

base

User Manual

base V3.0.0 and higher



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 Engineered Air base, CenCon, all associated expansion modules and User Manual have been certified by Intertek (ETL) as a recognized component for use with Engineered Air appliances only and are Certified to CAN/CSA Standard C22.2 No. 24 Temperature Indicating and Regulating Equipment (Canada) and Conforms to UL873 Standard for Safety Temperature Indicating and Regulating Equipment (US). The supplemental information found in the Technical Manuals and Communication Manuals is 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.

All manuals are available on the Engineered Air website.

SERVICE AND PARTS

North America Toll-free Technical Service

PH: 1-888-796-1359

North America Toll-free Parts

PH: 1-888-796-1332

CONTACT INFORMATION

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Calgary, Alberta, Canada
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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. Follow ALL federal, state, provincial and/or local codes, regulations and laws.

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.

CAUTION:

Rotating, linear and stored energy Components! Testing, servicing and troubleshooting of moving component can cause property damage, injury or death. All work must be performed by a qualified technician.

CAUTION:

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.

CAUTION:

This unit is connected to voltages that can be dangerous. Electrical shock could occur if instructions are not followed. Injury or death could occur if instructions are not followed. All work must be performed by a qualified technician. Always disconnect, lock out power and confirm capacitor have discharged before servicing. DO NOT bypass any interlock or safety switches under any circumstances.

CAUTION:

All wiring, piping and fuel line installations must be complete and functional before attempting to start the appliance.

CAUTION:

Each control module is configured, at the factory, for the appliance it is installed in at the time of leaving the factory. Each appliance may have different configurations and adjustments such as timings and offsets for gas/air where applicable. Follow the calibrations procedures in this manual for each individual unit and never attempt to install a controller from another unit without confirming with Engineered Air Service Department.

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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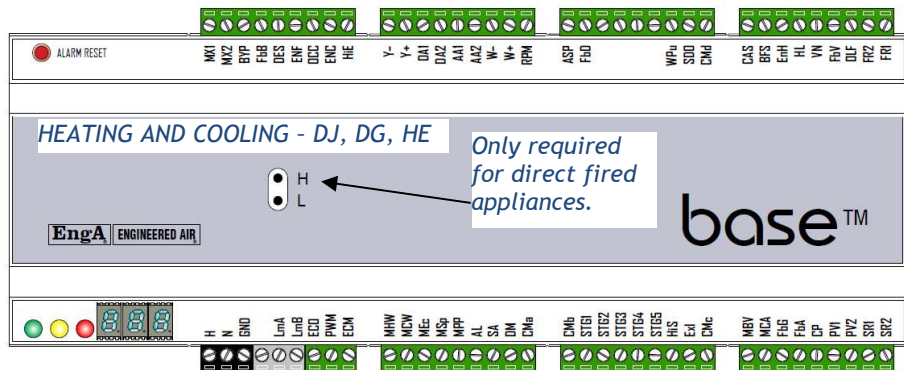
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GENERAL OVERVIEW

UNIT TYPE

The base may be configured for use with a variety of heating appliances, with and without cooling. A second version specific to the Engineered Air SH(X) type humidifier has 2 distinct terminal sets that differ from the heating version. The base version number is indicated on the top right corner of the web based user interface.

The Engineered Air base controller is the primary operational component for custom manufactured Engineered Air HVAC equipment. Engineered Air DJ style burners on SH(X) sizes 120-650, use the CD-XM expansion module for burner motor speed control.

