EngA ENGINEERED AIR

CenCon

Communication Manual for Modbus and BACnet (MSTP and IP)

Manual Revision 1.03

www.engineeredair.com

If any errors or omissions are noted please contact the nearest Engineered Air Technical Service Department. To ensure 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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TABLE OF CONTENTS

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 software.

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).

INTRODUCTION

The CenCon supports Modbus RTU, BACnet MS/TP RS-485 and BACnet/IP. The Baud rate is fixed at 19200 for Modbus RTU networks and can be adjusted from 19200 to 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 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	000.000.000.000
DNS 1	000.000.000.000
UDP Port#	47808 (not adjustable)

Note:

BACnet MSTP requires that in cases where there are multiple CenCon controllers on a network, the following settings must be unique for each controller:

- Gateway ID
- MAC Address
- MSTP 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 cycle the power to the controller to reset it and force the updates.

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. EMS is used to describe the objects that can be commanded by any 3rd party 'Energy Management System'.

CenCon POINTS LIST

Depending on the style and type of appliance, not all points will be available.

Read / Write

DESCRIPTION	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
VFD Minimum Speed	O	40003	AO2	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 XP-XM MODULE 1 DO1 Enable	O	00010	BO9	0/1	R/W
EMS XP-XM MODULE 1 DO2 Enable	O	00011	BO10	0/1	R/W
EMS XP-XM MODULE 1 DO3 Enable	O	00012	BO11	0/1	R/W
EMS XP-XM MODULE 1 DO4 Enable	O	00013	BO12	0/1	R/W
EMS XP-XM MODULE 2 DO1 Enable	O	00014	BO13	0/1	R/W
EMS XP-XM MODULE 2 DO2 Enable	O	00015	BO14	0/1	R/W
EMS XP-XM MODULE 2 DO3 Enable	O	00016	BO15	0/1	R/W
EMS XP-XM MODULE 2 DO4 Enable	O	00017	BO16	0/1	R/W
EMS XP-XM MODULE 3 DO1 Enable	O	00018	BO17	0/1	R/W
EMS XP-XM MODULE 3 DO2 Enable	O	00019	BO18	0/1	R/W
EMS XP-XM MODULE 3 DO3 Enable	O	00020	BO19	0/1	R/W
EMS XP-XM MODULE 3 DO4 Enable	O	00021	BO20	0/1	R/W
EMS XP-XM MODULE 4 DO1 Enable	O	00022	BO21	0/1	R/W
EMS XP-XM MODULE 4 DO2 Enable	O	00023	BO22	0/1	R/W

EMS XP-XM MODULE 4 DO3 Enable	O	00024	BO23	0/1	R/W
EMS XP-XM MODULE 4 DO4 Enable	O	00025	BO24	0/1	R/W

Read Only

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Modulating Cooling	O	40003	AO2	Integer mV	R
Modulating Economizer	O	40002	AO1	Integer mV	R
Modulating Heating	O	40001	AO0	Integer mV	R
VFD Command Speed	O	40004	AO3	Integer mV	R
VFD Feedback Speed	I	30007	AI6	Integer mV	R
IAQ Sensor	I	30001	AI0	Integer mV	R
Outside Humidity	I	30003	AI2	Integer %	R
Return/ Room Humidity	I	30006	AI5	Integer %	R
Feedback Damper	I	10002	BI1	1/0	R
Damper End Switch	I	10005	BI4	I/O	R
Alarm	O	00005	BO4	1/0	R
Supply Air	O	00003	BO2	1/0	R
Damper Actuator	O	00002	BO1	1/0	R
Occupied/ Unoccupied	I	10006	BI5	1/0	R
Time Clock Bypass	I	10007	BI6	1/0	R
Enable Fan	I	10008	BI7	1/0	R
Secondary BACnet Alarm	I	10001	BI0	1/0	R
Mixed Air Temperature	I	30019	AI18	Int/10 °F	R
Discharge Air Temperature	I	30021	AI20	Int/10 °F	R
Ambient Air Temperature	I	30020	AI19	Int/10 °F	R
Return/ Room Temperature	I	30017	AI16	Int/10 °F	R
Modulating Room Thermostat	I	30009	AI8	Integer %	R
Remote VFD Setpoint	I	30010	AI9	Integer %	R
Modulating Humidity	I	30006	AI5	Integer %	R
DX Coil Temperature	I	30018	AI17	Int/10 °F	R
Dehumidification	I	10009	BI8	1/0	R
VFD Bypass	I	10004	BI3	1/0	R
Heating Demand	O	40005	AO4	Integer %	R
Cooling Demand	O	40006	AO5	Integer %	R
Humidification Demand	O	40007	AO6	Integer %	R
Recovery Demand	O	40008	AO7	Integer %	R
Dehumidification Demand	O	40009	AO8	Integer %	R

EXPANSION MODULES POINTS LIST

The following points are read only.

C-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Modulating Compressor	O	40001	AO0	Integer mV	R
Modulating Condenser Fan #1	O	40002	AO1	Integer mV	R
Modulating Condenser Fan #2	O	40003	AO2	Integer mV	R
Modulating Reheat	I	40004	AO3	Integer mV	R
Cooling stage #1	O	00001	BO0	1/0	R
Cooling stage #2	O	00002	BO1	1/0	R
Cooling stage #3	O	00003	BO2	1/0	R
Cooling stage #4	O	00004	BO3	1/0	R
Cooling stage #5	O	00005	BO4	1/0	R
Cooling stage #6	O	00006	BO5	1/0	R
Condenser Fan Stage #1	O	00007	BO6	1/0	R
Condenser Fan Stage #2	O	00008	BO7	1/0	R
Stepped Reheat Stage #1	O	00009	BO8	1/0	R
Stepped Reheat Stage #2	O	00010	BO9	1/0	R
Digital Output (SSR)	I	10001	BI1	1/0	R
Dehumidify Setpoint	I	30021	AI21	Integer %	R
Enable Reheat	I	10001	BI0	1/0	R
Enable Cooling	I	10002	BI1	1/0	R

