EngA ENGINEERED AIR

CenCon

Communication Manual for

Modbus and BACnet (MSTP and IP)

Manual Revision 1.04

www.engineeredair.com

INTRODUCTION

This Manual is designed to be used and read in conjunction with the *CenCon User Manual*. A digital printable copy of all manuals can be found at https://www.engineeredair.com/manuals/

The CenCon is a configurable logic controller designed to be the primary controller of Engineered Air heating, cooling and ventilation equipment. This manual should be used in conjunction with the CenCon operation manual. The CenCon is designed to control the cooling, heating, and mixing economizer. In this manual, the primary setpoint and sensor refer to the final leaving temperature. All temperature register readings are based on degrees Fahrenheit. Conversion to degrees Celsius can be accomplished at the front-end system.

The CenCon is equipped with two RS485 ports equipped for Modbus RTU the BACnet® MS/TP protocols and an Ethernet port equipped for the BACnet® TCP/IP protocol. This manual describes the BACnet® objects and the information contained in each object. In this manual, BACnet® objects that can be written to are said to be EMS (Energy Management System) commanded, identified by R/W (Read/Write).

If any errors or omissions are noted, please contact the nearest Engineered Air Technical Service Department. To ensure the warranty is honored, only qualified personnel should be employed for service or troubleshooting. If further information is required, please contact the nearest Engineered Air sales office.

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INTRODUCTION

CenCon supports Modbus RTU, BACnet MS/TP RS-485 and BACnet/IP. The Baud rate is fixed at 19200 for Modbus RTU networks and 38400 for MS/TP networks. This manual describes the BACnet objects and the information contained in the CenCon. In this manual, object points that can be written to are said to be EMS (Energy Management System) commanded.

Wiring

The CenCon can be connected to either an RS-485 network or a to an Ethernet/IP network. The BACnet MS/TP RS-485, & BACnet/IP communication cables must conform to BACnet/Modbus specifications.

RS485

The CenCon has a gray terminal strip that is used for all RS-485 communication connections.

Terminals SmA and SmB have been designated and must be used to connect to the RS-485 Modbus network terminals.

Terminals BnA and BnB have been designated and must be used to connect to the RS-485 BACnet network.

The RS-485 communication cable to the CenCon should be a 24awg shielded twisted pair (STP) with a shunt capacitance of 16pF per foot and 100 ohm characteristic impedance.

Ethernet

The CenCon is equipped with a standard RJ45 Ethernet port located on the top of the controller. The Ethernet port is designed to be incorporated with a BACnet® over IP network that is used to communicate with the building EMS.

BACnet Communication Default Factory Settings

These default settings can be configured on the CenCon service display.

Modbus RTU

Baud Rate	19200
Address	1

BACnet MSTP

Gateway ID	270000
Baud Rate	38400
MAC Address	3
Max Master	10
MSTP DNET	2707
Max Info Frames	20

BACnet IP

Instance	270000
IP	192.168.0.10
Subnet	255.255.255.0
Gateway	192.168.0.1
DNS 1	8.8.8.8
UDP Port#	47808 (not adjustable)
Ip Dnet	2708

Note:

Where there are multiple CenCon controllers on a network, the following settings must be unique for each controller:

BACnet MSTP

- Gateway ID
- MAC Adress
- MSTP DNET

BACnet IP

- IP Adress
- IP DNET

It is also **recommended that there be a minimum value of 100 between Gateway ID's** to ensure that there are no conflicts with internal provisioning of module addresses.

After making any changes to the default communication setting you must first save the settings and then cycle the power to the controller to reset it and force the updates. Save Settings can be found at the bottom right of the Communication tab

When writing to the Cencon Controller a Write Priority of 3 to 7 must be used.

PICS & BTL Approved

BACnet PICS (Protocol Implementation Conformance Statement) defines the options available by BACnet that are implemented in the CenCon. These PICS are available from the factory upon request. The following defines the BACnet objects available on the network.

