MICRO CONTROL SYSTEMS

MCS Total Solutions for all your HVAC/R Control Needs

19XR CONTROLS UPGRADE with Optional VFD control

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

Revision - 2018-05-15

19XR Control Enclosure Upgrade

19XR Chiller before upgrade
old Carrier controls

19XR Chiller Upgraded to
MCS-CONTROLS

Large Box - NEMA rating—Type 1

27”w x 34.75”h x 8.0”d

MCS-MAGNUM-N

Operating Temperature - 4°F to 158°F (-20°C to 70°C)
Operating Humidity - 0-95% Non-Condensing
Digital Inputs - 4 inputs 0 or 5vdc only
Relay Outputs - 10 outputs 6.3amps @ 230vac
Analog Outputs - 4 outputs 0-10vdc
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

Touch Screen 15.4

Dimensions - 17”L x 12.11”W x 3.228”H
Gasket Material - HT-800 Medium Cellular Silicone - NEMA 4
LCD Screen - 15.4” (16:10 Diagonal), 16.2 Million Colors, 1280x800 Resolution

The Control Enclosure comes standard equipped with a MCS-MAGNUM-N controller board, 15.4” Touch Screen, two 15 amp, and one 20 amp circuit breaker. There is also a GFCI electrical outlet for laptop plug-in power at the box.

The MCS-CENTRIFUGAL has the following expansion boards installed: Three (3) MCS-SI16-AO4, and two (2) MCS-RO10.

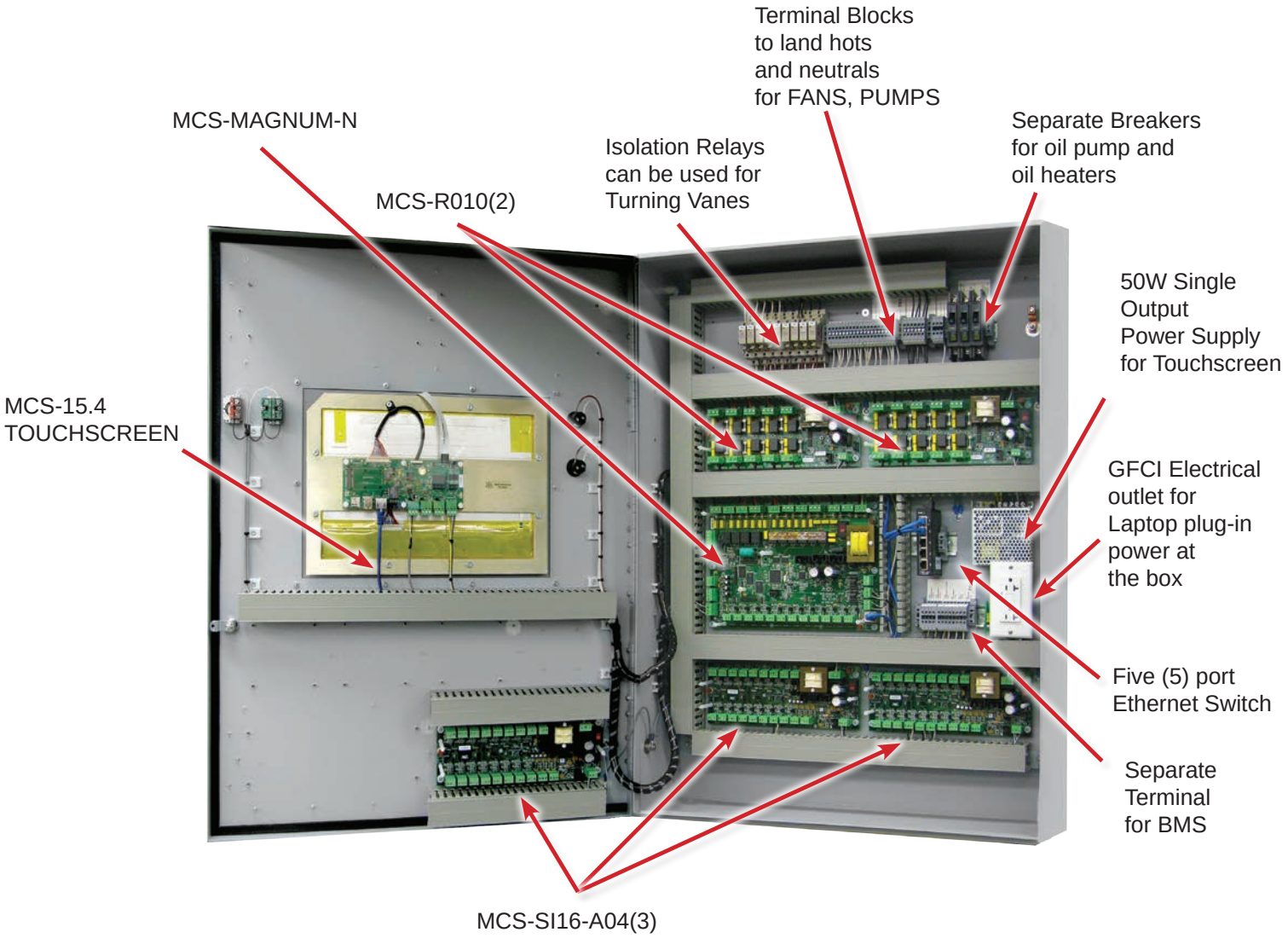
With the expansion boards you have a total of:
- 64 Sensor Inputs
- 30 Relay Outputs and
- 16 Analog Outputs

