

CenCon

User Manual

Manual Revision 2.0.3



These instructions are intended as an aid to qualified, licensed installers and service personnel for proper installation, adjustment, and operation of this unit. Read and understand these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service, or maintenance possibly resulting in fire, electrical shock, carbon monoxide poisoning, explosion, personal injury or property damage.

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www.engineeredair.com

INTRODUCTION

Read this manual thoroughly before operating or servicing this unit.

The CenCon and all its expansion modules have been certified by Intertek (ETL) as a recognized component for use with Engineered Air appliances only, evaluated to CSA 22.2 No. 24 Temperature Indicating and Regulating Equipment and UL873 Standard for Safety Temperature Indicating and Regulating Equipment. This is a User Operation Manual and therefore not subject to evaluation.

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.

There are two sets of electrical drawings and function sheets provided with the appliance. One set is in an envelope which also contains the Operation, Installation and Maintenance manual(s). This package is for copying, then should either be returned to the appliance or stored in a safe place. The other set is attached to the control panel door and should never be removed.

This User Manual and the CenCon Technical Manual are available on the Engineered Air website.

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WARNINGS, CAUTIONS AND NOTICES

Warning, Caution and Notice statements are used throughout this manual to emphasize important and critical information. You must read these statements to help ensure safety and to prevent damage.

WARNING:

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION:

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE:

Indicates information considered important but not hazard related.

CAUTION:

If capable of heating, this appliance can discharge at high temperatures. Operate with caution as excessive heat could potentially cause damage. Fire alarms, smoke and heat detectors, sprinklers, fire dampers, etc. could activate. Combustion setup and any service over-rides should be done with caution, and at cooler inlet temperatures. Refer to the appliance rating plate for the marked temperature rise of the appliance prior to commissioning or combustion setup.

WARNING:

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING:

This unit is connected to high voltages. Electrical shock could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work must be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.

CAUTION:

All the remote wiring must be complete and functional before attempting to start the appliance.

CAUTION:

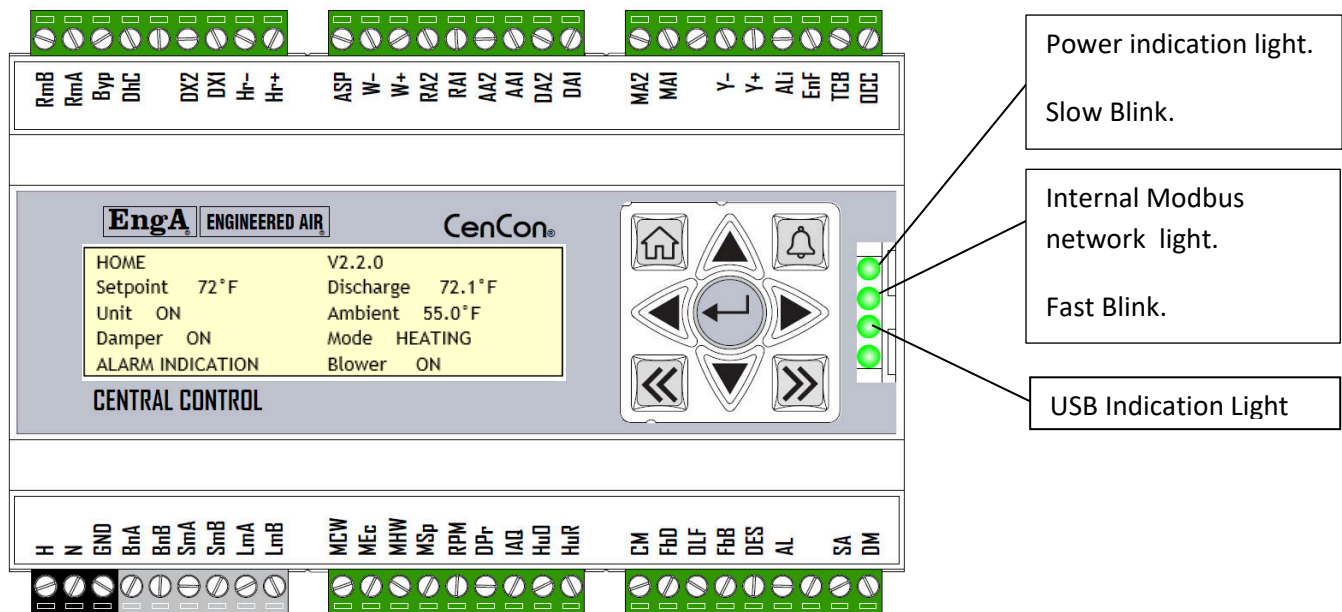
It is important that the service technician understands the CenCon is a configurable controller and is specifically programmed for this specific appliance. Do not replace with another controller without confirming its program suitability with Engineered Air.

