



*MCS Total
Solutions for all your
HVAC/R Control Needs*



MCS-CENTRIFUGAL-12
Industrial Control Panel

CVHE-F Controls -12 Upgrade with Optional VFD Control

This brochure describes a standard upgrade package for the CVHE-F Chiller.

Each control upgrade installation is unique. It may be necessary to add additional options to the standard upgrade as described in this brochure.

Fill out the questionnaire in the back of this brochure and forward to your sales representative for an estimate.



CVHE-F Control Enclosure Upgrade

CVHE Chiller controls before upgrading



MCS CENTRIFUGAL-12 Industrial Control Panel

NEMA rating - Type 1

Dimensions - 27" w x 39.75" h x 8.0" d

Certification - UL508A

MCS-MAGNUM-N-12

Controller Specification

Microprocessor.....	Zilog eZ80 Acclaim! @ 50mhz
Sensor Inputs (SI).....	12 inputs 0-5vdc (10-bit A/D)
Digital Inputs.....	4 inputs 0 or 5vdc only
Relay Outputs (RO).....	10 outputs 6.3amps @ 230vac
Analog Outputs (AO).....	4 outputs 0-10vdc
Printed Circuit Board.....	Six layer with separate power and ground planes
Input Power (Standard).....	12vdc-90W
MCS-I/O Comm Port.....	1 @ 38,400 baud
RS-485 Comm Port.....	1 @ 19,200 baud
Ethernet.....	10/100 Mbps Ethernet
Real Time Clock.....	Battery backup
Power Detection.....	Automatic power fail reset

MCS-TOUCH-15.4

Dimensions.....	12.11"W x 17"L X 3.228"H
LCD Screen.....	15.4" (16:10 Diagonal), 16.2 Million Colors, 1280x800 Resolution

The **MCS-CENTRIFUGAL-12** comes standard equipped with an MCS-MAGNUM-N -12 controller board, 15.4" Touch Screen, three 16 amp, one 20 amp and one 5 amp circuit breakers. There is also an electrical outlet for laptop plug-in power at the panel.

The Enclosure has the following expansion boards installed:

One (1) MCS-SI-Base, One (1) MCS-SI-BASE with MCS-SI-EXT, and ONE (1) MCS-RO-Base with MCS-RO-EXT.

After upgrading to MCS-MAGNUM 15.4 Controls



NEW - MCS-CONTROLS for CVHE-F



With the expansion boards you have a total of:

60 Sensor Inputs
30 Relay Outputs
16 Analog Outputs

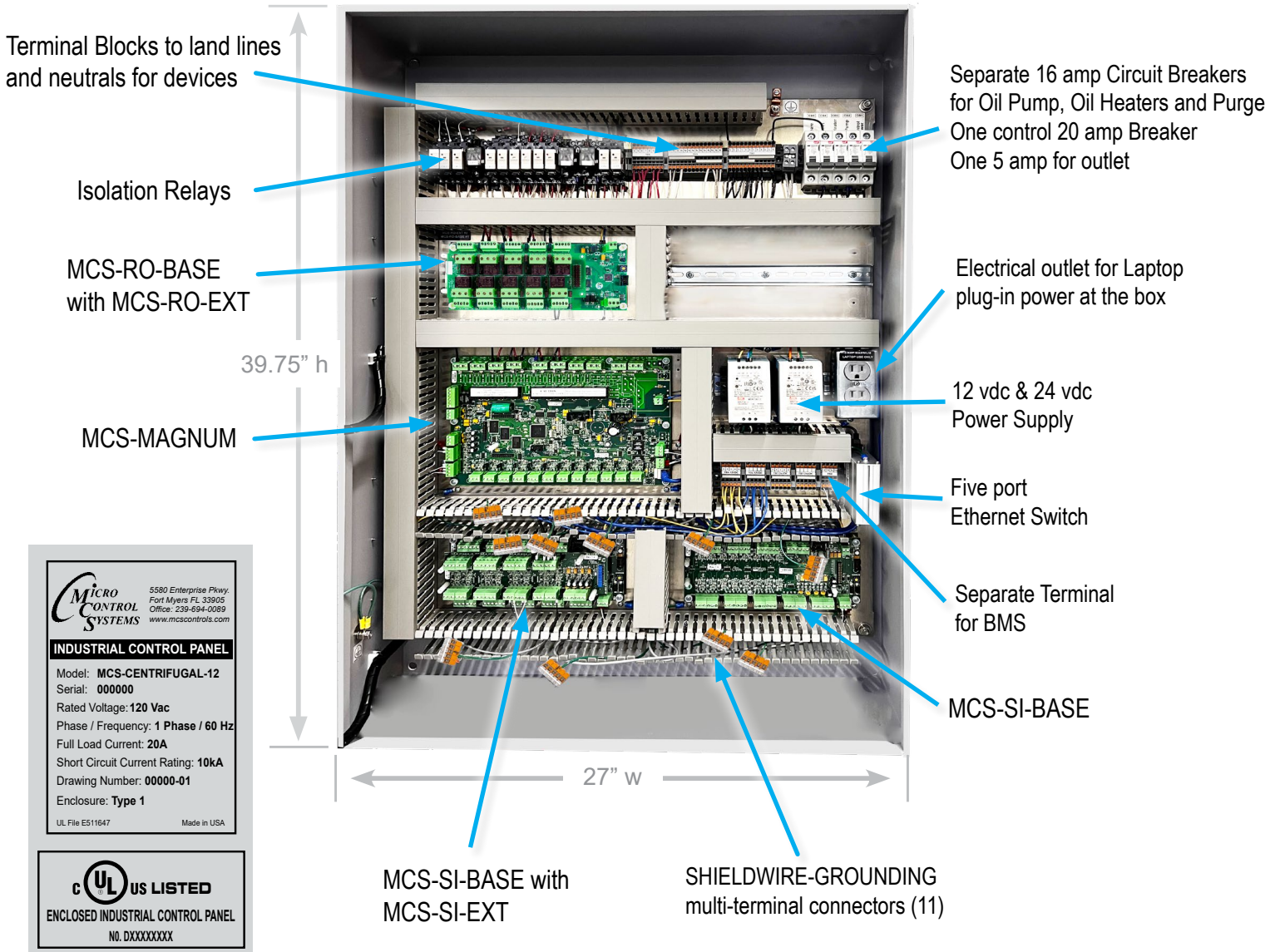
Standard configuration includes: Isolation relays, BMS Network connectivity, (Field selectable hardware or network BMS), and BMS terminal block for chiller relay.