Standard configuration includes: isolation relays, BMS Network connectivity, (Field selectable hardware or network BMS), and BMS Terminal block for chiller relay. This box is intended for use in an environment protected from the weather.

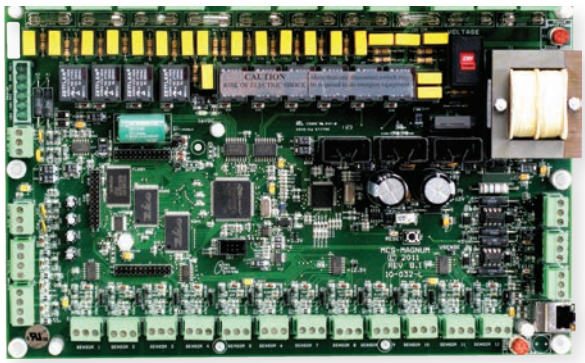
The following warning lights and switches are included in the standard enclosure; MB-Alarm, MB-Warning, MB-Emer-SW, Hand/Off/Auto Switch and Ethernet Switch.

For additional information on this new product or if you need information on any of our products, Email: sales@mcscontrols.com

19XR Typical Components



MCS-MAGNUM-N



The **MCS-MAGNUM-N** 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.

19XR Typical Components

15.4 TOUCHSCREEN

The **MCS-TOUCH-15.4** is a high resolution interface designed to simplify user access with the MCS-MAGNUM utilizing MCS-Connect to provide both graphics and service mode access to technicians. Information and graphics on the MCS-TOUCH-15.4 are shown on a 1280 x 800 LCD display with LED backlighting, which will guarantee long-life operation.

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

19XR Typical Components

Graphics For Touchscreens

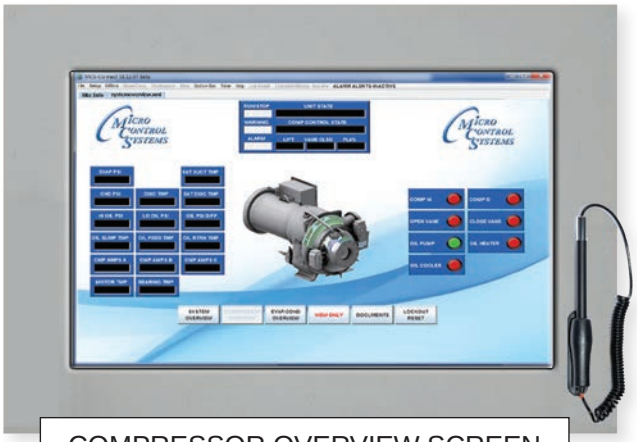
With the new Graphical Interface and MCS-CONNECT, you now have a better view of your controller's many functions as shown on the screens.