EngA BACnet Virtual Gateway

CenCon	[Gateway ID +1]
C-XM	[Gateway ID +2]
J-XM	[Gateway ID +6]
G-XM	[Gateway ID +8]
M-XM	[Gateway ID +10]
S-XM	[Gateway ID +12]
H-XM	[Gateway ID +14]
ER-XM	[Gateway ID +16]
XP-XM1	[Gateway ID +17]
XP-XM2	[Gateway ID +18]
XP-XM3	[Gateway ID +19]
XP-XM4	[Gateway ID +20]
CD-XM	[Gateway ID +21]
CD-XM2	[Gateway ID +22]
P-XM	[Gateway ID +24]
P-XM1	[Gateway ID +25]
P-XM2	[Gateway ID +26]
P-XM3	[Gateway ID +27]
P-XM4	[Gateway ID +28]
P-XM5	[Gateway ID +29]
P-XM6	[Gateway ID +30]
P-XM7	[Gateway ID +31]
CenCon - SW	[Gateway ID +55]

CenCon POINTS LIST

Depending on the style and type of appliance, not all points will be available. The CenCon and CenCon-SW will always be present on every device. Other devices are enabled based on the presence of expansion modules, depending on the appliance design.

Read / Write – CenCon SW

DESCRIPTION / Object Name	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Discharge Air Setpoint	O	40001	AO0	Int/10 °F	R/W
Damper Minimum Position	O	40002	AO1	Integer mV	R/W
Humidification Setpoint	O	40004	AO3	Integer %	R/W
Dehumidification Setpoint	O	40005	AO4	Integer %	R/W
DX Setpoint	O	40006	AO5	Int/10 °F	R/W
EMS XP-XM MODULE 1 AO1 VOLTAGE	O	40007	AO6	Integer mV	R/W
EMS XP-XM MODULE 1 AO2 VOLTAGE	O	40008	AO7	Integer mV	R/W
EMS XP-XM MODULE 2 AO1 VOLTAGE	O	40009	AO8	Integer mV	R/W
EMS XP-XM MODULE 2 AO2 VOLTAGE	O	40010	AO9	Integer mV	R/W
EMS XP-XM MODULE 3 AO1 VOLTAGE	O	40011	AO10	Integer mV	R/W
EMS XP-XM MODULE 3 AO2 VOLTAGE	O	40012	AO11	Integer mV	R/W
EMS XP-XM MODULE 4 AO1 VOLTAGE	0	40013	AO12	Integer mV	R/W
EMS XP-XM MODULE 4 AO2 VOLTAGE	O	40014	AO13	Integer mV	R/W
EMS Fan Enable	O	00001	BO0	0/1	R/W
EMS C-XM Enable	O	00002	BO1	0/1	R/W
EMS J-XM Enable	O	00003	BO2	0/1	R/W
EMS G-XM Enable	O	00004	BO3	0/1	R/W
EMS M-XM Enable	O	00005	BO4	0/1	R/W
EMS S-XM Enable	O	00006	BO5	0/1	R/W
EMS H-XM Enable	O	00007	BO6	0/1	R/W
EMS ER-XM Enable	O	00008	BO7	0/1	R/W
EMS Dehum Enable	O	00009	BO8	0/1	R/W
EMS Reheat Enable	O	00010	B09	0/1	R/W
EMS XP-XM MODULE 1 DO1 Enable	O	00011	BO10	0/1	R/W
EMS XP-XM MODULE 1 DO2 Enable	O	00012	BO11	0/1	R/W
EMS XP-XM MODULE 1 DO3 Enable	O	00013	BO12	0/1	R/W
EMS XP-XM MODULE 1 DO4 Enable	O	00014	BO13	0/1	R/W
EMS XP-XM MODULE 2 DO1 Enable	O	00015	BO14	0/1	R/W
EMS XP-XM MODULE 2 DO2 Enable	O	00016	BO15	0/1	R/W
EMS XP-XM MODULE 2 DO3 Enable	O	00017	BO16	0/1	R/W
EMS XP-XM MODULE 2 DO4 Enable	O	00018	BO17	0/1	R/W
EMS XP-XM MODULE 3 DO1 Enable	O	00019	BO18	0/1	R/W
EMS XP-XM MODULE 3 DO2 Enable	O	00020	BO19	0/1	R/W
EMS XP-XM MODULE 3 DO3 Enable	O	00021	BO20	0/1	R/W
EMS XP-XM MODULE 3 DO4 Enable	O	00022	BO21	0/1	R/W

