Micro Control Systems

MCS Total Solutions for all your Control Needs

Air Cooled Chiller Upgrade Package(s)

Package with Keypad

Package with Touchscreen

This brochure describes a standard upgrade package for the Turbocor series chillers. 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.

Air Cooled Upgrade

Package with Industrial Control Panel

Concerns:

- Old controls failed
- Wanted controls that were easier to understand and greater reliability, plus better and clear information

Equipment:

- Smardt and other brands Water Cooled Chillers
- One to Four Turbocor Compressors
- One to Four Staging Valves
- Load balancing EXV control

Steps Taken:

- Remove existing controls
- Install MCS controls
- Reprogram boards for communication
- Provide on-site training and support for contractor to better understand MCS controls.

Results:

One Smardt Chiller upgraded with MCS controls and one satisfied customer who is very happy with all the information and data available compared to the competitor's controls.

Old Controls

New Controls

Package for MCS Touchscreen

MCS MAGNUM with Keypad
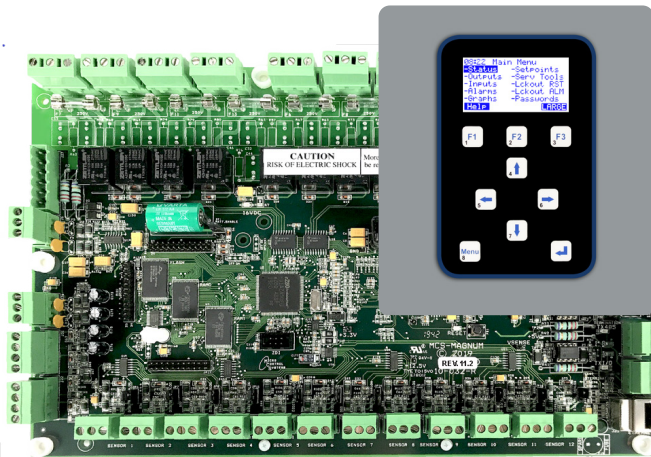
Part # **MCS-MAGNUM-DOOR**

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.

Accessory Parts

MCS-RS485-EXTENDER
   Cable for extending RS485 port to front
   of control cabinet

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)	12 vdc Regulated Power Supply
Minimum (Brown in)	9.44 vdc
Amp Draw (Loaded)	857.0 mA
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 Cutout Size	3.995"w x 5.955"h
Mounting Plate	7.5"w x 8.5"h
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)

Packaging

MAG-KEYPAD to MAGNUM 6 Conductor Cable with connectors

MAGNUM MOUNTING HARDWARE KIT
(8) #6-20 x 1" phillips panhead zinc plated steel drilling screw
Drilled Lexan 8" x 12" x 0.060 for Magnum board with
1-5/8" nylon standoff with 5/32" Snap Both Ends

Ship Weight	3.84 lb (approx)
Box Dimensions	13.25" x 9" x 5" (approx)

POWER SUPPLY NOT INCLUDED

Consult MCS-SALES for information on Power Supply sold for this controller.

MCS MAGNUM with TOUCHSCREEN

RoHS Compliant ✓
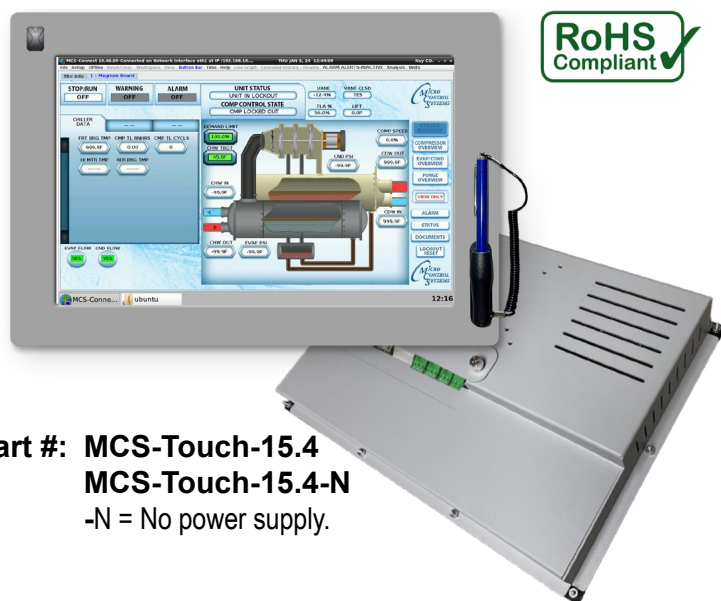
Part #: **MCS-Touch-15.4**
MCS-Touch-15.4-N
-N = No power supply.