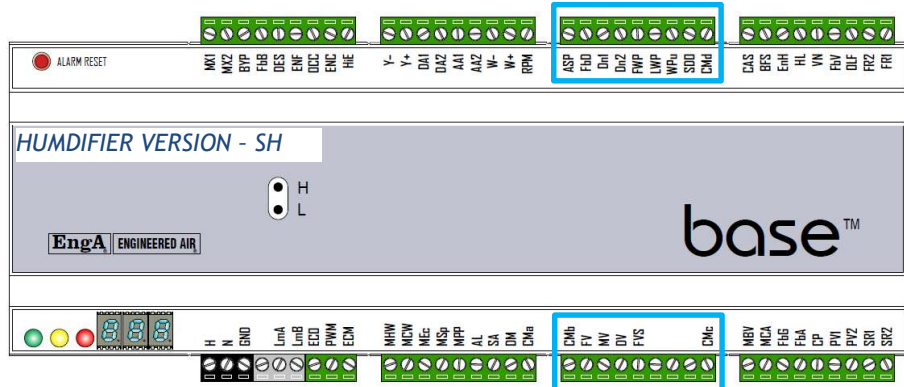


Green Light: 24Vac to H and N.

Yellow Light: Communication.

Red Light: Alarm indication.

7 segment displays: Left: Mode status, right 2 LED's: Alarm reference number.



Notice:



There is approximately a 1 minute delay before operation can commence on initial power up.

HARDWARE INFORMATION

Control Voltage	24Vac 60Hz
Digital Output Rating	120V 10A
Digital Input	24 - 120Vac ¹
Analog Output	0-10Vdc
Analog Input	0-10Vdc and 4-20mA ^{2,3}
Analog In Impedance	7.5kΩ
Temperature Rating	-40 - 150°F (65°C)
Temperature Sensor	10k Type 2 NTC

Apparent Power Ratings

base	10 VA
CD-XM	5 VA

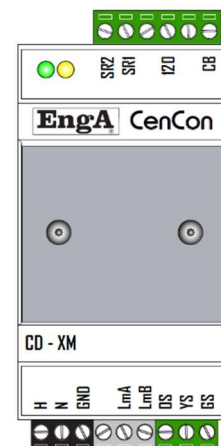
¹ Digital input connection to the CenCon, base or any of the expansion modules cannot use Mosfet solid state switches. Input switching must be mechanical.

² A 4-20mA input signal can be converted to 2-10VDC by installing a 500Ω resistor across the terminals. Only W+/- and Y+/- input range can be scaled using the web user interface. Alternatively, consider using a signal converter.

³ Analog inputs will trigger 10Vdc 'high' if using 24Vac input and a series Diode (1N400x).

CD-XM

TRIAC combustion motor speed drive. The 120V and CB terminals as separated to accept heavy insulation wire from the combustion blower motor. The CD-XM will be mounted in the electrical panel on 'standard' equipment. The CD-XM must always be mounted such that the speed sensor wire does not need to be extended, therefore it may be mounted inside the burner cabinet in equipment that has the burner control panel mounted farther away. If so, keep at least 6" (150mm) away from the ignition control.



BASIC OPERATION

The CD-XM module will control the combustion motor speed on DJ and large SH indirect fired burners in conjunction with the J-XM heating module. A 3 wire feedback signal from the Engineered Air hall-effect speed sensor is used to prove the actual blower speed.

PRESSURE SENSING

The internal pressure sensor will measure the required variable flow in a direct fired heater. The sensor is rated at 0-10mbar (0-4"wc).



CAUTION:



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

For detailed operation of the pressure sensor, please refer to the base Technical manual.

COMPUTER CONNECTION

Notice:

The base requires a connection to a computer for detailed information beyond what is indicated on the LED displays.

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 or base testing interface connect using a Cat.5 Ethernet cable 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 as per the picture.

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.

A USB Wi-Fi adapter can be used for this connection. Please Contact service@engineeredair.com for compatible options.

Please refer to the base Technical Manual for details on the user interface accessible via a browser.

USER INTERFACE



Return to MAIN screen.



Next/Previous page.