EMS XP-XM MODULE 4 DO1 Enable	O	00023	BO22	0/1	R/W
EMS XP-XM MODULE 4 DO2 Enable	O	00024	BO23	0/1	R/W
EMS XP-XM MODULE 4 DO3 Enable	O	00025	BO24	0/1	R/W
EMS XP-XM MODULE 4 DO4 Enable	O	00026	BO25	0/1	R/W

Read Only – CenCon SW

DESCRIPTION / Object Name	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Heating Demand	O	30001	AI0	Integer %	R
Cooling Demand	O	30002	AI1	Integer %	R
Humidification Demand	O	30003	AI2	Integer %	R
Recovery Demand	O	30004	AI3	Integer %	R
Dehumidification Demand	O	30005	AI4	Integer %	R
Wheel Rotation Present	O	10001	BIO	0/1	R

Read Only - CenCon

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
MCW	Modulating Cooling	O	40003	AO2	Integer mV	R
MEC	Modulating Economizer	O	40002	AO1	Integer mV	R
MHW	Modulating Heating	O	40001	AO0	Integer mV	R
MSP	VFD Command Speed	O	40004	AO3	Integer mV	R
RPM	VFD Feedback Speed	I	30007	AI6	Integer mV	R
IAQ	IAQ Sensor	I	30001	AI0	Integer mV	R
HuO	Outside Humidity	I	30003	AI2	Integer mV	R
HR +/-	Return/ Room Humidity	I	30006	AI5	Integer mV	R
FbD	Feedback Damper	I	30008	AI7	Integer mV	R
DES	Damper End Switch	I	10005	BI4	I/O	R
AL	Alarm	O	00005	BO4	1/0	R
SA	Supply Air	O	00003	BO2	1/0	R
DM	Damper Actuator	O	00002	BO1	1/0	R
OCC	Occupied/ Unoccupied	I	10006	BI5	1/0	R
*TCB	Time Clock Bypass	I	10007	BI6	1/0	R
EnF	Enable Fan	I	10008	BI7	1/0	R
ALi	Secondary BACnet Alarm	I	10001	BI0	1/0	R
MA	Mixed Air Temperature	I	30019	AI18	Int/10 °F	R
DA	Discharge Air Temperature	I	30021	AI20	Int/10 °F	R
AA	Ambient Air Temperature	I	30020	AI19	Int/10 °F	R
RA	Return/ Room Temperature	I	30017	AI16	Int/10 °F	R
W +/-	Modulating Room Thermostat	I	30009	AI8	Integer mV	R
ASP	Remote VFD Setpoint	I	30010	AI9	Integer mV	R
DX	DX Coil Temperature	I	30018	AI17	Int/10 °F	R
DHC	Dehumidification	I	10009	BI8	1/0	R
BYP	VFD Bypass	I	10004	BI3	1/0	R
DPr	(FUTURE)	I	30002	AI1	NA	R
Y +/-	DX Setpoint Reset	I	30005	AI4	Integer mV	R

FbB	Air Proving Switch	I	10003	BI2	0/1	R
OLF	(FUTURE)	I	10002	BI1	0/1	R

EXPANSION MODULES POINTS LIST

The following points are read only.