Description

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, glove (The glove needs to have a conductive fabric or material to work with cap touchscreens).

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 pre loaded 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.

Also, with a proper authorization code, changes can be made to the setpoints, sensor offsets, schedule, etc.

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.*

Without Internet Connection:

*The user can save **'ALARM ALERT DATA'** to a USB memory stick. Also, you can save **'EXTENDED HISTORY DATA** to a USB memory stick for troubleshooting. This can be done with or without internet connection.*

The Touchscreens are suitable for installation, both indoor and outdoor. Utilizing a gasket for an environment seal provides the unit with a NEMA 4 rating if installed in a <u>NEMA4 enclosure.</u>

Dimensions......................17"L x 12.11"W x 3.228"H
432mm L x 308mm W x 82mm H
Mounting
    Door Mount .... Template included
    10 mount studs thru customers enclosure.
    MS4745 silicone gasket
    NEMA 4 IP66 rated
    Indoor or outdoor (Mounted in Nema4 Enclosure)
    VESA Mount.................. 75 x 75 mm;100 x 100 mm (indoor only)

LCD Screen ....15.4" (16:10 Diagonal)
16.2 Million Colors
1280x800 Resolution
View Angle 70°U, 70°D, 70°L, 70°R
Soft Touch Capacitive Stylus pen
White LED Backlight (Min Life 50,000 Hrs)
Luminance Min. 350 Min. 450 Typical
Glare/Anti-Reflection ≤1.5% Hard
Coating (3H)
Operating Temperature .... -22°F to 176°F (-30°C to +80°C)
Operating Humidity...............0-95% Non-Condensing
Storage Temperature .... -22°F to 176°F (-30°C to +80°C)
0 to 95% Humidity; Non-Cond.
Input Power.........................12 vdc Regulated Power Supply
Mcs-Ethernet Switch-B........ 5 x RJ45 ports, 10/100/1000 Mbps
Minimum (Brown in) .... 8.50 vdc
Amp Draw (Loaded) .... 2 Amps (Max)
Motherboard.......................Broadcom BCM2711 Quad core
Cortex (ARMv8) 64-bit SoC @ 1.5Ghz

INPUT	MINIMUM	NOMINAL	MAXIMUM
VOLTAGE	10	12	12.5
AMPS			2

Flash Memory......................16 GB EMMC
RAM....................................2 GB DDR3
RS-485 Ports ....2 @ go up to 115200 baud rate
Ethernet 10 Mbps/100Mbps/1Gbps
USB ....2 USB type B 2.0 ports 480Mbps signalling
Real Time Clock .... Battery backup(Type BR2032)

Power Supply Included -

(add - N to part number = NO Power Supply)

- **90W 12VDC Power Supply**
  Input Voltage: 88 VAC to 264 VAC
  Output Voltage: 12 VDC @ 7.5 Amps
  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 Ethernet Cable - Orange**

- **DIN Rail Mounting Kit for 90W 12VDC Power Supply**

Packaging

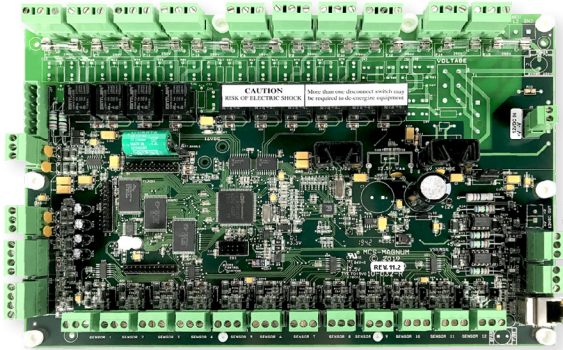Ship Weight .... 8.73 lb (approx)
Box Dimensions................. 16" x 12.5" x 8" (approx)

