



*MCS Total
Solutions for all your
Control Needs*

MCS-CENTRIFUGAL-12
Industrial Control Panel



19D SERIES CONTROLS-12 Upgrade with Optional VFD Control

This brochure describes a standard upgrade package for the 19D series chillers. 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 brief questionnaire in the back of this brochure and forward to your sales representative for an estimate.



19D Series Control Enclosure Upgrade



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 and 24vdc
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.
With the expansion boards you have a total of:

- 60 Sensor Inputs
- 30 Relay Outputs
- 16 Analog Outputs

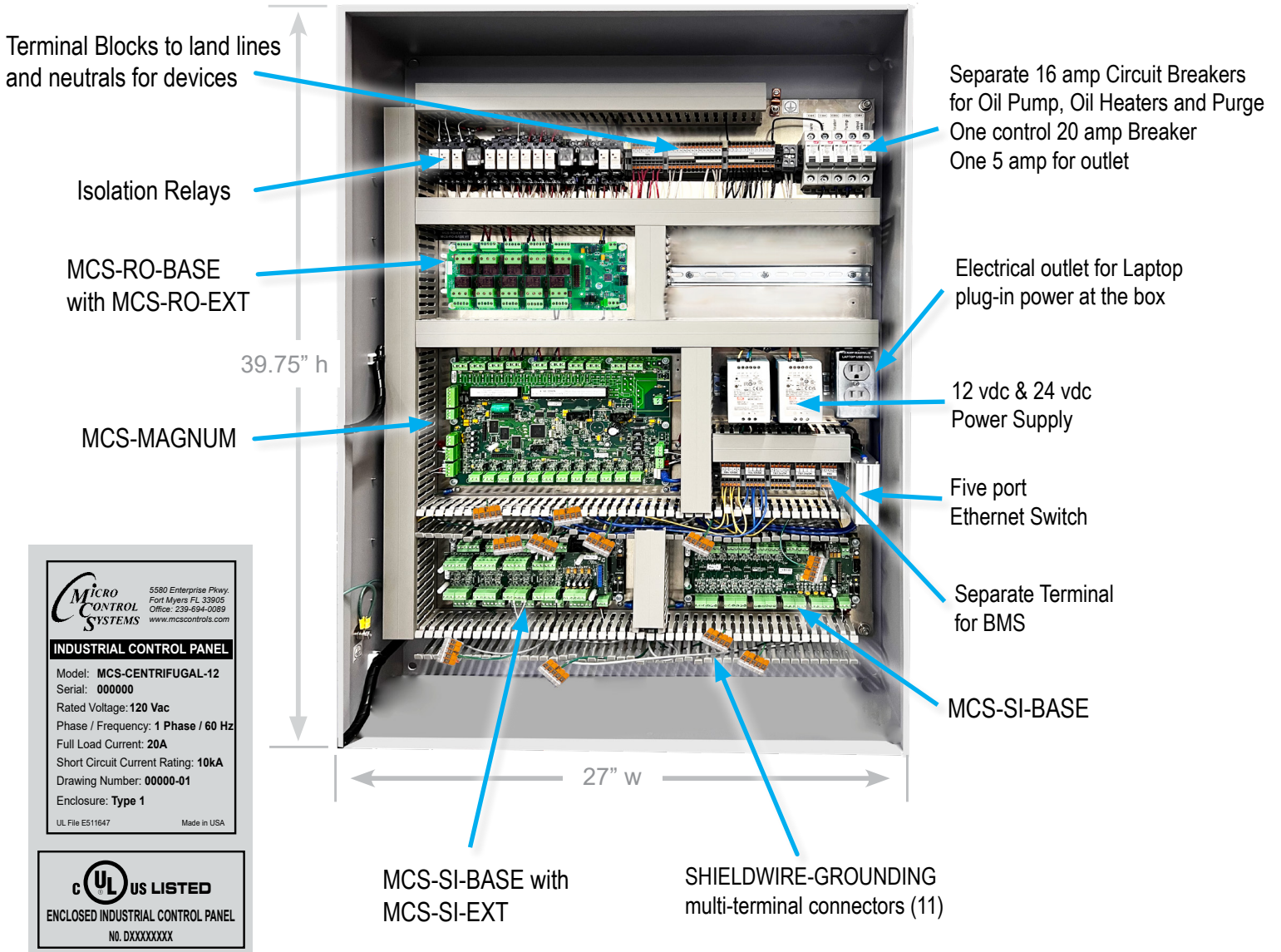
Standard configuration includes: Isolation relays, BMS Network connectivity, (Field selectable hardware or network BMS), and BMS terminal block for chiller relay.