C-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
MCp	Modulating Compressor	O	40001	AO0	Integer mV	R
MF1	Modulating Condenser Fan #1	O	40002	AO1	Integer mV	R
MF2	Modulating Condenser Fan #2	O	40003	AO2	Integer mV	R
MRh	Modulating Reheat	I	40004	AO3	Integer mV	R
C1a	Cooling stage #1	O	00001	BO0	1/0	R
C2a	Cooling stage #2	O	00002	BO1	1/0	R
C3a	Cooling stage #3	O	00003	BO2	1/0	R
C4a	Cooling stage #4	O	00004	BO3	1/0	R
C5a	Cooling stage #5	O	00005	BO4	1/0	R
C6a	Cooling stage #6	O	00006	BO5	1/0	R
F1b	Condenser Fan Stage #1	O	00007	BO6	1/0	R
F2b	Condenser Fan Stage #2	O	00008	BO7	1/0	R
R1b	Stepped Reheat Stage #1	O	00009	BO8	1/0	R
R2b	Stepped Reheat Stage #2	O	00010	BO9	1/0	R
DS +/-	(FUTURE)	I	30021	AI20	Integer mV	R
EnH	Enable Reheat Override	I	10001	BI0	1/0	R
EnC	Enable Cooling	I	10002	BI1	1/0	R

J-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
FbG	Feedback Gas	I	30003	AI2	Integer mV	R
MBV	Modulating Ball Valve	O	40001	AO0	Integer mV	R
CAS	Combustion Air Switch	I	10003	BI2	1/0	R
BFS	Blocked Flue Switch	I	10001	BI0	1/0	R
EnH	Enable Heat	I	10002	BI1	1/0	R
PV	Pilot Valve	O	00005	BO4	1/0	R
SR	Safety Relay	O	00006	BO5	1/0	R
FR	Flame Relay	O	00007	BO6	1/0	R
HL	High Limit	I	10005	BI4	1/0	R
CP	Condensate Probe	I	30005	AI4	Integer kΩ	R
MX	MX Valve	O	40005	AO4	Integer mV	R
FbV	Gas Valve Feedback	I	10004	BI3	1/0	R

G-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
FbG	Feedback Gas	I	30003	AI2	Integer mV	R
FbA	Feedback Air	I	30004	AI3	Integer mV	R
MBV	Modulating Ball Valve	O	40001	AO0	Integer mV	R
MCA	Modulating Combustion Air	O	40002	AO1	Integer mV	R
CAS	Combustion Air Switch	I	10003	BI2	1/0	R
BFS	Blocked Flue Switch	I	10001	BI0	1/0	R
EnH	Enable Heat	I	10002	BI1	1/0	R
CB	Combustion Blower	O	00001	BO0	1/0	R
PV	Pilot Valve	O	00005	BO4	1/0	R
SR	Safety Relay	O	00006	BO5	1/0	R
FR	Flame Relay	O	00007	BO6	1/0	R
HL	High Limit	I	10005	BI4	1/0	R
CP	Condensate probe sensor	I	30005	AI4	Integer kΩ	R
FbV	Gas Valve Feedback	I	10004	BI3	1/0	R

M-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
FbG	Feedback Gas	I	30003	AI2	Integer mV	R
MBV	Modulating Ball Valve	O	40001	AO0	Integer mV	R
MPP	Profile Pressure Actuator	O	40002	AO1	Integer mV	R
HiE	High Speed Enable	I	10001	BI0	1/0	R
EnH	Enable Heat	I	10002	BI1	1/0	R
HiS	High Speed	O	00001	BO0	1/0	R
Exl	Exhaust Fan Interlock	O	00002	BO1	1/0	R
DFR	Dual Flame Rod	O	00003	BO2	1/0	R
WPu	Water Pump	O	00004	BO3	1/0	R
PV	Pilot Valve	O	00005	BO4	1/0	R
SR	Safety Relay	O	00006	BO5	1/0	R
FR	Flame Relay	O	00007	BO6	1/0	R
FL	High Limit	I	10005	BI4	1/0	R
MX	MX Valve	O	40005	AO4	Integer mV	R
FbV	Gas Valve Feedback	I	10004	BI3	1/0	R

