



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



# **RTAA CONTROLS-12 UPGRADE**

This brochure describes a standard upgrade package for the RTAA 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.





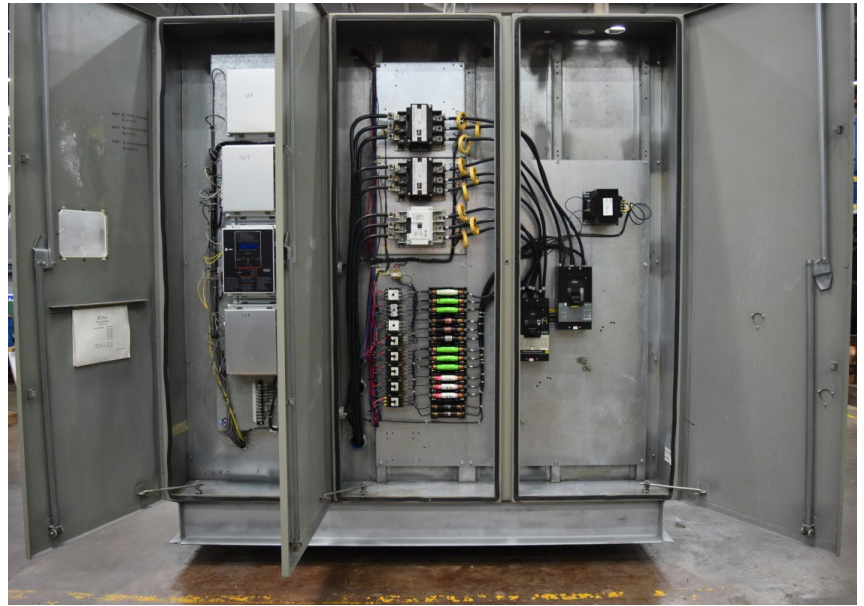
# MCS RTAA PHOTOS

## Reason for Upgrades

- Continuous shut down trips
- Existing Trane controls were obsolete
- Excessive man hours spent on site visits

## Steps Taken

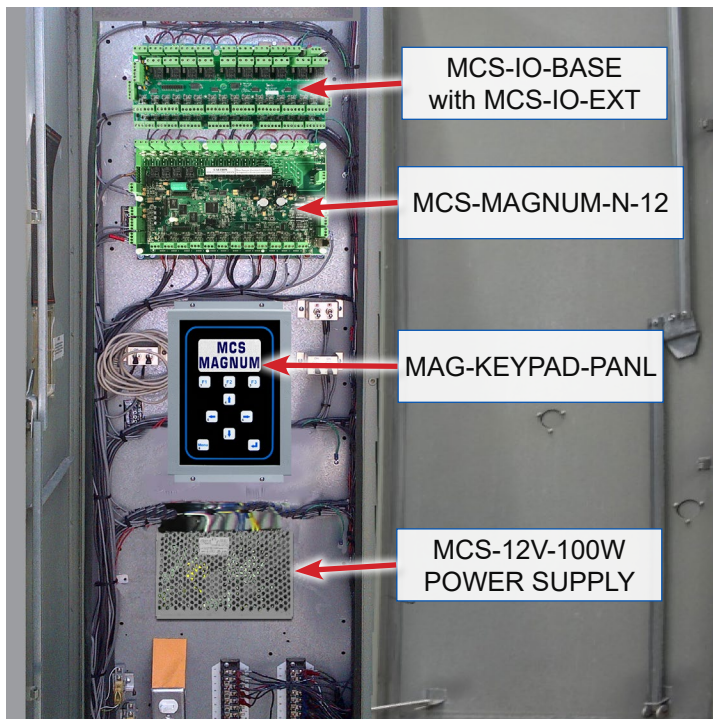
- Removed existing obsolete controls
- Installed MCS-Magnum Controls
- Replace Trane proprietary EXVs with standard Sporlan EXVs



RTAA chiller controls before upgrade

## Results:

Obsolete controls were replaced with MCS controls. This provided the customer with a control platform that is not built with a planned obsolescence. The MCS Controls 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.