The following warning lights and switches are included in the standard enclosure; Alarm, Warning, Emergency SW, Hand/Off/ Auto Switch.

This panel is intended for use in an environment protected from the weather.

MCS-MAGNUM-CENTRIFUGAL INDUSTRIAL CONTROL PANEL

NEMA Rating Type 1- P20 Rating



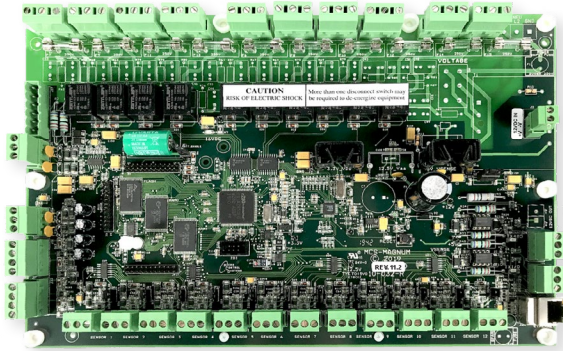
UL 508A Certified Industrial Control Panel

Benefits of selecting an Industrial Control Panel that carries the UL 508A certification include:

- UL 508A certification provides the inspection authority and your customer evidence that the control panel complies with nationally recognized safety standards. These standards ensure public safety and provide assurances that the electrical control panel is compliant with national and local electrical codes.
- For a control panel to carry the UL 508A Listing Mark, the panel must contain only UL recognized and listed components. The UL Mark on a component means that UL has evaluated and tested samples of this component and has concluded that they meet the UL requirements. This protects the quality and integrity of the enclosure and provides guarantee of safe performance.

CVHE-F Typical Components

MCS-MAGNUM-N-12



The **MCS-MAGNUM-N-12** is a durable microprocessor based controller designed for the hostile environments in the HVAC/R industry. It is designed to be the primary manager of the package it is controlling.

The Magnum provides flexibility with set points and control options that can be selected prior to commissioning a system or when the unit is live and functioning. The TouchScreen and MCS-CONNECT provide a clear and simple language that informs the user as to the status of the controller.

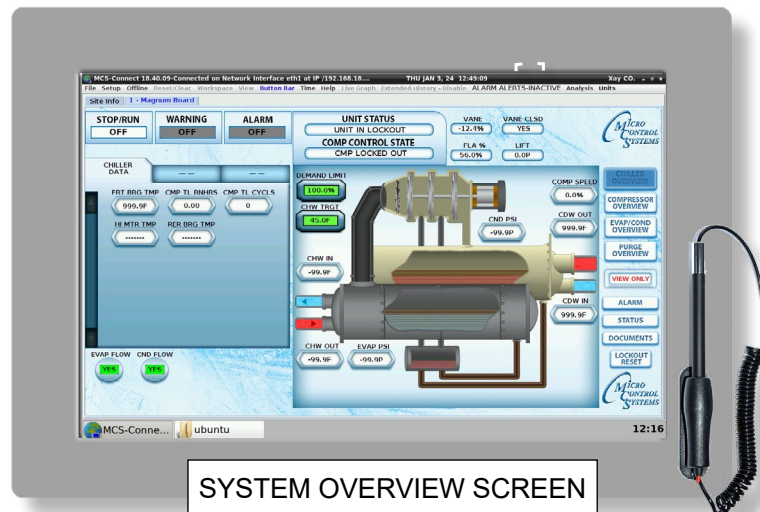
15.4 Touchscreen

The **MCS-TOUCH-15.4** capacitive touchscreen interface designed to simplify user access with the MCS-Magnum and MicroMag utilizing MCS-Connect to provide both graphics and service mode access to technicians. Input method: Finger, glove, stylus.