Alarm page



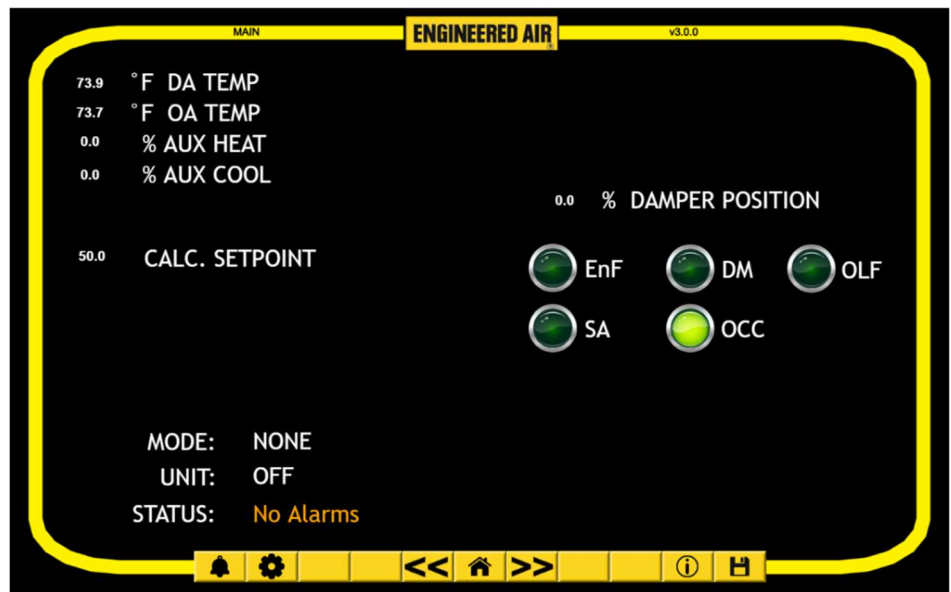
Setting page



Information page



Save any unsaved changes



When making any changes, ensure that you click the save icon on the bottom right of the screen.

The GREEN indicators shows the status of an input/output. For example, the EnF indicator denotes that the input is receiving power while the DM indicator shows that the output is sending power.

APPLIANCE TYPES

DJ STYLE INDIRECT FIRED

For indirect fired equipment with DJ (E, S, X) style burners up to size 140.

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). After a time delay the pilot valve is disabled. The burner is allowed to operate from low fire to high fire at a maximum 15:1 turndown ratio to maintain the requested discharge air temperature 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.

The base can control either a Maxitrol magnetic style modulating valve or an actuator and ball valve combination.

Combustion air blower modulation is controlled by the CD-XM expansion module.

DG STYLE INDIRECT FIRED

For indirect fired equipment, DJX sizes 200 and 300, and all DG sizes. These use actuator controlled air flow control damper and gas ball valves.

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 base will then disable the pilot valve. The burner is allowed to modulate from high fire to low fire to maintain the requested discharge air temperature 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.

HE DIRECT FIRED

For direct fired HE style direct fired heaters.

On a call for heating, and with the supply blower enabled, 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 base will then disable the pilot valve. The burner is allowed to modulate from low to high fire to maintain the requested discharge air temperature by modulating the fuel control valve. The heating will remain on as long as the heating enable circuit is energized.

Cycling a direct fired burner on and off 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.

The base can control either a Maxitrol magnetic style modulating valve or an actuator and ball valve combination.

Variable air volume systems include a burner bypass damper which modulates to maintain the correct burner profile pressure drop.

STAGED COOLING

For staged compressor operation the base will sequence on and off up to 5 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.

SH(X) HUMIDIFIER

SH and SHX series gas fired humidifiers are controllable using the humidifier version of the base controller.

SHX models use a second fill valve for the side tank.

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.

Large SH(X) sizes (120-650) use DJ style burner for the gas fired portion.

Appendix A – Alarms

ALARM RESET

To reset, press the Red Alarm Reset button on the corner of the base, or from the computer interface.

ALARM LIST

When an alarm condition exists, the base will flash the RED LED and show a number on the right 2 seven segment displays. The first (left) seven segment LED describes the current operating mode, as:

- 1 = Ventilation
- 2 = Economizer
- 3 = Heating
- 4 = Cooling

The two seven segment LED on the right side show the current alarm reference number.

The complete alarm list can be found on the following pages.

