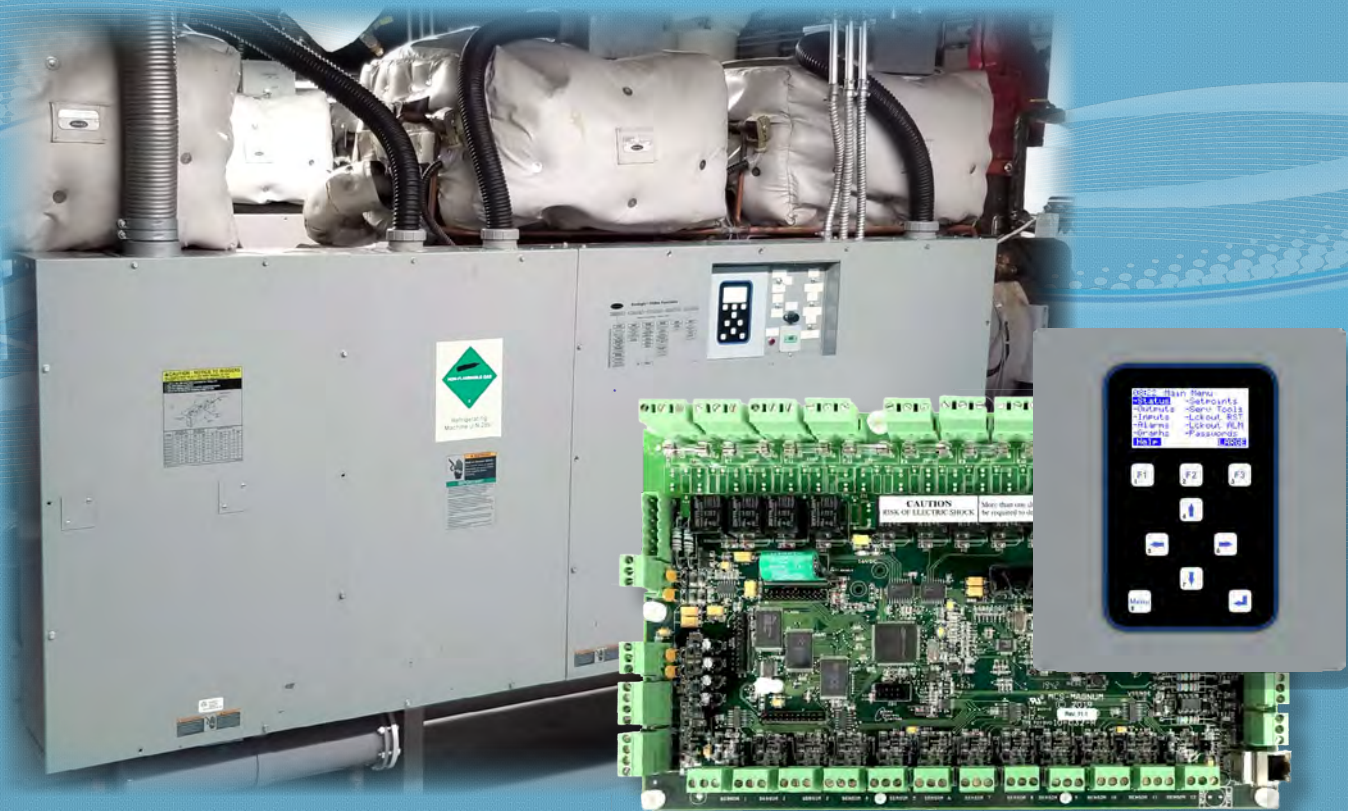




*MCS Total
Solutions for all your
HVAC/R Control Needs*



30HXC WATERCOOLED-12 CONTROLS UPGRADE

This brochure describes a standard upgrade package for the 30HXC Chiller.

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

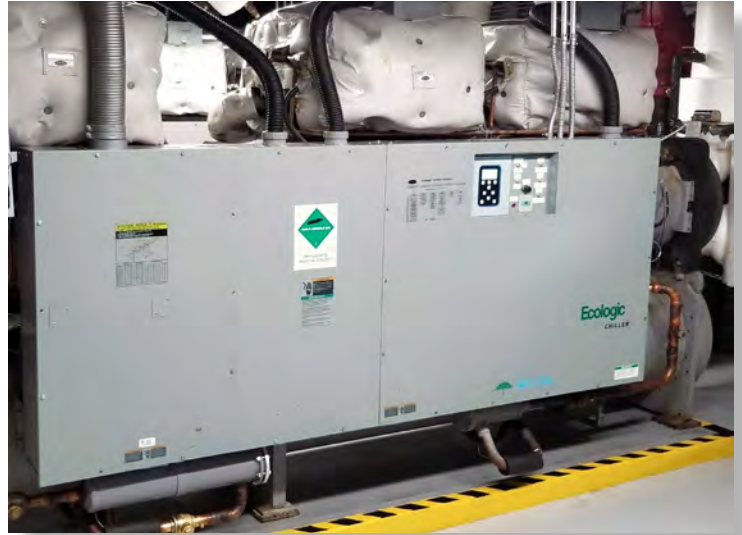
Fill out the brief questionnaire in the back of this brochure and forward to your sales representative for an estimate.



