

## DDC FUNCTION BLOCK LOGIC SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	POINT NAME AO ADDRESS		<b>PID CONTROLLER</b> - PROPORTIONAL, INTEGRAL, DERIVATIVE LOOPS USE STANDARD ALGORITHMS TO CALCULATE AN OUTPUT BASED ON A VARIABLE INPUT. PROPORTIONAL IS BASED ON THE DIFFERENCE BETWEEN THE INPUT AND THE SETPOINT. INTEGRAL IS BASED ON THE TIME THE INPUT DEVIATES FROM THE SETPOINT. DERIVATIVE IS BASED ON THE RATE THE INPUT IS APPROACHING THE SETPOINT. THE PID CAN BE EITHER DIRECT ACTING (DA) OR REVERSE ACTING (RA). IN A DA PID WHEN THE INPUT INCREASES THE OUTPUT INCREASES. IN A RA PID WHEN THE INPUT INCREASES THE OUTPUT DECREASES. OPTIONALLY, AN ADDITIONAL DIGITAL TRIGGER MAY BE ASSIGNED TO THE INPUT SECTION THAT WILL ENABLE/DISABLE CALCULATION OF THE PID LOOP.
	INPUT POINT - READS A VALUE FROM A PHYSICAL INPUT ON THE CONTROLLER AND CONVERTS FOR USE INSIDE THE FB. DESCRIPTION - CONTROLLER ADDRESS, POINTNAME AND POINT TYPE. AI - ANALOG INPUT DI - DIGITAL INPUT		<b>FLOATING CONTROLLER</b> - OUTPUT WILL INCREASE OR DECREASE INCREMENTALLY AS INPUT DEVIATES FROM SETPOINT. IN A DA CONTROLLER WHEN THE INPUT INCREASES THE OUTPUT INCREASES. IN A RA CONTROLLER WHEN THE INPUT INCREASES THE OUTPUT DECREASES.
	VIRTUAL POINT - ANALOG OR DIGITAL VALUE USED WITHIN A FB OR BROADCAST ACROSS THE LAN.		<b>RESET CONTROLLER</b> - USER DEFINED OUTPUT VALUE WILL RESET IN A LINEAR RELATIONSHIP BASED ON USER DEFINED INPUT VALUE.
	DIGITAL WIRE - DIGITAL LOGIC CONNECTION BETWEEN FB'S		<b>SWITCHING RELAY</b> - SWITCHES OUTPUT BETWEEN TWO INPUTS WHEN DIGITAL PILOT INPUT IS ON. SWITCH SHOWN IN NORMAL POSITION
	ANALOG WIRE - ANALOG LOGIC CONNECTION BETWEEN FB'S		<b>DEADBAND SWITCHING RELAY</b> - DIGITAL OUTPUT CHANGES WHEN INPUT VALUE RISES/FALLS ABOVE/BELOW SETPOINT 1 (SP1). DIGITAL OUTPUT RESTORES TO NORMAL WHEN INPUT RISES/FALLS ABOVE/BELOW SETPOINT 2 (SP2). SWITCH SHOWN IN NORMAL POSITION
	CONSTANT - CONSTANT VALUE INPUTS		<b>LOGICAL IF EXPRESSION</b> - THE OUTPUT IS ON IF THE INPUT MEETS THE CONDITION OF THE SETPOINT.
	GRAPHIC INTERFACE - VALUE APPEARS ON ENTERPRISE BUILDING MANAGEMENT SYSTEM (EBMS) GRAPHIC SCREEN.		<b>RAMP CONTROLLER</b> - LIMITS THE RATE OF CHANGE OF AN OUTPUT ON AN INCREASE IN VALUE OR A DECREASE IN VALUE. CHNGX - % OF TOTAL MAXIMUM OUTPUT VALUE ALLOWED FOR OUTPUT CHANGE # = TIME IN SECONDS. MAX = MAXIMUM OUTPUT VALUE. MIN = MINIMUM OUTPUT VALUE.
	ALARM & PRIORITY - TRANSMITS AN ALARM AND ALARM PRIORITY TO THE ENTERPRISE BUILDING MANAGEMENT SYSTEM (EBMS).		<b>TIMER</b> - OUTPUT IS ON FOR A USER SPECIFIED TIME AFTER INPUT CHANGES FROM OFF TO ON
	MESSAGE AND NUMBER - TRANSMITS A MESSAGE AND MESSAGE NUMBER TO THE ENTERPRISE BUILDING MANAGEMENT SYSTEM (EBMS).		<b>AUTOMATIC TIME SCHEDULER</b> - INCLUDES SCHEDULES ENTERED INTO CONTROLLER FOR 7 DAY SCHEDULING WITH HOLIDAYS AND OVERRIDE SCHEDULES. INCLUDES OVERRIDE INPUT FOR UNSCHEDULED OVERRIDE. OUTPUTS REFERENCE FLAGS CAN INCLUDE: HEATING SETBACK, COOLING SETBACK, AND UNOCCUPIED.
	TREND - ESTABLISHES TREND IN CONTROLLER.		<b>OPTIMUM START/STOP TIME SCHEDULER</b> - INCLUDES SCHEDULES ENTERED INTO CONTROLLER FOR DAY SCHEDULING WITH HOLIDAYS AND OVERRIDE SCHEDULES. INCLUDES OPTIMUM START STOP ROUTINE. OUTPUTS REFERENCE FLAGS CAN INCLUDE: WARM-UP-COOL-DOWN, HEATING SETBACK, COOLING SETBACK, AND UNOCCUPIED. INCLUDES OVERRIDE INPUT (OVR) FOR UNSCHEDULED OVERRIDE.