LED	Name	Description
General Alarms		
01	Low limit	The low limit setpoint is the lower of 40° F.
02	Air Proving Fault	VFD Feedback is greater than the minimum VFD speed for more than 30 seconds with the supply fan output off.
03	Shorted Air Proving	Air SA Proving switch shorted on startup.
04	Low airflow	Air Proving switch opens during operation for 30 seconds or the VFD feedback drops below the minimum speed for 30 seconds.
05	Discharge Air Sensor Failure	Discharge Air sensor is outside of its range (-60° F to 220° F) for 10 seconds or more.
06	Ambient Air Sensor Failure	Outdoor Ambient sensor is outside of range (-60° F to 220° F) for 10 seconds or more.
07	Damper End Switch Warning	Shorted damper end switch. Meaning the damper end switch is made before energizing the damper output.
08	Damper Mechanical Alarm	End switch enabled codex is true and end switch is not made after energizing damper output.
09	Communication	Loss of communication between base and CD-XM expansion module.
DJ Alarms		
80	Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.
81	Gas Valve out of range	Gas valve actuator feedback is greater or less than the demand. Tolerances and timing vary depending on mode of operation.
82	RPM out of range	Combustion blower motor RPM is greater or less than the demand. Tolerances and timing vary depending on mode of operation.
83	Open Air Proving	Combustion blower does not exceed 3000 rpm during purge.
84	Shorted Air Proving	Combustion rpm speed sensor has a value greater than 500 rpm for 60 seconds before the combustion blower has been commanded on.
85	Plugged Condensate	Blocked condensate sensor reads less then 7kΩ for more than 5 minutes.
86	High Limit	High limit safety tripped due to excessively high temperature.
87	Flame Relay Wiring	Received a gas valve feedback within 500ms of activating the flame relay output.
88	Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
89	Blocked Flue	Blocked flue sensor tripped.
90	60 Hz	Combustion blower frequency has exceeded 60 Hz (3590 RPM)
DG Alarms		
80	Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.
81	Gas Valve out of range	Gas valve actuator feedback is greater or less than the demand. Tolerances and timing depending vary on mode of operation.
82	Air Actuator Out of range	Air Actuator Feedback Is greater or less than the demand. Tolerances and timing vary depending on mode of operation.
83	Open CB 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
84	Shorted CB Air Proving	Combustion blower air switch input has power for 10 seconds before the combustion blower has been commanded on.
85	Plugged Condensate	Blocked condensate sensor reads less than 7kohms for more than 5 minutes.
86	High Limit	High limit safety tripped due to excessively high temperature.