Highly accurate and does not require calibration - easy to clean glass surface. Works outdoors, bright screen, water resistant, Exceptional Optics - 1280x800 resolution, sharp and vibrant images.

The MCS-TOUCH-15.4 comes pre-loaded with the MCS-CONNECT program that allows you to view the unit's status, history, warnings, alarms, setpoints, and more, all in a user-friendly graphic format.

Your Touchscreen includes sub folders for storing your important documents including your Configuration file, Electrical Drawings for all your components, and PDF Manuals, etc.



SYSTEM OVERVIEW SCREEN

- Freescale i.MX6 Dual Core 800mhz Motherboard
- ARM 9 32-bit RISC ARM processor
- 1Gb of 512mhz DDR3 RAM memory
- 4Gb of eMMC Flash memory
- 10m/100m/1G Ethernet
- 1 Micro-SD Slots
- 1 USB On-The-Go
- 2 USB Host 2.0
- Real Time Clock w/ Battery
- 3 RS485 communication ports

CVHE-F Typical Components

Graphics For Touchscreens

With the new Graphical Interface and MCS-CONNECT, you now have a better view of your controller's many functions as shown on the screens.

The basic graphics package is pre-installed and can be customized by OEMs with the MCS Graphic Builder or custom built by MCS for your controllers.

Standard screens include:

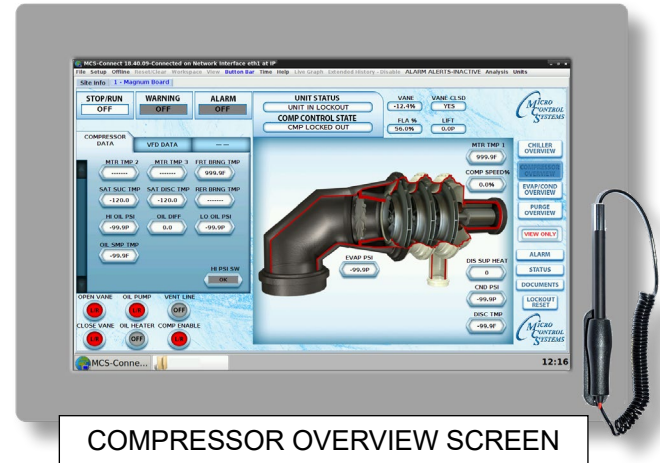
- System Overview Screen
- Compressor Overview Screen
- Evaporator/Condenser Overview Screen
- Documents

Additional screens can be added depending on the custom configuration of your system. Below are some optional screens that can be created.

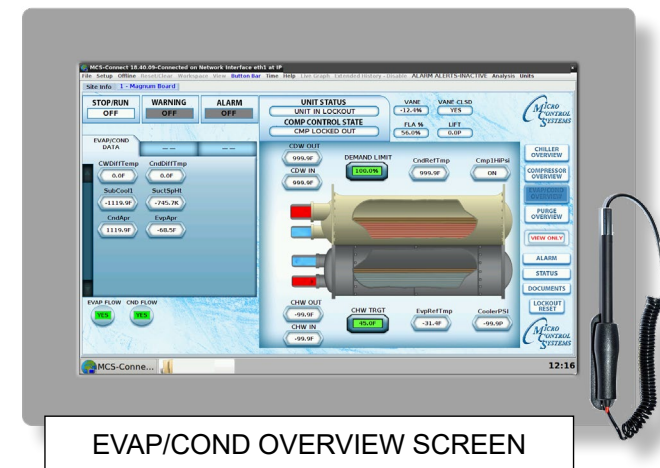
Documents, Spec Sheets, Drawings, etc.

Stored in the Touchscreen's flash memory, you will find pdf's and documents pertaining to the building of your unit. Each unit's configuration is different, so the 'SITE DOCUMENTS' file will pertain to that unit only and stored at the site.