	RUN TIME MONITOR - ACCUMULATES RUNTIME FOR DIGITAL OUTPUT AND CONVERTS TIME TO HOURS.		<b>CALCULATION BLOCK</b> - OUTPUT IS EQUAL TO CALCULATION USING INPUTS. EQUATION CAN BE MATHEMATICAL OR A PREDEFINED INDUSTRY STANDARD ALGORITHM (i.e. CFM, VELOCITY, PRESSURE, ENTHALPY, DEW POINT, ETC.)
	REFERENCE FLAG - USED AS CONNECTION TO FB'S BY REFERENCE INSTEAD OF WIRES.		<b>HIGH SELECTOR</b> - SELECTS HIGHER OF INPUT VALUES
	DIGITAL AND GATE - OUTPUT IS ON IF ALL INPUTS ARE TRUE		<b>LOW SELECTOR</b> - SELECTS LOWER OF INPUT VALUES
	DIGITAL OR GATE - OUTPUT IS ON IF ANY INPUT IS TRUE.		<b>AVERAGING BLOCK</b> - MATHEMATICALLY AVERAGES INPUT VALUES.
	DIGITAL EXCLUSIVE OR GATE - OUTPUT IS ON IF ONLY ONE INPUT IS TRUE.		<b>PRECEDENCE MODULE</b> - GENERATES VALUES BASED ON A COMPARISON OF COMMAND AND MONITORING INPUTS. DLY - DEFOULD DELAY PERIOD MTR - MONITOR (INPUT FOR PROOF) COM - COMMAND (INPUT FOR PROOF) RST - RESET (IF LATCHING IS USED) ALM - (ON WHEN MONITOR INPUT IS NOT EQUAL TO COMMAND INPUT) NML - OUTPUT IS ON WHEN MONITOR AND COMMAND INPUTS ARE ON AND NORMAL CONDITIONS ARE MET
	INVERSE (NOT) - IF INPUT = ON, OUTPUT = OFF; CONVERSELY IF INPUT = OFF, OUTPUT = ON		<b>TIME AVERAGE BLOCK</b> - OUTPUT IS EQUAL TO SUM OF INPUTS FROM USER SPECIFIED PREVIOUS TIME PERIOD (OR NUMBER OF SCANS) TO CURRENT TIME (OR SCAN) DIVIDED BY NUMBER OF DISCRETE POINTS IN THE SUMMATION PERIOD. OUTPUT IS A ROLLING TIME BASED AVERAGE OF THE INPUT VALUE.
	LATCH OFF - OUTPUT IS OFF WHENEVER INPUT IS ON. OUTPUT REMAINS OFF UNTIL RESET CHANGES FROM OFF TO ON.		<b>STAGER BLOCK</b> - OUTPUT IS EQUAL TO SUM OF REQUESTS FROM USER SPECIFIED INPUTS. ROTATION SHALL BE DETERMINED BY USER DEFINED PARAMETERS. EACH INDIVIDUAL OUTPUT CAN BE LOCKED OUT BY USER DEFINED INDIVIDUAL INPUTS. LOCKED OUT OUTPUTS SHALL BE SKIPPED IN ROTATION. (SEE SEQUENCE OF OPERATION FOR DETAILS)
	LATCH ON - OUTPUT IS ON WHENEVER INPUT IS ON. OUTPUT REMAINS ON UNTIL RESET CHANGES FROM OFF TO ON.		<b>LEAD/STANDBY BLOCK</b> - ON RUN COMMAND, LEAD OUTPUT IS SELECTED. LEAD OUTPUT CAN BE SWAPPED MANUALLY OR BY A TIME SCHEDULE. WHEN THE LEAD EQUIPMENT FAILS, THE STANDBY OUTPUT IS SELECTED. (SEE SEQUENCE OF OPERATION FOR DETAILS)
	ON/OFF DELAY TIMER - AFTER INPUT IS ON, OUTPUT IS ON/OFF AFTER A PREDETERMINED TIME (#) HAS ELAPSED.		
	CYCLE DELAY TIMER - WHEN SET TIME HAS ELAPSED, THE FIRST TIME INPUT IS ON, OUTPUT IS ON AND TIMER RESETS. BEFORE SET TIME HAS ELAPSED, OUTPUT IS OFF WHEN INPUT IS OFF. IF INPUT GOES FROM OFF TO ON BEFORE SET TIME HAS ELAPSED, OUTPUT WILL REMAIN OFF.		
	POWER FLAG - ON WHEN CONTROLLER IS INITIALLY POWERED ON AND NO PHASE LOSS IS DETECTED		
	FLIP FLOP - CHANGE STATE OF OUTPUT WHEN INPUT CHANGES FROM OFF TO ON; OUTPUT SET TO OFF WHEN RESET (R) GOES CHANGES FROM OFF TO ON		
	SETPOINT OPTIMIZATION - RESET OF OUTPUT FROM A SETPOINT VALUE TO A MINIMUM VALUE (BASED ON VALUES OR REQUESTS). DB - DEAD BAND. INC - INCREMENT/DECREMENT VALUE. HI - MAXIMUM RESET VALUE. LO - MINIMUM RESET VALUE.		
	SAMPLE & HOLD - CHANGE IN OUTPUT (WITH DEFINED MINIMUM & MAXIMUM VALUES) BY A DEFINED AMOUNT WHEN INPUT DEVIATES FROM SETPOINT (SP) BY A DEFINED AMOUNT AT A DEFINED INTERVAL. I - INPUT O - OUTPUT MX - MAXIMUM OUTPUT MN - MINIMUM OUTPUT INTVL - INTERVAL > +E +OA - WHEN INPUT RISES ABOVE SETPOINT BY AMOUNT "+E", OUTPUT IS INCREASED BY AMOUNT "+OA" < -E -OA - WHEN INPUT FALLS BELOW SETPOINT BY AMOUNT "-E", OUTPUT IS REDUCED BY AMOUNT "-OA"		