CAUTION:

Adding a variable air volume system to equipment originally designed with constant air flow will void warranty, unless approved and recorded by Engineered Air.

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OVERVIEW

The Engineered Air CenCon controller is the primary operational component for the majority of custom manufactured Engineered Air HVAC equipment. Functions include:

- Outdoor, discharge and room temperature monitoring.
- Outdoor and room humidity sensing.
- Single and variable speed fan control.
- Analog heating and cooling outputs.
- Damper and economizer control.
- Alarm annunciation.
- Freeze protection.
- Night mode for Mixbox applications.

Expansion modules (-XM) may be added to extend the operational capabilities to direct and indirect gas fired heating, staged and modulating cooling, humidification, and energy recovery systems.

Each CenCon controller is factory programmed specifically for the equipment installed. Refer to the appliance function description for additional details.

HARDWARE INFORMATION

Control Voltage	24Vac 60Hz
Digital Output Rating	120V 10A
Digital Input	24-120Vac
Analog Output	0-10Vdc
Analog Input	0-10Vdc or 4-20mA
AI impedance	7.5k Ω
Temperature Rating	-40 - 150° F (65° C)
Temperature Sensor	10k Type 2 NTC
Terminations	#14 awg max.

NOTICE:

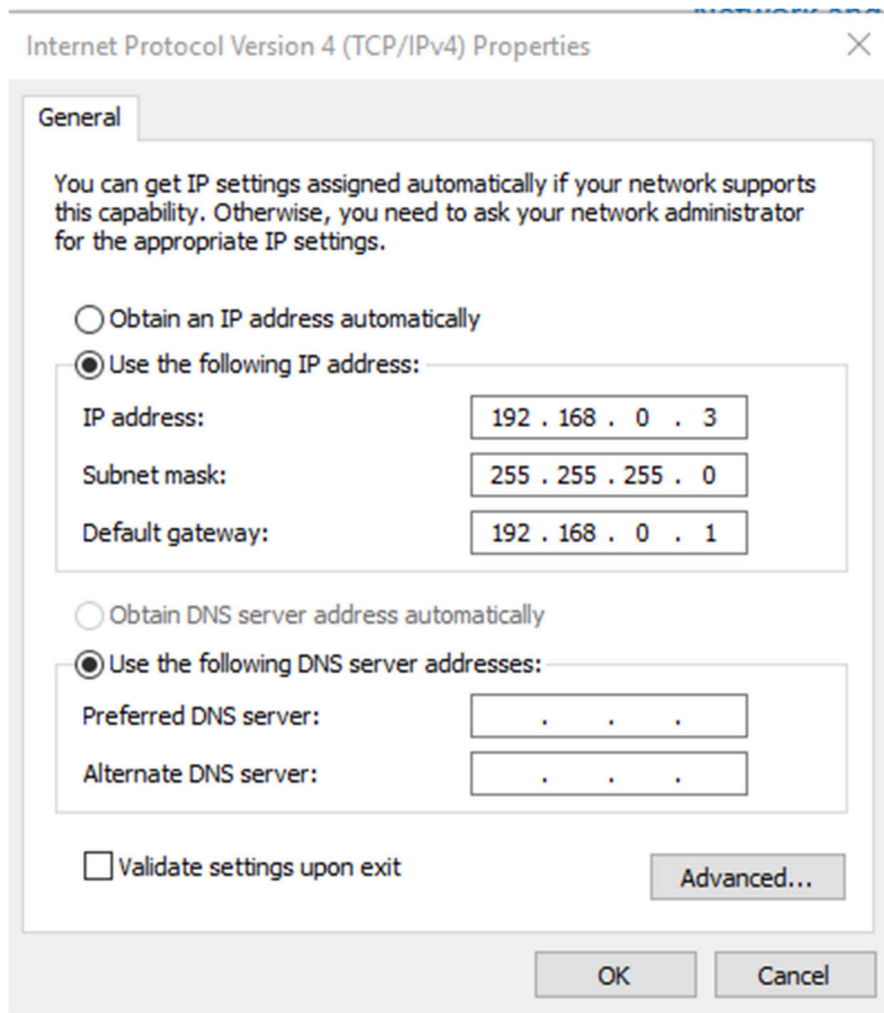
Digital inputs connections to the CenCon or any of the expansion modules cannot use mosfet solid state switches. Input switching must be mechanical.

COMMUNICATION

Direct connection may be made to a computer or tablet that has the ability to connect to a static IP address. To gain access to the CenCon testing interface connect using a Cat.5 Ethernet cable to the CenCon, near the top right of the controller. Tablets may require a USB to Ethernet adapter. Any web browser should work.

