.

8. ZONE TEMPERATURE SETPOINTS SHALL BE PER MUSEUM STANDARDS.

9. TU CONTROLLER SHALL RECALIBRATE THE AIRFLOW SENSOR AND RESET FLOATING CONTROL DAMPER CONTROL VALVE ACTUATOR ONCE A WEEK MINIMUM. THE RECALIBRAT1ON AND RESET PROCESS SHALL BE STAGGERED AMONGST THE TERMINAL UNITS SO THAT DUCT STATIC PRESSURE DOES NOT EXCEED LIMITS.

10. TU DISCHARGE AIR TEMP SHALL BE MONITORED FOR SYSTEM DIAGNOSTICS AND PROVIDE HIGH LIMIT CONTROL AS DESCRIBED.

11. CONTROL SIGNALS FOR TU DAMPER ACTUATOR AND HEATING CONTROL OUTPUT SHALL BE DISPLAYED WITH SYSTEM GRAPHICS.

12. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

TERMINAL UNIT SCHEDULE

ITEM #	TAG	FLOOR	SERVING AREA	SUPPLY AIR MIN CFM	SUPPLY AIR MAX CFM	ASSOCIATED ZONE SENSOR	ASSOCIATED AHU	MECH DWG REF
1	VAV TU-2	GROUND FLOOR				HMW92D	AHU-1	M1.4
2	VAV TU-3	GROUND FLOOR				HMW92D	AHU-1	M1.4
3	VAV TU-4	GROUND FLOOR				HMW92D	AHU-1	M1.4
4	VAV TU-5	GROUND FLOOR				HMW92D	AHU-1	M1.4
5	VAV TU-6	GROUND FLOOR				HMW92D	AHU-1	M1.4
6	VAV TU-7	GROUND FLOOR				HMW92D	AHU-1	M1.4
7	VAV TU-9	GROUND FLOOR				HMW92D	AHU-1	M1.4

TERMINAL UNIT WITH FTR SCHEDULE

ITEM #	TAG	FLOOR	SERVING AREA	SUPPLY AIR MIN CFM	SUPPLY AIR MAX CFM	ASSOCIATED ZONE SENSOR	ASSOCIATED AHU	MECH DWG REF
8	VAV TU-1	GROUND FLOOR				HMW92D	AHU-1	M1.4
9	VAV TU-8	GROUND FLOOR				HMW92D	AHU-1	M1.4

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 TERMINA UNIT SEQUENCE OF OPERATION

AHU-1 TERMINA UNIT BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	ECB-VAVS	7	VAV Programmable Controller With 3UI, 3DO & 1UO	Distech
2	Programmable Controller	C1	ECB-VAV	2	B-ASC Single-Duct VAV Controller with 4UI, 4DO, & 2UO	Distech
3	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	9	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
4	Electropneumatic transducer	EPT	EP313020	11	Electropneumatic transducer with manual override, 0-20 psig	Kele
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	6	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Transformer	TR	TR100VA004	9	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
3. WE HAVE FOUND ONLY 6 T/H COMBO SENSORS IN AHU-1 AS PER FLOOR PLAN & MECHANICAL DRAWING M1.4 & M1.5. FIELD TO DETERMINE ASSOCIATION OF TU & T/H COMBO SENSORS.
4. WE HAVE CONSIDERED RHC COILS ARE VAV-TU RHC COILS FILED TO CONFIRM.
5. FIELD TO VERIFY QUANTITIES OF AHU-1 TERMINAL UNITS.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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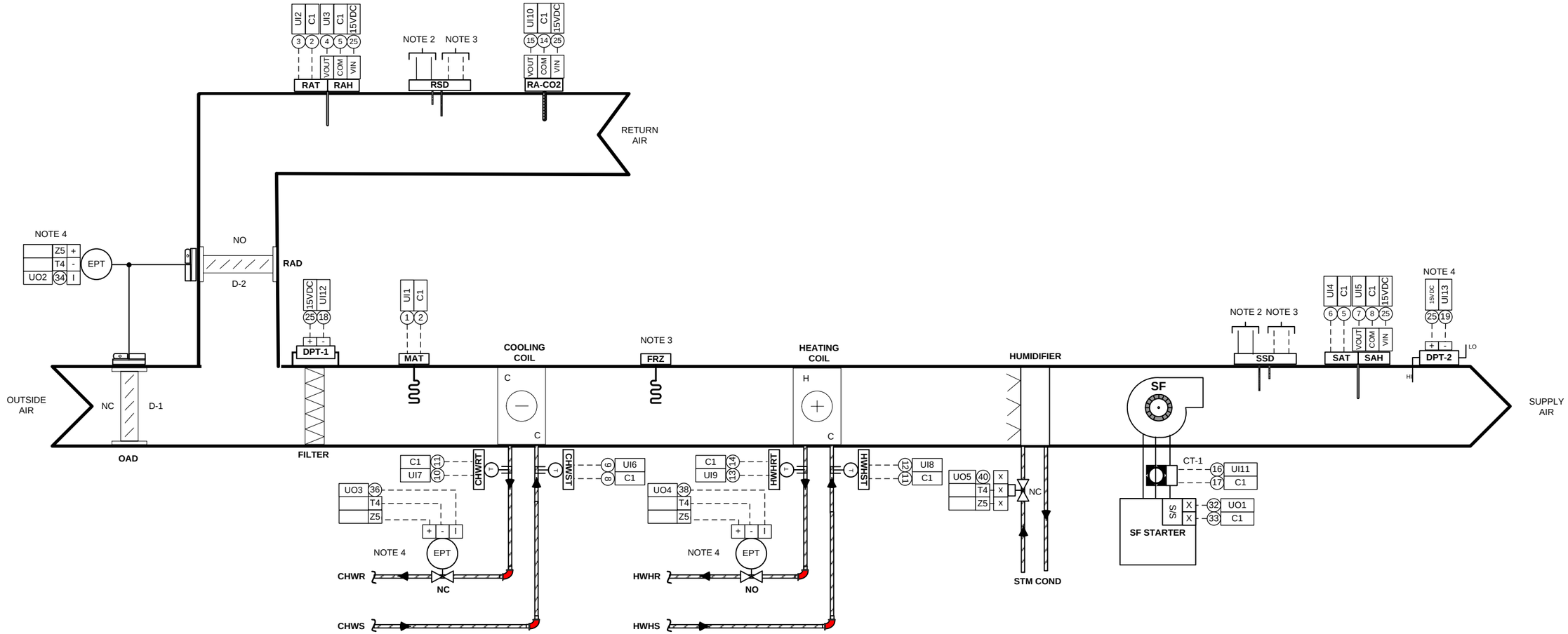
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-1 TERMINA UNIT BILL OF MATERIAL

AHU-2 SHEMATIC DIAGRAM



AHU-2 SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-2	MAIN MUSEUM BASEMENT	STEVENS, HITCHCOCK GALLERIES, WHITE BOARD ROOM , PRINT STUDY, HALLWAYS & OFFICES				M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Astoria, NY 11103
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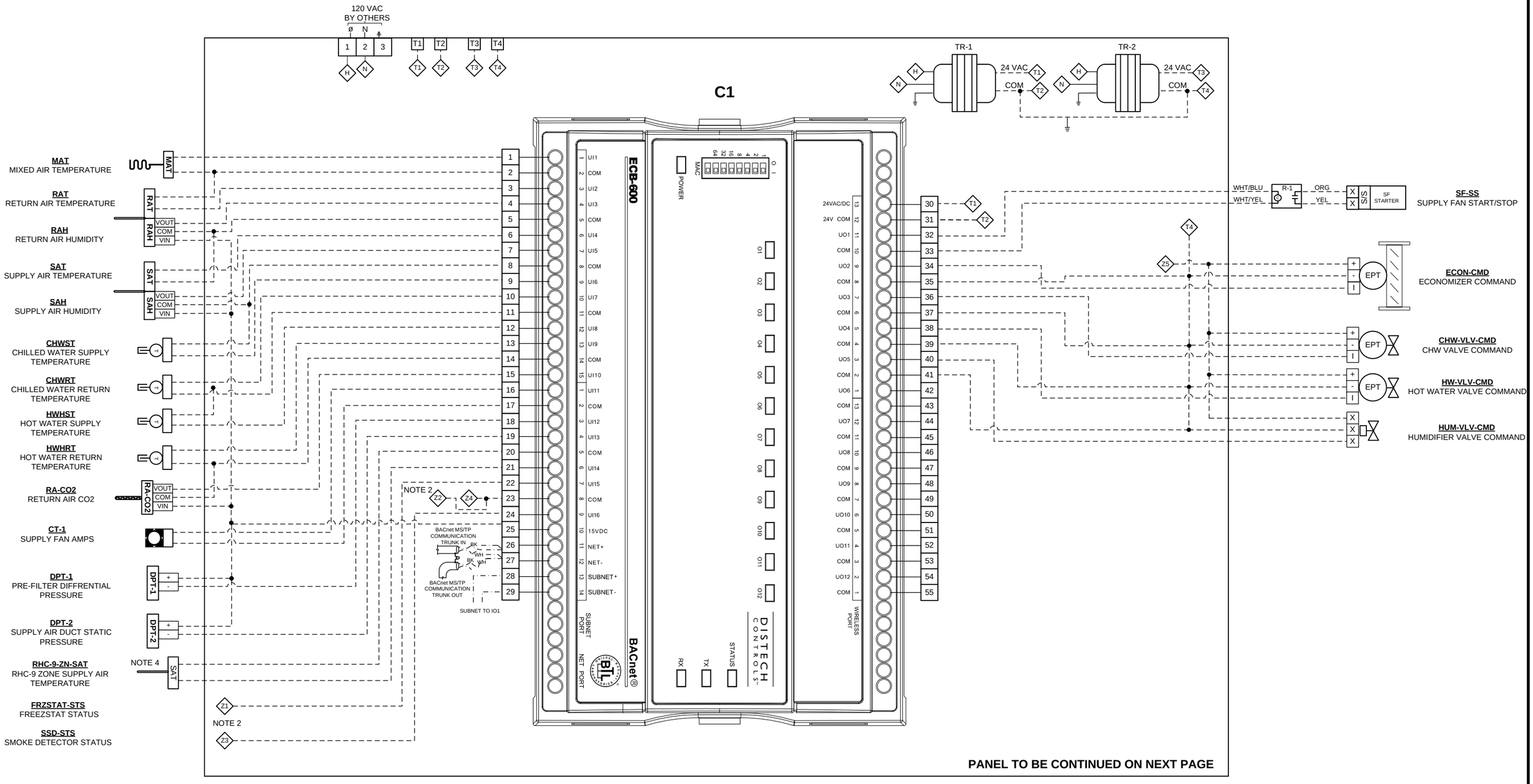
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 SHEMATIC DIAGRAM

AHU-2 WIRING DIAGRAM



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-3, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING
4. ZONE TEMPERATURE OF RHC-9 IS SHOWN HERE INSTEAD OF "C1" CONTROLLER OF ZONE DUCT HEATING COIL .

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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0	MM/DD/YYYY	Submitted for Approval	ICT

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32-72 Steinway St,
Astoria, NY 11103
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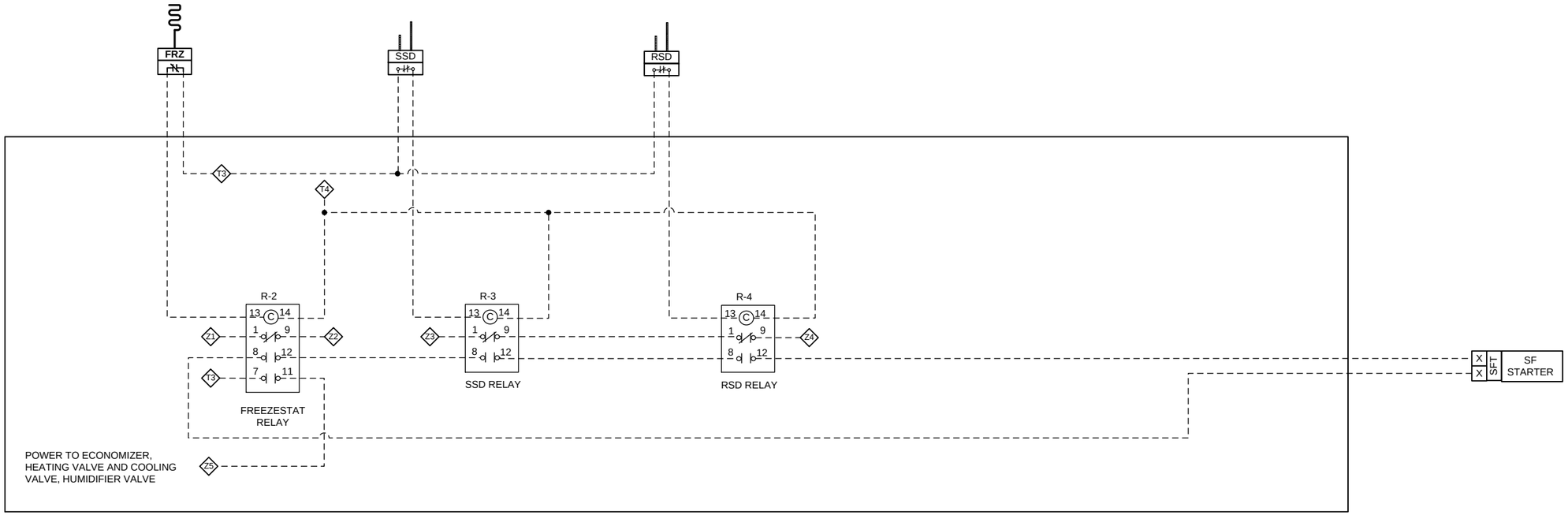
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 WIRING DIAGRAM

AHU-2 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BE-3, MAIN MUSEUM BASEMENT-EAST

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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32-72 Steinway St,
Astoria, NY 11103

(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-2 SEQUENCE OF OPERATION

AHU-2 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND THE DELAYS DESCRIED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING. HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED. UNOCCUPIED. AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTORS RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED. AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ)

6. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA UNIT CONTROL STATUS' INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

7. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

8. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SEIPONT. HOT WATER COIL VALVE SHALL CLOSE TO THE COIL.

9. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. HOT WATER COIL VALVE SHALL CLOSE TO THE COIL

10. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HOT WATER COIL VALVE TO MAINTAIN DAT SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

11. DDC SHALL MODULATE CHILLED WATER VALVE(S) TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

12.REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL WHEN AHU IS OPERATING. ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

13. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION
LOW LIMIT CO2 600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH WAIT CO2 1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

14. DOC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DX SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

15. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDIFY SETPOINT PER MUSEUM STANDARDS. DOC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

16. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DX SHALL ADJUST THE FAN(S) SPEED BASED ON AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED. DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPCINT.

17. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

18. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

19. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY ALTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA

20. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP. DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S).

21. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS. RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

22. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE — SUPPLY/RETURN FAN FAILURES

SMOKE DETECTOR (S) — LOW MIXED AIR TEMPERATURE OVERRIDE

LOW DISCHARGE AIR TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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32-72 Steinway St,
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 SEQUENCE OF OPERATION

AHU-2 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H, SAT/H	A/RH2-CP-D-010	2	Temperature & Humidity Combo Sensor	ACI
4	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
7	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
8	Panel Mounted Relay	R-2	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
9	Relay Socket	R-2	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
10	Panel Mounted Relay	R-3, 4	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-3, 4	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
12	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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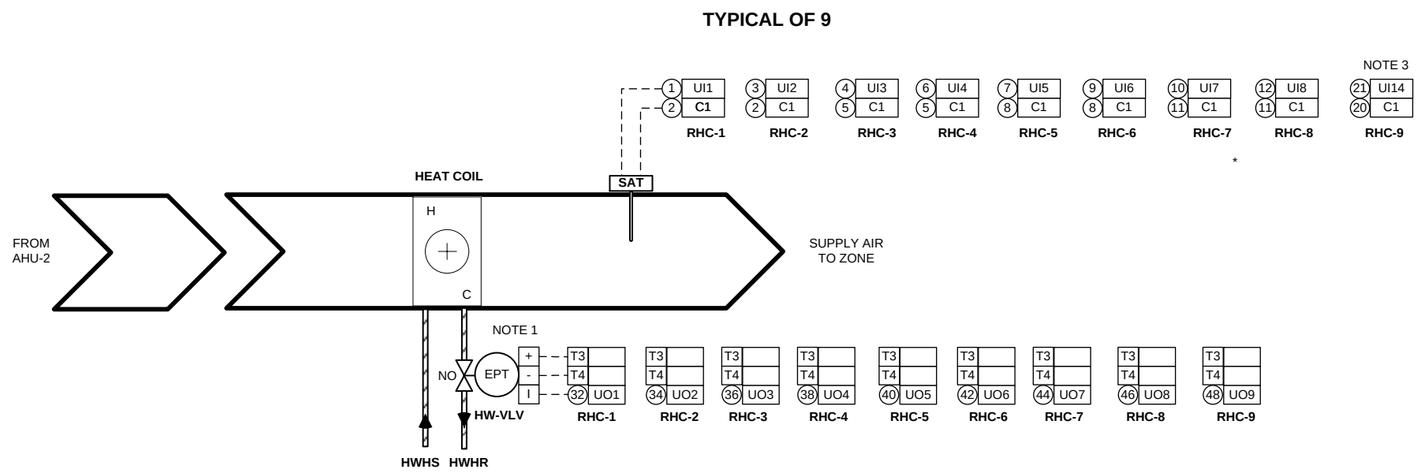
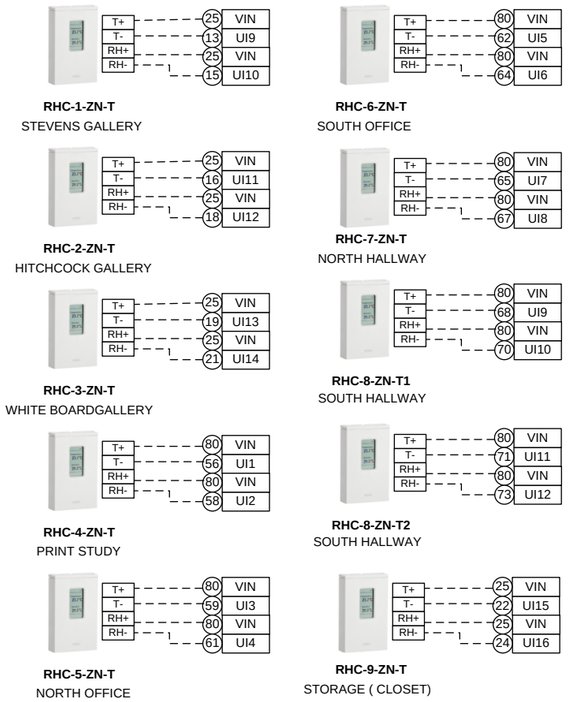
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 BILL OF MATERIAL

AHU-2 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM





REHEAT COIL SCHEDULE				
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H SENSORS	MECH DWG REF
1	RHC-1	STEVENS GALLERY	1	M1.4
2	RHC-2	HITCHCOCK GALLERY	1	M1.4
3	RHC-3	WHITE BOARDGALLERY	1	M1.4
4	RHC-4	PRINT STUDY	1	M1.4
5	RHC-5	NORTH OFFICE	1	M1.4
6	RHC-6	SOUTH OFFICE	1	M1.4
7	RHC-7	NORTH HALLWAY	1	M1.4
8	RHC-8	SOUTH HALLWAY	2	M1.4
9	RHC-9	STORAGE (CLOSET)	1	M1.4

NOTES:
1. EPT TO BE INSTALLED IN PANEL.
2. FIELD TO VERIFY LOCATION OF RHC & ZONE SERVED.
3.ZONE TEMPERATURE OF RHC-9 IS SHOWN IN "C1" CONTROLLER OF AHU-2

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

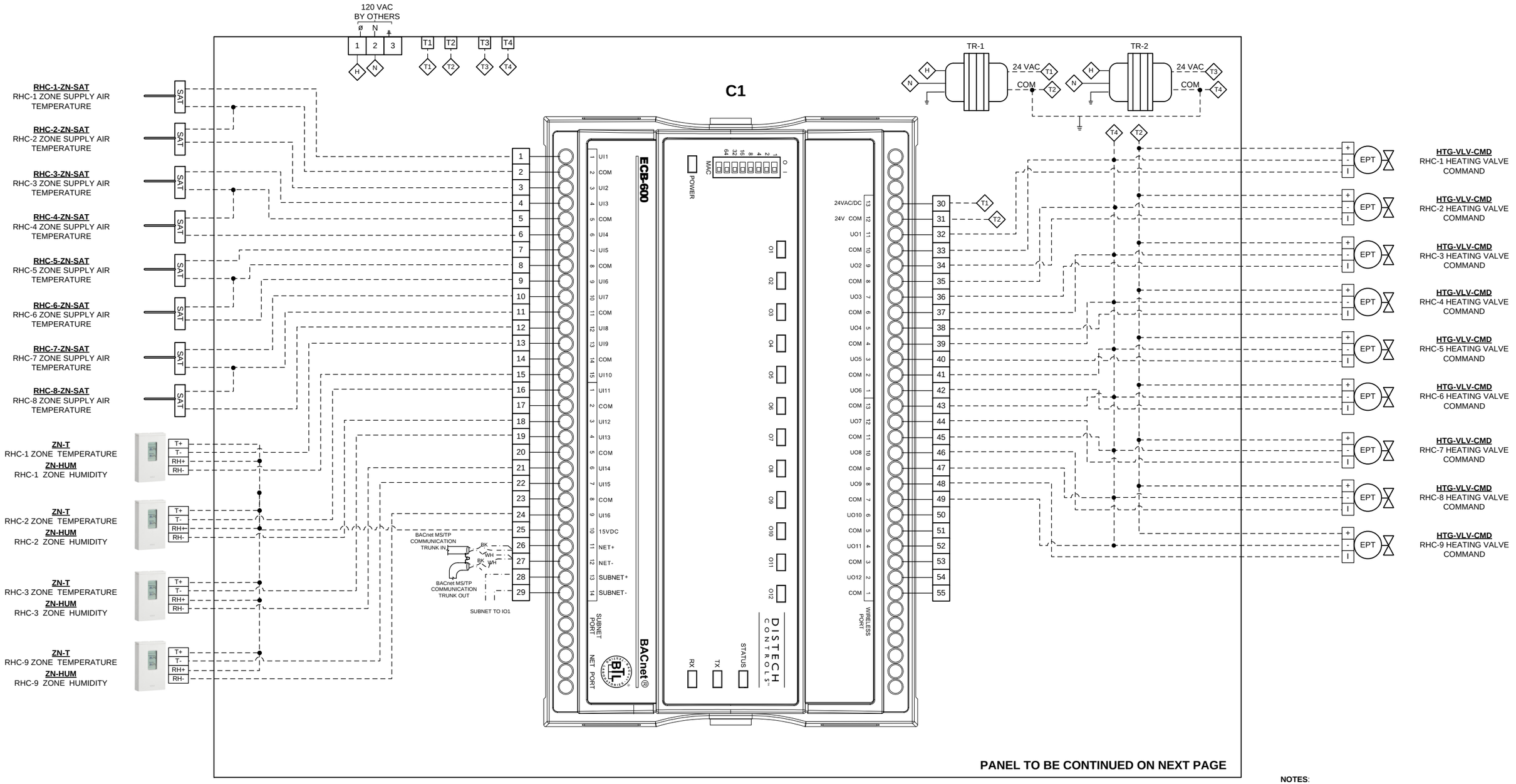
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-2 ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-3, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
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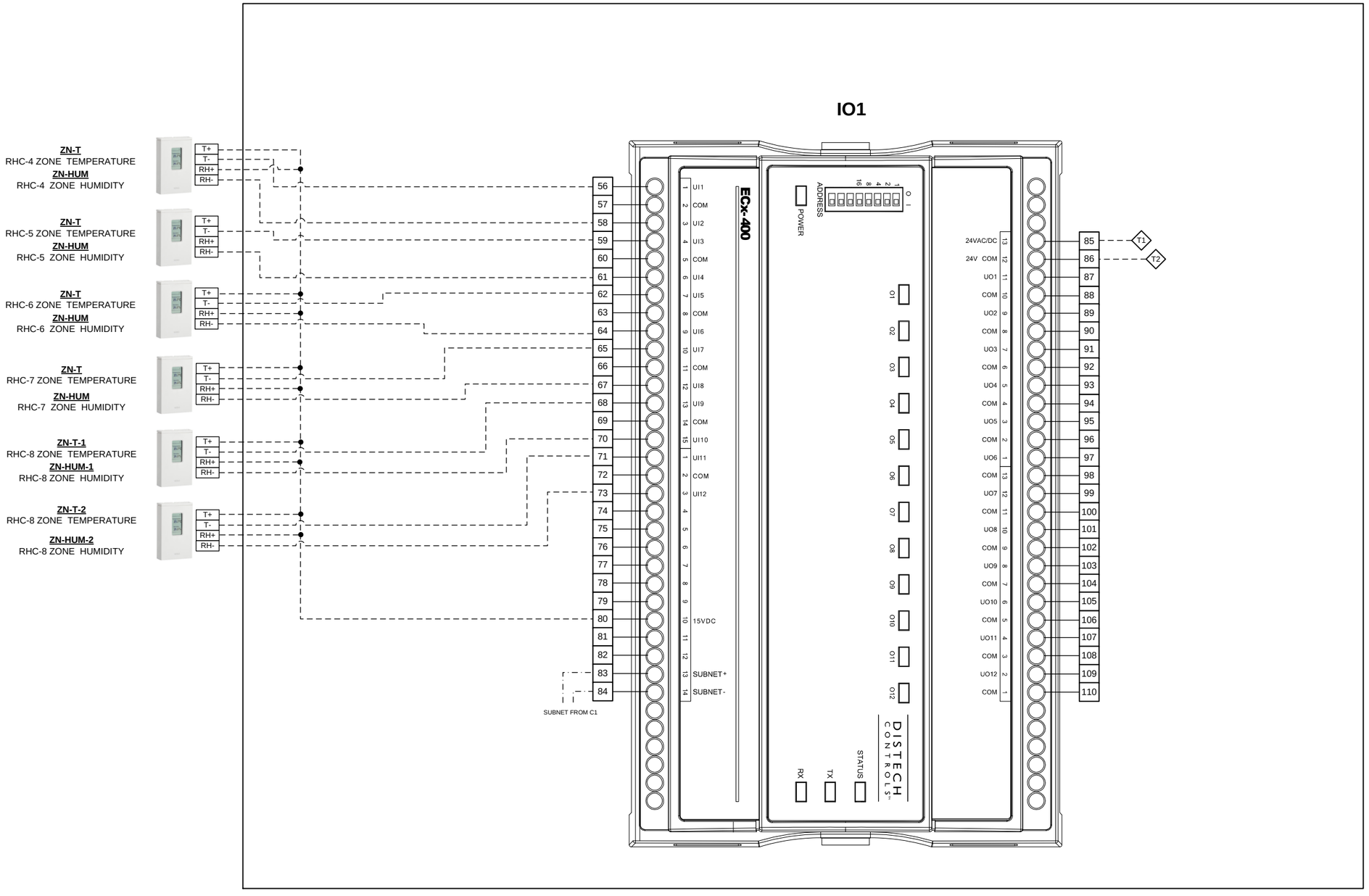
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1

AHU-2 ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-3, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-2 ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2

AHU-2 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	10	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
4	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	9	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
5	Electropneumatic transducer	EPT	EP313020	9	Electropneumatic transducer with manual override, 0-20 psig	Kele
6	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

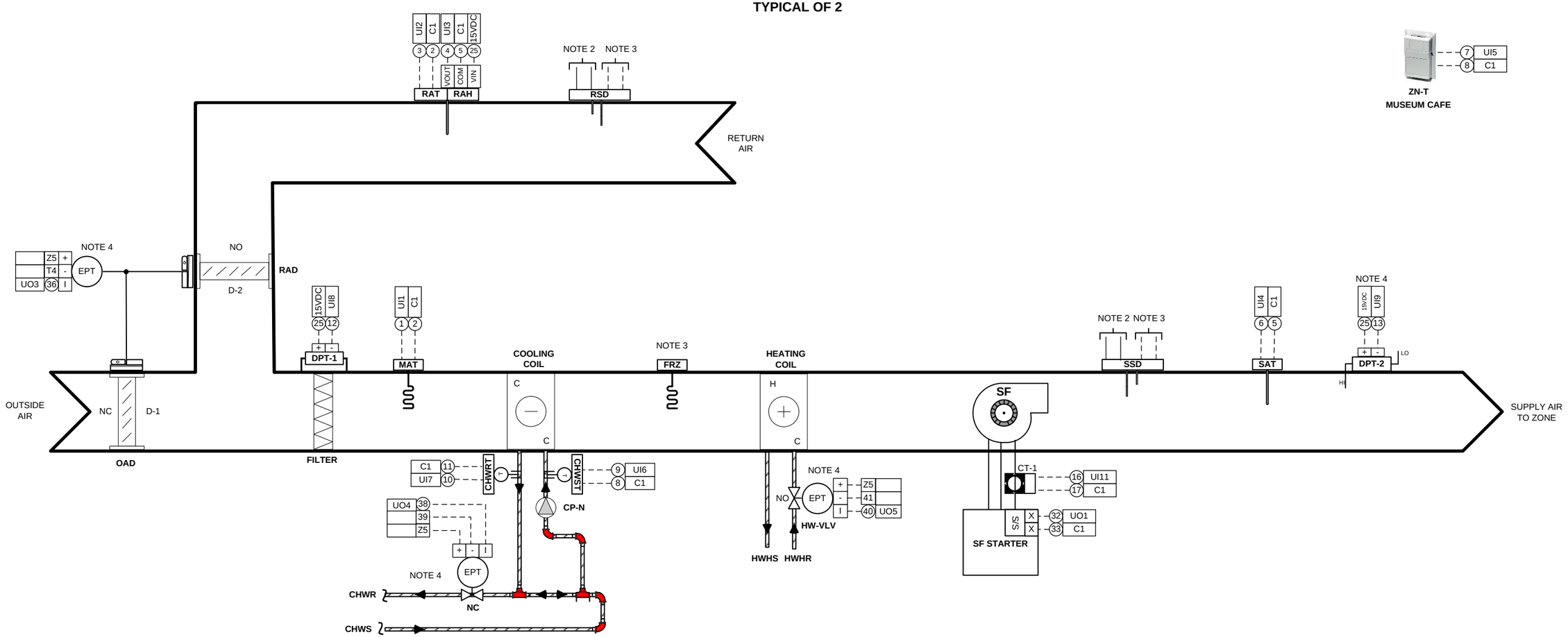
ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

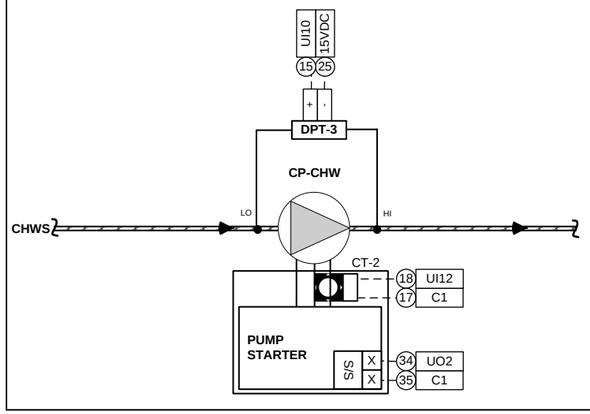
AHU-2 ZONE DUCT HEATING COIL BILL OF MATERIAL

AHU-4 & 5 SCHEMATIC DIAGRAM

TYPICAL OF 2



AIR HANDLER CHW CIRC PUMP



AHU-4 & AHU-5 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-4	MAIN MUSEUM BASMENT	MUSEUM CAFÉ				M1.1
AHU-5	MAIN MUSEUM BASMENT	MUSEUM CAFÉ TERRACE				M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

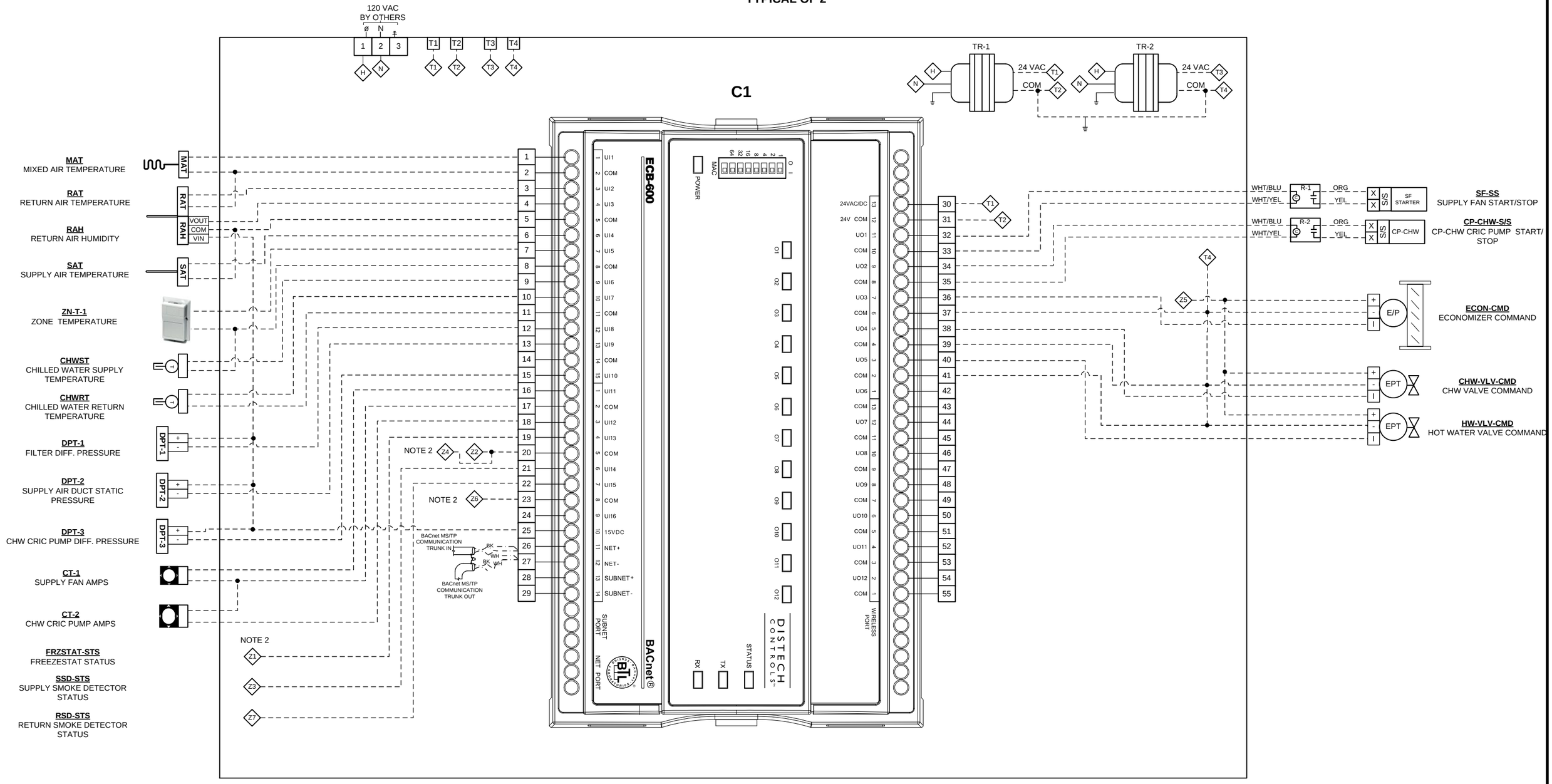
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-4 & 5 SCHEMATIC DIAGRAM

AHU-4 & 5 WIRING DIAGRAM

TYPICAL OF 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BE-5, MAIN MUSEUM BASEMENT-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

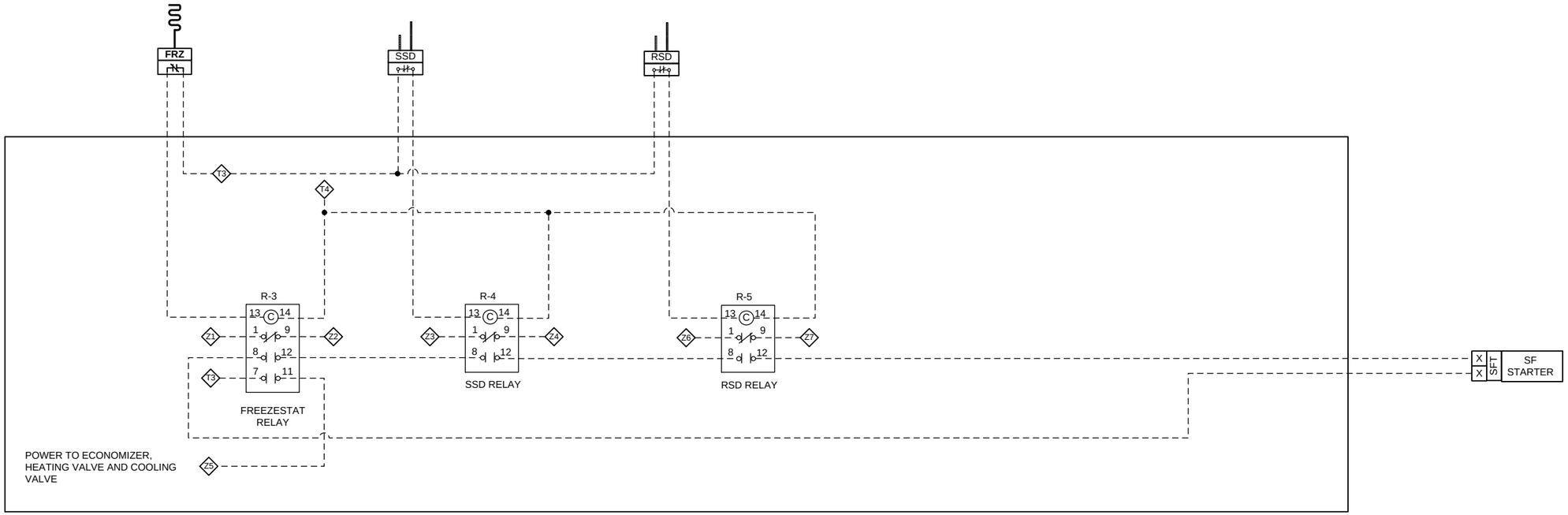
ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-4 & 5 WIRING DIAGRAM

AHU-4 & 5 INTERLOCK AND SAFETY WIRING DIAGRAM

TYPICAL OF 2



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BE-5, MAIN MUSEUM BASEMENT-EAST

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC

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Astoria, NY 11103

(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-4 & 5 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-4 & 5 SEQUENCE OF OPERATION

AHU-4 & AHU-5 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM.

6. CHW PUMP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

8. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

9. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

10. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

11. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

12. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

13. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS.

14. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL.

16. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT (REFER TO CO2 CONTROL) AND MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

17. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

18. FREEZESTAT(S) SHALL DEACTIVATE SUPPLY FAN WHEN TEMPERATURE IS 35°F OR BELOW.

19. DUCT SMOKE DETECTOR(S) SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED. DDC SHALL PROVIDE AN ALARM TO THE BAS.

20. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

21. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FAN OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND HEATING COIL VALVES TO THE COILS.

22. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

23. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE

SUPPLY FAN FAILURE

SMOKE DETECTOR(S)

LOW DISCHARGE AIR TEMPERATURE

LOW MIXED AIR TEMPERATURE OVERRIDE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-4 & 5 SEQUENCE OF OPERATION

AHU-4 & 5 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	2	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	2	Temperature & Humidity Combo Sensor	ACI
4	Zone Temp Sensor	ZN-T	A/CP-R2	2	Thermistor, 10K Type II, Room Temperature sensor	ACI
5	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	2	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
6	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	6	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1 , R-2	RIBU1C	4	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3	784-4C-24A	2	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-3	784-4C-SKT	2	DIN-rail mounting, for use with 784 series	Automation Direct
11	Panel Mounted Relay	R-4, 5	782-2C-24A	4	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-4, 5	782-2C-SKT	4	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	4	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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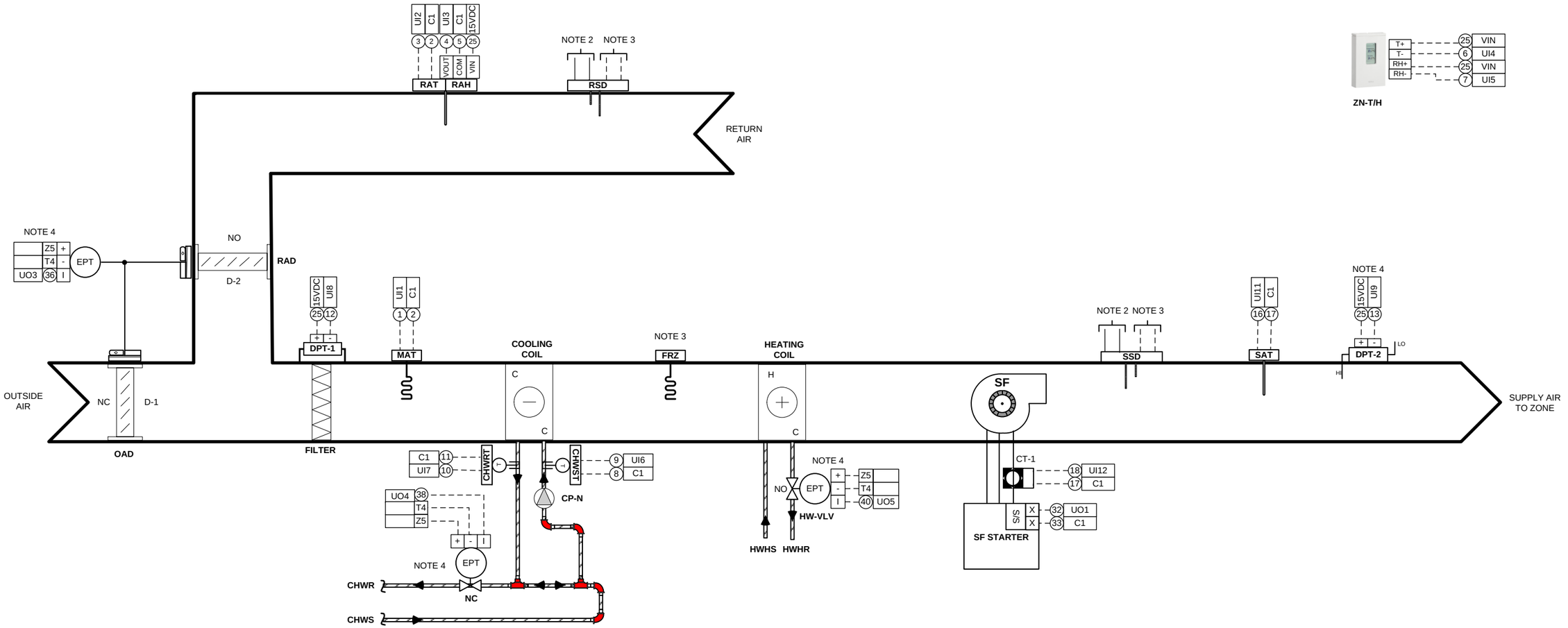
Astoria, NY 11103
(M) 718-350-8716

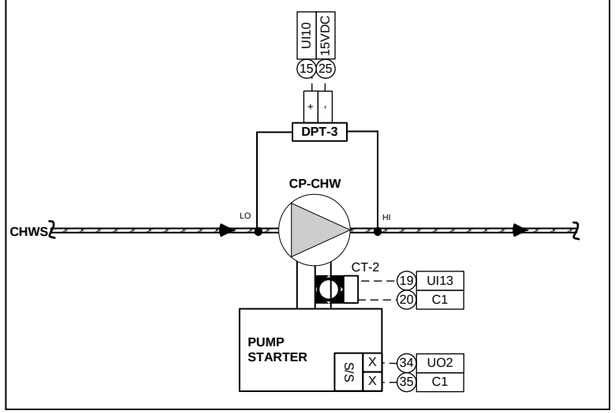
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-4 & 5 BILL OF MATERIAL

AHU-6 SCHEMATIC DIAGRAM



AIR HANDLER CHW CIRC PUMP



AHU-6 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-6	MAIN MUSEUM BASMENT	DEVELOPMENT OFFICES				M1.1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

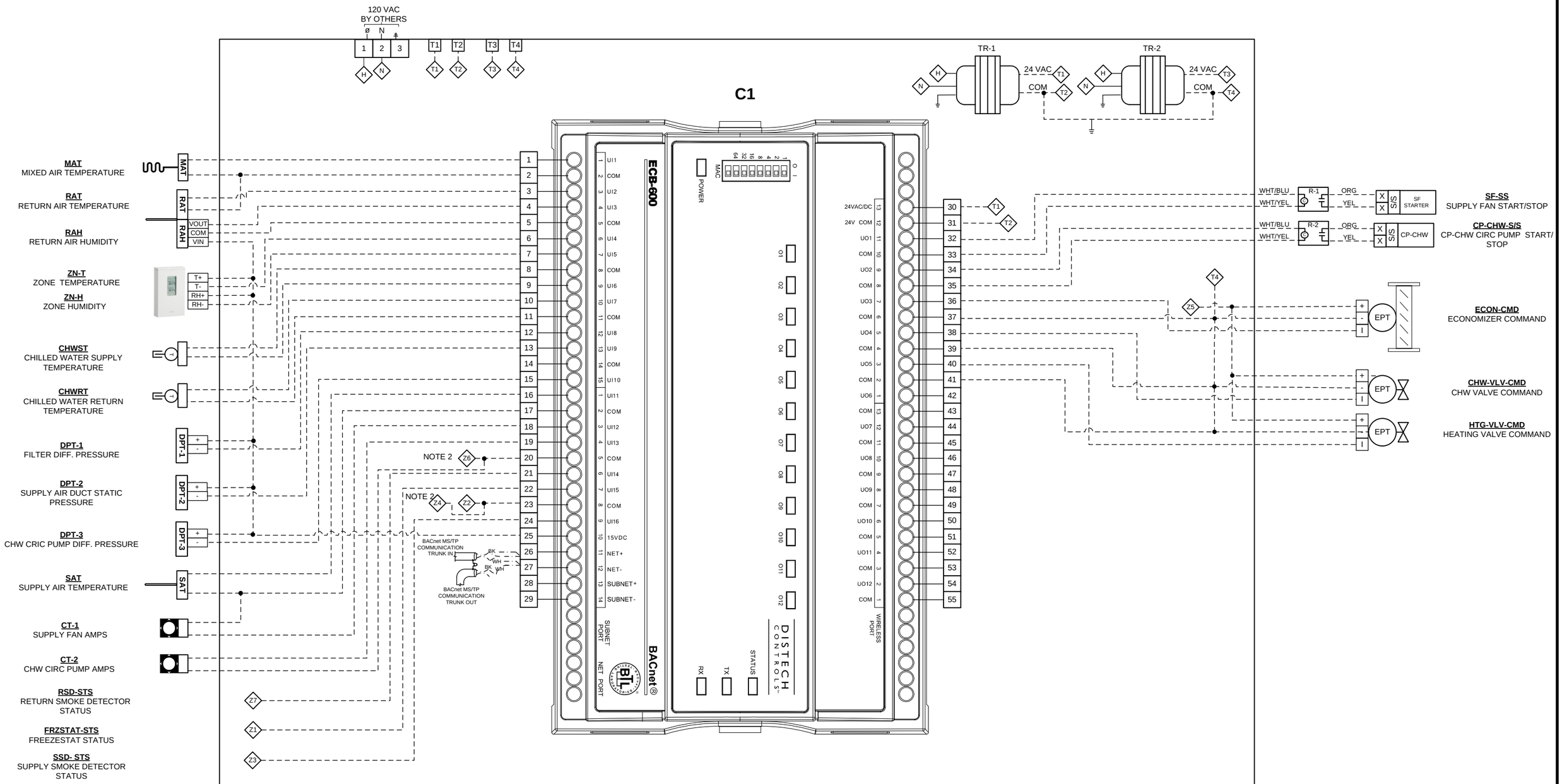
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-6 SCHEMATIC DIAGRAM

AHU-6 WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BP-3, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

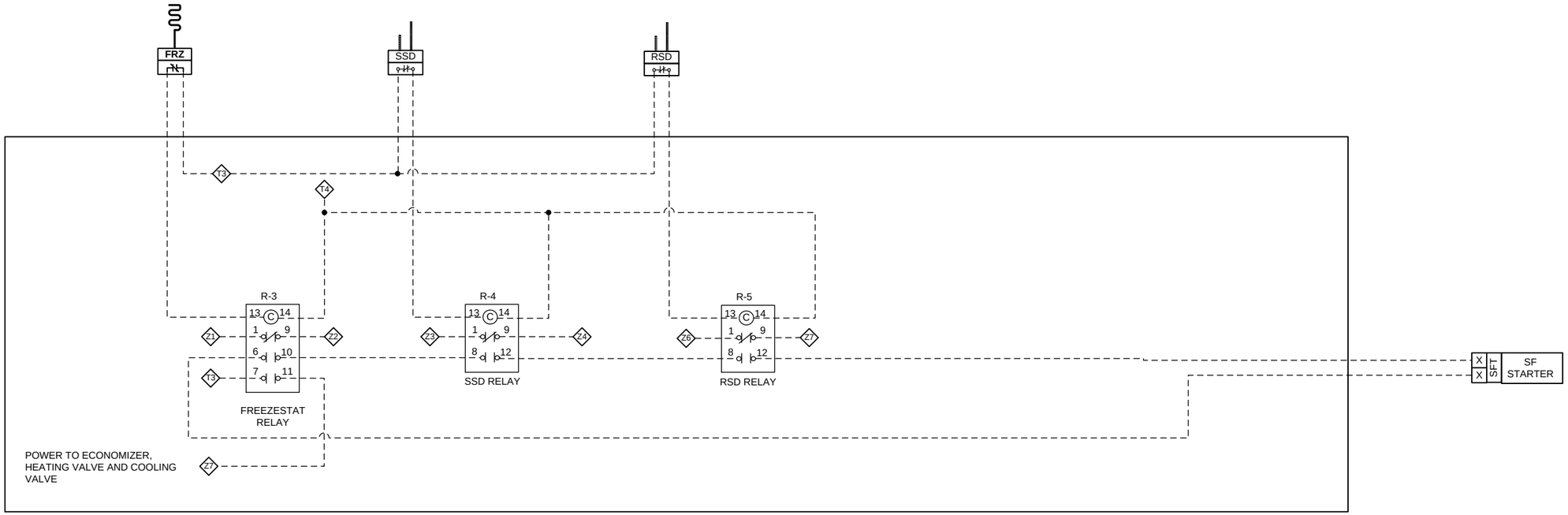
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-6 WIRING DIAGRAM

AHU-6 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BP-3, MAIN MUSEUM BASEMENT-PERISTYLE

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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Astoria, NY 11103
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-6 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-6 SEQUENCE OF OPERATION

AHU-6 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM.

6. CHW PUMP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

8. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

11. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

12. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

13. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL.

16. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

17. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

18. FREEZESTAT(S) SHALL DEACTIVATE SUPPLY FAN WHEN TEMPERATURE IS 35°F OR BELOW.

19. DUCT SMOKE DETECTOR(S) SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED. DDC SHALL PROVIDE AN ALARM TO THE BAS.

20. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

21. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FAN OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND HEATING COIL VALVES TO THE COILS.

22. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

23. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE

SUPPLY FAN FAILURE

SMOKE DETECTOR(S)

LOW DISCHARGE AIR TEMPERATURE

LOW MIXED AIR TEMPERATURE OVERRIDE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-6 SEQUENCE OF OPERATION

AHU-6 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
4	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
5	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
6	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-3	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
11	Panel Mounted Relay	R-4, 5	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-4, 5	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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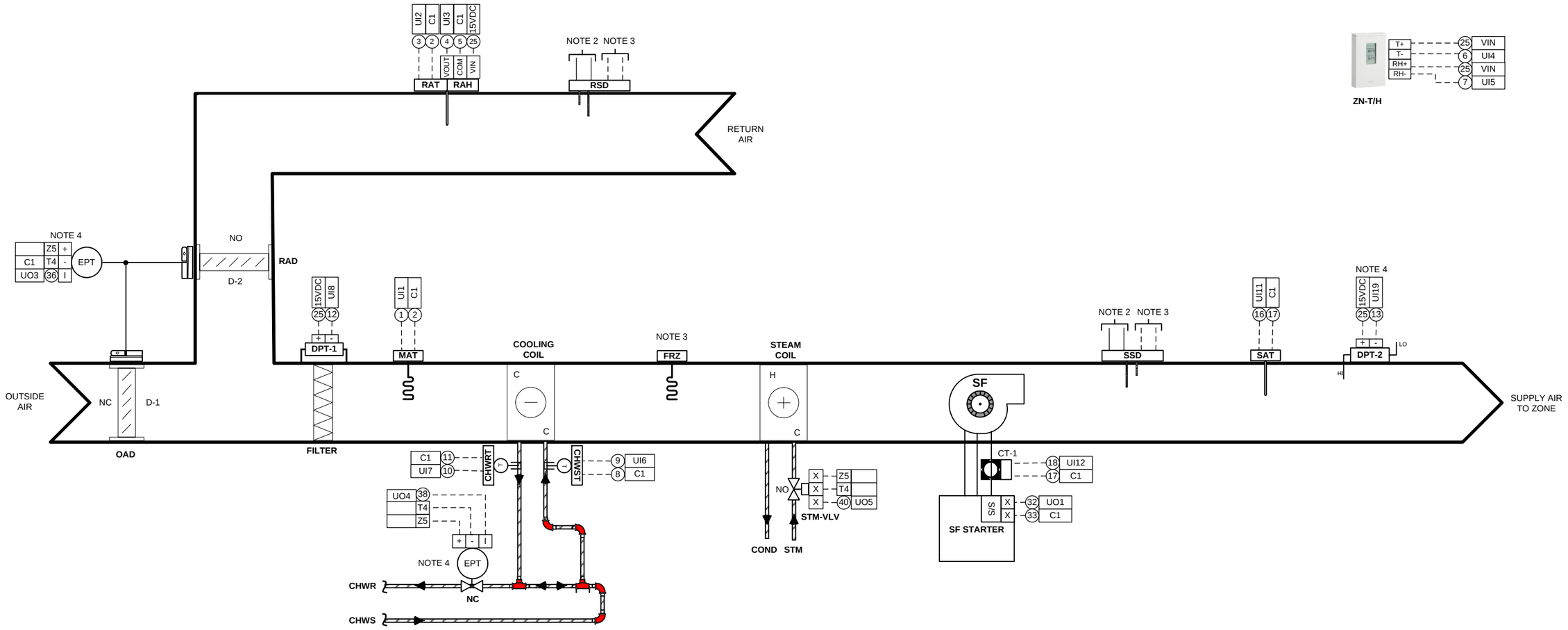
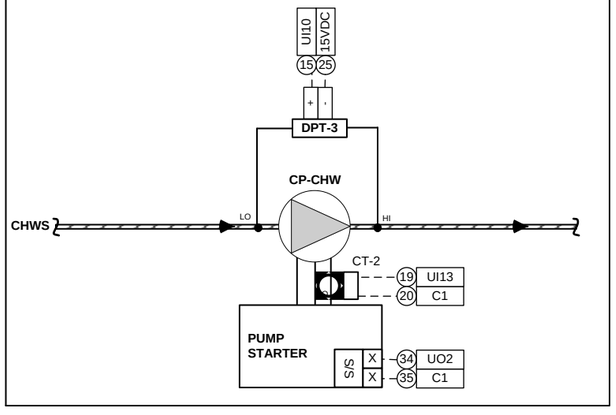
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-6 BILL OF MATERIAL

AHU-7 SCHEMATIC DIAGRAM



AIR HANDLER CHW CIRC PUMP



AHU-7 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-7	MAIN MUSEUM BASMENT	PLOUGH ENTRANCE				M1.3

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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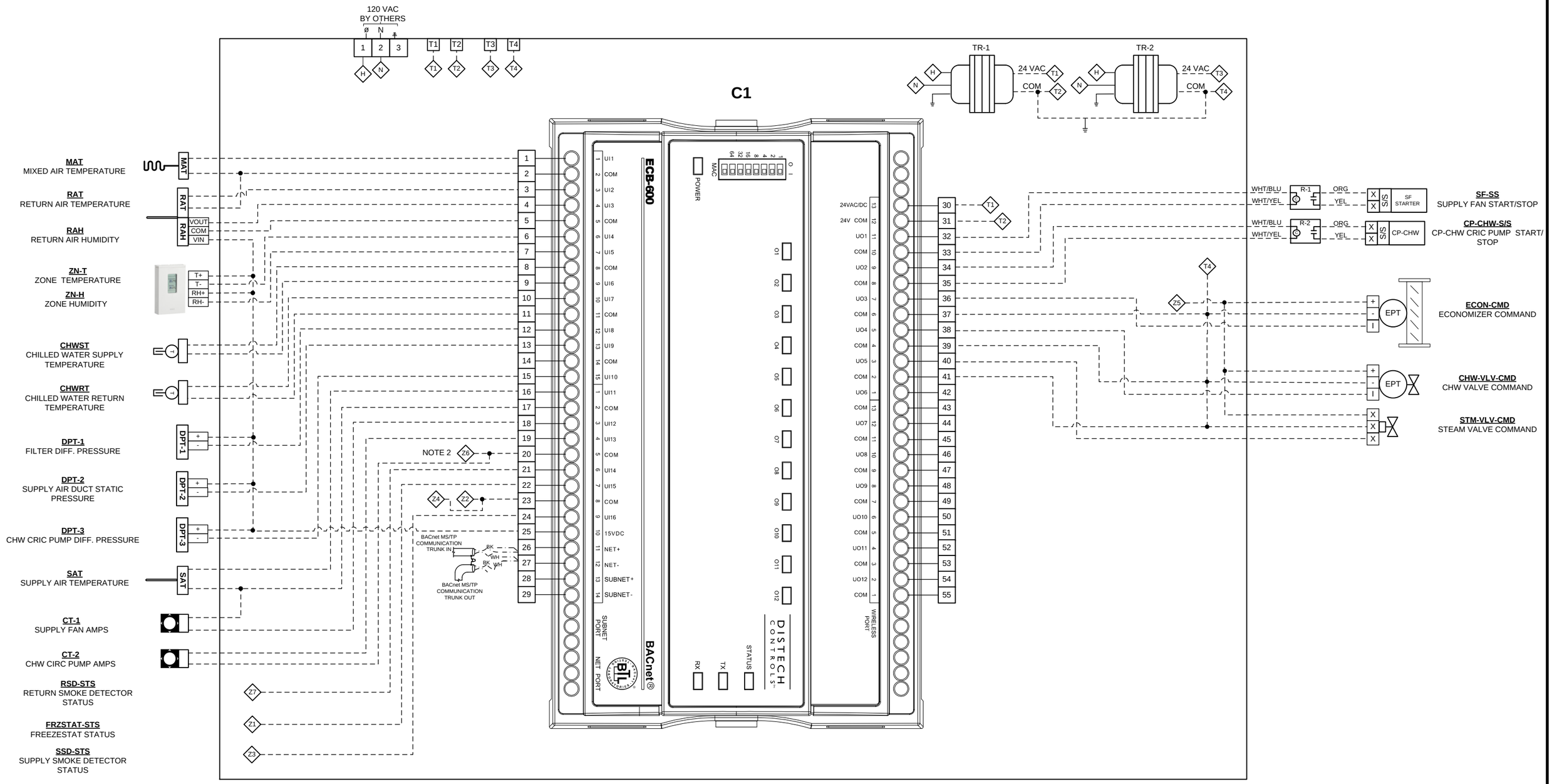
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-7 SCHEMATIC DIAGRAM

AHU-7 WIRING DIAGRAM



MAT
MIXED AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

RAH
RETURN AIR HUMIDITY

ZN-T
ZONE TEMPERATURE

ZN-H
ZONE HUMIDITY

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
SUPPLY AIR DUCT STATIC PRESSURE

DPT-3
CHW CRIC PUMP DIFF. PRESSURE

SAT
SUPPLY AIR TEMPERATURE

CT-1
SUPPLY FAN AMPS

CT-2
CHW CIRC PUMP AMPS

RSD-STS
RETURN SMOKE DETECTOR STATUS

FRZSTAT-STS
FREEZESTAT STATUS

SSD-STS
SUPPLY SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

CP-CHW-S/S
CP-CHW CRIC PUMP START/ STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-6,MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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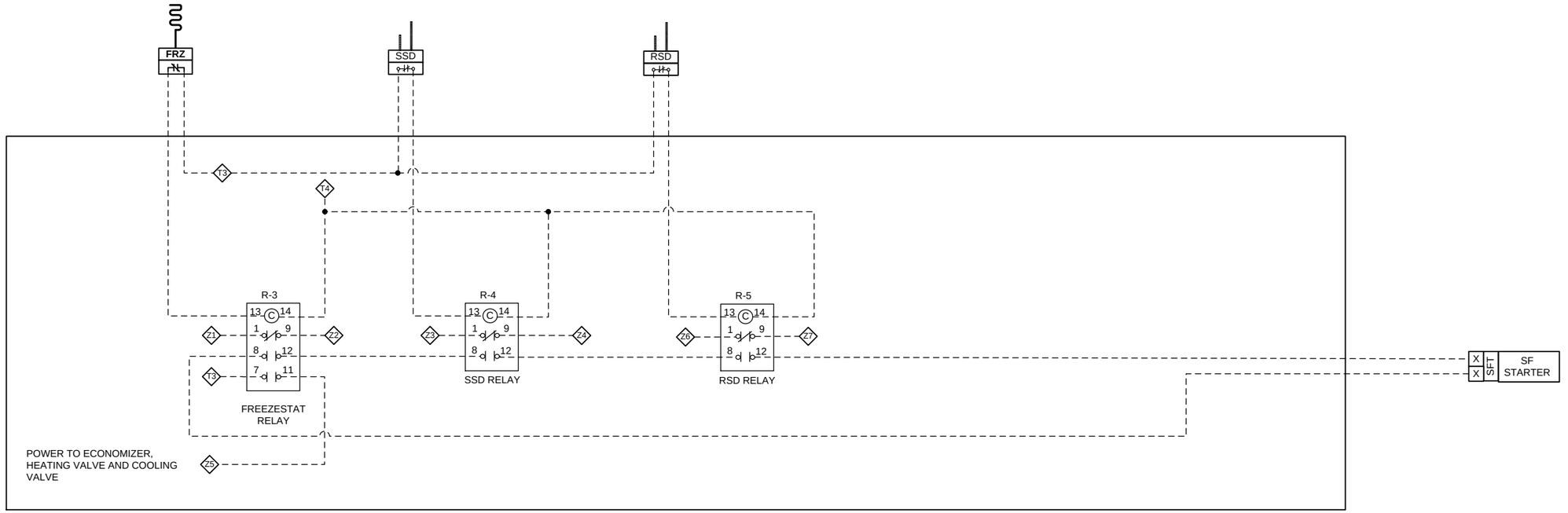
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-7 WIRING DIAGRAM

AHU-7 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BW-6,MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Astoria, NY 11103
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-7 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-7 SEQUENCE OF OPERATION

AHU-7 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM.