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-12 INDUSTRIAL CONTROL PANEL

NEMA Rating Type 1- P20 Rating



5580 Enterprise Pkwy.
Fort Myers FL 33905
Office: 239-694-0989
www.mcscontrols.com

INDUSTRIAL CONTROL PANEL

Model: MCS-CENTRIFUGAL-12
Serial: 000000
Rated Voltage: 120 Vac
Phase / Frequency: 1 Phase / 60 Hz
Full Load Current: 20A
Short Circuit Current Rating: 10kA
Drawing Number: 00000-01
Enclosure: Type 1

UL File E511647 Made in USA



ENCLOSED INDUSTRIAL CONTROL PANEL
NO. DXXXXXXX

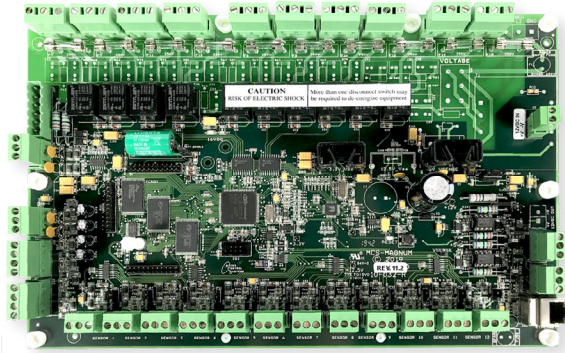
UL 508A Certified Industrial Control Panel

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.

19D Series 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.

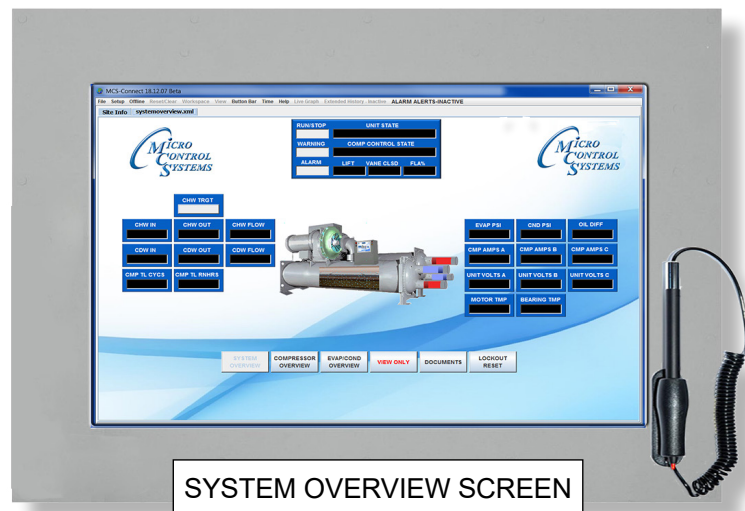
The Magnum provides flexibility with set points and control options that can be selected prior to commissioning a system or when the unit is live and functioning. The TouchScreen and MCS-CONNECT provide a clear and simple language that informs the user as to the status of the controller.

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.

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



- 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

19D Series 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 build by MCS for your controllers. See below some customized screens.

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.

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.

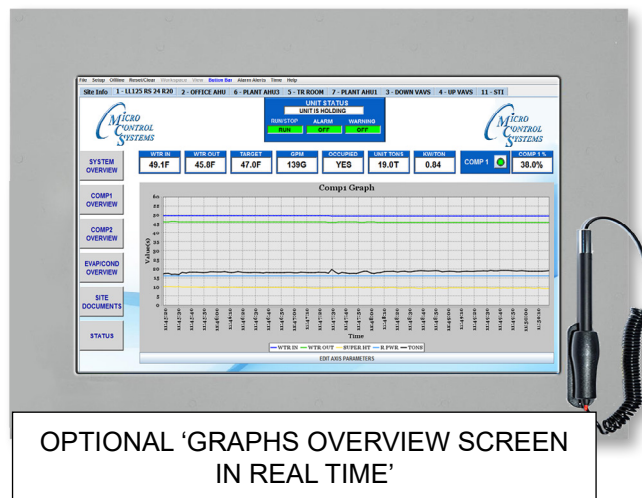
1. DRAWINGS (PDF'S) of the components used in this unit
2. MANUALS (if installed in your unit)
 - a. Getting Started Manual
 - b. Keypad Manual
 - c. Touchscreen Manual
 - d. MCS-CONNECT Manual
 - e. EXV Manual
 - f. BMS-GATEWAY Startup Guide