MCS Industrial Control Panel

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** 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. ***Standard screens include:***

- System Overview Screen
- Compressor Overview Screen
- Evaporator/Condenser Overview Screen
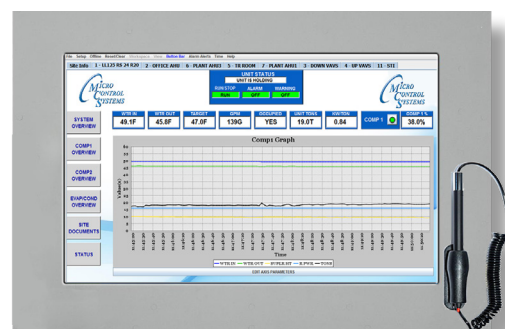- Documents
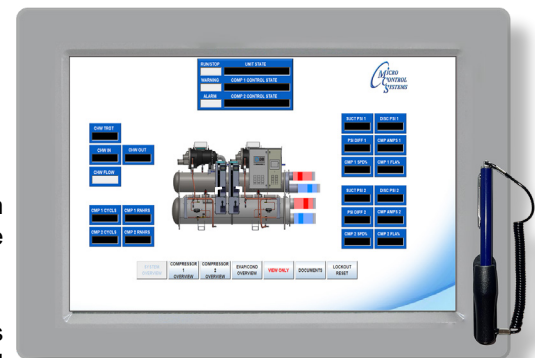
SYSTEM OVERVIEW
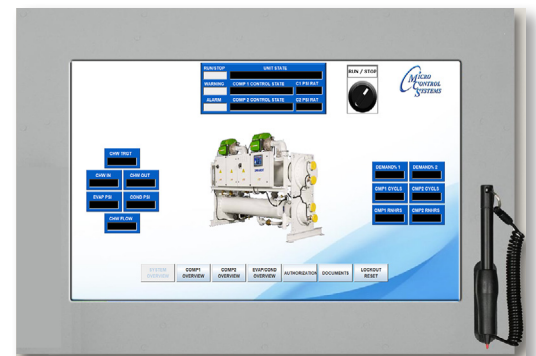
COMPRESSOR OVERVIEW


EVAPORATOR CONDENSER
OVERVIEW SCREEN

OPTIONAL
'GRAPHS OVERVIEW SCREEN IN
REAL TIME'

MCS Industrial Control Panel

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.
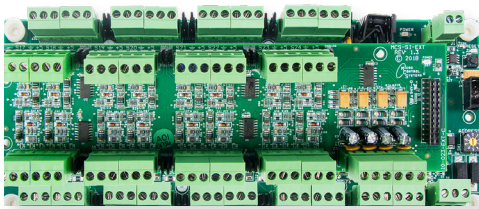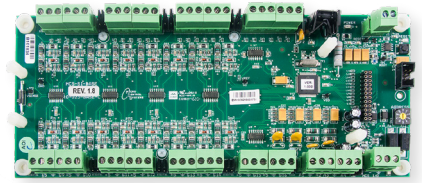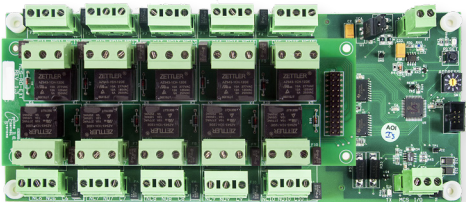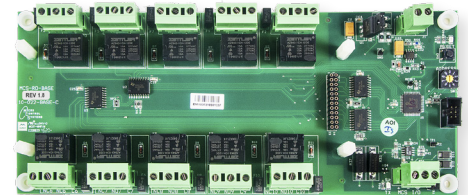
MCS-SI-EXT

MCS-SI-EXT mounted to
MCS-SI-BASE

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. 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 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.