To set the correct IP address in Windows (10, 11): right-click the Start Button and select Search. Type and select "Control Panel" to open the control panel window. Find and select Network and Sharing Center. Click Change Adapter Settings and then the Ethernet icon, which will open a status page. Click the Properties button, then double-click the Internet Protocol Version 4 (TCP/IPv4) located in the list box.

Set the static IP address with the following settings:



Click OK to accept, and then open a web browser and type in the following address to gain access to the controller interface:

192.168.0.10:8080/webvisu.htm

To simplify connections, make this a bookmark in the web browser for future connections.

CONTROLLER KEYPAD

The 9-button keypad has been configured to easily manipulate any user variables available for modification. Typically, this would include the temperature setpoint(s) and outside air minimum position.



The home button displays the main page.



Pressing the alarm button changes the display to the alarm page.



The left and right double arrow keys increment the display to the next page.



Use the left and right arrows to navigate the location of the cursor within each page.



Press the enter key once the cursor is located at the variable to be changed.



The up and down arrows change the value of the indicated variable. *

Note: Changing the setpoint variable is 'live'. Pressing enter is not required to set the value.

DISPLAY SCREENS

HOME	V2.2.0
Setpoint 72°F	Discharge 72.1°F
Unit ON	Ambient 55.0°F
Damper ON	Mode HEATING
ALARM INDICATION	Blower ON

The Home screen (may not be exactly as shown) displays the required setpoint, actual discharge temperature, and various active modes of operation.

The display screen saver will automatically go blank after 5 minutes. Pressing any key will reactivate the screen and return to the home page.

Incrementing screens will display additional descriptions of present operation for cooling, heating and economizer, in addition to the present state of binary and analog inputs and outputs.

The numbers along the bottom represent either the heating sequence or the presently active cooling stages, depending on the present mode of operation.

Below are some examples of display screens.

Cooling Screen

Showing stages 1,2,3 enabled, out of 6 total.

COOLING		C-XM
Setpoint	55 °F	Discharge 57.1 °F
Demand	16.9 %	Aux. Cool 0.0 %
Compressors	①②③④⑤⑥	

Heating Screen

HEATING		G-XM
Setpoint	90 °F	Discharge 89.3 °F
Demand	16.9 %	Aux. Heat 0.0 %
Burner Sequence	①②③④⑤⑥⑦	

Heating Description

①	Move to purge
②	Purge
③	Move to Ignition
④	Pilot Ignition
⑤	Main Valve
⑥	Post Purge
⑦	Shutdown

Economizer Screen




ECONOMIZER		CENCON	
Mixed Air	59.3°F	Discharge	53.8°F
Ambient Air	72.5°F	Return Air	75.8°F
Min Position	20.0%	Damper	34.5%

GENERAL ALARM LIST

Low limit	The low limit setpoint is 40°F (4°C).
Air Proving Fault	VFD Feedback is greater than the minimum VFD speed for more than 30 seconds with the supply fan output off.
Shorted Air Proving	Air Proving switch closed without airflow. Control needs to see a switching action when starting fan.
Low airflow	Air Proving switch opens during operation for 30 seconds or the VFD feedback drops below the minimum speed for 30 seconds.
Discharge Air Sensor Failure	Discharge Air sensor is outside of its range (-60°F to 220°F) for 10 seconds or more.
Ambient Air Sensor Failure	Outdoor Ambient sensor is outside of range (-60°F to 220°F) for 10 seconds or more.
Damper End Switch Warning	Shorted damper end switch. Meaning the damper end switch is made before energizing the damper output.
Damper Mechanical Alarm	End switch enabled codex is true and end switch is not made after energizing damper output.
Communication Error	Triggered on loss of communication with application modules.

ALARM RESET

Alarms may be reset either from the laptop computer or the CenCon keypad.

Press the  button, then  to move the cursor to the reset area. Then press .

EXPANSION MODULES (XM)

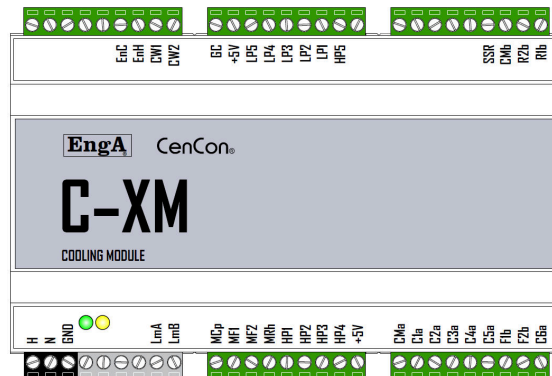
The CenCon controller can be connected to any Engineered Air expansion module. The expansion module provides the required wiring terminals for each additional feature. As expansion modules are added, the display screen selections will automatically update to include the new information. These screens display information and set points for the additional features.

