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File No: E169780

MCS-NITROMAG-DOOR

NEW

MCS-Nitromag Upgrade Brochure Self-Contained Package SWUD/SCWD

Click for Brochure Upgrades ▶

This brochure describes a standard upgrade package for the SWUD/SCWD Chiller. Each Control upgrade installation is unique. It may be necessary to add additional options to the standard upgrade as described in this brochure.
Click on the QR code to fill out the brief questionnaire found on www.mcscontrols and forward to your sales representative for an estimate.

Steps Taken:

• Removed existing obsolete controls

• Installed MCS-Magnum Controls

• New Temperature, Pressure, Current and Voltage sensors installed

• Provide sub cooling and superheat calculations

Results:

Obsolete controls were replaced with the MCS-Magnum Controller. This provided the customer with a control platform that is not built with a preplanned obsolescence.

The MCS Controls will allow for future upgrades and operational changes that can be made through updated software. Previously released MCS hardware remains supported with current and future products.

OLD TRANE PANEL
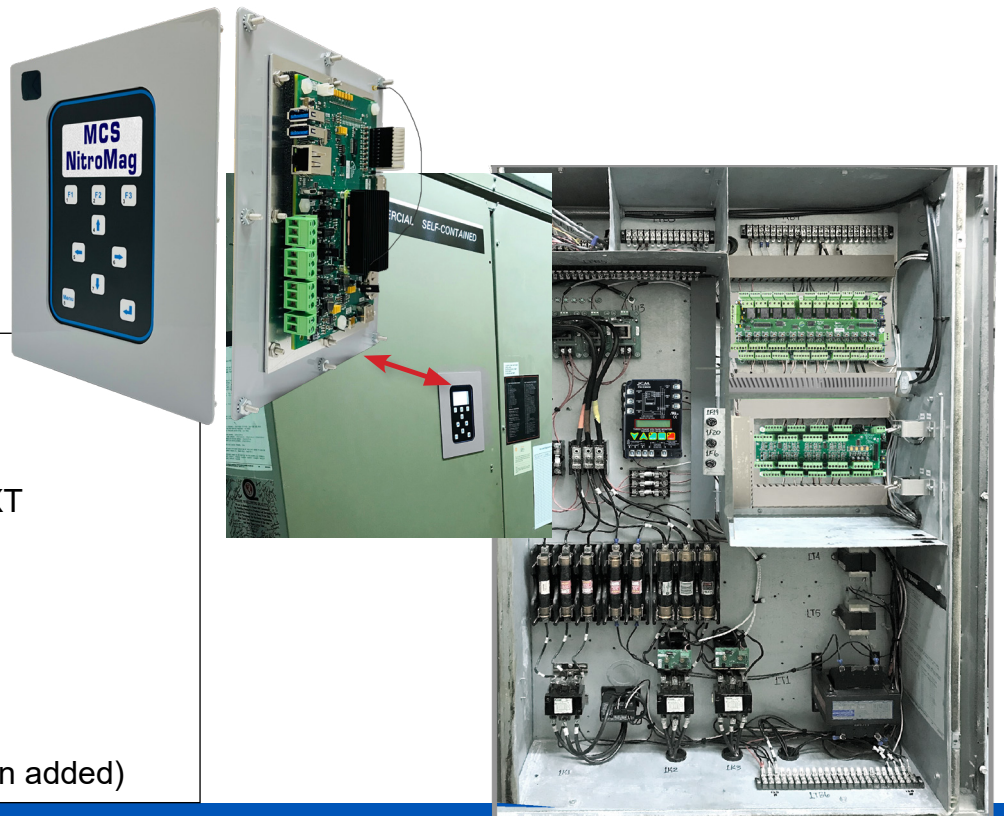
New MCS Controls:

MCS-NITROMAG-DOOR
MCS-IO-BASE and MCS-IO-EXT
MCS-RO-BASE and MCS-RO-EXT
MCS-PHASE
MCS-CURRENT SENSORS
MCS-90W POWER SUPPLY

OPTIONAL
MCS-SI-BASE and MCS-EXT
(not shown, increased points when added)

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 (10 Mbps/100 Mbps/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 Size ....5.26"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 Memory .... 16 GB EMMC
RAM .... 2 GB DDR3
MCS-I/O Comm Port. .... 1 @ 38,400 baud
RS-485 Ports. .... 2 @ go up to 115200 baud rate
Ethernet............................ 10 Mbps/100Mbps/1Gbps
HDMI .... 2 HDMI 2.0 ports-Standard and Micro
WiFi ....2.4 GHz, 5.0GHz 8.02 b/g/n/ac wireless
USB .... 2 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 Clock ....Battery backup(Type BR2032)
Power Detection ....Automatic power fail reset