MCS-RO-EXT

MCS-RO-EXT mounted to
MCS-RO-BASE

The **MCS-RO-EXT** provides a flexible and cost effective way to allow relay output expansion for the **MCS MAGNUM**.

Each MCS-RO-EXT can be paired with a 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.

Typical Upgrade

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.
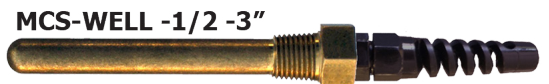
MCS-T-100 Temp Sensor

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

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.

MCS-WELL -1/2 -3"

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

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.
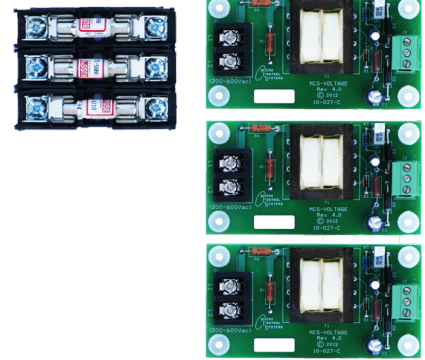
MCS-PHASE

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-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-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-RS-485 EXTENDER

For those installations requiring an RS-485 port to be accessible without the necessity of opening the Control Cabinet door, MCS offers the part shown above.

The MCS-RS-485-EXTENDER mounting plate can mount on the outside of your enclosure and plugs into the RS-485 port on the back of the keypad.

A removable three-position terminal block is provided for easy wiring. to the keypad.
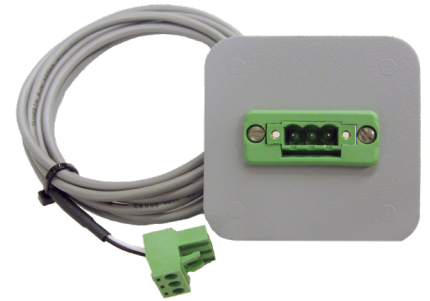
MCS-SEHI/SERI

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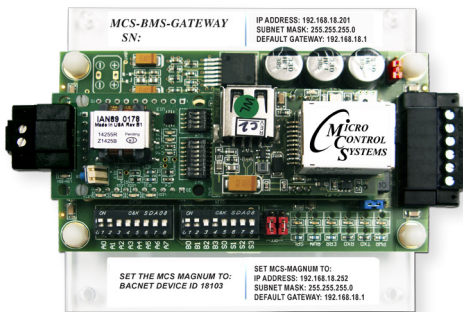
The **MCS-BMS-GATEWAY** is a microprocessor based communication device that provides translation from Bacnet IP, Bacnet MSTP, Modbus IP, Lontalk, or Johnson N2 communication interface. Information that can be transmitted includes the status of control points, alarm information, digital inputs, analog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

Air Cooled Points List

Relay Outputs

#	Output Name	Type	Description
M-1	SPAREM-1	Standard	Relay output not used
M-2	SPAREM-2	Standard	Relay output not used
M-3	SPAREM-3	Standard	Relay output not used
M-4	SPAREM-4	Standard	Relay output not used
M-5	SPAREM-5	Standard	Relay output not used
M-6	Cmp1I-Lock	Standard	Comp 1 J2 TurboCor Interlock
M-7	Cmp2I-Lock	User Logic	Comp 2 J2 TurboCor Interlock
M-8	Cmp3I-Lock	User Logic	Comp 3 J2 TurboCor Interlock
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