6. CHW PUMP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

8. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

9. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

10. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

11. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

12. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°F WB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

13. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

14. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE STEAM COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

16. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

17. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:

HEATING UNOCCUPIED SETPOINT = 62°F

HEATING OCCUPIED SETPOINT = 70°F

COOLING OCCUPIED SETPOINT = 74°F

COOLING UNOCCUPIED SETPOINT = 82°F

18. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

19. DUCT SMOKE DETECTOR(S) THRU DDC INPUT SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

20. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

21. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND HEATING COIL VALVES TO THE COILS.

22. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

23. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURE
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	LOW SPACE TEMPERATURE
HIGH SPACE TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

AHU-7 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
4	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
5	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
6	Immersion Temperature sensor	CHWRT, CHWST	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	2	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-3	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
11	Panel Mounted Relay	R-4, 5	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-4, 5	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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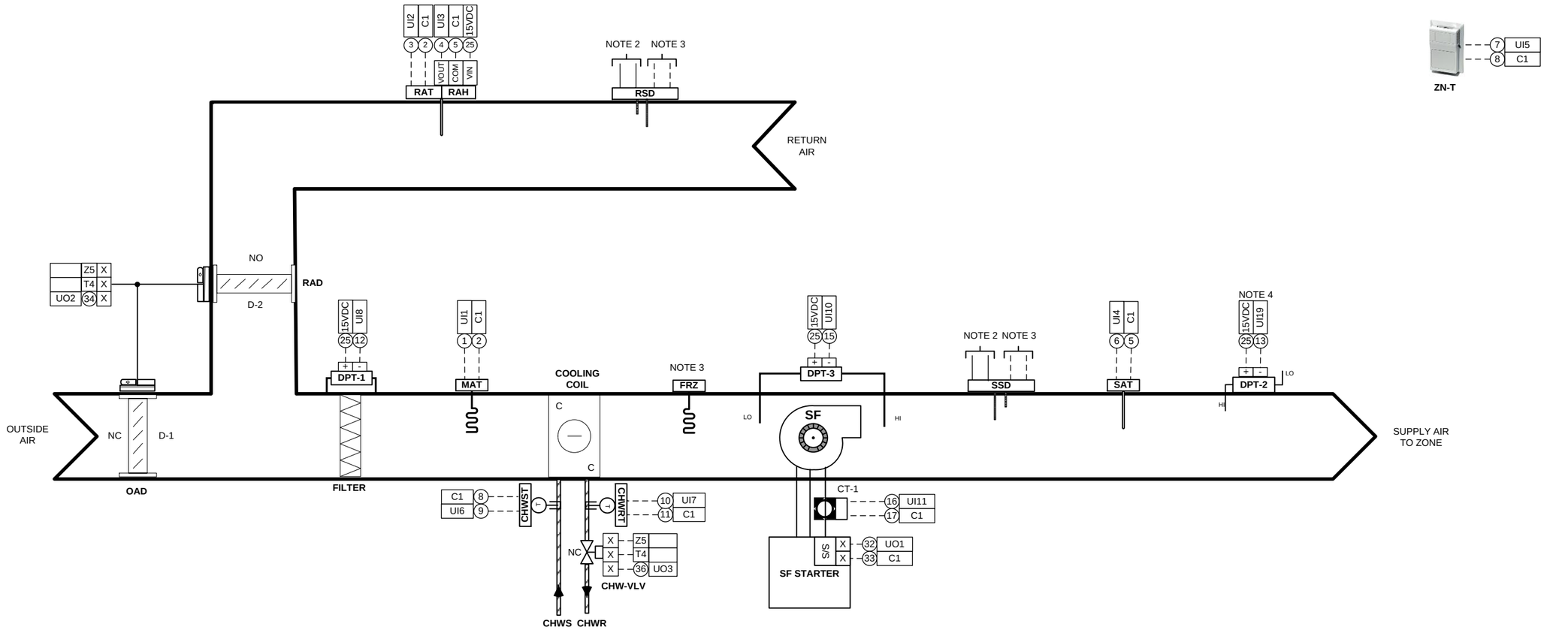
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-7 BILL OF MATERIAL

AHU-16 SCHEMATIC DIAGRAM



AHU-16 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-16	MAIN MUSEUM BASMENT	COLD FOOD PREP				M1.2

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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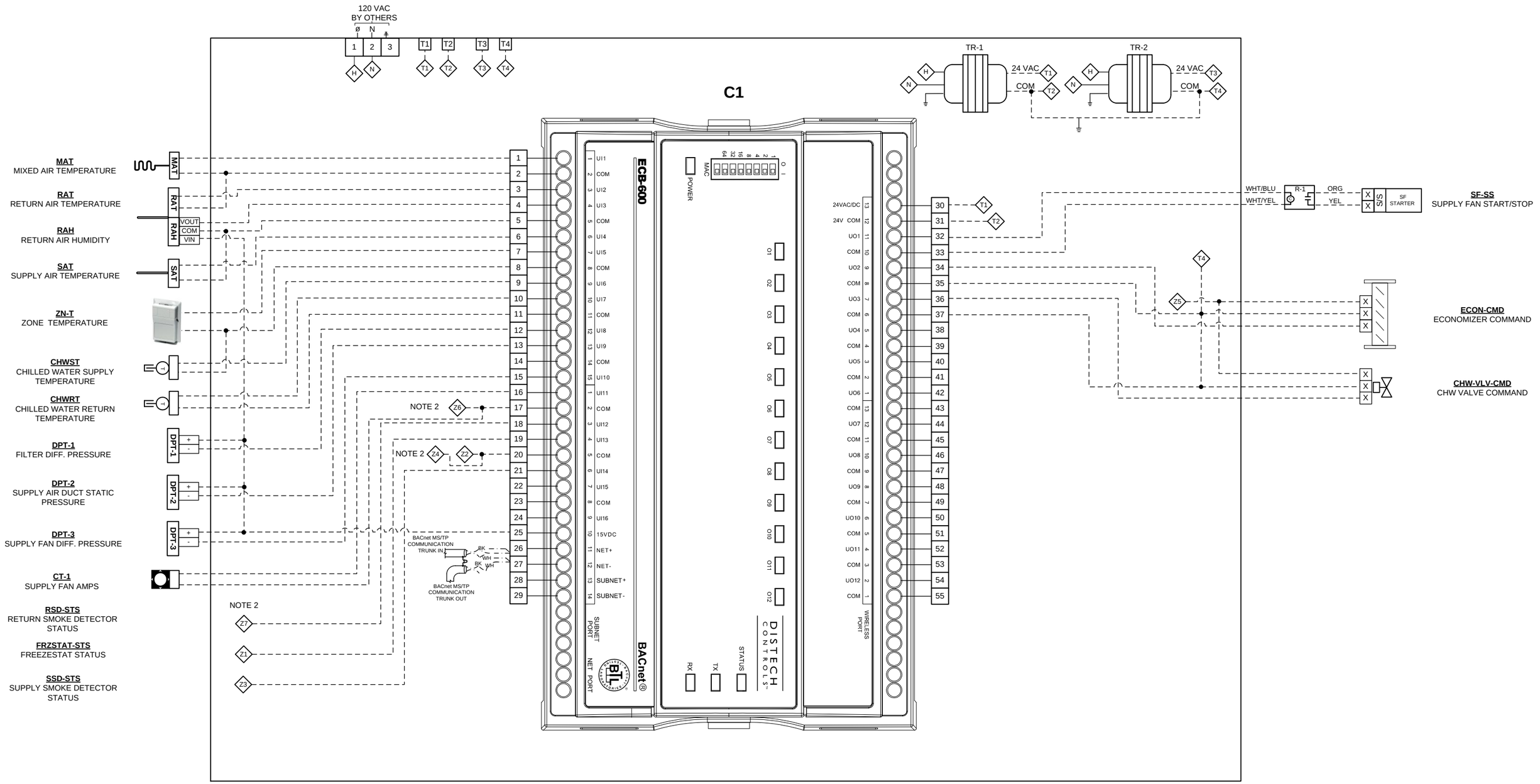
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-16 SCHEMATIC DIAGRAM

AHU-16 WIRING DIAGRAM



MAT
MIXED AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

RAH
RETURN AIR HUMIDITY

SAT
SUPPLY AIR TEMPERATURE

ZN-T
ZONE TEMPERATURE

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
SUPPLY AIR DUCT STATIC PRESSURE

DPT-3
SUPPLY FAN DIFF. PRESSURE

CT-1
SUPPLY FAN AMPS

RSD-STS
RETURN SMOKE DETECTOR STATUS

FRZSTAT-STS
FREEZESTAT STATUS

SSD-STS
SUPPLY SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-4, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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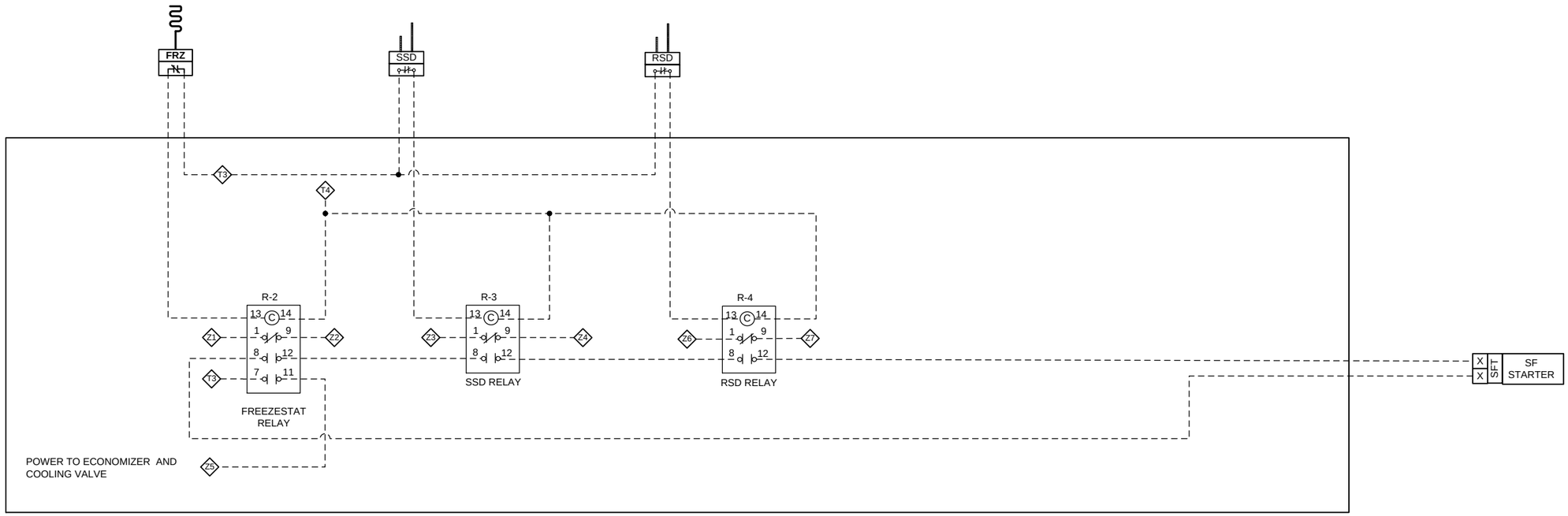
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-16 WIRING DIAGRAM

AHU-16 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BC-4, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-16 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-16 SEQUENCE OF OPERATION

AHU-16 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM.

6. WHEN SF IS ACTIVATED AND SF DIFFERENTIAL PRESSURE IS ABOVE 0.5 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

7. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

8. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

9. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

10. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

11. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

12. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT.

13. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT.

14. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT.

15. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

16. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:

COOLING OCCUPIED SETPOINT = 72°F

COOLING UNOCCUPIED SETPOINT = 78°F

17. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

18. DUCT SMOKE DETECTOR(S) THRU DDC INPUT SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

19. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

20. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL VALVE TO THE COIL.

21. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURE
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	LOW SPACE TEMPERATURE
HIGH SPACE TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-16 SEQUENCE OF OPERATION

AHU-16 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
4	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
5	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
6	Immersion Temperature sensor	CHWRT, CHWST	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
8	Panel Mounted Relay	R-2	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
9	Relay Socket	R-2	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
10	Panel Mounted Relay	R-3, 4	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-3, 4	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
12	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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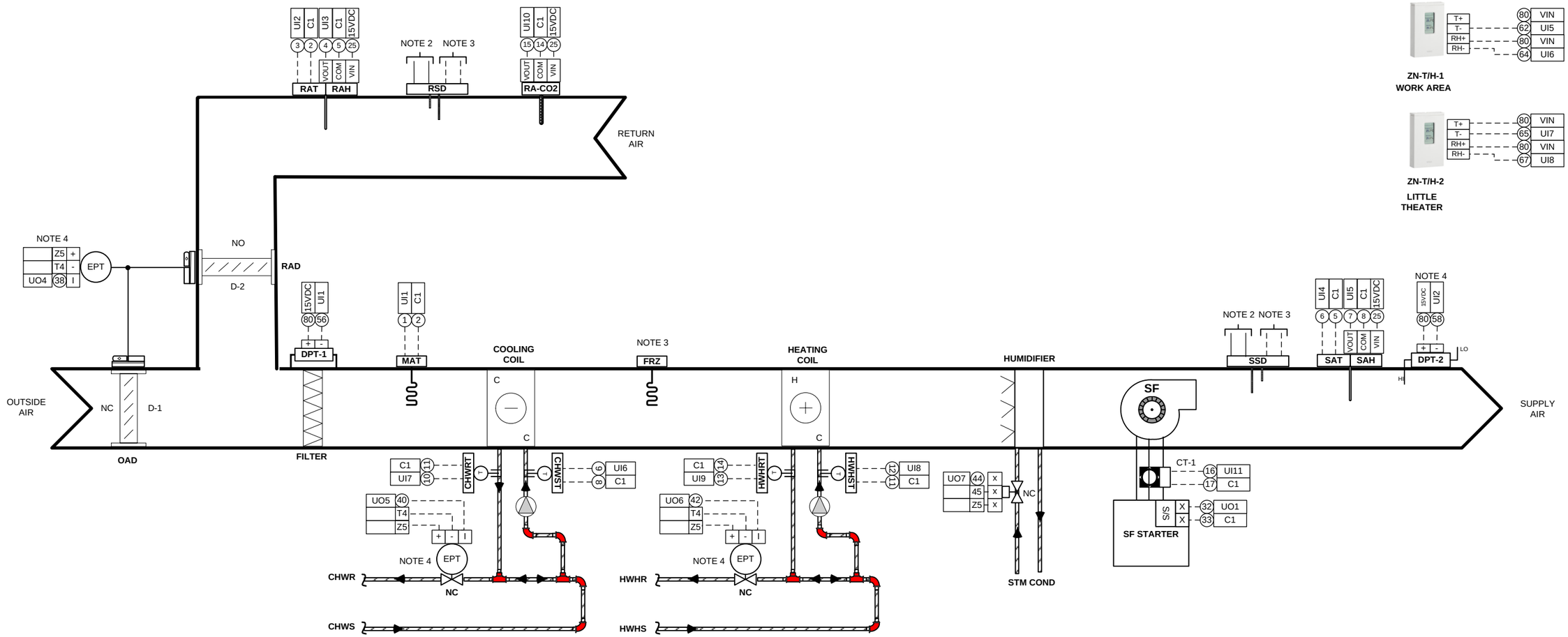
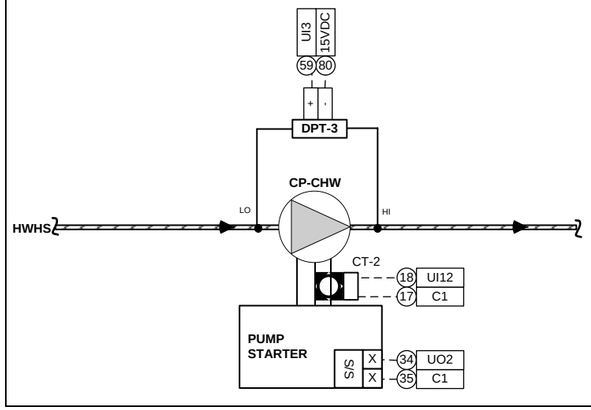
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-16 BILL OF MATERIAL

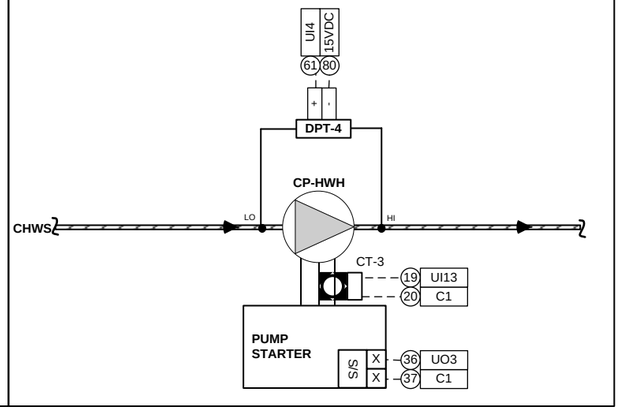
AHU-LTU SHEMATIC DIAGRAM



AIR HANDLER CHW CIRC PUMP



AIR HANDLER HWH CIRC PUMP



AHU-LTU SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-LTU	MAIN MUSEUM BASEMENT	LITTLE THEATER				M1.2

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
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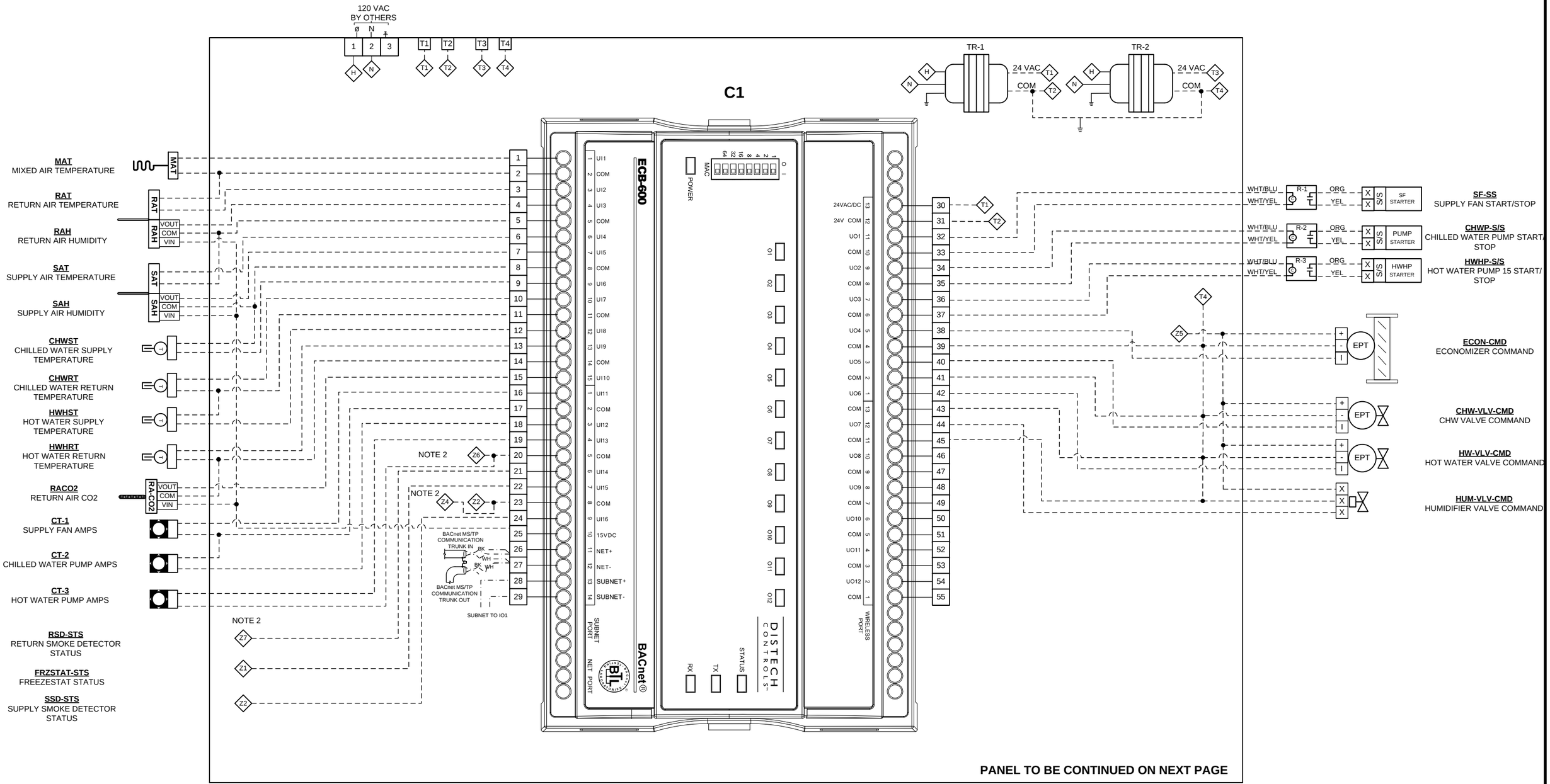
AHU-LTU SHEMATIC DIAGRAM

AHU-LTU WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-4, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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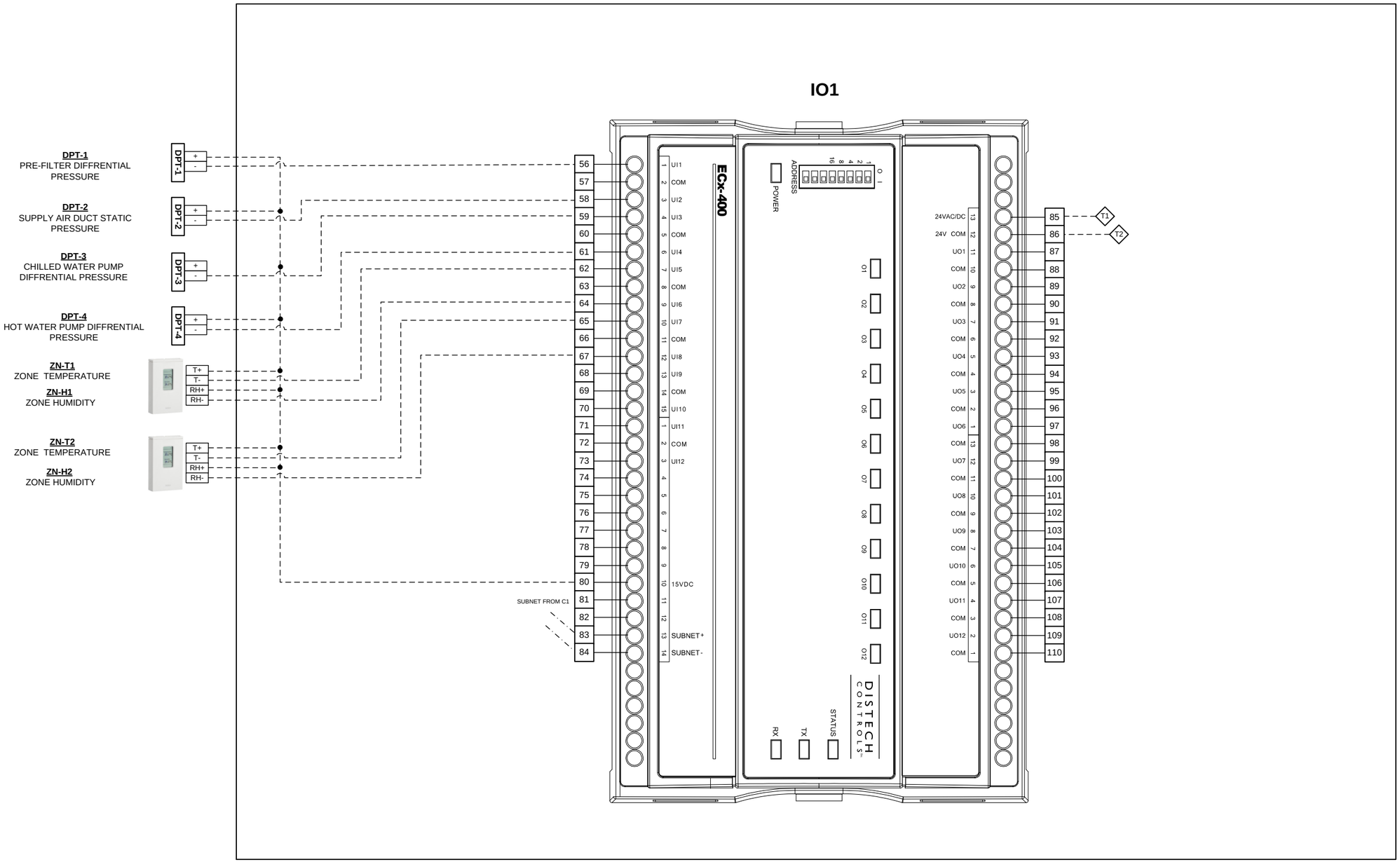
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-LTU WIRING DIAGRAM PAGE 1

AHU-LTU WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-4, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
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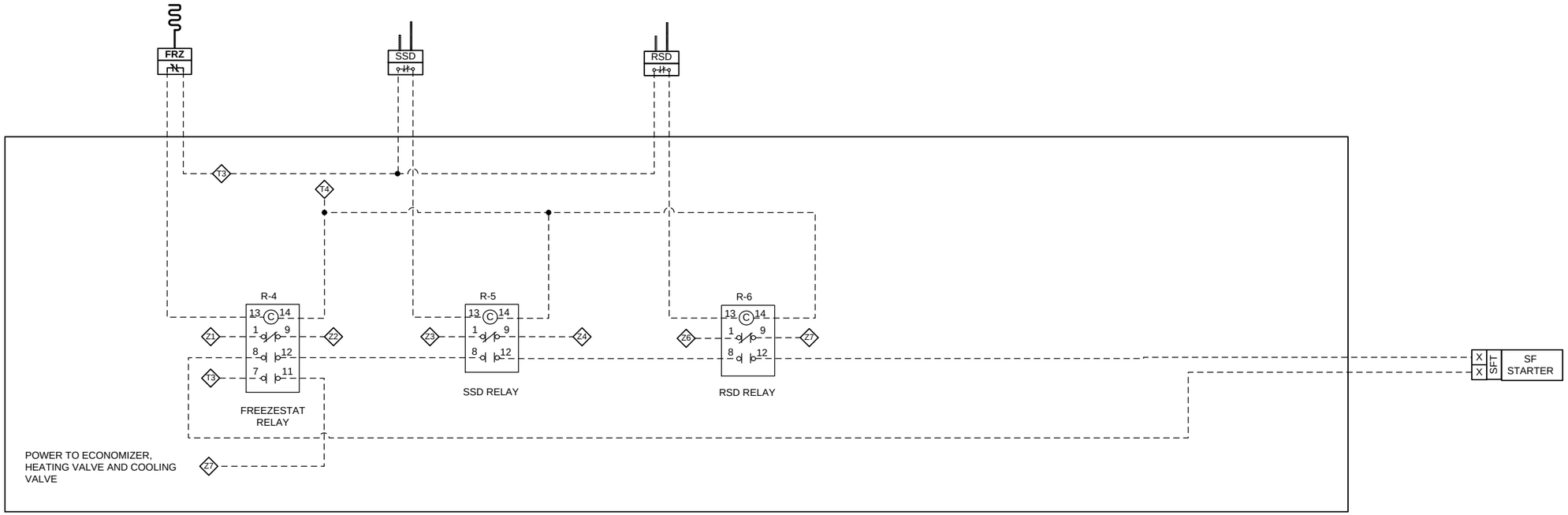
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-LTU WIRING DIAGRAM PAGE 2

AHU-LTU INTERLOCK AND SAFETY WIRING DIAGRAM



RELAY TO BE INSTALLED IN EXISTING NOVAR PANEL BC-4, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-LTU INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-LTU SEQUENCE OF OPERATION

AHU-LTU SYSTEM CONTROL:

1.ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS,DEADBANDS,CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2.CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3.SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4.SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5.OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOP TIMES, SPACE TEMPERATURE, AND OUTSIDE AIR TEMPERATURE IN ORDER TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

6.WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

7.CHW AND HWH PUMPS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. DDC SHALL ACTIVATE THE HWH PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS BELOW 55°F SETPOINT. PUMP STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

8.UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

9.WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

10.PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

11.ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE WE SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

12.OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

13.DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS.

14.WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE. DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT.HEATING COIL VALVE SHALL CLOSE TO THE COIL.

15.WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPCINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL

16.WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

17. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

18. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

19. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED. DDC SHALL AVERAGE THE READINGS FOR CONTROL DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

20. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSCR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB-COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB-COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQIRED PER 24 HOUR-PERIOD.

21. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

22. DUCT SMOKE DETECTOR(S) THRU DDC INPUT SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

23. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SEIPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURERS LOADED FILTER DATA.

24. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL AND HEATING COIL VALVES TO THE COILS.

25. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

26. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURE
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPRATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	LOW SPACE TEMPERATURE
HIGH SPACE TEMPRATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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32-72 Steinway St,
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-LTU SEQUENCE OF OPERATION

AHU-LTU BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity & Temperature Combo Sensor	RAT/H , DAT/H	A/RH2-CP-D-010	2	Temperature & Humidity Combo Sensor	ACI
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	2	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
7	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
8	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
9	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
10	Panel Mounted Relay	R-4	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-4	784-4C-SKT	1	DIN-rail mounting, for use with 784 series	Automation Direct
12	Panel Mounted Relay	R-5, 6	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
13	Relay Socket	R-5, 6	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
14	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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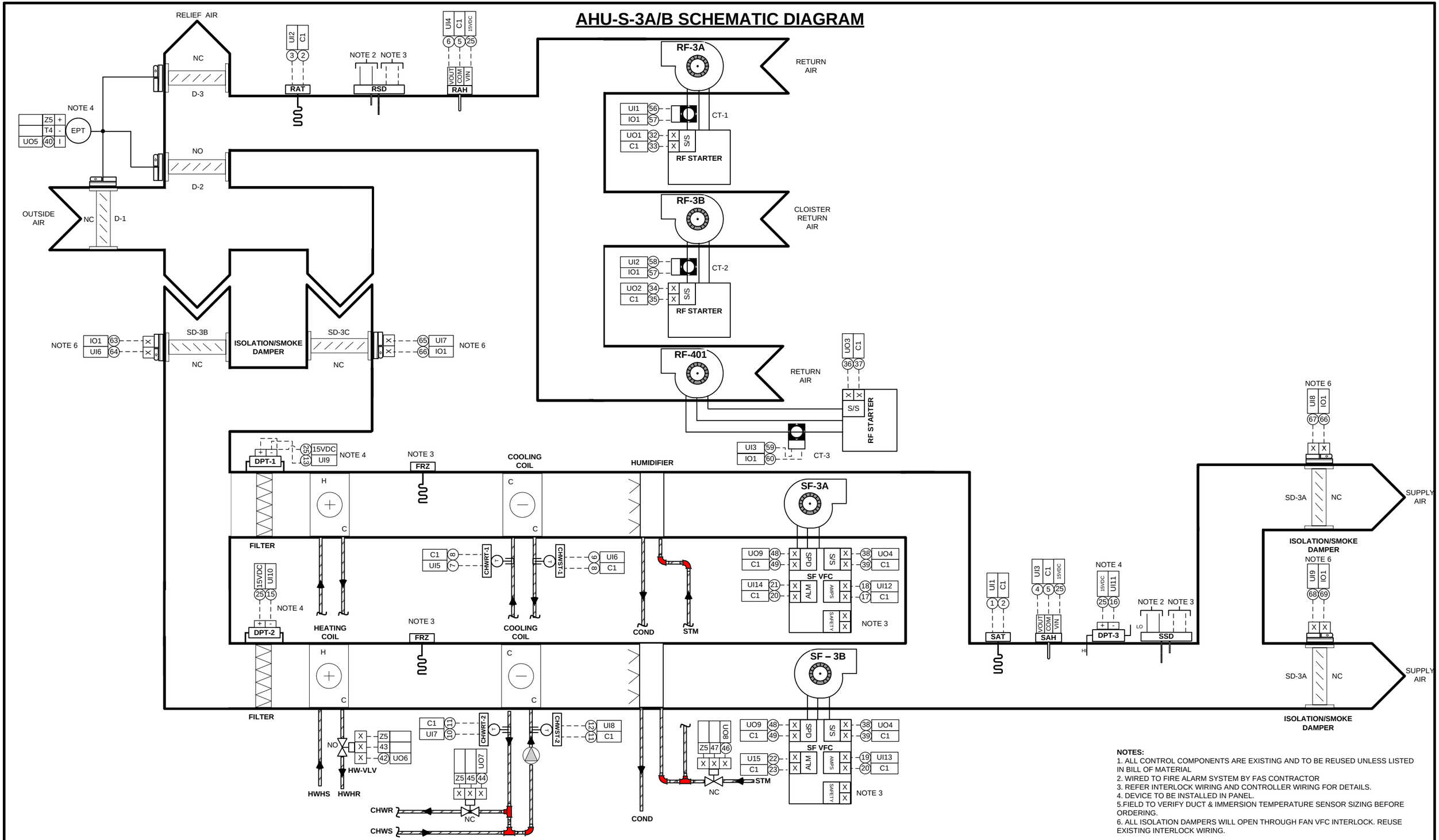
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-LTU BILL OF MATERIAL

AHU-S-3A/B SCHEMATIC DIAGRAM



NOTES:

1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC

32-72 Steinway St,
Astoria, NY 11103

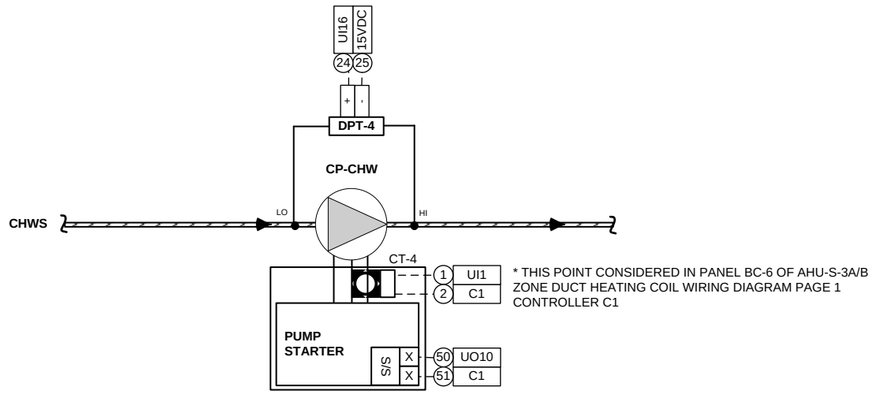
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B SCHEMATIC DIAGRAM

AHU-S-3A/B MISCELLANEOUS SYSTEM SCHEMATIC DIAGRAM

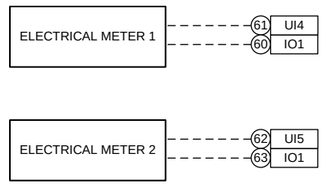
AIR HANDLER CHW CIRC PUMPS



* THIS POINT CONSIDERED IN PANEL BC-6 OF AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1 CONTROLLER C1

AHU-3A/B SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-S3 A/B	MAIN MUSEUM BASEMENT	CATERING OFFICE, CATERING PREP, PHOTOSHOP STORAGE, COLLECTORS CORNER STORAGE, VAULT, FURNITURE, PAINTING & BIN STORAGE				M1.2

ELECTRICAL METER MONIRORING



* ELECTRICAL MONITORING POINT NOT FOUND ON FLOOR PLAN SO WE HAVE CONSIDERED POINT IN IO1 OF AHU-S3A/B

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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0	MM/DD/YYYY	Submitted for Approval	ICT

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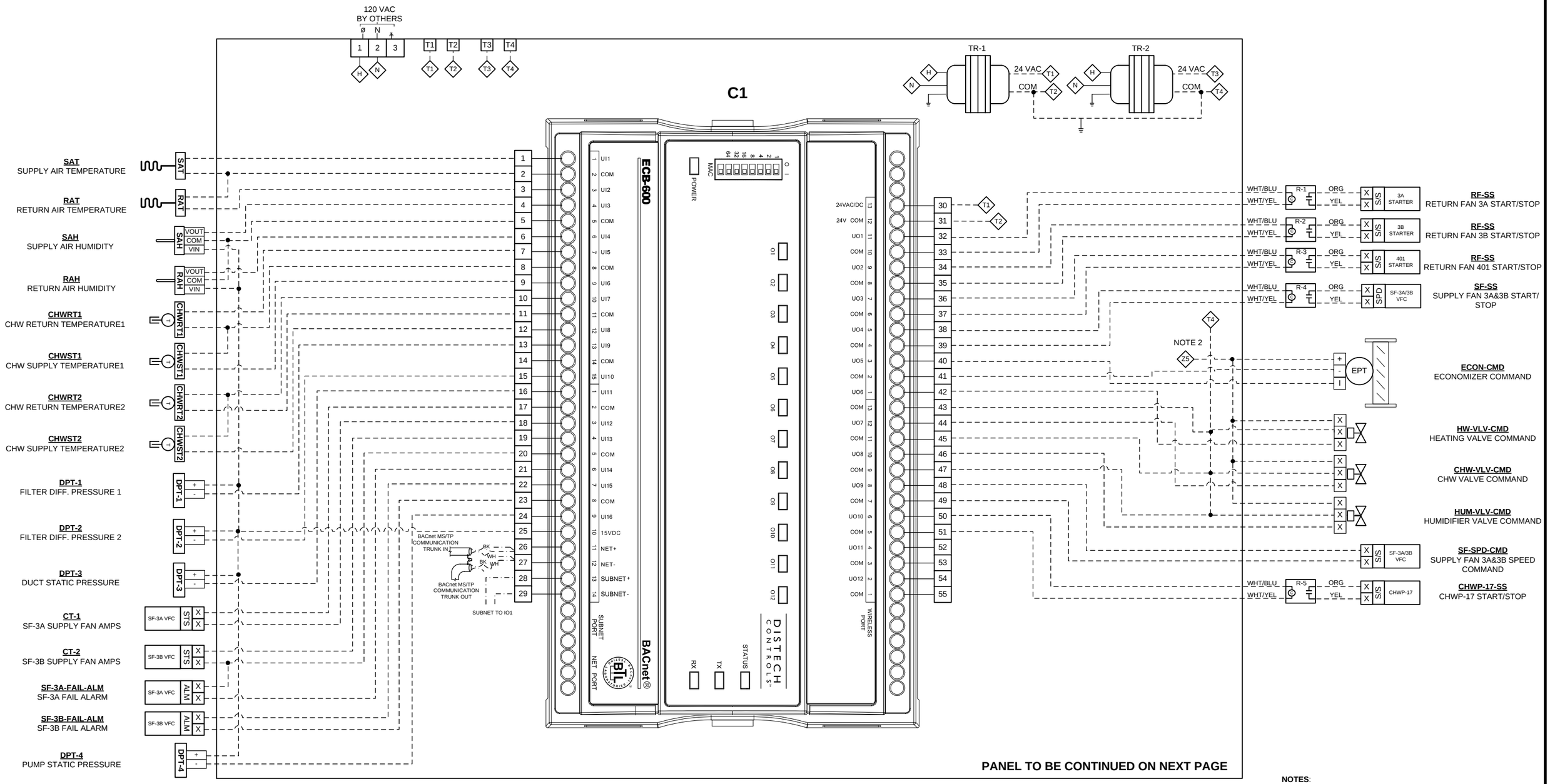
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B MISCELLANEOUS SYSTEM SCHEMATIC DIAGRAM

AHU-S-3A/B WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-6, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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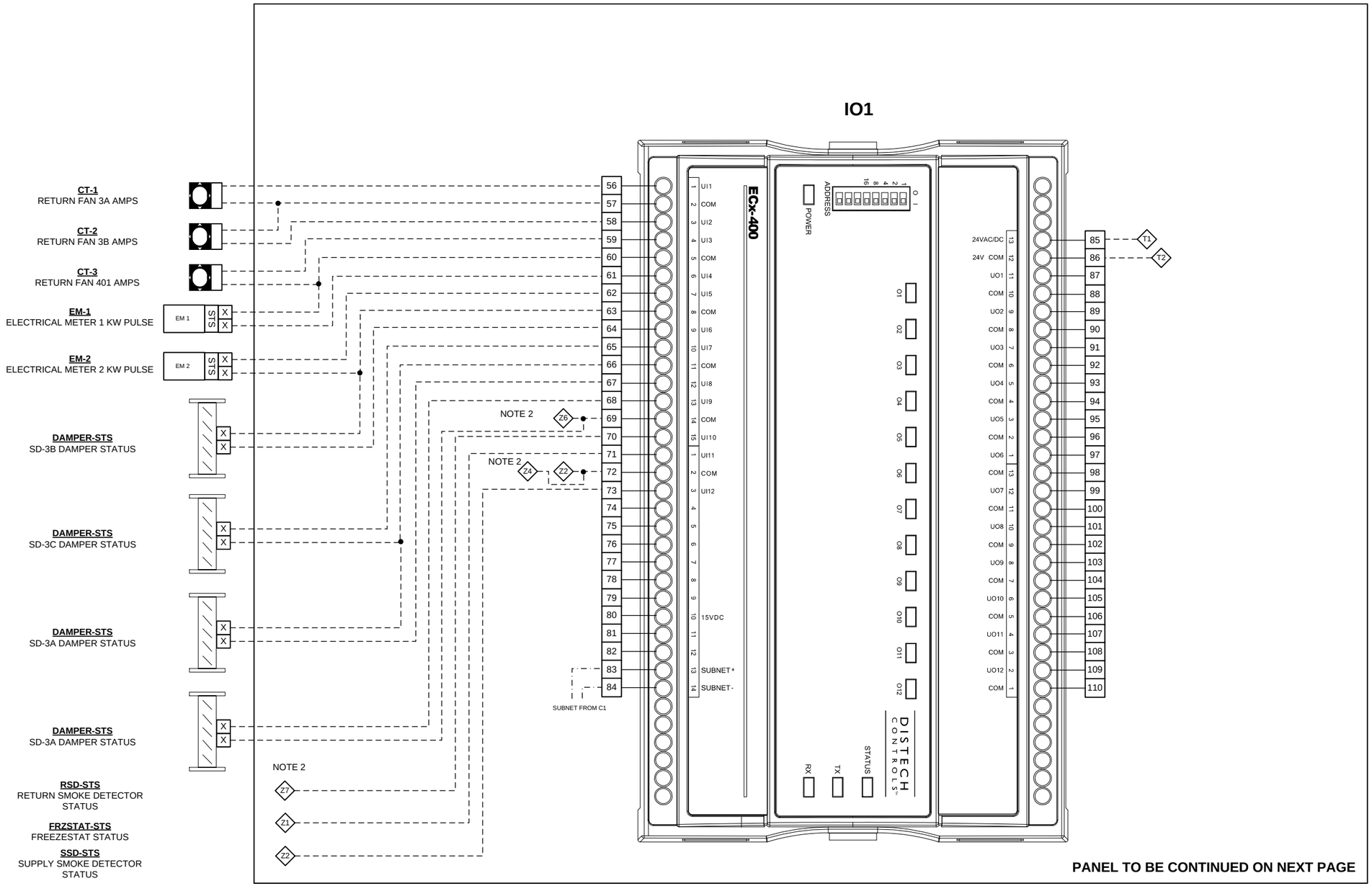
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B WIRING DIAGRAM PAGE 1

AHU-S-3A/B WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-6, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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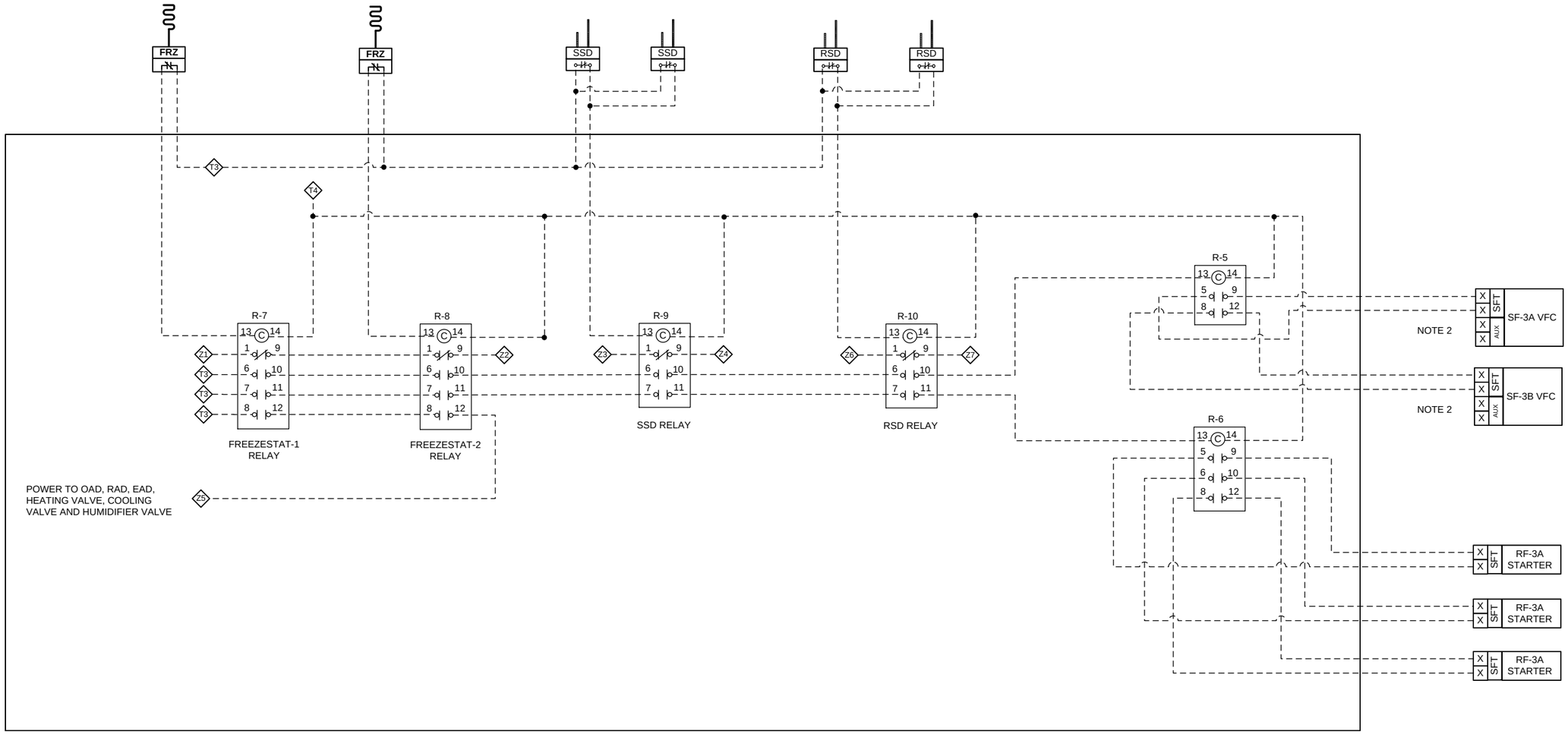
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B WIRING DIAGRAM PAGE 2

AHU-S-3A/B INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BC-6, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S-3A/B SEQUENCE OF OPERATION

AHU-S3A/B SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FANS (SF) AND ASSOCIATED RETURN FANS (RF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. TERTIARY CHWP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT AND UPON A DEMAND FOR DEHUMIDIFICATION. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

6. DDC SHALL MONITOR OPERATING STATUS OF SF—A & —B VFCS. IF ONE VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS FOR RESPECTIVE DRIVE FAILURE. IF BOTH VFCS FAIL, DDC SHALL PROVIDE AN EMERGENCY FAILURE ALARM TO BAS INDICATING BOTH DRIVES FAILED AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

7. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

8. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

9. DDC SHALL MODULATE CHILLED WATER VALVE(S) TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

10. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

11. DDC SHALL MONITOR CLOISTER (GALLERY 14) SPACE CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

12. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

13. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB-COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB-COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR-PERIOD.

14. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

15. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

16. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

17. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

18. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

19. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

20. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY/RETURN FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

ELECTRICAL METER MONITORING

DDC SHALL MONITOR ELECTRICAL KW DEMAND AND INCLUDE WITH GRAPHICS.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B SEQUENCE OF OPERATION

AHU-S-3A/B BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	SAT, RAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH, RAH	A/RH2-D	2	Duct Humidity Sensor, 2% Accuracy	ACI
5	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5"" insertion	ACI
6	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
7	Relay	R-1 To R-4	RIBU1C	4	Universal field mounted Relay	Functional Devices
8	Panel Mounted Relay	R-5	782-2C-24A	1	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
9	Relay Socket	R-5	782-2C-SKT	1	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
10	Panel Mounted Relay	R-6 To R-10	784-4C-24A	5	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
11	Relay Socket	R-6 To R-10	784-4C-SKT	5	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
12	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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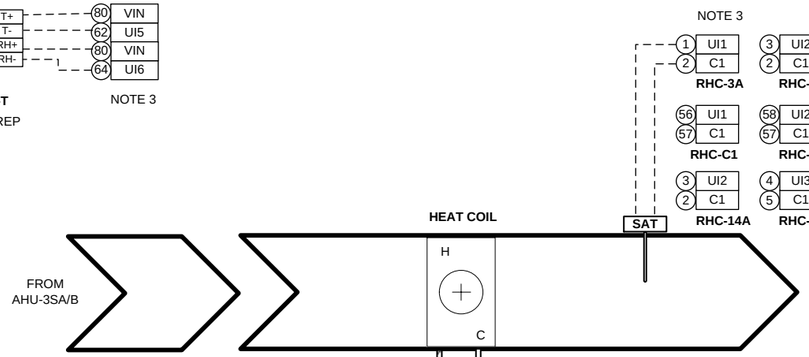
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B BILL OF MATERIAL

AHU-S-3A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 18



NOTE 3

RHC-3A (UI1, C1) · RHC-3B (UI2, C1) · RHC-3C (UI3, C1) · RHC-3D (UI4, C1) · RHC-3E (UI5, C1) · RHC-3F (UI6, C1) · RHC-3H (UI7, C1)

RHC-C1 (UI1, C1) · RHC-C2 (UI2, C1)

RHC-14A (UI2, C1) · RHC-14B (UI3, C1) · RHC-14C (UI4, C1) · RHC-14D (UI5, C1) · RHC-D1 (UI6, C1) · RHC-D2 (UI7, C1) · RHC-MS (UI8, C1) · RHC-MS2 (UI9, C1) · RHC-MS3 (UI10, C1)

HW-VLV: X, X, X

RHC-3A (UO1) · RHC-3B (UO2) · RHC-3C (UO3) · RHC-3D (UO4) · RHC-3E (UO5) · RHC-3F (UO6) · RHC-3H (UO7)

RHC-C1 (UO1) · RHC-C2 (UO2) — NOTE 3

RHC-14A (UO1) · RHC-14B (UO2) · RHC-14C (UO3) · RHC-14D (UO4) · RHC-D1 (UO5) · RHC-D2 (UO6) · RHC-MS (UO7) · RHC-MS2 (UO8) · RHC-MS3 (UO9)

RHC-3A-ZN-T — PHOTO SHOP STORAGE — VIN 25, UI8 12, VIN 25, UI9 13

RHC-3B-ZN-T — COLLECTORS CORNER STORAGE — VIN 25, UI10 15, VIN 25, UI11 16

RHC-3C-ZN-T — OBJECT STORAGE — VIN 25, UI12 18, VIN 25, UI13 19

RHC-3D-ZN-T — BIN STORAGE — VIN 25, UI14 21, VIN 25, UI15 22

RHC-3E-ZN-T — VAULT STORAGE — VIN 80, UI1 56, VIN 80, UI2 58

RHC-3F-ZN-T — FURNITURE STORAGE — VIN 80, UI3 59, VIN 80, UI4 61

RHC-3H-ZN-T — STORAGE 38 — VIN 80, UI5 62, VIN 80, UI6 64

RHC-C1-ZN-T — CATERING OFFICE — NOTE 3 — VIN 80, UI3 59, VIN 80, UI4 61

RHC-C2-ZN-T — CATERING PREP — NOTE 3 — VIN 80, UI5 62, VIN 80, UI6 64

RHC-14A/14B/14C/14D-ZN-T — MIDDLE AGES (CLOISTER) GALLERY — VIN 25, UI11 16, VIN 25, UI12 18

RHC-D1-ZN-T — ADMIN AREA DIRECTOR'S OFFICE — VIN 25, UI13 19, VIN 25, UI14 21

RHC-D2-ZN-T — ADMIN AREA CONFERENCE ROOM — VIN 25, UI15 22, VIN 25, UI16 24

RHC-MS/MS2/MS3-ZN-T — MUSEUM STORE — VIN 80, UI1 56, VIN 80, UI2 58

NOTES:
1. EPT TO BE INSTALLED IN PANEL.
2. FIELD TO VERIFY LOCATION OF RHC & ZONE SERVED.
3. ON SCHEMATIC IT IS MENTIONED RHC-C1 & RHC-C2 OF AHU-3A/B IS IN PANEL GC-1 SO WE HAVE CONSIDERED RESPECTIVE POINTS IN AHU-14 CONTROLLER & ITS IO MODULE

GROUNFD FLOOR ZONE HEATING COIL CONTROL

REHEAT COIL SCHEDULE

ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H SENSORS	MECH DWG REF
1	RHC-C1	CATERING OFFICE	1	M1.5
2	RHC-C2	CATERING PREP	1	M1.5
3	RHC-3A	PHOTO SHOP STORAGE	1	M1.5
4	RHC-3B	COLLECTORS CORNER STORAGE	1	M1.5
5	RHC-3C	OBJECT STORAGE	1	M1.5
6	RHC-3D	BIN STORAGE	1	M1.5
7	RHC-3E	VAULT STORAGE	1	M1.5
8	RHC-3F	FURNITURE STORAGE	1	M1.5
9	RHC-3H	PAINTING STORAGE 38	1	M1.5

MAIN FLOOR ZONE DUCT HEATING COIL CONTROL

REHEAT COIL SCHEDULE

ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H SENSORS	MECH DWG REF
1	RHC-14A	MIDDLE AGES (CLOISTER) GALLERY	1	M1.8
2	RHC-14B	MIDDLE AGES (CLOISTER) GALLERY		M1.8
3	RHC-14C	MIDDLE AGES (CLOISTER) GALLERY		M1.8
4	RHC-14C	MIDDLE AGES (CLOISTER) GALLERY		M1.8
5	RHC-3D1	ADMIN AREA DIRECTOR'S OFFICE	1	M1.8
6	RHC-3D2	ADMIN AREA CONFERENCE ROOM	1	M1.8
7	RHC-MS	MUSEUM STORE	1	M1.8
8	RHC-MS1	MUSEUM STORE		M1.8
9	RHC-MS2	MUSEUM STORE		M1.8

LEGEND

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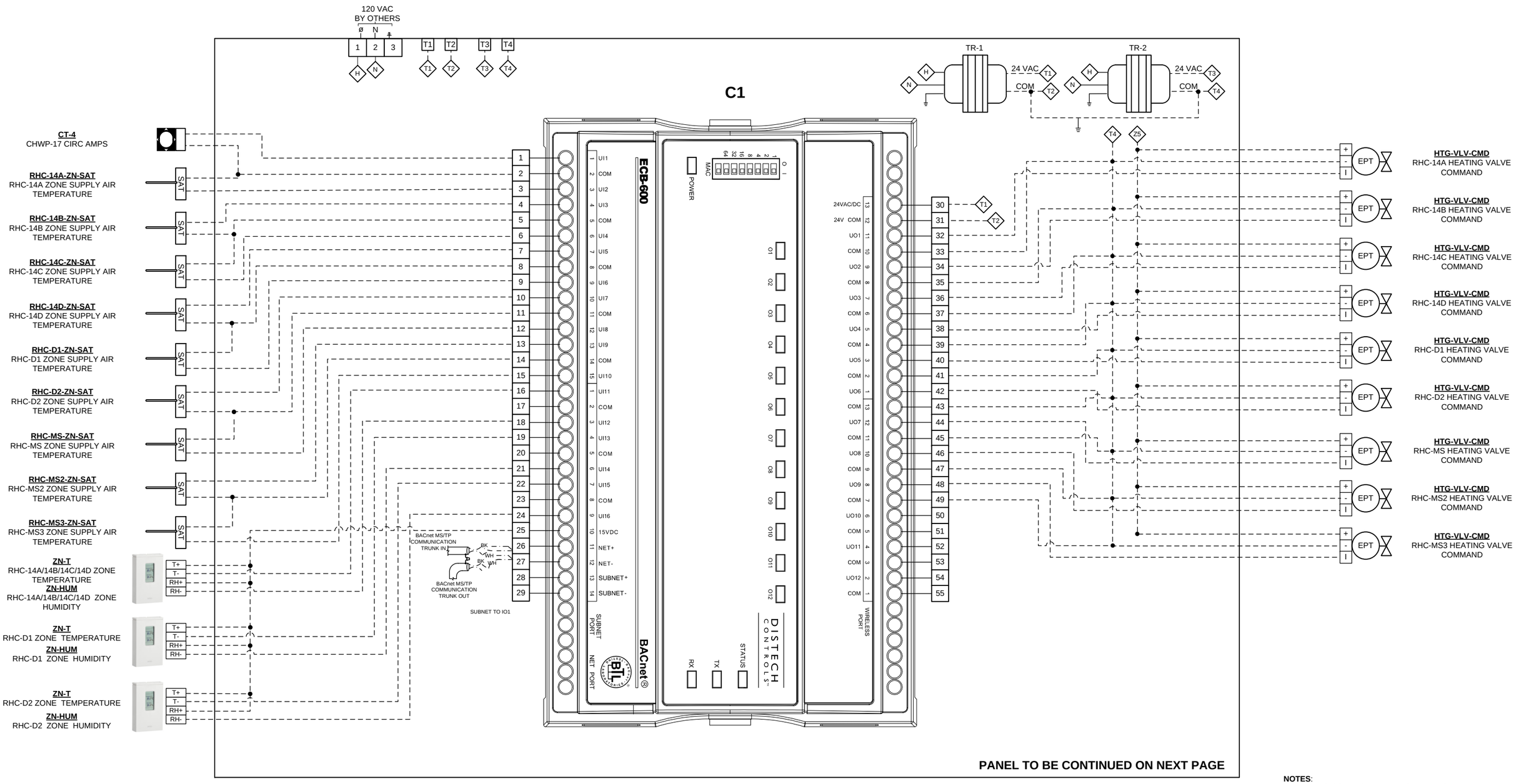
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