All expansion modules have (2) lights. The Green light is an indication of power, and the yellow light is to show communication to the CenCon is connected.

Expansion modules communicate to the CenCon via an internal Modbus network.

The red wire connects to the LmA terminal, while the black wire connects to LmB terminal.

C-XM



The Cooling module will control all aspects of the operation of mechanical cooling.

Basic operation:

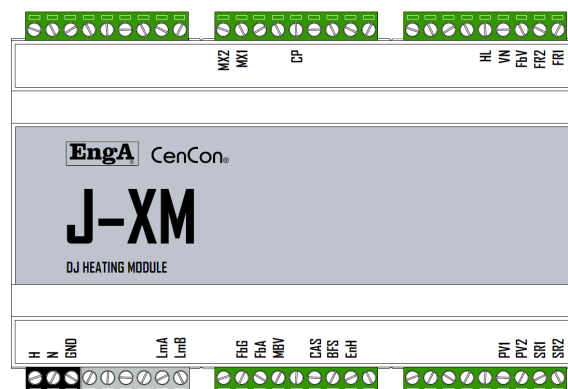
For staged compressor operation the C-XM will sequence on and off compressor stages to maintain the discharge temperature setpoint. As with all staged systems, expect the discharge temperature to fluctuate from setpoint as compressors are turned on and off. The C-XM can stage up to 6 compressors.

Condenser Reheat operation:

When dehumidification is enabled (digital input), and there is a call for dehumidification from the return or room air humidistat, the CenCon will enable the condenser reheat controller (Carel CRC) and stage on compressors to obtain the DX leaving temperature. The CenCon will modulate the output signal to the CRC to operate the reheat valve to maintain the requested discharge set point.

Appliances may have an added auxiliary heat option that will allow the main source of heat to be enabled if reheat is at 100% and the desired discharge setpoint cannot be attained.

J-XM



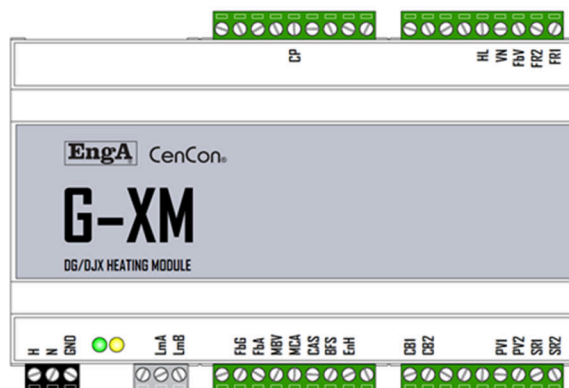
The DJ heating module will control all burner aspects of the DJ(E,S,X) series of indirect fired heaters.

Basic operation:

On a call for heating the combustion blower will be enabled to full speed to prepurge the heat exchanger. Once the prepurge time has elapsed the combustion blower speed will reduce to ignition speed and then enable the ignition control to start and prove pilot flame, then open the main safety valve (SSOV). Once the pilot flame has proven and the main flame is established, the J-XM will then disable the pilot valve. The burner is allowed to operate to maintain the requested discharge air temperature from the CenCon by modulating the control valve and the combustion blower speed. If heating is not required the burner will be disabled and the combustion blower will enter a post purge time, and then shut down.

Alarm List:

Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.
Shorted Air proving	Combustion blower feedback exceeds 500 rpm for more than 60 seconds when there is no demand.
Open Air Proving	Combustion blower does not exceed 3000 rpm during purge.
60 Hz	Combustion blower frequency has exceeded 60 Hz (3590 RPM)
Plugged Condensate	Blocked condensate sensor reads less than 7k Ω for more than 5 minutes.
Blocked Flue	Blocked flue input has been enabled for 3 minutes or more.
Flame Relay Wiring	Received a gas valve feedback within 500ms of activating the flame relay output.
Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
Gas Valve out of range	When ball valve is enabled, this alarm occurs if the gas actuator feedback is greater or less then the demand by 10% for more than 90 seconds.
RPM out of range	Combustion blower rpm feedback must be within 10% of demand.

G-XM

The DG heating module will control all burner aspects of the DG HT line of indirect fired heaters. The same burner is used on DJX200 and DJX300 models of heaters.