ER-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
MFr	Modulating By-Pass Damper	O	40001	AO0	Integer mV	R
MER	Modulating Energy Recovery	O	40002	AO1	Integer mV	R
EnH	Enable Heat	I	10001	BI0	1/0	R
RoT	Rotation Sensor	I	10002	BI1	1/0	R
ByD	By-Pass Damper	O	00001	BO0	1/0	R
ERC	Enable Wheel	O	00005	BO4	1/0	R
LA	Leaving Air Temperature	I	30020	AI19	Int/10 °F	R
EA	Exhaust Air Temperature	I	30021	AI20	Int/10 °F	R

S-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
FbG	Feedback Gas	I	30003	AI2	Integer mV	R
MHL	Modulating High Limit	I	30004	AI3	Integer mV	R
MBV	Modulating Ball Valve	O	40001	AO0	Integer mV	R
DHL	Duct High Limit	I	10003	BI2	1/0	R
BFS	Blocked Flue Switch	I	10001	BI0	1/0	R
EnH	Enable Heat	I	10002	BI1	1/0	R
FV	Fill Valve	O	00001	BO0	1/0	R
MV	Mixing Valve	O	00002	BO1	1/0	R
DV	Drain Valve	O	00003	BO2	1/0	R
FVS	Fill Valve Side	O	00004	BO3	1/0	R
PV	Pilot Valve	O	00005	BO4	1/0	R
SR	Safety Relay	O	00006	BO5	1/0	R
FR	Flame Relay	O	00007	BO6	1/0	R
HL	High Limit	I	10005	BI4	1/0	R
DH +/-	(FUTURE)	I	30001	AI0	Integer MV	R
Dn	Drain Sensor	I	30016	AI15	Int /10 °F	R
CP	Condensate Probe	I	30005	AI4	Integer KΩ	R
FWP	Fill Water Probe	I	30007	AI6	Integer KΩ	R
LWP	Low Water Probe	I	30006	AI5	Integer KΩ	R
MX	MX Valve	O	40005	AO4	Integer MV	R
FbV	Gas Valve Feedback	I	10004	BI3	1/0	R

XP-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
S1		I	30004	AI0	Int/10 °F	R
S2		I	30005	AI1	Int/10 °F	R
AI1		I	30007	AI2	Integer mV	R
AI2		I	30008	AI3	Integer mV	R
AI3		I	30009	AI4	Integer mV	R
AI4		I	30010	AI5	Integer mV	R
AO1		0	40001	AO0	Integer mV	R
AO2		0	40002	AO1	Integer mV	R
DI1		I	10001	BI0	1/0	R
DI2		I	10002	BI1	1/0	R
DI3		I	10003	BI2	1/0	R
DI4		I	10004	BI3	1/0	R
DO1		O	00001	BO0	1/0	R
DO2		O	00002	BO1	1/0	R
DO3		O	00003	BO2	1/0	R
DO4		O	00004	BO3	1/0	R

H-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
EnH	Enable Heat	I	10001	BI0	1/0	R
H1a	Heating Stage #1	O	00001	BO0	1/0	R
H2a	Heating Stage #2	O	00002	BO1	1/0	R
H3a	Heating Stage #3	O	00003	BO2	1/0	R
H4a	Heating Stage #4	O	00004	BO3	1/0	R
H5b	Heating Stage #5	O	00005	BO4	1/0	R
H6c	Heating Stage #6	O	00006	BO5	1/0	R
H7d	Heating Stage #7	O	00007	BO6	1/0	R
DSw	Door Switch	I	10004	BI3	1/0	R
HL	High Limit	I	10005	BI4	1/0	R