Job No. ##

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-1, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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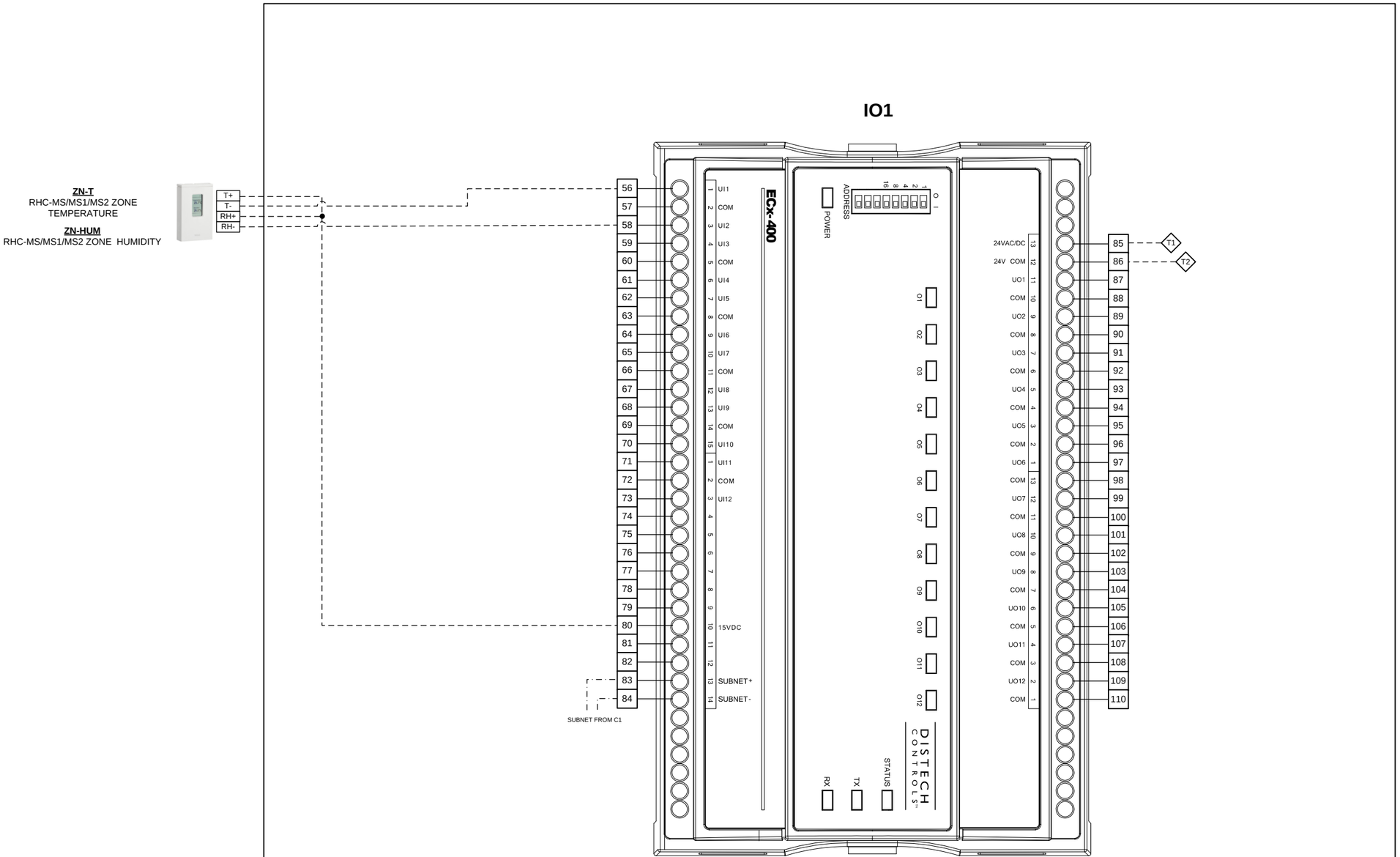
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-1, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

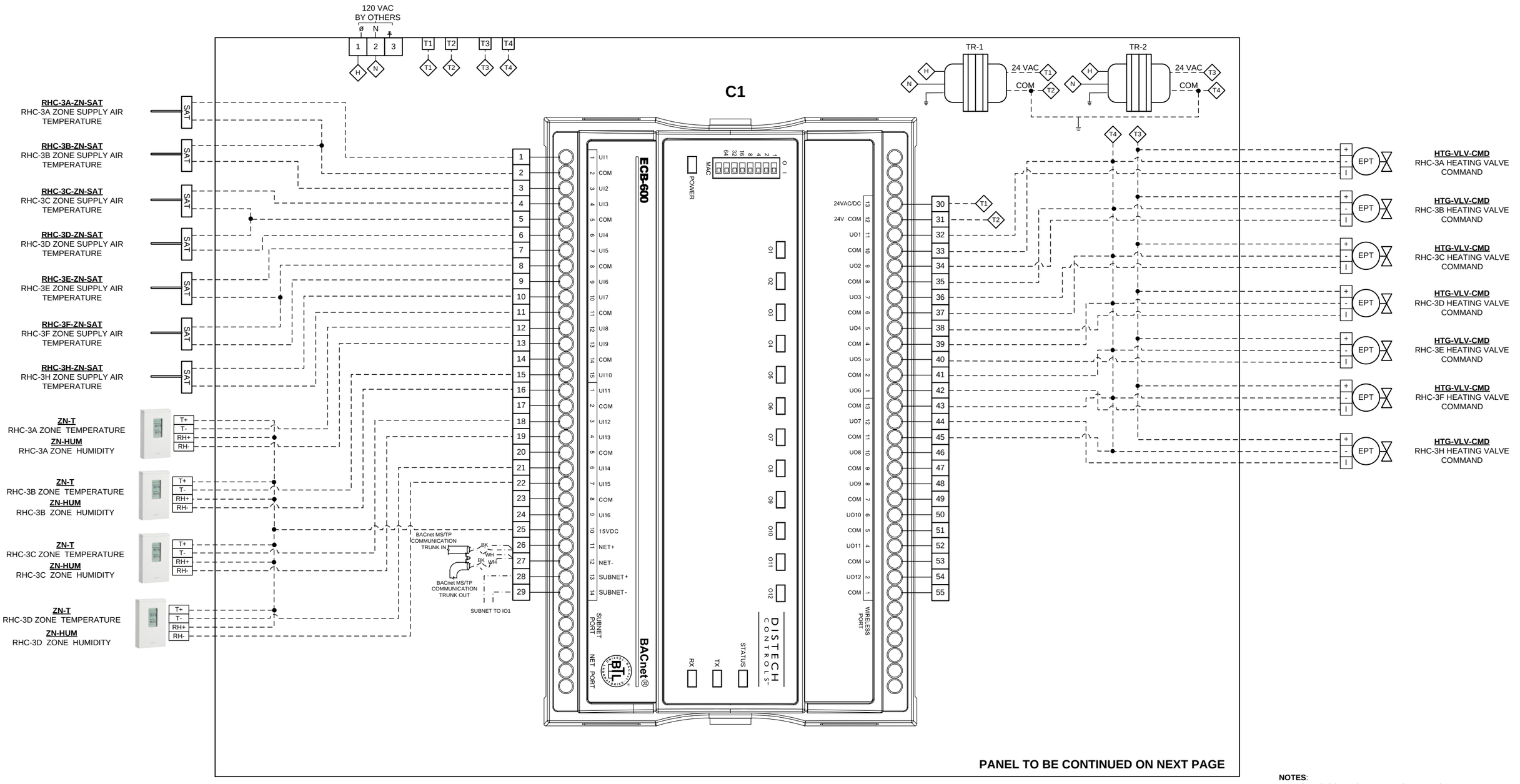
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-6, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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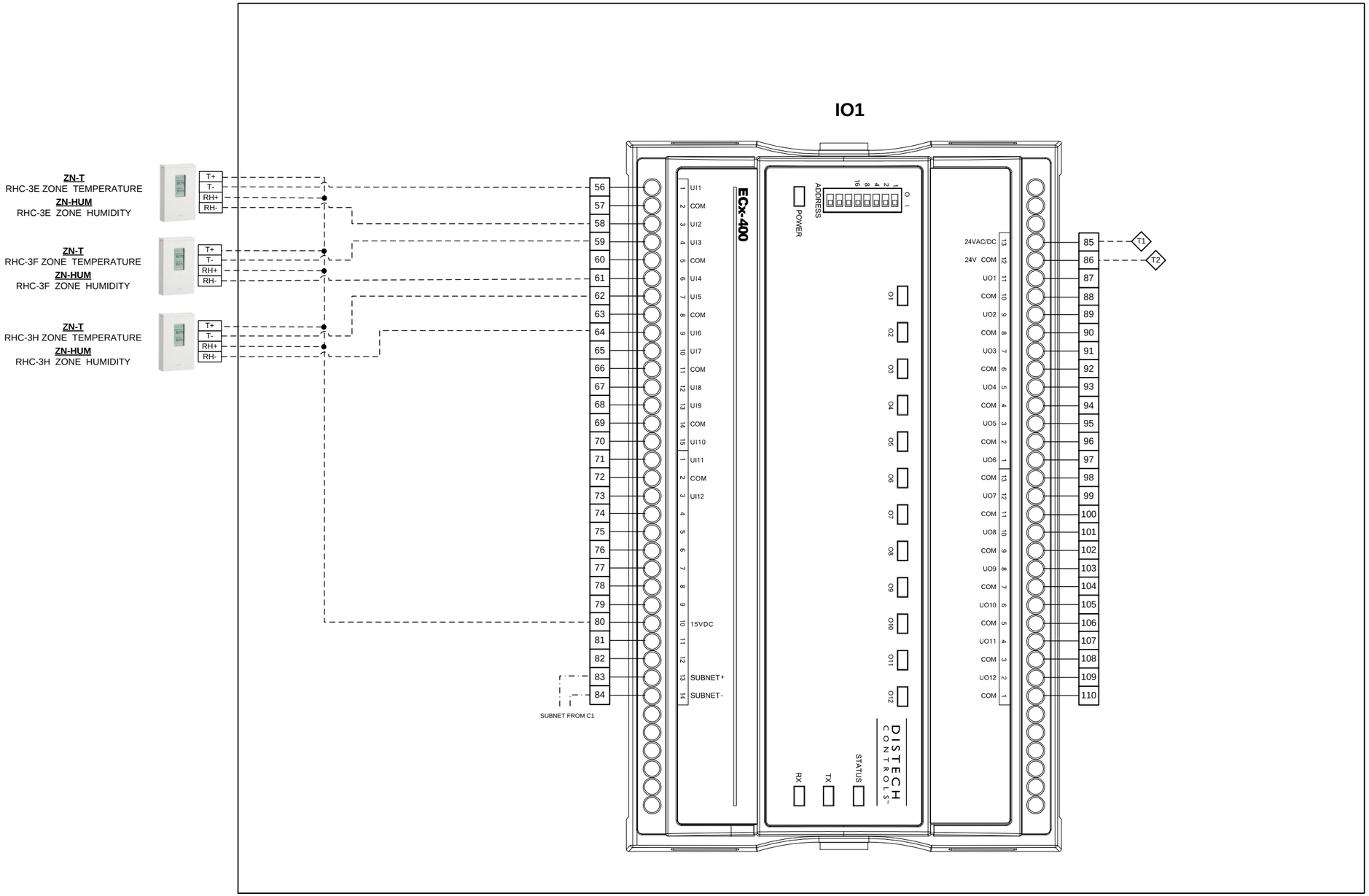
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 4



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-6, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 4

AHU-S-3A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-3A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

AHU-S-3A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	7	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
4	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	7	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
5	Electropneumatic transducer	EPT	EP313020	7	Electropneumatic transducer with manual override, 0-20 psig	Kele
6	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Temperature Sensor	SAT	A/CP-D-12"-GD	9	Thermistor, 10K Type II, Duct Temperature sensor, 12", Galv. Box	ACI
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	4	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Electropneumatic transducer	EPT	EP313020	9	Electropneumatic transducer with manual override, 0-20 psig	Kele
7	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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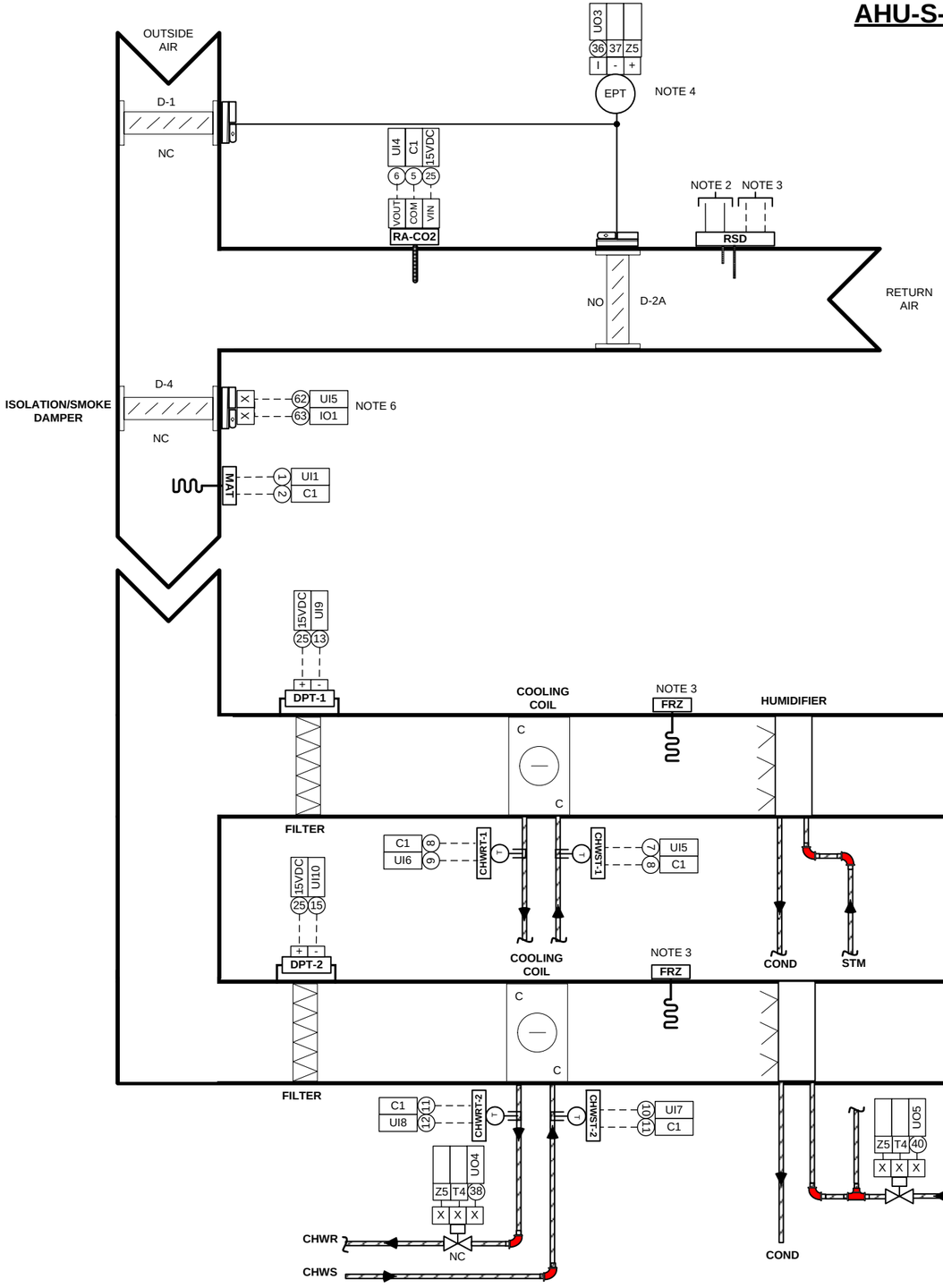
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

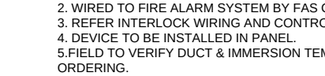
AHU-S-3A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

AHU-S-8A/B SCHEMATIC DIAGRAM



AHU-8 A/B SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-8 A/B	MAIN MUSEUM BASMENT	ELECTRONIC MEDIA EAST, WEST, GALLERY 23, 23A, 22, 24, 26, 27, 28B & 28C				M1.3

MUSEUM – WEST BSMT TC AIR COMPRESSOR MONITORING



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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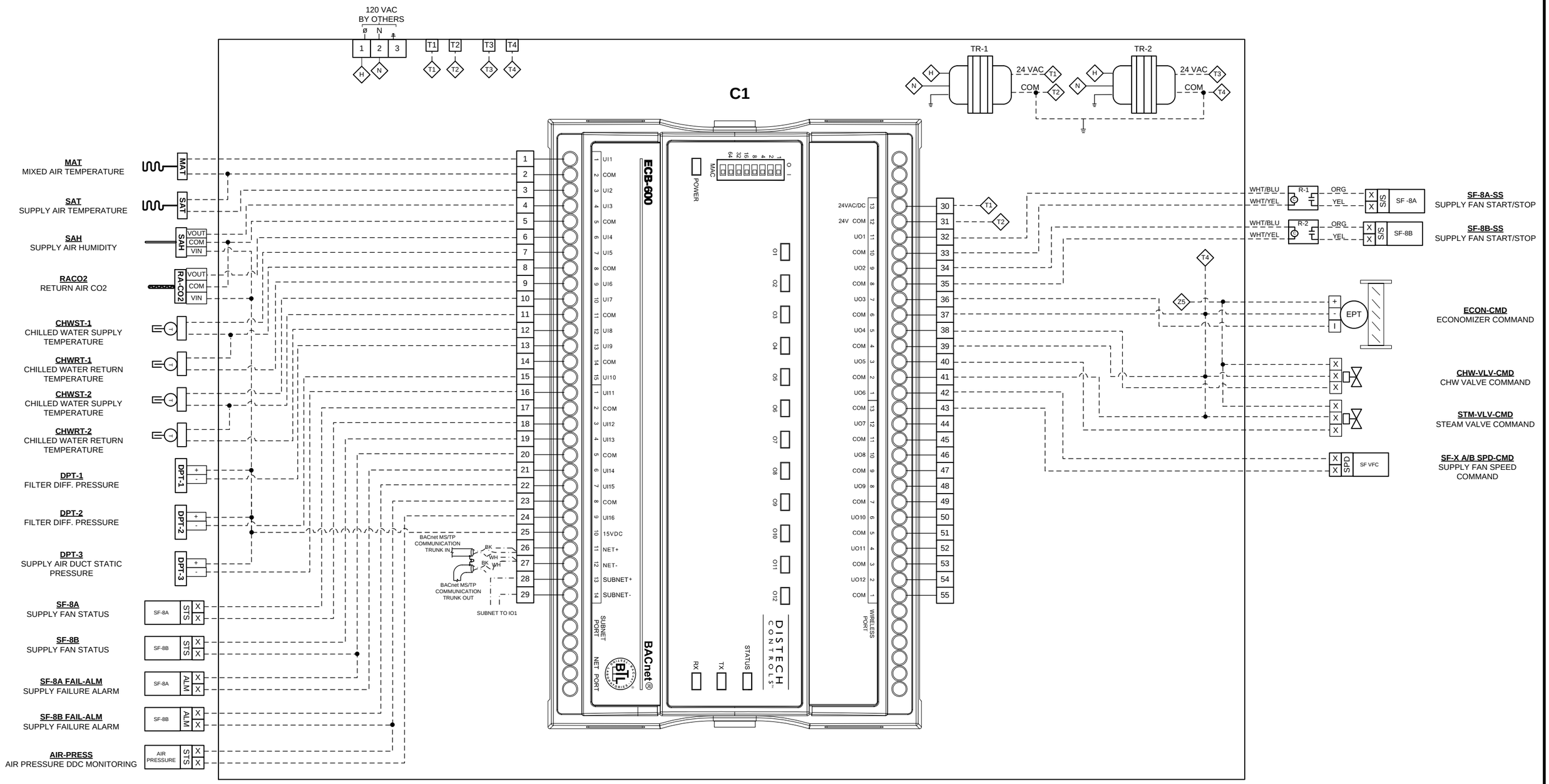
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B SCHEMATIC DIAGRAM

AHU-S-8A/B WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RACO2
RETURN AIR CO2

CHWST-1
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-1
CHILLED WATER RETURN TEMPERATURE

CHWST-2
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-2
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
FILTER DIFF. PRESSURE

DPT-3
SUPPLY AIR DUCT STATIC PRESSURE

SF-8A
SUPPLY FAN STATUS

SF-8B
SUPPLY FAN STATUS

SF-8A FAIL-ALM
SUPPLY FAILURE ALARM

SF-8B FAIL-ALM
SUPPLY FAILURE ALARM

AIR-PRESS
AIR PRESSURE DDC MONITORING

SF-8A-SS
SUPPLY FAN START/STOP

SF-8B-SS
SUPPLY FAN START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

SF-X A/B SPD-CMD
SUPPLY FAN SPEED COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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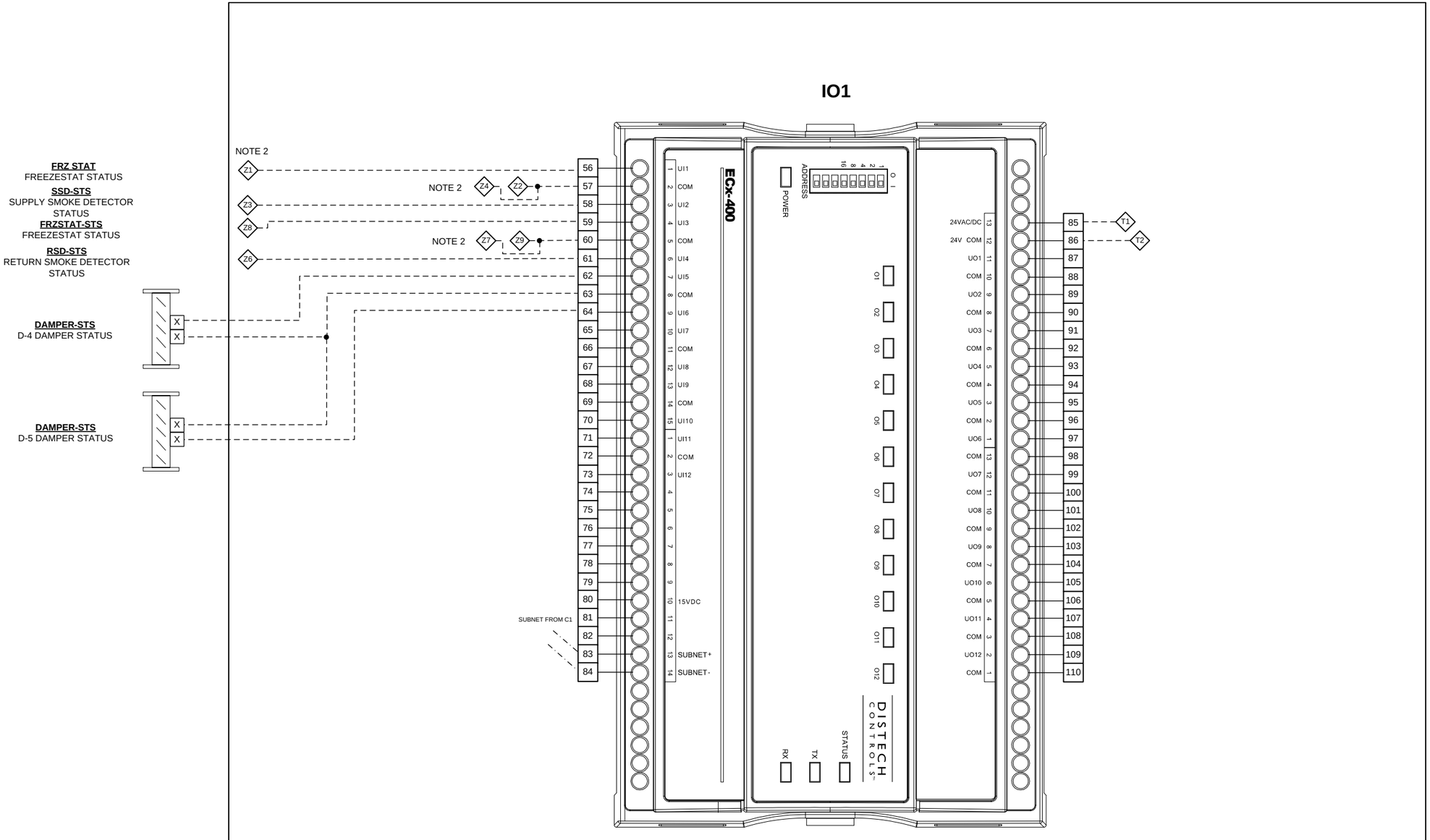
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B WIRING DIAGRAM PAGE 1

AHU-S-8A/B WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

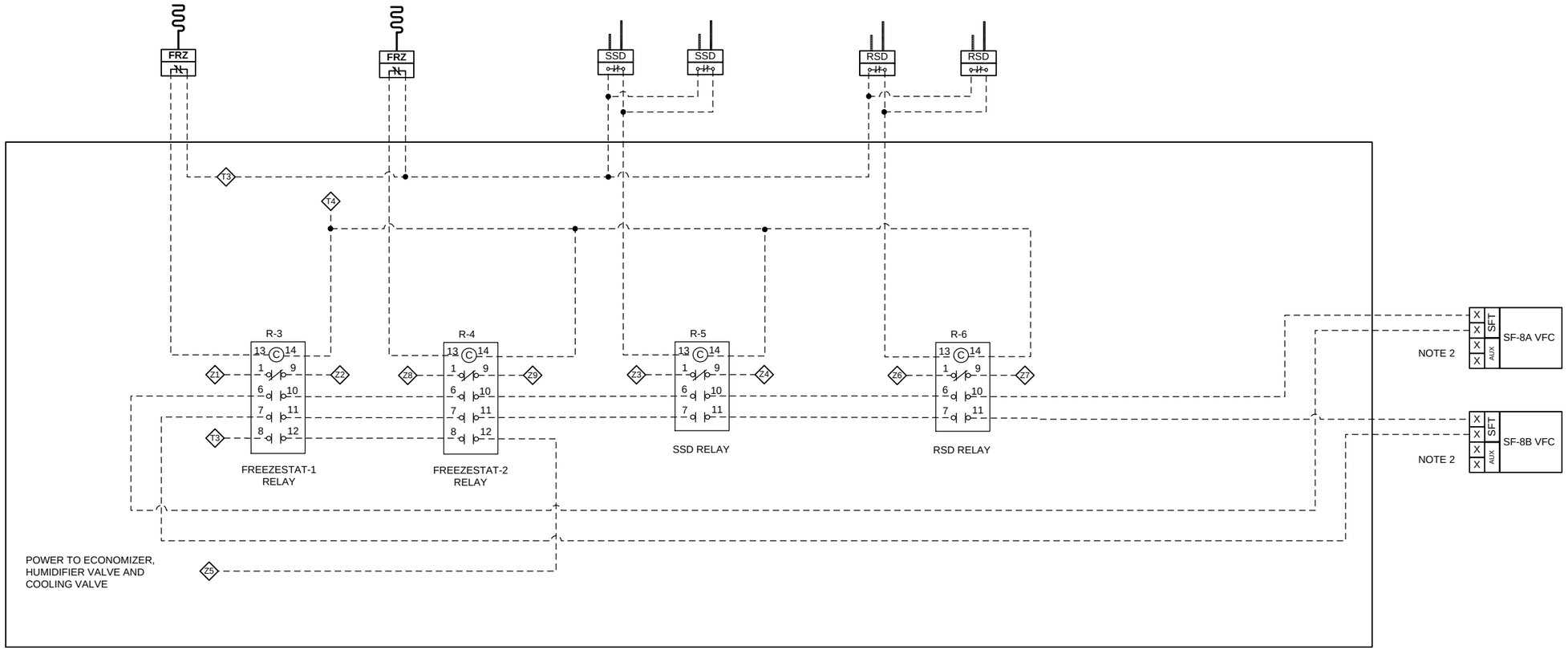
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B WIRING DIAGRAM PAGE 2

AHU-S-8A/B INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S-8 A/B SEQUENCE OF OPERATION

AHU-S-8 A/B SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3.SUPPLY FANS (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. DDC SHALL MONITOR OPERATING STATUS OF SF—A & —B VFCS. IF ONE VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS FOR RESPECTIVE DRIVE FAILURE. IF BOTH VFCS FAIL, DDC SHALL PROVIDE AN EMERGENCY FAILURE ALARM TO BAS INDICATING BOTH DRIVES FAILED AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE—CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START—UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

7. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

8 DDC SHALL MODULATE CHILLED WATER VALVE(S) TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

9. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS. DDC SHALL MONITOR RA CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

11. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

12. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB-COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB-COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR-PERIOD.

13. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

14. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

15. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

16. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

17. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

18. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

19. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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Astoria, NY 11103
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AHU-S-8 A/B BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, SAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH	A/RH2-D	1	Duct Humidity Sensor, 2% Accuracy	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5"" insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3 To R-6	784-4C-24A	4	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-3 To R-6	784-4C-SKT	4	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
11	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

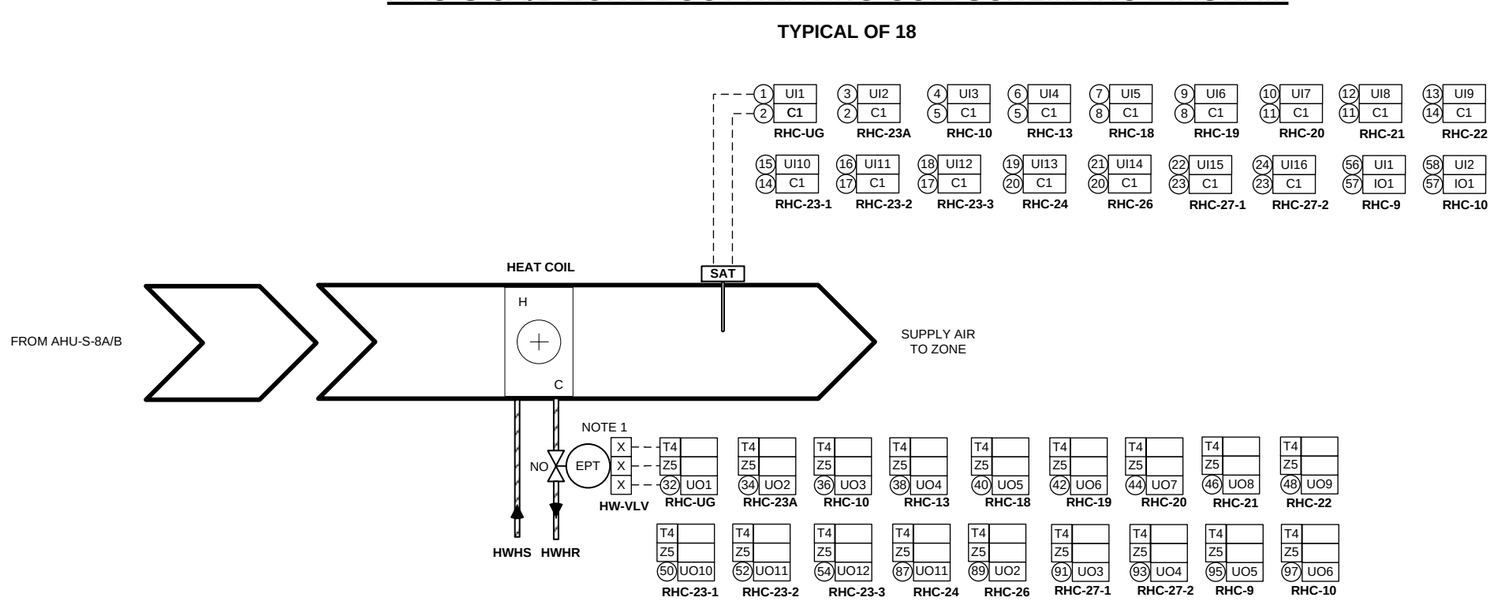
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

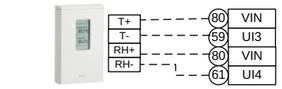
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8 A/B BILL OF MATERIAL

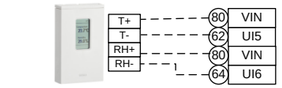
AHU-S-8A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM



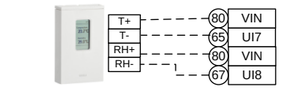
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H SENSORS	MECH DWG REF
1	RHC-UG	ELECTRONIC MEDIA EAST	1	M1.3
2	RHC-23A	GALLERY 23A	1	M1.3
3	RHC-10	GALLERY 23A		M1.3
4	RHC-13	GALLERY 23A	1	M1.3
5	RHC-18	GALLERY 23A		M1.3
6	RHC-19	ELECTRONIC MEDIA WEST	1	M1.3
7	RHC-20	ELECTRONIC MEDIA WEST		M1.3
8	RHC-21	ELECTRONIC MEDIA WEST		M1.3
9	RHC-22	EUROPE 1800 GALLERY 22	1	M1.3
10	RHC-23-1	EUROPE 1800 GALLERY 23	2	M1.3
11	RHC-23-2	EUROPE 1800 GALLERY 23		M1.3
12	RHC-23-3	EUROPE 1800 GALLERY 23		M1.3
13	RHC-24	EUROPE 1800 GALLERY 24	1	M1.3
14	RHC-26	ROTUNDA GALLERY 26	1	M1.3
15	RHC-27-1	EUROPE 1800 GALLERY 27	1	M1.3
16	RHC-27-2	EUROPE 1800 GALLERY 27		M1.3
17	RHC-9	LEVIS GALLERYES 28B & 28C	1	M1.3
18	RHC-10	LEVIS GALLERYES 28B & 28C		M1.3



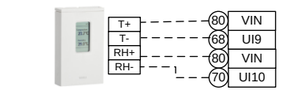
RHC-UG-ZN-T/H
ELECTRONIC MEDIA EAST



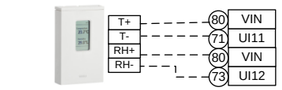
RHC-23A & 10-ZN-T/H
GALLERY 23A



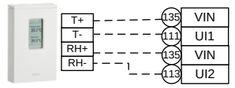
RHC-13 & 18-ZN-T/H
GALLERY 23A



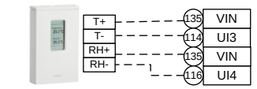
RHC-19, 20 & 21-ZN-T/H
ELECTRONIC MEDIA WEST



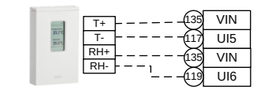
RHC-22-ZN-T/H
EUROPE 1800
GALLERY 22



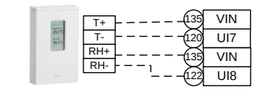
RHC-23-1/2/3-ZN-T/H
EUROPE 1800
GALLERY 23



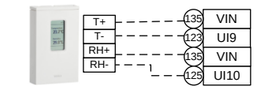
RHC-23-1/2/3-ZN-T/H
EUROPE 1800
GALLERY 23



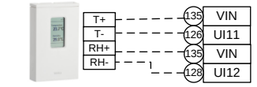
RHC-24-ZN-T/H
EUROPE 1800
GALLERY 24



RHC-26-ZN-T/H
ROTUNDA GALLERY
26



RHC-27-1/2-ZN-T/H
EUROPE 1800
GALLERY 27



RHC-9 & 10-ZN-T/H
GALLERY 28B & 28C

NOTES:
1. EPT TO BE INSTALLED IN PANEL.
2. FIELD TO VERIFY LOCATION OF RHC & ZONE SERVED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
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Astoria, NY 11103
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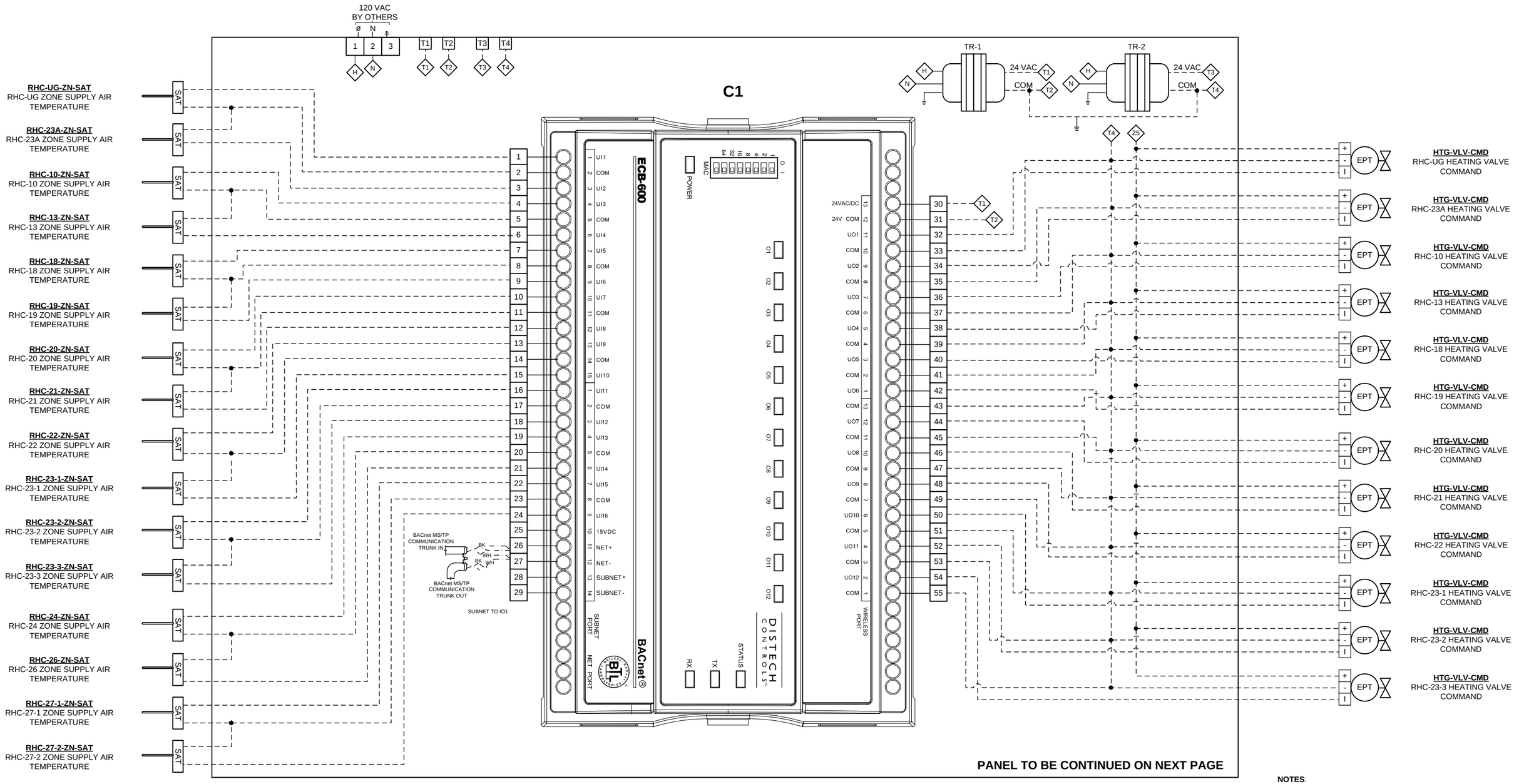
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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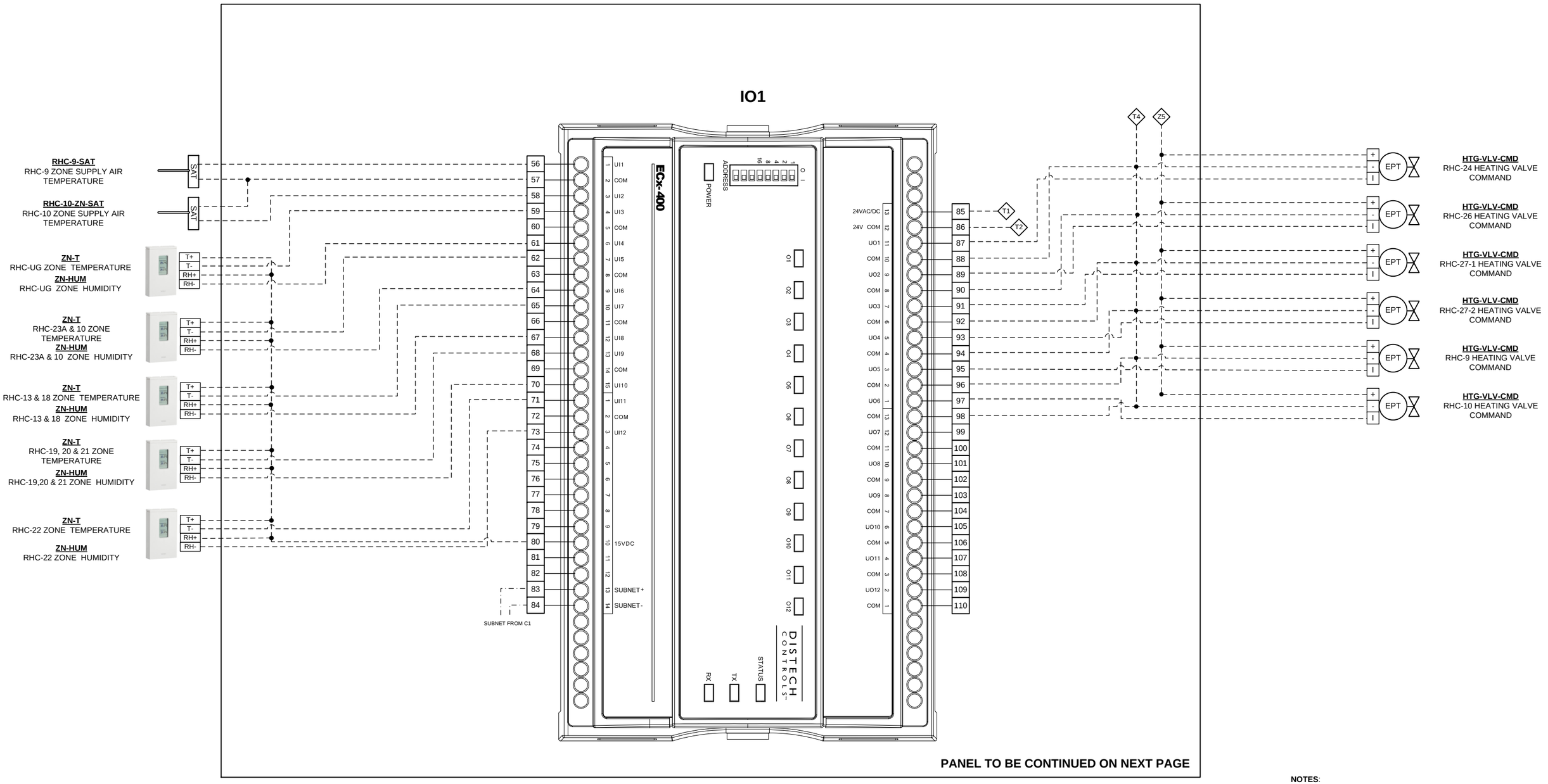
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
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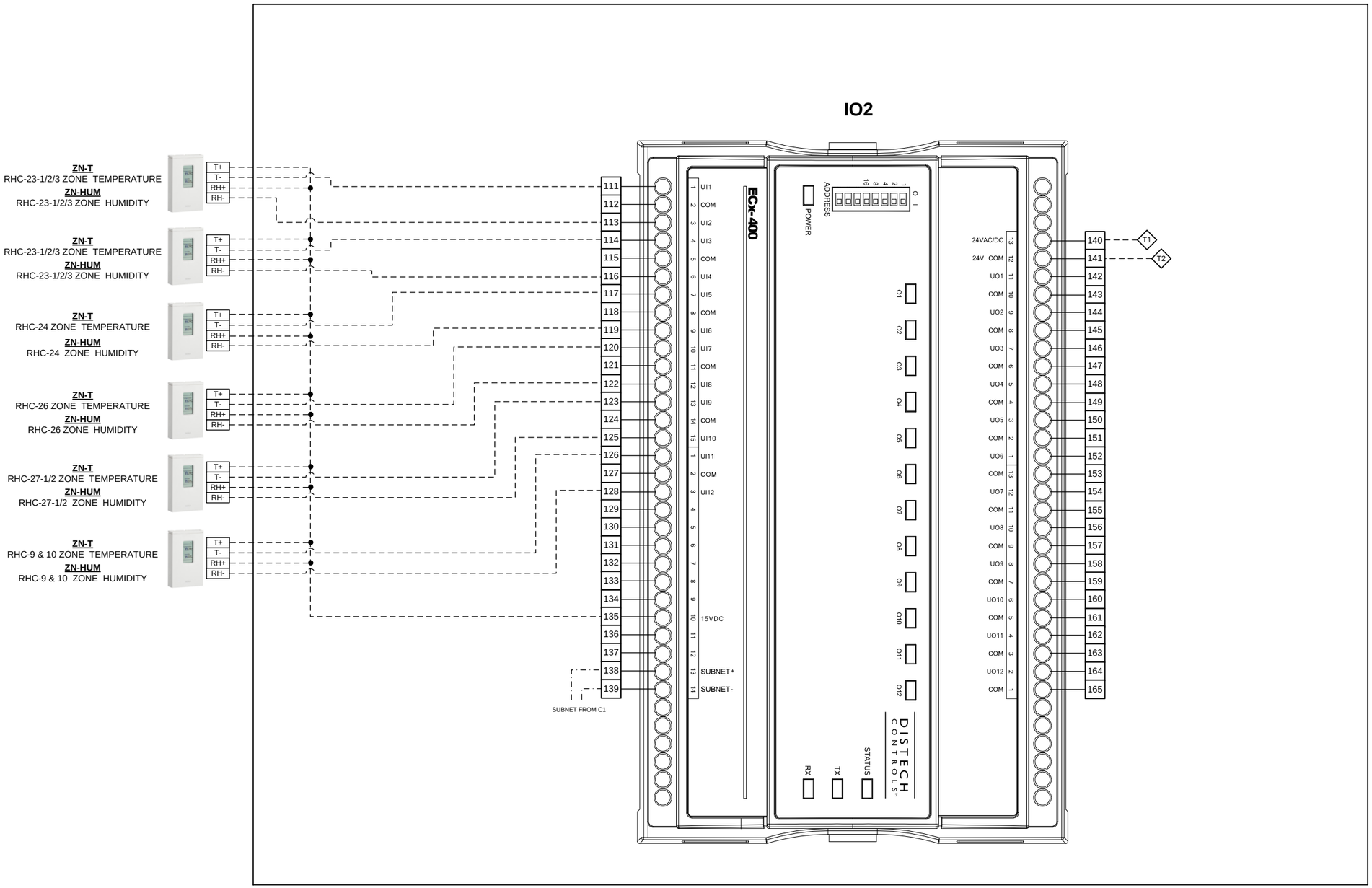
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-3, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

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- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3

AHU-S-8A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

AHU-S-8A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1, IO2	CDIX-400X-00	2	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	18	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
4	Electropneumatic transducer	EPT	EP313020	18	Electropneumatic transducer with manual override, 0-20 psig	Kele
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	11	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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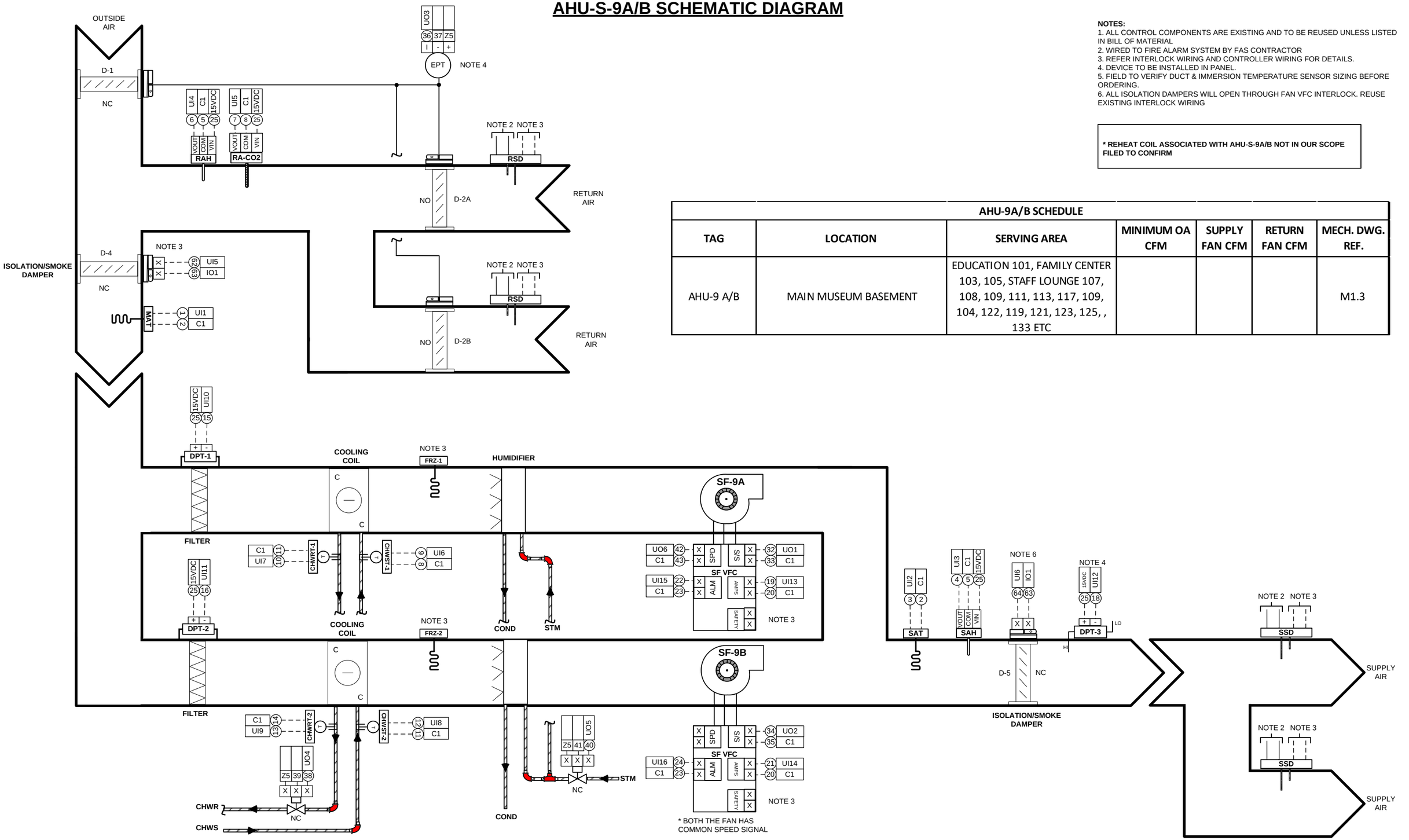
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-8A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

AHU-S-9A/B SCHEMATIC DIAGRAM



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING

*** REHEAT COIL ASSOCIATED WITH AHU-S-9A/B NOT IN OUR SCOPE FILED TO CONFIRM**

AHU-9A/B SCHEDULE

TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-9 A/B	MAIN MUSEUM BASEMENT	EDUCATION 101, FAMILY CENTER 103, 105, STAFF LOUNGE 107, 108, 109, 111, 113, 117, 109, 104, 122, 119, 121, 123, 125, , 133 ETC				M1.3

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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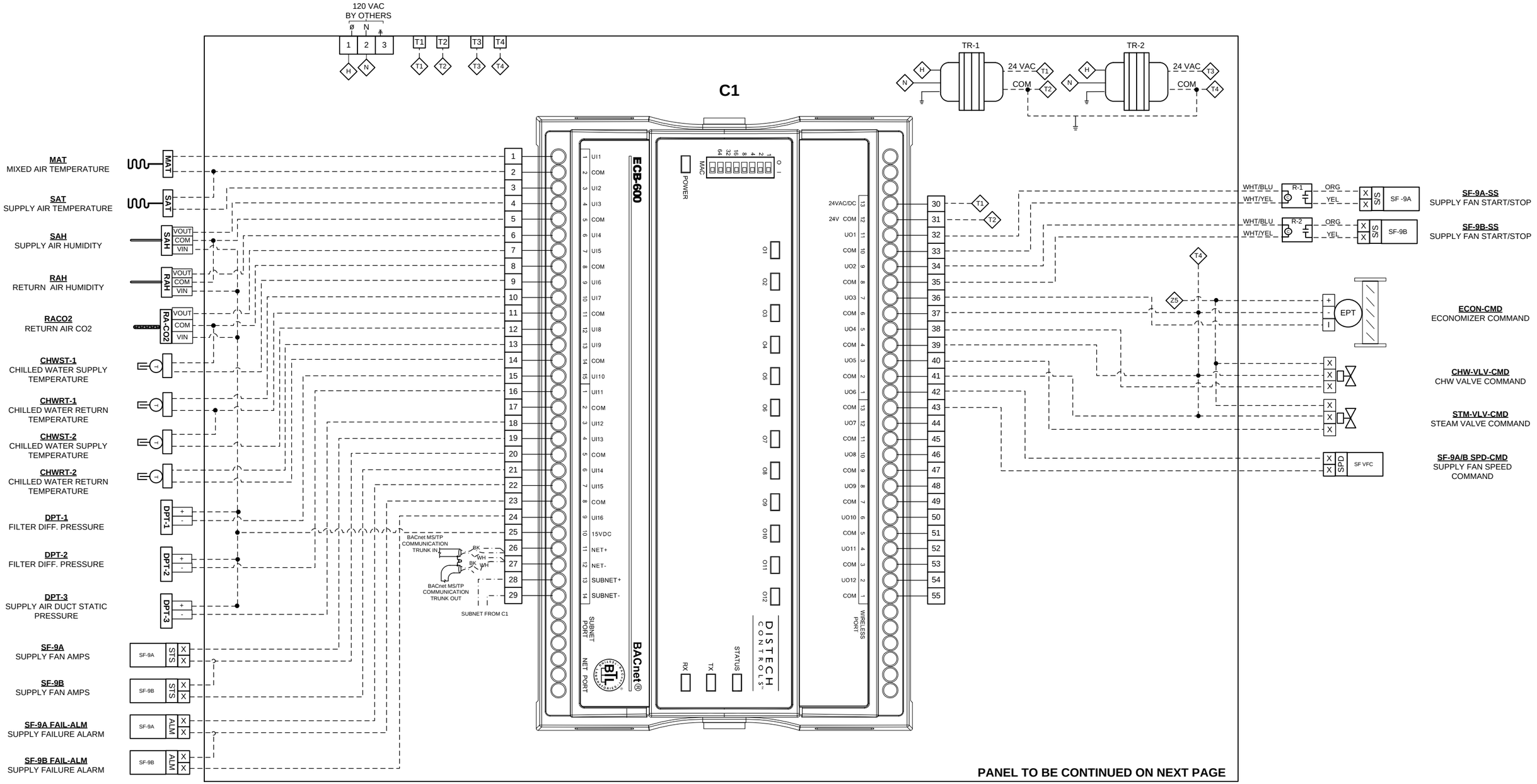
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B SCHEMATIC DIAGRAM

AHU-S-9A/B WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RAH
RETURN AIR HUMIDITY

RACO2
RETURN AIR CO2

CHWST-1
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-1
CHILLED WATER RETURN TEMPERATURE

CHWST-2
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-2
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
FILTER DIFF. PRESSURE

DPT-3
SUPPLY AIR DUCT STATIC PRESSURE

SF-9A
SUPPLY FAN AMPS

SF-9B
SUPPLY FAN AMPS

SF-9A FAIL-ALM
SUPPLY FAILURE ALARM

SF-9B FAIL-ALM
SUPPLY FAILURE ALARM

SF-9A-SS
SUPPLY FAN START/STOP

SF-9B-SS
SUPPLY FAN START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

SF-9A/B SPD-CMD
SUPPLY FAN SPEED COMMAND

PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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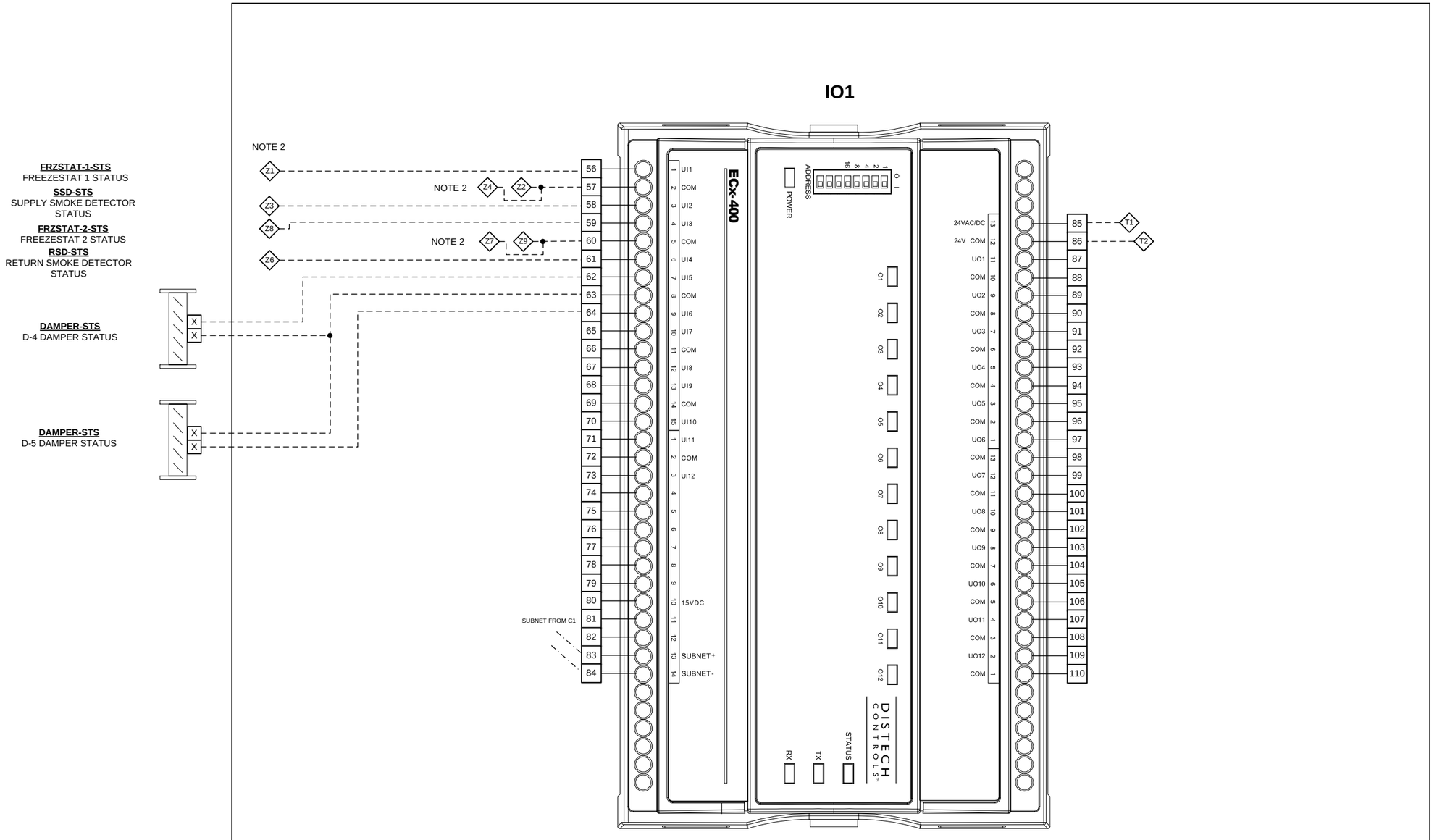
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B WIRING DIAGRAM PAGE 1

AHU-S-9A/B WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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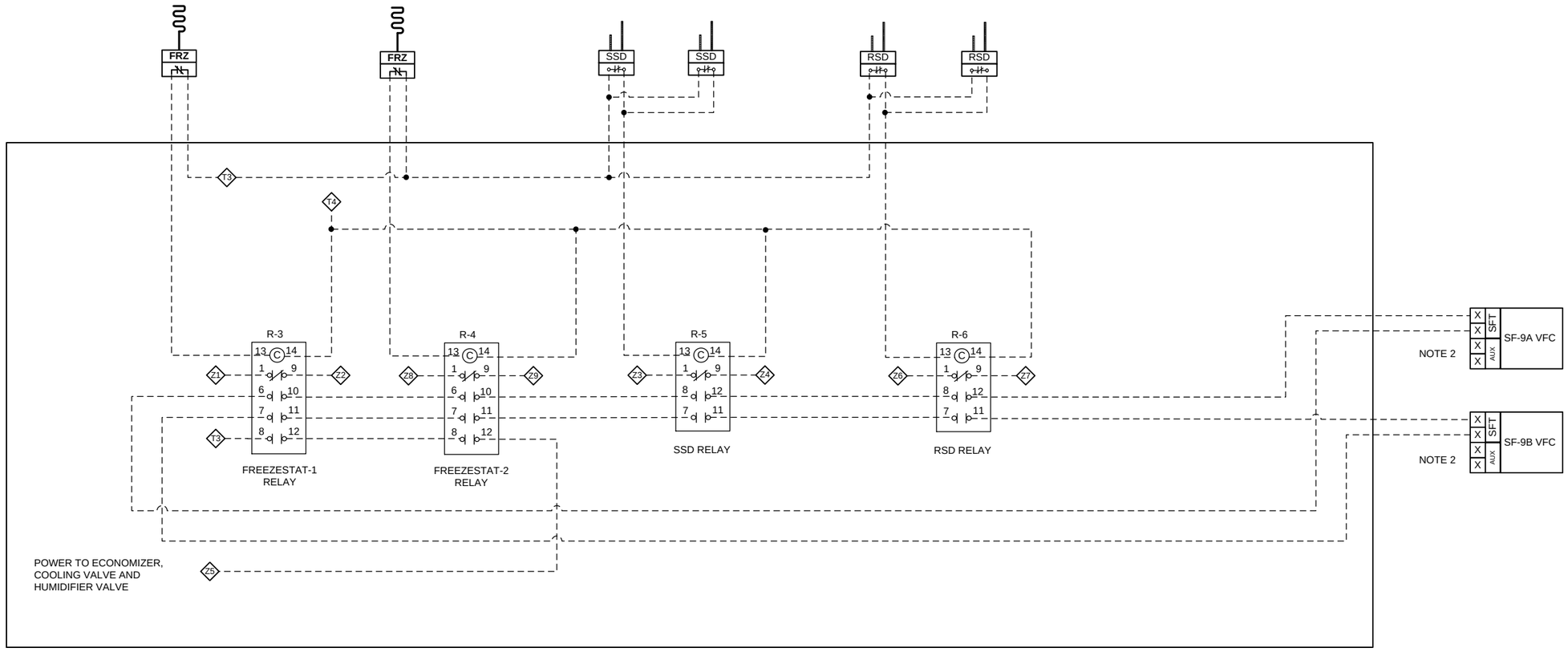
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B WIRING DIAGRAM PAGE 2

AHU-S-9A/B INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S-9A/B SEQUENCE OF OPERATION

AHU-9 A/B SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOPS TIMES, SPACE TEMPERATURES, AND OUTSIDE AIR TEMPERATURE TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

5. DURING UNOCCUPIED PERIODS, AHU SHALL UTILIZE NIGHT CYCLE MODE TO MAINTAIN A NIGHT SETBACK TEMPERATURE OF 62°F AND A NIGHT SETUP TEMPERATURE OF 80°F. DDC SHALL REFERENCE ALL SPACE TEMP SENSORS ASSOCIATED WITH RESPECTIVE AHU AND CYCLE AHU BASED ON LOWEST SPACE TEMP READING FOR HEATING AND HIGHEST SPACE TEMP READING FOR COOUNG. DDC SHALL PROVIDE 2°F DEADBAND AROUND UNOCCUPIED SETPOINTS FOR START/STOP CONTROL.

6. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

7. DDC SHALL MONITOR OPERATING STATUS OF SF—A & —B VFCS. IF ONE VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS FOR RESPECTIVE DRIVE FAILURE. IF BOTH VFCS FAIL, DDC SHALL PROVIDE AN EMERGENCY FAILURE ALARM TO BAS INDICATING BOTH DRIVES FAILED AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

8. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE—CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START—UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

9. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

10. DDC SHALL MODULATE CHILLED WATER VALVE(S) TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

11. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL.

12. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT	CO2 600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT	CO2 1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

13. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

14. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN RETURN AIR RELATIVE HUMIDITY INCREASES ABOVE RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB-COOL THE DISCHARGE AIR TEMP TO 50°F, THE HEATING COIL VALVE SHALL CLOSE TO THE COIL. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB-COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR-PERIOD.

15. DDC SHALL CHANGE THE AIR HANDLING UNIT(S) MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON THE DEMAND KW SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS (WHERE APPLJCABLE) TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINTS.

16. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

17. DUCT SMOKE DETECTOR(S) THRU DDC INPUT POINTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

18. FILTER STATUSES SHALL BE MONITORED BY DDC THIN DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

19. WHEN AIR HANDUNG UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

20. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

21. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTERS PRESSURE

SUPPLY FAN FAILURES

SMOKE DETECTOR(S)

LOW MIXED AIR TEMPERATURE OVERRIDE

LOW DISCHARGE AIR TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B SEQUENCE OF OPERATION

AHU-S-9A/B BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, SAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH, RAH	A/RH2-D	2	Duct Humidity Sensor, 2% Accuracy	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3 To R-6	784-4C-24A	4	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-5 To R-8	784-4C-SKT	4	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
11	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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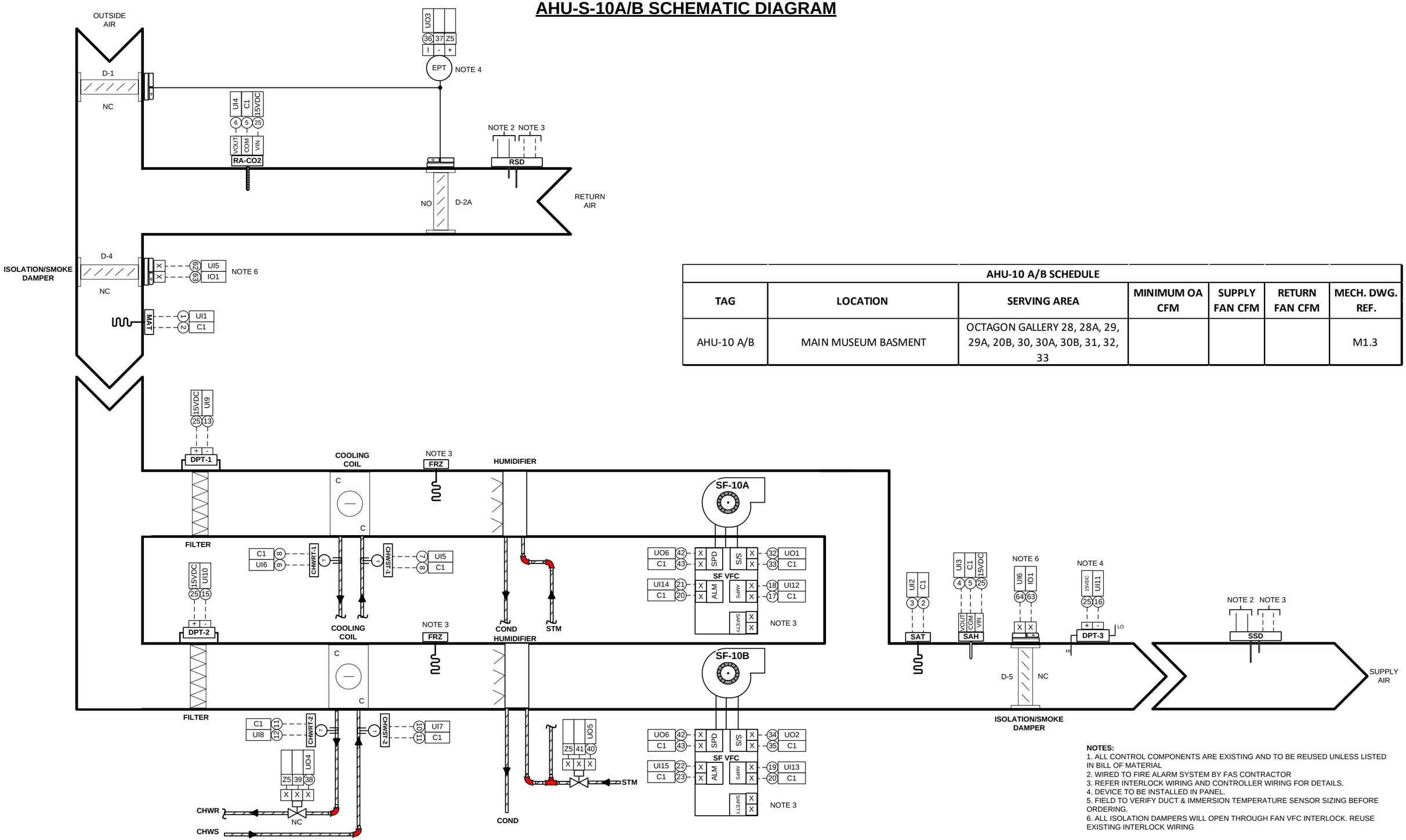
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-9A/B BILL OF MATERIAL

AHU-S-10A/B SCHEMATIC DIAGRAM



AHU-10 A/B SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-10 A/B	MAIN MUSEUM BASMENT	OCTAGON GALLERY 28, 28A, 29, 29A, 20B, 30, 30A, 30B, 31, 32, 33				M1.3

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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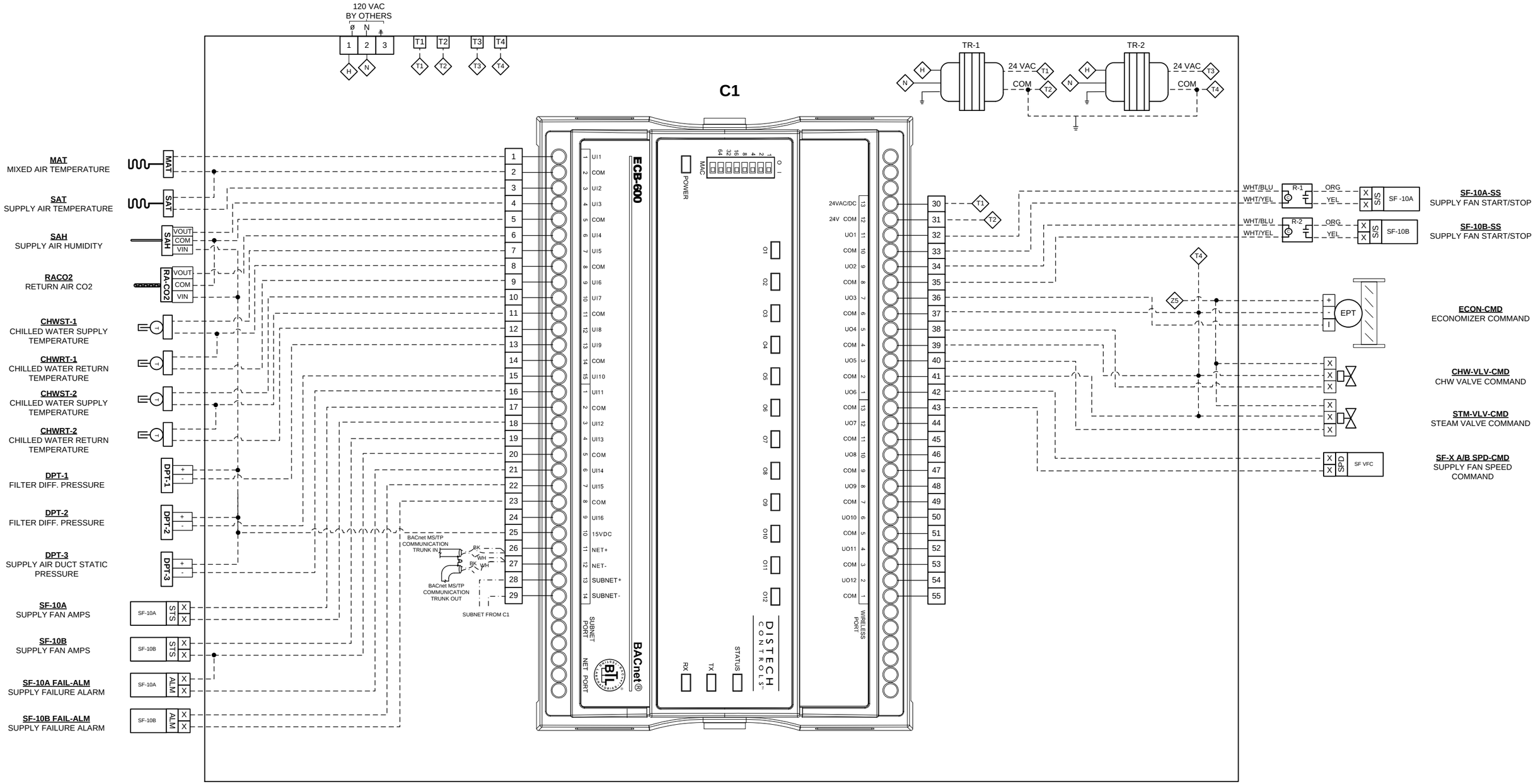
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B SCHEMATIC DIAGRAM

AHU-S-10A/B WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RACO2
RETURN AIR CO2

CHWST-1
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-1
CHILLED WATER RETURN TEMPERATURE

CHWST-2
CHILLED WATER SUPPLY TEMPERATURE

CHWRT-2
CHILLED WATER RETURN TEMPERATURE

DPT-1
FILTER DIFF. PRESSURE

DPT-2
FILTER DIFF. PRESSURE

DPT-3
SUPPLY AIR DUCT STATIC PRESSURE

SF-10A
SUPPLY FAN AMPS

SF-10B
SUPPLY FAN AMPS

SF-10A FAIL-ALM
SUPPLY FAILURE ALARM

SF-10B FAIL-ALM
SUPPLY FAILURE ALARM

SF-10A-SS
SUPPLY FAN START/STOP

SF-10B-SS
SUPPLY FAN START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

SF-X A/B SPD-CMD
SUPPLY FAN SPEED COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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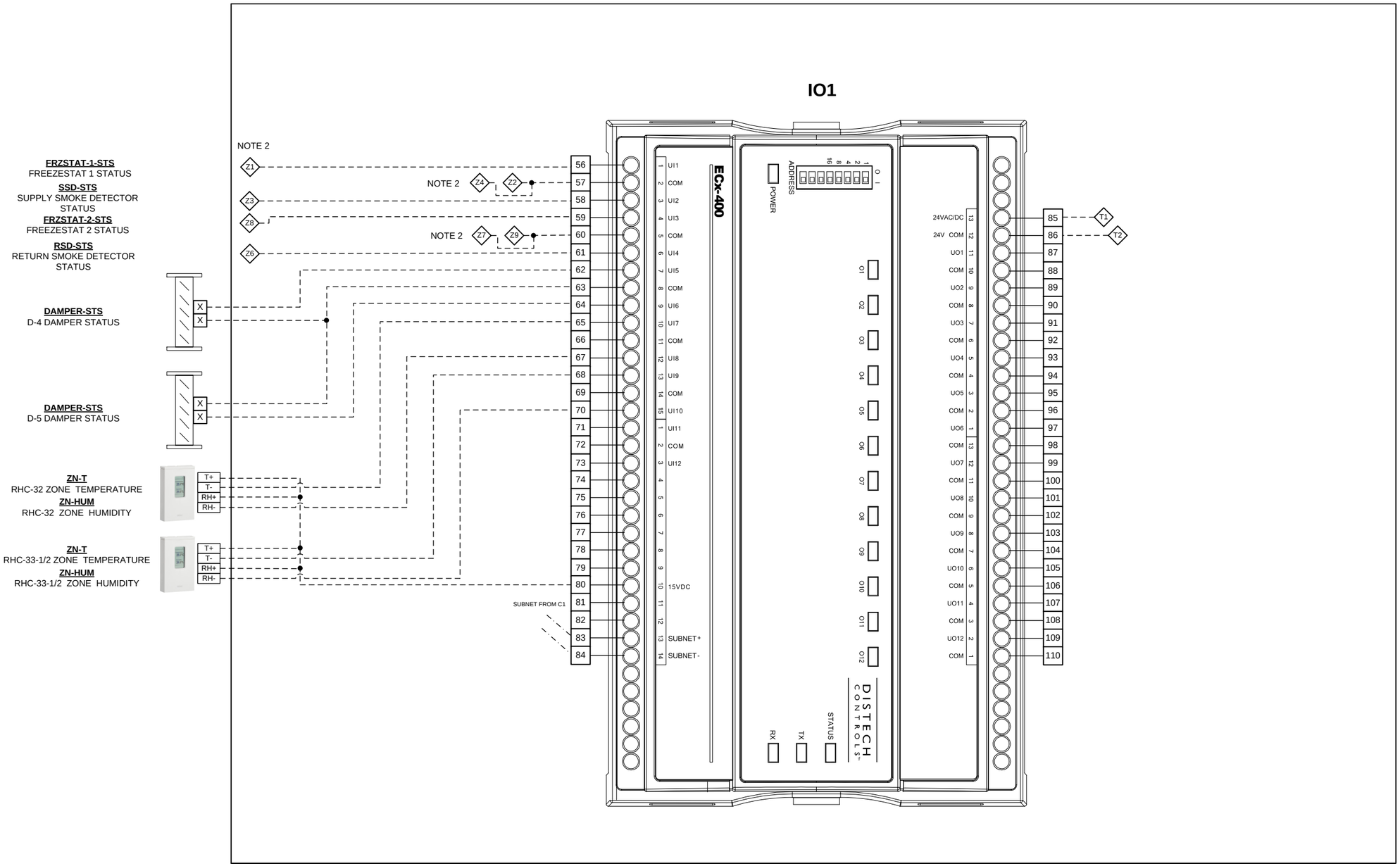
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B WIRING DIAGRAM PAGE 1

AHU-S-10A/B WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
4. ZONE TEMPERATURE & HUMIDITY POINT OF RHC-32 & RHC-33 ARE SHOWN HERE INSTED OF AHU-S-10A/B ZONE DUCT HEATING COIL CONTROLLER

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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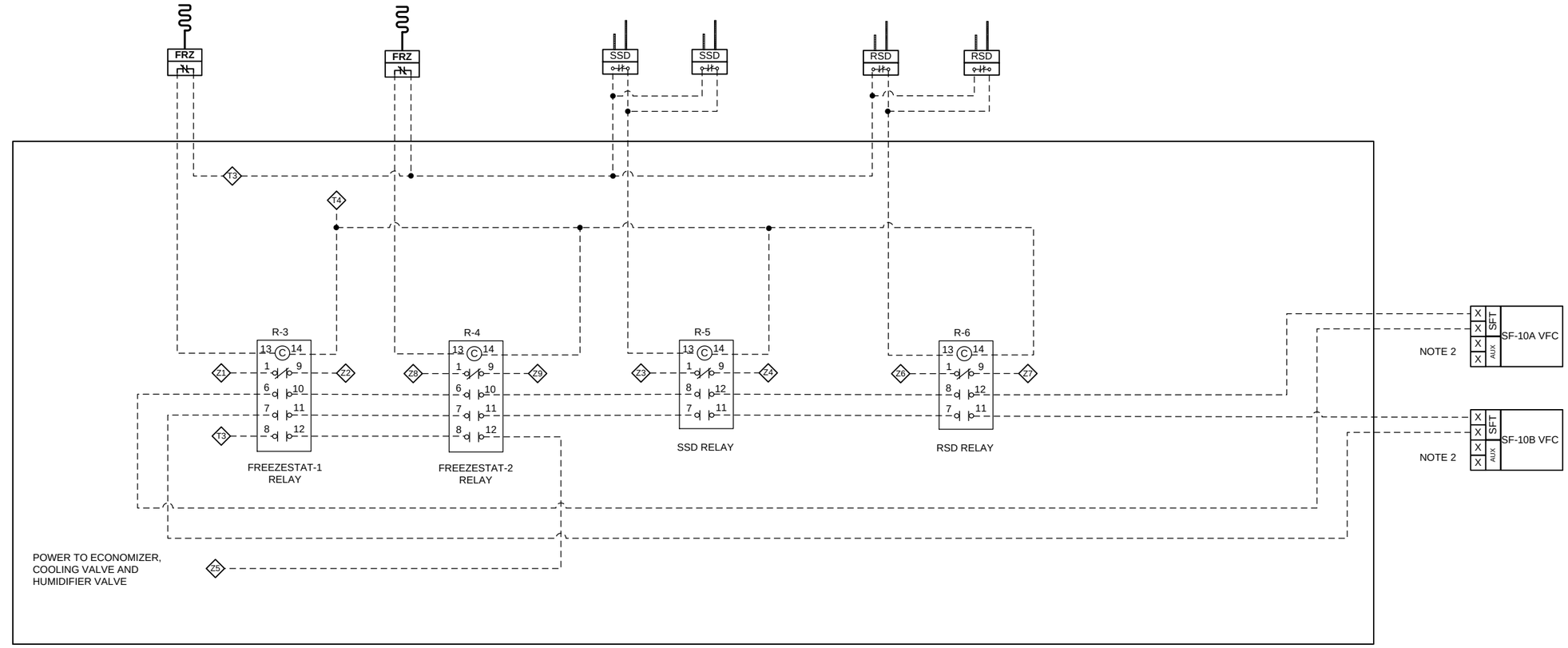
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B WIRING DIAGRAM PAGE 2

AHU-S-10A/B INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BW-5, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REUSE EXISTING ISOLATION DAMPER INTERLOCK WIRING WITH SF-VFC.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S-10A/B SEQUENCE OF OPERATION

AHU-S-10 A/B SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE.

4. OPTIMUM START PROGRAMMING SHALL AUTOMATICALLY TREND START/STOPS TIMES, SPACE TEMPERATURES, AND OUTSIDE AIR TEMPERATURE TO ADJUST THE STARTING AND STOPPING OF THE AIR HANDLING SYSTEM. COORDINATE ALL NEEDED PROGRAMMING REQUIREMENTS WITH THE OWNER REPRESENTATIVE.

5. DURING UNOCCUPIED PERIODS, AHU SHALL UTILIZE NIGHT CYCLE MODE TO MAINTAIN A NIGHT SETBACK TEMPERATURE OF 62°F AND A NIGHT SETUP TEMPERATURE OF 80°F. DDC SHALL REFERENCE ALL SPACE TEMP SENSORS ASSOCIATED WITH RESPECTIVE AHU AND CYCLE AHU BASED ON LOWEST SPACE TEMP READING FOR HEATING AND HIGHEST SPACE TEMP READING FOR COOLING. DDC SHALL PROVIDE 2°F DEADBAND AROUND UNOCCUPIED SETPOINTS FOR START/STOP CONTROL.

6. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATE PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

7. DDC SHALL MONITOR OPERATING STATUS OF SF—A & —B VFCS. IF ONE VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS FOR RESPECTIVE DRIVE FAILURE. IF BOTH VFCS FAIL, DDC SHALL PROVIDE AN EMERGENCY FAILURE ALARM TO BAS INDICATING BOTH DRIVES FAILED AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

8. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE—CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START—UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

9. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

10. DDC SHALL MODULATE CHILLED WATER VALVE(S) TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

11. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL.

12. DDC SHALL MONITOR RETURN AIR CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

13. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

14. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN RETURN AIR RELATIVE HUMIDITY INCREASES ABOVE RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F, THE HEATING COIL VALVE SHALL CLOSE TO THE COIL. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

15. DDC SHALL CHANGE THE AIR HANDLING UNIT(S) MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON THE DEMAND KW SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS (WHERE APPLICABLE) TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINTS.

16. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

17. DUCT SMOKE DETECTOR(S) -THRU DDC INPUT POINTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

18. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

19. WHEN AIR HANDING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND ALL FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

20. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

21. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTERS) PRESSURE	SUPPLY FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B SEQUENCE OF OPERATION

AHU-S-10A/B BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
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3	Duct Averaging Temperature Sensor	MAT, SAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH	A/RH2-D	1	Duct Humidity Sensor, 2% Accuracy	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Immersion Temperature sensor	CHWST, CHWRT, HWST, HWRT	A/CP-INW-2.5"-GD	4	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
11	Panel Mounted Relay	R-3 To R-6	784-4C-24A	4	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-3 To R-6	784-4C-SKT	4	DIN-rail mounting, for use with 784 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

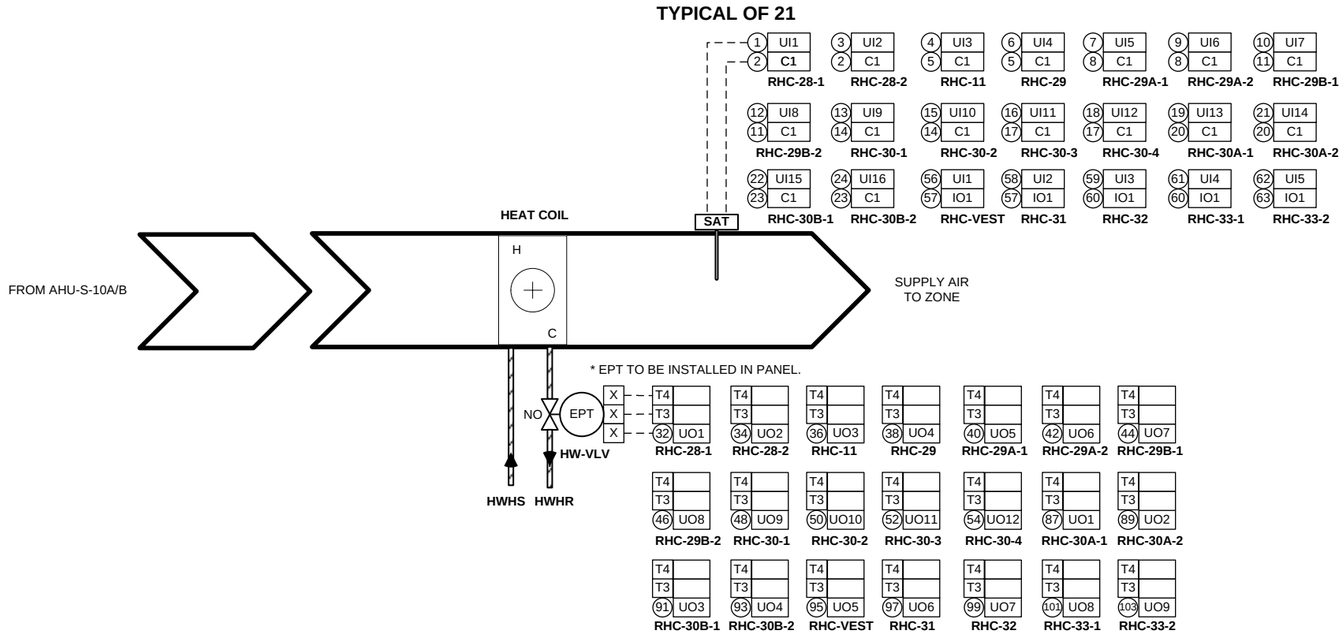
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

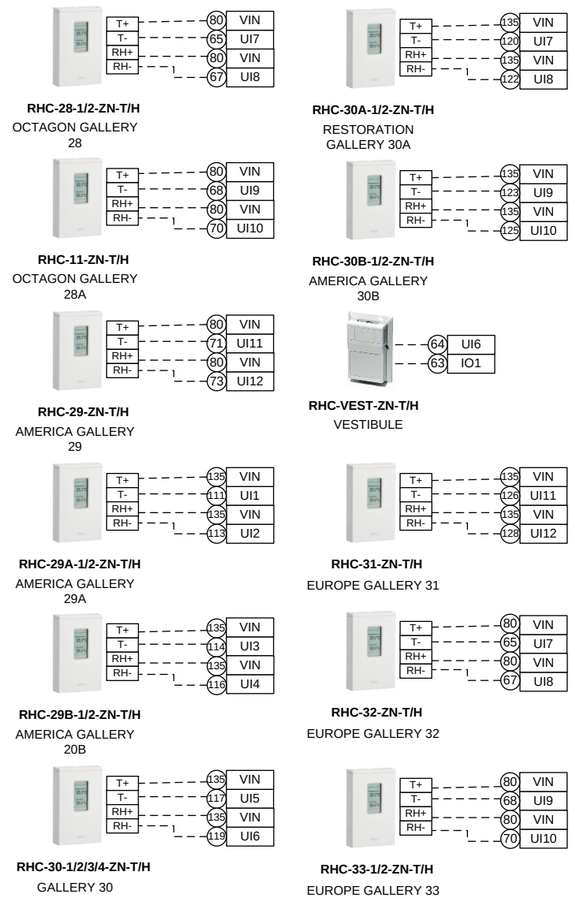
AHU-S-10A/B BILL OF MATERIAL

AHU-S-10A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM



REHEAT COIL SCHEDULE

ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H SENSORS	MECH DWG REF
1	RHC-28-1	GALLERY 28	1	M1.3
2	RHC-28-2	GALLERY 28		M1.3
3	RHC-11	GALLERY 28A	1	M1.3
4	RHC-29	GALLERY 29	1	M1.3
5	RHC-29A-1	GALLERY 29A	1	M1.3
6	RHC-29A-2	GALLERY 29A		M1.3
7	RHC-29B-1	GALLERY 20B	1	M1.3
8	RHC-29B-2	GALLERY 20B		M1.3
9	RHC-30-1	GALLERY 30	1	M1.3
10	RHC-30-2	GALLERY 30		M1.3
11	RHC-30-3	GALLERY 30		M1.3
12	RHC-30-4	GALLERY 30		M1.3
13	RHC-30A-1	GALLERY 30A	1	M1.3
14	RHC-30A-2	GALLERY 30A		M1.3
15	RHC-30B-1	GALLERY 30B	1	M1.3
16	RHC-30B-2	GALLERY 30B		M1.3
17	RHC-VEST	VESTIBULE	1	M1.3
18	RHC-31	GALLERY 31	1	M1.3
19	RHC-32	GALLERY 32	1	M1.3
20	RHC-33-1	GALLERY 33	1	M1.3
21	RHC-33-2	GALLERY 33		M1.3



LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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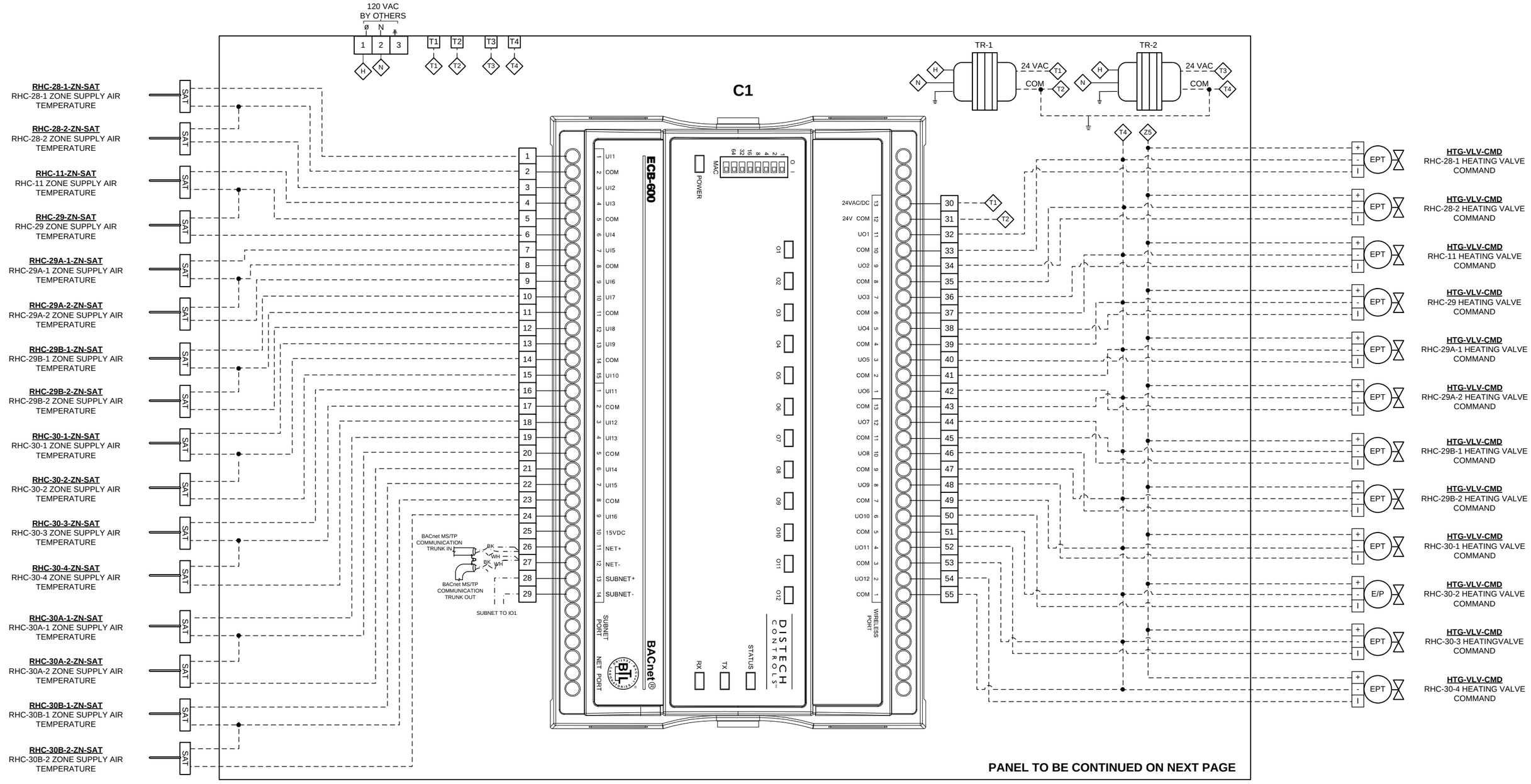
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-1, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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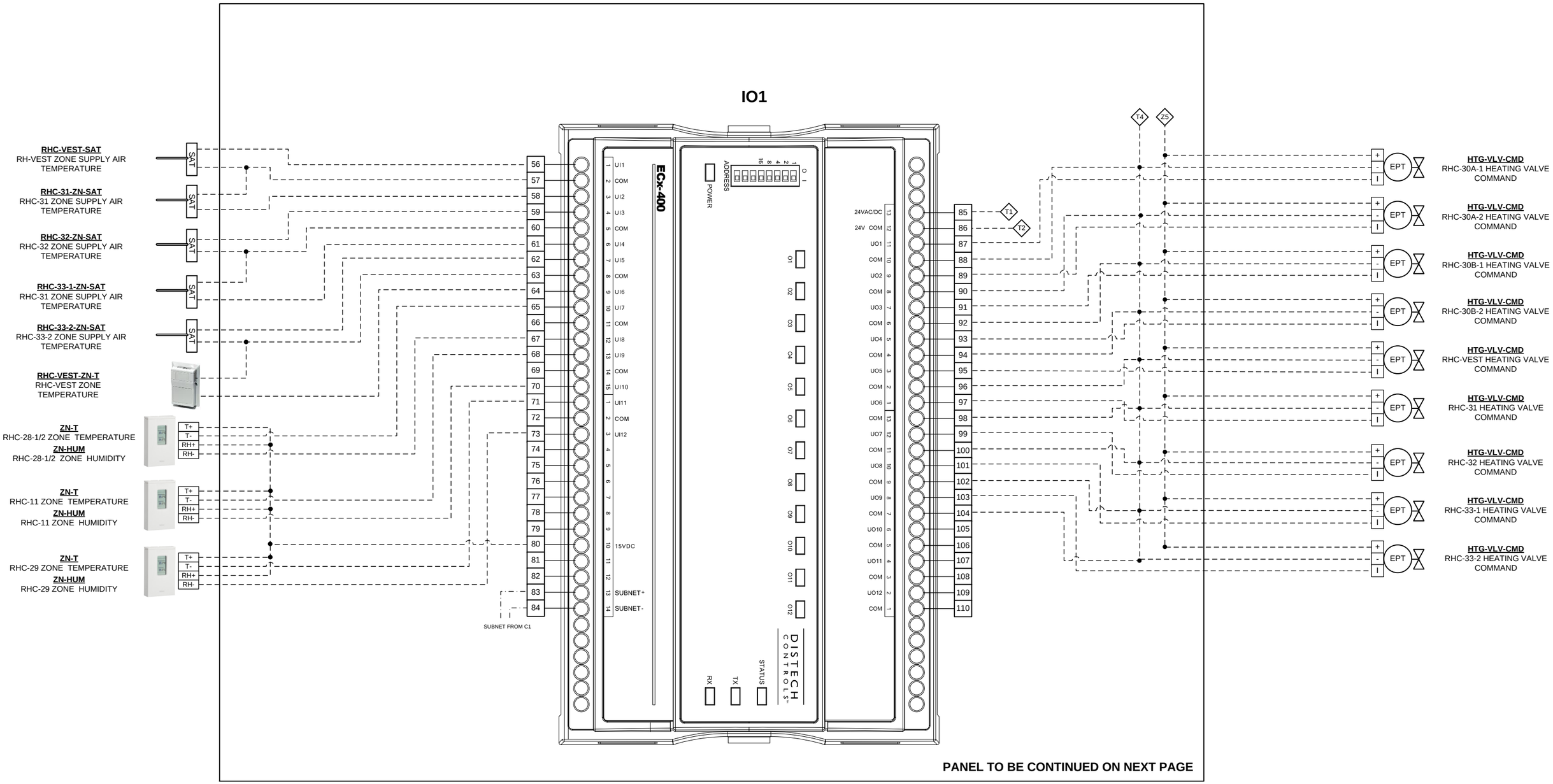
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 1

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2



PANEL LOCATION: CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-1, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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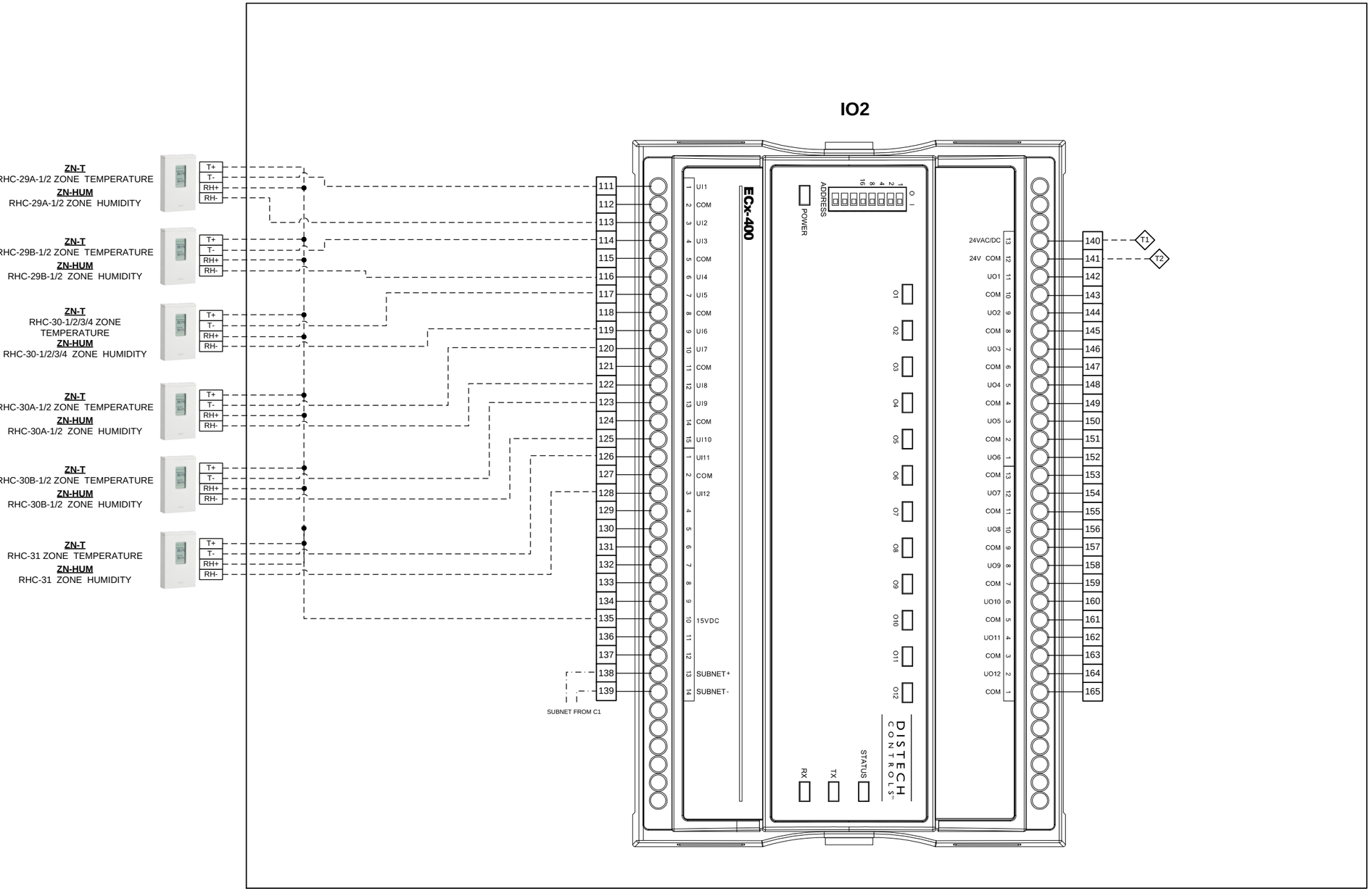
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 2

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BW-1, MAIN MUSEUM BASEMENT-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B ZONE DUCT HEATING COIL WIRING DIAGRAM PAGE 3

AHU-S-10A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S-10A/B ZONE DUCT HEATING COIL SEQUENCE OF OPERATION

AHU-S-10A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1, IO2	CDIX-400X-00	2	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	21	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
4	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	11	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Electropneumatic transducer	EPT	EP313020	21	Electropneumatic transducer with manual override, 0-20 psig	Kele
7	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
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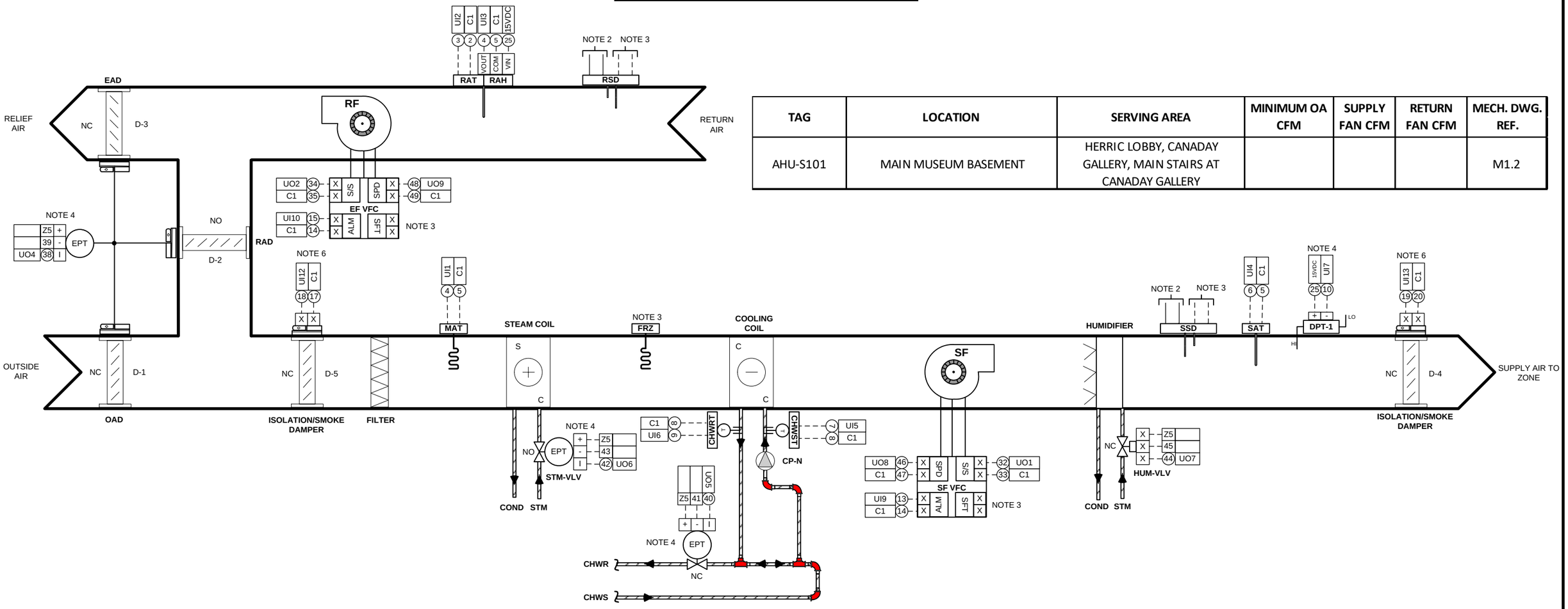
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

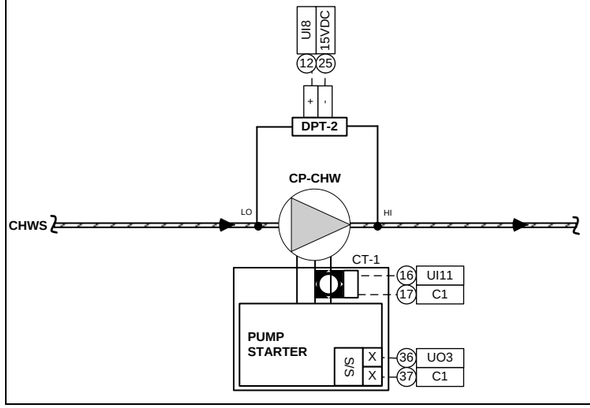
AHU-S-10A/B ZONE DUCT HEATING COIL BILL OF MATERIAL

AHU-S101 SCHEMATIC DIAGRAM

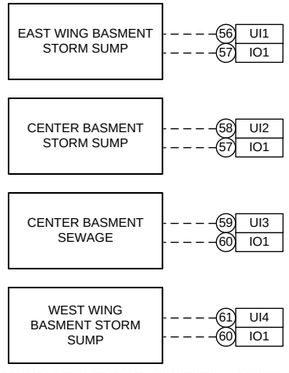


TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-S101	MAIN MUSEUM BASEMENT	HERRIC LOBBY, CANADAY GALLERY, MAIN STAIRS AT CANADAY GALLERY				M1.2

AIR HANDLER CHW CIRC PUMP

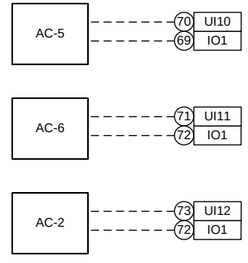


STROM PUMP/ SEWAGE PUMP MONITORING



* STROM PUMP/ SEWAGE PUMP MONITORING POINTS REFERENCE FROM MECHANICAL DRAWING M1.21

AC UNIT MONIRORING



* FIELD TO VERIFY LOCATION OF AC UNIT.
* ON PROPOSED NETWORK CONFIGURATION AC-5 ALARM CONSIDERED IN PANEL BC-1 SO WE HAVE CONSIDERED THE SAME IN NEAREST PANEL BC-1

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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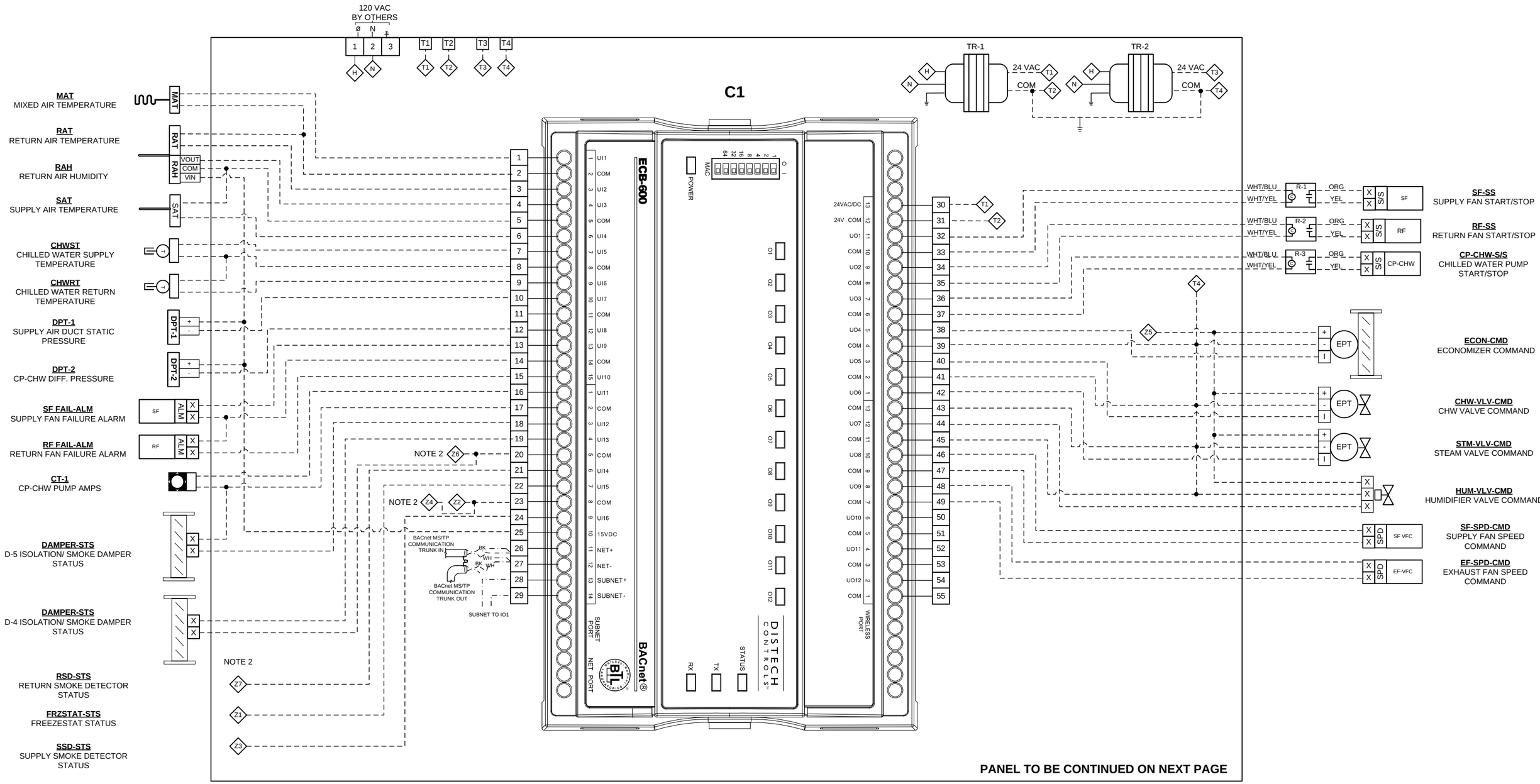
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 SCHEMATIC DIAGRAM

AHU-S101 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-2, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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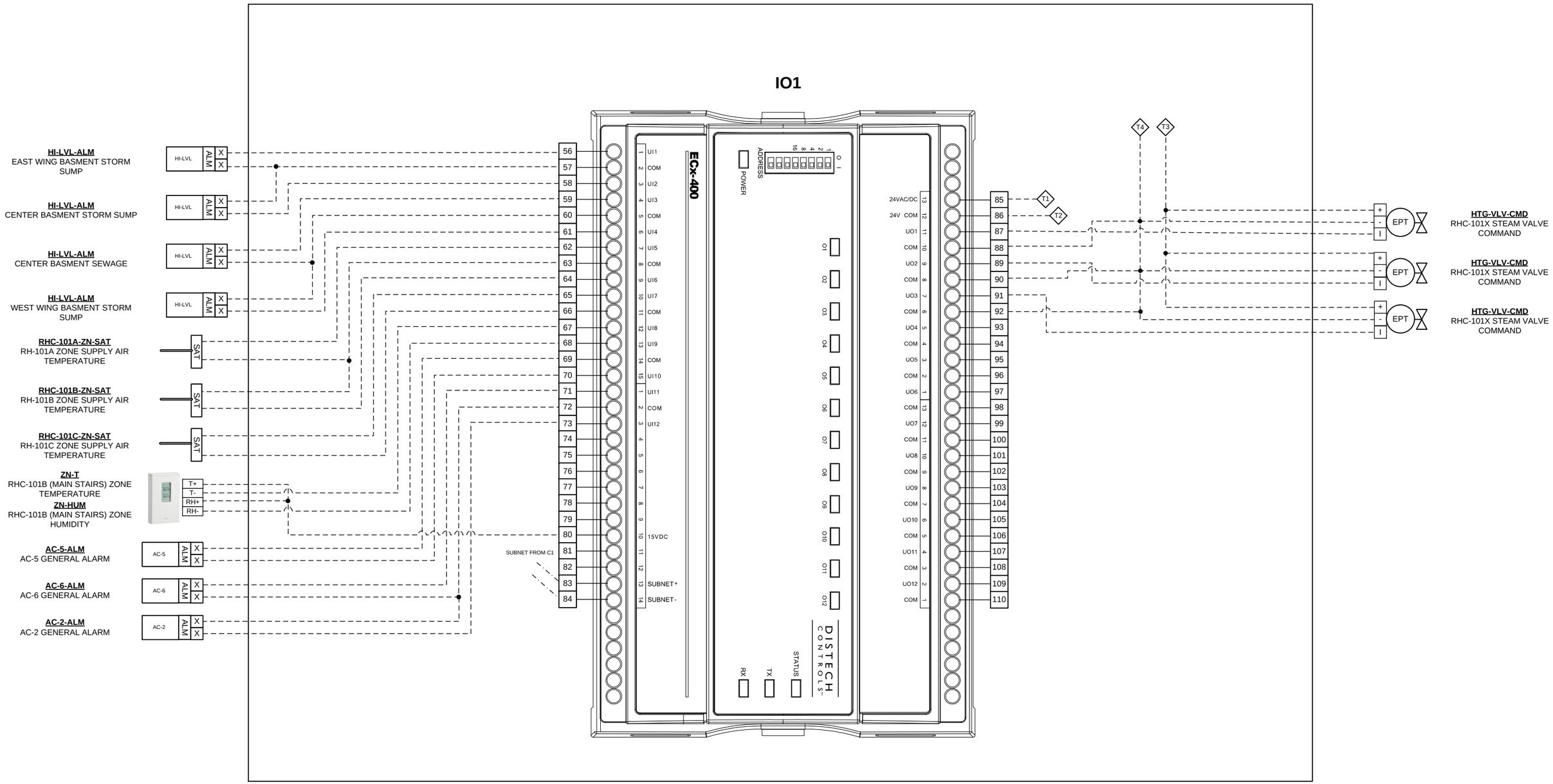
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 WIRING DIAGRAM PAGE 1

AHU-S101 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL BC-2, MAIN MUSEUM BASEMENT-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
4. STROM PUMP/ SEWAGE PUMP MONITORING POINT FROM MECHANICAL DRAWING M1.21 CONSIDERED OVER HERE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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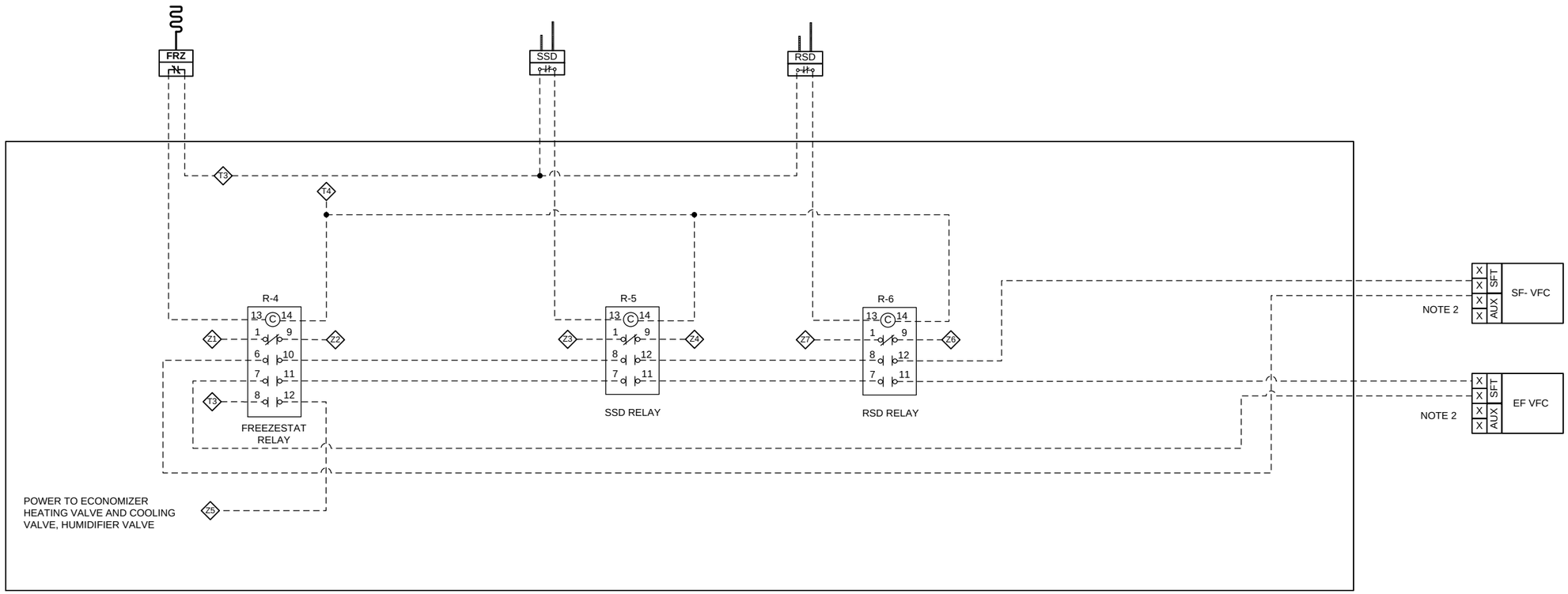
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 WIRING DIAGRAM PAGE 2

AHU-S101 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL BC-3, MAIN MUSEUM BASEMENT

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REUSE EXISTING ISOLATION DAMPER INTERLOCK WIRING WITH SF-VFC.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-S101 SEQUENCE OF OPERATION

AHU-S101 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN (SF) AND ASSOCIATED RETURN FAN (RF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. TERTIARY CHWP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT AND UPON A DEMAND FOR DEHUMIDIFICATION. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/MA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FANS TO OPERATE. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

6. DDC SHALL MONITOR OPERATING STATUS OF SF & RF VFCS. IF EITHER VFC FAILS, DDC SHALL PROVIDE AN EMERGENCY FAILURE ALARM TO BAS AND DEACTIVATE ENTIRE AHU. VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

7. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE—CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START—UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

8. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

9. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°F DB SETPOINT AND LESS THAN 44°F WB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

10. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

11. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

12. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE STEAM COIL VALVE TO MAINTAIN DAT SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

13. DDC SHALL MODULATE CHILLED WATER VALVE TO MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

14. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

15. DDC SHALL MONITOR AND AVERAGE THE GALLERY CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

16. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

17. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS, DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

18. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

19. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

20. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

21. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

22. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

23. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

24. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE
SMOKE DETECTOR(S)
LOW DISCHARGE AIR TEMPERATURE
SUPPLY/RETURN FAN FAILURES
LOW MIXED AIR TEMPERATURE OVERRIDE

AC UNIT MONITORING:

DDC SHALL MONITOR AC UNITS FOR GENERAL ALARM STATUS.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 SEQUENCE OF OPERATION