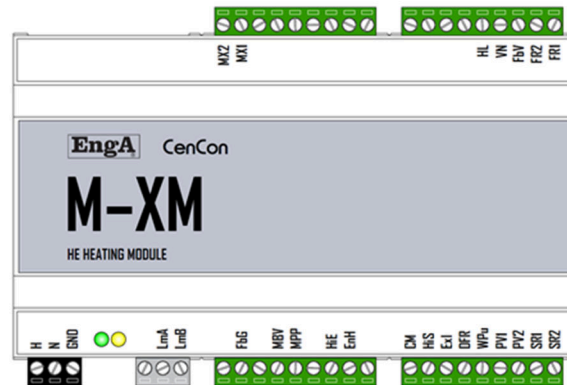
Basic operation:

On a call for heating the combustion blower will be enabled and the air actuator will open to the prepurge setpoint to purge the heat exchanger. Once the prepurge time has elapsed the gas and air actuators will move to ignition position and then enable the ignition control to start and prove pilot flame, then open the main safety valve (SSOV). Once the pilot flame has proven and the main flame is established, the G-XM will then disable the pilot valve. The burner is allowed to operate to maintain the requested discharge air temperature from the CenCon by modulating the gas and air actuators. If heating is not required the burner will be disabled and the combustion blower will enter a post purge time, and then shut down.

Alarm List:

Gas Valve out of range	Gas valve actuator feedback is greater or less than the demand. Time to trip will vary depending on mode of operation.
Air Actuator Out of range	Air Actuator Feedback Is greater or less then the demand. Tolerances and timing vary depending on the mode of operation.
Shorted Air Proving	Combustion blower air switch input has power for 10 seconds before the combustion blower has been commanded on.
Open Air Proving	Combustion blower air switch input has no power for 60 seconds after commanding the combustion blower on / Combustion blower air switch input has no power for 2 seconds during main flame.
Plugged Condensate	Blocked condensate sensor reads less than 7kohms for more than 5 minutes.
Blocked Flue	Blocked flue input has been enabled for 1 minute or more.
Flame Relay Wiring	Received a gas valve feedback within 500ms of activating the Flame relay output.
Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.

M-XM



The M-XM heating module will control all burner aspects of the HE series of direct fired heaters.

Basic operation:

With the heating enabled, and the supply blower operational, the ignition control will be enabled to start and prove pilot flame, then open the main safety valve (SSOV). Once the pilot flame has proven and the main flame is established, the M-XM will then disable the pilot valve. The burner is allowed to operate to maintain the requested discharge air temperature from the CenCon by modulating the control valve. If heating is not required the burner will be disabled, and then shut down.

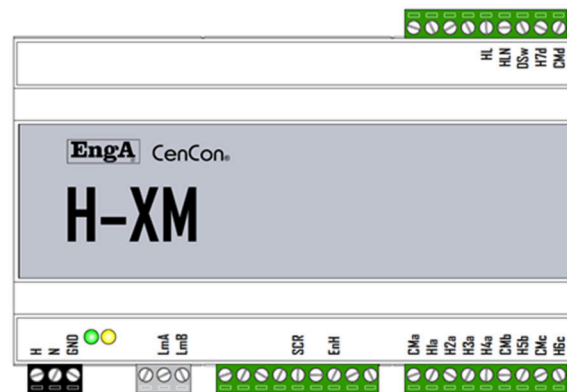
Cycling a direct fired burner will often cause undesirable fuel odorants to enter the occupied space. When in heating mode, direct fired appliances rely on a high turndown ratio of fuel control to maintain the discharge air temperature setpoint. The heating may be disabled by either a predetermined ambient lock out setpoint, or external contacts or switches connected to terminal EnH. The default ambient heating lockout setpoint (typically 65°F) is field adjustable only through a computer connection service interface.

Alarm List:

Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.
Flame Relay Wiring	Received a gas valve feedback within 500ms of activating the Flame relay output.
Gas Valve out of range	When ball valve is enabled this alarm occurs if the gas actuator feedback is greater or less than the demand by 10% for more than 60 (Default is currently variable) seconds.
Low Velocity Air Switch	Occurs if the pressure drops below the low pressure setpoint during modulation for more than 40 seconds
High Velocity Air Switch	Occurs if the pressure goes above the High pressure setpoint during modulation for more than 90 seconds

Low Pressure	Alarm occurs if the pressure is less than the low pressure setpoint plus 0.05" wc after the damper is opened and the blower has been commanded to start for a minute. This alarm will not be triggered if we have already passed the purge status and have lit. See Low velocity air Switch alarm.
Low Pressure Sensor	If the pressure is greater than the Very low pressure setpoint before the damper is opened for more than 1 minute.
Very Low Pressure	Occurs if the pressure drops below the very low pressure setpoint after the purge has been completed.
Far Sensor Flame Failure	Occurs if a secondary flame rod is enabled and we lose flame sensing in less than 20 seconds after the pilot valve drops out on consecutive attempts.