CD-XM

Object Name	DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
CB	Combustion Blower Enable	O	00001	BO0	1/0	R
Current RPM	Current RPM	I	30001	AI1	RPM	R
Filtered RPM	Filtered RPM	I	30002	AI0	RPM	R
RPM SP	Combustion Blower RPM Setpoint	O	40001	AO0	RPM	R

P-XM

DESCRIPTION / Object Name	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Current Pressure *	I	30001	AI0	Integer “wc	R
Filtered Pressure *	I	30001	AI2	Integer “wc	R
Pressure Setpoint (FUTURE)	O	40002	AO0	Integer “wc	R

* Note: A reading of 100 = 1“ WC

POINT DESCRIPTIONS

Read / Write – Cencon SW

The following Software point list are commandable (Read/Write) by BACnet or Modbus. Available points depend on appliance type and arrangement.

Discharge Air Temperature Setpoint
Final calculated discharge setpoint.

Damper Minimum Position Setpoint
Minimum outside air setpoint.

Humidification Setpoint
Room or return air humidity setpoint.

Dehumidification Setpoint
Room or return air dehumidification setpoint.

DX Setpoint
DX leaving temperature setpoint.

EMS XP-XM MODULE 1 AO1 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 1 AO2 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 2 AO1 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 2 AO2 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 3 AO1 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 3 AO2 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 4 AO1 VOLTAGE
Analog output voltage.

EMS XP-XM MODULE 4 AO2 VOLTAGE
Analog output voltage.

EMS Fan Enable
Enable start for system operation.

EMS CXM Enable
Mechanical cooling expansion module.

EMS J-XM Enable
Indirect fired gas heating expansion module for DJS, DJE, DJX (up to 140) appliances.

EMS G-XM Enable
Indirect fired gas heating expansion module for DG and DJX 200/300 appliances.

EMS M-XM Enable
Direct fired gas heating expansion module.

EMS S-XM Enable
Gas fired humidifier expansion module.

EMS H-XM Enable
Electric heat expansion module.

EMS ER-XM Enable
HRW heat wheel energy recovery enabled.

EMS Dehum Enable
Mechanical cooling with reheat appliances.

EMS Reheat Enable
Override to maximum reheat.

EMS XP-XM MODULE 1 DO1 Enable
Digital output enable.

EMS XP-XM MODULE 1 DO2 Enable
Digital output enable.

EMS XP-XM MODULE 1 DO3 Enable
Digital output enable.

EMS XP-XM MODULE 1 DO4 Enable
Digital output enable.

EMS XP-XM MODULE 2 DO1 Enable
Digital output enable.

EMS XP-XM MODULE 2 DO2 Enable
Digital output enable.

EMS XP-XM MODULE 2 DO3 Enable
Digital output enable.

EMS XP-XM MODULE 2 DO4 Enable
Digital output enable.

EMS XP-XM MODULE 3 DO1 Enable
Digital output enable.

EMS XP-XM MODULE 3 DO2 Enable
Digital output enable.

EMS XP-XM MODULE 3 DO3 Enable
Digital output enable.

EMS XP-XM MODULE 3 DO4 Enable
Digital output enable.

EMS XP-XM MODULE 4 DO1 Enable
Digital output enable.

EMS XP-XM MODULE 4 DO2 Enable
Digital output enable.

EMS XP-XM MODULE 4 DO3 Enable
Digital output enable.

EMS XP-XM MODULE 4 DO4 Enable
Digital output enable.

Read – Cencon SW

Heating Demand
Percent heating demand

Cooling Demand
Percent cooling demand

Humidification Demand
Percent humidification demand

Recovery Demand
Percent recovery demand

Dehumidification Demand
Percent dehumidification demand

Wheel Rotation Present
Energy Recovery wheel rotation detected.