J-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Feedback Gas	I	30003	AI2	Integer mV	R
Feedback Air	I	30004	AI3	Integer mV	R
Modulating Ball Valve	O	40001	AO0	Integer mV	R
Combustion Air Switch	I	10003	BI2	1/0	R
Blocked Flue Switch	I	10001	BI0	1/0	R
Enable Heat	I	10002	BI1	1/0	R
Pilot Valve	O	00005	BO4	1/0	R
Safety Relay	O	00006	BO5	1/0	R
Flame Relay	O	00007	BO6	1/0	R
High Limit	I	10005	BI4	1/0	R
Condensate Probe	I	30005	AI4	Integer	R
MX Valve	O	40005	AO4	Integer	R

G-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Feedback Gas	I	30003	AI2	Integer mV	R
Feedback Air	I	30004	AI3	Integer mV	R
Modulating Ball Valve	O	40001	AI0	Integer mV	R
Modulating Combustion Air	O	40002	AI1	Integer mV	R
Combustion Air Switch	I	10003	BI2	1/0	R
Blocked Flue Switch	I	10001	BI0	1/0	R
Enable Heat	I	10002	BI1	1/0	R
Combustion Blower	O	00001	BO0	1/0	R
Pilot Valve	O	00005	BO4	1/0	R
Safety Relay	O	00006	BO5	1/0	R
Flame Relay	O	00007	BO6	1/0	R
High Limit	I	10005	BI4	1/0	R
Condensate probe sensor	I	30005	AI4	Integer Ω	R

M-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Feedback Gas	I	30003	AI2	Integer mV	R
Modulating Ball Valve	O	40001	AO0	Integer mV	R
Profile Pressure Actuator	O	40002	AO1	Integer mV	R
High Speed Enable	I	10001	BI0	1/0	R
Enable Heat	I	10002	BI1	1/0	R
High Speed	O	00001	BO0	1/0	R
Exhaust Fan Interlock	O	00002	BO1	1/0	R
Dual Flame Rod	O	00003	BO2	1/0	R
Water Pump	O	00004	BO3	1/0	R
Pilot Valve	O	00005	BO4	1/0	R
Safety Relay	O	00006	BO5	1/0	R
Flame Relay	O	00007	BO6	1/0	R
High Limit	I	10005	BI4	1/0	R
MX Valve	O	40005	AO4	Integer	R

ER-XM

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

S-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Feedback Gas	I	30003	AI2	Integer mV	R
Modulating High Limit	I	30004	AI3	Integer mV	R
Modulating Ball Valve	O	40001	AO0	Integer mV	R
Duct High Limit	I	10003	BI2	1/0	R
Blocked Flue Switch	I	10001	BI0	1/0	R
Enable Heat	I	10002	BI1	1/0	R
Fill Valve	O	00001	BO0	1/0	R
Mixing Valve	O	00002	BO1	1/0	R
Drain Valve	O	00003	BO2	1/0	R
Fill Valve Side	O	00004	BO3	1/0	R
Pilot Valve	O	00005	BO4	1/0	R
Safety Relay	O	00006	BO5	1/0	R
Flame Relay	O	00007	BO6	1/0	R
High Limit	I	10005	BI4	1/0	R
Direct Humidity Control	I	30001	AI0	Integer	R
Drain Sensor	I	30016	AI15	Integer Ω	R
Condensate Probe	I	30005	AI4	Integer Ω	R
Fill Water Probe	I	30007	AI6	Integer Ω	R
Low Water Probe	I	30006	AI5	Integer Ω	R
MX Valve	O	40005	AO4	Integer	R

XP-XM

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

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Modulating Output	O	40002	AO1	Integer mV	R
Enable Heat	I	10001	BI0	1/0	R
Heating Stage #1	O	00001	BO0	1/0	R
Heating Stage #2	O	00002	BO1	1/0	R
Heating Stage #3	O	00003	BO2	1/0	R
Heating Stage #4	O	00004	BO3	1/0	R
Heating Stage #5	O	00005	BO4	1/0	R
Heating Stage #6	O	00006	BO5	1/0	R
Heating Stage #7	O	00007	BO6	1/0	R
Door Switch	I	10004	BI3	1/0	R
High Limit	I	10005	BI4	1/0	R

CD-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Combustion Blower	O	00001	BO0	1/0	R
Safety Relay	O	00002	BO1	1/0	R

P-XM

DESCRIPTION	In / Out	MODBUS Register	BACnet Address	TYPE	R/W
Pressure Sensor	I	30001	AI0	Integer “wc	R

POINT DESCRIPTIONS

Read / Write

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

Discharge Air Setpoint
Final calculated discharge setpoint.

Damper Minimum Position Setpoint
Minimum outside air setpoint.

VFD Minimum Speed Setpoint
VFD minimum speed setpoint; Refer to unit function for requirements.

Humidification Setpoint
Room or return air humidity setpoint.

Dehumidification Setpoint
Room or return air dehumidification setpoint.

DX Setpoint
DX 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 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

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
Hot gas reheat enabled.

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.

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

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 (swamp cooler) 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.

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
Gas fired humidifier expansion module enabled.

Fill Valve
Enable side tank (SHX) 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.

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.

AI1
Analog input 1 from 0 to 10 VDC.

AI1
Analog input 1 from 0 to 10 VDC.

AI1
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
Modulating output command to combustion air blower motor.

Safety Relay
Contact open on failure.

P-XM

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