DESIGNATIONS	DESCRIPTION
	20 PSIG MAIN CONTROL AIR
	WIRING

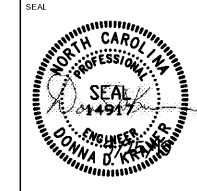
- GENERAL COORDINATION NOTES:**
- ALL CONTROL SYSTEMS RELAYS, TRANSFORMERS, POWER SUPPLIES, AND OTHER COMPONENTS WHICH REQUIRE 120V POWER SHALL BE CONSOLIDATED IN CONTROL PANELS UNLESS SPECIFICALLY GRANTED OTHERWISE BY DESIGNER OR WHERE CONTROLLERS ARE INTEGRAL TO THE CONTROLLED DEVICE AND ARE UNIT-MOUNTED (E.G. SOME VAV TERMINAL BOX CONTROLLERS, FAN COIL UNIT CONTROLLERS, ETC.).
  - CONTROL PANELS SHALL BE LOCATED AS SHOWN ON DRAWINGS, OR SHALL BE COORDINATED WITH DESIGNER PRIOR TO INSTALLATION. WHERE ADDITIONAL CONTROL PANELS ARE REQUIRED THEY SHALL BE LOCATED IN VICINITY OF CONTROL PANELS AS SHOWN ON CONSTRUCTION DOCUMENTS. WHERE SIDE-BY-SIDE MOUNTING OF MULTIPLE CONTROL PANELS OF THE SAME TYPE IS NOT FEASIBLE, PANELS SHALL BE STACKED ONE ABOVE THE OTHER WITH AN INVERTED 'L' WIRING GUTTER FOR CONTROL WIRE ROUTING.
  - THE CONTROLS CONTRACTOR SHALL COORDINATE LOCATIONS AND POWER REQUIREMENTS WITH THE DESIGNER UPON DETERMINATION OF REQUIREMENT FOR ADDITIONAL CONTROL PANELS OR CIRCUITS.
  - WHERE LOCATIONS OR NUMBER OF CONTROL PANELS VARIES FROM THOSE INDICATED ON CONSTRUCTION DOCUMENTS, THEY SHALL BE LOCATED ON A FLOOR PLAN AND SUBMITTED WITH SHOP DRAWINGS DURING THE SHOP DRAWING/SUBMITTAL PROCESS.
  - WHERE CONTROL EQUIPMENT FROM MULTIPLE VENDORS SHARE UTILITY CORRIDORS, CLOSETS, RACKS, AND/OR CABLE TRAYS, EQUIPMENT AND PANEL LOCATIONS SHALL BE COORDINATED. LOW VOLTAGE SENSOR OR CONTROL CABLE INSTALLED IN COMMON CABLE TRAYS SHALL HAVE UNIQUE JACKET COLOR BASED ON THE SYSTEM UNDER CONTROL. SUCH UNIQUE SYSTEMS MAY INCLUDE, BUT NOT BE LIMITED TO: BUILDING AUTOMATION, ANIMAL MONITORING AND CONTROL, ACCESS CONTROL/SECURITY, REVERSE OSMOSIS ANIMAL WATERING, AND AQUATIC SPECIES WATER TREATMENT.