COMPRESSOR OVERVIEW SCREEN



EVAP/COND OVERVIEW SCREEN



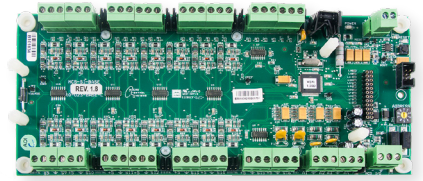
OPTIONAL 'GRAPHS OVERVIEW SCREEN
IN REAL TIME'

19D Series 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.

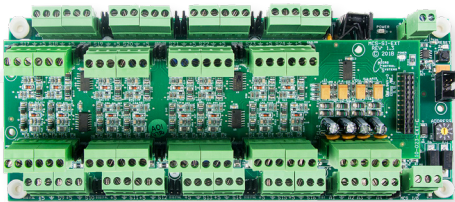


MCS-SI-EXT

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.

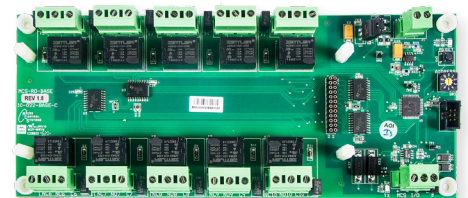


MCS-SI-EXT mounted to
MCS-SI-BASE

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.

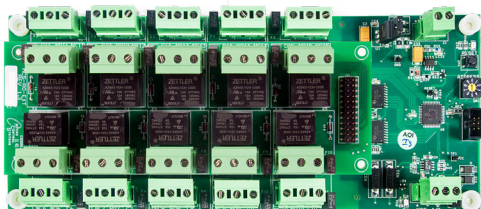


MCS-RO-EXT

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

19D Series 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-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.



19D Series Typical Components

MCS-CT500



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-CARRIER 5K-ADAPTER

The 19D series chiller comes equipped with embedded 5K thermistors in the motor. There are two (2) thermistors factory installed in each compressor. There are three (3) terminals for the thermistors. (S1, S2 & C) Motor temperature is measured by leads connected to one of the S terminals and the C terminal.

The thermistors are not field serviceable. If both motor thermistors fail the compressor needs to be replaced.

In order to monitor the motor on the 19D series a cable is installed on the C and S1 terminals of the Carrier's thermistor and then wired along with the MCS-CARRIER 5K-ADAPTER to a sensor input on the MCS-MAGNUM, MCS-SI-BASE or MCS-SI-EXT board. This allows the MAGNUM to monitor the temperature of the 19D series motors for proper operation.

A wiring diagram and instructions are included with the MCS-CARRIER 5K-ADAPTER.



19D Series Typical Options

CENTRIFUGAL VFD OPTION

MCS-MODBUS I/O is added for communication to the Variable Frequency Drive.

A second MCS-MODBUS I/O can be added for communicating to another slave device including the MCS-POWERMETER.

BMS GATEWAY

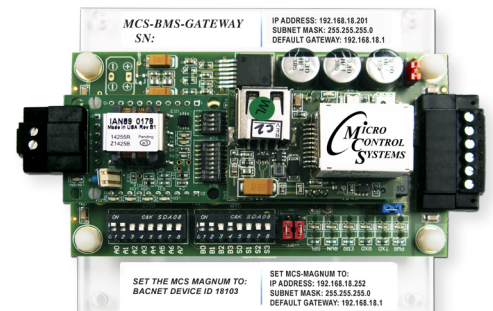
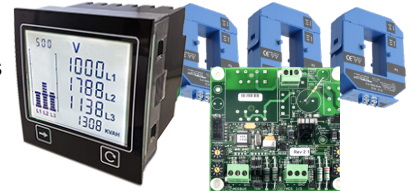
The **MCS-BMS-GATEWAY** is a microprocessor based communication device that provides translation from Bacnet IP, Bacnet MSTP, Modbus IP, Lontalk, or Johnson N2 communication interface. Information that can be transmitted includes the status of control points, alarm information, digital inputs, analog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

