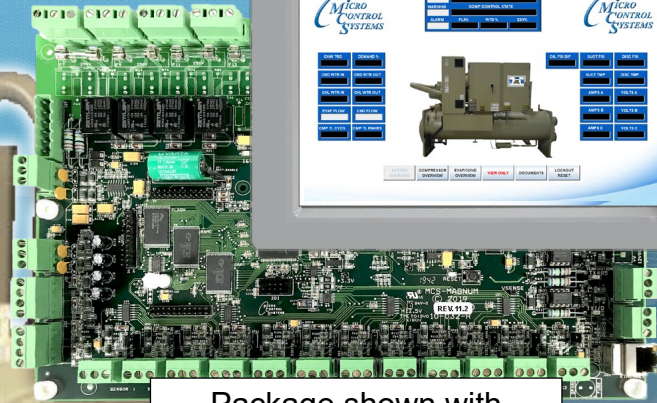
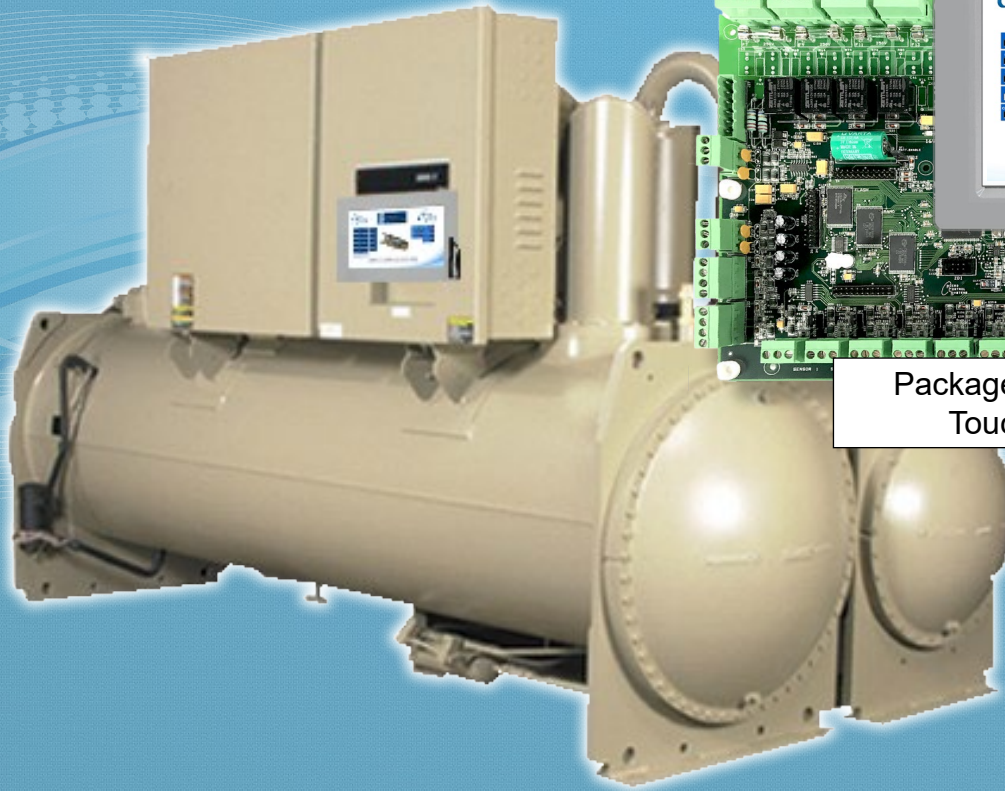




*MCS Total
Solutions for all your
HVAC/R Control Needs*



Package shown with
Touchscreen

RTHD CONTROLS UPGRADE-12

This brochure describes a standard upgrade package for the RTHD Chiller.