AHU-S101 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity & Temperature Combo Sensor	RAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
5	Duct Temperature Sensor	DAT	A/CP-D-8"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galvanised Box	ACI
6	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-4 To R-6	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-4 To R-6	784-4C-SKT	3	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
11	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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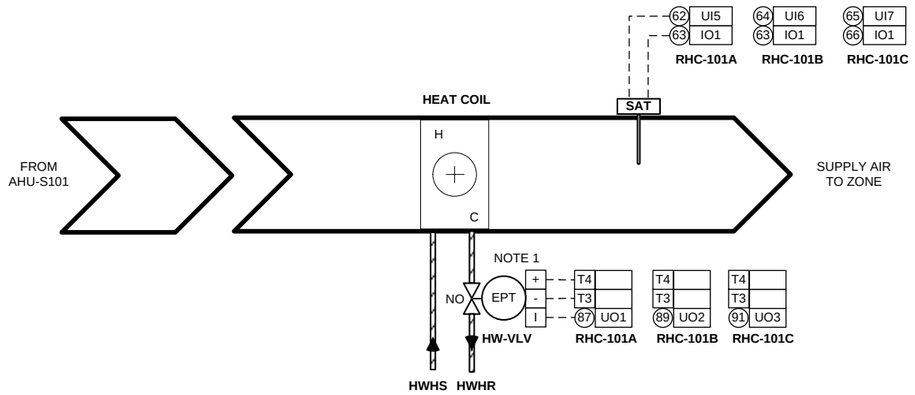
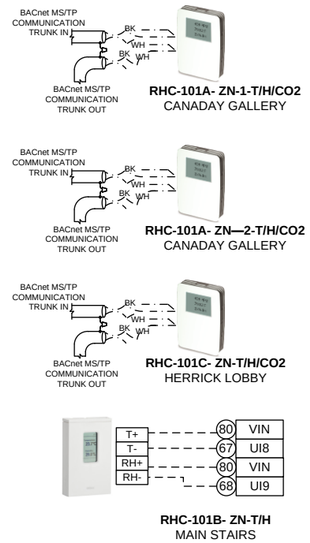
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 BILL OF MATERIAL

AHU-S101 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 3





REHEAT COIL SCHEDULE				
ITEM #	**TAG**	**LOCATION & SERVING AREA**	**NO OF ASSOCIATED T/H/CO2 SENSORS**	**MECH DWG REF**
1	RHC-101X	CANADAY GALLERY	2	M1.2
2	RHC-101X	MAIN STAIRS AT CANADAY GALLERY	1	M1.2
3	RHC-101X	HERRICK LOBBY	1	M1.2

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS, AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

NOTES:
1. EPT TO BE INSTALLED IN PANEL.
2. FIELD TO VERIFY LOCATION OF RHC & ZONE SERVED.
3. WE FOUND RHC-101A, RHC-101B & RHC-101C ON FLOOR PLAN SO WE HAVE ASSUME THE SAME NAMEING. SO KINDLY VERIFY ON FIELD

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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32-72 Steinway St,
Astoria, NY 11103
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-S101 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-S101 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	3	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
2	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
3	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
4	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	3	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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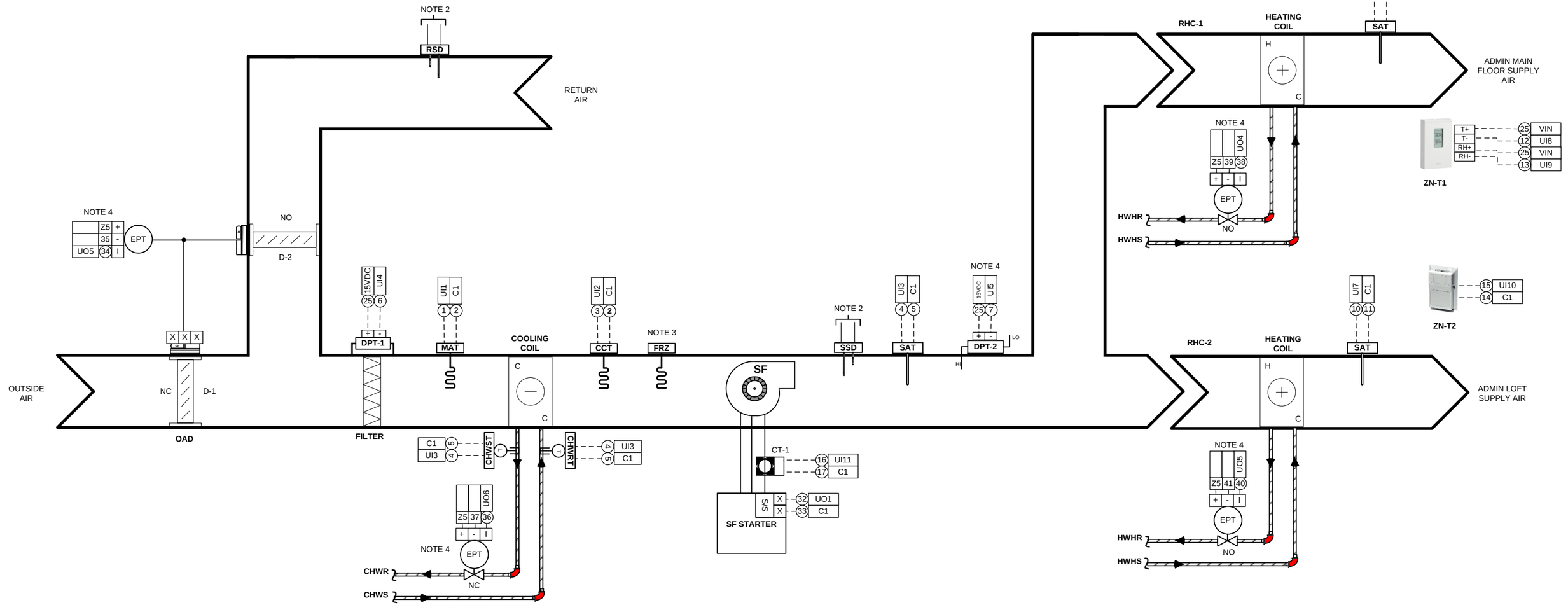
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

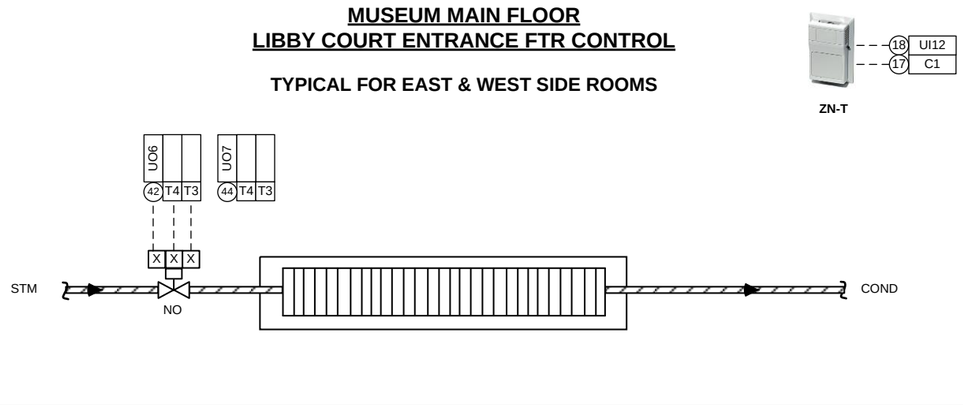
AHU-S101 ZONE DUCT HEATING COIL BILL OF MATERIAL

AHU-14 SCHEMATIC DIAGRAM



MUSEUM MAIN FLOOR
LIBBY COURT ENTRANCE FTR CONTROL

TYPICAL FOR EAST & WEST SIDE ROOMS



AHU-14 SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-14	MAIN MUSEUM GROUND FLOOR	ADMIN OFFICES, ADMIN LOFT OFFICES				M1.5

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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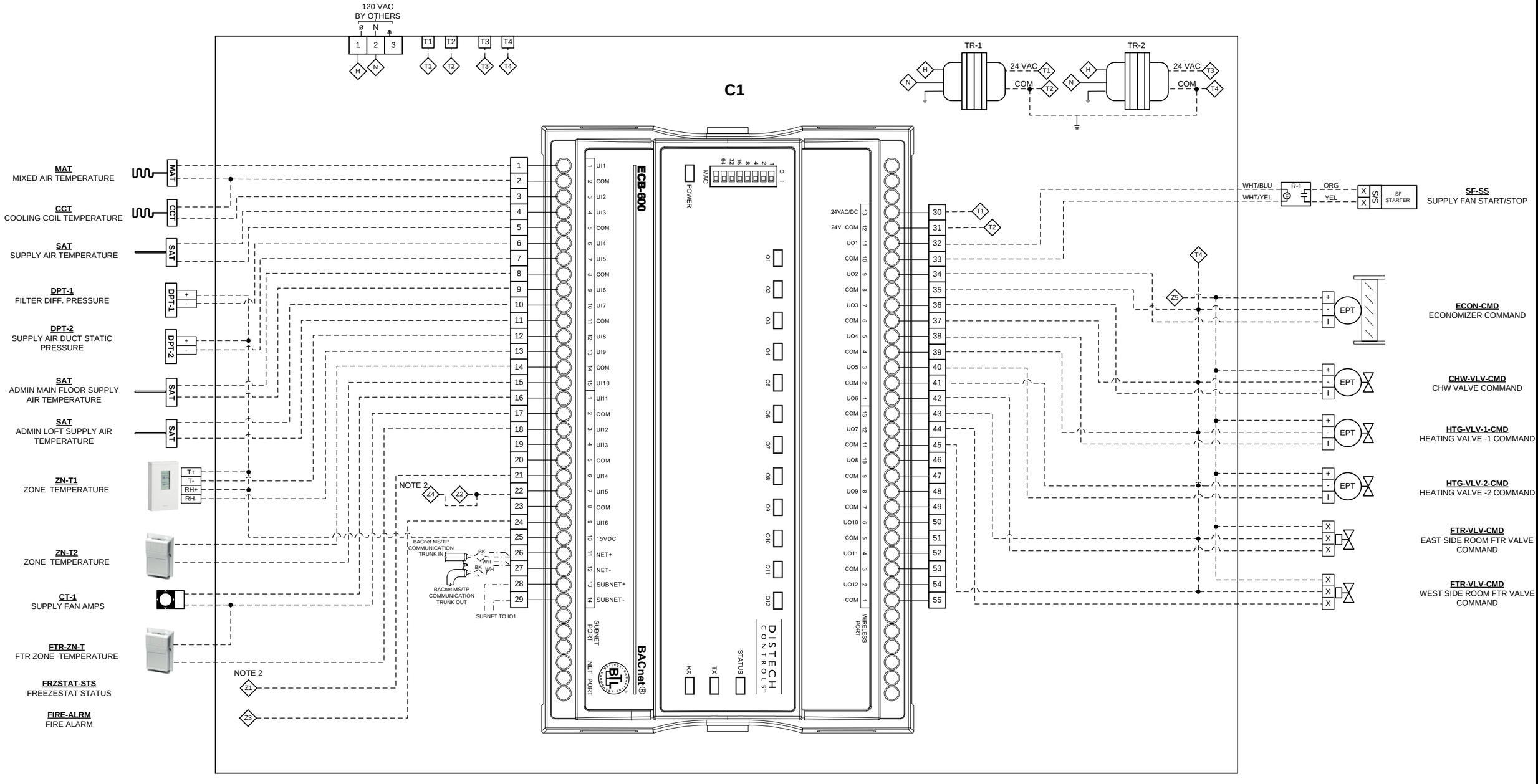
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-14 SCHEMATIC DIAGRAM

AHU-14 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL GC-1, MAIN MUSEUM GROUNG FLOOR-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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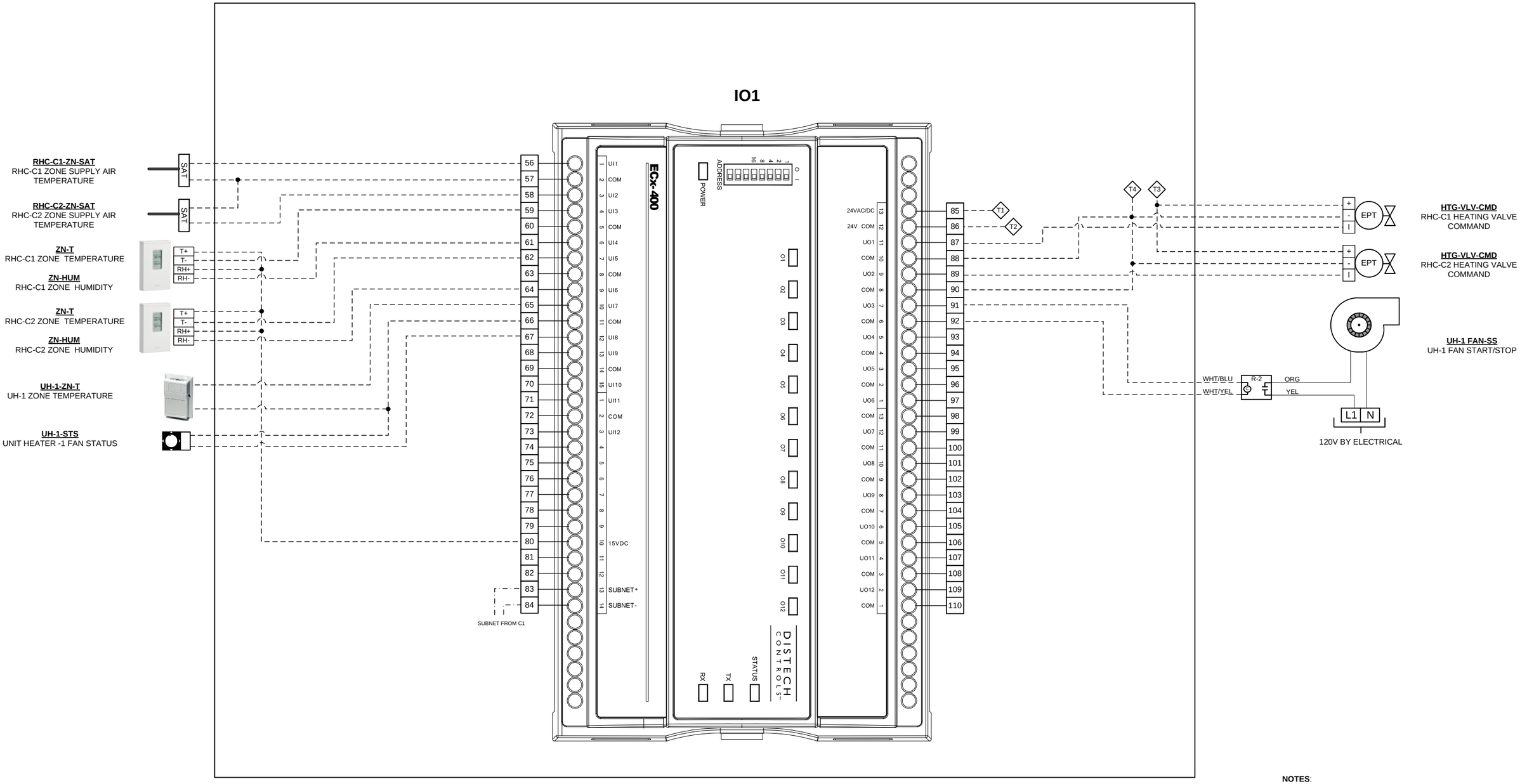
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-14 WIRING DIAGRAM PAGE 1

AHU-14 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL GC-1, MAIN MUSEUM GROUNG FLOOR-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
4. ON SCHEMATIC IT IS MENTIONED RHC-C1 & RHC-C2 OF AHU-3A/B IS IN PANEL GC-1 SO WE HAVE CONSIDERED HERE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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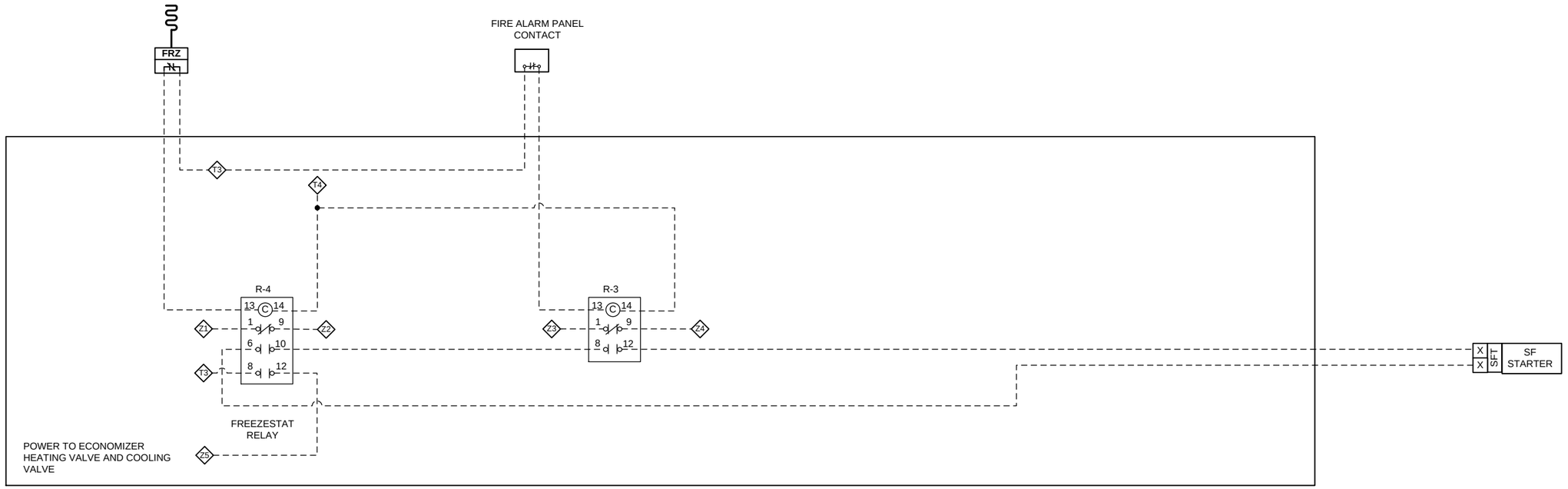
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-14 WIRING DIAGRAM PAGE 2

AHU-14 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL GC-1, MAIN MUSEUM GROUNG FLOOR-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REUSE EXISTING ISOLATION DAMPER INTERLOCK WIRING WITH SF-VFC.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-14 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-14 SEQUENCE OF OPERATION PAGE 1

AHU-14 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

6. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

7. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

8. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

9. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

10. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND CLOSE CHW COIL VALVE TO THE COIL.

11. DDC SHALL MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
< 45°F	60°F
> 55°F	55°F

12. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

13. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE DIRECTOR'S ASSISTANT'S OFFICE RELATIVE HUMIDITY SENSOR INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

14. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

15. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

16. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

17. WHEN AIR HANDLING UNIT IS DEACTIVATED 8Y DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S).

18. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

19. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURE
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-14 SEQUENCE OF OPERATION PAGE 1

AHU-14 SEQUENCE OF OPERATION PAGE 2

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LOBBY COURT ENTRANCE FTR CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS.

2. DDC SYSTEM SHALL CONTROL FINNED TUBE RADIATION VALVE TO MAINTAIN OCCUPIED/UNOCCUPIED SPACE TEMPERATURE SETPOINTS. CONTROL SHALL PROVIDE 2°F CONTROL AROUND SETPOINTS.

3. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:

HEATING UNOCCUPIED SETPOINT = 62°F

HEATING OCCUPIED SETPOINT = 70°F

ICT Solutions

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32-72 Steinway St,
Astoria, NY 11103

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AHU-14 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, CCT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Zone Temp Sensor	ZN-T	A/CP-R2	2	Thermistor, 10K Type II, Room Temperature sensor	ACI
5	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
6	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	3	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
7	Electropneumatic transducer	EPT	EP313020	4	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1, 2	RIBU1C	2	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-3	782-2C-24A	1	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-3	782-2C-SKT	1	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
11	Panel Mounted Relay	R-4	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-4	784-4C-SKT	1	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
13	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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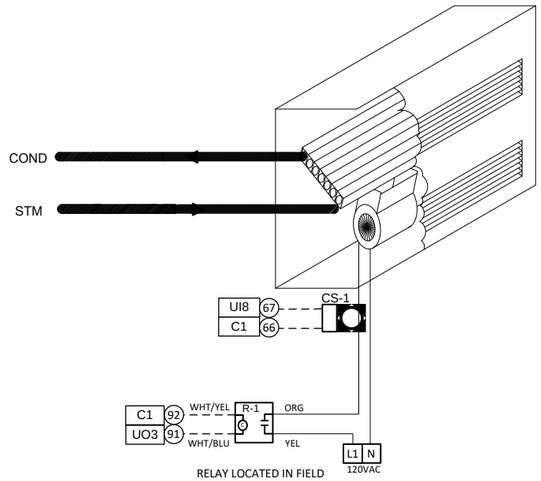
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

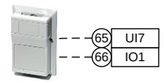
AHU-14 BILL OF MATERIAL

UH-1 SCHEMATIC DIAGRAM

MUSEUM GRD FLR – STEAM UNIT HEATER

UH-1 LOCATED IN OUTER RECEIVING AREA





ZN-T1

UPPER LEVEL NE
TEMPERATURE

UNIT HEATER SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING DEADBAND DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBAND SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS.

2. UNIT HEATER SHALL CYCLE ON/OFF TO MAINTAIN A SPACE TEMP OF 68°F SETPOINT DURING BUILDING OCCUPIED AND 62°F SETPOINT DURING BUILDING UNOCCUPIED PERIOD.

3. DDC SHALL MONITOR FAN OPERATION. ABNORMAL OPERATING STATUS SHALL ACTIVATE AN ALARM.

4. DDC SHALL PROVIDE 2°F (MINIMUM) DEADBAND AROUND SETPOINT.

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
2	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. FIELD TO VERIFY LOCATION OF UNIT HEATERS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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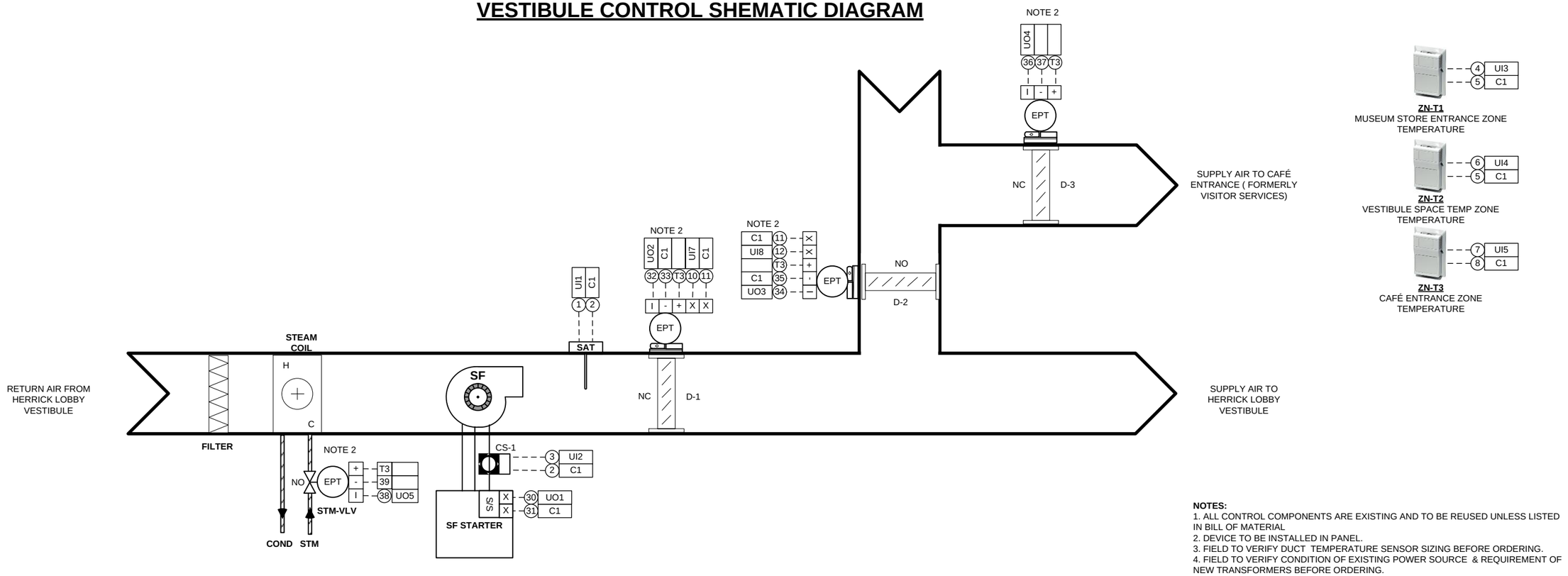
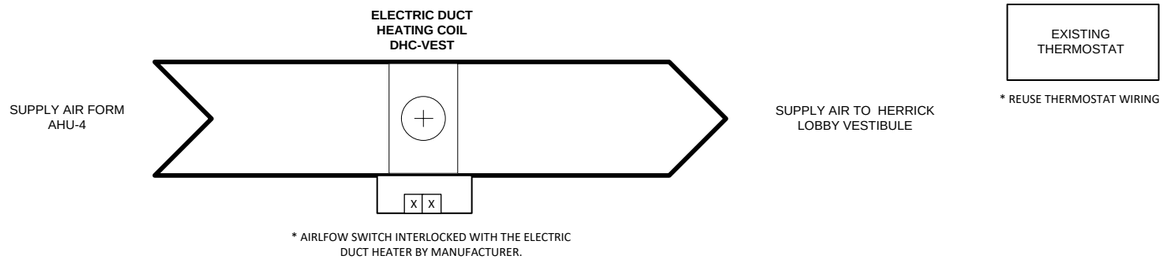
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

UH-1 SCHEMATIC DIAGRAM

VESTIBULE CONTROL SHEMATIC DIAGRAM



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3. FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.



* AIRLFOW SWITCH INTERLOCKED WITH THE ELECTRIC DUCT HEATER BY MANUFACTURER.

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-400X-00	1	B-AAC Programmable Controller With 12UI & 12UO	Distech
2	Zone Temp Sensor	ZN-T	A/CP-R2	3	Thermistor, 10K Type II, Room Temperature sensor	ACI
3	Duct Temperature Sensor	SAT	A/CP-D-12"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 12", Galv. Box	ACI
4	Electropneumatic transducer	EPT	EP313020	4	Electropneumatic transducer with manual override, 0-20 psig	Kele
5	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
6	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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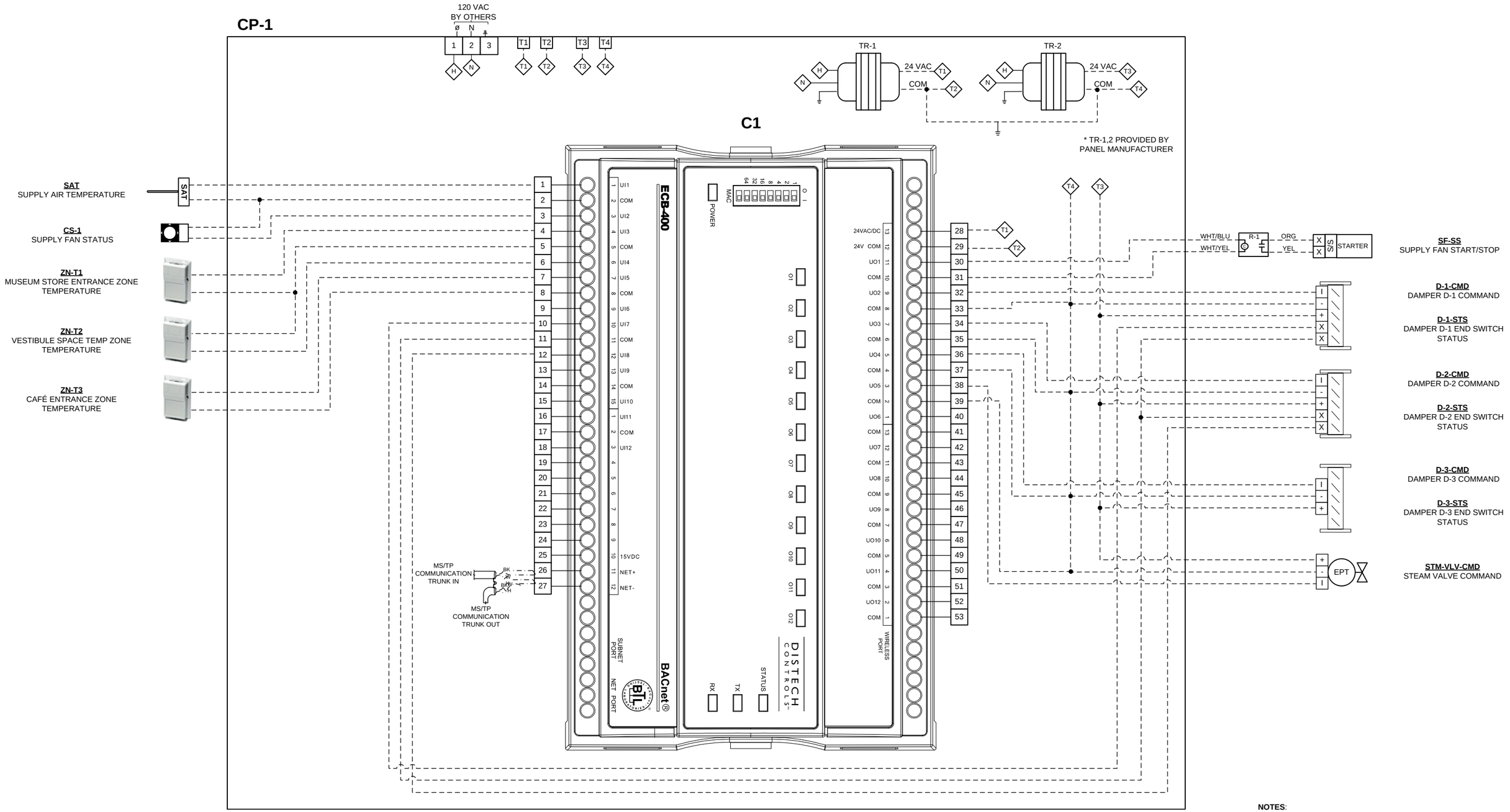
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VESTIBULE CONTROL SHEMATIC DIAGRAM

VESTIBULE CONTROL WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN PANEL GC-1, MAIN MUSEUM GROUND FLOOR CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VESTIBULE CONTROL WIRING DIAGRAM

VESTIBULE CONTROL SEQUENCE OF OPERATION

AHU-14 SYSTEM CONTROL:

HERRICK LOBBY VESTIBULE (INCLUDING BCU-1) AND MUSEUM STORE ENTRANCE (FORMERLY VISITOR SERVICES) CONTROL:

ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

1. CONTROL MODES SHALL BE HEATING AND COOLING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

2. BCU-1 SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. BCU-1 SF SHALL CYCLE ON/OFF FOR HEATING MODE ONLY.

3. BCU-1 SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. S-101 PROVIDES COOLING FROM THE COMMON SUPPLY DUCT TO HERRICK LOBBY VESTIBULE THRU EXISTING DAMPER D-2 AND TO THE FORMER VISITOR SERVICES AREA THRU EXISTING DAMPER D-3.

5. THERE IS A SUPPLEMENTAL ELECTRIC HEATING COIL CONTROLLED BY AN ELECTRIC THERMOSTAT (WITH AIRFLOW FROM AHU-4) THAT PROVIDES AIR TO THE VESTIBULE.

6. DDC SHALL PROVIDE 2°F DEADBAND SETPOINT BETWEEN HEATING AND COOLING MODES.

7. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINTS IN BOTH ZONES PER MUSEUM STANDARD SETPOINTS.

HEATING MODE CONTROL:

8. WHEN VESTIBULE TEMPERATURE IS BELOW HEATING SETPOINT, DDC SHALL COMMAND DAMPERS D-1 OPEN AND D-2 CLOSED. WHEN D-1 & D-2 LIMIT SWITCHES MAKE, DDC SHALL START BCU-1 SF AND MODULATE HEATING COIL VALVE TO MAINTAIN VESTIBULE TEMP SETPOINT. DDC SHALL MODULATE D-3 FOR S-101 AIRFLOW TO MAINTAIN SPACE HEATING TEMP SETPOINT IN THE CAFE ENTRANCE AREA (FORMER VISITOR SERVICES AREA).

9. WHEN VESTIBULE TEMPERATURE REACHES HEATING SETPOINT, DDC SHALL COMMAND BCU-1 SF OFF. DDC CLOSES D-1 AND D-2 (NO S-101 SUPPLY AIR TO THE VESTIBULE). DDC SHALL MODULATE BCU-1 HEATING COIL VALVE TO MAINTAIN 60°F PLENUM TEMP SETPOINT AT BCU-1 DISCHARGE AIR TEMP SENSOR. WHEN D-2 IS FULLY CLOSED BASED ON LIMIT SWITCH, DDC SHALL MODULATE D-3 FOR S-101 AIRFLOW TO MAINTAIN SPACE HEATING TEMP SETPOINT IN THE CAFE ENTRANCE AREA (FORMER VISITOR SERVICES AREA).

10. EXISTING ELECTRIC THERMOSTAT SHALL CYCLE SUPPLEMENTAL ELECTRIC HEATING COIL ON/OFF AS REQUIRED PER ITS HEATING SETPOINT. AIRFLOW FROM AHU-4 THAT SERVES CAFE AREA.

COOLING MODE CONTROL:

11. WHEN VESTIBULE TEMPERATURE IS ABOVE VESTIBULE COOLING SETPOINT, D-1 SHALL REMAIN CLOSED AND DDC SHALL MODULATE D-2 TO MAINTAIN VESTIBULE TEMP SETPOINT AND MODUALTE D-3 TO FORMER VISITOR SERVICES AREA TO MAINTAIN VISITOR SERVICES TEMP SETPOINT INDEPENDENTLY. BCU-1 SHALL REMAIN OFF.

12. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

13. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

MUSEUM STORE ENTRANCE LOW/HIGH TEMP

VESTIBULE LOW/HIGH TEMP

BCU-1 SF FAILURE ALARM

BCU-1 DA TEMP LOW ALARM

CONDITIONAL: D-1 FAILED TO OPEN

CONDITIONAL: D-2 FAILED TO OPEN

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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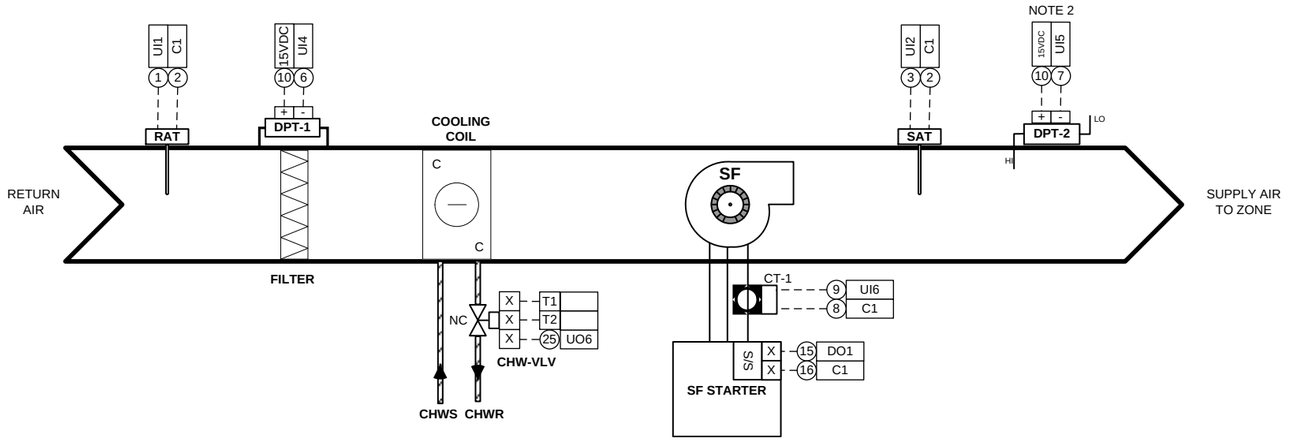
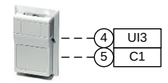
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

VESTIBULE CONTROL SEQUENCE OF OPERATION

AHU-17 SCHEMATIC DIAGRAM





EDUCATION OFFICE

AHU-17 SCHEDULE						
TAG	**LOCATION**	**SERVING AREA**	**MINIMUM OA CFM**	**SUPPLY FAN CFM**	**RETURN FAN CFM**	**MECH. DWG. REF.**
AHU-17	MAIN MUSEUM ATTIC	EDUCATION OFFICES				

BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-203X-00	1	B-ASC Programmable Controller With 6UI, 3UO & 5DO	Distech
2	Duct Temperature Sensor	RAT, SAT	A/CP-D-8"-GD	2	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
3	Zone Temp Sensor	ZN-T	A/CP-R2	1	Thermistor, 10K Type II, Room Temperature sensor	ACI
4	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
4.FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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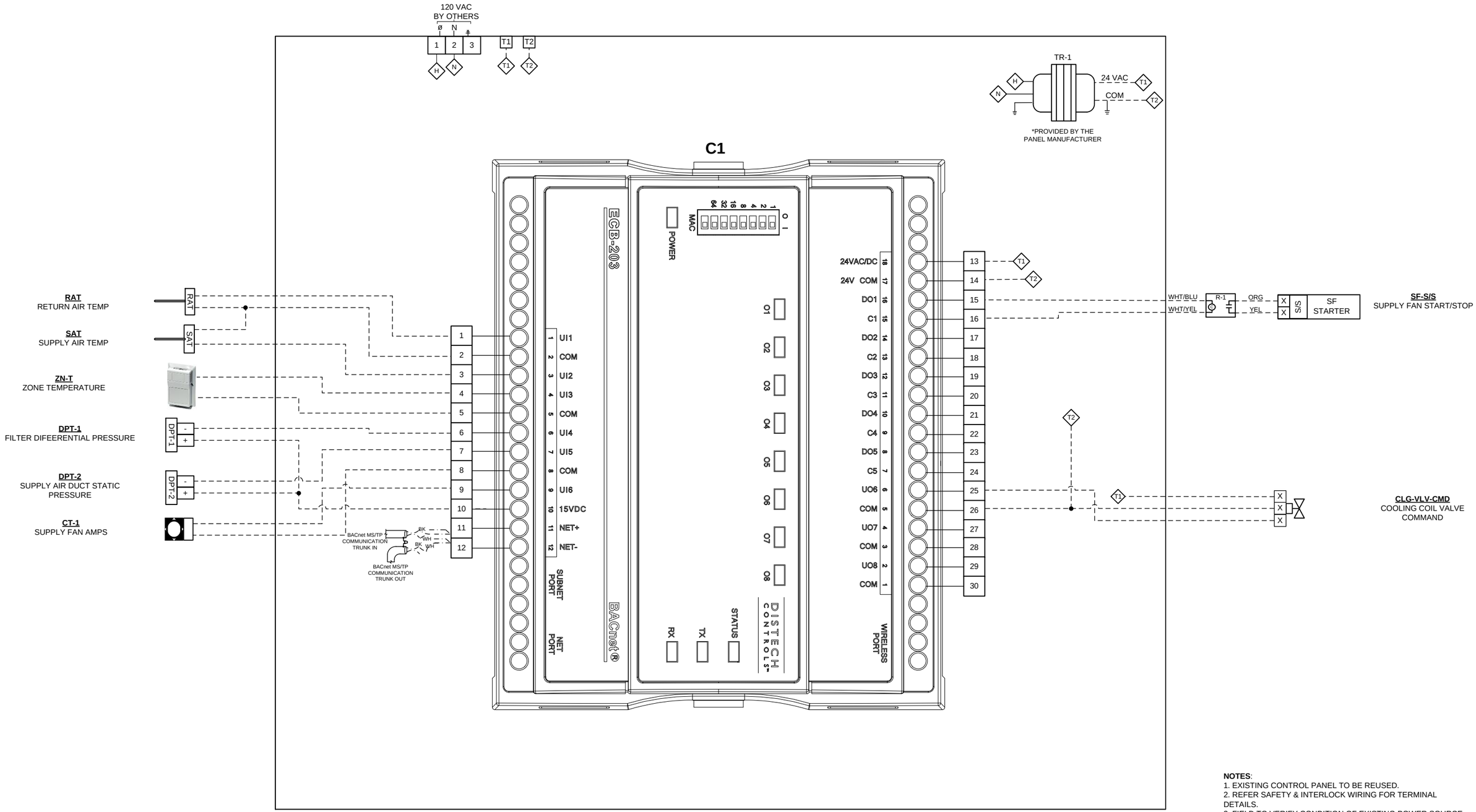
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-17 SCHEMATIC DIAGRAM

AHU-17 WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING PANEL BG-1, MAIN MUSEUM GROUND FLOOR -WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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0	MM/DD/YYYY	Submitted for Approval	ICT

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-17 WIRING DIAGRAM

AHU-17 SEQUENCE OF OPERATION

AHU-17 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2.CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE BASED ON BAS TIME OF DAY SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND NIGHT CYCLE MODE,

4. SUPPLY FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. AHU-17 SHALL PROVIDE COOLING ONLY CONTROL FOR WHEN SPACE LOADS DEMAND COOLING. WHEN SF IS ACTIVATED AND SF DIFFERENTIAL PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

6. WHEN SPACE TEMP IS ABOVE SETPOINT, DDC SHALL MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT.

7. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE COOLING COIL VALVE CLOSED TO THE COIL.

8. DDC SHALL PROVIDE +/- 0.51 CONTROL AROUND OCCUPIED COOLING SETPOINT. DDC SHALL PROVIDE DEADBAND CYCLE CONTROL OF 3°F AROUND UNOCCUPIED COOLING SETPOINT.

9. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:

COOLING OCCUPIED SETPOINT = 72°F

COOLING UNOCCUPIED SETPOINT = 78°F

10. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

11. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND FAN OFF AND CLOSE THE CHILLED WATER COIL VALVE TO THE COIL.

12. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

13. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY FAN FAILURE
LOW SPACE TEMPERATURE	HIGH SPACE TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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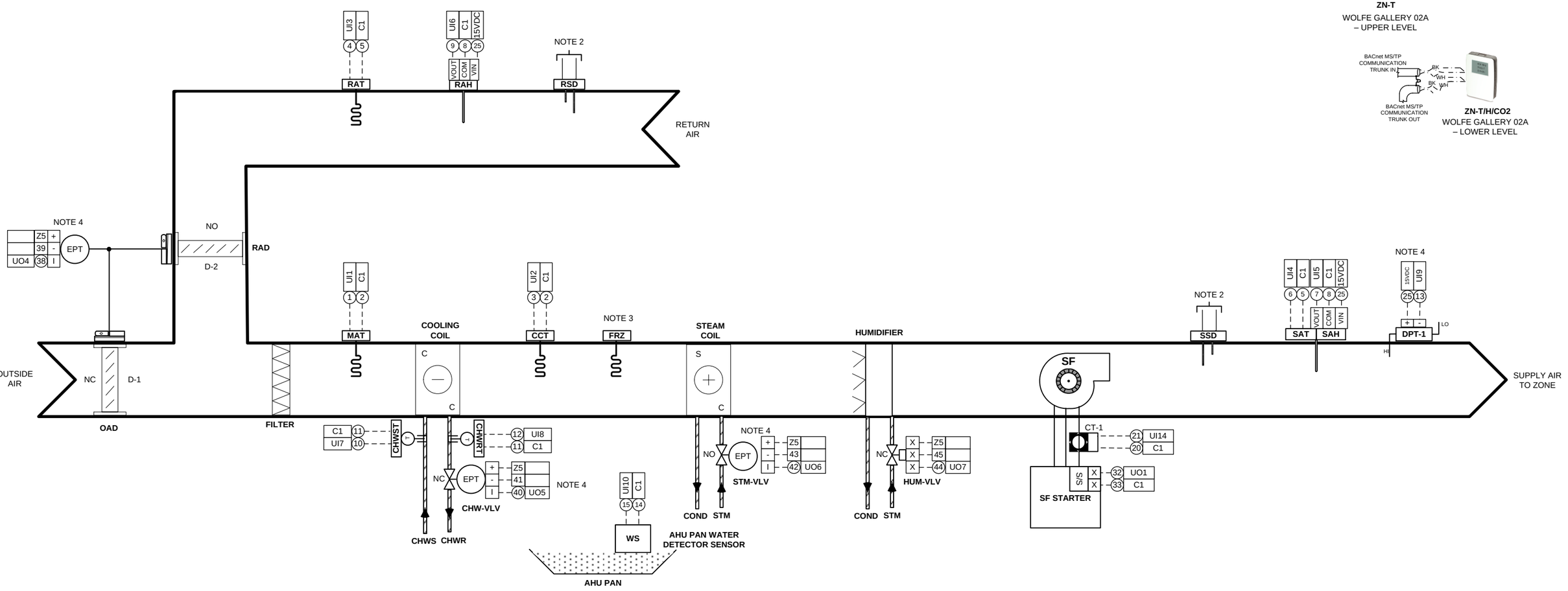
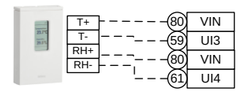
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-17 SEQUENCE OF OPERATION

AHU-3 SCHEMATIC DIAGRAM

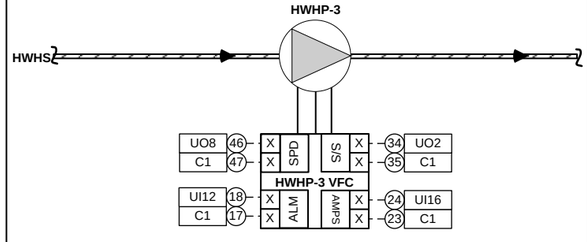




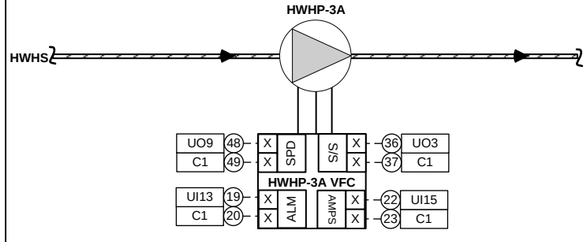
ZN-T
WOLFE GALLERY 02A
– UPPER LEVEL

ZN-T/H/CO2
WOLFE GALLERY 02A
– LOWER LEVEL

AHU-3 HWHP-3 CONTROL



AHU-3 HWHP-3A CONTROL



AHU-3 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-3	MAIN MUSEUM ATTIC	WOLFE GALLERY (02)				M1.1 / M1.10

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
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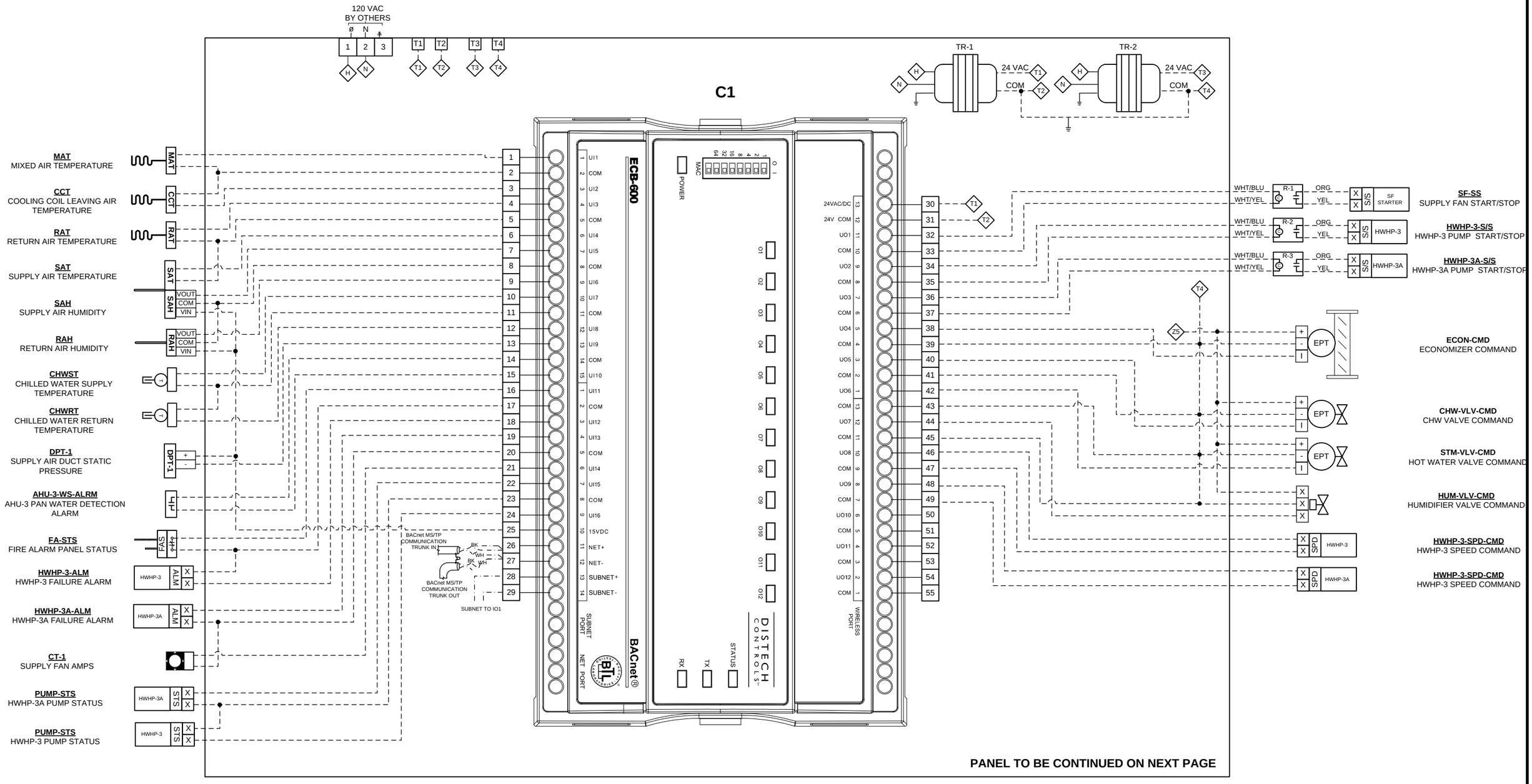
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-3 SCHEMATIC DIAGRAM

AHU-3 WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

CCT
COOLING COIL LEAVING AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RAH
RETURN AIR HUMIDITY

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
SUPPLY AIR DUCT STATIC PRESSURE

AHU-3-WS-ALRM
AHU-3 PAN WATER DETECTION ALARM

FA-STS
FIRE ALARM PANEL STATUS

HWHP-3-ALM
HWHP-3 FAILURE ALARM

HWHP-3A-ALM
HWHP-3A FAILURE ALARM

CT-1
SUPPLY FAN AMPS

PUMP-STS
HWHP-3A PUMP STATUS

PUMP-STS
HWHP-3 PUMP STATUS

SF-SS
SUPPLY FAN START/STOP

HWHP-3-S/S
HWHP-3 PUMP START/STOP

HWHP-3A-S/S
HWHP-3A PUMP START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

STM-VLV-CMD
HOT WATER VALVE COMMAND

HUM-VLV-CMD
HUMIDIFIER VALVE COMMAND

HWHP-3-SPD-CMD
HWHP-3 SPEED COMMAND

HWHP-3-SPD-CMD
HWHP-3 SPEED COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL W/1-IOM, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

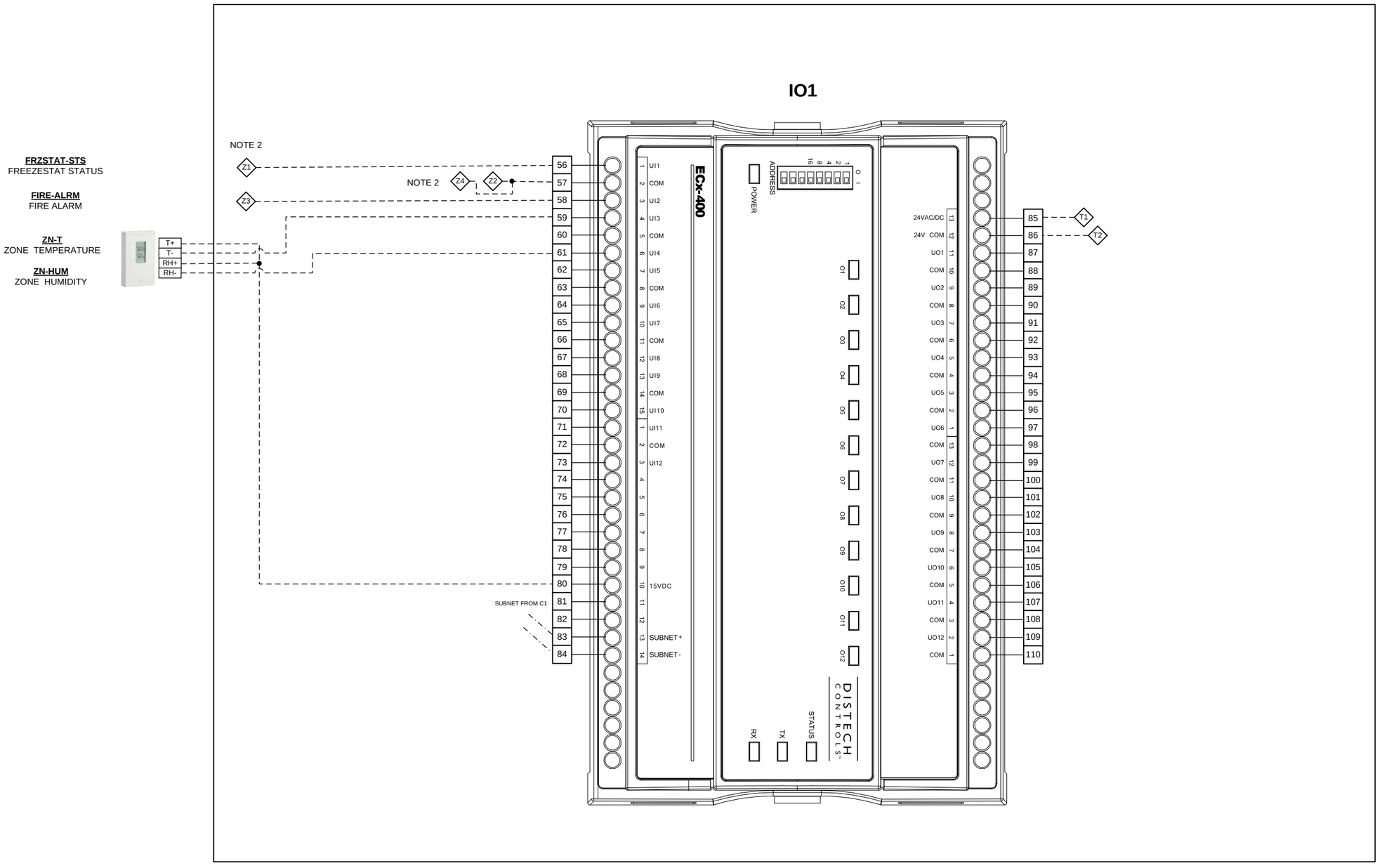
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-3 WIRING DIAGRAM PAGE 1

AHU-3 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL W/1-IOM, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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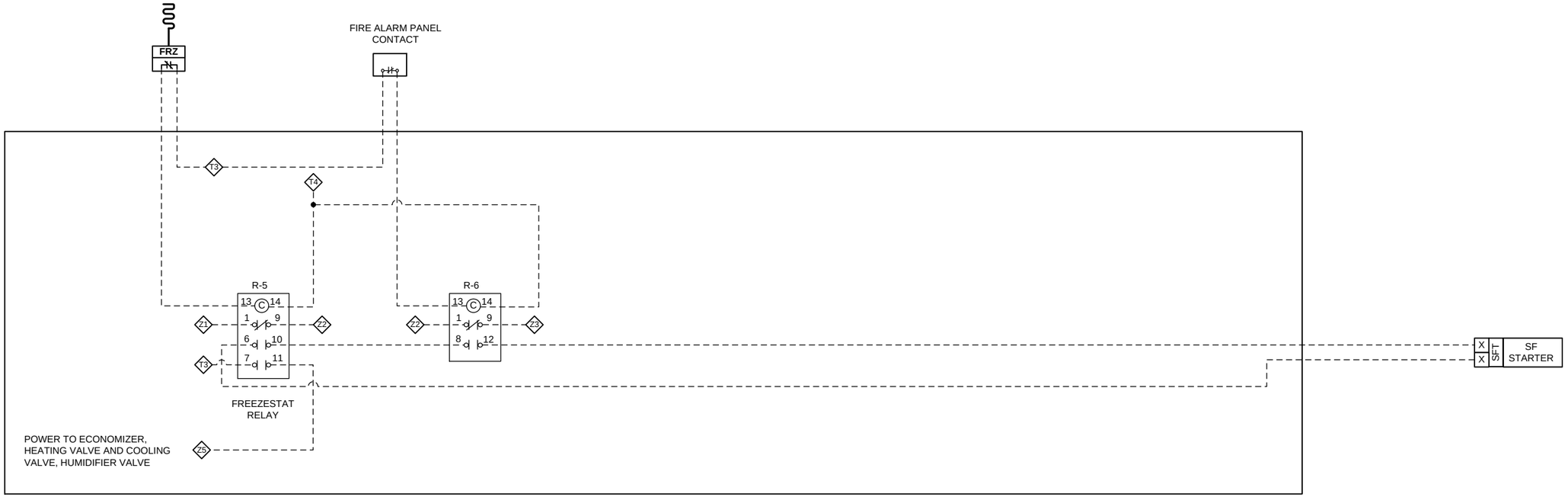
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-3 WIRING DIAGRAM PAGE 2

AHU-3 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL W/1-IOM, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-3 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-3 SEQUENCE OF OPERATION

AHU-3 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

6. CHW PUMPS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ALTERNATE CHW PUMP OPERATION BASED ON RUNTIME HOURS OR AT THE BEGINNING OF EACH MONTH - OPERATOR SELECTABLE. DDC SHALL ACTIVATE ONE OF THE TWO PUMPS AS THE "LEAD" CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY. IF THE "LEAD" PUMP FAILS TO START WITHIN 120 SECONDS DELAY, DDC COMMANDS THE PUMP OFF AND STARTS THE "STANDBY" PUMP. IF THE "STANDBY" PUMP FAILS TO START, DDC COMMANDS THE PUMP OFF. IN BOTH CASES, DDC PROVIDES BAS WITH AN ALARM.

7. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. .

8. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

9. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS.

10. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

11. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT. STEAM COIL VALVE SHALL CLOSE TO THE COIL.

12. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE STEAM COIL VALVE TO MAINTAIN DAT SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

13. DDC SHALL MONITOR ZONE CO2 SENSOR. IF THE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

14. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

15. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

16. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

17. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

18. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

19. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

20. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S).

21. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

22. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS.

23. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE — SUPPLY/RETURN FAN FAILURES

SMOKE DETECTOR(S) — LOW MIXED AIR TEMPERATURE OVERRIDE

LOW DISCHARGE AIR TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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AHU-3 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, CCT, RAT	A/CP-FA-24'-GD	3	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	RAH	A/RH2-D	1	Duct Humidity Sensor, 2% Accuracy	ACI
5	Duct Humidity & Temperature Combo Sensor	SAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
6	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	1	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI
7	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
8	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
9	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
10	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
11	Panel Mounted Relay	R-4	782-2C-24A	1	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-4	782-2C-SKT	1	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
13	Panel Mounted Relay	R-5	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
14	Relay Socket	R-5	784-4C-SKT	1	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
15	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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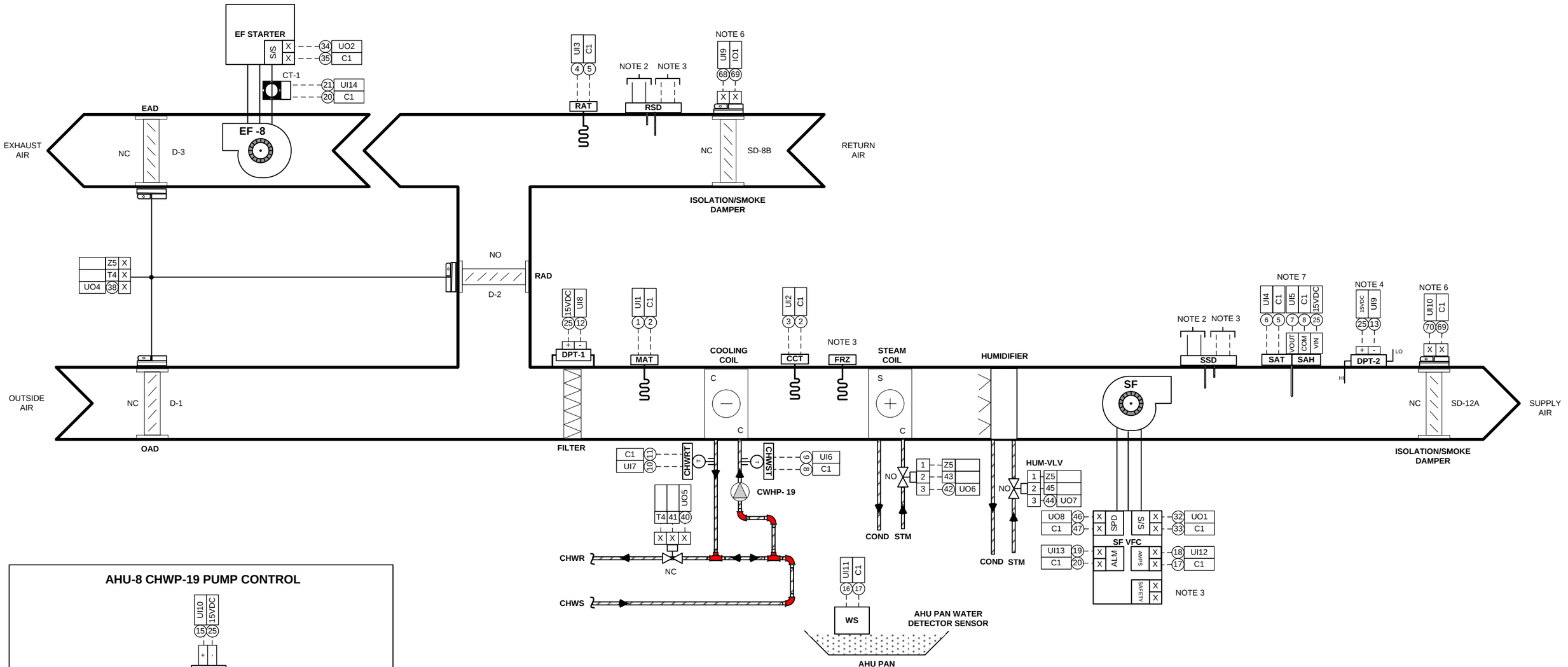
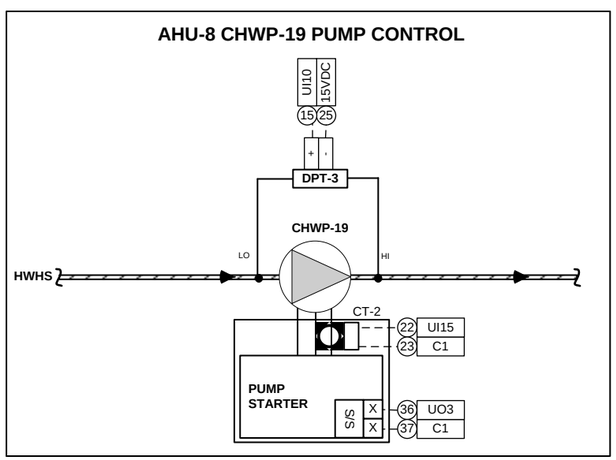
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-3 BILL OF MATERIAL

AHU-8 SCHEMATIC DIAGRAM





AHU-8 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-8	MAIN MUSEUM ATTIC	GALLERY 15, 16, 18 & 19				M1.31

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING
7. TO COMPLY WITH SEQUENCE OF OPERATION WE HAVE ADDED SAT SENSOR IN SCHEMATIC

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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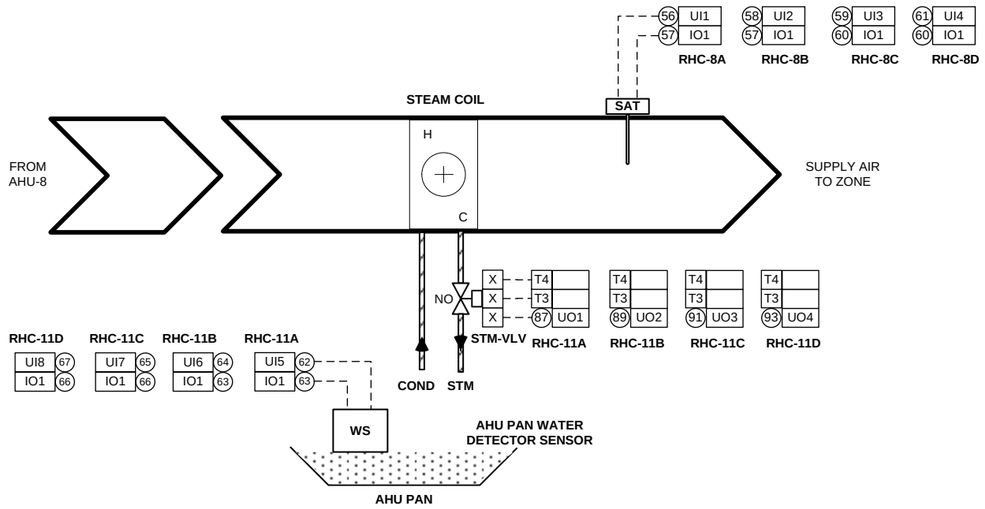
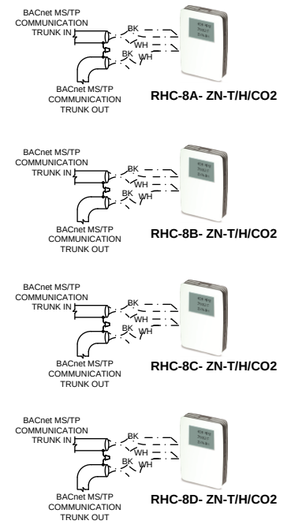
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 SCHEMATIC DIAGRAM

AHU-8 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 4





REHEAT COIL SCHEDULE				
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H/CO2 SENSORS	MECH DWG REF
1	RHC-8A	GALLERY 03	1	M-1.11
2	RHC-8B	GALLERY 04	1	M-1.11
3	RHC-8C	GALLERY 05	1	M-1.11
4	RHC-8D	GALLERY 09	1	M-1.11

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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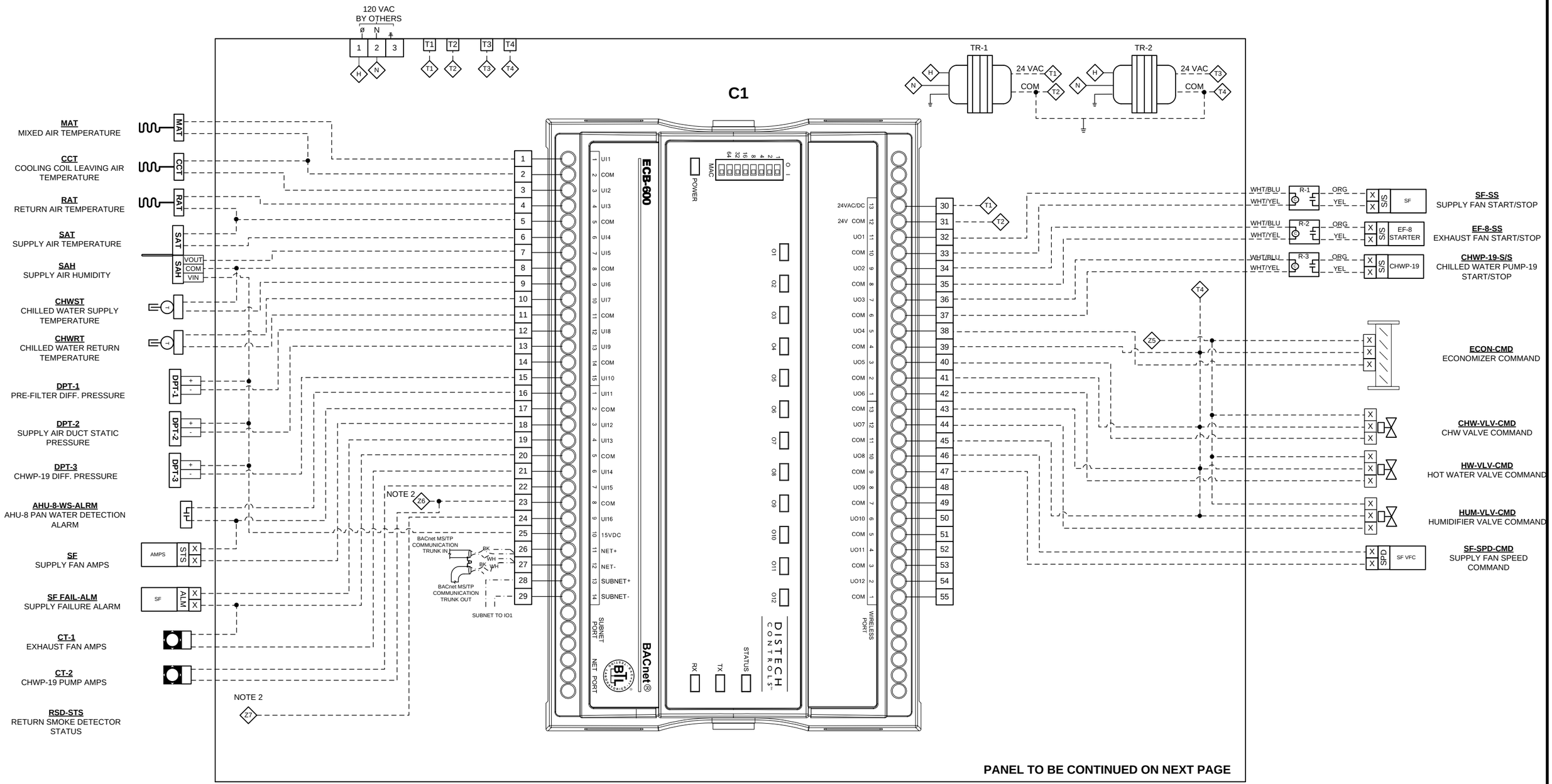
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-8 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-3, MAIN MUSEUM ATTIC-WEST

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS..

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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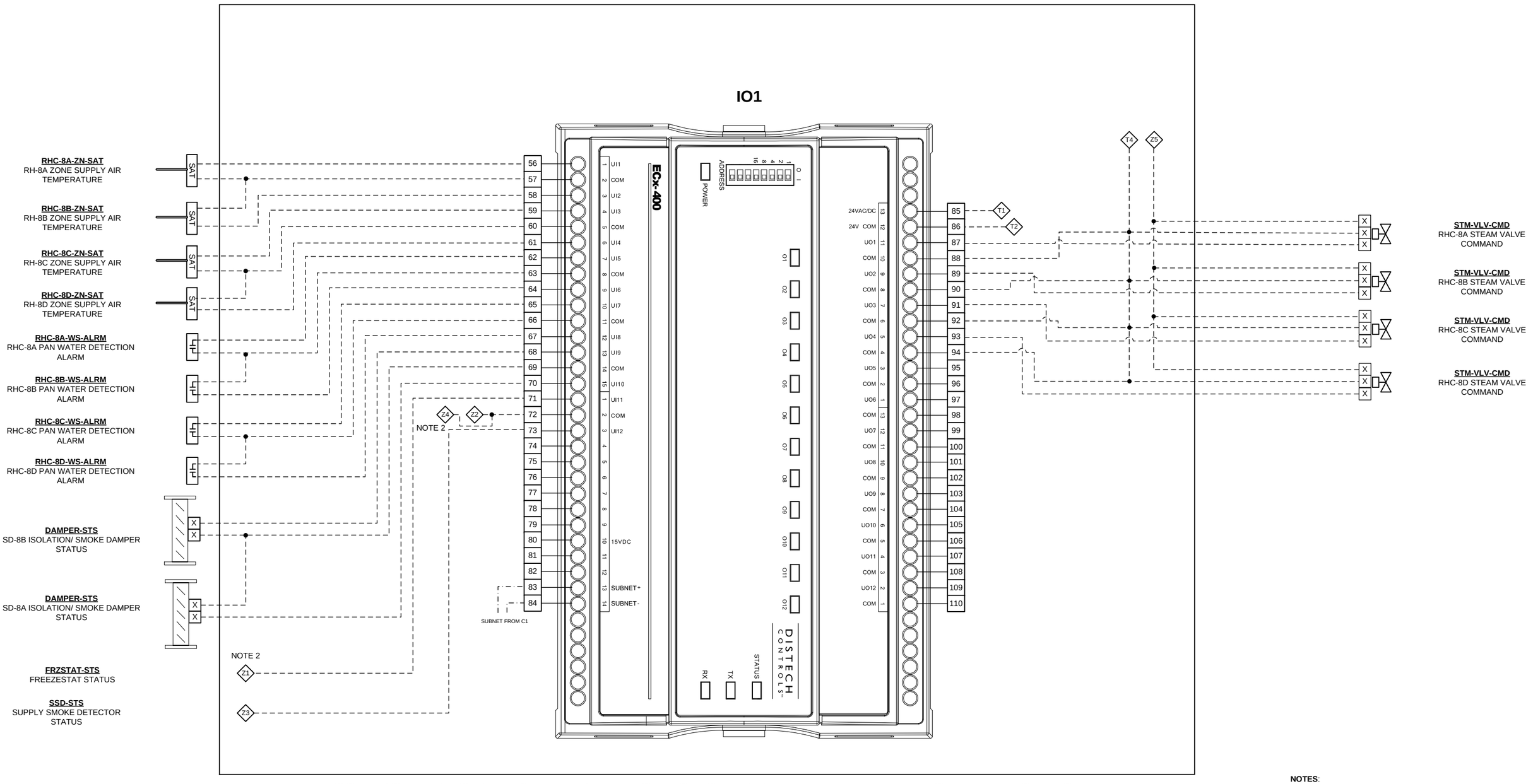
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 WIRING DIAGRAM PAGE 1

AHU-8 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-4, MAIN MUSEUM ATTIC-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
4. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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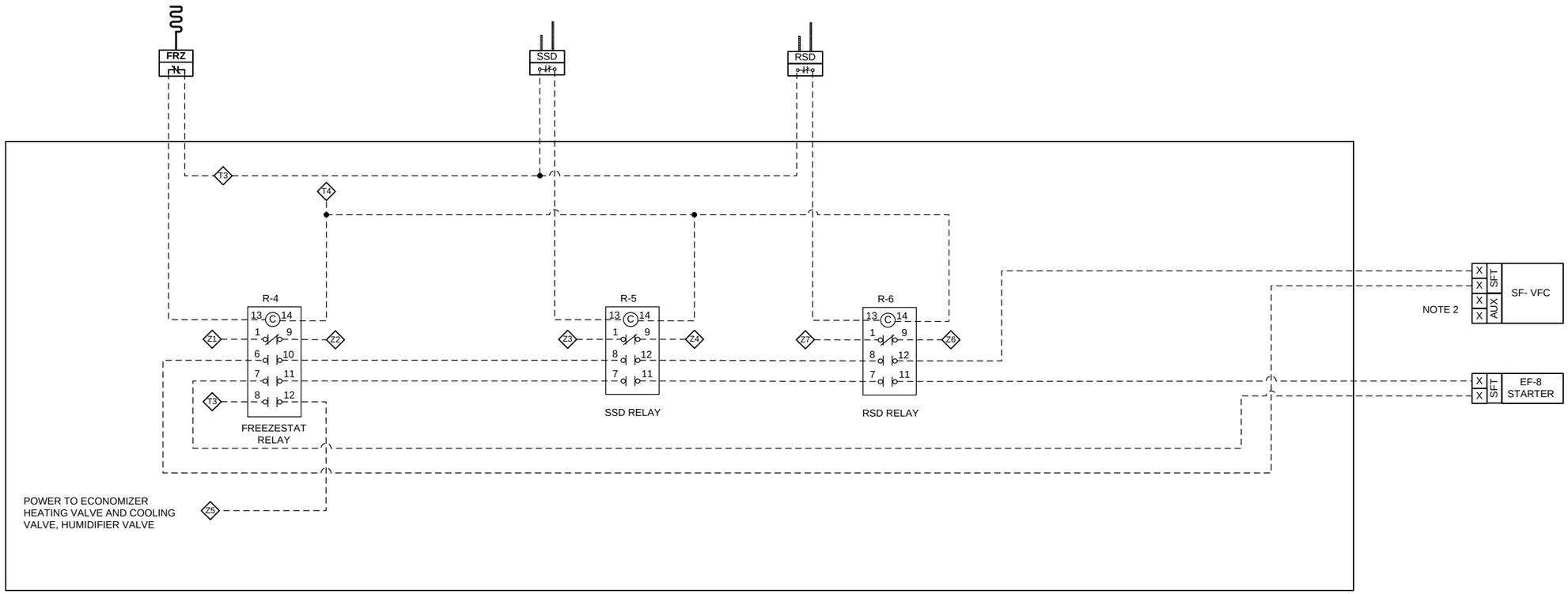
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 WIRING DIAGRAM PAGE 2

AHU-8 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AW-4, MAIN MUSEUM ATTIC-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-8 SEQUENCE OF OPERATION

AHU-8 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY AND EXHAUST FANS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/RA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. CHW PUMP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

8. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

9. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

10. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

11. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

12. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND CLOSE CHW COIL VALVE TO THE COIL.

13. DDC SHALL MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤45°F	60°F
≥ 55°F	55°F

14. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

15. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS. DDC SHALL MONITOR AND AVERAGE THE GALLERY CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT	CO2 600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT	CO2 1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

17. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

18. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE SPACE RELATIVE HUMIDITY SENSOR INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

19. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

20. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

21. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

22. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND EXHAUST FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

23. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

24. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS.

25. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY/EXHAUST FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 SEQUENCE OF OPERATION

AHU-8 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, CCH-T, RAT	A/CP-FA-24'-GD	3	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity & Temperature Combo Sensor	SAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
5	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
6	Relay	R-1 To R3	RIBU1C	3	Universal field mounted Relay	Functional Devices
7	Panel Mounted Relay	R-4 To R-6	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
8	Relay Socket	R-4 To R-6	784-4C-SKT	3	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
9	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

AHU-8 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Duct Temperature Sensor	SAT	A/CP-D-12"-GD	4	Thermistor, 10K Type II, Duct Temperature sensor, 12", Galv. Box	ACI
2	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	4	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.
3. TO COMPILE WITH SEQUENCE OF OPERATION WE HAVE ADDED SAT/H SENSOR

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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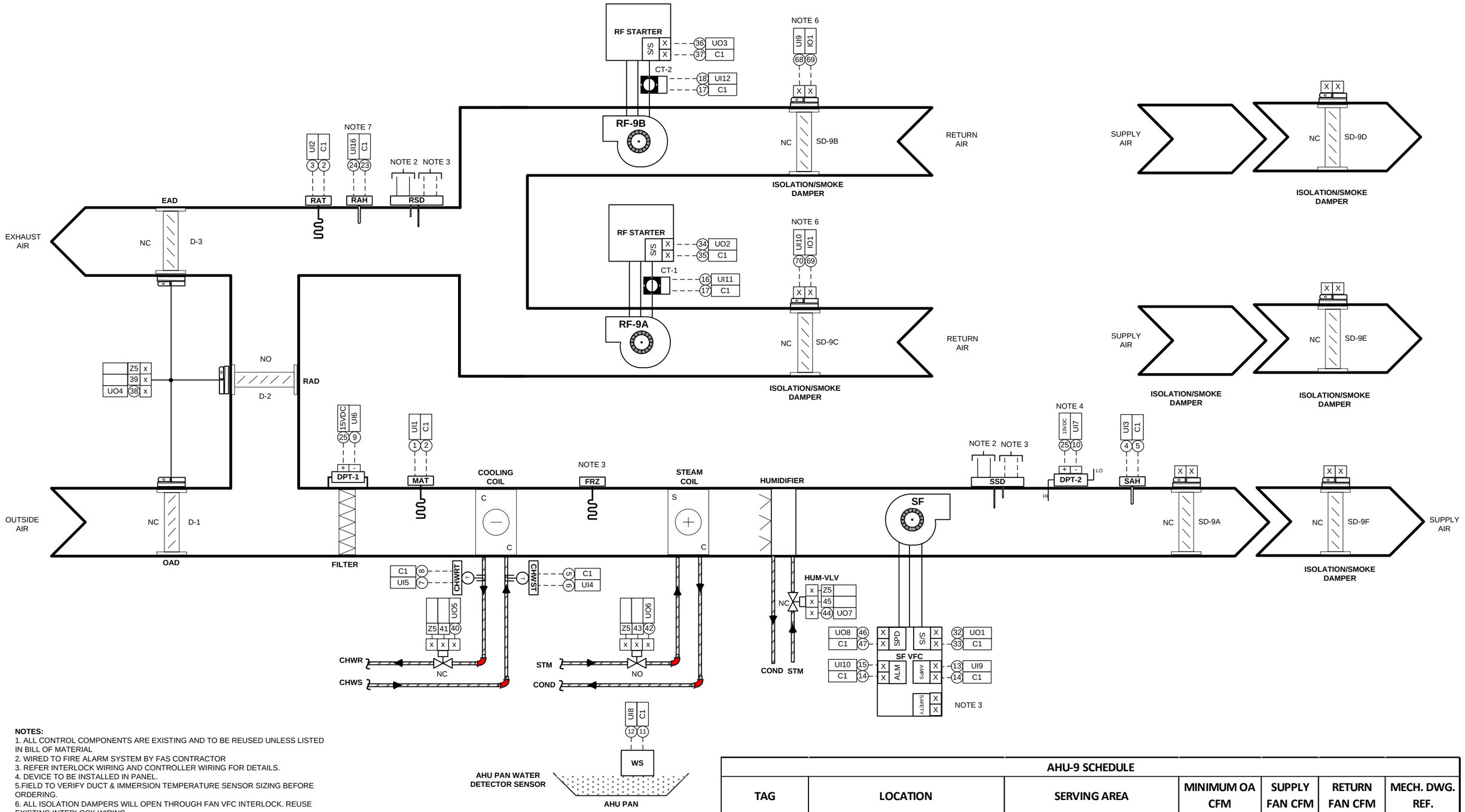
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-8 BILL OF MATERIAL

AHU-9 SCHEMATIC DIAGRAM



NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.
7. TO COMPLY SEQUENCE OF OPERATION WE HAVE ADDED RAH SENSEOR IN SCHEMATIC

AHU-9 SCHEDULE

TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-9	MAIN MUSEUM ATTIC	GALLERY 1, 11 & 35				M1.10

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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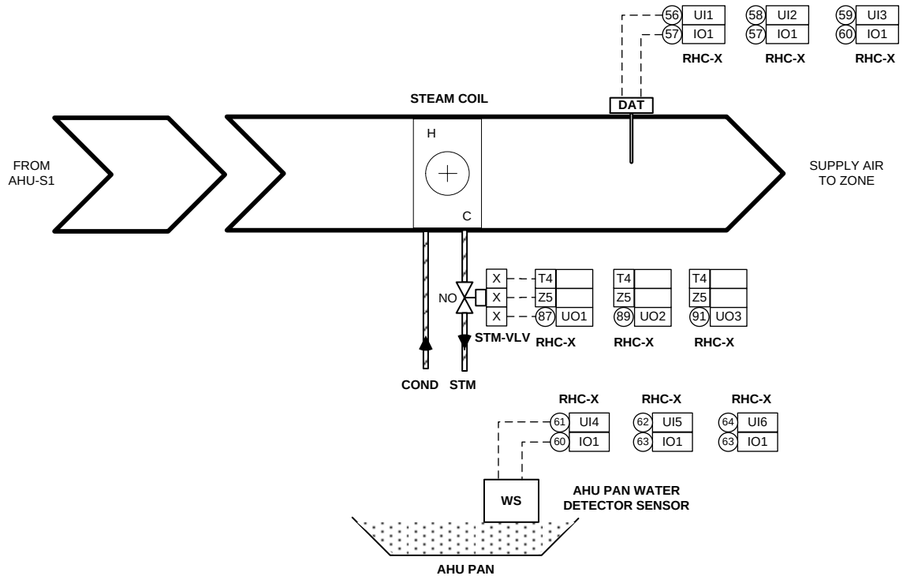
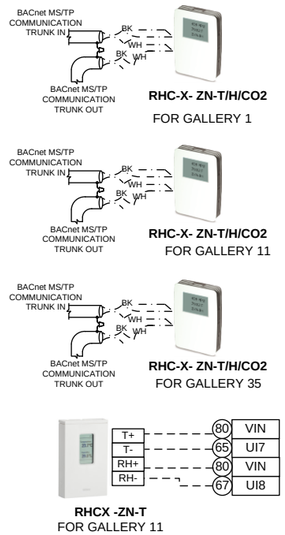
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 SCHEMATIC DIAGRAM

AHU-9 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 3





REHEAT COIL SCHEDULE				
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H/CO2 SENSORS	MECH DWG REF
1	RHC-X	GALLERY 01	1	
2	RHC-X	GALLERY 11	2	
3	RHC-X	GALLERY 35	1	

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

NOTES:
1. FIELD TO VERIFY LOCATION OF RHC & ZONE SERVED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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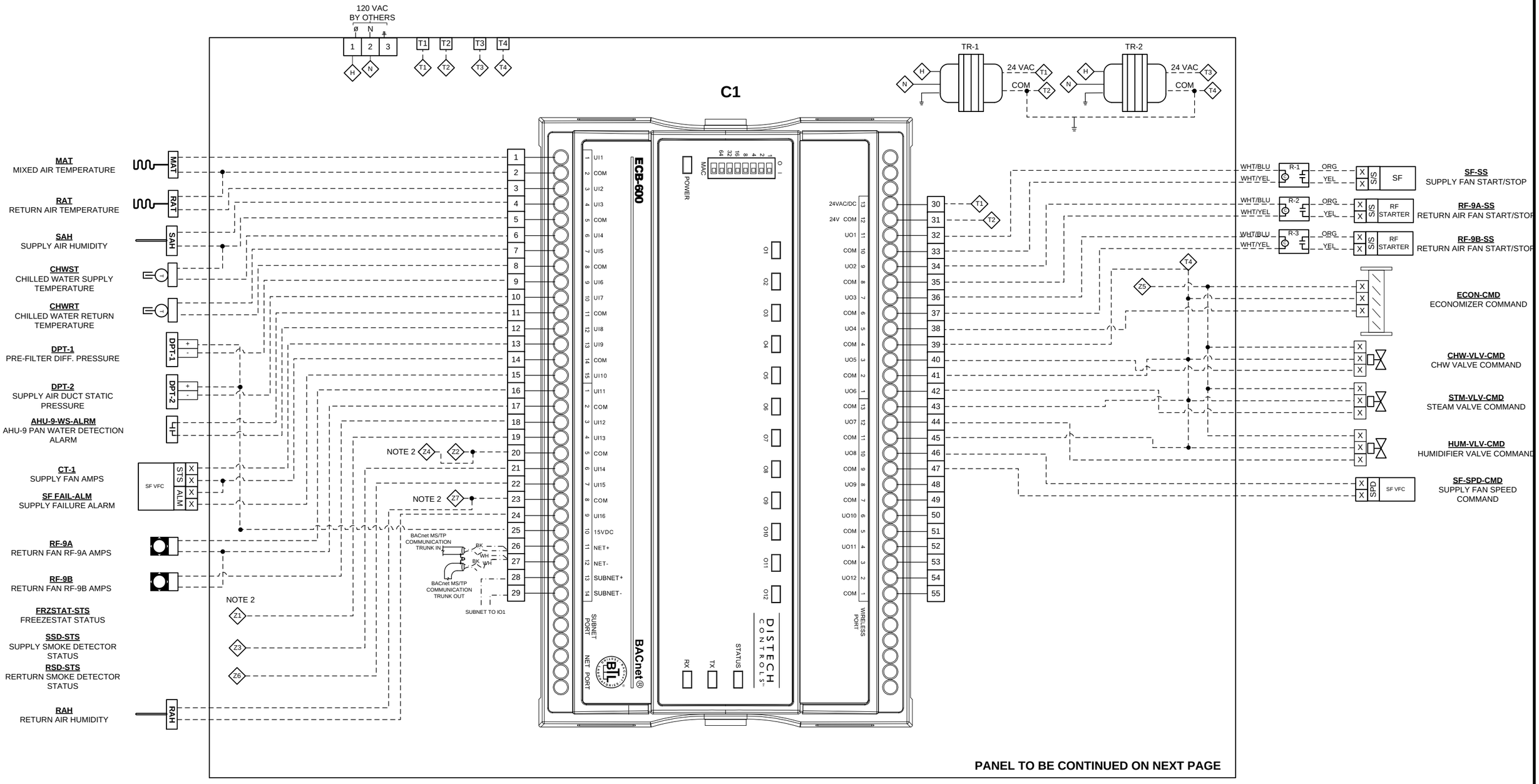
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-9 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-4, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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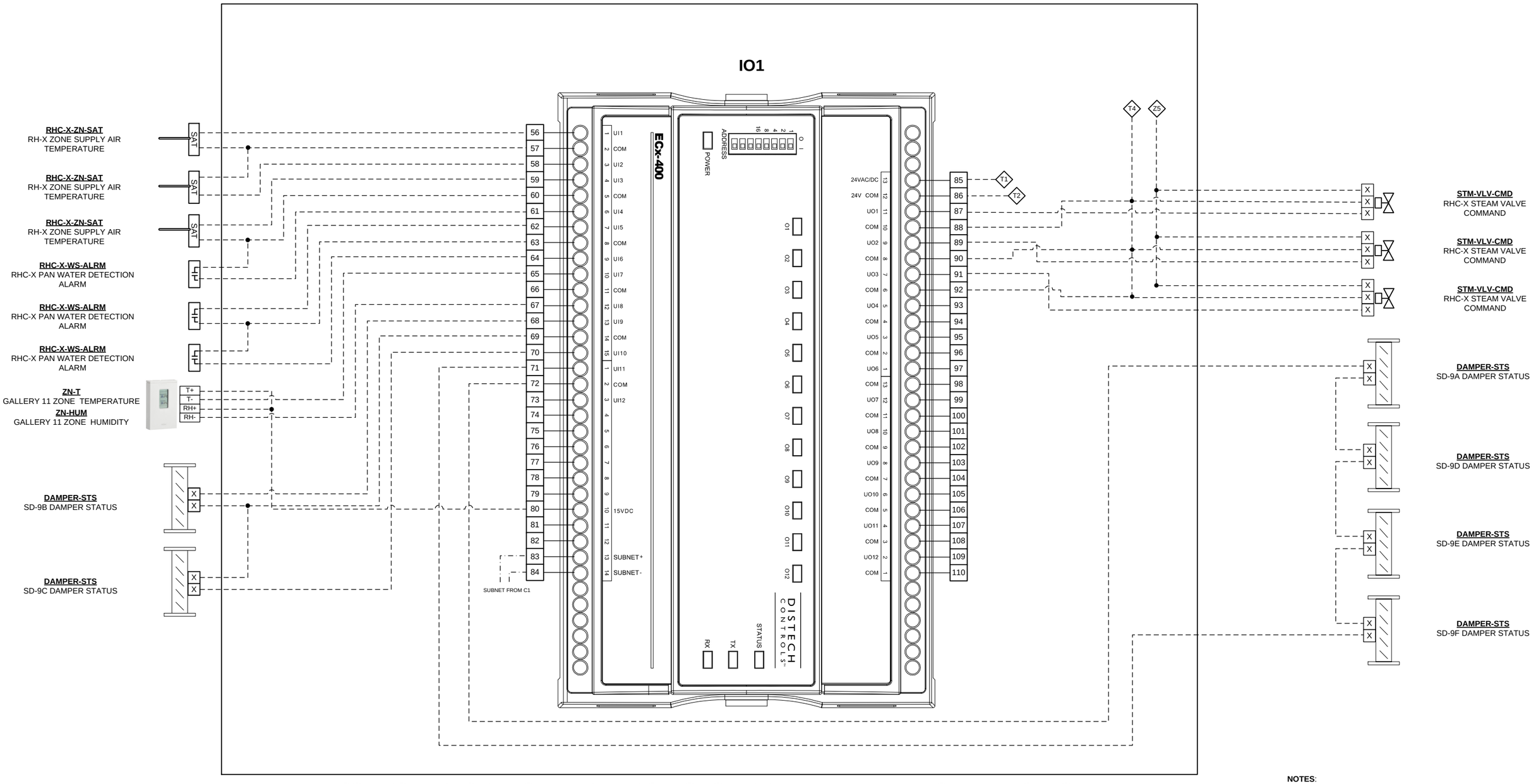
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 WIRING DIAGRAM PAGE 1

AHU-9 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-4, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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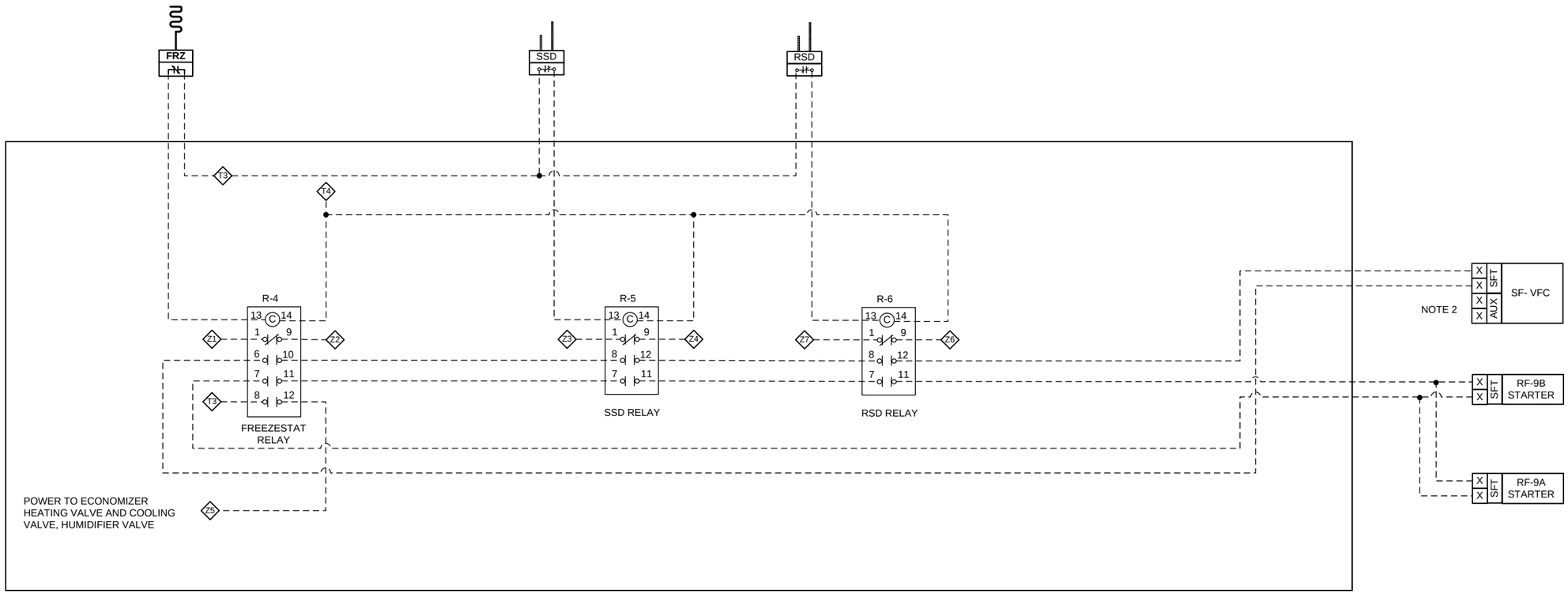
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 WIRING DIAGRAM PAGE 2

AHU-9 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AE-4, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-9 SEQUENCE OF OPERATION

AHU-9 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY AND RETURN FANS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/RA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

7. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

8. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

9. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

10. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

11. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND CLOSE CHW COIL VALVE TO THE COIL.

12. DDC SHALL MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤45°F	60°F
≥55°F	55°F

13. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

14. DDC SHALL MONITOR AND AVERAGE THE GALLERY CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

15. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

16. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE DIRECTOR'S ASSISTANT'S OFFICE RELATIVE HUMIDITY SENSOR INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

17. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

18. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

19. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

20. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

21. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

22. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS.

23. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY/RETURN FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 SEQUENCE OF OPERATION

AHU-9 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, RAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH, RAH	A/RH2-D	2	Duct Humidity Sensor, 2% Accuracy	ACI
5	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
6	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
7	Panel Mounted Relay	R-4 To R-6	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
8	Relay Socket	R-4 To R-6	784-4C-SKT	3	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
9	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

AHU-9 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	3	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
2	Combo Sensor T/H/CO2	ZN-T	TSENSE: CO2	3	CO2 Sensor with Temperature, RH & Display TSENSE is an advanced and versatile 3 in 1 transmitter.	ACI
3	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	1	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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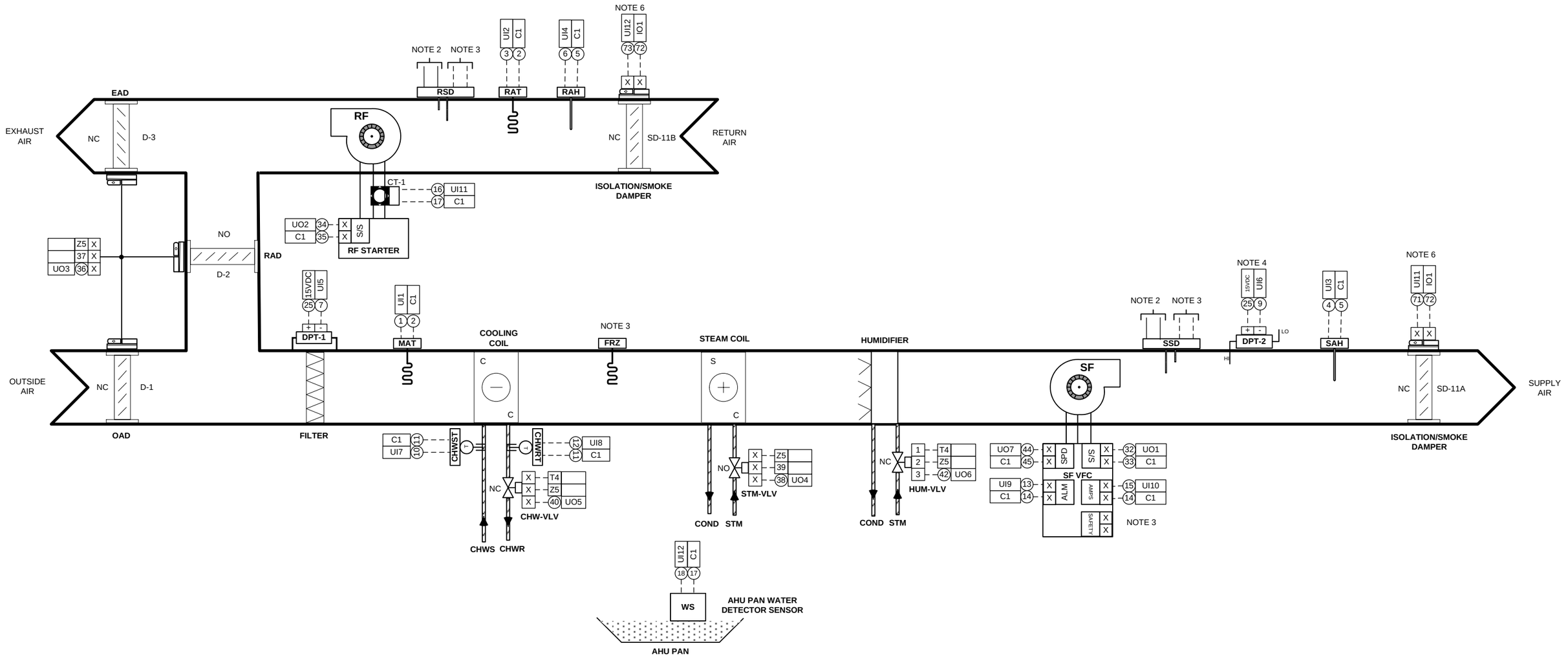
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-9 BILL OF MATERIAL

AHU-11 SCHEMATIC DIAGRAM



AHU-11 SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-11	MAIN MUSEUM ATTIC	GALLERY 03, 04, 05, 09 &10				M1.10

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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Astoria, NY 11103
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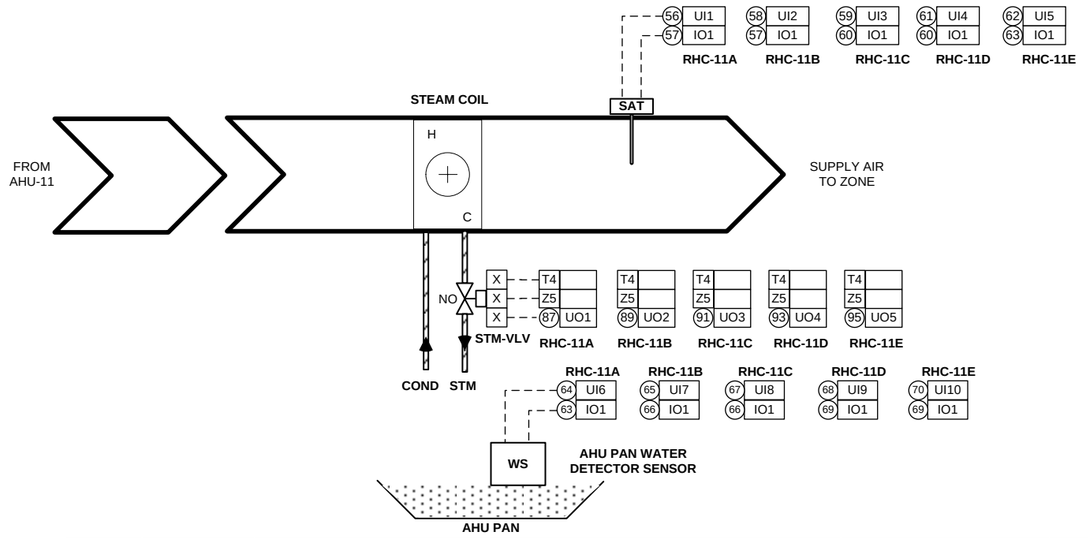
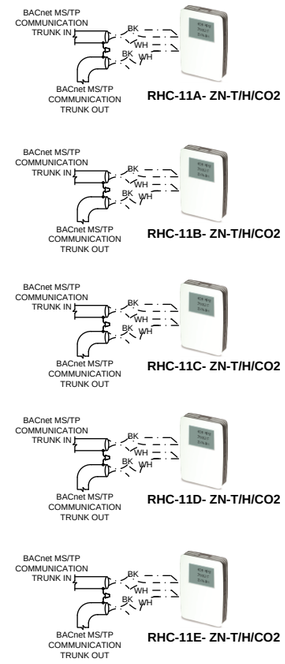
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 SCHEMATIC DIAGRAM

AHU-11 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 4





REHEAT COIL SCHEDULE				
ITEM #	TAG	LOCATION & SERVING AREA	NO OF ASSOCIATED T/H/CO2 SENSORS	MECH DWG REF
1	RHC-11A	GALLERY 03	1	M-1.11
2	RHC-11B	GALLERY 04	1	M-1.11
3	RHC-11C	GALLERY 05	1	M-1.11
4	RHC-11D	GALLERY 09	1	M-1.11
5	RHC-11E	GALLERY 10	1	M-1.11

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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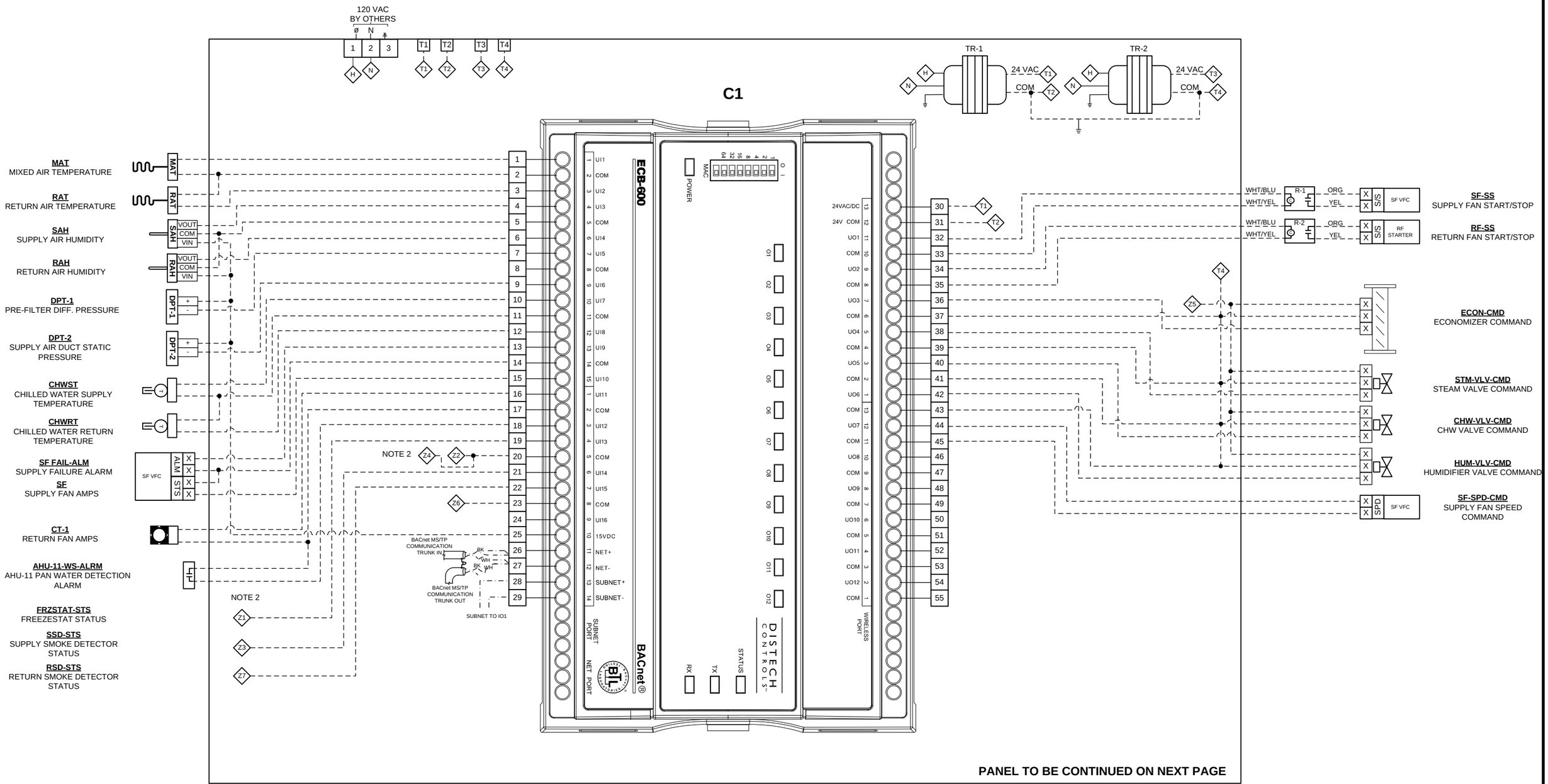
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-11 WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RAH
RETURN AIR HUMIDITY

DPT-1
PRE-FILTER DIFF. PRESSURE

DPT-2
SUPPLY AIR DUCT STATIC PRESSURE

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

SF FAIL-ALM
SUPPLY FAILURE ALARM

SF
SUPPLY FAN AMPS

CT-1
RETURN FAN AMPS

AHU-11-WS-ALRM
AHU-11 PAN WATER DETECTION ALARM

FRZSTAT-STS
FREEZESTAT STATUS

SSD-STS
SUPPLY SMOKE DETECTOR STATUS

RSD-STS
RETURN SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

RF-SS
RETURN FAN START/STOP

ECON-CMD
ECONOMIZER COMMAND

STM-VLV-CMD
STEAM VALVE COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

HUM-VLV-CMD
HUMIDIFIER VALVE COMMAND

SF-SPD-CMD
SUPPLY FAN SPEED COMMAND

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-2, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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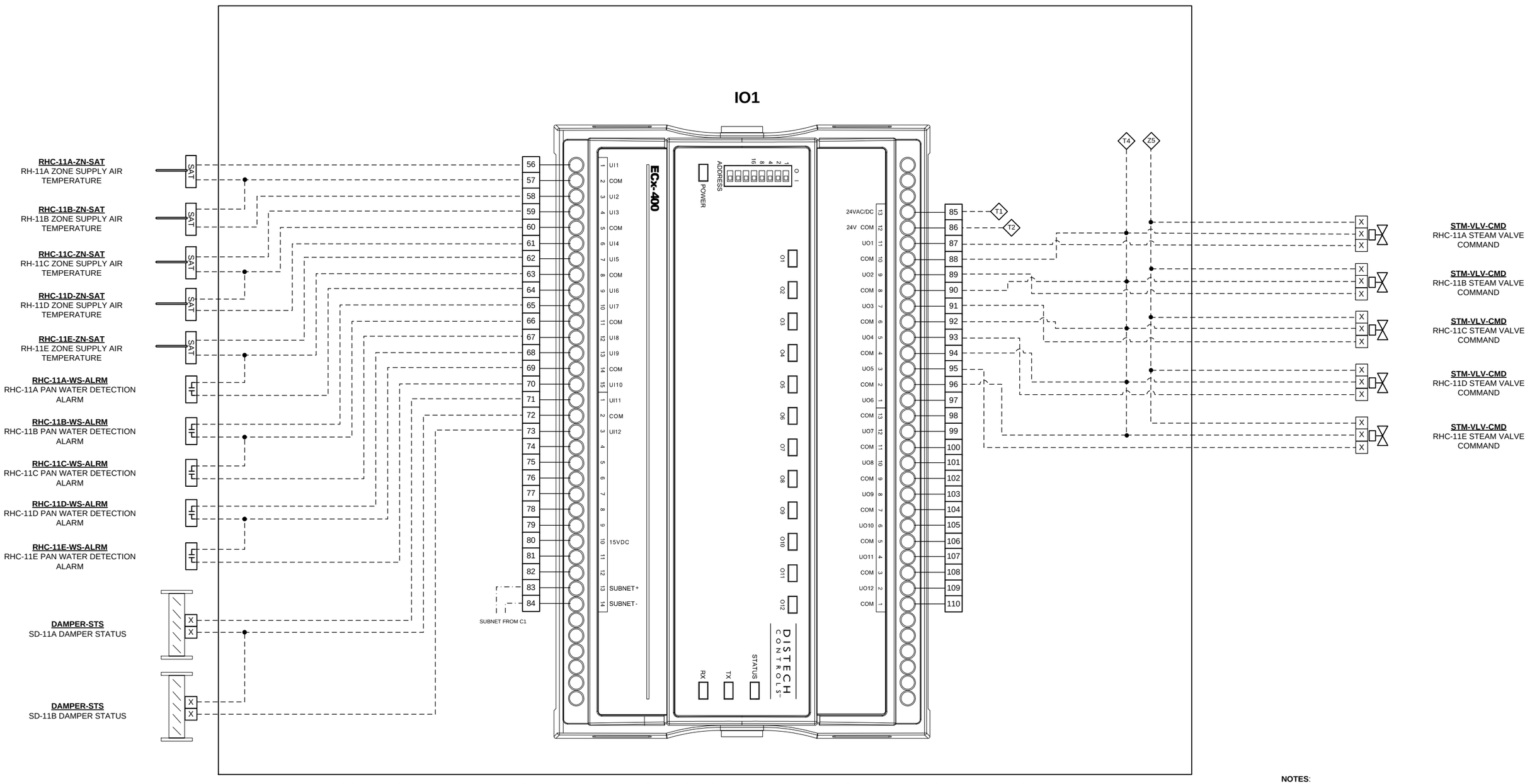
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 WIRING DIAGRAM PAGE 1

AHU-11 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-2, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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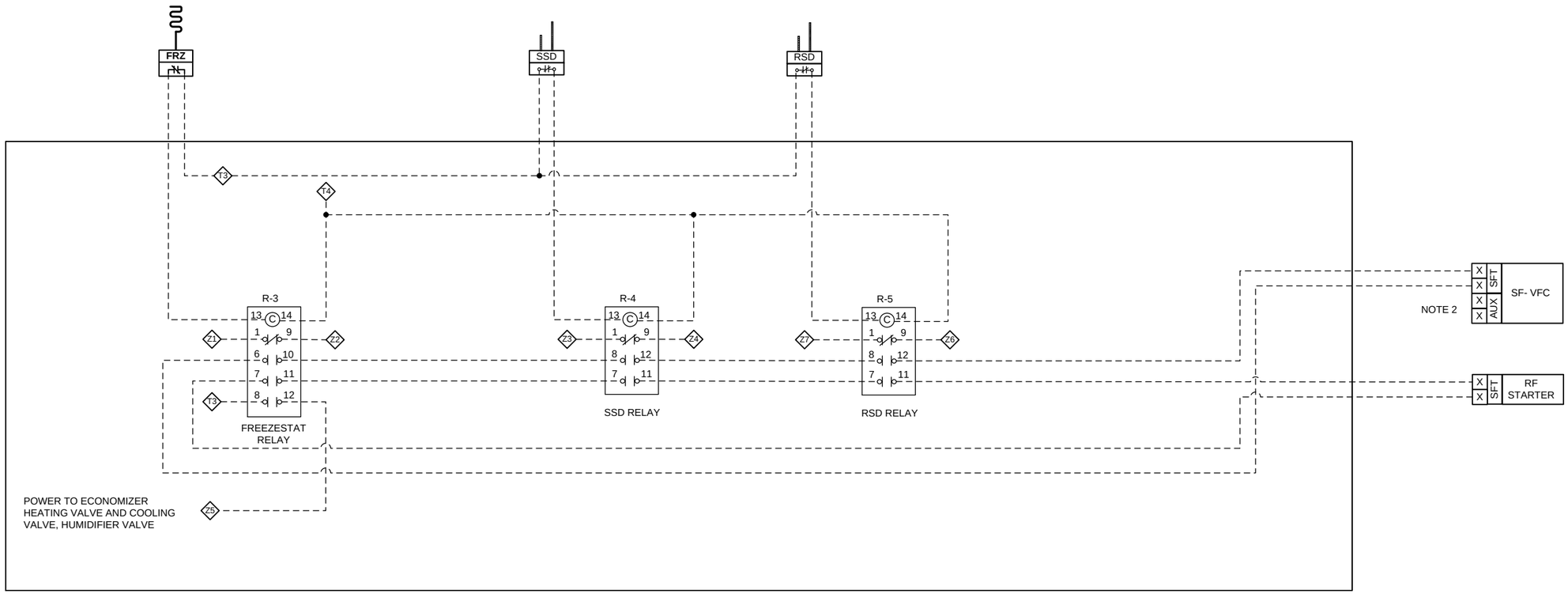
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 WIRING DIAGRAM PAGE 2

AHU-11 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AE-2, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-11 SEQUENCE OF OPERATION

AHU-11 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY AND RETURN FANS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/RA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

7. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

8. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

9. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

10. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

11. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND CLOSE CHW COIL VALVE TO THE COIL.

12. DDC SHALL MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤ 45°F	60°F
≥ 55°F	55°F

13. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS.

14. DDC SHALL MONITOR AND AVERAGE THE GALLERY CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

16. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

17. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

18. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

19. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND RETURN FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

20. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

21. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS.

22. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY/RETURN FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-11 SEQUENCE OF OPERATION

AHU-11 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, RAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH, RAH	A/RH2-D	2	Duct Humidity Sensor, 2% Accuracy	ACI
5	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5” insertion	ACI
6	Relay	R-1, R-2	RIBU1C	2	Universal field mounted Relay	Functional Devices
7	Panel Mounted Relay	R-3 To R-5	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
8	Relay Socket	R-3 To R-5	784-4C-SKT	3	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct
9	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

AHU-11 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	5	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
2	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	5	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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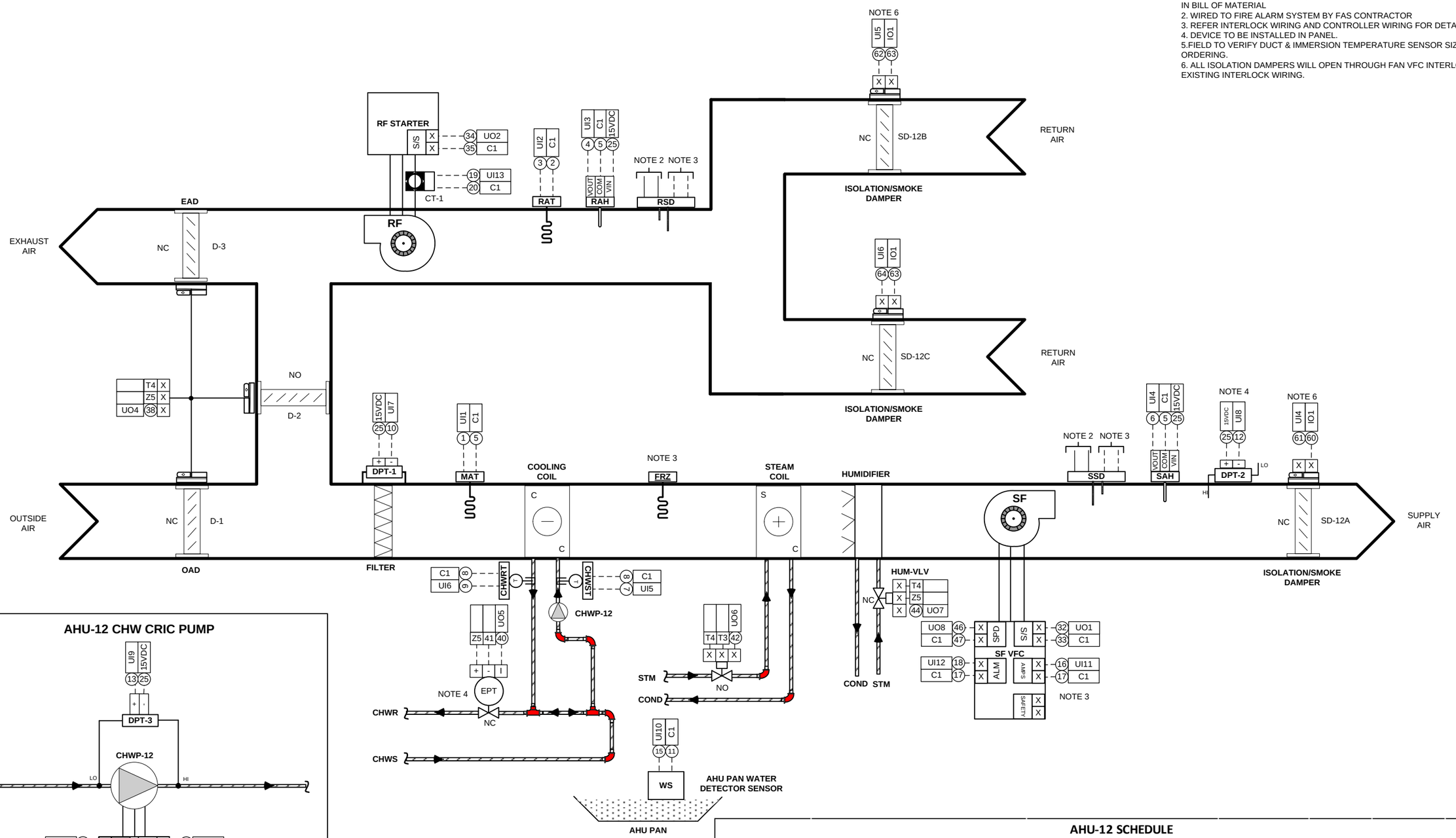
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

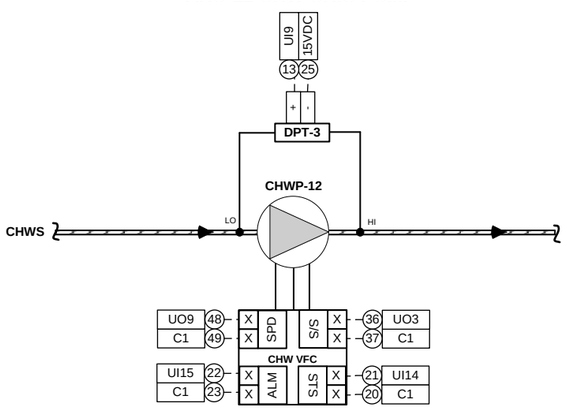
AHU-11 BILL OF MATERIAL

AHU-12 SCHEMATIC DIAGRAM

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
6. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.