Read - Cencon

Modulating Cooling
Chilled water coil valve actuator.

Modulating Economizer
Modulating economizer / mix box actuator.

Modulating Heating
Hot water coil valve actuator.

VFD Command Speed
VFD control signal.

VFD Feedback Speed
Confirmation of VFD speed.

IAQ Sensor
Indoor air quality sensor.

Outside Humidity
Outside / ambient air relative humidity sensor.

Return/ Room Humidity
Room / return air relative humidity sensor.

Feedback Damper
Economizer / mix box damper actuator position feedback signal.

Damper End Switch
Mechanical damper end switch.

Alarm
General alarm output annunciation.

Supply Air
Blower enable status.

Damper Actuator
Damper actuator status.

Occupied/ Unoccupied
Enable occupied mode

Enable Fan
Appliance enable.

Secondary BACnet Alarm
Spare alarm input for BACnet annunciation

Mixed Air Temperature
Economizer or mixing damper leaving air temperature.

Discharge Air Temperature
Final leaving temperature.

Ambient Air Temperature
Ambient/outside air temperature.

Return/ Room Temperature
Return or room air temperature.

Modulating Thermostat
Roomstat heating / cooling signal.

Remote VFD Setpoint
VFD speed demand signal.

Modulating Humidity
Humidity demand signal.

DX Coil Temperature
Pre-cool leaving air temperature.

Dehumidification
Dehumidification mode enabled.

VFD Bypass
VFD bypass mode active.

C-XM

Modulating Compressor
Output to modulating compressor.

Modulating Condenser Fan #1 & #2
Output to variable speed condenser fans.

Modulating Reheat
Output to modulating hot gas reheat coil.

Cooling stage #1 to #6
Cooling stages enabled.

Condenser Fan Stage #1 & #2
Ambient temperature based condenser fan #1 or #2 enabled.

Stepped Reheat Stage #1 & #2
Stepped / staged reheat output.

Dehumidify Setpoint
RH% setpoint for dehumidification operation.

Enable Reheat - Override
Hot gas reheat override.

Enable Cooling
Mechanical cooling enabled.

J-XM

Feedback Gas
Modulating gas valve actuator feedback signal.

Modulating Ball Valve
Modulating gas valve actuator output.

Combustion Air Switch
Proof of combustion air flow.

Blocked Flue Switch
Opens on blocked flue.

Enable Heat
Expansion module heating function enabled.

Pilot Valve
Pilot valve operation is interrupted once main flame sensing is established.

Safety Relay
Secondary safety lockout contact.

Flame Relay
Flame relay contact enabled.

High Limit
Opens on high heat exchanger section temperature.

Condensate Probe
Condensate probe sensor (Ω).

MX Valve
DC current output to the magnetic style modulating gas valve.

Gas Valve Feedback
Indication that the main gas valve has been energized.

G-XM

Feedback Gas
Modulating gas valve actuator feedback signal.

Feedback Air
Modulating combustion air actuator feedback signal.

Modulating Ball Valve
Modulating gas valve actuator output.

Combustion Air Switch
Proof of combustion air flow.

Blocked Flue Switch
Normally closed, opens on blocked flue.

Enable Heat
Expansion module heating function enabled.

Pilot Valve
Pilot valve operation is interrupted once main flame sensing is established.

Safety Relay
Secondary safety lockout.

Flame Relay
Flame relay enabled.

High Limit
Normally closed, opens on high temperature

Condensate Probe
Condensate probe sensor

Gas Valve Feedback
Indication that the main gas valve has been energized.

M-XM

Feedback Gas
Modulating gas valve actuator feedback signal.

Modulating Ball Valve
Modulating gas valve actuator output.

Profile Pressure
Modulating profile pressure damper actuator position.

High Speed Enable
Initiate high speed operation.

Enable Heat
Expansion module heating function enabled.

High Speed
High speed fan start contact.