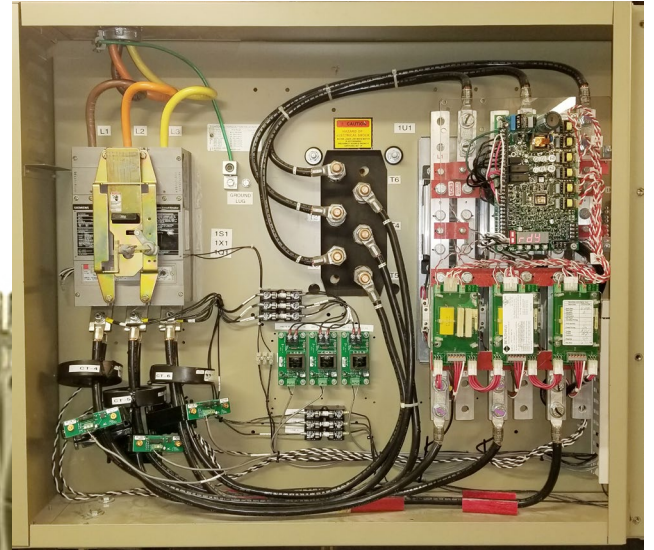
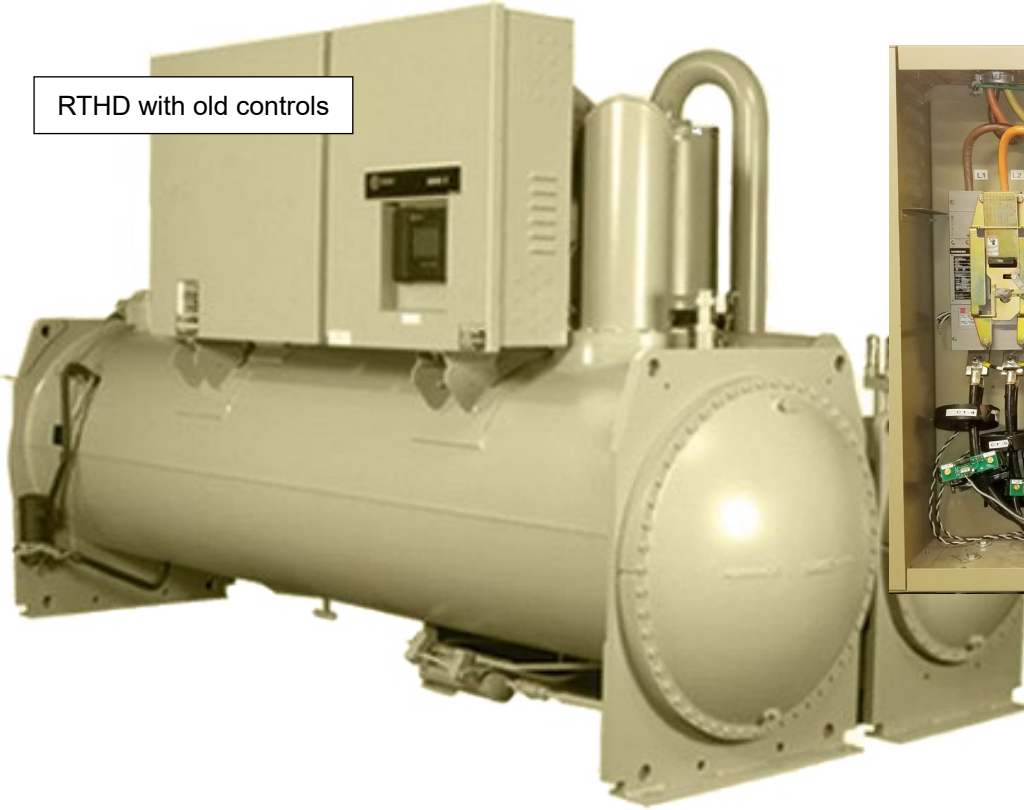
Each control upgrade installation is unique. It may be necessary to add additional options to the standard upgrade as described in this brochure.

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



RTHD UPGRADE PHOTOS

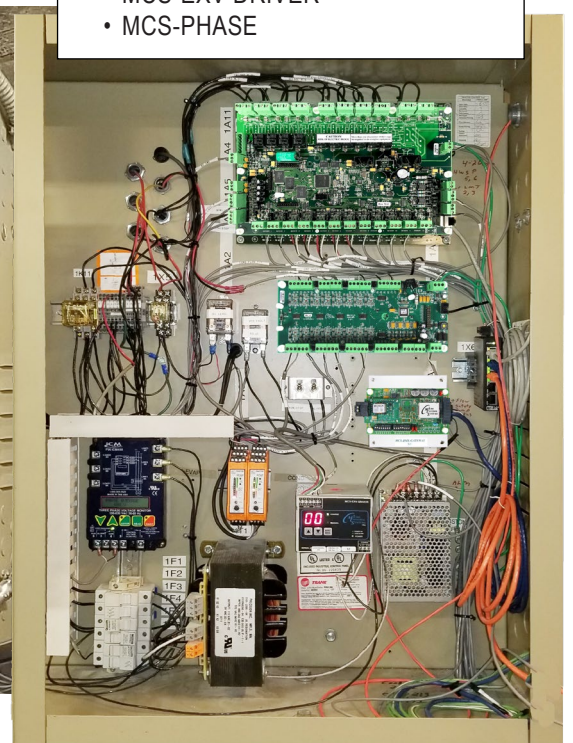
RTHD with old controls



Control Upgrades

MCS-MAGNUM-N-12

- MCS-SI-BASE
- MCS-BMS GATEWAY
- MCS-EXV DRIVER
- MCS-PHASE



RTHD Controller and Touchscreen Specs



Part # **MCS-MAGNUM-15.4-12**

Description

The **MCS-MAGNUM-15.4-12** consists of a MCS-MAGNUM controller along with a Touchscreen 15.4 in display.