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.

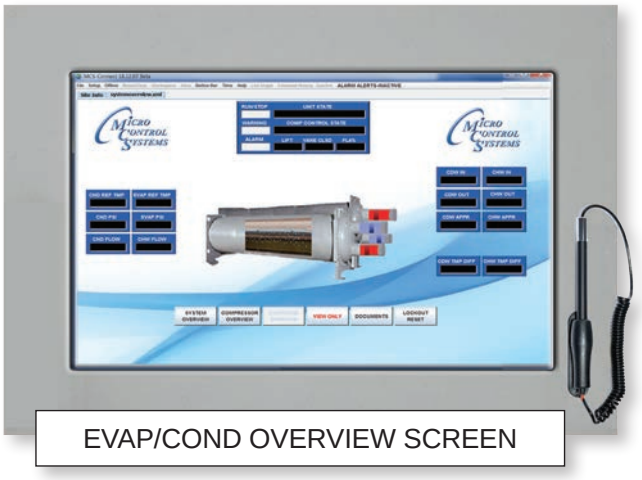


COMPRESSOR OVERVIEW SCREEN

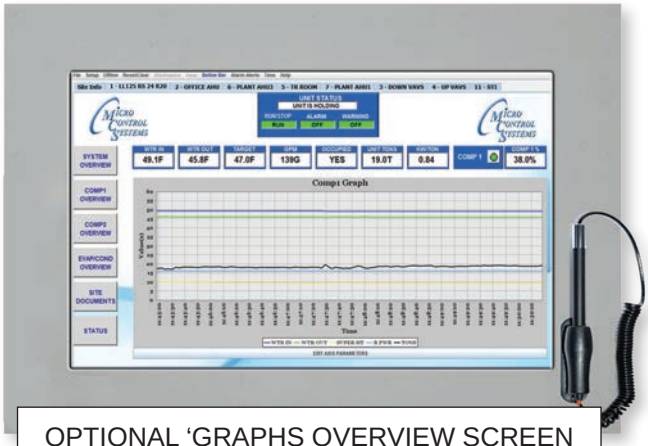
Documents, Spec Sheets, Drawings, etc.

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



EVAP/COND OVERVIEW SCREEN

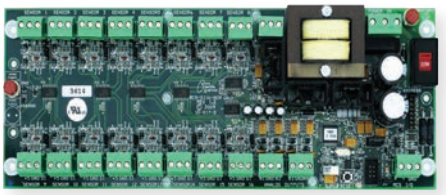


OPTIONAL 'GRAPHS OVERVIEW SCREEN IN REAL TIME'

OPTIONAL CUSTOM GRAPHICS 'GAUGE OVERVIEW SCREEN'

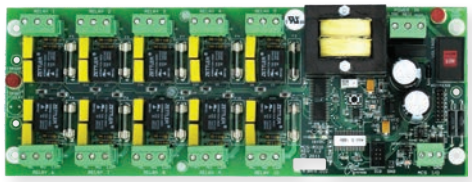
19XR Typical Components

MCS-SI16-AO4



The **MCS-SI16-AO4** provides a flexible and cost effective way to allow sensor input and analog output expansion for **MCS MAGNUM**. Each MCS-SI16-AO4 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-SI16-AO4 may be located up to 5,000 feet away.
Each MCS-SI16-AO4 board is equipped with a dual voltage power transformer and an automatic power fail reset system.

MCS-RO10



The **MCS-RO10** provides a flexible and cost effective way to allow relay output expansion for **MCS-MAGNUM**. Each MCS-RO10 has a stand-alone microprocessor which communicates with a MCS MAGNUM 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-RO10 may be located up to 5,000 feet away.

