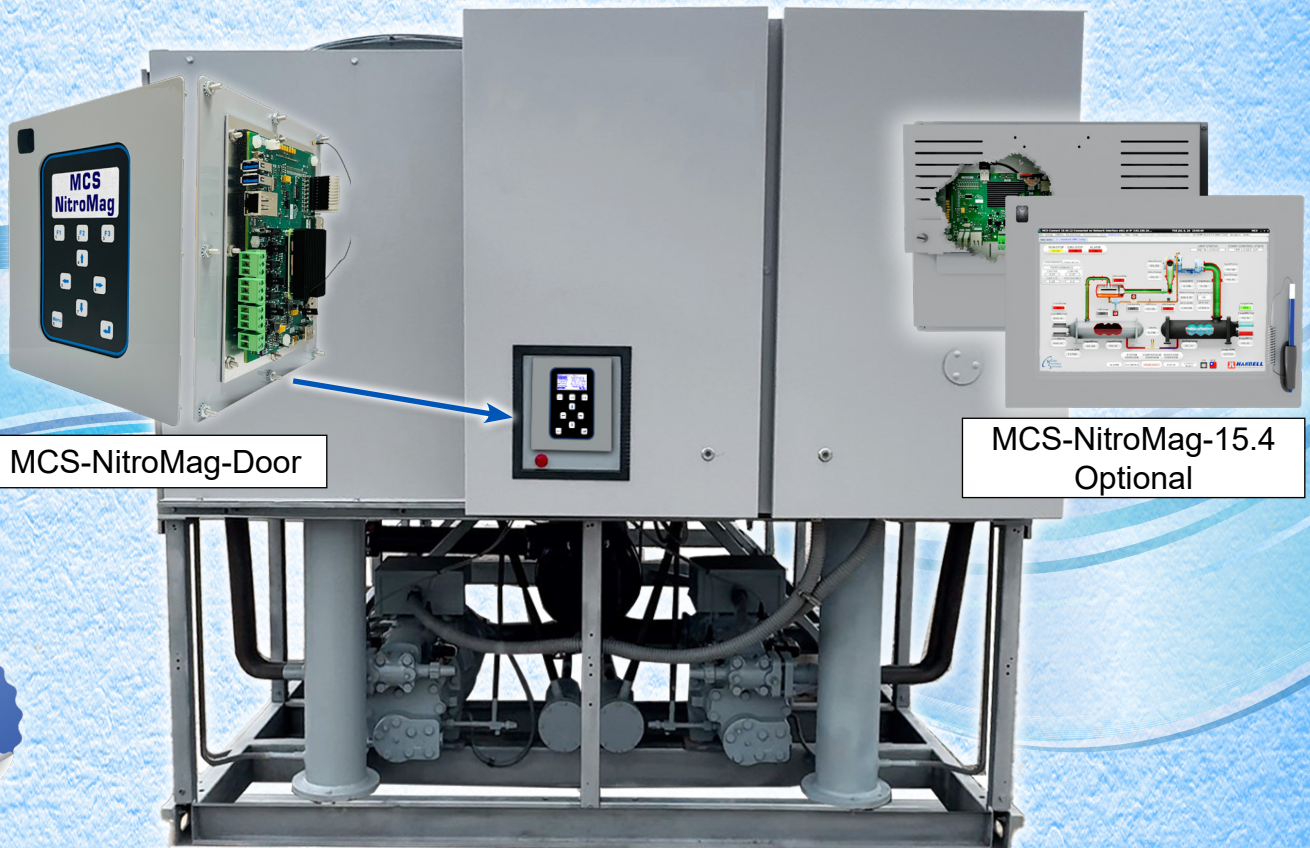




***MCS Total
Solutions for all your
HVAC/R Control Needs***



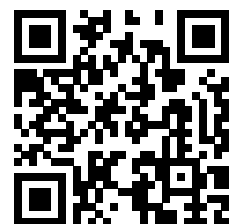
MCS-NitroMag-Door

MCS-NitroMag-15.4
Optional

NEW

MCS-NitroMag Upgrade Brochure RTAA Chiller

Scan for Brochure Upgrades ►



This brochure describes a standard upgrade package for the CHILLER.