RTAA with MCS control upgrade



Upgrades to EXVs



# MCS MAGNUM PANL-12



Part # MCS-MAGNUM-PANL-12



## Description

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 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-PANL-12** consists of a master micro controller along with a keypad and display. Complementing the Magnum micro controller are the **MCS-RO-BASE**, **MCS-RO-EXT** and **MCS-SI-BASE** and **MCS-SI-EXT** expansion boards. Power is supplied by a 50W Single Output Power Supply.

Communication with these units occurs at 38,400 baud over the MCS-I/O port, which is dedicated to this purpose.

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 using four #6 (6-32) sheet metal screws
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 88-264vac 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 (4 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 +158°F (-30°C to +80°C)

### MCS-12V-90W

#### 90W 12VDC Enclosed Switching Power Supply

Input Voltage: 88 VAC to 264 VAC
Output Voltage: 12 VDC @ 7.5Amps
Input Current: 3A / 115 AC - 1.6A / 230AC
Output Rated Current: 7.5A
Size: 2.76" x 3.54" x 2.14 (W*H*D (70*90*54.5mm))

# RTAA Typical Control Upgrade

## MCS-IO-BASE

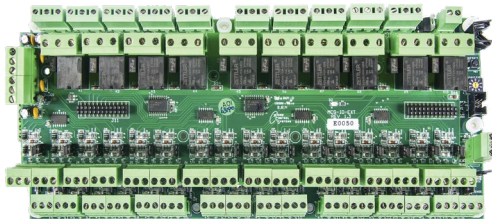
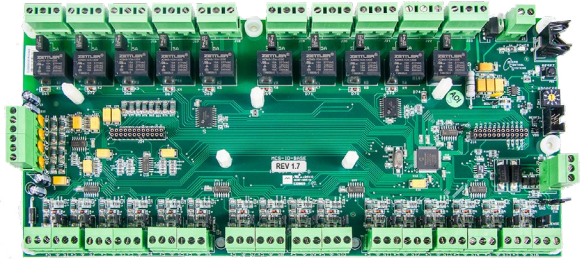
The MCS-IO-BASE provides a flexible and cost effective way to allow relay output, sensor input and analog output expansion for MCS MAGNUM.

Each MCS-IO-BASE has a stand-alone microprocessor which communicates with a 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-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 printed circuit board is a four layer board with a separate power and ground plane to provide the ultimate in efficient electrical noise suppression. This coupled with noise suppression circuitry makes the MCS-IO-BASE virtually impervious to electrical noise.

The MCS-IO-BASE provides sixteen sensor inputs. The inputs are universal and support either a digital or analog input signal. There are also four analog outputs that provide independent DC voltage outputs from 0 to 10vdc. These analog outputs are controlled by the MAGNUM micro controllers.

Ten relay outputs fused at 5.0 amps are provided. Each relay output provides common, normally open and normally closed contacts on a removable terminal block. Each input and output consists of a three position removable terminal block, providing +5vdc, ground and signal in. A polyfuse protects the +5vdc line from shorted sensors.



MCS-IO-EXT mounted to  
MCS-IO BASE

## MCS-IO-EXT

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. The inputs are universal and support either a digital or analog input signal.

The MCS-IO-EXT provides,16 additional sensor inputs, four additional analog outputs and 10 additional relay outputs that provide independent dc voltage outputs from 0 to 10vdc.

These analog outputs are controlled by the MAGNUM micro controllers.

## 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. By placing a 100,000 ohm resistor between signal and ground the sensor may be used in a three wire input mode.



# RTAA Typical Control Upgrade

## TRANSDUCERS



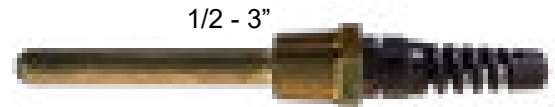
The **MCS Pressure Transducers** are one of the most economic and durable options on the market for dealing with high-pressure industrial applications.

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.