AHU-12 CHW CRIC PUMP



AHU-12 SCHEDULE

TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
AHU-12	MAIN MUSEUM ATTIC	GALLERY 06, 07 & 08				M1.10

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

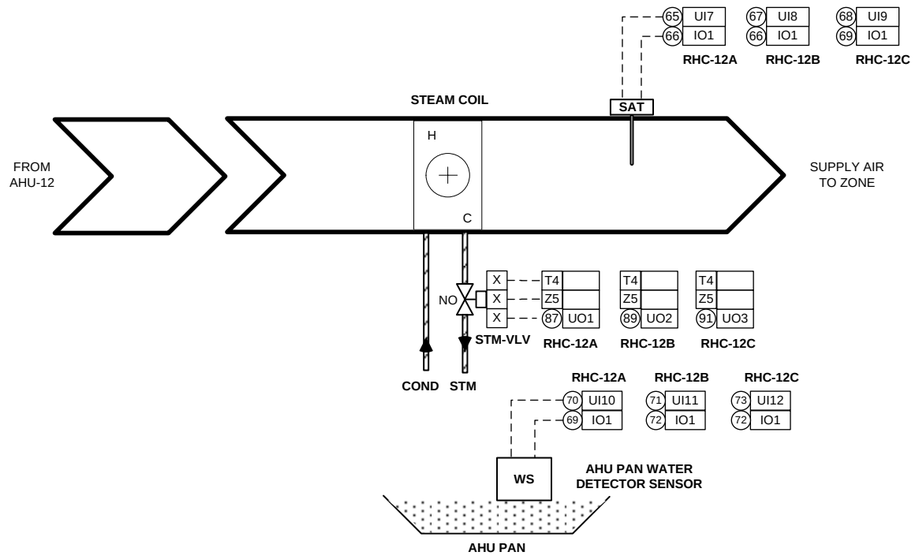
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

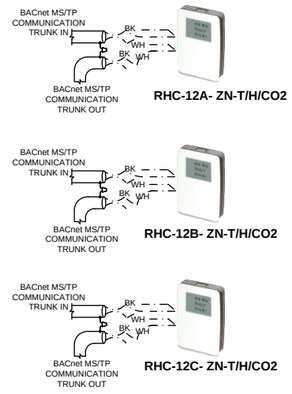
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 SCHEMATIC DIAGRAM

AHU-12 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

TYPICAL OF 3





REHEAT COIL SCHEDULE				
ITEM #	**TAG**	**LOCATION & SERVING AREA**	**NO OF ASSOCIATED T/H/CO2 SENSORS**	**MECH DWG REF**
1	RHC-12A	GALLERY 06	1	M-1.11
2	RHC-12B	GALLERY 07	1	M-1.11
3	RHC-12C	GALLERY 08	1	M-1.11

ZONE TEMPERATURE CONTROL:

1. ZONES MAY HAVE ONE OR MORE ASSOCIATED SPACES, TEMP OR TEMP/HUMIDITY SENSORS AND DUCT-MOUNTED REHEAT COILS.

2. ZONE TEMP OR TEMP/HUMIDITY IN EACH SPACE SHALL MAINTAIN ZONE TEMPERATURE TO MUSEUM STANDARD SETPOINTS. WHEN MULTIPLE TEMP OR TEMP/HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE TEMP SENSOR READINGS FOR CONTROL.

3. DDC SHALL SHALL MODULATE THE ZONE HWH CONTROL VALVE(S) ON THE ASSOCIATED REHEAT COIL(S) TO MAINTAIN THE SPACE TEMPERATURE SETPOINTS.

4. DEADBAND CONTROL OF ZONE TEMPERATURE SHALL ALLOW NO MORE THAN +/-1°F TEMPERATURE CHANGE (ADJ.) PER 24 HOUR-PERIOD (ADJ.). A 3°F DEADBAND (ADJ.) PER ZONE SHALL REQUIRE NO CONTROL CHANGES.

5. DDC SHALL LIMIT THE HWH REHEAT COIL DISCHARGE AIR TEMP FROM EXCEEDING 90°F HIGH LIMIT SETPOINT.

6. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

LOW SPACE TEMPERATURE HIGH SPACE TEMPERATURE

LOW SPACE HUMIDITY HIGH SPACE HUMIDITY

HIGH CO2 LEVEL (WHERE APPLICABLE)

7. WHEN THE AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL MODULATE THE HWH REHEAT COIL VALVE TO MAINTAIN 50°F LEAVING AIR TEMPERATURE SETPOINT. WHEN THE AIR HANDLING UNIT IS ENERGIZED AND AIRFLOW PROVEN FROM THE DUCT STATIC PRESSURE SENSOR, DDC SHALL CONTROL FOR SPACE TEMPERATURE SETPOINT.

8. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

9. COORDINATE ALARM LEVEL SETPOINTS WITH THE OWNER. ZONES NEAR EXTERIOR ENTRANCES MAY REQUIRE DELAYS BEFORE ALARMING TO ALLOW FLUCTUATING SPACE CONDITIONS TO STABILIZE.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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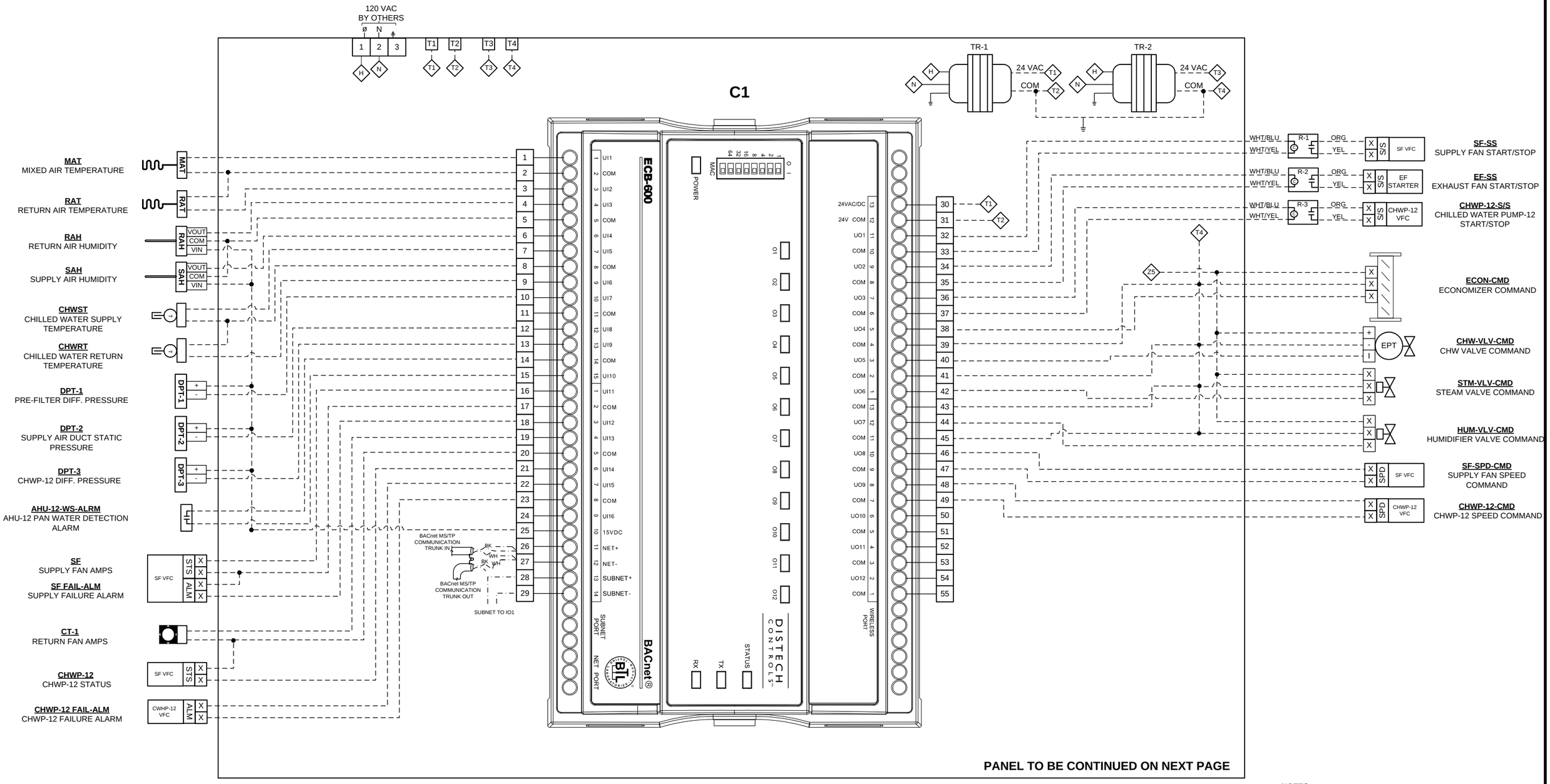
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 ZONE DUCT HEATING COIL SCHEMATIC DIAGRAM

AHU-12 WIRING DIAGRAM PAGE 1



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-1, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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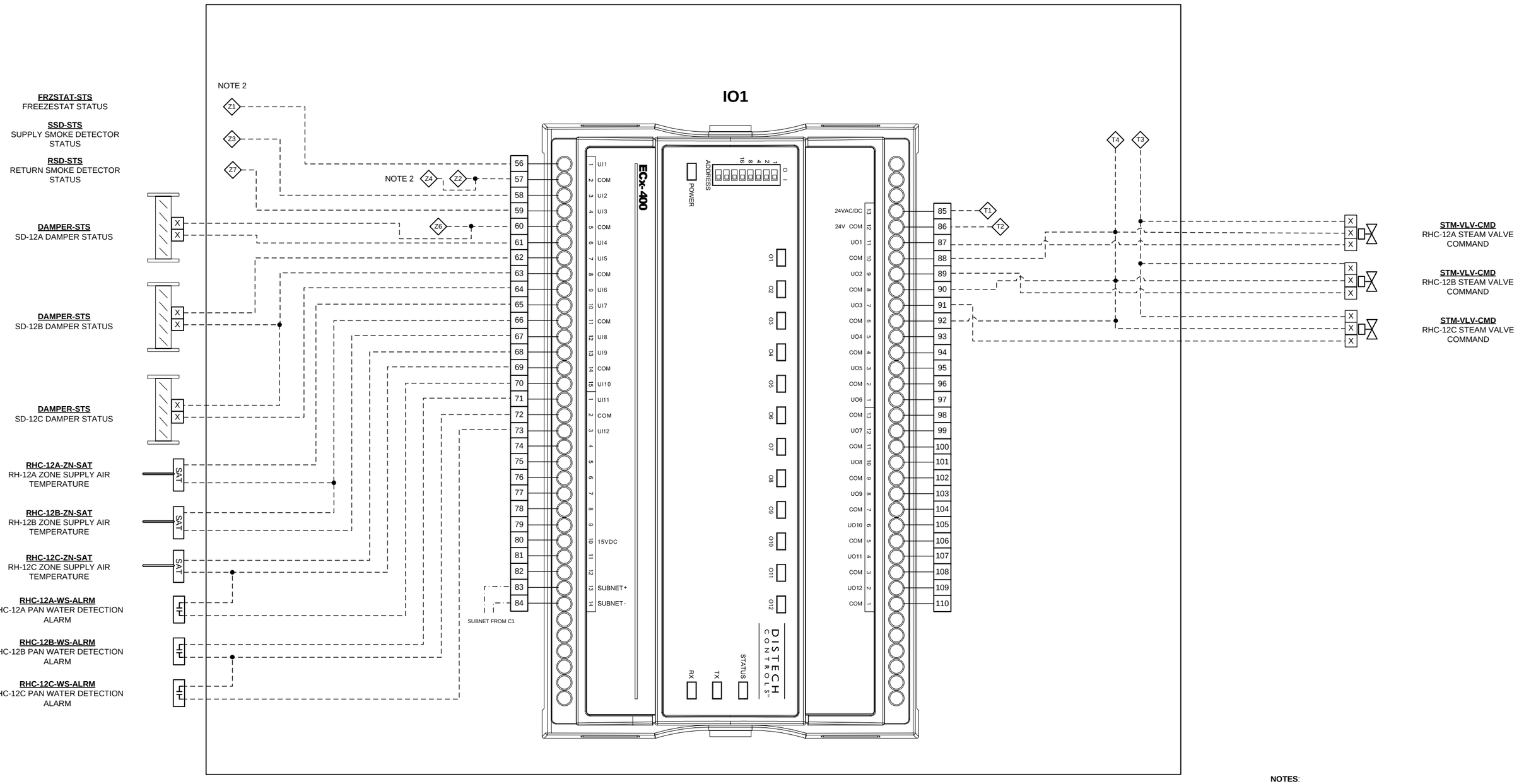
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 WIRING DIAGRAM PAGE 1

AHU-12 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-1, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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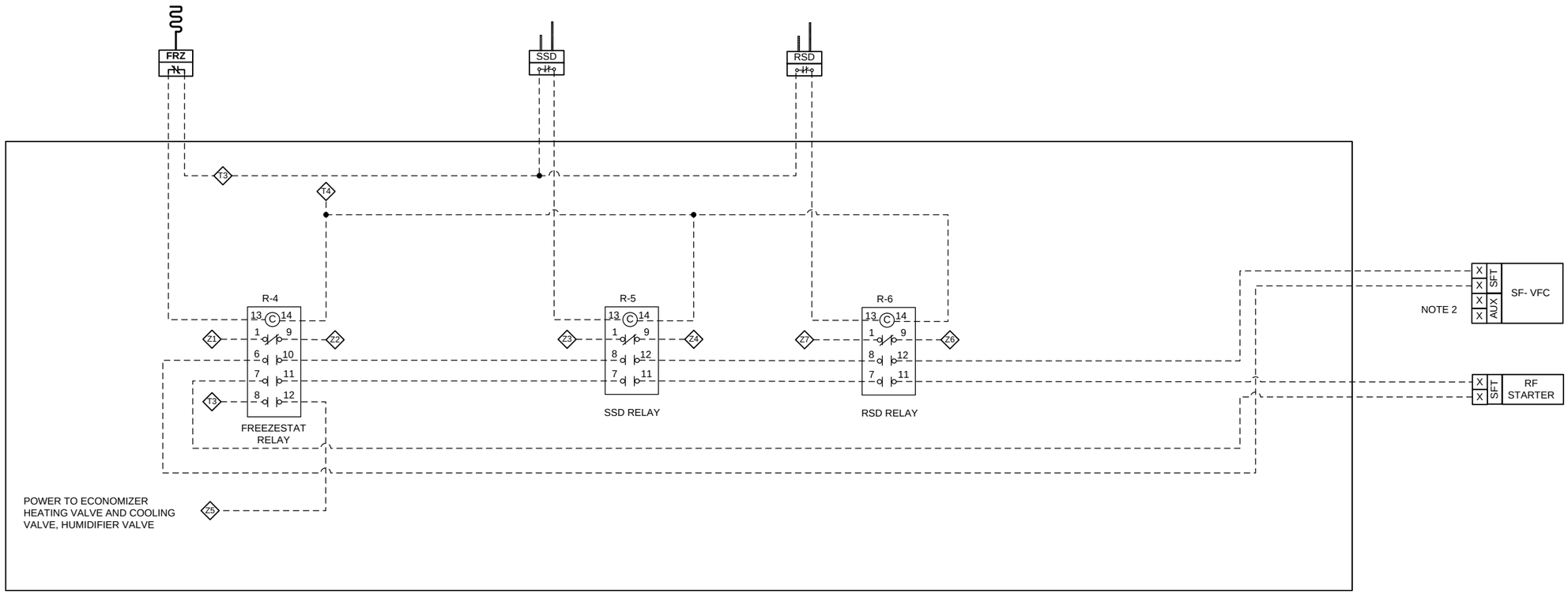
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 WIRING DIAGRAM PAGE 2

AHU-12 INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AE-1, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. ALL ISOLATION DAMPERS WILL OPEN THROUGH FAN VFC INTERLOCK. REUSE EXISTING INTERLOCK WIRING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-12 SEQUENCE OF OPERATION

AHU-12 SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY AND EXHAUST FANS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED, WIRING INTERLOCK THRU VFC SHALL OPEN THE NORMALLY CLOSED SA/RA SMOKE ISOLATION DAMPERS. SMOKE DAMPER POSITION SHALL BE PROVEN WITH A LIMIT SWITCH TO DDC DIGITAL INPUT. WHEN INPUTS INDICATE ALL DAMPERS ARE OPEN, DDC SHALL ALLOW FAN OPERATION. WHEN SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PROVIDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. CHW PUMP SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. PUMP STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED, DDC SHALL POSITION THE MIXED AIR DAMPERS TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. UPON FAN START-UP OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS (ADJ.).

8. DDC SHALL OVERRIDE MIXED AIR DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MA LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC. CO2 LEVEL CONTROL SHALL BE DISABLED.

9. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

10. WHEN DISCHARGE AIR TEMP (DAT) IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

11. WHEN DAT IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN DAT SETPOINT.

12. WHEN DAT IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND CLOSE CHW COIL VALVE TO THE COIL.

13. DDC SHALL MAINTAIN THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SETPOINT BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

OAT	DAT
≤45°F	60°F
≥ 55°F	55°F

14. DDC SHALL CHANGE THE AIR HANDLING UNIT MODE OF OPERATION TO THE DEMAND LIMITING MODE BASED ON KW DEMAND SETPOINT. DDC SHALL MODULATE SUPPLY FAN(S) VFCS TO SLOW THE FAN(S) TO A PRESET MINIMUM SPEED. DDC SHALL ADJUST THE FAN(S) SPEED BASED ON THE AVERAGED SPACE(S) TEMPERATURE SETPOINT TO INCREASE ABOVE THE PRESET MINIMUM SPEED TO MAINTAIN SPACE TEMP SETPOINT. WHEN KW DEMAND PERIOD HAS ELAPSED, DDC SHALL SLOWLY RAMP VFCS BACK TO NORMAL OPERATIONAL SPEED SETPOINT.

15. REFER TO HEATING ZONE CONTROL FOR SPACE TEMPERATURE CONTROL. WHEN AHU IS OPERATING, ZONE REHEAT COILS SHALL MAINTAIN SPACE DRY BULB TEMPERATURE CONTROL PER MUSEUM STANDARDS. DDC SHALL MONITOR AND AVERAGE THE GALLERY CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

17. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

18. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE SPACE RELATIVE HUMIDITY SENSOR INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

19. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET). DDC SHALL MONITOR FREEZESTAT(S) STATUS AND ACTIVATE ALARM IF CONDITION OCCURS.

20. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SFS & RFS WHEN PRODUCTS OF COMBUSTION ARE DETECTED.

21. FILTER STATUSES SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE SWITCHES. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINTS SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

22. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SUPPLY AND EXHAUST FANS OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, CLOSE HUMIDIFIER VALVE(S), AND CLOSE THE CHILLED WATER VALVE TO THE COIL(S). INTERLOCK WIRING SHALL CLOSE THE SA/MA SMOKE ISOLATION DAMPERS.

23. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

24. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS.

25. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE
SMOKE DETECTOR(S)
LOW DISCHARGE AIR TEMPERATURE
SUPPLY/EXHAUST FAN FAILURES
LOW MIXED AIR TEMPERATURE OVERRIDE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
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Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 SEQUENCE OF OPERATION

AHU-12 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, RAT	A/CP-FA-24'-GD	2	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Duct Humidity Sensor	SAH, RAH	A/RH2-D	2	Duct Humidity Sensor, 2% Accuracy	ACI
5	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5" insertion	ACI
6	Electropneumatic transducer	EPT	EP313020	1	Electropneumatic transducer with manual override, 0-20 psig	Kele
7	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
8	Panel Mounted Relay	R-4 To R-6	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
9	Relay Socket	R-4 To R-6	784-4C-SKT	3	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
10	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

AHU-12 ZONE DUCT HEATING COIL BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Duct Temperature Sensor	SAT	A/CP-D-8"-GD	3	Thermistor, 10K Type II, Duct Temperature sensor, 8", Galv. Box	ACI
2	Combo Sensor T/H/CO2	ZN-T	TSENSE-LCD	3	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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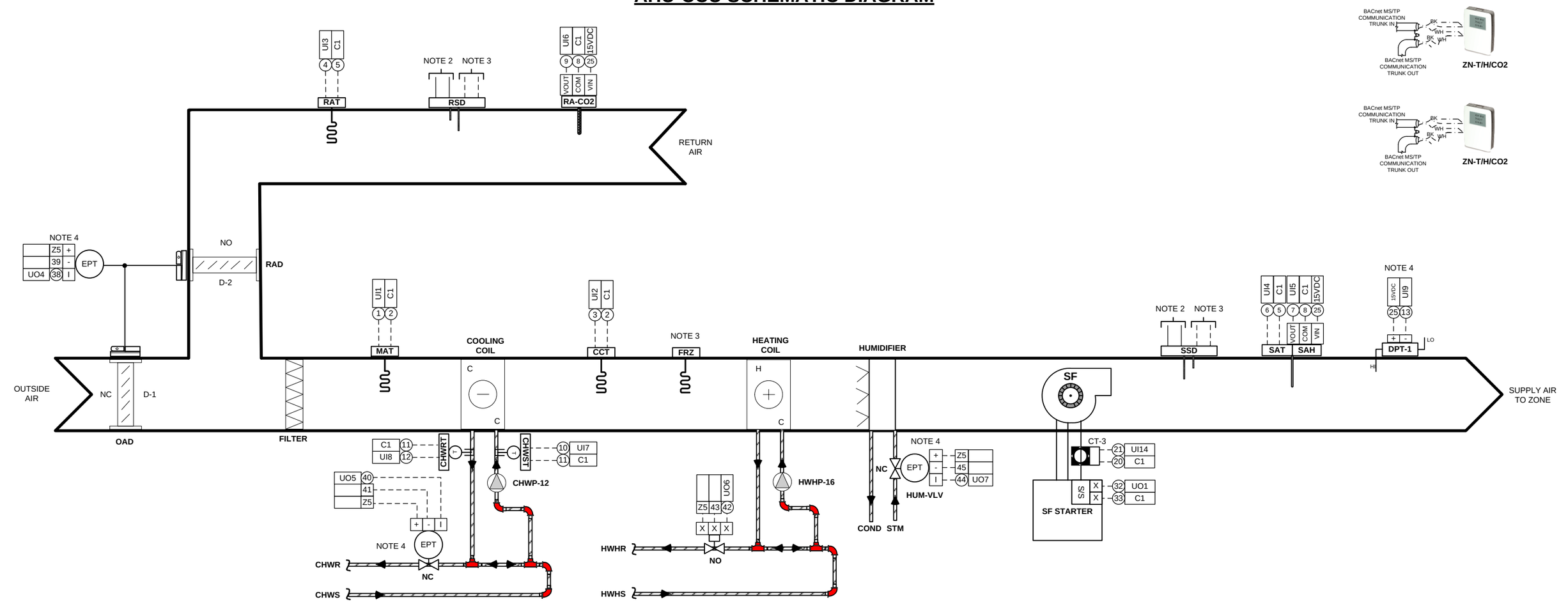
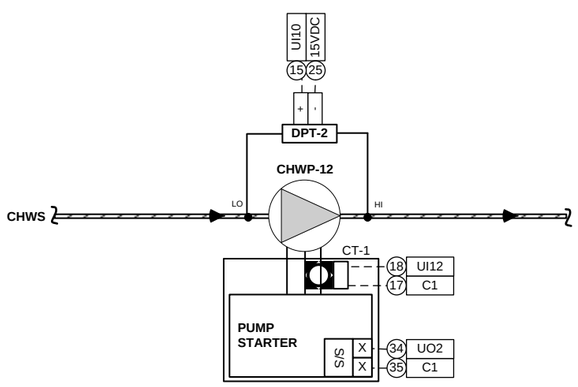
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-12 BILL OF MATERIAL

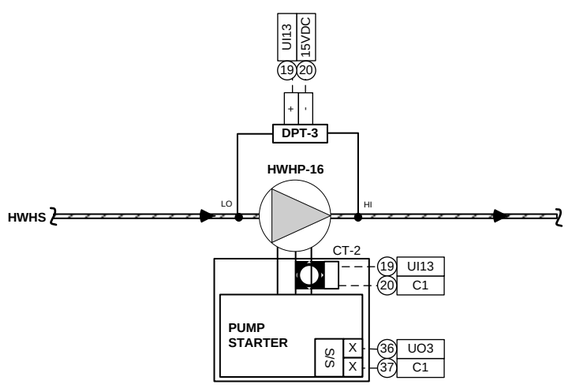
AHU-CCU SCHEMATIC DIAGRAM



AHU-CCU CHWP-12 PUMP CONTROL



AHU-CCU HWHP-16 PUMP CONTROL



AHU-CCU SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
CCU	MAIN MUSEUM ATTIC	CLASSIC COURT GLLERIES (02)				M1.10

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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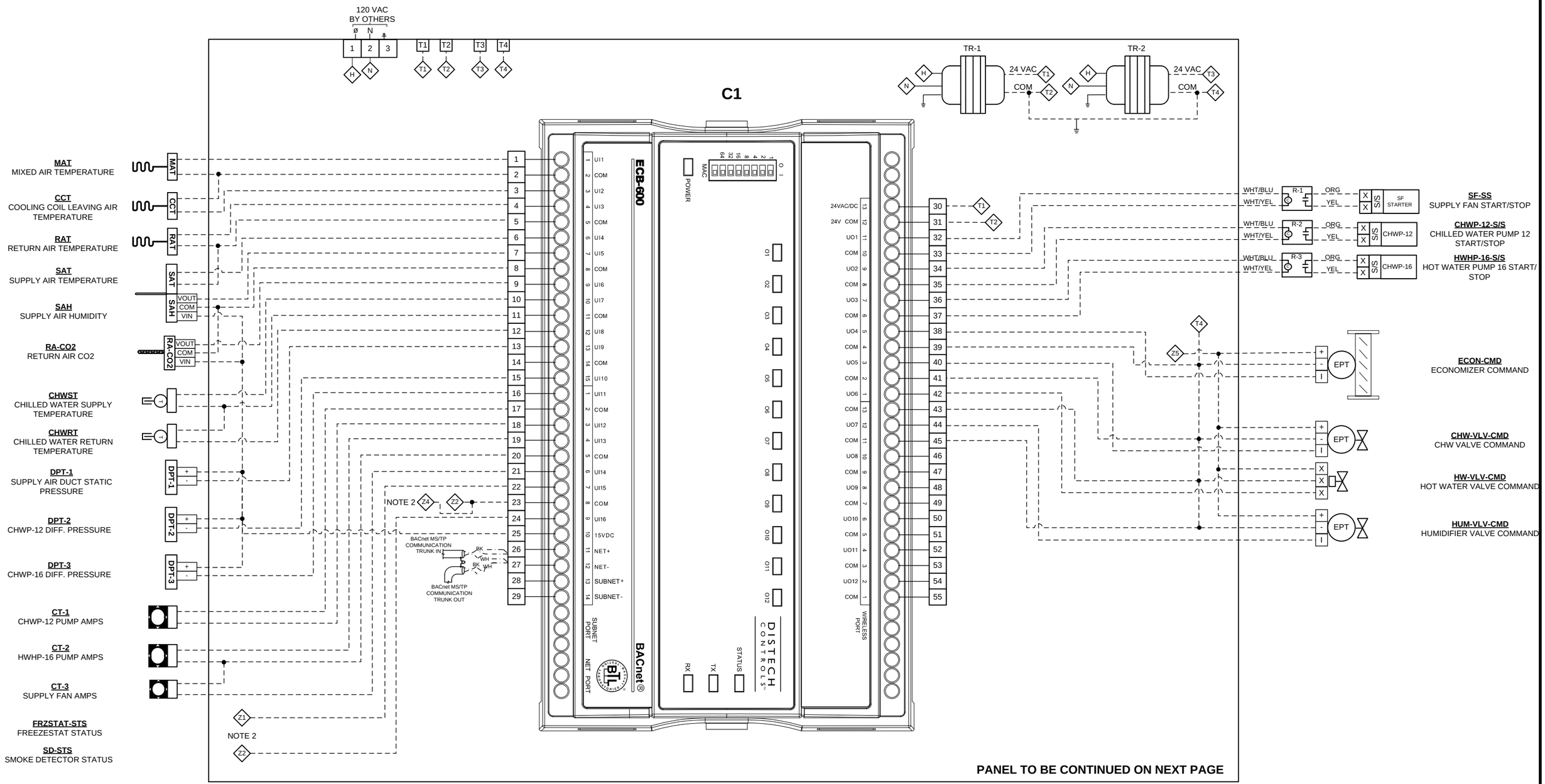
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-CCU SCHEMATIC DIAGRAM

AHU-CCU WIRING DIAGRAM



MAT
MIXED AIR TEMPERATURE

CCT
COOLING COIL LEAVING AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

RA-CO2
RETURN AIR CO2

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
SUPPLY AIR DUCT STATIC PRESSURE

DPT-2
CHWP-12 DIFF. PRESSURE

DPT-3
CHWP-16 DIFF. PRESSURE

CT-1
CHWP-12 PUMP AMPS

CT-2
HWHP-16 PUMP AMPS

CT-3
SUPPLY FAN AMPS

FRZSTAT-STS
FREEZESTAT STATUS

SD-STS
SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

CHWP-12-S/S
CHILLED WATER PUMP 12 START/STOP

HWHP-16-S/S
HOT WATER PUMP 16 START/STOP

ECON-CMD
ECONOMIZER COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

HW-VLV-CMD
HOT WATER VALVE COMMAND

HUM-VLV-CMD
HUMIDIFIER VALVE COMMAND

PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-3, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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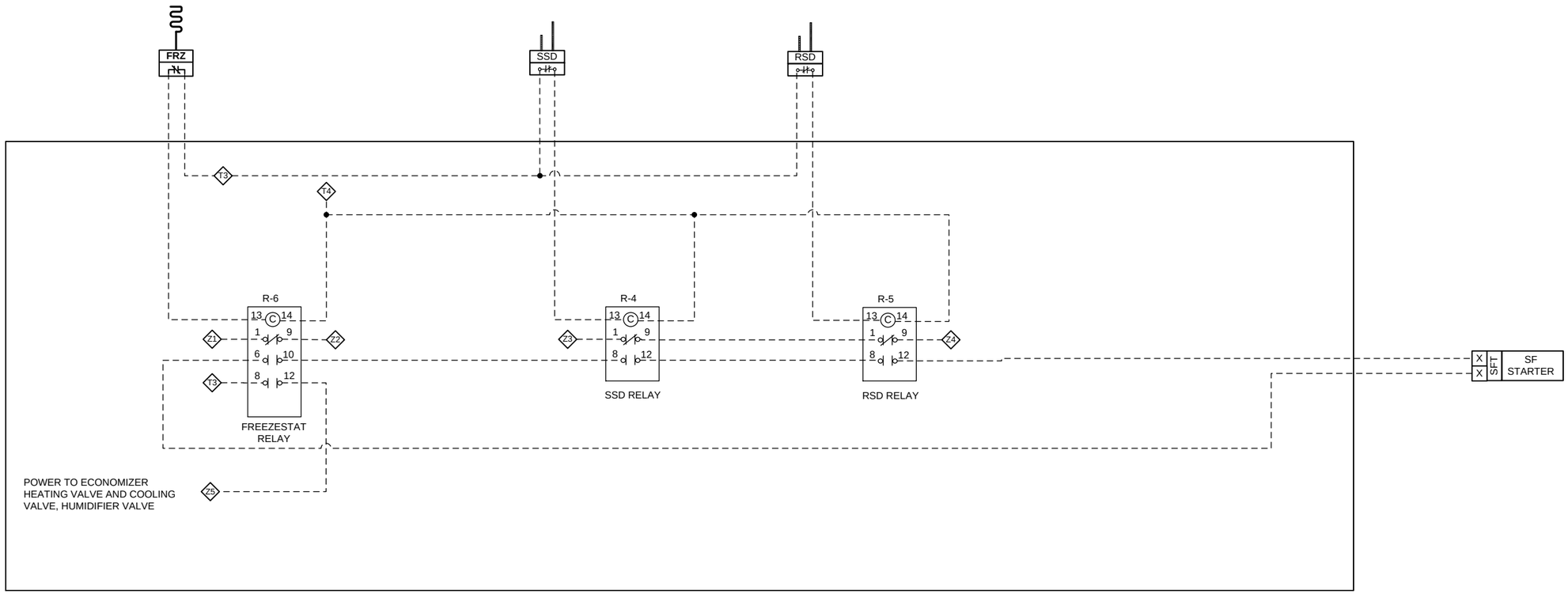
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-CCU WIRING DIAGRAM

AHU-CCU INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AE-3, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-CCU INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-CCU SEQUENCE OF OPERATION

AHU-CCU SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED, AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

5. CHW AND HWH PUMPS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. DDC SHALL ACTIVATE THE HWH PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS BELOW 55°F SETPOINT. PUMP STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

6. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

7. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

8. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

9. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

10. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°FDB SETPOINT AND LESS THAN 44°FWB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

11. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS.

12. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HWH COIL VALVE SHALL CLOSE TO THE COIL.

13. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HWH COIL VALVE SHALL CLOSE TO THE COIL.

14. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HWH COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

15. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

16. DDC SHALL MONITOR SPACE CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION	
LOW LIMIT CO2	600 PPM	MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM	MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

17. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

18. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

19. FREEZESTAT(S) SHALL DEACTIVATE SF WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

20. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

21. FILTER STATUS SHALL BE MONITORED BY DDC THRU DIFFERENTIAL PRESSURE TRANSMITTERS. WHEN DIFFERENTIAL PRESSURE REACHES DP SETPOINT, DDC SHALL ACTIVATE DIRTY FILTER ALARM. FILTER DP SETPOINT SHALL BE BASED ON FILTER MANUFACTURER'S LOADED FILTER DATA.

22. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SF OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL, HEATING COIL AND HUMIDIFIER VALVES.

23. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

24. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

SUPPLY FAN FAILURES

SMOKE DETECTOR(S)

LOW MIXED AIR TEMPERATURE OVERRIDE

LOW DISCHARGE AIR TEMPERATURE

LOW SPACE TEMPERATURE

HIGH SPACE TEMPERATURE

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-CCU SEQUENCE OF OPERATION

AHU-CCU BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Averaging Temperature Sensor	MAT, CCT, RAT	A/CP-FA-24'-GD	3	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Humidity & Temperature Combo Sensor	SAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
4	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	2	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI
5	Duct CO2 Sensor	RA-CO2	A/CO2-DUCT	1	Duct CO2 Sensor	ACI
6	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-2.5"-GD	2	Immersion 10 kΩ type II thermistor without well and 2.5"” insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	3	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1 To R-3	RIBU1C	3	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-4, 5	782-2C-24A	2	DPDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-4, 5	782-2C-SKT	2	DIN-rail mounting, DPDT, for use with 782 series	Automation Direct
11	Panel Mounted Relay	R-6	784-4C-24A	1	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
12	Relay Socket	R-6	784-4C-SKT	1	DIN-rail mounting, 4PDT, for use with 784 series	Automation Direct

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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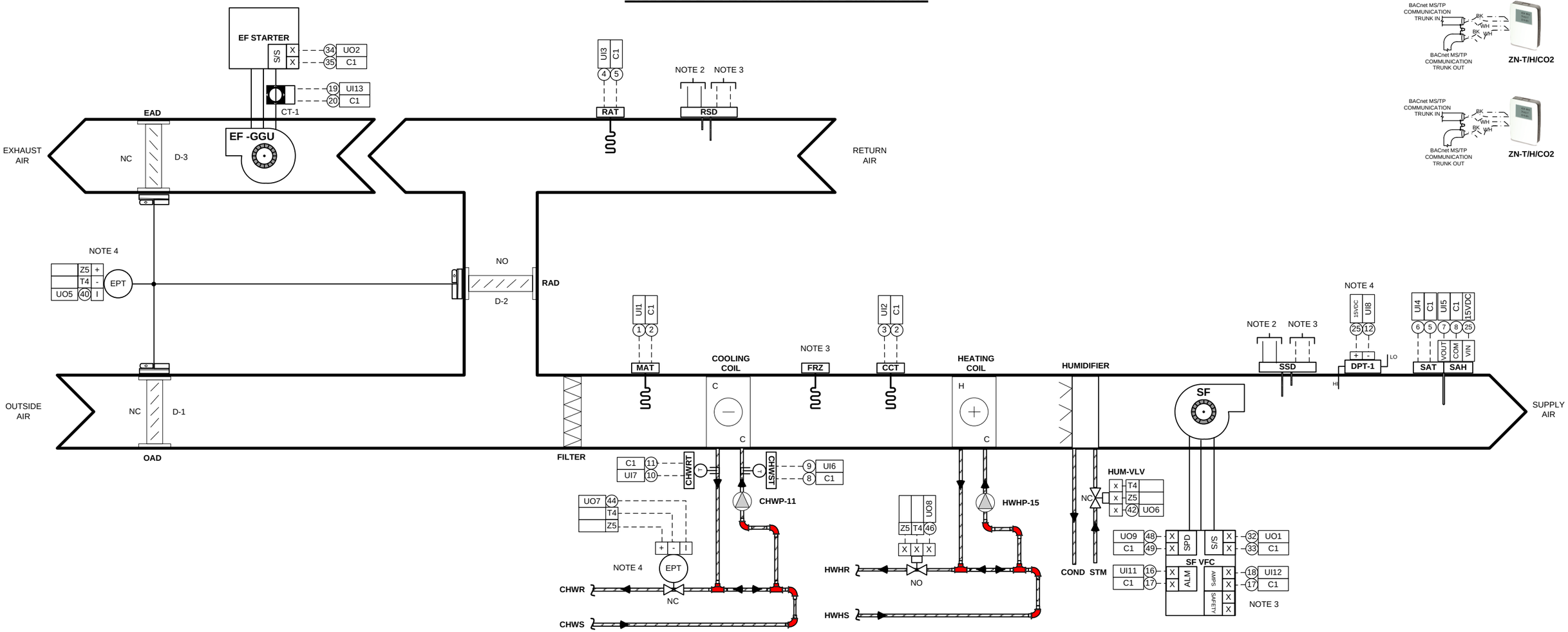
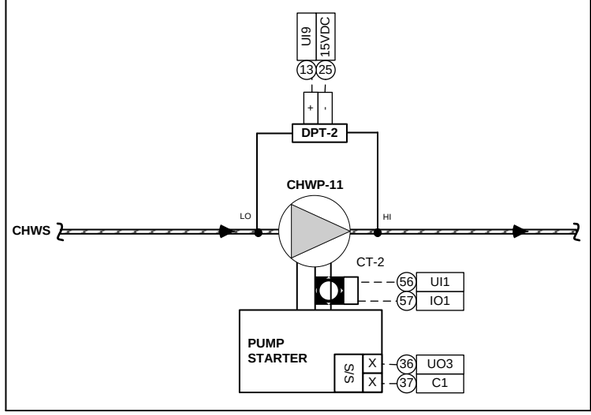
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-CCU BILL OF MATERIAL

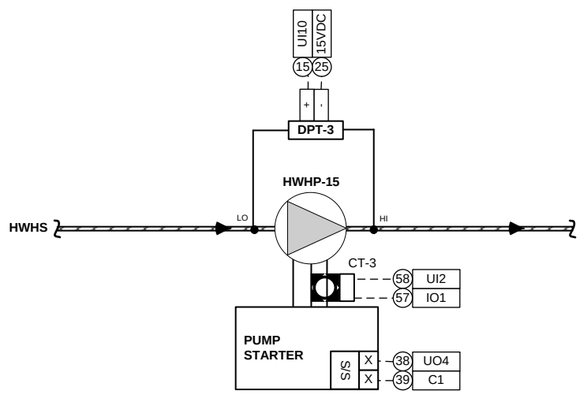
AHU GGU SCHEMATIC DIAGRAM



AHU-CCU CHWP-11 PUMP CONTROL



AHU-CCU HWHP-15 PUMP CONTROL



AHU-GGU SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
GGU	MAIN MUSEUM ATTIC	GREAT GLLERIES (36)				M1.12

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. WIRED TO FIRE ALARM SYSTEM BY FAS CONTRACTOR
3. REFER INTERLOCK WIRING AND CONTROLLER WIRING FOR DETAILS.
4. DEVICE TO BE INSTALLED IN PANEL.
5.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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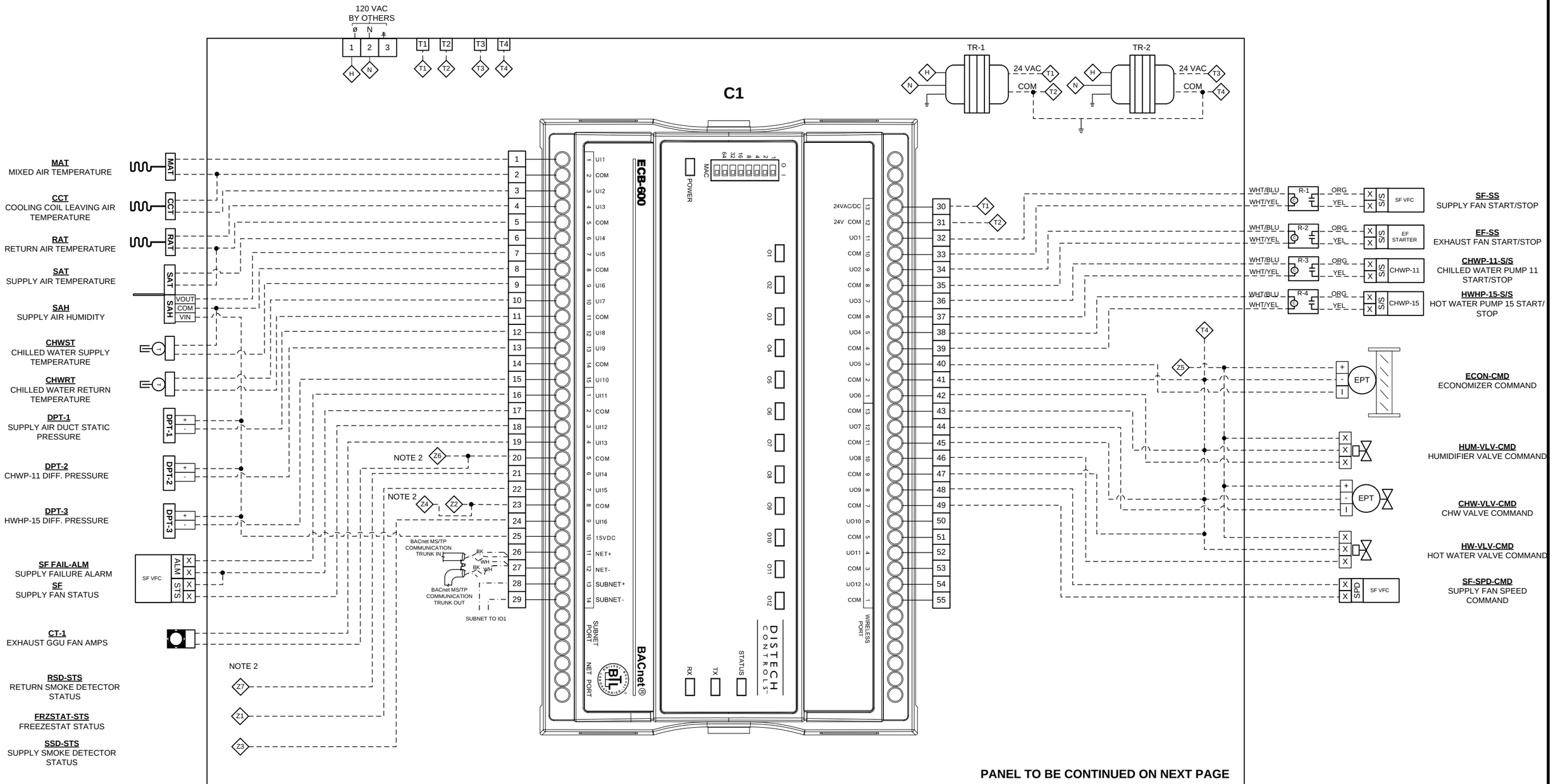
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU GGU SCHEMATIC DIAGRAM

AHU-GGU WIRING DIAGRAM PAGE 1



MAT
MIXED AIR TEMPERATURE

CCT
COOLING COIL LEAVING AIR TEMPERATURE

RAT
RETURN AIR TEMPERATURE

SAT
SUPPLY AIR TEMPERATURE

SAH
SUPPLY AIR HUMIDITY

CHWST
CHILLED WATER SUPPLY TEMPERATURE

CHWRT
CHILLED WATER RETURN TEMPERATURE

DPT-1
SUPPLY AIR DUCT STATIC PRESSURE

DPT-2
CHWP-11 DIFF. PRESSURE

DPT-3
HWHP-15 DIFF. PRESSURE

SF FAIL-ALM
SUPPLY FAILURE ALARM

SF
SUPPLY FAN STATUS

CT-1
EXHAUST GGU FAN AMPS

RSD-STS
RETURN SMOKE DETECTOR STATUS

FRZSTAT-STS
FREEZESTAT STATUS

SSD-STS
SUPPLY SMOKE DETECTOR STATUS

SF-SS
SUPPLY FAN START/STOP

EF-SS
EXHAUST FAN START/STOP

CHWP-11-S/S
CHILLED WATER PUMP 11 START/STOP

HWHP-15-S/S
HOT WATER PUMP 15 START/STOP

ECON-CMD
ECONOMIZER COMMAND

HUM-VLV-CMD
HUMIDIFIER VALVE COMMAND

CHW-VLV-CMD
CHW VALVE COMMAND

HW-VLV-CMD
HOT WATER VALVE COMMAND

SF-SPD-CMD
SUPPLY FAN SPEED COMMAND

PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-2, MAIN MUSEUM ATTIC-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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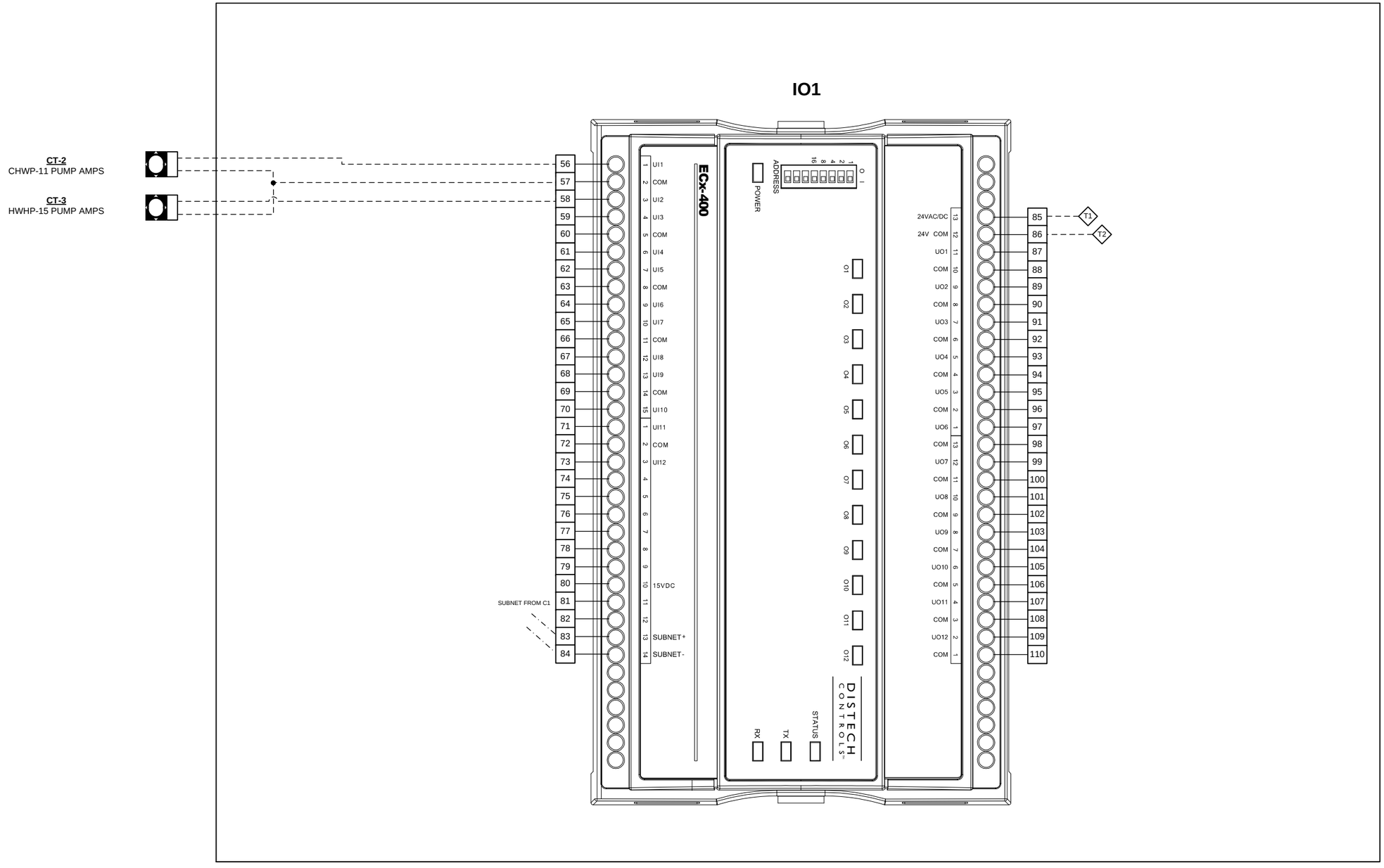
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-GGU WIRING DIAGRAM PAGE 1

AHU-GGU WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-2, MAIN MUSEUM ATTIC-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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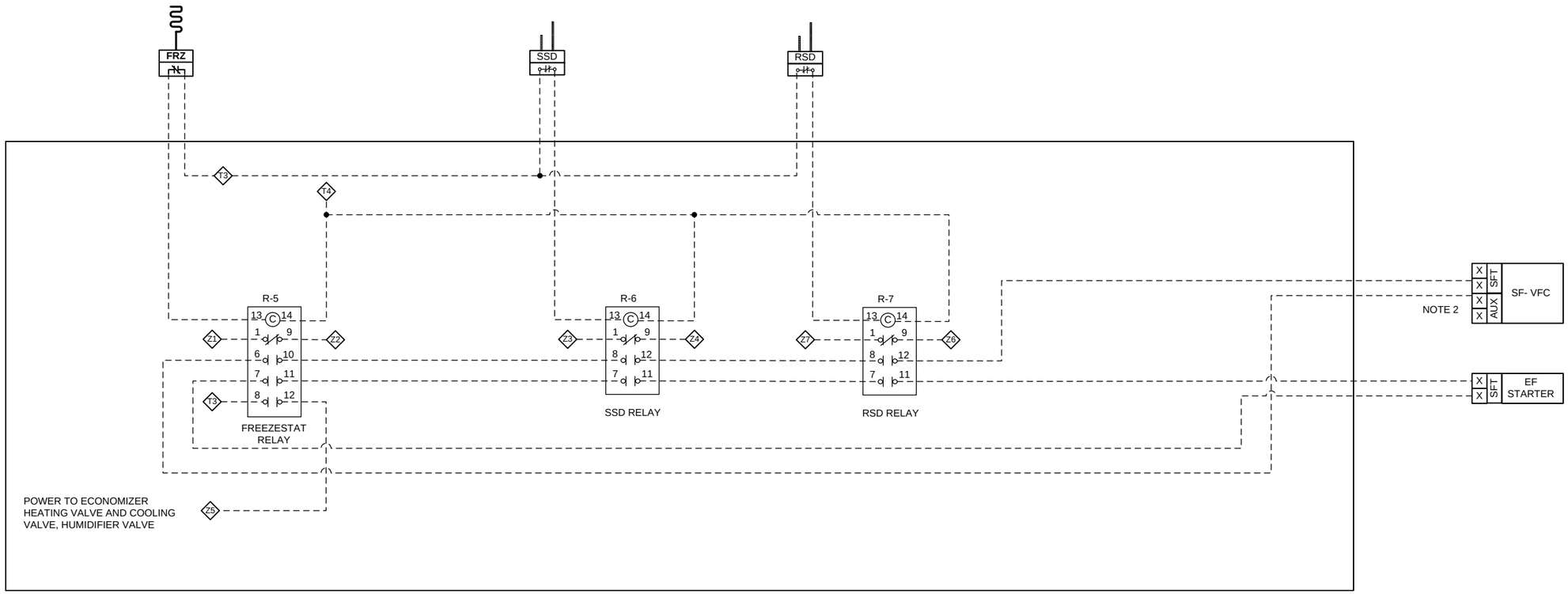
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-GGU WIRING DIAGRAM PAGE 2

AHU-GGU INTERLOCK AND SAFETY WIRING DIAGRAM



RELAYS TO BE INSTALLED IN EXISTING NOVAR PANEL AW-2, MAIN MUSEUM ATTIC-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-GGU INTERLOCK AND SAFETY WIRING DIAGRAM

AHU-GGU SEQUENCE OF OPERATION

GGU SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, CONTROL MODES, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY BAS OPERATORS AND SHOWN ON BAS GRAPHIC. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. CONTROL MODES (WHEN APPLICABLE) SHALL BE: HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFICATION, OCCUPIED, UNOCCUPIED AND DEMAND LIMITING. MODE STATUS SHALL BE DISPLAYED ON BAS GRAPHIC.

3. SUPPLY FAN & EXHAUST FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

4. ALL SUPPLY AND EXHAUST FAN STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. AN ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

5. DDC SHALL MONITOR OPERATING STATUS OF SF VFC. IF VFC FAILS, DDC SHALL PRUDE AN ALARM TO BAS AND DEACTIVATE ENTIRE AHU (SEE HEREIN). VFC SPEED SETTING SHALL BE BASED ON TAB CONTRACTOR'S REPORT DATA.

6. CHW AND HWH PUMPS SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC SHALL ACTIVATE THE CHW PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS ABOVE 55°F SETPOINT. DDC SHALL ACTIVATE THE HWH PUMP CONTINUOUSLY WHEN OUTSIDE AIR TEMP IS BELOW 55°F SETPOINT. PUMP STATUSES SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL PUMP MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

7. WHEN SF IS ACTIVATED AND SUPPLY AIR DUCT STATIC PRESSURE IS ABOVE 0.15 IN. W.G. SETPOINT, DDC SHALL ENABLE THE CONTROL ALGORITHM.

8. UPON INITIAL START OR RESTART, DAMPERS SHALL BE POSITIONED FROM CLOSED TO MINIMUM POSITION OVER A PERIOD OF 300 SECONDS.

9. WHEN AHU IS ACTIVATED DURING OCCUPIED MODE, DDC SHALL POSITION THE MIXED AIR DAMPERS (CALLED DAMPERS) TO THE MINIMUM OUTSIDE AIR POSITION AS DETERMINED FROM THE PRE-CONSTRUCTION AIR BALANCE BY TAB CONTRACTOR. DAMPERS SHALL BE ALLOWED TO MODULATE AS DESCRIBED. WHEN AHU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE OR MORNING WARM-UP MODE, DAMPERS SHALL REMAIN CLOSED TO OUTSIDE AIR.

10. PRE-OCCUPANCY WARM-UP SHALL BE UTILIZED WITH DDC OPTIMUM START/STOP PROGRAMMING BASED ON SPACE TEMPERATURE FEEDBACK.

11. ONE HOUR (ADJUSTABLE) PRE-OCCUPANCY PURGE SHALL BE UTILIZED WITH OCCUPIED MODE TIME SCHEDULE WHEN ZONE SPACE TEMPERATURE IS GREATER THAN OCCUPIED COOLING SETPOINTS AND OUTSIDE AIR ECONOMIZER IS AVAILABLE. DAMPERS MAY GO AS MUCH AS 100% OPEN.

12. OA ECONOMIZER IS AVAILABLE WHEN OA TEMPERATURE IS LESS THAN 55°F DB SETPOINT AND LESS THAN 44°F WB SETPOINT AS DETERMINED FROM NETWORK OA SENSORS.

13. DDC SHALL MAINTAIN SPACE TEMPERATURE SETPOINT TO MUSEUM STANDARD SETPOINTS.

14. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS AVAILABLE, DDC SHALL FIRST MODULATE DAMPERS ABOVE MINIMUM OA FLOW POSITION, THEN WHEN OA DAMPER IS FULLY OPEN, MODULATE COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HWH COIL VALVE SHALL CLOSE TO THE COIL.

15. WHEN SPACE TEMP IS ABOVE SETPOINT AND ECONOMIZER IS NOT AVAILABLE, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE CHW COOLING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. HEATING COIL VALVE SHALL CLOSE TO THE COIL.

16. WHEN SPACE TEMP IS BELOW SETPOINT, DDC SHALL MODULATE DAMPERS TO MAINTAIN MINIMUM OA FLOW CFM SETPOINT AND MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT. CHW COIL VALVE SHALL CLOSE TO THE COIL.

17. DDC SHALL OVERRIDE DAMPER CONTROL TO PREVENT MIXED AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. MIXED AIR DAMPERS ARE ALLOWED TO FULLY CLOSE TO PREVENT LOW LIMIT NUISANCE TRIPPING OF FREEZESTAT. WHEN IN THIS MODE, DDC SHALL PROVIDE "LOW MIXED AIR LIMIT CONTROL STATUS" INDICATION AT BAS GRAPHIC.

18. DDC SHALL MONITOR SPACE CO2 SENSORS. IF THE AVERAGE CO2 LEVEL RISES ABOVE THE LOW LIMIT CO2 SETPOINT, THE MINIMUM OA DAMPER POSITION SHALL BE RESET PROPORTIONALLY BETWEEN MINIMUM OA CFM POSITION SETPOINT AND MAXIMUM OA CFM POSITION SETPOINT AS FOLLOWS:

CO2 SETPOINT	OA DAMPER CFM POSITION
LOW LIMIT CO2	600 PPM — MINIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)
HIGH LIMIT CO2	1,000 PPM — MAXIMUM OA CFM POSITION SETPOINT (BY TAB CONTRACTOR)

19. DDC SHALL PROVIDE HUMIDIFICATION CONTROL AND MODULATE THE HUMIDIFIER STEAM VALVE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS. WHEN MULTIPLE RELATIVE HUMIDITY SENSORS ARE USED, DDC SHALL AVERAGE THE READINGS FOR CONTROL. DDC SHALL PERFORM DISCHARGE HUMIDITY HIGH LIMIT CONTROL AT 85% RH SETPOINT. WHEN HUMIDIFICATION IS NOT REQUIRED DDC SHALL CLOSE THE HUMIDIFIER STEAM VALVE.

20. DDC SHALL PROVIDE DEHUMIDIFICATION CONTROL WHEN THE AVERAGE OF THE SPACE RELATIVE HUMIDITY SENSOR(S) INCREASES ABOVE SPACE RELATIVE HUMIDITY SETPOINT PER MUSEUM STANDARDS, DDC SHALL MODULATE THE CHW COIL VALVE TO SUB—COOL THE DISCHARGE AIR TEMP TO 50°F. IF CHILLED WATER SUPPLY TEMP IS INSUFFICIENT FOR SUB—COOLING, DDC SHALL SIGNAL THE POWER PLANT TO PROVIDE 40°F CHILLED WATER UNTIL DEHUMIDIFICATION MODE IS COMPLETE. DDC SHALL PROVIDE 3% RH DEADBAND CONTROL AROUND SETPOINT. IF WITHIN THE DEADBAND, NO CONTROL CHANGES ARE REQUIRED PER 24 HOUR—PERIOD.

21. FREEZESTAT(S) SHALL DEACTIVATE SFS WHEN TEMPERATURE IS 35°F OR BELOW (MANUALLY RESET).

22. DUCT SMOKE DETECTOR(S) THRU DDC INPUTS SHALL DEACTIVATE SF & EF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AND PROVIDE ALARM TO BAS.

23. WHEN AIR HANDLING UNIT IS DEACTIVATED BY DDC/BAS OPERATOR COMMAND OR A SAFETY DEVICE TRIP, DDC SHALL COMMAND SF & EF OFF, CLOSE MIXED AIR DAMPERS TO OUTSIDE AIR, AND CLOSE THE CHILLED WATER COIL, HEATING COIL, AND HUMIDIFIER VALVES.

24. ALL DDC POINTS SHOWN AND ASSOCIATED SETPOINTS, RESET SETPOINTS, TIME DELAYS, CONTROL MODES, AND DEADBANDS ARE CONTINUOUSLY MONITORED AND DISPLAYED AT THE BAS GRAPHIC.