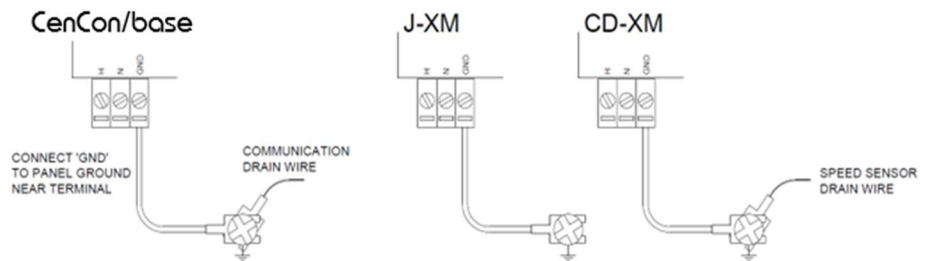
87	Flame Relay Wiring	Received a gas valve feedback within 500ms of activating the Flame relay output.
88	Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
89	Blocked Flue	Blocked flue input has been enabled for 1 minute or more.
HE Alarms		
80	Gas Valve Wiring	Gas valve feedback has power before the FR and SR contact are energized.
81	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.
86	High Limit	High limit safety tripped due to excessively high temperature.
87	Flame Relay Wiring	Received gas valve feedback signal within 500ms of activating the Flame relay output.
88	Flame Failure	Gas valve feedback has no power after 1 minute of enabling the Flame relay output.
91	Low Velocity Air Switch	Occurs if the pressure drops below the low pressure setpoint during modulation for more than 40 seconds
92	High Velocity Air Switch	Occurs if the pressure goes above the High pressure setpoint during modulation for more than 90 seconds
94	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 the sequence has already passed the purge status and has lit. See "Low velocity Air Switch" alarm
95	Low Pressure Sensor	If the pressure is greater than the Very low pressure setpoint before the damper is opened for more than 1 minute.
96	Very Low Pressure	Occurs if the pressure drops below the very low pressure setpoint after the purge has been completed.
97	Far Sensor Flame Failure	Occurs if a secondary flame rod is enabled and flame sensing is lost in less than 20 seconds after the pilot valve drops out on consecutive attempts.
SH(X) Alarms		
61	Tank Overflow	SH is in normal operating mode and the drain temperature is greater than 110 deg F for longer than 10 seconds
62	Water Foaming	Low water probe made and fill valve open for less than 2 minutes during normal operation
63	Failed Water Supply	The fill valve stays open longer than the required time (varies on current mode: Normal operation: 5m; Complete fill: 1hr)
64	Failure to Drain	Low water probe covered and drain valve open for longer than 1 hour
65	Water Probe Sequence	Fill water probe is covered before the low water probe
66	Duct High Limit	Duct humidity has tripped the mechanical high limit.
67	Drain Sensor Failure	Drain sensor is out of range (less than 30° or greater than 212°F) for 10 seconds
68	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.

Appendix B – Grounding

For purposes of unit wiring to chassis in this manual, grounding and bonding reference the same thing and may be used interchangeably. Shielded cables always include an uninsulated ground connection wire, called a 'drain' wire.

MODULE GROUNDING

The CenCon, base and all expansion modules have a black power connection termination that includes Hot (H), Neutral (N), and Ground (GND). The GND terminal must be connected to a short green wire securely fastened to unpainted metal directly below the termination of each expansion module.



As shown in the example below, the DJ speed sensor wire shield drain wire must connect to the same unpainted ground connection used by the CD-XM input power. The communication wire ground should only connect to the CenCon or base unpainted ground connection.

COMMUNICATION WIRE GROUNDING AND DAISY CHAIN

NOTICE:

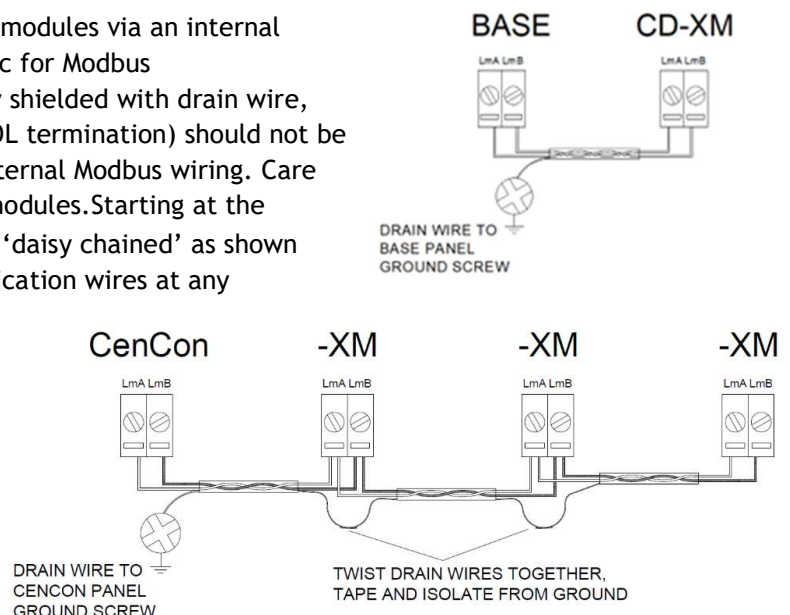


Correctly wiring the internal Modbus communication network is critical to ensuring stable operation. Maintain the wiring at least 8" (200mm) away from any high power wiring, motors, transformers or VFD's.