# RTAA Typical Control Upgrade

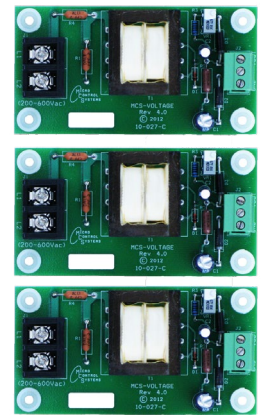


## MCS-PHASE

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).

# RTAA Typical Options

## 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.



# RTAA Typical Point List

## Relay Outputs

#	Output Name	Type	Description
M-1	Comp 1M	Screw w/ EXV	Compressor Start Main
M-2	Comp 1D	Standard	Compressor Start Delta
M-3	Load 1	Standard	Increase Compressor Capacity - Compressor 1
M-4	Unload 1	Standard	Decrease Compressor Capacity - Compressor 1
M-5	LiqLinSol1	Standard	Liquid Line Solenoid - Compressor 1
M-6	Spare	X	Not Used - Reserved for Expansion
M-7	Spare	X	Not Used - Reserved for Expansion
M-8	BrrlHeater	Standard	Evaporator Heater
M-9	Warning	Standard	Warning Light: Unit is in a safety condition prior to a safety shutdown
M-10	Alarm	Standard	Alarm Light: Unit is in a safety shutdown
1-1	Comp 2M	Screw w/ EXV	Compressor Start Main
1-2	Comp 2D	Standard	Compressor Start Delta
1-3	Load 2	Standard	Increase Compressor Capacity - Compressor 2
1-4	Unload 2	Standard	Decrease Compressor Capacity - Compressor 2
1-5	LiqLinSol2	Standard	Liquid Line Solenoid - Compressor 2
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	ChwPump 1	Standard	Chilled water pump #1: Turn ON or OFF
1-10	ChwPump 2	Standard	Chilled water pump #2: Turn ON or OFF
2-1	CndFan 1-1	Standard	Condensor Fan #1 : Turn ON or OFF
2-2	CndFan 1-2	Standard	Condensor Fan #2: Turn ON or OFF
2-3	CndFan 1-3	Standard	Condensor Fan #3: Turn ON or OFF
2-4	CndFan 1-4	Standard	Condensor Fan #4: Turn ON or OFF
2-5	CndFan 1-5	Standard	Condensor Fan #5: Turn ON or OFF
2-6	CndFan 2-1	Standard	Condensor Fan #1 : Turn ON or OFF
2-7	CndFan 2-2	Standard	Condensor Fan #2: Turn ON or OFF
2-8	CndFan 2-3	Standard	Condensor Fan #3: Turn ON or OFF
2-9	CndFan 2-4	Standard	Condensor Fan #4: Turn ON or OFF
2-10	CndFan 2-5	Standard	Condensor Fan #5: Turn ON or OFF

## Analog Outputs

#	Output Name	Type	Description
M-1	EXV1 %	Hardwired	% of Expansion Valve opening for Circuit 1
M-2	EXV2 %	Hardwired	% of Expansion Valve opening for Circuit 2