25. THE FOLLOWING CONDITIONS SHALL BE ALARMED AT THE BAS:

HIGH AIR FILTER PRESSURE	SUPPLY/ EXHAUST FAN FAILURES
SMOKE DETECTOR(S)	LOW MIXED AIR TEMPERATURE OVERRIDE
LOW DISCHARGE AIR TEMPERATURE	LOW SPACE TEMPERATURE
HIGH SPACE TEMPERATURE	

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU-GGU SEQUENCE OF OPERATION

AHU- GGU BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Duct Averaging Temperature Sensor	MAT, CCT, RAT	A/CP-FA-24'-GD	3	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
4	Combo Sensor T/H/CO2	ZN-T/H/CO2	TSENSE-LCD	2	CO2 Sensor with Temperature, RH & Display with Bacnet communication	ACI
5	Duct Humidity & Temperature Combo Sensor	SAT/H	A/RH2-CP-D-010	1	Temperature & Humidity Combo Sensor	ACI
6	Immersion Temperature sensor	CHWST, CHWRT	A/CP-INW-6-GD	2	Immersion 10 kΩ type II thermistor without well and 6" insertion	ACI
7	Electropneumatic transducer	EPT	EP313020	2	Electropneumatic transducer with manual override, 0-20 psig	Kele
8	Relay	R-1 To R-4	RIBU1C	4	Universal field mounted Relay	Functional Devices
9	Panel Mounted Relay	R-5 To R-7	784-4C-24A	3	4PDT Relay, 24 VAC, LED Indicator	Automation Direct
10	Relay Socket	R-5 To R-7	784-4C-SKT	3	DIN-rail mounting, DPDT, for use with 784 series	Automation Direct
11	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

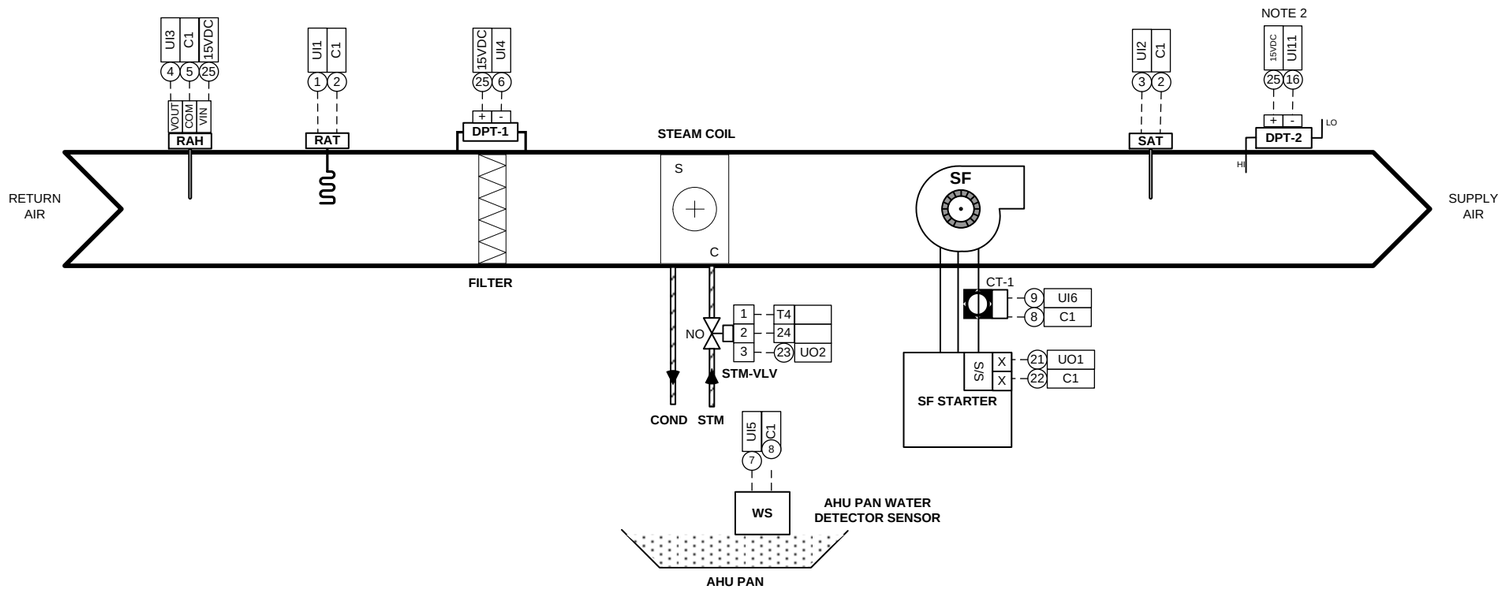
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT Solutions
ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

AHU- GGU BILL OF MATERIAL

SKYLIGHT AHU SCHEMATIC DIAGRAM



SKYLIGHT AHU SCHEDULE						
TAG	LOCATION	SERVING AREA	MINIMUM OA CFM	SUPPLY FAN CFM	RETURN FAN CFM	MECH. DWG. REF.
SKYLIGHT AHU	MAIN MUSEUM ATTIC	SKYLIGHT AREA NEAR AHU-9, 10 & 11				M1.10

SKYLIGHT AHU SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. SUPPLY FANS (SF) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. AHU SHALL OPERATE CONTINUOUSLY (24X7). DDC, BAS, OR A SAFETY DEVICE MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUSES. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE ALL FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

3. "SPACE" TEMPERATURE SHALL BE SENSED AT THE RETURN AIR DUCT. "SPACE" HUMIDITY SHALL BE SENSED AT THE RETURN AIR DUCT.

4. DDC SHALL MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT OF 70°F.

5. DDC SHALL OVERRIDE DRY BULB SPACE TEMP CONTROL BASED ON CALCULATION OF SPACE DEW POINT TEMP AND INCREASE SPACE TEMP 2°F SETPOINT ABOVE SPACE DEW POINT TEMP SETPOINT. WHEN SPACE DEW POINT TEMP DECREASES BELOW 68°F SETPOINT, DRY BULB TEMPERATURE CONTROL SHALL RESTART.

6. UPON SENSING WATER IN COIL PAN, DDC SHALL PROVIDE AN ALARM TO THE BAS AND CLOSE HEATING COIL VALVE.

7. WHEN AIR HANDLING UNIT IS DEACTIVATED OR DDC/BAS OPERATOR COMMANDED OFF, DDC SHALL COMMAND SF OFF AND CLOSE THE HEATING COIL VALVE.

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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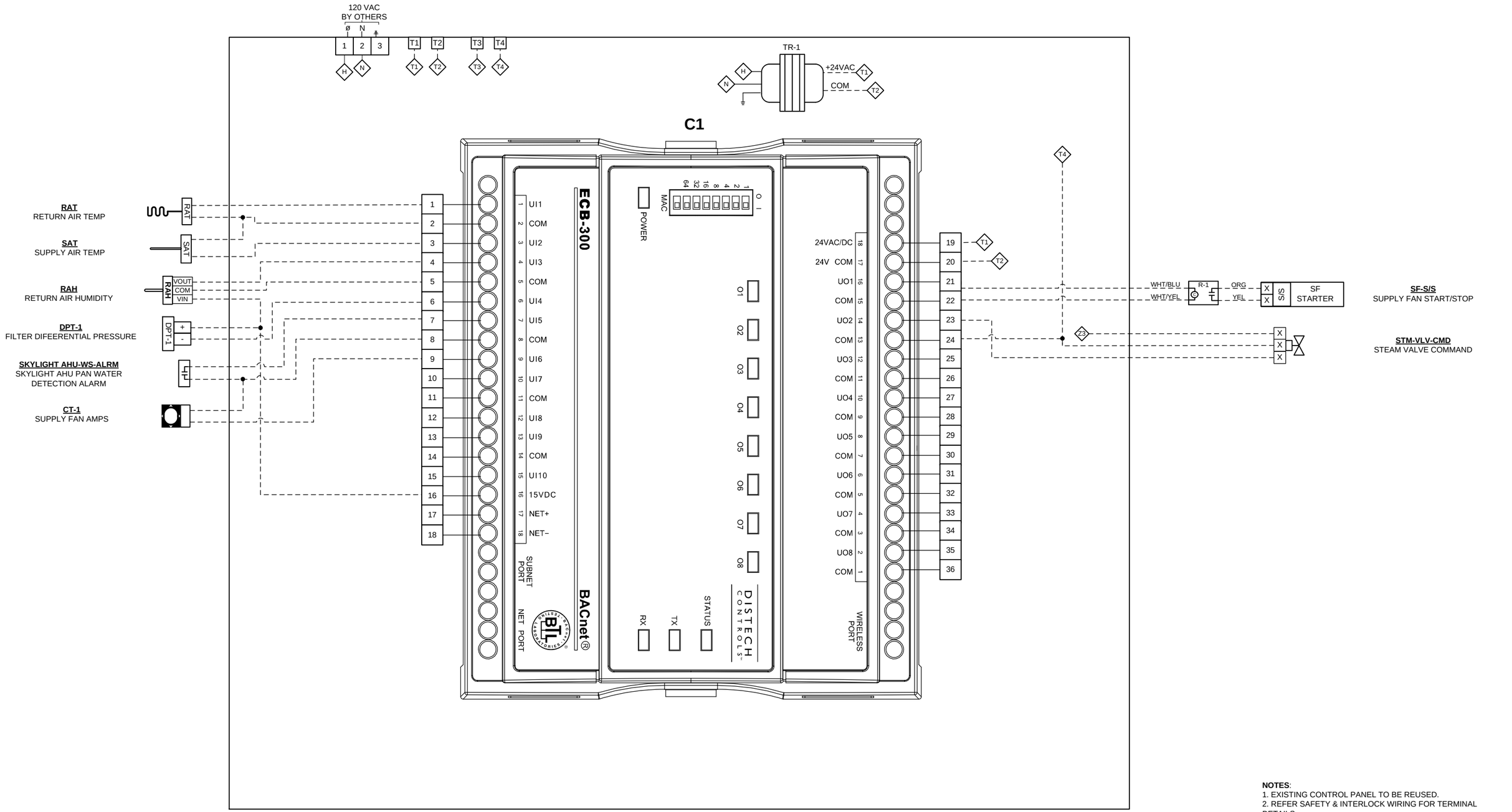
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

SKYLIGHT AHU SCHEMATIC DIAGRAM

SKYLIGHT AHU WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AE-3, MAIN MUSEUM ATTIC-EAST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. REFER SAFETY & INTERLOCK WIRING FOR TERMINAL DETAILS.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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ICT SOLUTIONS, INC
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(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

SKYLIGHT AHU WIRING DIAGRAM

SKYLIGHT AHU BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-300X-00	1	B-AAC Programmable Controller With 10UI & 8UO	Distech
2	Duct Averaging Temperature Sensor	RAT	A/CP-FA-24'-GD	1	Thermistor, 10K Type II, Flexible Cable Averaging Duct Temperature sensor, 24', Galv. Box	ACI
3	Duct Temperature Sensor	SAT	A/CP-D-12"-GD	1	Thermistor, 10K Type II, Duct Temperature sensor, 12", Galv. Box	ACI
4	Duct Humidity Sensor	RAH	A/RH2-D	1	Duct Humidity Sensor, 2% Accuracy	ACI
5	Relay	R-1	RIBU1C	1	Universal field mounted Relay	Functional Devices
6	Transformer	TR-1	TR100VA004	1	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
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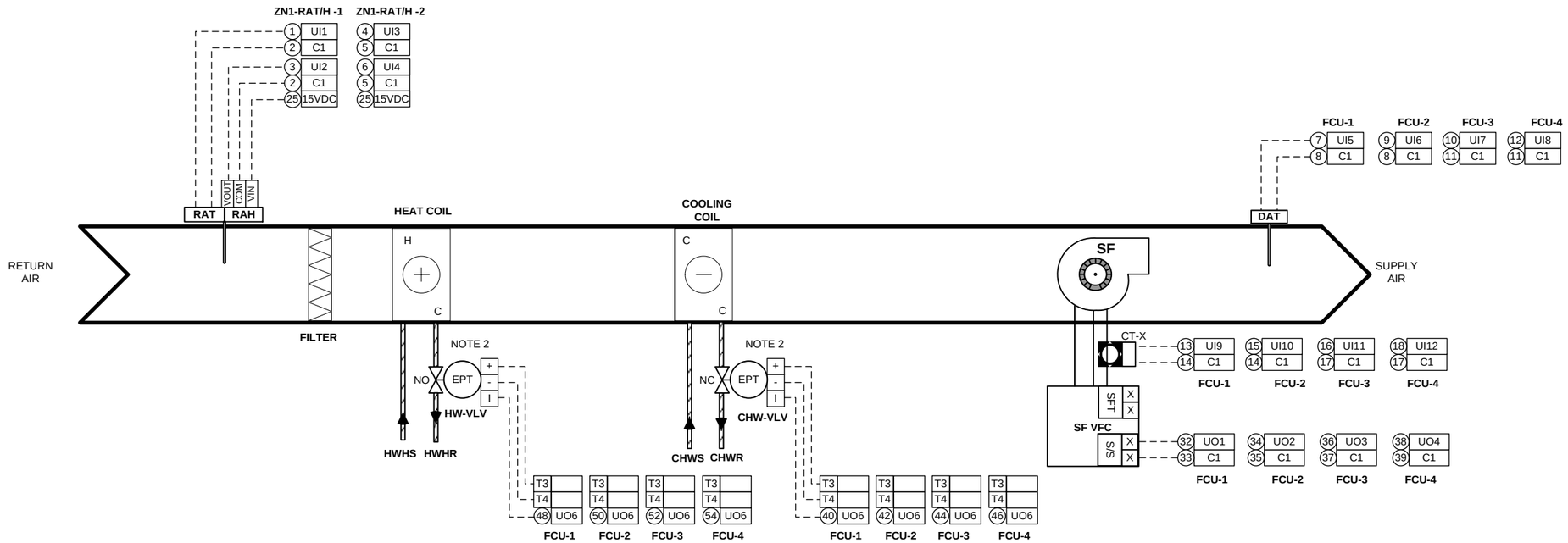
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

SKYLIGHT AHU BILL OF MATERIAL

MUSEUM ATTIC ZONE 1 FCU SCHEMATIC DIAGRAM

TYPICAL OF 4



ZONE 1 FCU

FAN COIL UNIT SCHEDULE				
ITEM #	**TAG**	**FLOOR**	**LOCATION & SERVING AREA**	**MECH DWG REF**
1	FCU-1	FIRST FLOOR	ELECTRONIC MEDIA EAST GALLERY	M-1.12
2	FCU-2	FIRST FLOOR	EUROPEAN ARTS AND DECORATIVE ROOMS	M-1.12
3	FCU-3	SECOND FLOOR	EUROPEAN ARTS AND DECORATIVE ROOMS	M-1.12
4	FCU-4	THIRD FLOOR	ELECTRONIC MEDIA WEST GALLERY	M-1.12

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Astoria, NY 11103
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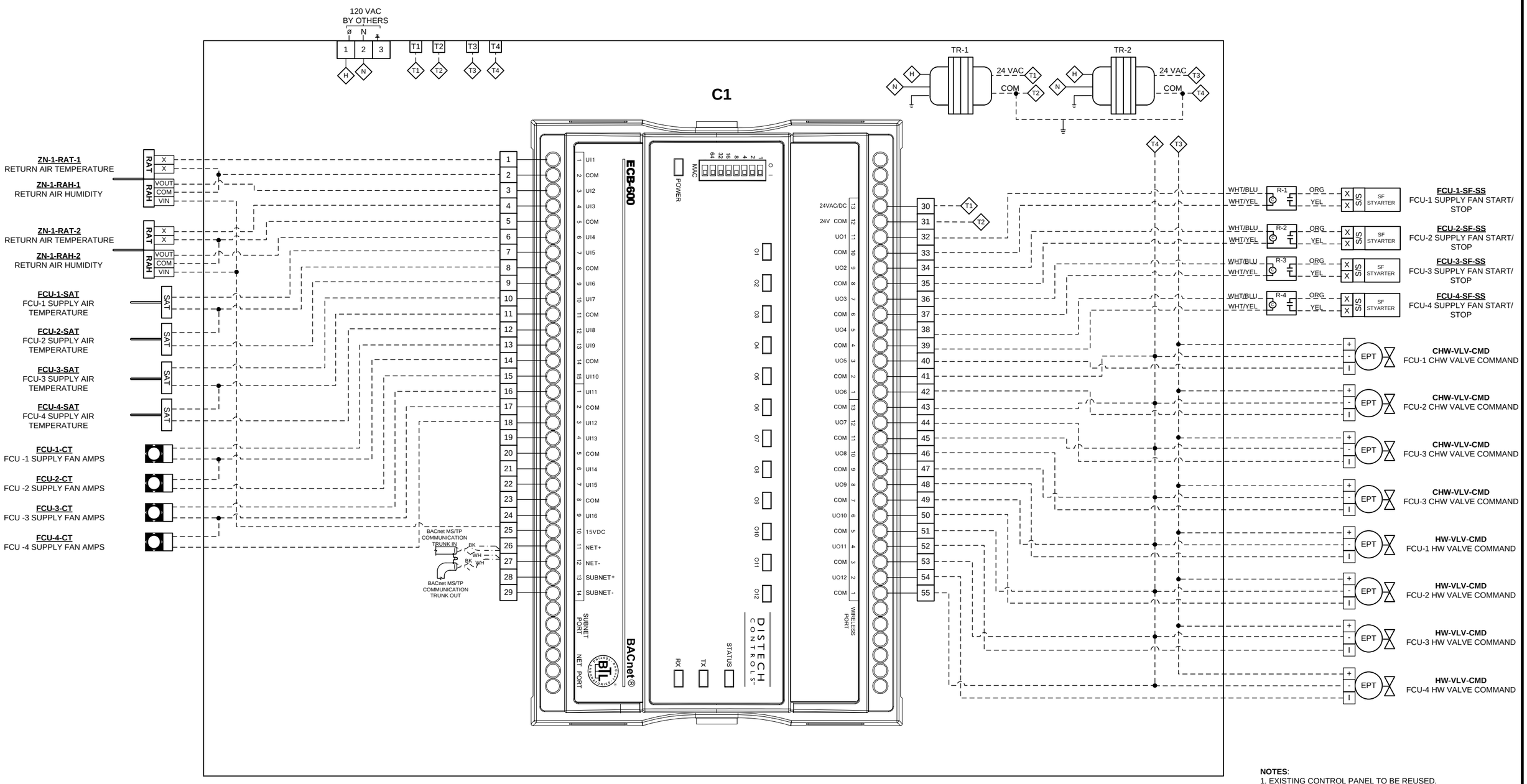
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 1 FCU SCHEMATIC DIAGRAM

MUSEUM ATTIC ZONE 1 FCU WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-1, MAIN MUSEUM ATTIV-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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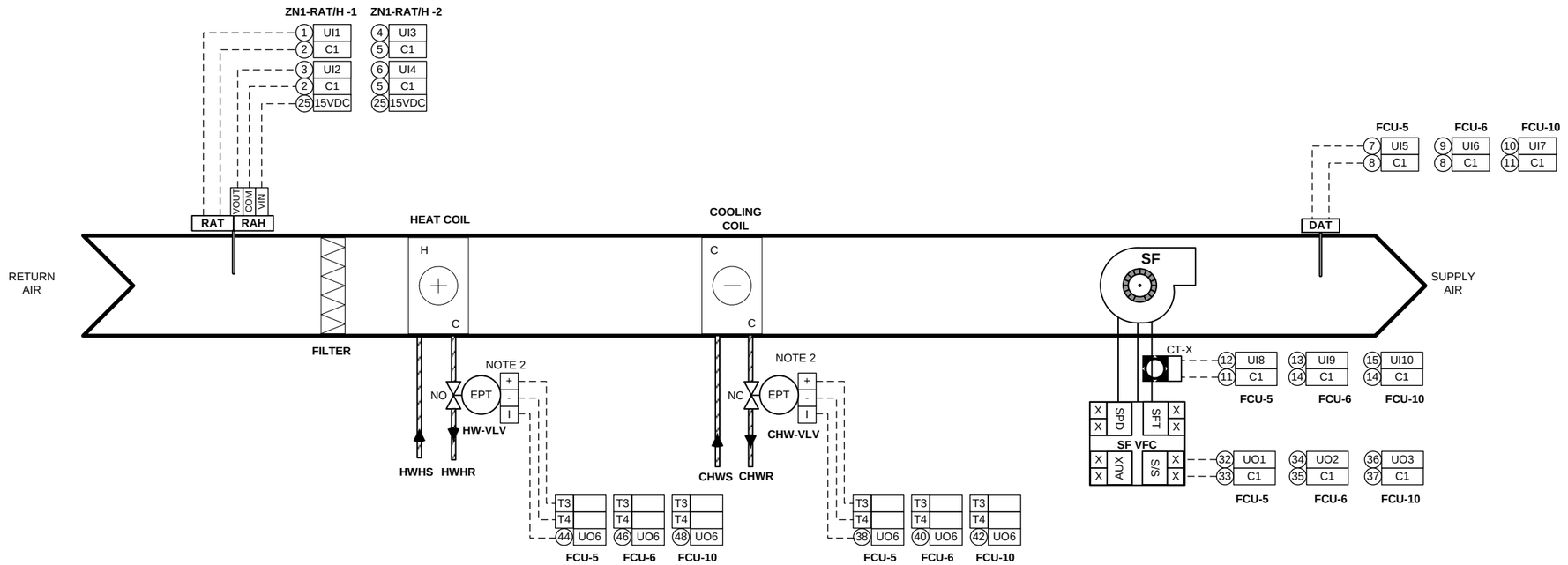
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 1 FCU WIRING DIAGRAM

MUSEUM ATTIC ZONE 2 FCU SCHEMATIC DIAGRAM

TYPICAL OF 3



ZONE 2 FCU

FAN COIL UNIT SCHEDULE				
ITEM #	**TAG**	**FLOOR**	**LOCATION & SERVING AREA**	**MECH DWG REF**
1	FCU-5	THIRD FLOOR	ELECTRONIC MEDIA WEST & LEVIS GALLERY 28C	M-1.12
2	FCU-6	THIRD FLOOR	GALLERY 27 & OCTAGON GALLERY 28	M-1.12
3	FCU-10	FOURTH FLOOR	GALLERY 29A	M-1.12

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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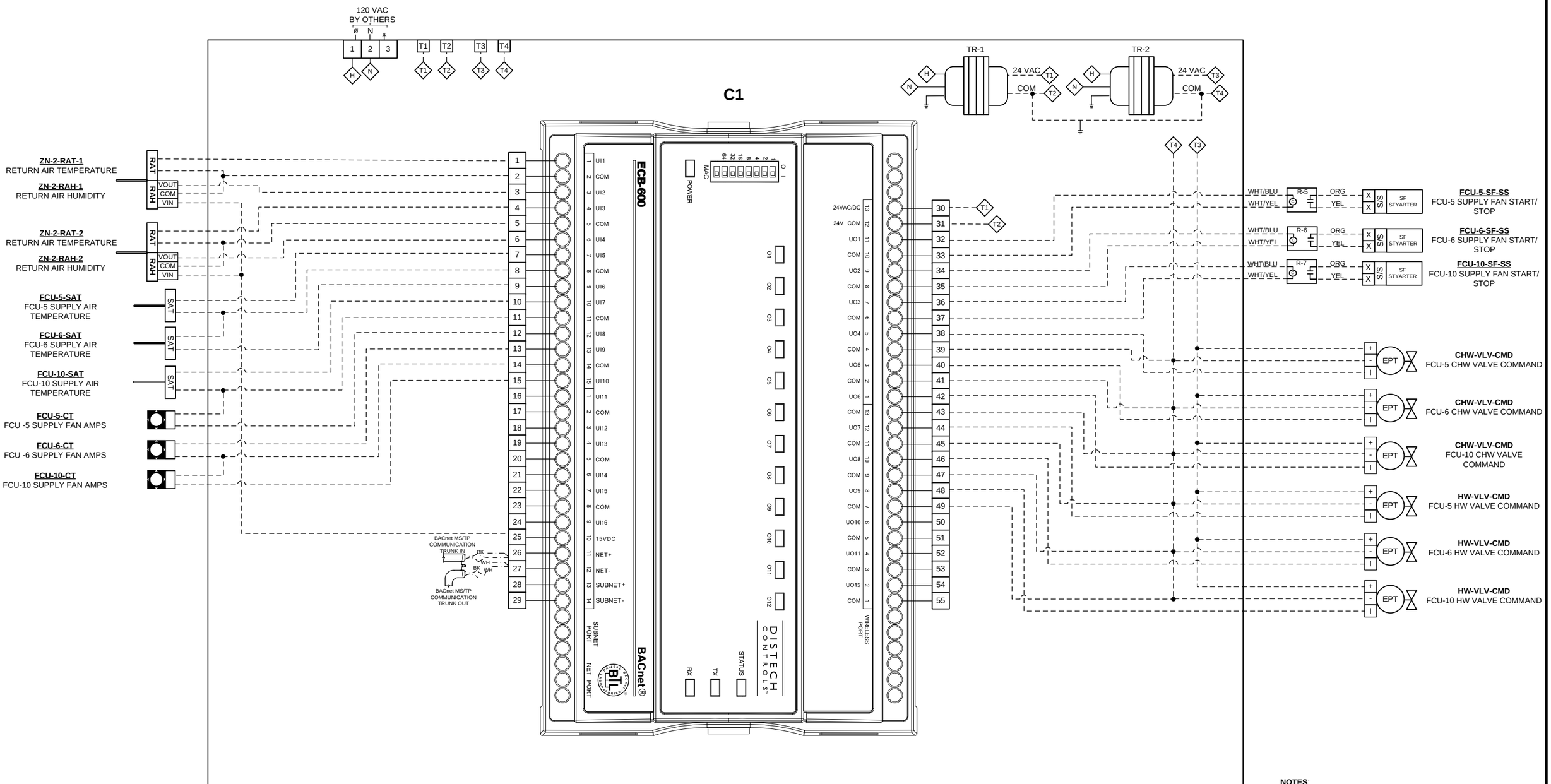
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 2 FCU SCHEMATIC DIAGRAM

MUSEUM ATTIC ZONE 2 FCU WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-1, MAIN MUSEUM ATTIV-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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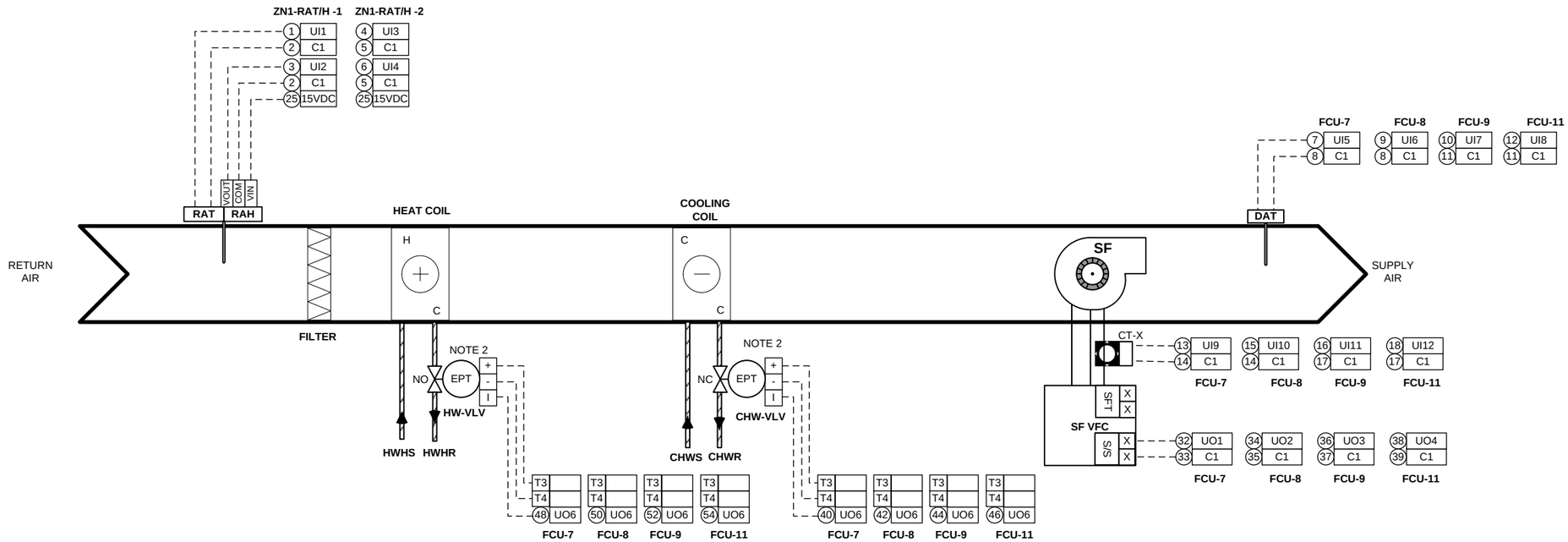
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 2 FCU WIRING DIAGRAM

MUSEUM ATTIC ZONE 3 FCU SCHEMATIC DIAGRAM

TYPICAL OF 4



ZONE 3 FCU

FAN COIL UNIT SCHEDULE				
ITEM #	**TAG**	**FLOOR**	**LOCATION & SERVING AREA**	**MECH DWG REF**
1	FCU-7	FOURTH FLOOR	GALLERY 29B & GALLERY 31	M-1.12
2	FCU-8	FOURTH FLOOR	GALLERY 31 & GALLERY 32	M-1.12
3	FCU-9	FOURTH FLOOR	GALLERY 32 & GALLERY 33	M-1.12
4	FCU-11	FOURTH FLOOR	GALLERY 27 & GALLERY 36	M-1.12

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. DEVICE TO BE INSTALLED IN PANEL.
3.FIELD TO VERIFY DUCT & IMMERSION TEMPERATURE SENSOR SIZING BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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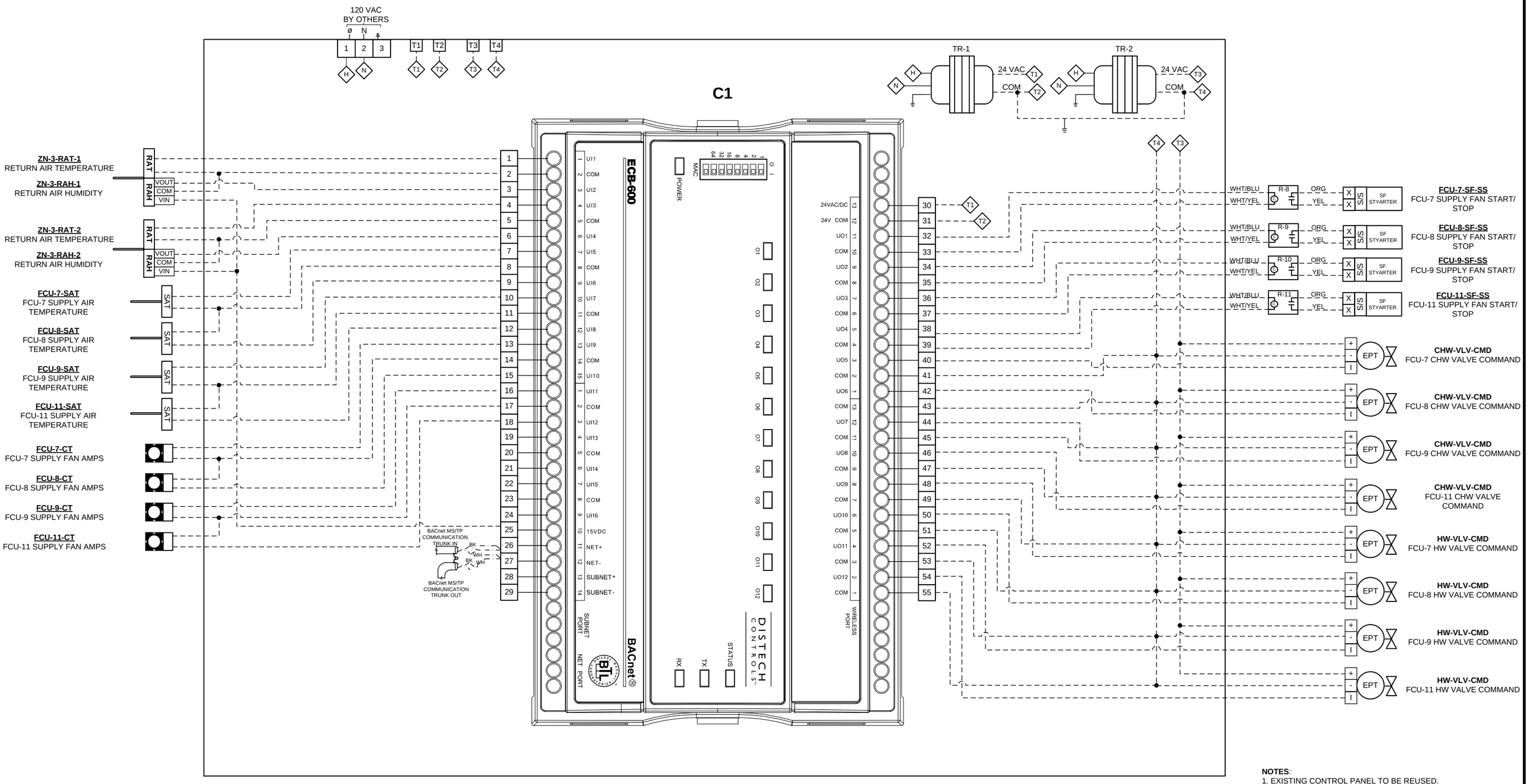
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 3 FCU SCHEMATIC DIAGRAM

MUSEUM ATTIC ZONE 3 FCU WIRING DIAGRAM



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AW-1, MAIN MUSEUM ATTIV-WEST

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
3. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

MUSEUM ATTIC ZONE 3 FCU WIRING DIAGRAM

FCU SEQUENCE OF OPERATION

FAN COIL UNIT SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

2. SUPPLY FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. DDC OR BAS MAY DEACTIVATE THE FAN, REFER TO DEACTIVATION SEQUENCE HEREIN. FAN STATUS SHALL BE MONITORED BY DDC THRU MOTOR AMP STATUS. ABNORMAL FAN STATUS CONDITION SHALL ACTIVATE AN ALARM. DDC SHALL TOTALIZE FAN MOTOR RUN TIME HOURS OF OPERATION FOR BAS DISPLAY.

3. EACH ZONE HAS TWO TEMPERATURE/HUMIDITY COMBINATION SENSORS. DDC SHALL MAINTAIN SPACE TEMPERATURE AND HUMIDITY SETPOINTS TO MUSEUM STANDARD SETPOINTS. TYPICAL ZONE HEATING CONTROL: FCU SHALL CYCLE ON/OFF CONTINUOUSLY (24X7) AS DESCRIBED.

4. TYPICAL ZONE HEATING CONTROL: FCU SHALL CYCLE ON/OFF CONTINUOUSLY (24X7) AS DESCRIBED.

4.1. DDC SHALL AVERAGE THE SPACE TEMPERATURE SENSORS' VALUES.

4.2. WHEN SPACE TEMP DECREASES BELOW SPACE TEMP SETPOINT MINUS 2°F, DDC SHALL COMMAND ON THE FCU NEAREST TO THE LOWEST READING SPACE TEMP SENSOR FIRST AND MODULATES THE HEATING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT. AFTER A DELAY OF 5 MINUTES, IF THE NEAREST FCU CANNOT MAINTAIN AVERAGE SPACE TEMP SETPOINT, DDC COMMANDS ON THE NEXT NEAREST FCU, AND MODULATES THE HEATING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT.

4.3. THE THIRD AND FOURTH FCU IN THE ZONE SHALL BE STAGED ON IN SEQUENCE SHOULD THE AVERAGE SPACE TEMPERATURE NOT INCREASE TO SETPOINT. A MINIMUM OF TWO MINUTES SHALL ELAPSE BETWEEN FCU STARTS. THE NEXT SEQUENTIAL FCU SHALL NOT START UNLESS THE AVERAGE SPACE TEMPERATURE IS A MINIMUM OF 2°F BELOW SETPOINT.

4.4. IF NECESSARY, THIS REPEATS UNTIL ALL FOUR FCUS ARE OPERATING. ALL FOUR FCU CHW COIL VALVES SHALL BE FULLY CLOSED TO THE COIL.

4. TYPICAL ZONE COOLING CONTROL: FCU SHALL CYCLE ON/OFF CONTINUOUSLY (24X7) AS DESCRIBED.

4.1. DDC SHALL AVERAGE THE SPACE TEMPERATURE SENSORS' VALUES.

4.2. WHEN SPACE TEMP INCREASES ABOVE SPACE TEMP SETPOINT PLUS 2°F, DDC SHALL COMMAND ON THE FCU NEAREST TO THE HIGHEST READING SPACE TEMP SENSOR FIRST AND MODULATES THE COOLING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT. AFTER A DELAY OF 5 MINUTES, IF THE NEAREST FCU CANNOT MAINTAIN AVERAGE SPACE TEMP SETPOINT, DDC COMMANDS ON THE NEXT NEAREST FCU, AND MODULATES THE COOLING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT.

4.3. THE THIRD AND FOURTH FCU IN THE ZONE SHALL BE STAGED ON IN SEQUENCE SHOULD THE AVERAGE SPACE TEMPERATURE NOT DECREASE TO SETPOINT. A MINIMUM OF TWO MINUTES SHALL ELAPSE BETWEEN FCU STARTS. THE NEXT SEQUENTIAL FCU SHALL NOT START UNLESS THE AVERAGE SPACE TEMPERATURE IS A MINIMUM OF 2°F BELOW SETPOINT.

4.4. IF NECESSARY, THIS REPEATS UNTIL ALL FOUR FCUS ARE OPERATING. ALL FOUR FCU HWH COIL VALVES SHALL BE FULLY CLOSED TO THE COIL.

4. TYPICAL ZONE DEHUMIDIFICATION CONTROL: FCU SHALL CYCLE ON/OFF CONTINUOUSLY (24X7) AS DESCRIBED.

4.1. DDC SHALL AVERAGE THE SPACE HUMIDITY SENSORS' VALUES.

4.2. WHEN SPACE HUMIDITY INCREASES ABOVE SPACE TEMP SETPOINT PLUS 2% RH, DDC SHALL COMMAND ON THE FCU NEAREST TO THE HIGHEST READING SPACE HUMIDITY SENSOR FIRST AND FULLY OPENS THE COOLING COIL VALVE AND MODULATES THE HEATING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT AND DEHUMIDIFY THE SPACE. AFTER A DELAY OF 5 MINUTES, IF THE NEAREST FCU CANNOT MAINTAIN AVERAGE SPACE HUMIDITY SETPOINT, DDC COMMANDS ON THE NEXT NEAREST FCU, AND FULLY OPENS THE COOLING COIL VALVE AND MODULATES THE HEATING COIL VALVE TO MAINTAIN AVERAGE SPACE TEMP SETPOINT AND DEHUMIDIFY THE SPACE.

4.3. THE THIRD AND FOURTH FCU IN THE ZONE SHALL BE STAGED ON IN SEQUENCE SHOULD THE AVERAGE SPACE HUMIDITY NOT DECREASE TO SETPOINT. A MINIMUM OF TWO MINUTES SHALL ELAPSE BETWEEN FCU STARTS. THE NEXT SEQUENTIAL FCU SHALL NOT START UNLESS THE AVERAGE SPACE HUMIDITY IS A MINIMUM OF 4% RH ABOVE SETPOINT.

4.4. WHEN SPACE HUMIDITY APPROACHES SPACE HUMIDITY SETPOINT, DDC SHALL DEACTIVATE THE FIRST FCU IT STARTED, THEN THE SECOND, THEN THE THIRD, AND FINALLY THE FOURTH FCU IS DEACTIVATED.

5. ZONE 1 SHALL CONSIST OF FCU-1 THRU FCU-4.

6. ZONE 2 SHALL CONSIST OF FCU-5, -6, & -10.

7. ZONE 3 SHALL CONSIST OF FCU-7, -8, -9, & -11.

8. WHEN ANY FCU IS DEACTIVATED, DDC COMMANDS OFF THE SF AND CLOSES THE HEATING AND COOLING COIL VALVES TO THE COILS.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

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ICT SOLUTIONS, INC
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Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU SEQUENCE OF OPERATION

FCU BILL OF MATERIAL

TYPICAL OF 11

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	3	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	Duct Temperature Sensor	DAT	A/CP-D-12"-GD	11	Thermistor, 10K Type II, Duct Temperature sensor, 12", Galvanised Box	ACI
3	Duct Humidity & Temperature Combo Sensor	RAT/H, SAT/H	A/RH2-CP-D-010	6	Temperature & Humidity Combo Sensor	ACI
4	Electropneumatic transducer	EPT	EP313020	22	Electropneumatic transducer with manual override, 0-20 psig	Kele
5	Relay	R-1 TO R-11	RIBU1C	11	Universal field mounted Relay	Functional Devices
6	Transformer	TR-1, 2	TR100VA004	6	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SENSOR SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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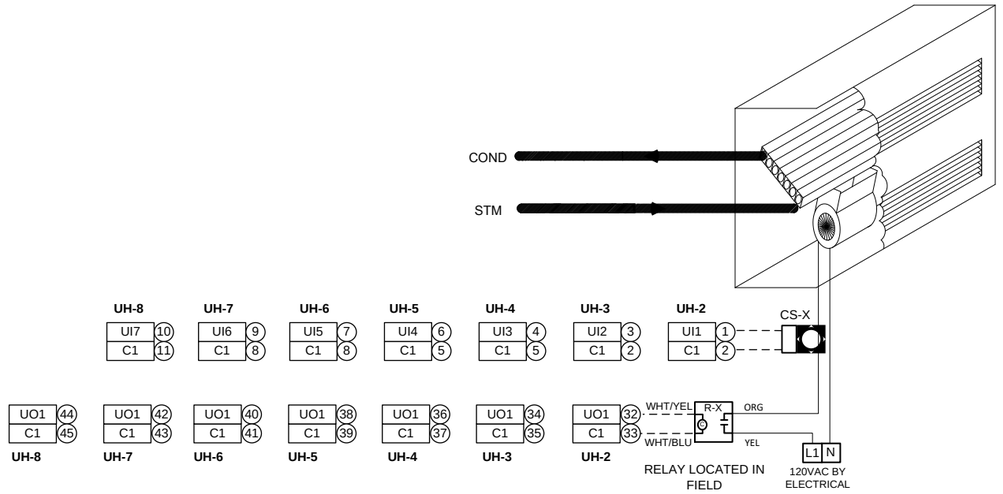
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

FCU BILL OF MATERIAL

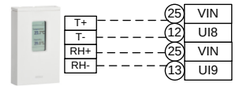
UH-2 TO UH-8 SCHEMATIC DIAGRAM

TYPICAL OF 7



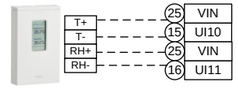
ZN-T-UH2
ZONE TEMPERATURE

ZN-H-UH2
ZONE HUMIDITY



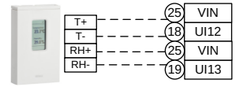
ZN-T-UH3
ZONE TEMPERATURE

ZN-H-UH3
ZONE HUMIDITY



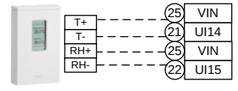
ZN-T-UH4
ZONE TEMPERATURE

ZN-H-UH4
ZONE HUMIDITY



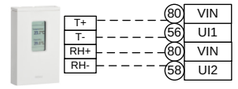
ZN-T-UH5
ZONE TEMPERATURE

ZN-H-UH5
ZONE HUMIDITY



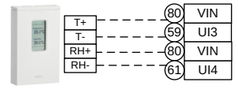
ZN-T-UH6
ZONE TEMPERATURE

ZN-H-UH6
ZONE HUMIDITY



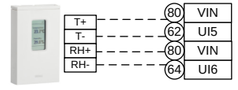
ZN-T-UH7
ZONE TEMPERATURE

ZN-H-UH7
ZONE HUMIDITY



ZN-T-UH8
ZONE TEMPERATURE

ZN-H-UH8
ZONE HUMIDITY



UNIT HEATER SYSTEM CONTROL:

1. ALL SETPOINTS INCLUDING DEADBAND DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBAND SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS.

2. UNIT HEATER SHALL OPERATE YEAR ROUND. WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 55°F, DDC SHALL CYCLE UNIT HEATER ON AND MODULATE HEATING COIL VALVE TO MAINTAIN SPACE TEMP SETPOINT OF 70°F.

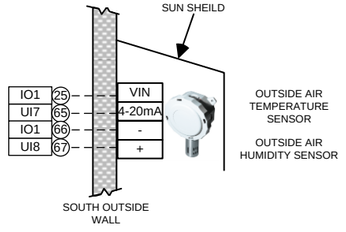
3. DDC SHALL OVERRIDE DRY BULB SPACE TEMP CONTROL BASED ON CALCULATION OF SPACE DEW POINT TEMP AND INCREASE SPACE TEMP 2°F SETPOINT ABOVE SPACE DEW POINT TEMP SETPOINT. WHEN SPACE DEW POINT TEMP DECREASES BELOW 68°F SETPOINT, DRY BULB TEMPERATURE CONTROL SHALL RESTART.

4. DDC SHALL MONITOR FAN OPERATION. ABNORMAL OPERATING STATUS SHALL ACTIVATE AN ALARM.

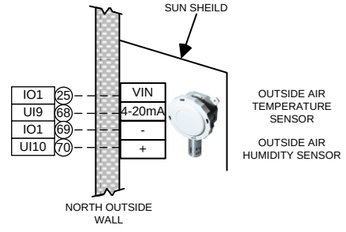
5. DDC SHALL PROVIDE 2°F (MINIMUM) DEADBAND AROUND SETPOINT.

NOTES:
1. ALL CONTROL COMPONENTS ARE EXISTING AND TO BE REUSED UNLESS LISTED IN BILL OF MATERIAL
2. FIELD TO VERIFY LOCATION OF UNIT HEATERS.

SOUTH OA SENSOR



NORTH OA SENSOR



LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

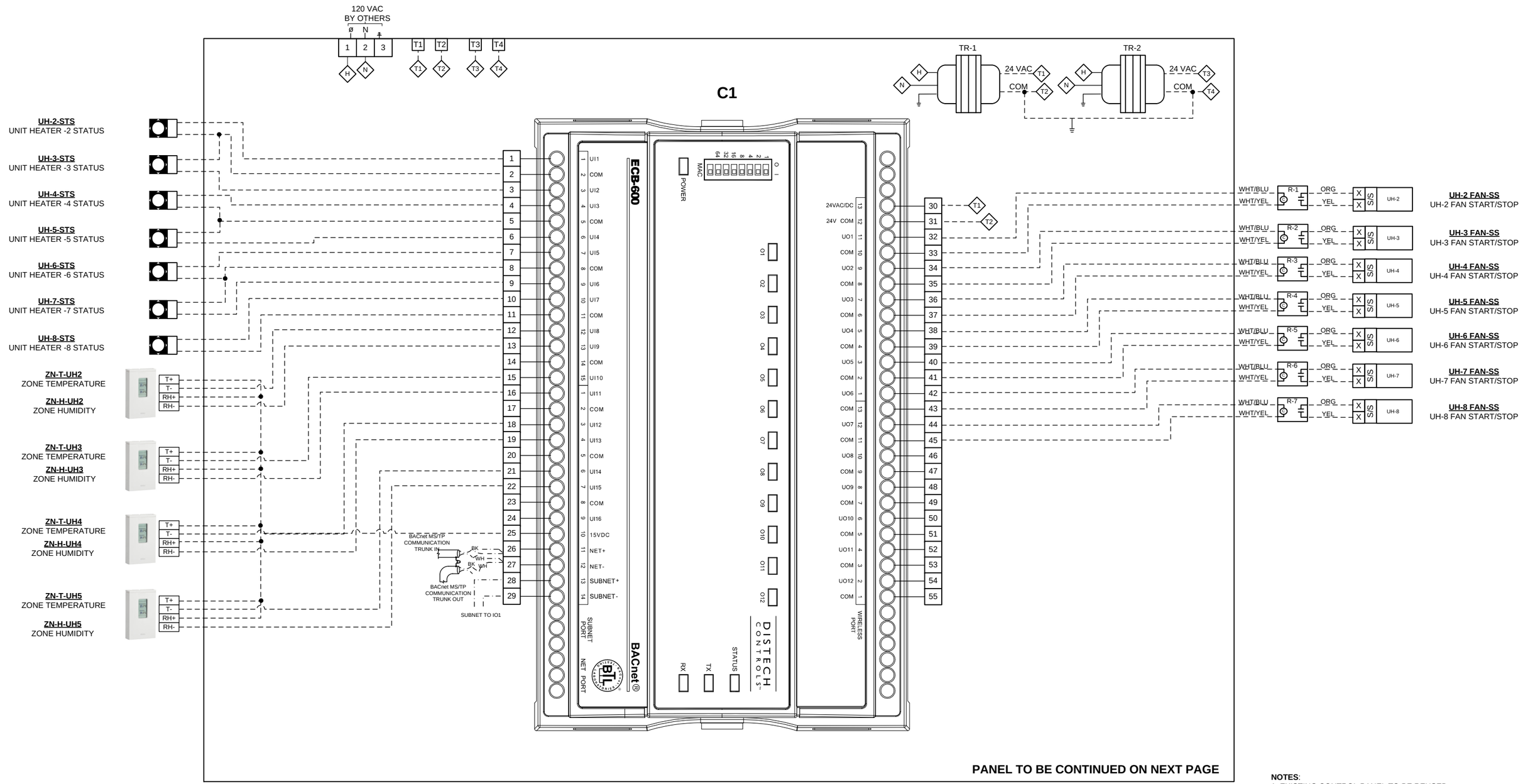
NO.	DATE	REVISION	BY
0	MM/DD/YYYY	Submitted for Approval	ICT

ICT SOLUTIONS, INC
32-72 Steinway St,
Astoria, NY 11103
(M) 718-350-8716

Project: **SAMPLE PROJECT - DISTECH CONTROLS**

UH-2 TO UH-8 SCHEMATIC DIAGRAM

UH-2 TO UH-8 WIRING DIAGRAM PAGE 1



PANEL TO BE CONTINUED ON NEXT PAGE

CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AC-2, MAIN MUSEUM ATTIC-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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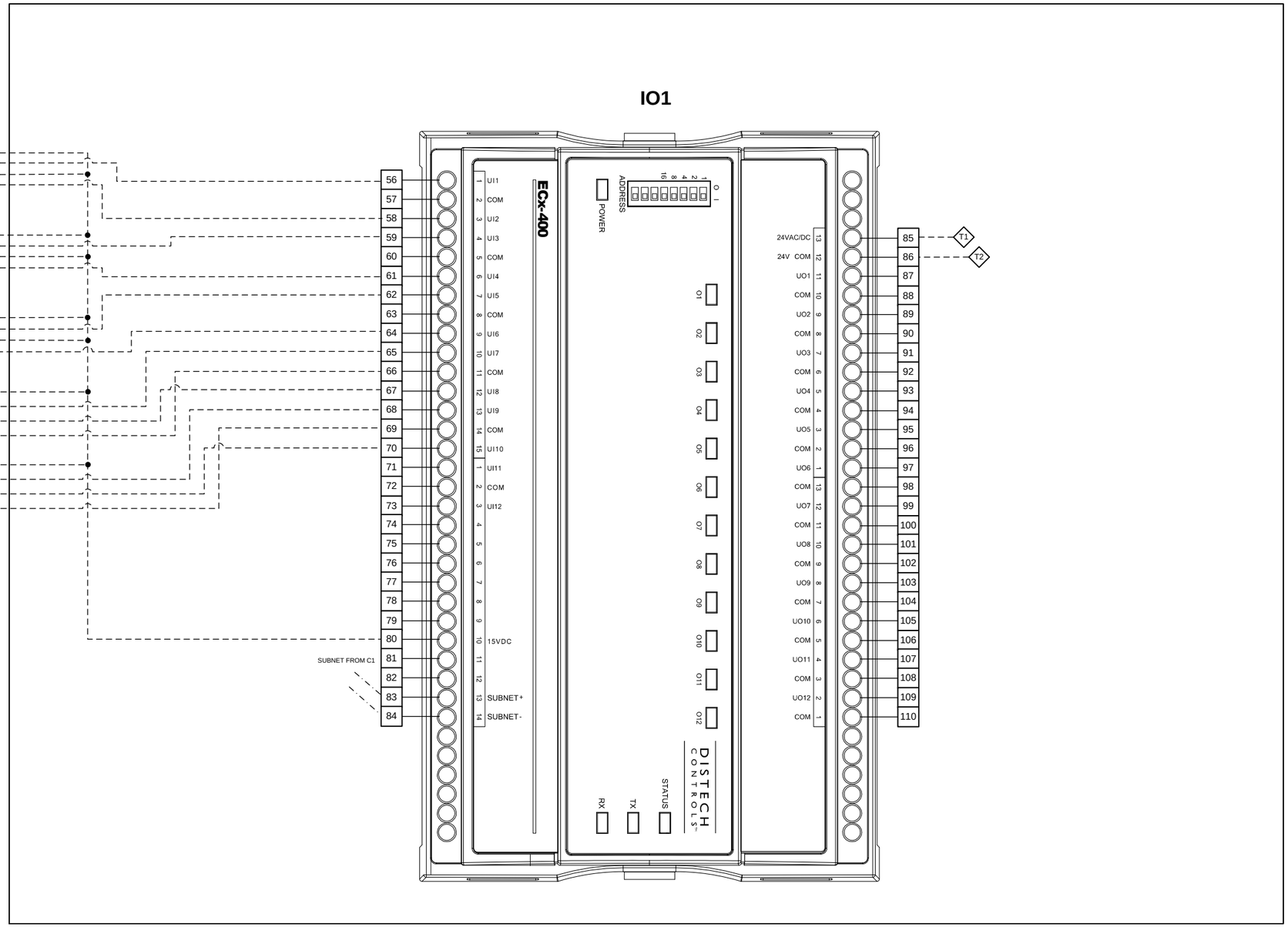
Project: **SAMPLE PROJECT - DISTECH CONTROLS**

UH-2 TO UH-8 WIRING DIAGRAM PAGE 1

UH-2 TO UH-8 WIRING DIAGRAM PAGE 2



CONTROLLER TO BE INSTALLED IN EXISTING NOVAR PANEL AC-2, MAIN MUSEUM ATTIC-CENTER

NOTES:
1. EXISTING CONTROL PANEL TO BE REUSED.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

UH-2 TO UH-8 WIRING DIAGRAM PAGE 2

UH-2 TO UH-8 BILL OF MATERIAL

Item #	Application	Tag	Part no	Quantity	Description	Manufacturer
1	Programmable Controller	C1	CDIB-600X-00	1	B-AAC Programmable Controller With 16UI & 12UO	Distech
2	IO Extension Module	IO1	CDIX-400X-00	1	24-Point I/O Extension Module With 12UI & 12UO	Distech
3	Zone Temp & Humidity Combo Sensor	ZN-T/H	HMW92D	7	Humidity andTemperature Transmitter with Display, 2 Current Outputs	Vaisala
4	Duct Humidity & Temperature Combo Sensor	OAT/H	A/RH2-CP-O-010	2	Outdoor Air Temperature & Humidity Combo Sensor	ACI
5	Relay	R-1 To R-7	RIBU1C	7	Universal field mounted Relay	Functional Devices
6	Transformer	TR-1, 2	TR100VA004	2	Transformer 100 VA, 480/277/240/120 to 24 Vac, Circuit Breaker	Functional Devices

NOTES:
1. FIELD TO VERIFY DUCT TEMPERATURE SIZING BEFORE ORDERING.
2. FIELD TO VERIFY CONDITION OF EXISTING POWER SOURCE & REQUIREMENT OF NEW TRANSFORMERS BEFORE ORDERING.

LEGEND

- Low Voltage, 18 AWG, Copper Wire
- Low Voltage Communication Wiring 22/2 AWG, CL2P, Shielded Copper Wire, Low Capacitance
- Line Voltage, THHN Field Wiring

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

UH-2 TO UH-8 BILL OF MATERIAL

STANDARD TEMPERATURE AND HUMIDITY SETPOINTS FOR MUSEUM

STANDARD TEMPERATURE SETPOINTS:

NON-ART AREA AIR HANDLING EQUIPMENT ZONES (AHUs. HEAT COILS):

- OCCUPIED HEATING = 68°F
- STANDBY HEATING = NA
- UNOCCUPIED HEATING = 60°F

- OCCUPIED COOLING = 74°F
- STANDBY COOLING = NA
- UNOCCUPIED COOLING = 78°F

- LOCAL ADJUSTMENT RANGE FOR OCCUPIED SETPOINTS (WHERE APPLICABLE) SHALL BE +/- 3°F

- ECONOMIZER LOCKOUT SETPOINT (AS APPLICABLE), OA DEWPOINT TEMP = 52°F

NON-ART AREA PERIMETER HEATING ZONES (CUH. UH)

- OCCUPIED HEATING = 68°F
- UNOCCUPIED HEATING = 55°F

ART AREA AIR HANDLING EQUIPMENT ZONES (AHUs. HEAT COILS):

- OCCUPIED HEATING = 70°F
- UNOCCUPIED HEATING = 70°F

- OCCUPIED COOLING = 70°F
- UNOCCUPIED COOLING = 70°F

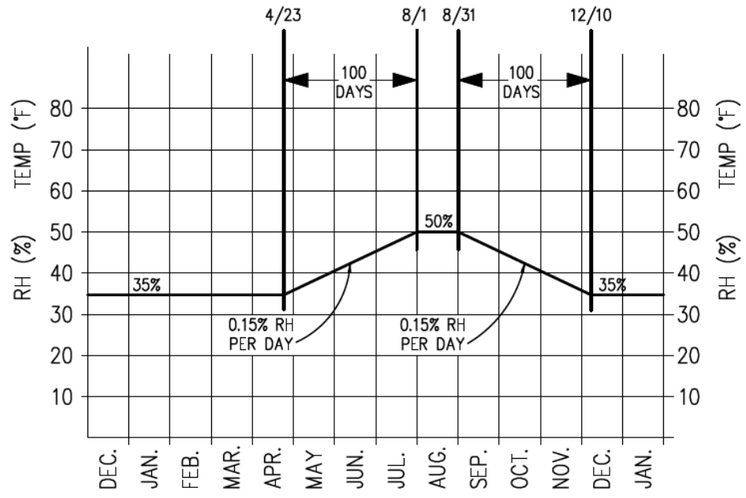
- NO LOCAL ADJUSTMENT RANGE FOR OCCUPIED SETPOINTS.

- ECONOMIZER LOCKOUT SETPOINT (AS APPLICABLE), OA TEMP = 52°F

ART AREA PERIMETER HEATING ZONES (CUH. UH)

- OCCUPIED HEATING = 72°F
- UNOCCUPIED HEATING = 72°F

THE TOLEDO MUSEUM OF ART - STANDARD HUMIDITY SETPOINTS



HUMIDITY SETPOINT RESET SCHEDULE

NOTES:

1. PROVIDE A BUILDING-WIDE GLOBAL SETPOINT GRAPHICAL INTERFACE PAGE WITH THE FOLLOWING STANDARD RESET SCHEDULES THAT SHALL BE APPLIED TO ALL EQUIPMENT AND ZONE CONTROL AS APPLICABLE PER SPECIFIC ZONE TYPES, CONTROL DETAILS AND SEQUENCES OF OPERATION.
2. ADJUST SETPOINT BASED ON CALENDAR DATES AS INDICATED ON MONTHLY HUMIDITY SETPOINT CHART.
3. INDIVIDUAL EQUIPMENT OR ZONE SETPOINTS SHALL THEN BE CAPABLE OF BEING OVERRIDDEN BY FACILITY MAINTENANCE AS REQUIRED, EVEN TO A CONSTANT VALUE (EXAMPLE OF 50% RH YEAR-ROUND WHICH IS CURRENT PRACTICE FOR ALL ZONES).

MONTHLY HUMIDITY SETPOINT CHART

MONTH	%RH SETPOINT
JAN	35
FEB	35
MAR	35
UP TO APR 22	35
FROM APR 23	+0.15% RH FROM PREVIOUS DAY
MAY	+0.15% RH FROM PREVIOUS DAY
JUN	+0.15% RH FROM PREVIOUS DAY
JUL	+0.15% RH FROM PREVIOUS DAY
AUG	50
SEP	-0.15% RH FROM PREVIOUS DAY
OCT	-0.15% RH FROM PREVIOUS DAY
NOV	-0.15% RH FROM PREVIOUS DAY
UP TO DEC 9	-0.15% RH FROM PREVIOUS DAY
FROM DEC 10	35

LEGEND

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Project: **SAMPLE PROJECT - DISTECH CONTROLS**

STANDARD TEMPERATURE AND HUMIDITY SETPOINTS FOR MUSEUM