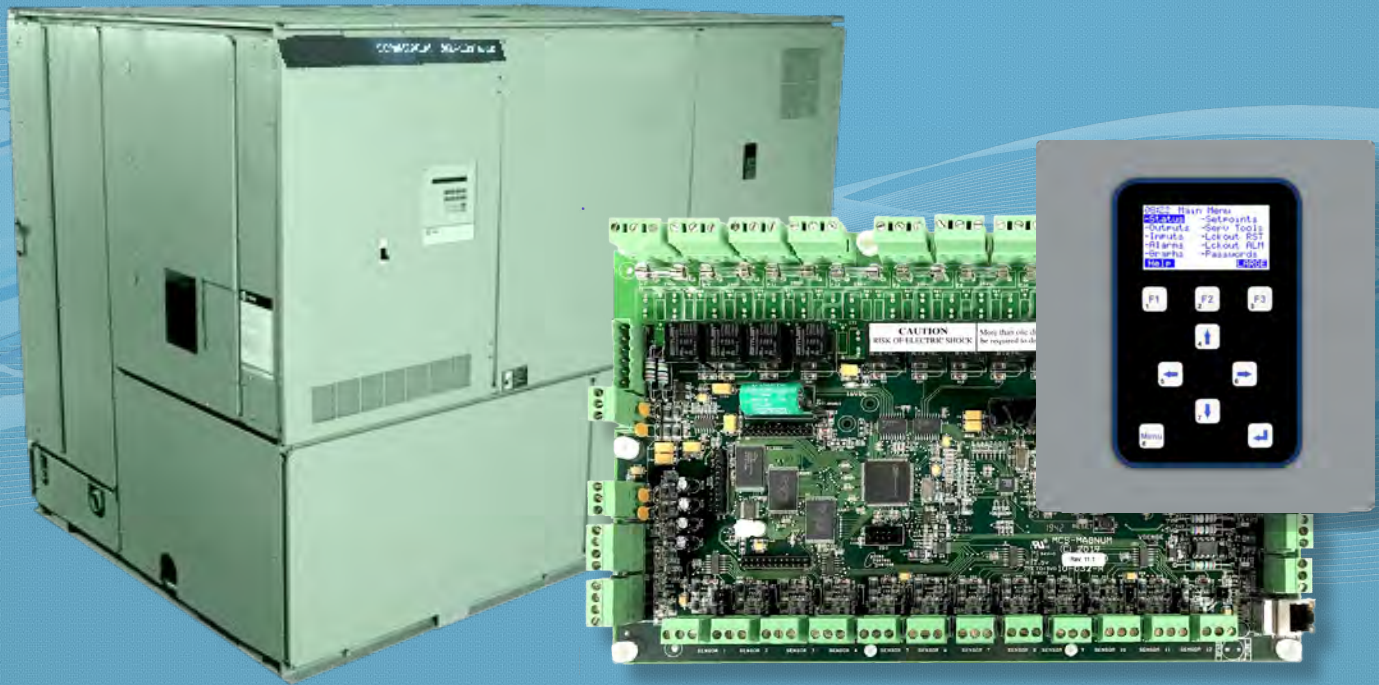**MCS Total Solutions for all your Control Needs**

SWUD/SCWD Self-Contained Package

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.

Fill out the brief questionnaire in the back of this brochure 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

OLD TRANE PANEL

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.
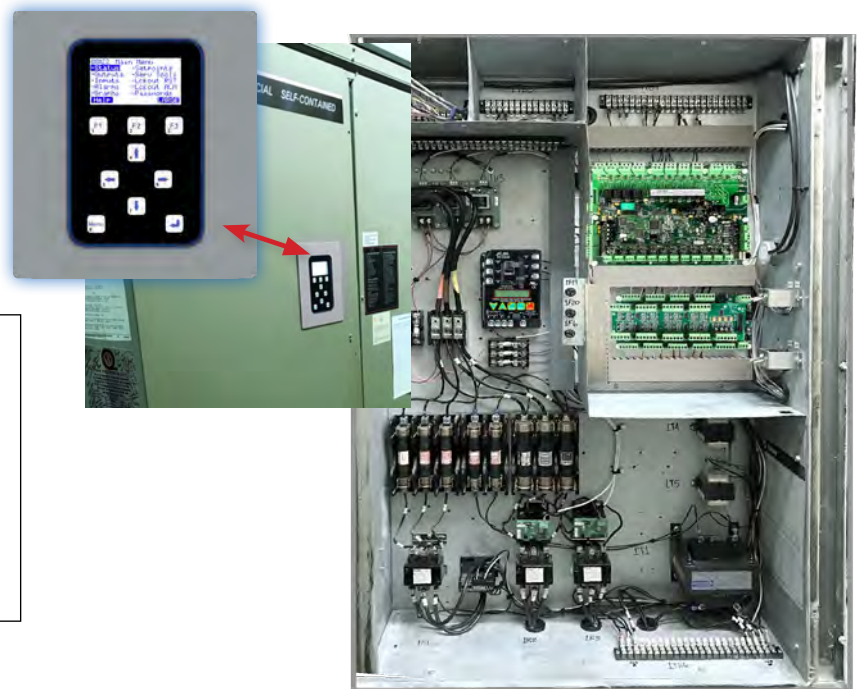
New MCS Controls:

MCS-MAGNUM-DOOR-12
MCS-SI-BASE and MCS-SI-EXT
MCS-PHASE
MCS-CURRENT SENSORS
MCS-90W POWER SUPPLY

MCS-MAGNUM-DOOR-12

Part # **MCS-MAGNUM-DOOR**

RoHS Compliant ✓   cULus

File No: E169780

Description

The MCS-MAGNUM-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 setpoints and control options that can be selected prior to commissioning a system or when the unit is live and functioning. Displays, alarms and other interfaces are accomplished in a clear and simple language that informs the user as to the status of the controller.

The MCS-MAGNUM-DOOR-12 consists of a master control board along with a keypad and display. Complementing the Magnum micro controller are the MCS-RO-BASE, MCS-RO-EXT, MCS-SI-BASE, MCS-SI-EXT expansion boards. This allows for system expansion to a maximum of 112 inputs, and 108 outputs. Communication with these units occurs at 38,400 baud over the MCS-I/O port, which is dedicated to this purpose.

A RS-485 port is also provided for communication with Building Management Systems (BMS).

A MCS-BMS-GATEWAY is available to provide protocols for: Bacnet IP, Bacnet MSTP, Modbus IP, Lontalk, or Johnson N2 communication interface. Information that can be transmitted includes the status of the unit, status of the inputs and outputs, alarm information, and setpoints.

A complete software support package is available for your PC, allowing for system configuration, dynamic on-line display screens, remote communication, graphing and more.

Specifications

Controller

|	
Dimensions	12.0"w, 8.0"h, 2.0"d
Mounting Holes	Mounts on a backplane utilizing eight through-hole studs
Operating Temperature	-40°F to +158°F (-40°C to +70°C)
Operating Humidity	0-95% Non-Condensing
Storage Temperature	-40°F to +158°F (-40°C to +70°C)
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 power in board from 95-265vac switching power supply 77°F (25°C) ambient, 20VA max
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

Keypad/LCD
NEMA rated Type 1

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	7.25"w x 8.50"h (8 mounting studs)
Keypad Layout	9 keys (3 function keys)
Connection	6 conductor shielded cable (max length of cable is 10 feet)
RS-485 Comm Port	1 @ 19,200 baud
Operating Temperature	-4°F to +158°F (-20°C to +70°C)
Operating Humidity	0-95% Non-Condensing
Storage Temperature	-22°F to +185°F (-30°C to +85°C)

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.

MCS-SI-BASE board can be powered by a 12VDC regulated power supply and has a automatic power fail reset system.
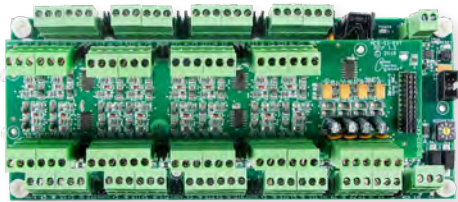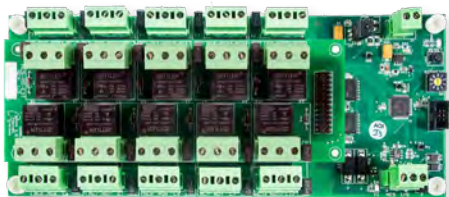
MCS-SI-EXT mounted to
MCS-SI-BASE

MCS-SI-EXT

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-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 an 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

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

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.

SWUD/SCWD Typical Upgrade

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 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

1/4 - 3"

The MCS-WELL was designed to be used with the MCS-T100 temperature sensor, although it has other applications. It is used in the 30HXC 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.

1/4- 2.5"
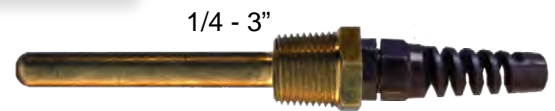
The **MCS-TUBE** can be epoxied to a discharge or suction line on the 30HXC series chillers in order to obtain temperature readings without the use of a well. It was designed to be used with the MCS-T100 temperature sensor and comes pre-filled with heat conductive compound to aid in transferring temperature to the sensor.