#	Output Name	Type	Description
1-1	Comp 1	Step w\ EXV	Compressor 1 Run Enable
1-2	SPARE1-2	Standard	Relay output not used
1-3	SPARE1-3	Standard	Relay output not used
1-4	SPARE1-4	Standard	Relay output not used
1-5	SPARE1-5	Standard	Relay output not used
1-6	SPARE1-6	Standard	Relay output not used
1-7	SPARE1-7	Standard	Relay output not used
1-8	SPARE1-8	Standard	Relay output not used
1-9	SPARE1-9	Standard	Relay output not used
1-10	SPARE1-10	Standard	Relay output not used

#	Output Name	Type	Description
2-1	Comp 2	Step w\ EXV	Compressor 2 Run Enable
2-2	SPARE2-2	Standard	Relay output not used
2-3	SPARE2-3	Standard	Relay output not used
2-4	SPARE2-4	Standard	Relay output not used
2-5	SPARE2-5	Standard	Relay output not used
2-6	SPARE2-6	Standard	Relay output not used
2-7	SPARE2-7	Standard	Relay output not used
2-8	SPARE2-8	Standard	Relay output not used
2-9	SPARE2-9	Standard	Relay output not used
2-10	SPARE2-10	Standard	Relay output not used

#	Output Name	Type	Description
3-1	Comp 3	Step w\ EXV	Compressor 3 Run Enable
3-2	SPARE2-2	Standard	Relay output not used

Air Cooled Points List

Relay Outputs

#	Output Name	Type	Description
3-3	SPARE2-3	Standard	Relay output not used
3-4	SPARE2-4	Standard	Relay output not used
3-5	SPARE2-5	Standard	Relay output not used
3-6	SPARE2-6	Standard	Relay output not used
3-7	SPARE2-7	Standard	Relay output not used
3-8	SPARE2-8	Standard	Relay output not used
3-9	SPARE2-9	Standard	Relay output not used
3-10	SPARE2-10	Standard	Relay output not used

#	Output Name	Type	Description
4-1	Cmp1Alarm	Standard	Comp 1 In Alarm Output
4-2	Cmp2Alarm	Standard	Comp 2 In Alarm Output
4-3	Cmp3Alarm	Standard	Comp 3 In Alarm Output

Sensor Inputs

#	Output Name	Type	Description
M-1	ChilWtrIn	MCST100	Chilled Water In Temperature
M-2	ChilWtrOut	MCST100	Chilled Water Leaving Temperature
M-3	CndWtrIn	MCST100	Condenser water incoming temperature
M-4	CndWtrOut	MCST100	Condenser water leaving temperature
M-5	CndLevel	User Defined	Condenser Level Sensor
M-6	LoPsi SW 1	DIGITAL	Mechanical Low Psi Switch Comp 1
M-7	HiPsi SW 1	DIGITAL	Mechanical High Psi Switch Comp 1
M-8	LoPsi SW 2	DIGITAL	Mechanical Low Psi Switch Comp 2
M-9	HiPsi SW 2	DIGITAL	Mechanical High Psi Switch Comp 2
M10	LoPsi SW 3	DIGITAL	Mechanical Low Psi Switch Comp 3
M11	HiPsi SW 3	DIGITAL	Mechanical High Psi Switch Comp 3
M12	CndFlow	DIGITAL	Monitors the condenser flow
M13	ChwFlow	DIGITAL	Monitors the chilled water flow
M14	Phaseloss	DIGITAL	Phase loss: phase imbalance
M15	Run/Stop	DIGITAL	Run/Stop/Hand Switch
M16	Emg/Stop	DIGITAL	Emergency Stop Switch