## CONTROL SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DDC POINT DESCRIPTOR WITH NAME. AI - ANALOG INPUT. DI - DIGITAL INPUT. AO - ANALOG OUTPUT. DO - DIGITAL OUTPUT.		DISCONNECT SWITCH
			CONTROL TRANSFORMER
	TEMPERATURE SENSOR WITH AVERAGING ELEMENT		RELAY COILS
	TEMPERATURE SENSOR WITH SINGLE POINT ELEMENT		FUSE
	TEMPERATURE SENSOR WITH PIPE WELL		THERMISTOR
	SPACE TEMPERATURE SENSOR		NORMALLY OPEN AND NORMALLY CLOSED CONTACTS
	HUMIDITY SENSOR		HAND-OFF-AUTO SELECTOR SWITCH
	CURRENT SENSOR		WIRING DESIGNATION. (NO. OF HATCHES INDICATES NO. OF CONDUCTORS)
	SMOKE DETECTOR		WIRING CONNECTION
	DIFFERENTIAL PRESSURE SWITCH		ON-OFF SELECTOR SWITCH
	WATER FLOW SWITCH		THREE WAY CONTROL VALVE
	TWO WAY CONTROL VALVE		LIMIT SWITCH
	DAMPENER ACTUATOR		CONTROL DAMPER
	AIR DIFFERENTIAL PRESSURE TRANSMITTER (0 - 5" RANGE)		HYDRONIC DIFFERENTIAL PRESSURE TRANSMITTER
	VARIABLE SPEED DRIVE		HYDRONIC FLOWMETER
	FREEZESTAT		THERMOSTAT
	AIRFLOW MEASURING STATION		ELECTRO-PNEUMATIC TRANSDUCER
	FAN INLET AIRFLOW MEASURING STATION		

## ABBREVIATIONS

ALM	ALARM	NC	NORMALLY CLOSED
AH	AIR HANDLER	NO	NORMALLY OPEN
BLDG	BUILDING	OA	OUTSIDE AIR
C	COMMON	OVRD	OVERRIDE
CL	COOL	RA	RETURN AIR
CHPS	CHILLED WATER PUMP, SECONDARY	REQ	REQUEST
CHWP	CHILLED WATER PUMP	RF	RETURN FAN
CHWR	CHILLED WATER RETURN	RH	RELATIVE HUMIDITY
CHWS	CHILLED WATER SUPPLY	RLF	RELIEF FAN
CW	CONDENSER WATER	S/S	START / STOP
CWP	CONDENSER WATER PUMP	SA	SUPPLY AIR
CWR	CONDENSER WATER RETURN	SD	SMOKE DETECTOR
CWS	CONDENSER WATER SUPPLY	SEC	SECONDARY OR SECONDS
DD	DOWN-DUCT	SF	SUPPLY FAN
DP	DIFFERENTIAL PRESSURE	SCHWR	SECONDARY CHILLED WATER RETURN
EF	EXHAUST FAN	SCHWS	SECONDARY CHILLED WATER SUPPLY
FBK	FEEDBACK	SHWR	SECONDARY HOT WATER RETURN
FC	FAN COIL	SHWS	SECONDARY HOT WATER SUPPLY
HOA	HAND - OFF - AUTOMATIC	T	TEMPERATURE
HT	HEAT	TB	TERMINAL BOX
HWP	HOT WATER PUMP	TW	TEMPERED WATER
HWPS	HOT WATER PUMP, SECONDARY	TWP	TEMPERED WATER PUMP
HWR	HOT WATER RETURN	TWR	TEMPERED WATER RETURN
HWS	HOT WATER SUPPLY	TWS	TEMPERED WATER SUPPLY
ISO	ISOLATION	VP	VELOCITY PRESSURE
MA	MIXED AIR	VSD	VARIABLE SPEED DRIVE
		VHP	VAPORIZED HYDROGEN PEROXIDE



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REVISION:

SHEET TITLE: HVAC CONTROLS LEGEND  
 SCALE: (N/A)

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