POWER SUPPLY NOT INCLUDED

Ship Weight .... 2.00 lbs (approx)
Box Dimensions................. 9" x 6-1/2" x 2-3/4" (approx)

SWUD/SCWD Typical Upgrade

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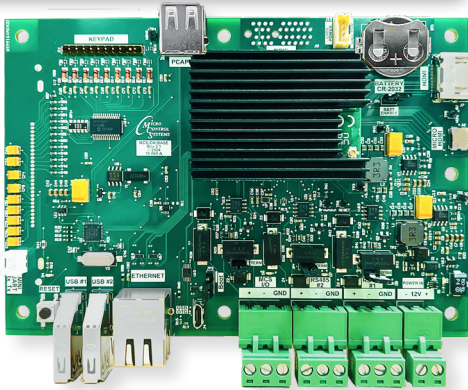
The **MCS-NitroMag-N** is a control system containing a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GHz.

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. Because communication is over a RS-485 long distance two-wire differential network transmission system, the MCS-IO-BASE may be located up to 5,000 feet away.
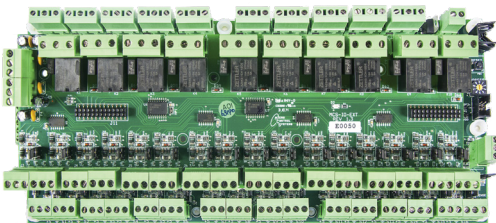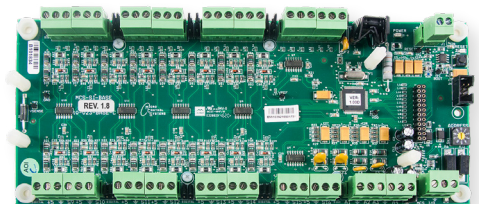
Each MCS-IO-BASE board can be powered by a 12VDC regulated power supply and has a automatic power fail reset system.

The **MCS-IO-EXT** provides a flexible and cost effective way to allow additional relay output, sensor input and analog output expansion for the MCS-NitroMag.

Each MCS-IO-EXT can be paired with a MCS-IO-BASE to double the number of inputs and outputs. Each MCS-IO-EXT board is powered by the MCS-IO-BASE board once it is stacked on top.

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 controller.
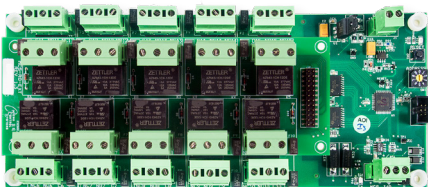
Each MCS-RO-BASE has a stand-alone microprocessor which communicates over the MCS-I/O port at 38,400 baud. The MCS-RO-BASE has 10 relay outputs.

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.
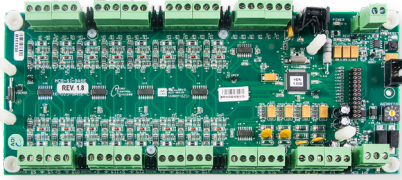
The MCS-RO-EXT can be paired with a MCS-RO-BASE to double the number of outputs(20).

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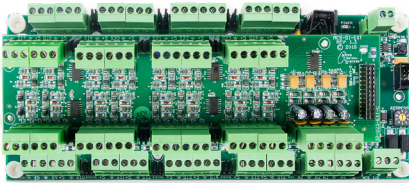
MCS-SI-BASE & MCS-SI-EXT

The **MCS-SI-BASE** provides a flexible and cost effective way to allow sensor input and analog output expansion for the MCS-NitroMag over the MCS-I/O port at 38,400 baud. Each MCS-SI-BASE has a stand-alone microprocessor which communicates 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. 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.

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

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-PRESSURE TRANSDUCERS

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.

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 23XL 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.

MCS-WELL -1/2 -3"
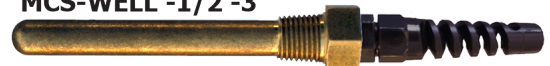
1/4- 2.5"

The **MCS-TUBE** can be epoxied to a discharge or suction line on the 23XL 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-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

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RoHS Compliant ✔

MCS-EPOXY

- Pre-measured 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

MCS-T100

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-USB-RS485

The **MCS-USB-RS485** is a USB to RS485 cable that provides a fast simple way to connect a **MCS-Nitromag** 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).
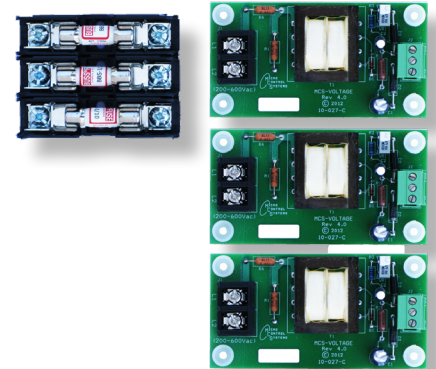
SWUD/SCWD Typical Upgrade

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-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.