For consistency, always wire: Red to LmA, and Black to LmB.

The CenCon or base communicates with expansion modules via an internal Modbus communication protocol. The wire is specific for Modbus communication: ASTM B33, Twisted pair, 22ga. fully shielded with drain wire, and plenum rated jacket. An end of line resistor (EOL termination) should not be required due to the relatively short length of the internal Modbus wiring. Care must be taken to ensure correct polarity between modules. Starting at the CenCon or base wiring must be routed in series, or 'daisy chained' as shown below. There should never be more than 2 communication wires at any LmA/LmB terminal.

The communication wire drain should be connected only at the same unpainted ground termination used by the CenCon or base panel ground. All expansion module intermediate drain wires must be twisted together tightly and taped to secure together and isolate from ground. A wire nut or insulated splice connector may also be used. It is important that these must not be grounded anywhere except at the CenCon or base ground connection.



Appendix C – Terminal Description

HEATING COOLING VERSION

Terminal changes when using SH(X) humidifier version are indicated.

Terminal	Type	Name	Description	Value
H N		Power Supply		24 Vac
GND		Ground	Connect to chassis.	
LmA B		Modbus	Internal network.	
ECO	AO	ECM Motor Output	ECM motor output controls signal.	0-10 Vdc
PWM		ECM Motor Feedback	ECM motor speed feedback signal.	PWM
ECM		ECM Common	ECM output signal common.	0-10 Vdc
MHW	AO	Modulating heating	Hot water coil valve actuator. 0V=off.	0-10 Vdc
MCW	AO	Modulating cooling	Chilled water coil valve actuator. 0V=off.	0-10 Vdc
MEc	AO	Modulating economizer	Economizer / Mixbox actuator. 0V=closed.	0-10 Vdc
MSp	AO	VFD command speed	VFD control signal.	0-10 Vdc
MPP	AO	Profile pressure	Modulating profile pressure damper actuator output.	0-10 Vdc
AL	DO	Alarm	Alarm contact for annunciation.	24 Vac
SA	DO	Supply air	Blower enable contact.	24 Vac
DM	DO	Damper actuator enable	Two position actuator control.	24 Vac
CMA	COM	Common to output set 'a'	Common power relays 'a', above.	24/120 Vac
CMB	COM	Common to output set 'b'	Common power relays 'b', below.	24/120 Vac
STG1	DO	Cooling stage #1	Output stage #1 cooling, powered from common 'b'.	24/120 Vac
STG2	DO	Cooling stage #2	Output stage #2 cooling, powered from common 'b'.	24/120 Vac
STG3	DO	Cooling stage #3	Output stage #3 cooling, powered from common 'b'.	24/120 Vac
STG4	DO	Cooling stage #4	Output stage #4 cooling, powered from common 'b'.	24/120 Vac
STG5	DO	Cooling stage #5	Output stage #5 cooling, powered from common 'b'.	24/120 Vac
HiS	DO	High Speed	High speed fan start contact.	24/120 Vac
Exl	DO	Exhaust fan low	Single or low speed exhaust fan start contact.	24/120 Vac
CMc	COM	Common to output set 'c'	Common power relays 'c', below.	24/120 Vac
MBV	AO	Modulating ball valve	Modulating gas valve actuator output.	0-10 Vdc
MCA	AO	Modulating combustion air	Modulating combustion air actuator output.	0-10 Vdc
FbG	AI	Feedback Gas	Compares the ball valve actuator feedback signal to the demand signal.	0-10 Vdc
FbA	AI	Feedback Air	Compares the combustion air actuator feedback signal to the demand signal.	0-10 Vdc
CP	AI	Condensate probe	Condensate probe sensor input.	Ohms (Ω)
PV1, PV2	DO	Pilot valve	Disables the pilot flame once the main burner has been established.	24/120 Vac
SR1, SR2	DO	Safety relay	Secondary safety lockout contacts	24/120 Vac