Air Cooled Points List

Sensor Inputs

#	Output Name	Type	Description
1-1	Cmp1 Fault	TurboCorFault	Compressor 1 Fault Message
1-2	Ctrl Mode1	ModbusHex	Compressor 1 Control Mode
1-3	IGV Open%	MODBUS	Inlet Guide Vane%-Compressor 1
1-4	SuctPsi 1	MODBUS	Suction Pressure - Compressor 1
1-5	DiscPsi 1	MODBUS	Discharge Pressure - Compressor 1
1-6	CavityTmp1	MODBUS	Cavity Temperature-Compressor 1
1-7	InvertTmp1	MODBUS	Inverter Temperature-Compressor 1
1-8	ChokSpeed1	MODBUS	Choke Speed-Compressor 1
1-9	SurgSpeed1	MODBUS	Surge Speed-Compressor 1
1-10	ActSpeed1	MODBUS	Actual Speed-Compressor 1
1-11	ComPSIRat1	MODBUS	Compressor 1 Pressure Ratio
1-12	Cmp1Amps	MODBUS	Compressor 1 Amperage
1-13	M IGV1STPS	MODBUS	Inlet Guide Vane Steps-Compressor 1
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	Cmp2 Fault	TurboCorFault	Compressor 2 Fault Message
2-2	Ctrl Mode2	ModbusHex	Compressor 2 Control Mode
2-3	IGV Open%	MODBUS	Inlet Guide Vane%-Compressor 2
2-4	SuctPsi 2	MODBUS	Suction Pressure - Compressor 2
2-5	DiscPsi 2	MODBUS	Discharge Pressure - Compressor 2
2-6	CavityTmp2	MODBUS	Cavity Temperature-Compressor 2
2-7	InvertTmp2	MODBUS	Inverter Temperature-Compressor 2
2-8	ChokSpeed2	MODBUS	Choke Speed-Compressor 2
2-9	SurgSpeed2	MODBUS	Surge Speed-Compressor 2
2-10	ActSpeed2	MODBUS	Actual Speed-Compressor 2
2-11	ComPSIRat2	MODBUS	Compressor 2 Pressure Ratio
2-12	Cmp2Amps	MODBUS	Compressor 2 Amperage
2-13	M IGV2STPS	MODBUS	Inlet Guide Vane Steps-Compressor 2
2-14	SPARE2-14	SPARE	Sensor input not used
2-15	SPARE2-15	SPARE	Sensor input not used
2-16	SPARE2-16	SPARE	Sensor input not used

Air Cooled Points List

Sensor Inputs

#	Output Name	Type	Description
3-1	Cmp3 Fault	TurboCorFault	Compressor 3 Fault Message
3-2	Ctrl Mode2	ModbusHex	Compressor 3 Control Mode
3-3	IGV Open%	MODBUS	Inlet Guide Vane%-Compressor 3
3-4	SuctPsi 2	MODBUS	Suction Pressure - Compressor 3
3-5	DiscPsi 2	MODBUS	Discharge Pressure - Compressor 3
3-6	CavityTmp2	MODBUS	Cavity Temperature-Compressor 3
3-7	InvertTmp2	MODBUS	Inverter Temperature-Compressor 3
3-8	ChokSpeed2	MODBUS	Choke Speed-Compressor 3
3-9	SurgSpeed2	MODBUS	Surge Speed-Compressor 3
3-10	ActSpeed2	MODBUS	Actual Speed-Compressor 3
3-11	ComPSIRat2	MODBUS	Compressor 3 Pressure Ratio
3-12	Cmp2Amps	MODBUS	Compressor 3 Amperage
3-13	M IGV2STPS	MODBUS	Inlet Guide Vane Steps-Compressor 3
3-14	SPARE2-14	SPARE	Sensor input not used
3-15	SPARE2-15	SPARE	Sensor input not used
3-16	SPARE2-16	SPARE	Sensor input not used

#	Output Name	Type	Description
4-1	EvapPsi	MCS-200	Evaporator Pressure
4-2	DiscPsi 1	MCS-500	Discharge Pressure 1
4-3	DiscPsi 2	MCS-500	Discharge Pressure 2
4-4	DiscPsi 3	MCS-500	Discharge Pressure 3
4-5	LiqPsi	MCS-500	Liquid Pressure
4-6	SuctTmp 1	MCST100	Suction Temperature - Compressor 1
4-7	SuctTmp 2	MCST100	Suction Temperature - Compressor 2
4-8	SuctTmp 3	MCST100	Suction Temperature - Compressor 3
4-9	DiscTmp 1	MCST100	Discharge Temperature - Compressor 1
4-10	DiscTmp 2	MCST100	Discharge Temperature - Compressor 2
4-11	DiscTmp 3	MCST100	Discharge Temperature - Compressor 3
4-12	LiqTmp	MCST100	Liquid Temperature
4-13	Disable 1	DIGITAL	Turns Off Compressor 1
4-14	Disable 2	DIGITAL	Turns Off Compressor 2
4-15	Disable 3	DIGITAL	Turns Off Compressor 3
4-16	Ambient	MCST100	Outdoor Air Temperature