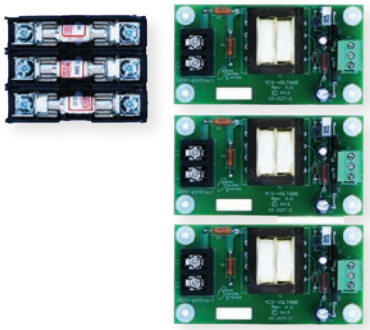
Each MCS-RO10 board is equipped with a dual voltage power transformer and an automatic power fail reset system.

MCS-VOLTAGE-3PH

The **MCS-VOLTAGE-3PH** measures AC voltage between 200-600 AC. It is designed to monitor the voltage of each phase of the main input power to the unit.

The MCS-VOLTAGE-3PH sensor provides three separate DC voltage outputs that correspond to the AC voltage it is measuring.

This sensor allows the **MCS-Magnum** to safely protect the motors on the unit from under voltage, over voltage and voltage imbalance conditions. It also can be used to calculate unit KW (requires amp and power factor sensors).



MCS-PRESSURE TRANSDUCERS

MCS-200C MCS-500C

The **MCS Pressure Transducers** are one of the most economical and durable options on the market for dealing with high-pressure industrial applications.

In addition to being CE and UL approved, MCS transducers are capable of surviving high vibration. They include a cavity built out of solid 17-4 PH stainless steel ¼" SAE Female Flare fitting & Schrader valve; 7/16-20 UNF pipe thread which creates a leak-proof, all metal sealed system that makes the transducers ideal for use with rugged HVAC environments.

19XR Typical Components

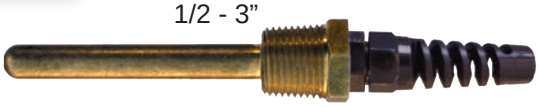
MCS-T-100 Temp Sensor

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 1000' of cable with no noticeable effect. The MCS-T100 sensor has the ability to move from 32ºF to 212ºF in approximately 10 to 15 seconds.

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 19XR series chillers in the chilled water and condenser water lines. It comes pre-filled with heat conductive compound to aid in temperature to the sensor.

1/2 - 3"



1/4- 2.5"

The **MCS-TUBE** can be epoxied to a discharge or suction line on the 19XR 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-USB-RS485

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

When the MCS-USB-RS485 cable is plugged into a laptop or PC, Windows will install a device driver that allows the cable to be used as a standard Window communication port.

MCS-CARRIER 5K-ADAPTER

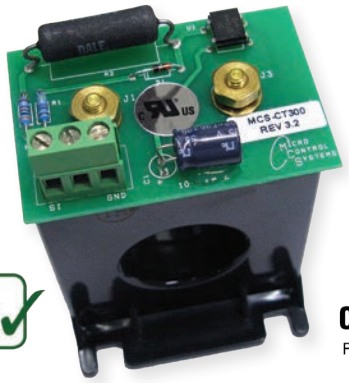
The 19D series chiller comes equipped with embedded 5K thermistors in the motor. There are two (2) thermistors factory installed in each compressor. There are three (3) terminals for the thermistors. (S1, S2 & C) Motor temperature is measured by leads connected to one of the S terminals and the C terminal.

The thermistor's 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 or MCS-SI16-AO4 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.

19XR Typical Components



RoHS Compliant

c UL us
File No: E169780

MCS-CT300

The **MCS-CT300** current sensor monitors current flowing to electrical equipment. The magnitude of the current is converted to a linear 0 to 5vdc output signal 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

19XR 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.