Typical Options for SWUD/SCWD

MCS-NitroMag-15.4

The **MCS-NitroMag-15.4** is a control system containing a Capacitive Touch-screen, 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.
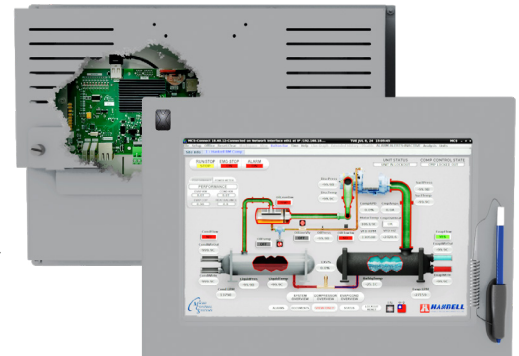
Example Typical Point List

This is a standard points list for 4 Circuit with 5 Compressors with Water Side Economizer.

Relay Inputs (MCS-IO-BASE)

#	Output Name	Type	Description
1-1	Comp A	Scroll	1st Compressor
1-2	Comp B	Scroll	2nd Compressor
1-3	Comp C	Scroll	3rd Compressor
1-4	Comp D	Scroll	4rd Compressor
1-5	Comp E	Scroll	5rd Compressor
1-4	O/A Damp	User Logic	Outdoor Air Damper
1-5	WSE 1	User Logic	Water Side Economizer 1
1-6	WSE 2	User Logic	Water Side Economizer 2
1-7	Spare	Spare	Not Used
1-8	SplyFan	User Logic	Supply Fan
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

Sensor Inputs (MCS-IO-BASE)

#	Output Name	Type	Description
1-1	Supply Air	MCST100-	Supply Air Temperature
1-2	Return Air	MCST100	Return Air Temperature
1-3	Mixed Air	MCS-T100	Mixed Air Temperature
1-4	SuctPsi B&E	MCS-200	Suction Pressure Compressor B and E
1-5	DiscPsi B&E	MCS-500	Discharge Pressure Compressor B and E
1-6	LiqPsi B&E	MCS-500	Liquid Line Pressure Compressor B and E
1-7	CmpAmps B	CT-300	Compressor B Amps
1-8	SuctTmp B&E	MCST100	Suction Temperature Compressor B and E
1-9	DiscTmp B&E	MCST100	Discharge Temperature Compressor B and E
1-10	LiqTmp B&E	MCST100	Liquid Line Temperature Compressor B and E
1-11	HiPsiSw B & E	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor B and E
1-12	CndWtFlow	DIGITAL	Condenser Water Flow
1-13	PhaseLoss	DIGITAL	Phase loss: Phase Imbalance Monitor
1-14	AirFlow	DIGITAL	Air Flow Switch
1-15	Run/Stop	DIGITAL	Run/Stop/Hand Switch
1-16	HiStaticSW	DIGITAL	High Duct Static Switch

Sensor Inputs (MCS-IO-EXT)

#	Output Name	Type	Description
2-1	CndWtrIn	MCST100	Condenser Water Incoming Temperature
2-2	CndWrtOut	MCST100	Condenser Water Leaving Temperature

Example Typical Point List

This is a standard points list for 4 Circuit with 5 Compressors with Water Side Economizer.

Sensor Inputs (MCS-IO-EXT)

#	Output Name	Type	Description
2-3	SuctPsi D	MCS-200	Suction Temperature Compressor D
2-4	DiscPsi D	MCS-500	Discharge Temperature Compressor D
2-5	LiqPsi D	MCS-500	Liquid Line Pressure Compressor D
2-6	CmpAmps D	CT-300	Compressor D Amps
2-7	SuctTemp D	MCST100	Suction Temperature Compressor D
2-8	DiscTemp D	MCST100	Discharge Temperature Compressor D
2-9	LiqTemp D	MCST100	Liquid Line Temperature Compressor D
2-10	HiPsiSW D	MCST100	Mechanical Hi Pressure Safety Switch Compressor D
2-11	Spare	Spare	Not Used - Reserved for Expansion
2-12	CmpAmps E	CT-300	Compressor E Amps
2-13	DiscTemp E	MCST100	Discharge Temperature Compressor E
2-14	SmokeAlarm	DIGITAL	Smoke Alarm Input
2-15	EmgStop	DIGITAL	Emergency stop switch
2-16	DuctStatic	STATIC 5"B	Duct Static Pressure