30HXC Typical Upgrade

Reason for Upgrades:

- Failing linear floats in the economizer
- Continuous shut down trips
- Existing controls were obsolete
- Excessive man hours spent on site visits



Steps Taken:

- Removed existing obsolete controls
- Installed MCS-Magnum Controls
- Replaced old canister style economizer with a new plate-frame style economizer.
- Replace proprietary EXVs with standard Sporlan EXVs
- Connected compressor motor temperature sensors to MCS-Magnum Controller
- Customer added additional fan contractors to improve Discharge PSI control.



NEW
MCS
MAGNUM
CONTROLS



NEW
MCS Retrofit
Economizer
Piping Re-sized

Results:

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

MCS MAGNUM DOOR-12



Part # **MCS-MAGNUM-DOOR-12**



Description

The **MCS-MAGNUM** 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** and a **MCS-SI-EXT** expansion boards. Power is supplied by a 90W 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.

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 88-264vac switching 100W 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-12V-90W

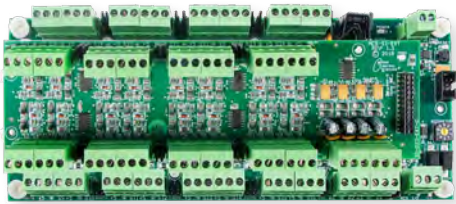
90W 12VDC Enclosed Switching Power Supply

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))

30HXC Typical Components

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.



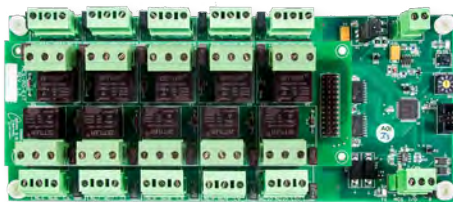
MCS-SI-EXT mounted to
MCS-SI-BASE

MCS-SI-EXT

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 mounted to
MCS-RO-BASE

MCS-RO-EXT

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.

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.



30HXC Typical Components

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 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 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.



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-CARRIER 5K-ADAPTER



The Carrier 30 HXC chiller comes equipped with embedded 5K thermistors in the motor. There are two (2) thermistors factory installed in each compressor. There are three (3) terminals for the thermistors. (S1, S2 & C) Motor temperature is measured by leads connected to one of the S terminals and the C terminal.

30HXC Typical Components



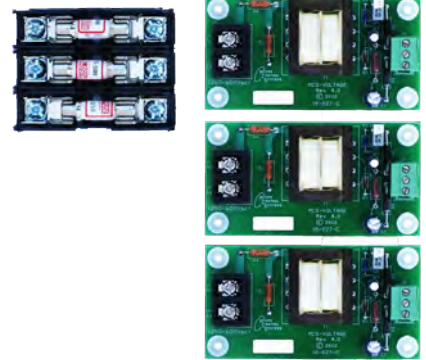
MCS-CT300

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-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.



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).

30HXC Typical Components

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-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.



30HXC 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.