H-XM

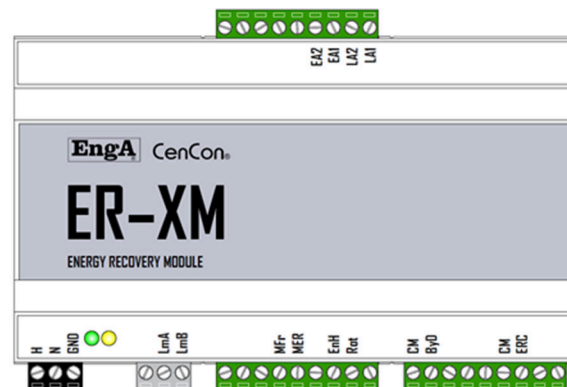


For staged electric heater operation.

Basic operation:

On confirmation of safeties and a call for heating the H-XM will stage on sequential stages of electric heat to maintain the requested discharge setpoint.

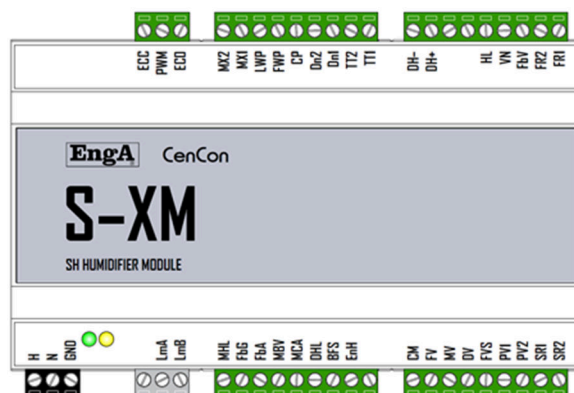
ER-XM



The energy recovery expansion module controls Engineered Air heat pipes, plates and wheels.

Basic operation:

On a call for energy recovery, with the enable contact closed, the ER-XM will command the energy recovery method to achieve the discharge setpoint (heat wheel motor speed, heat pipe tilt actuator, heat plate damper actuator). Exhaust temperature or enthalpy is monitored for performance and frost protection.

S-XM

SH and SHX series gas fired humidifiers are controlled from the S-XM expansion module.

Basic operation:

On a call for humidification the tank first fills with water, then the burner gas-fired heat is enabled to produce steam. Water level is controlled by the water level probes. Water quality dictates the minimum tank drain cycle times. Drain temperature is monitored and cooled with the supply water if required.

Drain cycle times are preprogrammed based on water quality or may be initiated by a time clock contact.

The following alarm list is for the water side. For gas fired burner alarms reference the J-XM.

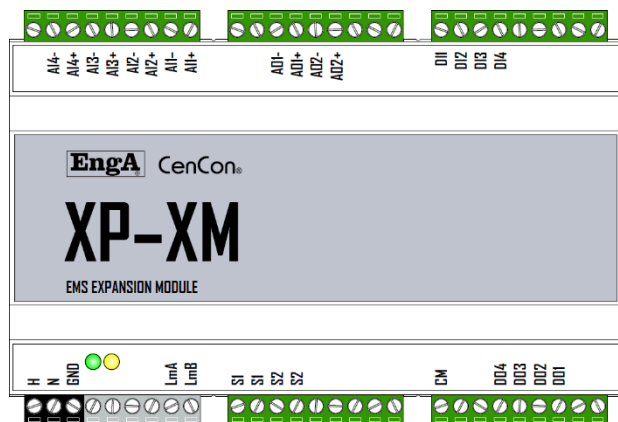
Alarm List:

Tank High Pressure Overflow	SH is in normal operating mode and the drain temperature is greater than 110 deg F for longer than 10 seconds.
Water Foaming	Low water probe made and fill valve open for less than 2 minutes during normal operation.
Failed Water Supply	The fill valve stays open longer than the required time (varies on current mode: Normal operation: 5m; Complete fill: 1hr).
Failure to Drain	Low water probe covered and drain valve open for longer than 1 hour.
Water Probe Sequence	Fill water probe is covered before the low water probe.
Drain Sensor Failure	Drain sensor is out of range (less than 30° or greater than 212°F) for 10 seconds.

Fill Valve Stuck Open

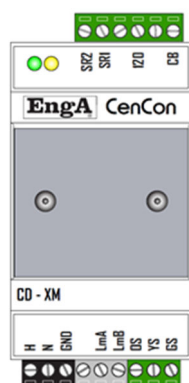
Fill water probe and low water probes are covered and the drain temperature is greater than 110°F for longer than 10 seconds when the SH is off and no drain is required.