Typical Points List

Sensor Inputs

#	Output Name	Type	Description
5-1	Net R/S	BMS RUN	Building Management interface Run/Stop
5-2	NetReset	BMS CW RSET	Building Management interface target reset
5-3	NetDmdLmt	BMS Dmd FLA%	Building Management interface for Demand %

Analog Outputs

#	Output Name	Description
M-1	EXV %	Electronic Expansion Valve Control Signal
M-2	CndFans%	Analog input for control fans
M-3	HotGas%	Analog for controlling Hot Gas valve
M-4	SpareM-4	Analog input not used
1-1	Demand 1%	Compressor 1 Speed Demand
1-2	SPARE1-2	Analog input not used
1-3	SPARE1-3	Analog input not used
1-4	SPARE1-4	Analog input not used
2-1	Demand 2%	Compressor 2 Speed Demand
2-2	SPARE2-2	Analog input not used
2-3	SPARE2-3	Analog input not used
2-4	SPARE2-4	Analog input not used
3-1	Demand 3%	Compressor 2 Speed Demand
3-2	SPARE2-2	Analog input not used
3-3	SPARE2-3	Analog input not used
3-4	SPARE2-4	Analog input not used

Air Cooled Information

Company: _____   Phone: _____

Name: _____ Title: _____ Email: _____

Mobile:_____ Jobsite: _____

Chiller Manufacturer	Chiller Model Number	Chiller Serial Number	Refrigerant Type

Will existing panel enclosure be used?   Yes   No, MCS will supply loose board to mount in the existing enclosure.

How many Circuits? _____   How many compressors per circuit?_____

1. *Compressor Model(s):   Comp #1: _____   Comp #2: _____   Comp #3_____   Comp#4: _____*

2. *What is the compressor's Full Load Amps (FLA)? Comp #1:_____ Comp #2: _____ Comp #3: _____ Comp # 4:_____*

3. *Does / Will unit have a refrigerant Level Sensor   Yes   No   If no, MCS will control on Suction Superheat.*

     If yes, is the Level Sensor located on: Evaporator   Condenser

     Level Sensor Model:_____   Signal Output?_____

4. *What model EXVS will you be using for: refrigerant level/superheat control?_____   How many EXVS?_____*

5. *Does / Will you be using a staging valve for each compressor?   Yes   No*
    (comes off the discharge of compressor BEFORE the check valve and goes back to suction side of compressor. Each compressor will have its own valve)

     If yes, what model valves? Comp #1: _____   Comp #2: _____   Comp #3:_____   Comp #4: _____

6. *Does / Will you be using a (LBV) load balancing valve (aka hot gas valve) on the unit?   Yes   No*

     (comes off the discharge of compressor **AFTER** the check valve) *If yes, what model valve? _____*

7. *Will MCS control the Condenser?   Yes   No   Condenser type? _____*

     If Air Cooled, Common Condenser?   Yes   No

     If yes, how many fans? _____ If no, how many fans per circuit?_____   VFD on first fan, per circuit?   Yes   No

8. *Will MCS control the Evaporator?   Yes   No   If yes, 1 or 2 pumps? _____   VFD's?   Yes   No*

9. *Is there an Economizer on this chiller?   Yes   No   Type of Economizer? _____*

     If 'None', what type of econo control used to the compressor?_____
     (EXV modulated based on econo superheat(requires econo suct psi & Temp)

10. *Will the unit be communicating to BMS?   Yes   No   What Protocol will be used to BMS? _____*

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

Micro Control Systems