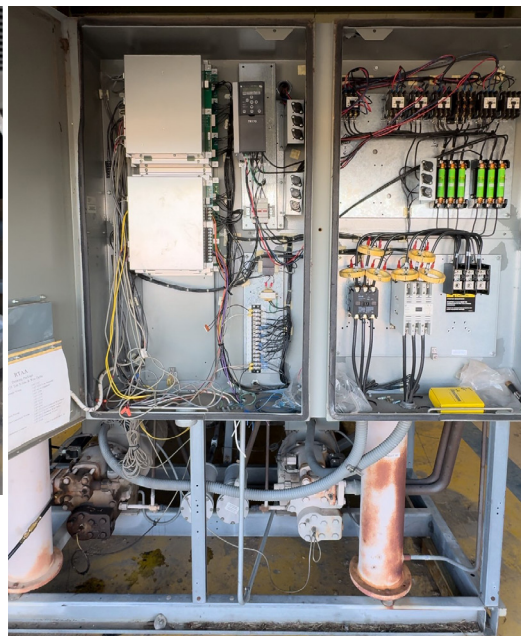
Each control upgrade installation is unique. It may be necessary to add additional options to the standard upgrade as described in this brochure.

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

Example MCS-NitroMag Upgrade Photos



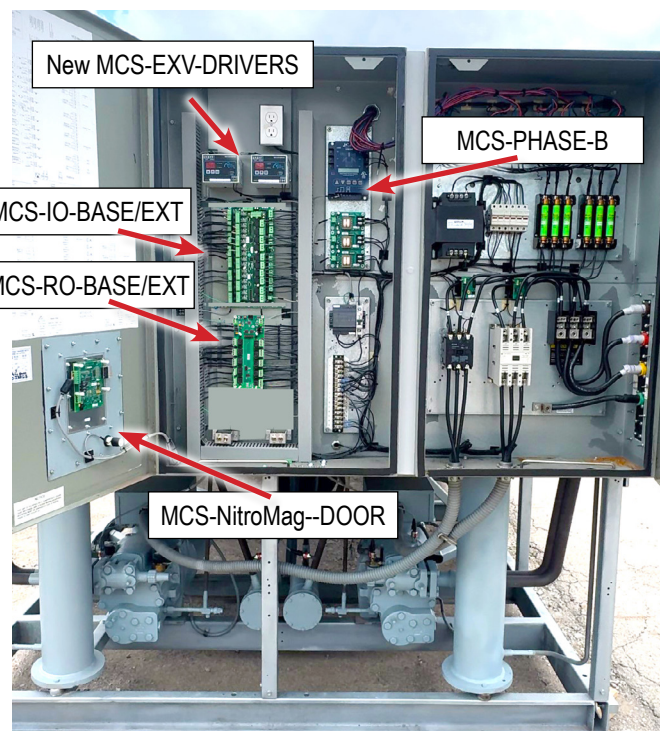
RTAA chiller controls before upgrade



RTAA with MCS control upgrade using MCS-NitroMag-DOOR



Upgrades to EXVs and MCS-EXV-DRIVERS





MCS-NitroMag-DOOR

Description & Specifications



Part # MCS-NitroMag-DOOR

Description

The **MCS-NitroMag-DOOR** is a control system containing a Keypad, a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GB.

The **MCS-NitroMag-DOOR** features an easy-to-use keypad with three function keys, four directions keys and two selection keys (Menu & Enter).

The display LCD is 128 x 64 dot pixel graphics, 2.8" diagonal viewing area with White characters on a dark background (reversible). Includes a NEMA Type 1 faceplate for easy mounting to an enclosure door.

The MCS-NitroMag-DOOR controller allows for 144 SI inputs, 90 RO outputs, and 36 AO outputs. (Expansion Boards required).

It comes with a built-in WiFi interface for Ethernet connectivity, and an onboard WiFi antenna mounted on the front.

Includes a **Modbus interface** which enables it to act as a Modbus Master using the Modbus RTU protocol, which allows communication with Modbus slave devices for parameter access.