XP-XM



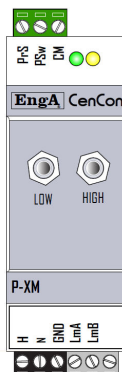
The XP-XM allows for the addition of BACnet (EMS) points not currently available on the CenCon. These points are for monitoring only, or command points from the front end BACnet system. Up to a maximum of (4) XP-XM expansion modules may be used on a single system. Custom programming for functional operation of these points is not available.

CD-XM



A Triac driver slave to the J-XM heating module, this module controls the combustion motor speed on DJ(E,S,X) indirect fired heaters. A 3 wire feedback signal is returned to the module to confirm the blower speed.

P-XM



The P-XM expansion module measures differential pressure, typically for filter monitoring. In addition, it works in conjunction with the M-XM direct fired heater board to measure pressure drop across the burner profile opening.

CAUTION:

Do not blow onto the pressure ports. Excessive pressure and moisture will damage it. The ports are fragile and should not be tampered with.

TERMINAL DESIGNATIONS

CenCon

H N	Power Supply
GND	Ground
LmA B	Modbus
BmA,B	BACnet
SmA,B	Modbus
MCW AO	Modulating cooling
MEc AO	Modulating economizer
MHW AO	Modulating heating
MSP AO	VFD command speed
RPM AI	VFD feedback speed
DPr AI	Supply duct pressure
IAQ AI	Indoor Air Quality
HuO AI	Outside humidity
CM	Relay common
FbD AI	Outside Air Damper feedback
OLF DI	VFD fault
FbB DI	Air proving switch
DES DI	Damper end switch
AL DO	Alarm
SA DO	Supply air
DM DO	Damper actuator enable
OCC DI	Occupied / unoccupied mode
TCB DI	Time clock bypass
EnF DI	Enable Fan
ALi DI	Secondary Bacnet alarm
Y+- AI	Modulating cooling thermostat
MA1,2 AI	Mixed air temperature
DA1,2 AI	Discharge temperature
AA1,2 AI	Ambient air temperature
RA1,2 AI	Return / room temperature
W+- AI	Modulating heating thermostat
ASP AI	Remote VFD setpoint
Hr+- AI	Modulating humidity
DX1,2 AI	DX temperature
DhC DI	Dehumidification
ByP DI	VFD Bypass
RmA,B	Modbus Room

J-XM

H N	24Vac Power Supply
GND	Ground
LmA,B	Internal Modbus
FbG AI	Gas actuator feedback

MBV AO	Gas actuator demand
CAS DI	Combustion air switch
BFS DI	Blocked flue switch
EnH DI	Enable heat
PV1,2 DO	Pilot valve enable
SR1,2 DO	Safety relay
FR1,2 DO	Flame relay
FbV DI	SSOV feedback hot
VN	SSOV and HL feedback neutral
HL DI	High limit
CP AI	Condensate probe
MX1,2 AO	Maxitrol valve
ECO AO	ECM Demand
PWM AI	ECM rpm feedback
ECC	ECM Neutral

G-XM

H N	24Vac Power Supply
GND	Ground
LmA,B	Internal Modbus
FbG AI	Gas actuator feedback
FbA AI	Air actuator feedback
MBV AO	Gas actuator demand
MCA AO	Air actuator demand
CAS DI	Combustion air switch
BFS DI	Blocked flue switch
EnH DI	Enable heat
CB1,2 DO	Combustion blower enable
PV1,2 DO	Pilot valve enable
SR1,2 DO	Safety relay
FR1,2 DO	Flame relay
FbV DI	SSOV feedback hot
VN	SSOV and HL feedback neutral
HL DI	High limit

M-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Modbus
FbG	AI	Feedback Gas
MBV	AO	Modulating ball valve
MPP	AO	Profile pressure
HiE	DI	High Speed Enable
EnH	DI	Enable heat
CM	COM	Relay Common
HiS	DO	High Speed
Exl	DO	Exhaust fan low
DFR	DO	Dual Flame Rod
WPu	DO	Water Pump
PV1,2	DO	Pilot valve
SR1,2	DO	Safety relay
FR1,2	DO	Flame relay
FbV	DI	SSOV feedback hot
VN		SSOV and HL feedback neutral
HL	DI	High limit
MX1,2	AO	Maxitrol Valve

C-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Internal Modbus
MCp	AO	Modulating compressor output
MF1	AO	Modulating condenser 1 fan output
MF2	AO	Modulating condenser 2 fan output
MRh	AO	Modulating reheat output
HP1	AI	High pressure transducer stage 1
HP2	AI	High pressure transducer stage 2
HP3	AI	High pressure transducer stage 3
HP4	AI	High pressure transducer stage 4
+5V		+5Vdc output
CMA		Relay set 'a' common
C1a	DO	Cooling stage 1
C2a	DO	Cooling stage 2
C3a	DO	Cooling stage 3
C4a	DO	Cooling stage 4
C5a	DO	Cooling stage 5
F1b	DO	Condenser fan 1
F2b	DO	Condenser fan 2
C6a	DO	Cooling stage 6 output
R1b	DO	Stepped reheat stage 1
R2b	DO	Stepped reheat stage 2