1. DRAWINGS (PDF'S) of the components used in this unit
2. MANUALS (if installed in your unit)
 - a. Getting Started Manual
 - b. Keypad Manual
 - c. Touchscreen Manual
 - d. MCS-CONNECT Manual
 - e. EXV Manual
 - f. BMS-GATEWAY Startup Guide

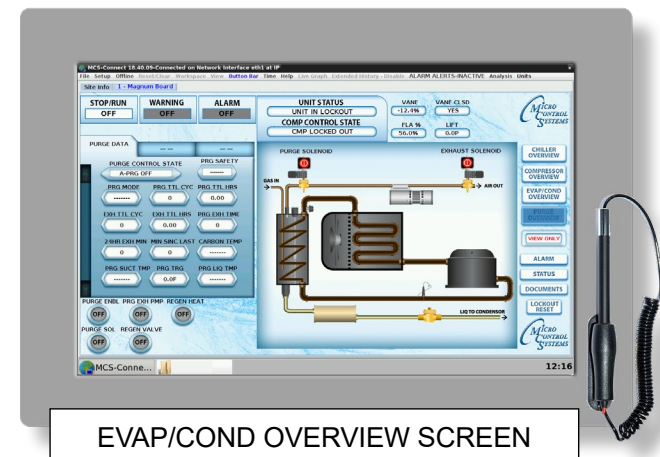
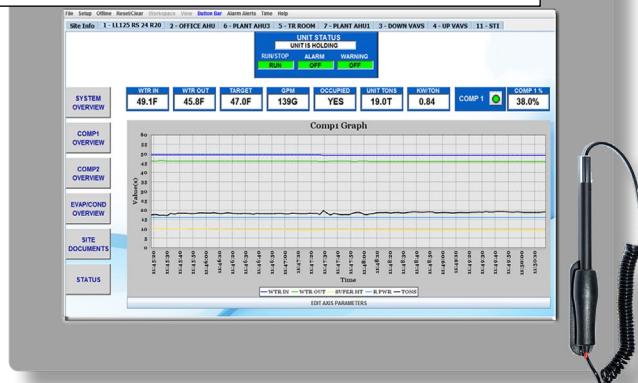


COMPRESSOR OVERVIEW SCREEN



EVAP/COND OVERVIEW SCREEN

LIVE GRAPH OVERVIEW SCREEN IN REAL TIME



EVAP/COND OVERVIEW SCREEN

CVHE-F Typical Components

MCS-SI-BASE

The **MCS-SI-BASE** provides a flexible and cost effective way to allow sensor input and analog output expansion for the **MCS MAGNUM**. Each MCS-SI-BASE has a stand-alone microprocessor which communicates with the MCS MAGNUM over the MCS-I/O port at 38,400 baud. All data is check summed with auto error correction. Because communication is over a RS-485 long distance two-wire differential network transmission system, the MCS-SI-BASE may be located up to 5,000 feet away.

Each MCS-SI-BASE board is powered by a 12VDC regulated power supply and has a automatic power fail reset system.

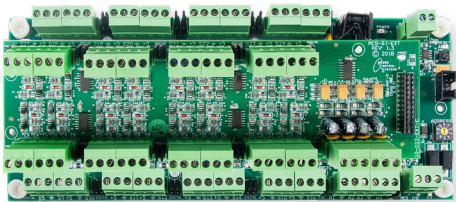


MCS-SI-EXT

The **MCS-SI-EXT** provides a flexible and cost effective way to allow sensor input and analog output expansion for the **MCS MAGNUM**.

Each MCS-SI-EXT can be paired with a MCS-SI-BASE to double the number of inputs and outputs. Each

MCS-SI-EXT board is powered by the MCS-SI-BASE board once it is stacked on top.



MCS-SI-EXT mounted to
MCS-SI-BASE

MCS-RO-BASE

The **MCS-RO-BASE** provides a flexible and cost effective way to allow relay output expansion for the **MCS-MAGNUM**. Each MCS-RO-BASE has a stand-alone microprocessor which communicates with a Magnum/Micromag over the MCS-I/O port at 38,400 baud. All data is check summed with auto error correction. Because the communication is over a RS-485 long distance two-wire differential network transmission system, the MCS-RO-BASE may be located up to 5,000 feet away.

The MCS-RO-BASE board is powered by a 12VDC regulated power supply.

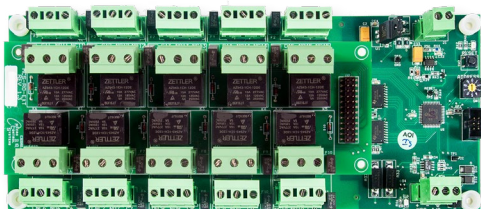


MCS-RO-EXT

The **MCS-RO-EXT** provides a flexible and cost effective way to allow relay output expansion for the **MCS MAGNUM**.

Each MCS-RO-EXT can be paired with a MCS-RO-BASE to double the number of outputs.

Each MCS-RO-EXT board is powered by the MCS-RO-BASE board once it is stacked on top.



MCS-RO-EXT mounted to
MCS-RO-BASE

CVHE-F Typical Components

MCS-PRESSURE TRANSDUCERS

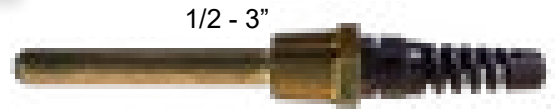


The **MCS-150AC** pressure transducer is specially designed for use in low pressure HVAC/refrigeration applications in the most demanding environments. The MCS-150AC pressure transducer uses absolute zero as a definitive reference point, absolute pressure remains precise and accurate regardless of changes in ambient or process temperatures.