The MCS-BMS-GATEWAY protocol is field selectable by setting jumper on the device. Using **MCS-CONFIG** and the CONFIG files for the MCS-MAGNUM, you can automatically create the CSV files that is required by the MCS-BMS-GATEWAY.

MCS-POWERMETER-B-MODBUS

Monitors the voltage, current, power, energy, and many other electrical parameters on single and three-phase electrical systems.

Kit Components Include:
3 rope Current Transformers
MCS-MODBUS-I/O



19D Series Typical Point List

Relay Outputs

#	Output Name	Type	Description
M-1	CompM	Standard	Compressor Start Main
M-2	CompD	Standard	Compressor Start Delta
M-3	OpenVane	Standard	Vane open: relay output used to open the compressor guide vane.
M-4	CloseVane	Standard	Vane closed: relay output used to close the compressor guide vane.
M-5	OilPump	Standard	Oil pump: Turn ON or OFF
M-6	OilHtr	Standard	Oil heater: Turn ON or OFF
M-7	Spare	X	Not Used - Reserved for Expansion
M-8	OilCooler	User Logic	Oil cooler: Turn ON or OFF
M-9	Spare	X	Not Used - Reserved for Expansion
M-10	PurgeEnbl	Standard	Purge enable: this relay will be turned ON when the compressor turns on allowing the purge to run

1-1	Spare	X	Not Used - Reserved for Expansion
1-2	Warning	Standard	Warning Light: unit is in a safety condition prior to a safety shutdown.
1-3	Alarm	Standard	Alarm Light: unit is in a safety shutdown
1-4	RunStatus	User Logic	Hardwired or BMS point to notify BMS that the unit is running
1-5	Spare	X	Not Used - Reserved for Expansion
1-6	Spare	X	Not Used - Reserved for Expansion
1-7	Spare	X	Not Used - Reserved for Expansion
1-8	Spare	X	Not Used - Reserved for Expansion
1-9	Spare	X	Not Used - Reserved for Expansion
1-10	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
2-5	Spare	X	Not Used - Reserved for Expansion
2-6	Spare	X	Not Used - Reserved for Expansion
2-7	Spare	X	Not Used - Reserved for Expansion
2-8	Spare	X	Not Used - Reserved for Expansion

19D Series Typical Point List

Relay Outputs (continued)

#	Output Name	Type	Description
2-9	Spare	X	Not Used - Reserved for Expansion
2-10	Spare	X	Not Used - Reserved for Expansion
3-1	Spare	X	Not Used - Reserved for Expansion
3-2	Spare	X	Not Used - Reserved for Expansion
3-3	HwBmsR/S	User Logic	Hardwired BMS Run/Stop
3-4	NtBmsR/S	User Logic	Virtual Network Point for BMS Run/Stop
3-5	Spare	X	Not Used - Reserved for Expansion
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	Spare	X	Not Used - Reserved for Expansion

Sensor Inputs

#	Input Name	Type	Description
M-1	ChilWtrIn	MCST100	Chilled Water In Temperature
M-2	ChilWtrOut	MCST100	Chilled Water Leaving Temperature
M-3	Evap Psi	MCS-150AC	Evaporator Pressure
M-4	Cnd Psi	MCS-150AC	Condensor Pressure
M-5	HiOilPsi	MCS-150AC	Hi Oil Pressure
M-6	LoOilPsi	MCS-150AC	Lo Oil Pressure
M-7	Spare	X	Not Used - Reserved for Expansion
M-8	DiscTmp	MCST100	Discharge Temperature
M-9	OilFeedTmp	MCST100	Oil Supply Temperature
M-10	OilRtnTmp	MCST100	Oil Return Temperature
M-11	OilSumpTmp	MCST100	Oil Sump Temperature
M-12	Spare	X	Not Used - Reserved for Expansion
M-13	VaneClosed	Digital	Vane closed: relay output used to close the compressor guide vane.
M-14	Spare	X	Not Used - Reserved for Expansion