CMb		Relay set 'b' common
SSR		Solid state relay output
HP5	AI	High pressure transducer stage 5
LP1	AI	Low pressure transducer stage 1
LP2	AI	Low pressure transducer stage 2
LP3	AI	Low pressure transducer stage 3
LP4	AI	Low pressure transducer stage 4
LP5	AI	Low pressure transducer stage 5
+5V		+5Vdc output
GC		DC common
EnH	DI	Set reheat to Maximum
EnC	DI	Enable mechanical cooling

H-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Modbus
SCR	AO	Modulating output
EnH	DI	Enable heat
CMA	COM	Common to output 'a'.
H1a	DO	Heating stage #1
H2a	DO	Heating stage #2
H3a	DO	Heating stage #3
H4a	DO	Heating stage #4
CMb	COM	Common to output set 'b'
H5b	DO	Heating stage #5
CMc	COM	Common to output set 'c'
H6c	DO	Heating stage #6
CMd	COM	Common to output set 'd'
H7d	DO	Heating stage #7
DSw	DI	Door Switch
HLN		High limit neutral
HL	DI	High Limit

ER-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Internal Modbus
MFr	AO	Modulating Bypass Damper Demand
MER	AO	Drive Motor Speed Signal
EnH	DI	Enable energy recovery
Rot	DI	High Speed Enable
ByD	DO	Bypass Damper
ERC	DO	Relay Common
LA1,2	DO	Leaving (Supply) Air Temperature
EA1,2	DO	Exhaust Air Temperature

S-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Internal Modbus
MHL	AI	Modulating High Limit
FbG	AI	Feedback Gas
MBV	AO	Modulating Ball Valve
BFS	DI	Blocked Flue Switch
EnH	DI	Enable heat/humidity
CM	COM	Relay Common
FV	DO	Fill Valve
MV	DO	Mixing Valve
DV	DO	Drain Valve
FVS	DO	Fill Valve Side
PV1,2	DO	Pilot valve
SR1,2	DO	Safety relay
FR1,2	DO	Flame relay
FbV	DI	Feedback valve
VN		Valve neutral
HL	DI	Tank High limit
DH+,-	AI	Direct Humidity
Dn1,2	AI	Drain Sensor
CP	AI	Condensate probe
FWP		Fill water probe
LWP		Low water probe

MX1,2	AO	Maxitrol Valve
ECO	AO	ECM Demand
PWM	PWM	ECM rpm feedback
ECC		ECM Neutral
DHL	DI	Duct high limit

CD-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Internal Modbus
OS	AI	Tachometer +
YS	AI	Tachometer -
GS	AI	Tachometer reference
CB	AO	TRIAC output
120		120Vac input
SR1,2	DO	Safety relay

P-XM

H N		24Vac Power Supply
GND		Ground
LmA,B		Internal Modbus
CM		Relay common
PSw	DO	Pressure switch
PrS	AO	Pressure sensor

SPLIT MODBUS WIRING

Some appliance systems may be split for either operation or installation, and may require the installation of remote wiring for the internal Modbus communication between the CenCon and the remote mounted appliance expansion module. An example of this could be an evaporator unit with a remote mounted condenser. This wiring is critical to the operation of the appliance.

Internal communication wiring for RS-485 (EIA/TIA-485) is a shielded twisted pair, specified for Modbus communication: ASTM B33, Twisted pair, 22ga. fully shielded with drain wire, and rated for plenum use. External wiring should be similarly rated.

Most wire manufacturers provide cable specific for Modbus communication. The installer should review the distance and the environment the wiring will travel through with the manufacturer.

- As a minimum, Modbus communication protocol must be shielded with twisted pair 2 conductor wiring, 20 or 22ga.
- The RS-485 (EIA/TIA-485) interface standard does not specify a ground wire, but such wire is needed to provide a return path for common mode currents and reduction of emissions.
- Ensure correct polarity between controllers as wire colors may differ. Refer to the field wiring diagram supplied with the appliance.
- The shield ground (drain) wire should only be connected to ground where the CenCon controller is installed. Tape and isolate the other end of the drain wire.
- End of Line (EoL) termination is typically not required due to the relatively short length between split appliances.
- Wiring to remote, or split, equipment is only done in the 'Daisy Chain' scheme sequence arrangement.