MCS-POWERMETER

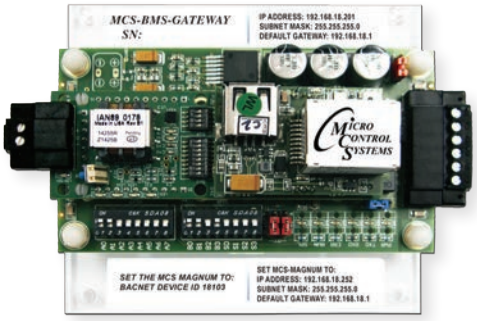
Monitors the voltage, current, power, energy, and many other electrical parameters on single and three-phase electrical systems.
Kit Components Include:
3 rope Current Transformers
MCS-MODBUS-I/O

BMS GATEWAY

The **MCS-BMS-GATEWAY** is a microprocessor based communication device that provides translation from BACnet IP to LonTalk, BACnet MSTP, or Johnson Control N2. 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 file for the MCS-MAGNUM, you can automatically create the program that is required by the MCS-BMS-GATEWAY.

Then using a web browser you can download the program into the unit.



MCS-REMOTE-SI116-AO4

Ease of wiring for remote starter applications.

Provides a flexible and cost effective way to allow remote expansion for the MCS-MAGNUM.

Communication is over a RS-485 long distance two-wire differential network transmission system, allowing the enclosure to be located up to 5000 feet away.

MCS 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	OilHeater	Standard	Oil heater: Turn ON or OFF
M-7	HtrLock	User Logic	Heater Lock (Lock is ON when Compressor is ON)
M-8	Spare	X	Not Used - Reserved for Expansion
M-9	Spare	X	Not Used - Reserved for Expansion
M-10	Spare	X	Not Used - Reserved for Expansion
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	ChwPump	Standard	Chilled Water Pump: Turn ON or OFF
1-9	CondPump	Standard	Condenser Pump: Turn ON or OFF
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	MtrCooling	User Logic	Motor Cooling: Turn ON or OFF
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

MCS Typical Point List

Relay Outputs (contined)

#	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	DisHWRst	User Logic	Disallow Hardwire Reset
3-9	DisNetRst	User Logic	DisNetRst
3-10	HtrILock	User Logic	Heater Lock (Lock is ON when Compressor is ON)

Sensor Inputs

#	Input Name	Type	Description
M-1	ChilWtrIn	MCST100	Chilled Water In Temperature
M-2	ChilWtrOut	MCST100	Chilled Water Leaving Temperature
M-3	Suct Psi	MCS--200	Suction Pressure
M-4	DiscPsi	MCS-500	Discharge Pressure
M-5	OilFeedPsi	MCS-500	Oil Supply Pressure
M-6	OilSumpPsi	CARR-5K	Oil Sump Pressure
M-7	SuctTmp	MCST100	Suction Temperature
M-8	DiscTmp	MCST100	Discharge Temperature
M-9	OilFeedTmp	MCST100	Oil Supply Temperature
M-10	Spare	X	Not Used - Reserved for Expansion
M-11	OilSumpTmp	CARR-5K	Oil Sump Temperature
M-12	Spare	X	Not Used - Reserved for Expansion
M-13	VaneClosed	Digital	Vane Closed Switch: ON or OFF
M-14	PhaseLoss	Digiital	Phase Loss: Phase Imbalance

MCS Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
M-15	Run/Stop	Digital	Run/Stop Hand Switch
M-16	EmgStop	Digital	Emergency Stop Switch
1-1	CndRefTmp	MCST100	Condensor Refrigerant Temperature
1-2	EvapRefTmp	MCST100	Evaporator Refrigerant Temperature
1-3	CmpAmps A	CT-1500	Reads Amp Draw on Leg 1
1-4	CmpAmps B	CT-1500	Reads Amp Draw on Leg 2
1-5	CmpAmps C	CT-1500	Reads Amp Draw on Leg 3
1-6	Volts A	User Defined	Volts Phase A
1-7	Volts B	User Defined	Volts Phase B
1-8	Volts C	User Defined	Volts Phase C
1-9	HiPsiSW	Digital	Mechanical Hi Pressure Safety
1-10	MotorTmp	CARR-5K	Motor Temperature
1-11	Spare	X	Not Used - Reserved for Expansion
1-12	Spare	X	Not Used - Reserved for Expansion
1-13	BearingTmp	CARR-5K	Bearing Temperature
1-14	Spare	X	Not Used - Reserved for Expansion
1-15	TransOK	Digital	Transition Starter OK
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	ChwFlowSW	Digital	Proof for Chilled Water Flow
2-8	CdwFlowSW	Digital	Proof for Condenser Water Flow
2-9	OilDiffSW	Digital	Oil pressure differential
2-10	CndWtrIn	MCST100	Condenser Water Incoming Temperature
2-11	CndWtrOut	MCST100	Condenser Water Leaving Temperature