The **MCS-TOUCH-15.4** capacitive 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. Input method: Finger, Stylus or *Glove.

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.

MCS-TOUCH-15.4 comes preloaded with the MCS-CONNECT program that allows you to view the 'unit's status', 'extended history', 'alerts', 'alarms', setpoints, and more, all in a user-friendly graphic format. The **MCS-TOUCH-15.4-12** can connect up to 60 MCS controllers and supports RS485 or Ethernet networking.

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 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-N is a UL Recognized Component under UL File #169780 and also ROHS compliant.

Complementing the Magnum micro controller are a variety of MCS expansion boards.

Packaging

MCS-SHIELDWIRE-GROUNDING multi-terminal splicing connector with 9"- 16 awg wire with ring terminal (package of 2).



Specifications

MCS-Magnum Controller

Dimensions.....	12.0" w, 8.0" h, 2.0" d
Mounting Holes	Mounts on a backplane utilizing 8 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

MCS-Touch 15.4

Dimensions	17" L x 12.11" W x 2" H
LCD Screen.....	15.4" (16:10 Diagonal) 1280 x 800 Resolution 5-Wire resistive touch w/Stylus pen
Gasket.....	HT800 Cellular Silicone NEMA 4 IP66 rated
Surface Treatment.....	Glare/Anti-Reflection ≤1.5%
Operating Temperature	-22°F to 176°F (-30°C to +80°C)
Operating Humidity.....	90 %RH (Non Condensing)
Storage Temperature	-22°F to 176°F (-30°C to +80°C)
Motherboard-Rev 4.0	Freescall i.MX6 Dual Core 800mhz 2Gb of 512mhz DDR3 RAM memory 16Gb of eMMC Flash memory 10m/100m/1G Ethernet 1 Micro-SD Slots 2 USB Host 2.0 Real Time Clock (RTC) w/ Battery 3 RS485 communication ports
Touchscreen Surface.....	UV Degradation Protection

Parts Included

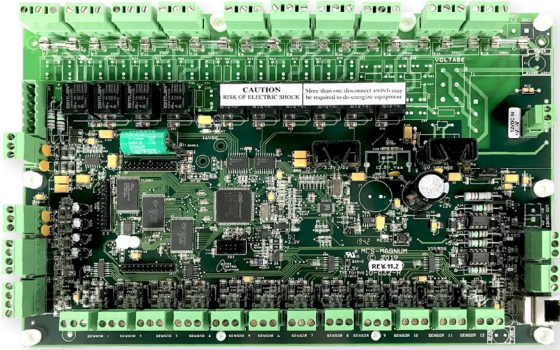
- **90W 12VDC Power Supply**
Input Voltage: 88 VAC to 264 VAC
Output Voltage: 12 VDC @ 7.5Amps
Input Current: 3A / 115 AC - 1.6A / 230AC
Output Rated Current: 7.5A
Size: 2.76" x 3.54" x 2.14 (W*H*D) (70*90*54.5mm)
- **7ft CAT 5e Crossover Patch Cord, Orange**
- **Kit of (8) #6 x 1" Phillips Pan head Zinc Plated Steel Screws**



* The glove needs to have a conductive fabric or material to work with cap touchscreens.

RTHD Controller and Touchscreen

MCS-MAGNUM-N-12



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 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.

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 1280x800 LCD display with LED back-lighting, 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.