It features various connection ports for:

- 2 HDMI ports (1 Standard & 1 Micro)
- WiFi antenna connection
- 12vdc power input connection
- Ethernet port (10Mbps/100Mbps/1Gbps)
- Two RS-485 Ports up to 115200 baud rate
- MCS-IO port for communicating with expansion boards

Specifications

Keypad Door

Dimensions.....7.25"w x 8.50"h 1.42"d
(184.15 mm x 215.9 mm x 36.17 mm)

Mounts using supplied #6-32 Kep nut

Display.....128 x 64 dot pixel STN
monochrome graphics LCD
with 2.8" diagonal viewing area

Color.....White characters on a blue
background (Reversible)

Keypad Size5.26"w x 8.50"h (8 mounting studs)

Keypad Layout.....9 keys (3 function keys)

Operating Temperature....-4°F to +185°F (-20°C to +85°C)

Operating Humidity.....0-95% Non-Condensing

Controller

Microprocessor.....Broadcom BCM2711 quad core
Cortex (ARMv8) 64-bit SoC @ 1.5Ghz

INPUT	MINIMUM	NOMINAL	MAXIMUM
VOLTAGE	10	12	12.5
AMPS			0.5

Flash Memory16 GB EMMC

RAM2 GB DDR3

MCS-I/O Comm Port.1 @ 38,400 baud

RS-485 Ports2 @ go up to 115200 baud rate

Ethernet.....10Mbps/100Mbps/1Gbps

HDMI2 HDMI 2.0 ports-Standard and Micro

WiFi2.4GHz, 5.0GHz 8.02 b/g/n/ac wireless

USB2 USB type B 2.0 ports 480Mbps signalling

Protocols.....BACnet IP, BACnet MSTP, Modbus IP,
Modbus RTU Slave, Modbus RTU Master
(BTL certification pending)

Real Time ClockBattery backup(Type BR2032)

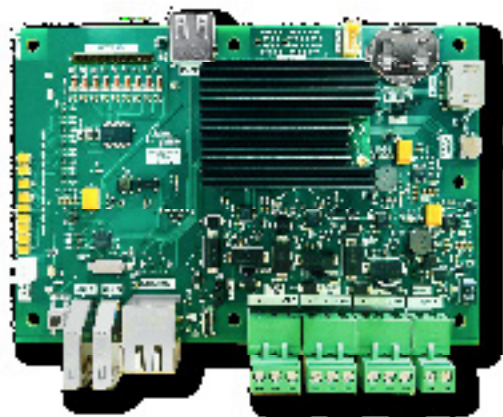
Power DetectionAutomatic power fail reset

POWER SUPPLY NOT INCLUDED

Ship Weight2.00 lbs (approx)

Box Dimensions.....9" x 6-1/2" x 2-3/4" (approx)

Example Typical Upgrade with Optional Boards



MCS-NitroMag-N

The MCS-NitroMag-N is a control system containing a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GHz.

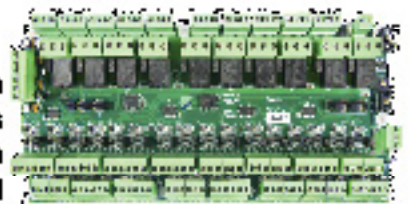
The MCS-NitroMag-N controller connects with MCS Expansion boards and Extension boards, allowing for a maximum of 144 SI inputs, 90 RO outputs, and 36 AO outputs.

The MCS-NitroMag-N comes with a built-in WiFi interface for Ethernet connectivity, and an onboard WiFi antenna connection.

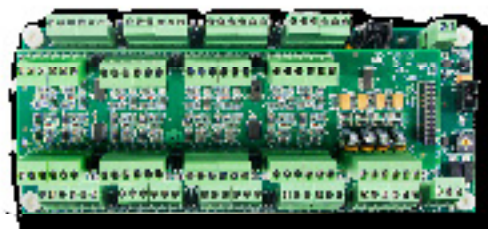
MCS-IO-Base & MCS-IO-EXT

MCS-IO-BASE has a stand-alone microprocessor which communicates with a MCS-NitroMag over the MCS-I/O port at 38,400 baud. The MCS-IO-BASE has 16 SI inputs, 10 RO outputs, and 4 AO outputs. All data is check summed with auto error correction. Each MCS-IO-BASE board can be powered by a 12VDC regulated power supply and has a automatic power fail reset system.

The MCS-IO-EXT provides a flexible and cost effective way to allow relay output, sensor input and analog output expansion for MCS-NitroMag. Each MCS-IO-EXT can be paired with a MCS-IO-BASE to double the number of inputs and outputs.