MCS 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	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
3-11	Spare	X	Not Used - Reserved for Expansion
3-12	UnitInL/O	User Logic	Tests for Unit in Lock Out
3-13	CtlRun/Stop	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	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. Fixed value or true hardwired input.
4-4	Spare	X	Not Used - Reserved for Expansion
4-5	NetBmsRun	BMS-SI	Virtual Network Point for Run/Stop
4-6	NetBmsDmd	BMS-SI	Virtual Network Point for Demand %
4-7	NetBmsCwr	BMS-SI	Virtual Network Point for Chilled Water Reset: Reset Target Temp
4-8	Fla%	User Logic	Full Load Amp %

MCS Typical Point List

Sensor Inputs (continued)

#	Input Name	Type	Description
4-9	Lift	User Logic	Lift Calculation
4-10	ChwAppr	User Logic	Condenser Water Approach: Difference between saturated discharge temperature minus the condenser leaving water temperature
4-11	ChwDiffTmp	User Logic	Chilled Water Temperature Differential: Difference between entering/leaving temperature
4-12	CdwAppr	User Logic	Condenser Water Approach: Difference between saturated discharge temperature minus the condenser leaving water temperature
4-13	CdwDiffTmp	User Logic	Chilled Water Temperature Differential: Difference between entering/leaving temperature
4-14	Spare	X	Not Used - Reserved for Expansion
4-15	Subcooling	User Logic	Subcooling Calculation
4-16	Spare	X	Not Used - Reserved for Expansion
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	Unit Tons	TONS	Measures Unit Tons
5-5	Unit KW	KW	Measures Unit KW
5-6	Kw/Tons	User Logic	KW / Ton Calculation
5-7	PwrFactor	User Logic	Power Factor Calculation
5-8	Spare	X	Not Used - Reserved for Expansion
5-9	OilPsiSwOK	User Logic	Proof of Oil Pressure Switch OK
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

MCS 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	BMS DMD	User Logic	Virtual Network Point for Demand %
6-12	BMS Reset	User Logic	Virtual Network Point for Target Reset
6-13	d/aHwRst	User Logic	Disallow Hardwired Reset
6-14	d/aNetRst	User Logic	Disallow Network Reset
6-15	Spare	X	Not Used - Reserved for Expansion
6-16	Allow Unit	User Logic	Run/stop indicator for graphic display

19XR Information

Company: _____ Phone: _____

Name: _____ Title: _____

Email: _____ Mobile: _____

Site: _____

Model Number	Serial Number	Refrigerant Used	Full Load Amps of Compressor

Does the compressor have a remote starter ☐YES ☐NO

What is the Starter Type? ☐Wye-Delta ☐XL ☐SOFT START ☐VFD

Does the compressor have a VFD (Variable Frequency Drive)? ☐YES ☐NO Model _____

Will the VFD be hardwired to MCS controls or over MODBUS? ☐Hardwired ☐MODBUS

COMMENTS (if there is any other information we should know?

_____

_____

_____

_____

_____

For additional information on any of our products, Email: sales@mcscontrols.com or call 239-694-0089

Fax this form to: 239-694-0031

5580 Enterprise Pkwy., Fort Myers, FL 33905
Office: 239-694-0089 • Fax: 239-694-0031
www.mcscontrols.com