The MCS-150AB pressure transducer is CE, UL and RoHs compliant. It is capable of surviving high vibration. MCS-150AC has a cavity built out of stainless steel with a Neoprene sealing material, 1/4" SAE Female Flare fitting & Schrader valve; 7/16-20 UNF pipe thread which creates a leak-proof, all metal sealed system that makes the MCS-150AC ideal for use with rugged HVAC environments using refrigerant Media.

MCS-Wells/Tubes

The MCS-WELL was designed to be used with the MCS-T100 temperature sensor, although it has other applications. It is used in the CVHE-F series chillers in the chilled water and condenser water lines. It comes pre-filled with heat conductive compound to aid in transferring temperature to the sensor.



The **MCS-TUBE** can be epoxied to a discharge or suction line on the CVHE-F series chillers in order to obtain temperature readings without the use of a well. It was designed to be used with the MCS-T100 temperature sensor and comes pre-filled with heat conductive compound to aid in transferring temperature to the sensor.

MCS-T100 Temp Sensor



An extremely fast acting temperature sensor built for demanding environments. It is ideal for high moisture locations with continuous freeze and thaw cycles. The sensor is potted with a thermally conductive RTV Cure Silicon Adhesive to guarantee durability and response. Its high accuracy allows for interchangeability in the field. The large resistance range allows the use of over 1,000' of cable with no noticeable effect. The MCS-T100 sensor has the ability to move from 32°F to 212°F in approximately 10 to 15 seconds.

MCS-EPOXY

- Pre-measured resins and hardeners in one tube
- Easy to use - bonds, seals, plugs, molds and rebuilds
- No special tools needed
- Cures under water



- Pressure tested to 1300 psi
- Temperatures up to 500 degree F
- Color..... Gray
- Density 15.9 lb/gal (1.9 g/cc)
- Hardness (Shore D) 85
- Tensile Strength 6000 psi
- Compressive Strength 18.000 psi
- Modulus of Elasticity 6 x 105 psi
- Shear Strength 700 psi

CVHE-F Typical Components

MCS-CT500



The **MCS-CT500** current sensor monitors current flowing to electrical equipment. The magnitude of the current is converted to a linear output voltage between 0.06 to 4.52vdc which can be read as a standard analog input signal. The signal is used by MCS micro controllers for the following:

1. For slide valve control on screw machines
2. For high amp motor overload protection
3. For verification of device on / off

MCS-USB-RS485



The **MCS-USB-RS485** is a USB to RS485 cable that provides a fast simple way to connect a **MCS-MAGNUM** to a Laptop or PC.

The MCS-USB-RS485 cable contains a small internal electronic circuit board, which converts USB to RS485 with LED indicators for transmit (TX=Red) and receive (RX=Green).

MCS-PHASE-B

The **MCS-PHASE-B** is a programmable 3-phase line voltage monitor, high temperature LCD display, easy setup and clear diagnostic readout of system faults. The MCS-PHASE-B was specifically designed to protect motors and other 3-phase loads from premature failure and damage due to common voltage faults such as unbalance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling.



CVHE-F Typical Options

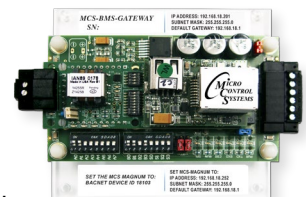
MCS-ACTUATOR

The **MCS-ACTUATOR** is used in conjunction with MCS controls as a replacement for certain model stepper motor actuators. This MCS Actuator operates as a 'pulse style open/close unit'.



MCS-BMS-GATEWAY

The **MCS-BMS-GATEWAY** is a microprocessor based communication device that provides translation from Bacnet IP, Bacnet MSTP, Modbus IP, Lontalk, or Johnson N2 communication interface. Information that can be transmitted includes the status of control points, alarm information, digital inputs, analog inputs or setpoints.