MCS-SI-Base & MCS-SI-EXT



The MCS-SI-BASE provides a flexible and cost effective way to allow sensor input and analog output expansion for the MCS-NitroMag. Each MCS-SI-BASE has a stand-alone microprocessor which communicates with the MCS-NitroMag over the MCS-I/O port at 38,400 baud. The MCS-SI-BASE has 16 SI inputs and 4 AO outputs. All data is check summed with auto error correction. MCS-SI-BASE board can be powered by a 12VDC regulated power supply and has a automatic power fail reset system.

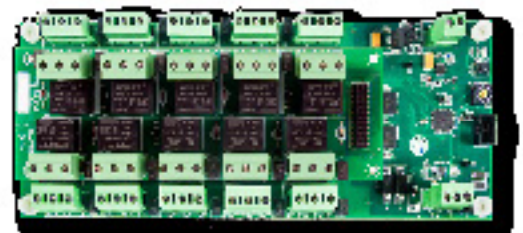
The MCS-SI-EXT provides a flexible and cost effective way to allow sensor input and analog output expansion for the MCS MAGNUM. Each MCS-SI-EXT can be paired with a MCS-SI-BASE to double the number of inputs and outputs.

MCS-RO-Base & MCS-RO-EXT

The MCS-RO-BASE provides a flexible and cost effective way to allow relay output expansion for the MCS-NitroMag. Each MCS-RO-BASE has a stand-alone microprocessor which communicates 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.

The MCS-RO-EXT provides a flexible and cost effective way to allow relay output expansion for the MCS NitroMag. Each MCS-RO-EXT can be paired with a MCS-RO-BASE to double the number of outputs.



RTAA Typical Control Upgrade

TRANSDUCERS



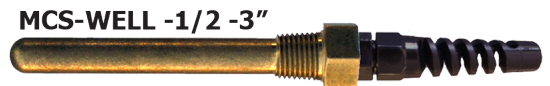
The **MCS Pressure Transducers** are one of the most economic and durable options on the market for dealing with high-pressure industrial applications.

In addition to being CE and UL approved, the transducers are capable of surviving high vibration. They include a cavity built out of solid 17-4 PH stainless steel 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 transducers ideal for use with rugged HVAC environments.

The MCS Pressure Transducers have a output voltage of 0.5 to 4.5vdc (ratio metric) and are also overvoltage protected in both positive and reverse polarity, which adds an extra layer of safeguard against short-circuiting caused by unpredictable power surges.

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 19D 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. The MCS-T100 sensor has the ability to move from 32°F to 212°F in approximately 10 to 15 seconds.



The **MCS-TUBE** can be epoxied to a discharge or suction line on the 19D 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-EPOXY

- Premeasured resins and hardeners in one tube
- Easy to use - bonds, seals, plugs, molds and rebuilds
- No special tools needed
- Can even harden under water



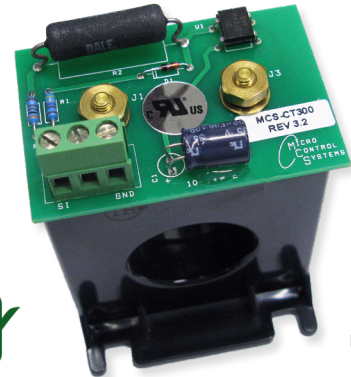
- Pressure tested to 1300 psi
- Temperatures up to 500 degree F
- Color..... Gray
- Density 15.9 lb/gal (1.9 g/cc)
- Hardness (Shore D) 85
- Tensile Strength 6000 psi
- Compressive Strength 18.000 psi
- Modulus of Elasticity 6 x 105 psi
- Shear Strength 700 psi

RTAA Typical Control Upgrade

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



MCS-EXV-DRIVER



The **MCS-EXV-DRIVER** is used for the positioning and control of Sporlan, Alco, Carel, and Danfoss bipolar expansion valves using an analog input of 0-10 VDC (0 VDC = 0% valve opening, 10 VDC = 100% valve opening). The MCS-EXV-DRIVER also supports overdriving on full opened and full closed voltage signals. The display decimal notifies when overdriving by blinking.