Standard screens include:

- System Overview Screen
- Compressor Overview Screen
- Evaporator/Condenser Overview Screen
- Documents



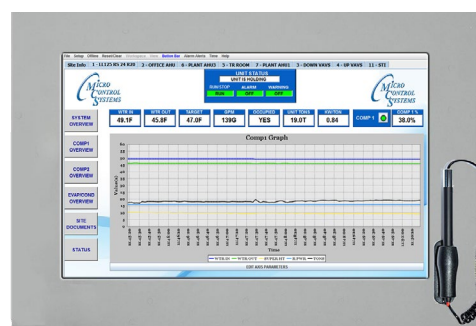
SYSTEM OVERVIEW



COMPRESSOR OVERVIEW SCREEN



EVAPORATOR CONDENSER OVERVIEW SCREEN



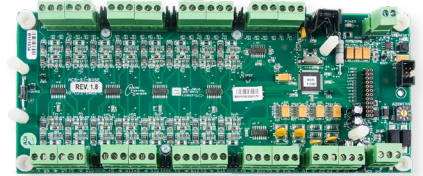
OPTIONAL 'GRAPHS OVERVIEW SCREEN IN REAL TIME'

RTHD Installed MCS Products

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.

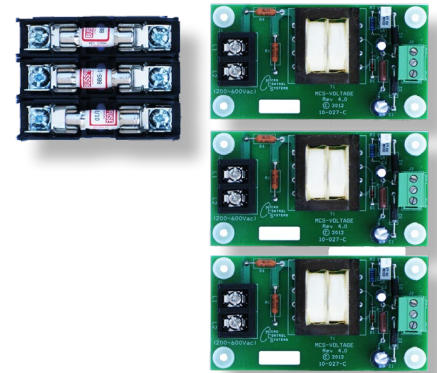
Each MCS-SI-BASE board can be powered by a 12VDC regulated power supply and has a automatic power fail reset system.



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's measuring.



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-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 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.

RTHD Installed MCS Products

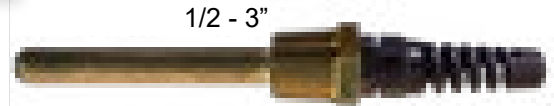
MCS T100 Temp Sensor



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 32°F to 212°F 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 RTHD 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-TUBE** can be epoxied to a discharge or suction line on the RTHA 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** 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-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

RTHD Installed MCS Products

MCS-CT500



MCS-CT500 current sensor monitors current flowing to electrical equipment. The magnitude of the current is converted to a linear output voltage between 0.06 to 4.52vdc 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-RTHD OIL SENSOR

MCS-RTHD OIL SENSOR uses light reflecting from a conical glass prism as a means of detecting the absence of a fluid at the level of the glass cone.

It is used in refrigeration systems in compressors to maintain a desired level of fluid.

When no fluid covers the lower half of the cone infra-red light from the module reflects from the mirror-like inner surface of the cone back to a light detector signaling the electronic module to switch. This signals the module to switch. When fluid covers the lower half of the cone, the light from the emitter disperses into the fluid. The resulting absence of reflected light is detected by the receiver and the module switches in the opposite direction.



RTHD Typical Options

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 over driving on full opened and full closed voltage signals. The display decimal notifies when over driving by blinking.



MCS-SEHI

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



MCS RTHD Standard Point List

Relay Outputs

#	Output Name	Type	Description
M-1	Comp M	Screw w\ EXV	Compressor main relay for star-delta
M-2	Comp D	Standard	Compressor transition relay for star-delta
M-3	Load	Standard	Increase compressor capacity
M-4	Unload	Standard	Decrease compressor capacity
M-5	Oil Sol	User Logic	Opens oil line to the compressor
M-6	OilHeater	User Logic	Oil heater: Turn ON or OFF
M-7	OilDranSol	User Logic	Operates Oil Drain Solenoid
M-8	OilFillSol	User Logic	Operates Oil Fill Solenoid
M-9	EvapValve	User Logic	Operated Evaporator Valve
M10	Alarm	Standard	Unit is in a safety shutdown

Sensor Inputs

#	Output Name	Type	Description
M-1	ChIWtrIn	MCST100	Chilled water in temperature
M-2	ChIWtrOut	MCST100	Chilled water out temperature
M-3	SuctPsi	MCS-200	Suction PSI
M-4	DiscPsi	MCS-500	Discharge PSI
M-5	LiqPsi	MCS-500	Liquid Refrigerant Pressure
M-6	OilInFltP	MCS-500	Oil Filter In Pressure
M-7	OilOutFltP	MCS-500	Oil Filter Out Pressure
M-8	SuctTmp	MCST100	Suction Temperature
M-9	DiscTmp	MCST100	Discharge temperature
M10	EvpRefTmp	MCST100	Evaporator refrigerant temperature
M11	LiqLineTmp	MCST100	Liquid Line Temperature - Compressor
M12	SpareM-12	SPARE	Sensor input not used
M13	Spare	NOT USED	Sensor input not used
M14	Run/Stop	DIGITAL	Run/Stop/Hand Switch
M15	EvapFlow	DIGITAL	Evaporator Flow Switch
M16	Emg/Stop	DIGITAL	Emergency stop switch