19D Series Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
M-15	Run/Stop	Digital. Open=Off	Run/Stop Hand Switch
M-16	Emg/Stop	Digital. Closed=Off	Emergency Stop Switch
1-1	CndRefTmp	MCST100	Condenser Refrigerant Temperature
1-2	EvapRefTmp	MCST100	Evaporator Refrigerant Temperature
1-3	Spare	X	Not Used - Reserved for Expansion
1-4	Spare	X	Not Used - Reserved for Expansion
1-5	Spare	X	Not Used - Reserved for Expansion
1-6	ImpDispSW	Digital	Impeller Displacement Switch
1-7	Spare	X	Not Used - Reserved for Expansion
1-8	Spare	X	Not Used - Reserved for Expansion
1-9	HiPsiSW	Digital	Mechanical Hi Pressure Safety
1-10	MtrTmp	CARR-5K	Motor Temperature
1-11	Spare	X	Not Used - Reserved for Expansion
1-12	Spare	X	Not Used - Reserved for Expansion
1-13	ThrustBrTp	CARR-5K	Thrust Bearing Temperature
1-14	Spare	X	Not Used - Reserved for Expansion
1-15	Spare	X	Not Used - Reserved for Expansion
1-16	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
2-5	Spare	X	Not Used - Reserved for Expansion
2-6	Spare	X	Not Used - Reserved for Expansion
2-7	ChIWtrFlow	Digital	Proof for Chilled Water Flow
2-8	CndWtrFlow	Digital	Proof for Condenser Water Flow
2-9	Spare	X	Not Used - Reserved for Expansion
2-10	CndWtrIn	MCST100	Condenser Water In Temperature
2-11	CndWtrOut	MCST100	Condenser Water Leaving Temperature

19D Series Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
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	Spare	X	Not Used - Reserved for Expansion
3-2	Spare	X	Not Used - Reserved for Expansion
3-3	Spare	X	Not Used - Reserved for Expansion
3-4	Spare	X	Not Used - Reserved for Expansion
3-5	CmpAmpsA	CT-500	Reads Amp Draw on Leg 1
3-6	CmpAmpsB	CT-500	Reads Amp Draw on Leg 2
3-7	CmpAmpsC	CT-500	Reads Amp Draw on Leg 3
3-8	UnitVoltsA	600VAC4	Volts Phase A
3-9	UnitVoltsB	600VAC4	Volts Phase B
3-10	UnitVoltsC	600VAC4	Volts Phase C
3-11	HiOilTmp	User Logic	Hi Oil Temperature
3-12	UnitInL/O	User Logic	Tests for Unit in Lock Out
3-13	CtlRun/Stop	User Logic	Control Run/Stop
3-14	Trans OK	Digital	Transition Starter OK
3-15	PhaseLoss	Digital	Phase Loss: Phase Imbalance
3-16	Spare	X	Not Used - Reserved for Expansion
4-1	Spare	X	Not Used - Reserved for Expansion
4-2	Spare	X	Not Used - Reserved for Expansion
4-3	ChwGPM	User Logic	Chilled Water Gallons Per Minute
4-4	Spare	X	Not Used - Reserved for Expansion
4-5	NetBmsRun	BMS-SI	Hardwired BMS RUN/STOP
4-6	NetBmsDmd	BMS-SI	Hardwired Point for Demand %
4-7	NetBmsChwr	BMS-SI	Hardwired BMS chilled water reset: Reset target temperature
4-8	Fla%	User Logic	Full Load Amp % Calculation

19D Series Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
4-9	LIFT	User Logic	Lift Calculation
4-10	ChwApproach	User Logic	Condenser water approach: difference between saturated discharge temperature minus the condenser leaving water
4-11	ChwDiffTmp	User Logic	Condenser differential temperature: difference between leaving/entering temperature
4-12	CdwApproach	User Logic	Condenser water approach: difference between saturated discharge temperature minus the condenser leaving water
4-13	CdwDiffTmp	User Logic	Condenser differential temperature: difference between leaving/entering temperature
4-14	Spare	X	Not Used - Reserved for Expansion
4-15	Subcooling	User Logic	Subcooling Calculation
4-16	FLA Divisr	User Logic	Full Load Amp Divisor