MCS-EPOXY

- 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-AVG-20

The MCS-T100-AVG-20 comprised of four MCS-T100-20s in addition to a Nema 4X mounting enclosure is used to read the average temperature. The Nema 4X is a durable, weatherproof enclosure which is suited to be mounted inside or outside. By mounting four MCS-T100-20 temperature sensors in different locations in the duct, the MCS-T100-AVG-20 provides an average duct temperature

MCS-CT300

RoHS Compliant ✓

c**RU**us
File No: E169780

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-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.
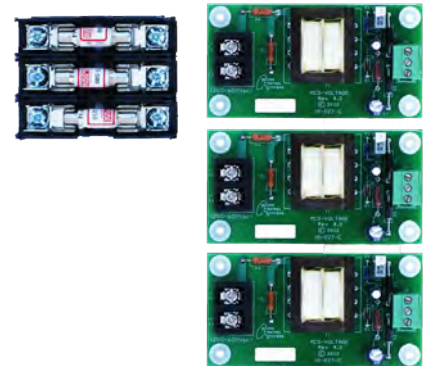
MCS-PHASE-B

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.alance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling.

MCS-USB-RS485

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

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

MCS-TOUCH-15.4

The **MCS-TOUCH-15.4** is a new 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.

With Internet Connection:
The user is able to email 'ALARM ALERTS' back to a technician. The emails will include 'SAVE DIAGNOSTIC DATA' to help troubleshoot the alarm.

Also with the internet connection, you can send 'SMS TEXT MESSAGES' with job site name and alarm, message only.

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.

MCS-SEHI/SERI

The **MCS-SEHI/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-SEHI/SERI valves are easily interfaced with MCS microprocessor based controllers.

MCS-BMS-GATEWAY

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

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.

SWUD/SCWD Typical Points List

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

Relay Inputs

#	Output Name	Type	Description
M-1	Comp A	Scroll	1st Compressor
M-2	Comp B	Scroll	2nd Compressor
M-3	Comp C	Scroll	3rd Compressor
M-4	Comp D	Scroll	4rd Compressor
M-5	Comp E	Scroll	5rd Compressor
M-4	O/A Damp	User Logic	Outdoor Air Damper
M-5	WSE 1	User Logic	Water Side Economizer 1
M-6	WSE 2	User Logic	Water Side Economizer 2
M-7	Spare	Spare	Not Used
M-8	SplyFan	User Logic	Supply Fan
M-9	Warning	Standard	Warning Light: unit is in a safety condition prior to a safety shutdown.
M10	Alarm	Standard	Alarm Light: Unit is in a safety shutdown

Sensor Inputs

#	Output Name	Type	Description
M-1	Supply Air	MCST100-	Supply Air Temperature
M-2	Return Air	MCST100	Return Air Temperature
M-3	Mixed Air	MCS-T100	Mixed Air Temperature
M-4	SuctPsi B&E	MCS-200	Suction Pressure Compressor B and E
M-5	DiscPsi B&E	MCS-500	Discharge Pressure Compressor B and E
M-6	LiqPsi B&E	MCS-500	Liquid Line Pressure Compressor B and E
M-7	CmpAmps B	CT-300	Compressor B Amps
M-8	SuctTmp B&E	MCST100	Suction Temperature Compressor B and E
M-9	DiscTmp B&E	MCST100	Discharge Temperature Compressor B and E
M10	LiqTmp B&E	MCST100	Liquid Line Temperature Compressor B and E
M11	HiPsiSw B & E	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor B and E
M12	CndWtFlow	DIGITAL	Condenser Water Flow
M13	PhaseLoss	DIGITAL	Phase loss: Phase Imbalance Monitor
M14	AirFlow	DIGITAL	Air Flow Switch
M15	Run/Stop	DIGITAL	Run/Stop/Hand Switch
M16	HiStaticSW	DIGITAL	High Duct Static Switch
1-1	CndWtrIn	MCST100	Condenser Water Incoming Temperature
1-2	CndWrtOut	MCST100	Condenser Water Leaving Temperature
1-3	SuctPsi D	MCS-200	Suction Temperature Compressor D
1-4	DiscPsi D	MCS-500	Discharge Temperature Compressor D
1-5	LiqPsi D	MCS-500	Liquid Line Pressure Compressor D
1-6	CmpAmps D	CT-300	Compressor D Amps

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

Sensor Inputs (continued)