FR1, FR2	DO	Flame relay	Flame relay enable contacts.	24/120 Vac
OLF	DI	Economizer Disable	Disables mixing function and sets outside air dampers to minimum position.	24/120 Vac
FbV	DI	Feedback valve	Feedback signal from the safety shut off valve (SSOV). Wired directly to valve.	24/120 Vac
VN		Valve neutral	Neutral feedback signal from the safety shut off valve (SSOV) and High Limit.	
HL	DI	High limit	Normally closed, opens on high temperature.	24 Vac
EnH	DI	Enable heat	24V must be applied to allow heating function.	24 Vac
BFS	DI	Blocked flue switch	Normally closed, opens on blocked flue.	24 Vac
CAS	DI	Combustion air switch	Optional proof of combustion air flow.	24 Vac
CMd	COM	Common to output set 'd'	Common power relays 'd', above.	24/120 Vac
SDO	DO	Multipurpose output.	HE dual flame sensing switchover and Combustion blower start output for DG.	
WPU	DO	Water Pump	Enable evaporative 'swamp' cooler water pump.	24/120 Vac
FbD	AI	Damper Feedback	Modulating damper actuator feedback.	0-10 Vdc
ASP	AI	Remote VFD Setpoint	VFD speed input demand signal.	0-10 Vdc
RPM	AI	VFD feedback speed	VFD output speed feedback	0-10 Vdc
W+-	AI	External heating or humidity signal (SH)	Independent heating demand or SH humidity signal.	0-10 Vdc
AA1,2	AI	Ambient air temperature	10k Type 2 thermistor	Ohms (Ω)
DA1,2	AI	Discharge temperature	10k Type 2 thermistor	Ohms (Ω)
Y+-	AI	Modulating cooling thermostat	Independent cooling demand signal.	0-10 Vdc
HiE	DI	High Speed Enable	Initiate high speed operation.	24 Vac
EnC	DI	Enable cooling	Enable / disable mechanical cooling.	24 Vac
OCC	DI	Occupied / Unoccupied	Enable occupied mode when powered.	24 Vac
ENF	DI	Enable Fan	Occupied mode start	24 Vac
DES	DI	Damper End Switch	Mechanical damper end switch input	24 Vac
FbB	DI	Air Proving Switch	Supply blower air proving switch	24 Vac
BYP	DI	VFD Bypass	VFD bypass input.	24 Vac
MX1, MX2	AO	Maxitrol Valve	DC current output to the Maxitrol modulating valve.	mAdc

SH(X) HUMIDIFIER VERSION

CMB	COM	Common to outputs 'b'	Common power relays 'b', below.	24/120 Vac
FV	DO	Fill Valve	Enable water fill valve.	24/120 Vac
MV	DO	Mixing Valve	Enable drain water tempering valve.	24/120 Vac
DV	DO	Drain Valve	Enable primary drain valve.	24/120 Vac
FVS	DO	Side Tank Fill Valve	Enable side tank (SHX) fill valve.	24/120 Vac
Dn1,2	AI	Drain sensor	Drain temperature sensor probe input.	Ohm (Ω)
FWP	AI	Fill water probe	Fill water level sensor.	Ohm (Ω)
LWP	AI	Low water probe	Low level water sensor.	Ohm (Ω)

CD-XM

Terminal	Type	Name	Description	Value
H N		Power Supply	24Vac Grounded Neutral	24 Vac
GND		Ground	Connect to chassis.	
LmA B		Modbus	Internal Network	
OS	AI	Tachometer +	Engineered Air DJ speed sensor Red wire.	0-10 Vdc
YS	AI	Tachometer -	Engineered Air DJ speed sensor Yellow wire.	0-10 Vdc
GS	AI	Tachometer reference	Engineered Air DJ speed sensor Green wire.	0-10 Vdc
CB	AO	TRIAC output	Output to combustion blower motor.	120 Vac
120		120V line in	120V Hot input	120 Vac
SR1,2	DO	Safety relay	Normally open output contacts	24/120 Vac