1-1	CndFlow	DIGITAL	Proof for condenser flow
1-2	CndWtrIn	MCST100	Chilled water in temperature
1-3	CndWtrOut	MCST100	Chilled water out temperature
1-4	HiPsiSW	DIGITAL	Mechanical high pressure safety
1-5	LoPsiSW	DIGITAL	Mechanical low pressure safety
1-6	CmpAmps A	CT-500	Reads amp draw on leg 1
1-7	CmpAmps B	CT-500	Reads amp draw on leg 2
1-8	CmpAmps C	CT-500	Reads amp draw on leg 3

MCS RTHD Standard Point List

Sensor Inputs

#	Output Name	Type	Description
1-9	OilDetect	DIGITAL	Detects if Oil is presence in Oil sump
1-10	Volts A	600VAC4	Volts phase A
1-11	Volts B	600VAC4	Volts phase B
1-12	Volts C	600VAC4	Volts phase C
1-13	Trans OK	DIGITAL	Transition Starter OK
1-14	Spare1-14	SPARE	Sensor input not used
1-15	Spare1-15	SPARE	Sensor input not used
1-16	Spare1-16	SPARE	Sensor input not used

2-1	EvapDifTmp	User Logic	Temperature Difference across Evaporator
2-2	CndDifTmp	User Logic	Temperature Difference across Condenser
2-3	SuperHeat	User Logic	Input for Plotting Super Heat with MCS Connect
2-4	SubCooling	User Logic	Subcooling - Compressor
2-5	Ctl Flow	User Logic	Evaporator and Condenser Flow Proven
2-6	EvapAppr	User Logic	Chilled water out temperature minus Evaporator refrigerant temperature
2-7	Bms R/S	BMS RUN	Hardwired BMS RUN/STOP
2-8	BmsDmd%	BMS Dmd FLA%	Hardwired Point for Demand %
2-9	BmsChwRst	BMS CW RSET	Hardwired BMS chilled water reset: Reset target temperature
2-10	UnitTons	TONS	Unit Tons - Logic purpose ONLY
2-11	Unit KW	KW	Unit Kilowatts - Logic purpose ONLY
2-12	KW/Tons	User Logic	Unit Kilowatts/Tons Calculation - Logic purpose ONLY
2-13	PwrFactor	User Logic	Power Factor Calculation - Logic purpose ONLY
2-14	ChwGPM	User Logic	Chilled Water Flow Rate
2-15	AllowUnit	User Logic	Run/stop indicator for graphic display - Logic purpose ONLY
2-16	OilFitDiff	User Logic	Oil Filter differential Pressure

3-1	DrtyOilFit	User Logic	Indicates Dirty Oil Filer
3-2	Spare3-2	SPARE	Sensor input not used
3-3	BMS Rest	BMS_SI	Building Management System Target Reset

Sensor Inputs

#	Output Name	Type	Description
M-1	EXV %	Standard	% of Expansion Valve opening

Notes

RTHD Information

Please visit our website for a fillable form that you can email to: sales@mcscontrols.com

Company: _____ Phone: _____

Name: _____ Title: _____ Email: _____

Mobile: _____ Site: _____

Model Number	Serial Number	Refrigerant Used	Full Load Amps of Compressor

- Model of existing Panel:**
- What is the Starter Type?** **Are we monitoring the Transition OK or Starter Fault?**
- How many EXV's are on the unit?** **NOTE: MCS WILL CONTROL EXV's ON SUCTION SUPERHEAT.**
- Is there a Variable Frequency Drive?:** What is the VFD Make and Model? Make: _____ Model: _____
 - Will the VFD be hardwired to MCS controls, over MODBUS or both?
 - If you are using a VFD other than a Yaskawa VFD, do you need MCS to control the VFD Enclosure Temperature and Fans? Yes No
- What protocol will be used for Building Management communication?**
- Will Phase loss need to be monitored?** Yes No
- What kind of Hot Gas Bypass is present?**
- Is MCS controlling Pumps?** Yes No
 - How will the Chilled Water Pump(s) be wired?**
 - How will the Condenser Water Pump be wired?**
- Is MCS controlling Condenser/Evaporator Isolation Valve?** Yes No BMS
- 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: _____
- What is the 'RUN LOAD AMPS' (FLA)** **COMP 1:**
- Will the Chilled/Condenser Water Flow be measured by Flow or Differential?**
- Will Ambient Temperature need to be monitored?** Yes No

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



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www.mcscontrols.com