5-1	Spare	X	Not Used - Reserved for Expansion
5-2	Spare	X	Not Used - Reserved for Expansion
5-3	Spare	X	Not Used - Reserved for Expansion
5-4	UnitTons	TONS	Unit Tons
5-5	UnitKW	KW	Unit KW
5-6	Kw/Tons	User Logic	Unit KW/Tons Calculation
5-7	PwrFactor	User Logic	Power Factor Calculation
5-8	Spare	X	Not Used - Reserved for Expansion
5-9	Spare	X	Not Used - Reserved for Expansion
5-10	Spare	X	Not Used - Reserved for Expansion
5-11	Spare	X	Not Used - Reserved for Expansion
5-12	Ctl Flow	User Logic	Control Flow - Tests both Condenser and Chilled Water Flow
5-13	Spare	X	Not Used - Reserved for Expansion
5-14	Spare	X	Not Used - Reserved for Expansion
5-15	Spare	X	Not Used - Reserved for Expansion
5-16	Spare	X	Not Used - Reserved for Expansion

6-1	Spare	X	Not Used - Reserved for Expansion
6-2	Spare	X	Not Used - Reserved for Expansion

19D Series Typical Point List

Sensor Inputs (continued)

6-3	Spare	X	Not Used - Reserved for Expansion
6-4	Spare	X	Not Used - Reserved for Expansion
6-5	Spare	X	Not Used - Reserved for Expansion
6-6	HwBmsDmd	User Logic	Hardwired Point for Demand %
6-7	HwBmsRset	User Logic	Hardwired Point for Target Reset
6-8	NtBmsDmd	User Logic	Virtual Network Point for Demand %
6-9	NtBmsRset	User Logic	Virtual Network Point for target reset
6-10	Bms R/S	User Logic	Virtual Network Point for Run/Stop
6-11	BmsDmd	User Logic	Virtual Network Point for Demand %
6-12	BmsRset	User Logic	Virtual Network Point for target reset
6-13	d/aHwRst	User Logic	Disable Hardwired Reset
6-14	d/aNetRst	User Logic	Disable Network Reset
6-15	Spare	X	Not Used - Reserved for Expansion
6-16	Allow Unit	User Logic	Run/stop indicator for graphic display

19D Series Information

FILL OUT THIS FORM - SAVE TO YOUR DESKTOP AND EMAIL TO SALES@MCSCONTROLS.COM

Company: _____ Phone: _____

Name: _____ Title: _____ Email: _____

Mobile: _____ Site: _____

Model Number	Serial Number	Refrigerant Used	Full Load Amps of Compressor

1. **Model of existing 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. **If there is a Purge on the unit, how is it controlled?**

5. **What protocol will be used for Building Management communication?**

6. **For the Vane Actuator, is there a Digital Switch or a Potentiometer?**

7. **If there is a Potentiometer, what is the Actuator Model?** Model: _____

8. **Will Phase loss need to be monitored?** Yes No **How would you like the pressures to be displayed?**

9. **What kind of Hot Gas Bypass is present?**

10. **Is MCS controlling the Chilled Water Pump(s)?** Yes No **How will they be wired?**

11. **How will the Condenser Water Pump be wired?**

12. **Is the Oil Pump cycled?** Yes No

13. **Are there Tower Fan(s)** Yes No **Is MCS controlling these fan(s)? How many are there, how are they wired?**

14. **What Main Voltage is being supplied to the unit?** Voltage: _____ Is MCS monitoring Main Voltage? Yes No

15. **What is the Control Voltage being supplied?** Voltage: _____

16. **What is the 'RUN LOAD AMPS' (FLA)** **COMP 1:** _____ **COMP 2:** _____

17. **Will the Chilled/Condenser Water Flow be measured by Flow or Differential?**

18. **Will Ambient Temperature need to be monitored?** Yes No

19. **Will MCS be Monitoring the Oil Feed Temperature?** Yes No

20. **Will MCS be Monitoring the Oil Return Temperature?** Yes No

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

Visit <https://www.mcscontrols.com/brochures.html> for a fillable form to email to sales@mcscontrols.com



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