#	Output Name	Type	Description
1-7	SuctTemp D	MCST100	Suction Temperature Compressor D
1-8	DiscTemp D	MCST100	Discharge Temperature Compressor D
1-9	LiqTemp D	MCST100	Liquid Line Temperature Compressor D
1-10	HiPsiSW D	MCST100	Mechanical Hi Pressure Safety Switch Compressor D
1-11	Spare	Spare	Not Used - Reserved for Expansion
1-12	CmpAmps E	CT-300	Compressor E Amps
1-13	DiscTemp E	MCST100	Discharge Temperature Compressor E
1-14	SmokeAlarm	DIGITAL	Smoke Alarm Input
1-15	EmgStop	DIGITAL	Emergency stop switch
1-16	DuctStatic	STATIC 5"B	Duct Static Pressure
2-1	SuctPsi A	MCS-200	Suction Pressure Compressor A
2-2	DicsPsi A	MCS-500	Discharge Pressure Compressor A
2-3	LiqPsi A	MCS-500	Liquid Line Pressure Compressor A
2-4	CmpAmps A	CT-300 / 5	Compressor A Amps
2-5	SuctTmp A	MCST100	Suction Temperature Compressor A
2-6	DiscTmp A	MCST100	Discharge Temperature Compressor A
2-7	LiqTmp A	MCST100	Liquid Line Temperature Compressor A
2-8	HiPsiSw A	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor A
2-9	SuctPsi C	MCS-200	Suction Pressure Compressor C
2-10	DicsPsi C	MCS-500	Discharge Pressure Compressor C
2-11	LiqPsi C	MCS-500	Liquid Line Pressure Compressor C
2-12	CmpAmps C	CT-300 / 5	Compressor C Amps
2-13	SuctTmp C	MCST100	Suction Temperature Compressor C
2-14	DiscTmp C	MCST100	Discharge Temperature Compressor C
2-15	LiqTmp C	MCST100	Liquid Line Temperature Compressor C
2-16	HiPsiSw C	DIGITAL	Mechanical Hi Pressure Safety Switch Compressor C
3-1	SupHeatB&E	User Logic	Suction superheat for Compressor B and E
3-2	SuperHeat D	User Logic	Suction superheat for Compressor D
3-3	SuperHeat A	User Logic	Suction superheat for Compressor A
3-4	SuperHeat C	User Logic	Suction superheat for Compressor C
3-5	DiscSpht B	User Logic	Discharge superheat for Compressor B
3-6	DiscSpht D	User Logic	Discharge superheat for Compressor D
3-7	DiscSpht A	User Logic	Discharge superheat for Compressor A
3-8	DiscSpht C	User Logic	Discharge superheat for Compressor C
3-9	SubCool B&E	User Logic	Subcooling for Compressor B&E
3-10	SubCool D	User Logic	Subcooling for Compressor D
3-11	SubCool A	User Logic	Subcooling for Compressor A
3-12	SubCool C	User Logic	Subcooling for Compressor C

SWUD/SCWD Typical Points List

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

Sensor Inputs (continued)

#	Output Name	Type	Description
3-13	NetR/S	BMS RUN	Run/Stop from Building Management
3-14	NetTrgRst	BMS CW RSET	Chilled Water Reset from Building Management
3-15	NetDmdLmt	BMS Dmd Step	Capacity Step Limiting from Building Management
3-16	DmpOn/Off	User Logic	Damper On Proof
4-1	DmpOn/Off	BMS_SI	Damper Demand from Building Management

Analog Outputs

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

SWUD/SCWD Information

Company: _____ Phone: _____

Name: _____ Title: _____ Email: _____

Mobile: _____ Site: _____

Model Number	Serial Number	Refrigerant Used	Full Load Amps of Compressor

1. *Model of existing Panel:*   *If other, Panel_____*

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

3. *What Main Voltage is being supplied to the unit?* Voltage:_____ *What is the Control Voltage being supplied?* Voltage:_____

4. *Is the unit equipped with heating?*   Yes   No

    Electric - How is it controlled?

    ▪ If *On/Off* how many stages?   ▪ If *SCR* (Modulated) must use 0-10vdc signal for MCS control.

    Gas   *If Gas - MCS provides start command only.*

5. *Will MCS control the Evap (supply air fan?*   Yes   No

    ▪ How is the fan controlled?

6.   *Is there an outside air damper?*   Yes   No   If yes, how does it operate?

7. *Is the unit equipped with Economizer? (free Cooling)*

    Will MCS control Economizer?   Yes   No

8. *Will MCS monitor Evaporator Flow? If Yes:*

9. *Will MCS monitor Condenser Flow? If Yes:*

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

11. I*s MCS controlling Pumps?*   Yes   No

    a. How will the Chilled Water Pumps(s) be wired?

    b. How will the Condenser Water Pump be wired?

12. *How many refrigerant circuits on the unit?*

13. *What compressors are sharing a circuit(s)?*

14. *What is the 'RUN LOAD AMPS' (FLA)? COMP 1:*   *COMP 2:*   *COMP 3:*   *COMP 4:*   *COMP 5:*

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

Micro Control Systems

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