# RTAA Typical Point List

## Sensor Inputs

#	Input Name	Type	Description
M-1	ChillWtrIn	MCST100	Chilled Water In Temperature
M-2	ChillWtrOut	MCST100	Chilled Water Out Temperature
M-3	Suct PSI 1	MCS-200	Suction Pressure - Compressor 1
M-4	Disc PSI 1	MCS-500	Discharge Pressure - Compressor 1
M-5	Oil PSI 1	MCS-500	Oil Pressure - Compressor 1
M-6	Liq PSI 1	MCS-500	Liquid Refrigerant Pressure - Compressor 1
M-7	Cmp Amps 1	CT-300	Compressor Amperage 1
M-8	SuctTmp 1	MCS-T100	Suction Temperature - Compressor 1
M-9	DiscTmp 1	MCST100	Discharge Temperature - Compressor 1
M-10	LiqLinTmp 1	MCST100	Liquid Line Temperature - Compressor 1
M-11	Mtr Fault 1	Digital	Detects phase loss, phase reversal, high motor temperature & high discharge temperature - Compressor 1
M-12	Oil Fltr SW 1	Digital	Oil Filter Switch - Compressor 1
M-13	ChwFlow	Digital	Proof for chilled water flow
M-14	PhaseLoss	Digital	Phase loss: Phase imbalance
M-15	Run/Stop	Digital	Run/Stop Hand Switch
M-16	EmgStop	Digital	Emergency Stop Switch
1-1	Suct PSI 2	MCS-200	Suction Pressure - Compressor 2
1-2	Disc PSI 2	MCS-500	Discharge Pressure - Compressor 2
1-3	Oil PSI 2	MCS-500	Oil Pressure - Compressor 2
1-4	Liq PSI 2	MCS-500	Liquid Refrigerant Pressure - Compressor 2
1-5	Cmp Amps 2	CT-300	Compressor Amperage 2
1-6	Suct Tmp 2	MCST100	Suction Temperature - Compressor 2
1-7	Disc Tmp 2	MCST100	Discharge Temperature - Compressor 2
1-8	LiqLin Tmp 2	MCST100	Liquid Line Temperature - Compressor 2
1-9	Mtr Fault 2	Digital	Detects phase loss, phase reversal, high motor temperature & high discharge temperature - Compressor 2
1-10	OilFltrSW 2	Digital	Oil Filter Switch
1-11	Ambient	MCST100	Outdoor Air Temperature
1-12	TRGT RESET	TRGTRST	Reset to the Target Setpoint
1-13	Hi PSI SW1	Digital	Mechanical High Pressure Safety 1
1-14	Hi PSI SW2	Digital	Mechanical High Pressure Safety 2
1-15	Disable 1	Digital	Turns Off Compressor 1
1-15	Disable 2	Digital	Turns Off Compressor 2

# RTAA Typical Point List

#	Input Name	Type	Description
2-1	TransOK1	Digital	Transition Starter OK - Compressor 1
2-2	TransOK2	Digital	Transition Starter OK - Compressor 2
2-3	Volts A	User Defined	Volts phase A
2-4	Volts B	User Defined	Volts phase B
2-5	Volts C	User Defined	Volts phase C
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	Spare	X	Not Used - Reserved for Expansion
2-10	Spare	X	Not Used - Reserved for Expansion
2-11	Spare	X	Not Used - Reserved for Expansion
2-12	Spare	X	Not Used - Reserved for Expansion
2-13	Spare	X	Not Used - Reserved for Expansion
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
3-1	SuctSprHt1	User Logic	Suction Super Heat - Compressor 1
3-2	SuctSprHt2	User Logic	Suction Super Heat - Compressor 2
3-3	SubCool1	User Logic	Subcooling - Compressor 1
3-4	SubCool2	User Logic	Subcooling - Compressor 2
3-5	SuperHeat+	User Logic	Input for Plotting Super Heat with MCS Connect
3-6	SuperHeat-	User Logic	Input for Plotting Super Heat with MCS Connect
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	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



# TRANE RTAA Information

Use fillable form below that you can email to: [sales@mcscontrols.com](mailto:sales@mcscontrols.com)

Company: \_\_\_\_\_ Phone: \_\_\_\_\_

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Email: \_\_\_\_\_ Mobile: \_\_\_\_\_

Site: \_\_\_\_\_

**Please provide picture of Chiller name plate when possible**

Model Number	Serial Number

Refrigerant Type \_\_\_\_\_

Will the unit be communicating to BMS?      YES      NO

If YES, what Protocol will be used?

What is the Starter Type? \_\_\_\_\_

Are there VFD'S on the condenser fans?      YES      NO

If so, how many on each circuit? \_\_\_\_\_

What Main Voltage is being supplied to the unit? Voltage: \_\_\_\_\_

Is MCS monitoring Main Voltage?      Yes      No

What is the Control Voltage being supplied? Voltage: \_\_\_\_\_

Full load Amps of each compressor 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

Are there multiple power sources?      YES      NO

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

For additional information on any of our products, Email: [sales@mcscontrols.com](mailto: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](http://www.mcscontrols.com)