Auto Mode – The unit defaults to this mode after every power up. In this mode, the MCS-EXV-DRIVER-XX positions the valve according to the analog input control voltage. **Manual Mode** – When in auto mode, if holding the 'Auto/Manual' key for 5 seconds and then entering the authorization number switches the unit into manual mode.

MCS-SERI



The **MCS-SERI** are Electronically Operated Step motor flow control valves, intended for the precise control of liquid refrigerant flow. Synchronized signals to the motor provide discrete angular movement, which translates into precise linear positioning of the valve piston. Valve pistons and ports are uniquely characterized, providing improved flow resolution and performance. The MCS-SERI valves are easily interfaced with MCS microprocessor based controllers. Therefore, they are applicable on all the same types of systems found in the air conditioning and refrigeration industry as thermostatic expansion valves.

Example Typical Control Upgrade

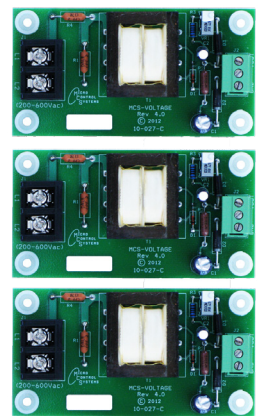


MCS-PHASE

The **MCS-PHASE** is a programmable 3-phase line voltage monitor with 25-fault memory, high temperature LCD display, easy setup and clear diagnostic readout of system faults. The MCS-PHASE 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.

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.



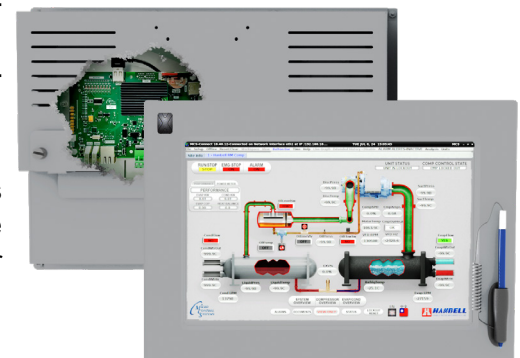
MCS-USB-RS485

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).

MCS-NitroMag-15.4

The **MCS-NitroMag-15.4** is a control system containing a Capacitive Touchscreen, and a MCS-NitroMag-N controller. It includes a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor on the MCS-NitroMag-N delivers a blazing speed of 1.5GHz.

The Capacitive touchscreen interface designed to simplify user access with the MCS Expansion Boards and utilizing MCS-Connect to provide both graphics and service mode access to technicians. 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.



Example Typical Points List with Optional Boards

Relay Outputs (MCS-IO-BASE)

#	Output Name	Type	Description
1-1	Comp 1M	Screw w/ EXV	Compressor Start Main
1-2	Comp 1D	Standard	Compressor Start Delta
1-3	Load 1	Standard	Increase Compressor Capacity - Compressor 1
1-4	Unload 1	Standard	Decrease Compressor Capacity - Compressor 1
1-5	LiqLinSol1	Standard	Liquid Line Solenoid - Compressor 1
1-6	Spare	X	Not Used - Reserved for Expansion
1-7	Spare	X	Not Used - Reserved for Expansion
1-8	BrrlHeater	Standard	Evaporator Heater
1-9	Warning	Standard	Warning Light: Unit is in a safety condition prior to a safety shutdown
1-10	Alarm	Standard	Alarm Light: Unit is in a safety shutdown

Relay Outputs (MCS-IO-EXT)

#	Output Name	Type	Description
2-1	Comp 2M	Screw w/ EXV	Compressor Start Main
2-2	Comp 2D	Standard	Compressor Start Delta
2-3	Load 2	Standard	Increase Compressor Capacity - Compressor 2
2-4	Unload 2	Standard	Decrease Compressor Capacity - Compressor 2
2-5	LiqLinSol2	Standard	Liquid Line Solenoid - Compressor 2
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
2-9	ChwPump 1	Standard	Chilled water pump #1: Turn ON or OFF
2-10	ChwPump 2	Standard	Chilled water pump #2: Turn ON or OFF

Relay Outputs (MCS-RO-BASE)