Sensor Inputs (MCS-SI-BASE)

#	Output Name	Type	Description
3-1	SuctPsi A	MCS-200	Suction Pressure Compressor A
3-2	DicsPsi A	MCS-500	Discharge Pressure Compressor A
3-3	LiqPsi A	MCS-500	Liquid Line Pressure Compressor A
3-4	CmpAmps A	CT-300 / 5	Compressor A Amps
3-5	SuctTmp A	MCST100	Suction Temperature Compressor A
3-6	DiscTmp A	MCST100	Discharge Temperature Compressor A
3-7	LiqTmp A	MCST100	Liquid Line Temperature Compressor A
3-8	HiPsiSw A	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor A
3-9	SuctPsi C	MCS-200	Suction Pressure Compressor C
3-10	DicsPsi C	MCS-500	Discharge Pressure Compressor C
3-11	LiqPsi C	MCS-500	Liquid Line Pressure Compressor C
3-12	CmpAmps C	CT-300 / 5	Compressor C Amps
3-13	SuctTmp C	MCST100	Suction Temperature Compressor C
3-14	DiscTmp C	MCST100	Discharge Temperature Compressor C
3-15	LiqTmp C	MCST100	Liquid Line Temperature Compressor C
3-16	HiPsiSw C	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor C

Sensor Inputs (User Logic - no board)

#	Output Name	Type	Description
4-1	SupHeatB&E	User Logic	Suction superheat for Compressor B and E
4-2	SuperHeat D	User Logic	Suction superheat for Compressor D
4-3	SuperHeat A	User Logic	Suction superheat for Compressor A

Example Typical Point List

This is a standard points list for 4 Circuit with 5 Compressors with Water Side Economizer.

Sensor Inputs (User Logic vertual board)

#	Output Name	Type	Description
4-4	SuperHeat C	User Logic	Suction superheat for Compressor C
4-5	DiscSpht B	User Logic	Discharge superheat for Compressor B
4-6	DiscSpht D	User Logic	Discharge superheat for Compressor D
4-7	DiscSpht A	User Logic	Discharge superheat for Compressor A
4-8	DiscSpht C	User Logic	Discharge superheat for Compressor C
4-9	SubCool B&E	User Logic	Subcooling for Compressor B&E
4-10	SubCool D	User Logic	Subcooling for Compressor D
4-11	SubCool A	User Logic	Subcooling for Compressor A
4-12	SubCool C	User Logic	Subcooling for Compressor C
4-13	NetR/S	BMS RUN	Run/Stop from Building Management
4-14	NetTrgRst	BMS CW RSET	Chilled Water Reset from Building Management
4-15	NetDmdLmt	BMS Dmd Step	Capacity Step Limiting from Building Management
4-16	DmpOn/Off	User Logic	Damper On Proof

Sensor Inputs (MCS-SI-EXT)

5-1	DmpOn/Off	BMS_SI	Damper Demand from Building Management
5-2	Spare	Spare	Not Used - Reserved for Expansion
5-3	Spare	Spare	Not Used - Reserved for Expansion
5-4	Spare	Spare	Not Used - Reserved for Expansion
5-5	Spare	Spare	Not Used - Reserved for Expansion
5-6	Spare	Spare	Not Used - Reserved for Expansion
5-7	Spare	Spare	Not Used - Reserved for Expansion
5-8	Spare	Spare	Not Used - Reserved for Expansion
5-9	Spare	Spare	Not Used - Reserved for Expansion
5-10	Spare	Spare	Not Used - Reserved for Expansion
5-11	Spare	Spare	Not Used - Reserved for Expansion
5-12	Spare	Spare	Not Used - Reserved for Expansion
5-13	Spare	Spare	Not Used - Reserved for Expansion
5-14	Spare	Spare	Not Used - Reserved for Expansion
5-15	Spare	Spare	Not Used - Reserved for Expansion
5-16	Spare	Spare	Not Used - Reserved for Expansion

Analog Outputs (MCS-IO-BASE)

#	Output Name	Description
1-1	SplyFan %	Supply Fan Speed Demand Signal
1-2	Spare M-2	Not Used - Reserved for Expansion
1-3	Spare M-3	Not Used - Reserved for Expansion
1-4	Spare M-4	Not Used - Reserved for Expansion

Sample Questionnaire

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 Start 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, over MODBUS _____

     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 wires?_____

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 Tem_____ ☐Y ☐N

COMMENTS (Is there any other Infomation we need to know?):

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