30HXC Typical Point List

Relay Outputs

#	Output Name	Type	Description
M-1	Comp 1AM	Step w/ EXV	Compressor 1 main relay for star-delta
M-2	Comp 1AD	Standard	Compressor 1 transition relay for star-delta
M-3	Load 1A-1	Step w/ EXV	Compressor 1 loaded to 50%
M-4	Load 1A-2	Step w/ EXV	Compressor 1 loaded to 100%
M-5	Oil Pump 1A	Standard	Oil pump: Turn ON or OFF circuit A
M-6	HotGas 1A	Standard	Hot gas bypass: Turn ON or OFF circuit A
M-7	LiqInj 1A	Standard	Liquid injection motor cooling compressor 1
M-8	Oil Sol 1A	User Logic	Opens oil line to the compressor circuit A
M-9	Econ 1A	User Logic	Opens solenoid for economizer circuit A
M-10	Warning	Standard	Warning Light: unit is in a safety condition prior to a safety shutdown.
1-1	Comp 2BM	Step w/ EXV	Compressor 2 main relay for star-delta
1-2	Comp 2BD	Standard	Compressor 2 transition relay for star-delta
1-3	Load 2B-1	Step w/ EXV	Compressor 2 loaded to 50%
1-4	Load 2B-2	Step w/ EXV	Compressor 2 loaded to 100%
1-5	Oil Pump 2B	Standard	Oil pump: Turn ON or OFF circuit B
1-6	HotGas 2B	Standard	Hot gas bypass: Turn ON or OFF circuit B
1-7	LiqInj 2B	Standard	Liquid injection motor cooling compressor 2
1-8	Oil Sol 2B	User Logic	Opens oil line to the compressor circuit B
1-9	Econ 2B	User Logic	Opens solenoid for economizer circuit 2
1-10	Alarm	Standard	Alarm Light: unit is in a safety shutdown
2-1	Comp 3AM	Step w/ EXV	Compressor 3 main relay for star-delta
2-2	Comp 3AD	Standard	Compressor 3 transition relay for star-delta
2-3	Load 3A-1	Step w/ EXV	Compressor 3 loaded to 50%
2-4	Load 3A-2	Step w/ EXV	Compressor 3 loaded to 100%
2-5	Oil Pump 3A	Standard	Oil pump: Turn ON or OFF circuit A
2-6	LiqInj 3A	Standard	Liquid injection motor cooling compressor 3
2-7	Oil Sol 3A	User Logic	Opens oil line to the compressor circuit A
2-8	Econ 3A	User Logic	Opens solenoid for economizer circuit A
2-9	Spare 2-9	Spare	Relay output not used
2-10	Spare 2-10	Spare	Relay output not used
3-1	Evap Pump	Standard	Evaporator loop pump: Turn ON or OFF
3-2	Cnd Pump	User Logic	Condenser pump: Turn ON or OFF
3-3	Tower Fan	Standard	Tower fan enable
3-4	Spare 3-4	Spare	Relay output not used
3-5	Spare 3-5	Spare	Relay output not used
3-6	Spare 3-6	Spare	Relay output not used
3-7	Spare 3-7	Spare	Relay output not used
3-8	Spare 3-8	Spare	Relay output not used
3-9	Spare 3-9	Spare	Relay output not used
3-10	Spare 3-10	Spare	Relay output not used

30HXC Typical Point List

Analog Outputs

#	Output Name	Description
M-1	Exv 1%	% of EXV valve opening for circuit A
M-2	Exv 2%	% of EXV valve opening for circuit B
M-3	CndSpd%	% of condensor fan/pump speed

Sensor Inputs

#	Input Name	Type	Description
M-1	ChilWtr In	MCS-T100	Chilled water in temperature
M-2	ChilWtrOut	MCS-T100	Chilled water out temperature
M-3	Suct Psi 1A	MCS-200	Suction PSI circuit A
M-4	Disc Psi 1A	MCS-500	Discharge PSI circuit A
M-5	Oil Psi 1A	MCS-500	Oil PSI circuit A
M-6	Amps 1A	CT-300	Compressor amps compressor 1
M-7	Suct Tmp 1A	MCS-T100	Suction temperature circuit A
M-8	Disc Tmp 1A	MCS-T100	Discharge temperature circuit A
M-9	Mtr Tmp 1A	Carr-5K	Reads the motor temperature on circuit A
M-10	TransOK 1A	Digital	Transition starter OK circuit A
M-11	Oil Lvl 1A	Digital	Oil level float switch compressor 1
M-12	Mtr Ovld1A	Digital	Motor module reading compressor 1
M-13	ChilWtrFlow	Digital	Proof for condenser flow
M-14	PhaseLoss	Digital	Phase loss: phase imbalance
M-15	Run/Stop	Digital	Run/Stop/Hand Switch
M-16	Emg/Stop	Digital	Emergency stop switch
1-1	Suct Psi 2B	MCS-200	Suction PSI circuit B
1-2	Disc Psi 2B	MCS-500	Discharge PSI circuit 2B
1-3	Oil Psi 2B	MCS-500	Oil PSI circuit 2B
1-4	Amps 2B	CT-300	Compressor amps compressor 2
1-5	Suct Tmp 2B	MCS-T100	Suction temperature circuit B
1-6	Disc Tmp 2B	MCS-T100	Discharge temperature circuit B
1-7	Mtr Tmp 2B	Carr-5K	Reads the motor temperature on circuit B
1-8	TransOK 2B	Digital	Transition starter OK circuit B
1-9	Oil Lvl 2B	Digital	Oil level float switch compressor 2
1-10	Mtr Ovld2B	Digital	Motor module reading compressor 2
1-11	Suct Psi 3A	MCS-200	Suction PSI circuit A
1-12	Disc Psi 3A	MCS-500	Discharge PSI circuit A
1-13	Oil Psi 3A	MCS-500	Oil PSI circuit A
1-14	Amps 3A	CT-300	Compressor amps compressor 3
1-15	Suct Tmp 3A	MCS-T100	Suction temperature circuit A