3-1	CndFan 1-1	Standard	Condensor Fan #1 : Turn ON or OFF
3-2	CndFan 1-2	Standard	Condensor Fan #2: Turn ON or OFF
3-3	CndFan 1-3	Standard	Condensor Fan #3: Turn ON or OFF
3-4	CndFan 1-4	Standard	Condensor Fan #4: Turn ON or OFF
3-5	CndFan 1-5	Standard	Condensor Fan #5: Turn ON or OFF
3-6	CndFan 2-1	Standard	Condensor Fan #1 : Turn ON or OFF
3-7	CndFan 2-2	Standard	Condensor Fan #2: Turn ON or OFF
3-8	CndFan 2-3	Standard	Condensor Fan #3: Turn ON or OFF
3-9	CndFan 2-4	Standard	Condensor Fan #4: Turn ON or OFF
3-10	CndFan 2-5	Standard	Condensor Fan #5: Turn ON or OFF

Example Typical Points List with Optional Boards

Sensor Inputs (MCS-IO-BASE)

#	Output Name	Type	Description
1-1	ChillWtrIn	MCST100	Chilled Water In Temperature
1-2	ChillWtrOut	MCST100	Chilled Water Out Temperature
1-3	Suct Psi 1	MCS-200	Suction Pressure - Compressor 1
1-4	Disc Psi 1	MCS-500	Discharge Pressure - Compressor 1
1-5	Oil Psi 1	MCS-500	Oil Pressure - Compressor 1
1-6	Cmp Amps 1	CT-300	Compressor Amperage 1
1-7	SuctTmp 1	MCS-T100	Suction Temperature - Compressor 1
1-8	DiscTmp 1	MCS-T100	Discharge Temperature - Compressor 1
1-9	MtrFault 1	Digital	Proof of Compressor speed fault has ocures
1-10	Disable1	Digital	Indication of compressor has been shut down
1-11	LiqRefTmp1	MCS-T100	Monitoring Liquid Temperature
1-12	SpareM-12	X	Not Used - Reserved for Expansion
1-13	ChwWtrFlow	Digital	Proof for chilled water flow
1-14	PhaseLoss	Digital	Phase loss: Phase imbalance
1-15	Run/Stop	Digital	Run/Stop Hand Switch
1-16	EmgStop	Digital	Emergency Stop Switch

Sensor Inputs (MCS-IO-EXT)

#	Output Name	Type	Description
2-1	Suct Psi 2	MCS-200	Suction Pressure - Compressor 2
2-2	Disc Psi 2	MCS-500	Discharge Pressure - Compressor 2
2-3	Oil Psi 2	MCS-500	Oil Pressure - Compressor 2
2-4	Cmp Amps 2	CT-300	Compressor Amperage 2
2-5	SuctTmp 2	MCS-T100	Suction Temperature - Compressor 2
2-6	DiscTmp 2	MCS-T100	Discharge Temperature - Compressor 2
2-7	MtrFault 2	Digital	Proof of Compressor speed fault has ocures
2-8	Disable2	Digital	Indication of compressor has been shut down
2-9	LiqRefTmp2	MCS-T100	Monitoring Liquid Temperature
2-10	Spare	X	Not Used - Reserved for Expansion
2-11	Ambien	MCS-T100	Ambient Monitoring
2-12	HIPsiSW1	Digital	High Pressure Switch 1
2-13	HIPsiSW2	Digital	High Pressure Switch 2
2-14	Spare	X	Not Used - Reserved for Expansion
2-15	Spare	X	Not Used - Reserved for Expansion
2-16	Spare	X	Not Used - Reserved for Expansion

Example Typical Points List with Optional Boards

Sensor Inputs (MCS-IO-EXT)

#	Output Name	Type	Description
3-1	StartFlt 1	Digital	Starter Fault 1
3-2	StartFlt 2	Digital	Starter Fault 2
3-3	LiqRefPsi1	MCS-500	Liquid Refrigerant Pressure 1
3-4	LiqRefPsi2	MCS-500	Liquid Refrigerant Pressure 2
3-5	UnitVoltsA	600VAC4	Volts phase A
3-6	UnitVoltsB	600VAC4	Volts phase B
3-7	UnitVoltsC	600VAC4	Volts phase C
3-8	CndFanFlt1	DIGITAL	Condenser Fan Fault 1
3-9	CndFanFlt2	DIGITAL	Condenser Fan Fault 2
3-10	Spare	X	Not Used - Reserved for Expansion
3-11	Spare	X	Not Used - Reserved for Expansion
3-12	Spare	X	Not Used - Reserved for Expansion
3-13	Spare	X	Not Used - Reserved for Expansion
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