CVHE-F Typical Point List

Relay Outputs

#	Output Name	Type	Description
M-1	CompM	Optional	Compressor Start Main
M-2	CompD	Optional	Compressor Start Delta
M-3	OpenVane	Optional	Vane open: relay output used to open the compressor guide vane.
M-4	CloseVane	Optional	Vane closed: relay output used to close the compressor guide vane.
M-5	OilPump	Standard	Oil pump: Turn ON or OFF
M-6	Oil Heater	Standard	Oil Heater: Turn ON or OFF
M-7	HotGasBY	Optional	Hot Gas Bypass: Turn ON or OFF
M-8	Motor Cooling	Optional / CVHA only	Motor Cooling
M-9	PurgExhPmp	Optional	Purge Exhaust Pump
M-10	PurgeEnbl	Optional / User Logic	Purge Enable: this relay will be turned ON when the compressor turns on, allowing the purge to run

1-1	Purge Sol	Optional	Purge Solenoid
1-2	WarnLight	Standard	Warning Light: unit is in a safety condition prior to a safety shutdown.
1-3	AlarmLight	Standard	Alarm Light: unit is in a safety shutdown
1-4	RunStatus	Standard / User Logic	Hardwired or BMS point to notify BMS that the unit is running
1-5	VentLine	Standard / User Logic	Vent Line: Turn ON or OFF
1-6	Hgby Close	Optional	Floating Hot Gas Bypass: Close
1-7	Hgby Open	Optional	Floating Hot Gas Bypass: Open
1-8	Chw Pump 1	Optional	Chilled Water Pump #1
1-9	Chw Pump 2	Optional	Chilled Water Pump #2
1-10	CndWtrPump	Optional	Condenser Water Pump

2-1	Cnd Valve	Optional	Condenser Isolation Valve
2-2	Spare	X	Not Used - Reserved for Expansion
2-3	Spare	X	Not Used - Reserved for Expansion
2-4	TwrFan 1	Optional	Tower Fan #1
2-5	TwrFan 2	Optional	Tower Fan #2
2-6	VFD Cabinet Fan	Optional	Cooling Fan for Variable Frequency Drive Cabinet
2-7	Spare	X	Not Used - Reserved for Expansion

CVHE-F Typical Point List

Relay Outputs (continued)

#	Output Name	Type	Description
2-8	Spare	X	Not Used - Reserved for Expansion
2-9	Spare	X	Not Used - Reserved for Expansion
2-10	Spare	X	Not Used - Reserved for Expansion
3-1	VentEnbl	Standard / User Logic	Vent Enable - Logic purpose ONLY
3-2	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
3-3	HwBmsR/S	Standard / User Logic	BMS Run/Stop - Logic purpose ONLY
3-4	NtBmsR/S	Standard / User Logic	Virtual Network Point for BMS Run/Stop - Logic purpose ONLY
3-5	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
3-6	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
3-7	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
3-8	d/aHWRst	Standard / User Logic	Disallow Hardwired Reset - Logic purpose ONLY
3-9	d/aNetRst	Standard / User Logic	Disallow Network Reset - Logic purpose ONLY
3-10	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY

Sensor Inputs

#	Input Name	Type	Description
M-1	ChilWtrIn	Standard / MCST100	Chilled Water In Temperature
M-2	ChilWtrOut	Standard / MCST100	Chilled Water Leaving Temperature
M-3	Evap Psi	Standard / MCS-150AC	Evaporator Pressure
M-4	Cnd Psi	Standard / MCS-150AC	Condenser Pressure
M-5	HiOilPsi	Standard / MCS-150AC	High Oil Pressure
M-6	LoOilPsi	Standard / MCS-150AC	Low Oil Pressure
M-7	Suct Temp	Standard / MCS-T100	Suction Temperature
M-8	DiscTmp	Standard / MCS-T100	Discharge Temperature
M-9	OilFeedTmp	Optional/MCS-T100-CVHA ONLY	Oil Feed Temperature
M-10	OilRetnTmp	Optional/MCS-T100-CVHA ONLY	Oil Return Temperature
M-11	OilSumpTmp	Standard / MCS-T100	Oil Sump Temperature
M-12	Vane%	Optional / User Defined	Vane Potentiometer
M-13	VaneClosed	Optional / Digital	Vane Closed: relay output used to close the compressor guide vane.
M-14	PhaseLoss	Optional / Digital	Phase Loss: Phase imbalance