Exhaust Fan Interlock
Single or low speed exhaust fan start contact.

Dual Flame Rod
Relay output to switch flame rods.

Water Pump
Enable evaporative water pump.

Pilot Valve
Pilot valve operation is interrupted once main flame sensing is established.

Safety Relay
Secondary safety lockout contacts.

Flame Relay
Flame relay enable contacts.

High Limit
Normally closed, opens on high temperature.

MX Valve
DC current output to the modulating gas valve.

Gas Valve Feedback
Indication that the main gas valve has been energized.

ER-XM

Modulating By-Pass Damper
Modulating output to bypass damper actuator.

Modulating Energy Recovery
Modulating output to heat wheel drive motor, heat pipe tilt actuator, or heat plate damper actuator.

Enable Heat
Expansion module energy recovery operation.

Rotation Sensor
Input from rotation sensor.

By-Pass Damper
Bypass damper enabled.

Enable Wheel
Wheel motor start enabled.

Leaving Air Temperature
Temperature of the air at heat recovery device's discharge plenum, in ºF

Exhaust Air Temperature
Temperature of the air at heat recovery device's exhaust plenum, in ºF

S-XM

Feedback Gas
Compares the ball valve actuator feedback signal to the demand signal.

Modulating High Limit
Optional analog input for duct mounted high humidity sensing.

Modulating Ball Valve
Modulating gas valve actuator output.

Duct High Limit
Duct mounted high humidity sensing opens on high humidity.

Blocked Flue Switch
Normally closed, opens on blocked flue.

Enable Heat/Humidity
Gas fired humidifier expansion module enabled.

Fill Valve
Main tank fill valve.

Mixing Valve
Drain temperature control valve.

Drain Valve
Primary Drain Actuator

Fill Valve Side
SHX series side tank fill valve.

Pilot Valve
Pilot valve operation is interrupted once main flame sensing is established.

Safety Relay
Secondary safety lockout contacts.

Flame Relay
Flame relay enable contacts.

High Limit
Normally closed, opens on high temperature.

Direct Humidity
Input for direct control of humidifier.

Drain Sensor
Drain probe sensor input.

Condensate Probe
Condensate probe (SHX) sensor input.

Fill Water Probe
Fill water level sensor.

Low Water Probe
Low water level sensor.

MX Valve
DC current output to the modulating gas valve.

Gas Valve Feedback
Indication that the main gas valve has been energized.

H-XM

Modulating Output
Modulating output to external SCR controller.

Enable Heat
Expansion module electric heating enabled.

Heating Stage #1 to #7
Staged heating output.

Door Switch
External safeties input

High Limit
Normally closed, opens on high temperature

XP-XM

S1
Sensor 1 thermistor input.

S2
Sensor 2 thermistor input.

AI1
Analog input 1 from 0 to 10 VDC.

AI2
Analog input 1 from 0 to 10 VDC.

AI3
Analog input 1 from 0 to 10 VDC.

AI4
Analog input 1 from 0 to 10 VDC.

DI1
Normally open input contact.

DI2
Normally open input contact.

DI3
Normally open input contact.

DI4
Normally open input contact.

AO1
Analog output 1 from 0 to 10 VDC.

AO2
Analog output 2 from 0 to 10 VDC.

DO1
Normally open output contact.

DO2
Normally open output contact.

DO3
Normally open output contact.

DO4
Normally open output contact.

CD-XM

Combustion Blower Enable
Modulating output command to combustion air blower motor.

Current RPM
Current combustion blower motor RPM

Filtered RPM
Current RPM averaged over the past few samples.

RPM Setpoint
Demand RPM being sent to the Combustion air blower

P-XM

Current Pressure
Pressure sensor output 0-4”w.c.

Filtered Pressure
Current Pressure averaged over the recent samples.

Pressure Setpoint
Pressure setpoint, when above this value the relay will be activated.