Example Typical Points List with Optional Boards

Sensor Inputs (User Logic - virtual board)

#	Output Name	Type	Description
4-1	EvpTmp Dif	User Logic	Input for Plotting sensor with MCS Connect
4-2	TmpDiff	User Logic	Input for Plotting sensor with MCS Connect
4-3	PumpFault	User Logic	Input for Plotting sensor with MCS Connect
4-4	Suct SH 1	User Logic	Input for Plotting sensor with MCS Connect
4-5	Suct SH 2	User Logic	Input for Plotting sensor with MCS Connect
4-6	SubCool 1	User Logic	Input for Plotting sensor with MCS Connect
4-7	SubCool 2	User Logic	Input for Plotting sensor with MCS Connect
4-8	Spare3-8	User Logic	
4-9	Spare3-9	User Logic	
4-10	Bms R/S	User Logic	Input for Plotting sensor with MCS Connect
4-11	BmsTrgtRst	User Logic	Input for Plotting sensor with MCS Connect
4-12	BmsDmdLmt	User Logic	Input for Plotting sensor with MCS Connect

Analog Outputs (MCS-IO-BASE)

#	Output Name	Type	Description
1-1	EXV1 %	Hardwired	% of Expansion Valve opening for Circuit 1
1-2	EXV2 %	Hardwired	% of Expansion Valve opening for Circuit 2
1-3	CndFan1%	Hardwired	% of Condencer Fan 1
1-4	CndFan2%	Hardwired	% of Condencer Fan 2

Sample Questionnaire

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

General Information

Company: _____ Phone: _____

Name: _____ Title: _____ Email: _____

Mobile: _____ Site: _____

Unit Information

Installation Site Name _____

Model # _____ Unit Serial # _____ Site Unit # _____

What is the Voltage of the Unit? ☐ 208V, ☐ 230V, ☐ 460V, ☐ 4160V, Other Voltage _____

What is the Control voltage in the unit? ☐ 24V, ☐ 115V, ☐ 230V, What type of Refrigerant is being used? _____

Is MCS monitoring Main Voltage? ☐ Yes ☐ No. Will Phase loss need to be monitored? ☐ Yes ☐ No.

Network Information

1. Integrating to Building Management System (BMS) ☐ Yes ☐ No, If yes, complete the form provided on page 2.

Motor Information

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? ☐ Yes ☐ No.

a. What is the VFD Make and Model? VFD Make _____ VFD Model _____

b. Will the VFD be hardwired to MCS controls, or IO BUS _____

c. Is MCS required to control VFD Cabinet Auxiliary Fan? ☐ Yes ☐ No.

4. What are the Motor "RUN LOAD AMPS"(FLA)? COMP 1: _____ COMP 2: _____

5. Is Hot Gas Bypass present? ☐ Yes ☐ No, How does it operate? _____

Purge Information

6. What is the Purge Type on the unit, how is it controlled? _____

Evap/Condenser/Pump Information

7. Is MCS controlling the chiller Water Pump(s)? ☐ Yes ☐ No, How will they be wired? _____

8. Is MCS controlling the Condenser water Pump(s)? ☐ Yes ☐ No, How will they be wired? _____

9. Is MCS controlling Condenser/Evaporator Isolation Valve? ☐ Yes ☐ No ☐ BMS.

10. Is MCS controlling tower fan(s)? ☐ Yes ☐ No, How many are there _____, how are they wired? _____

11. Will the Chilled/Condenser Water Flow be measured by? _____

Ambient Information

12. Will Ambient temperature need to be monitored? ☐ Yes ☐ No.

CVHA Information Only

13. 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 need to know?):

Scan for fillable questionnaire ►

1. **Viewing form printed Brochure**, Scan QR code from mobile device, email the form to your email address.
2. Click on the emailed link. Fill out the digital fillable form on a computer and email to sales@mcscontrols.com





5580 Enterprise Pkwy., Fort Myers, FL 33905

Office: 239-694-0089 • Fax: 239-694-0031

www.mcscontrols.com