30HXC Typical Point List

Sensor Inputs			
#	Input Name	Type	Description
1-16	Disc Tmp 3A	MCS-T100	Discharge temperature circuit A
2-1	Mtr Tmp 3A	Carr-5K	Reads the motor temperature on circuit A
2-2	TransOK 3A	Digital	Transition starter OK circuit A
2-3	Oil Lvl 3A	Digital	Oil level float switch compressor 3
2-4	Mtr Ovld3A	Digital	Motor module reading compressor 3
2-5	LiqRefTmp1	MCS-T100	Evaporator barrel temperature circuit A
2-6	LiqRefTmp2	MCS-T100	Evaporator barrel temperature circuit B
2-7	EvpRefTmp1	MCS-T100	Evaporator refrigerant temperature circuit 1A
2-8	EvpRefTmp2	MCS-T100	Evaporator refrigerant temperature circuit 2B
2-9	Ref Lvl 1	VOLT5DC	Refrigerant level circuit A
2-10	Ref Lvl 2	VOLT5DC	Refrigerant level circuit B
2-11	CndWtrIn	MCS-T100	Condenser water incoming temperature
2-12	CndWtrOut	MCS-T100	Condenser water leaving temperature
2-13	CndWtrFlow	Digital	Verifies that the cooling loop pump is running
2-14	MechHiPsi1	Digital	Mechanical high pressure safety circuit 1A
2-15	MechHiPsi2	Digital	Mechanical high pressure safety circuit 2B
2-16	Disable1	Digital	Turns off compressor 1
3-1	Disable2	Digital	Turns off compressor 2
3-2	Disable3	Digital	Turns off compressor 3
3-3	Ctrl Flow	User Logic	Monitors the chilled water and condenser flow
3-4	Spare 3-4	Spare	Sensor input not used
3-5	Spare 3-5	Spare	Sensor input not used
3-6	Spare 3-6	Spare	Sensor input not used
3-7	Spare 3-7	Spare	Sensor input not used
3-8	Spare 3-8	Spare	Sensor input not used
3-9	Spare 3-9	Spare	Sensor input not used
3-10	Spare 3-10	Spare	Sensor input not used
3-11	Spare 3-11	Spare	Sensor input not used
3-12	Spare 3-12	Spare	Sensor input not used
3-13	Spare 3-13	Spare	Sensor input not used
3-14	Spare 3-14	Spare	Sensor input not used
3-15	Spare 3-15	Spare	Sensor input not used
3-16	Spare 3-16	Spare	Sensor input not used

30HXC Information

NOTE: This form has drop down fillable areas. If you are viewing from a brochure, please visit our website for a form that you can fill in and email to: sales@mcscontrols.com

Company: _____ Phone: _____
 Name: _____ Title: _____ Email: _____
 Mobile: _____ Site: _____

Model Number	Serial Number	Refrigerant Type	Full Load Amps of Compressor

1. *What is the Starter Type?*
2. *Does this unit have a Economizer? If yes, what type?* Yes No
3. *Evaporator location?*
4. *Is MCS controlling Pumps?* Yes No
 - a. *How will the Chilled Water Pump(s) be wired?*
 - b. *How will the Condenser Water Pump be wired?*
3. *Will MCS control Tower Fan* Yes No *Is the tower Fan on a VFD?* Yes No
4. *Will the unit be communicating to BMS?* Yes No

What protocol will be used for BMS?
5. *What Main Voltage is being supplied to the unit?* Voltage: _____ *Is MCS monitoring Main Voltage?* Yes No
6. *What is the Control Voltage being supplied?* Voltage: _____
7. *What is the 'RUN LOAD AMPS' (FLA)* COMP 1: COMP 2: COMP 3: COMP 4:
8. *Does the Chiller have Hot Gas?* Yes No

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

For additional information on any of our products, Email: sales@mcscontrols.com or call 239-694-0089

Fax this form to: 239-694-0031



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www.mcscontrols.com