CVHE-F Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
M-15	Run/Stop	Standard / Digital. Open=Off	Run/Stop Hand Switch
M-16	Emg/Stop	Standard / Digital. Closed=Off	Emergency Stop Switch
1-1	CndRefTmp	Standard / MCS-T100	Condenser Refrigerant Temperature
1-2	EvapRefTmp	Standard / MCS-T100	Evaporator Refrigerant Temperature
1-3	CmpAmpsA	Optional / CT300/500/750	Compressor Amps Phase A
1-4	CmpAmpsB	Optional / CT300/500/750	Compressor Amps Phase B
1-5	CmpAmpsC	Optional / CT300/500/750	Compressor Amps Phase C
1-6	Volts A	Optional / 600VAC4	Volts Phase A
1-7	Volts B	Optional / 600VAC4	Volts Phase B
1-8	Volts C	Optional / 600VAC4	Volts Phase C
1-9	HiPsiSW	Standard / Digital	Mechanical Hi Pressure Safety
1-10	MtrTmp1	Standard / User Defined	Compressor Motor Temperature Leg #1
1-11	MtrTmp2	Standard / User Defined	Compressor Motor Temperature Leg #2
1-12	MtrTmp3	Standard / User Defined	Compressor Motor Temperature Leg #3
1-13	FrtBrngTmp	Standard / MCST100	Front Bearing Temperature
1-14	RerBrngTmp	Standard / MCS-T100	Rear Bearing Temperature
1-15	TransOK	Optional / Digital	Transition Starter OK
1-16	PurgModeSW	Optional / Mode Select Switch	Purge Mode Selector Switch
2-1	PurgSucTmp	Optional / MCS-T100	Purge Suction Temperature
2-2	PurgLiqTmp	Optional / MCS-T100	Purge Liquid Temperature
2-3	PurgSafety	Optional / Digital	Purge Safety
2-4	Spare	X	Not Used - Reserved for Expansion
2-5	VfdCabTemp	Optional / MCS-T100	Vfd Cabinet Temperature
2-6	Ambient	Optional / MCS-T100	Ambient Temperature
2-7	ChlWtrFlow	Optional / Digital	Proof for Chilled Water Flow
2-8	CndWtrFlow	Optional / Digital	Verifies that the condenser water pump is running
2-9	Spare	X	Not Used - Reserved for Expansion
2-10	CndWtrIn	Standard / MCS-T100	Condenser Water In Temperature

CVHE-F Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
2-11	CndWtrOut	Standard / MCS-T100	Condenser Water Leaving Temperature
2-12	Spare	X	Not Used - Reserved for Expansion
2-13	HwBmsDmd	Demand %	Hardwired Point for Demand %
2-14	HwBmsChwr	TRGTRST	Hardwired BMS Chilled Water Reset: Reset target temperature
2-15	Spare	X	Not Used - Reserved for Expansion
2-16	Spare	X	Not Used - Reserved for Expansion
3-1	Vfd Fault	Optional / Digital or Modbus	Vfd Fault
3-2	Vfd Hertz	Optional / User Defined or Modbus	Vfd Hertz
3-3	Vfd Kw	Optional / Kw or Modbus	Vfd Kilowatts
3-4	ChlWtrPmpFlt	Optional / Digital	Chilled Water Pump Fault
3-5	CndWtrPmpFlt	Optional / Digital	Condenser Water Pump Fault
3-6	Spare	X	Not Used - Reserved for Expansion
3-7	Spare	X	Not Used - Reserved for Expansion
3-8	Spare	X	Not Used - Reserved for Expansion
3-9	Spare	X	Not Used - Reserved for Expansion
3-10	Unit Amps	Standard / User Logic	Unit Amps
3-11	HiOilTmp	Standard / User Logic	High Oil Temperature
3-12	UnitInL/O	Standard / User Logic	Tests for Unit in Lock Out
3-13	CtlRun/Stop	Standard / User Logic	Control Run/Stop
3-14	Spare	X	Not Used - Reserved for Expansion
3-15	Spare	X	Not Used - Reserved for Expansion
3-16	Spare	X	Not Used - Reserved for Expansion
4-1	ChwFlow	Standard / User Logic	Chilled Water Flow
4-2	CdwFlow	Standard / User Logic	Condenser Water Flow
4-3	ChwGPM	Standard / User Logic	Chilled Water Gallons Per Minute
4-4	CdwGPM	Standard / User Logic	Condenser Water Gallons Per Minute
4-5	NetBmsRun	Standard / BMS-SI	Hardwired BMS RUN/STOP
4-6	NetBmsDmd	Standard / BMS-SI	Hardwired Point for Demand %

CVHE-F Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
4-7	NetBmsChwr	Standard / BMS-SI	Hardwired BMS chilled water reset: Reset target temperature
4-8	Fla%	Standard / User Logic	Full Load Amp % Calculation
4-9	Lift	Standard / User Logic	Lift Calculation
4-10	ChwAppr	Standard / User Logic	Condenser Water Approach: difference between saturated discharge temperature minus the condenser leaving water
4-11	ChwDiffTmp	Standard / User Logic	Condenser Differential Temperature: difference between leaving/entering temperature
4-12	CdwAppr	Standard / User Logic	Condenser Water Approach: difference between saturated discharge temperature minus the condenser leaving water
4-13	CdwDiffTmp	Standard / User Logic	Condenser Differential Temperature: difference between leaving/entering temperature
4-14	DisTpSrgOv	Standard / User Logic	Discharge Temperature Surge Override
4-15	Subcooling	Standard / User Logic	Subcooling Calculation
4-16	SuctSuperH	Standard / User Logic	Suction Super Heat
5-1	HiBrngTmp	Standard / User Logic	Hi Bearing Temperature - Logic purpose ONLY
5-2	MtrTmp1&2	Standard / User Logic	Motor Temperature Compressors 1&2 - Logic purpose ONLY
5-3	HiMtrTmp	Standard / User Logic	Hi Motor Temperature - Logic purpose ONLY
5-4	UnitTons	Standard / TONS	Unit Tons - Logic purpose ONLY
5-5	UnitKW	Standard / KW	Unit Kilowatts - Logic purpose ONLY
5-6	Kw/Tons	Standard / User Logic	Unit Kilowatts/Tons Calculation - Logic purpose ONLY
5-7	PwrFactor	Standard / User Logic	Power Factor Calculation - Logic purpose ONLY
5-8	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-9	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-10	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-11	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-12	Ctl Flow	Standard / User Logic	Control Flow - Tests both Condenser and Chilled Water Flow - Logic purpose ONLY
5-13	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-14	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-15	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
5-16	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY

CVHE-F Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
6-1	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-2	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-3	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-4	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-5	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-6	HwBmsDmd	Standard / User Logic	Hardwired Point for Demand % - Logic purpose ONLY
6-7	HwBmsRset	Standard / User Logic	Hardwired Point for Target Reset - Logic purpose ONLY
6-8	NtBmsDmd	Standard / User Logic	Virtual Network Point for Demand % - Logic purpose ONLY
6-9	NtBmsRset	Standard / User Logic	Virtual Network Point for Target Reset - Logic purpose ONLY
6-10	Bms R/S	Standard / User Logic	Virtual Network Point for Run/Stop - Logic purpose ONLY
6-11	BmsDemand	Standard / User Logic	Virtual Network Point for Demand % - Logic purpose ONLY
6-12	BmsReset	Standard / User Logic	Virtual Network Point for Target Reset - Logic purpose ONLY
6-13	d/aHwRst	Standard / User Logic	Disable Hardwired Reset - Logic purpose ONLY
6-14	d/aNetRst	Standard / User Logic	Disable Network Reset - Logic purpose ONLY
6-15	Spare	X	Not Used - Reserved for Expansion - Logic purpose ONLY
6-16	Allow Unit	Standard / User Logic	Run/stop indicator for graphic display - Logic purpose ONLY

Analog Outputs

#	Input Name	Type	Description
M-1	Comp Spd%	Optional	Compressor Speed%
M-2	CndWtrValve%	Optional	Condenser Water Valve%
M-3	CndFanSpd%	Optional	Condenser Fan Speed%
M-4	CndPmpSpd%	Optional	Condenser Pump Speed%

1-1	ChIWtrSpd%	Optional	Chilled Water Pump Speed%
1-2	CndWtrSpd%	Optional	Condenser Water Pump Speed%
1-3	Spare	X	Not Used - Reserved for Expansion
1-4	Spare	X	Not Used - Reserved for Expansion

2-1	Spare	X	Not Used - Reserved for Expansion
2-2	Spare	X	Not Used - Reserved for Expansion
2-3	Spare	X	Not Used - Reserved for Expansion
2-4	Spare	X	Not Used - Reserved for Expansion

CVHE-F Information

Company: _____ Phone: _____
 Name: _____ Title: _____ Email: _____
 Mobile: _____ Site: _____

Model Number	Serial Number	Refrigerant Used	Full Load Amps of Compressor

1. **Model of existing Trane Panel:**
2. **What is the Starter Type?** **Are we monitoring the Transition OK or Starter Fault?**
 - a. Does the Compressor have a remote starter? Yes No
3. **Is there a Variable Frequency Drive?:** What is the VFD Make and Model? Make: _____ Model: _____
 - a. Will the VFD be hardwired to MCS controls, over MODBUS or both?
 - b. If you are using a VFD other than a Yaskawa VFD, do you need MCS to control the VFD Enclosure Temperature and Fans? Yes No
4. **What is the Purge type on the unit, how is it controlled?**
5. **What protocol will be used for Building Management communication?**
6. **Will Phase loss need to be monitored?** Yes No
7. **Is Hot Gas Bypass present?** Yes No **How does it operate?**
8. **Is MCS controlling the Chilled Water Pump(s)?** Yes No **How will they be wired?**
9. **Is MCS controlling the Condenser Water Pump(s)?** Yes No **How will they be wired?**
10. **Is MCS controlling Condenser/Evaporator Isolation Valve?** Yes No BMS
11. **Is MCS controlling these fan(s)? How many are there, how are they wired?**
12. **What Main Voltage is being supplied to the unit?** Voltage: _____ Is MCS monitoring Main Voltage? Yes No
13. **What is the Control Voltage being supplied?** Voltage: _____
14. **What is the 'RUN LOAD AMPS' (FLA)** **COMP 1:** **COMP 2:**
15. **Will the Chilled/Condenser Water Flow be measured by Flow switch or GPM?**
16. **Will Ambient Temperature need to be monitored?** Yes No

CVHA ONLY:

17. **Is there a Motor Cooler?** Yes No **Will MCS be monitoring the Oil Feed?** Yes No **Return Temperature?** Yes No

COMMENTS (is there any other information we should know?):



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