MCS-8 Getting Started
Chiller Manual

Revision 1.2
Hardware Rev. 1.5
Software CHLS / CHLR 07.00-'K' & greater

The MCS Commitment

Our commitment is to provide practical solutions for the industries needs and to be both a leader and partner in the effective use of microprocessor controls.

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Revision Page

Date	Author	Description of Changes
7/13/99	John G. Walterick	Updated Kelly L. Mitchell beginning manual
02/15/00	John G. Walterick	Added Startup section
07/24/00	John G. Walterick	Added Mounting & Wiring MCS Equipment section
08/30/00	John G. Walterick	Updated for CHLR & CHLS 07.00-K

Table of Contents

Getting Started

About the MCS-8

The MCS-8 is a rugged microprocessor based controller that is built for the hostile environment of the HVAC/R industry. It is designed to provide primary control, no mechanical controls; interface with building management systems and communicate both locally and remotely. The MCS-8 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-8 is designed to safeguard the system that is being controlled, eliminate the need for manual intervention and to provide a simple but meaningful man-machine-interface.

With the MCS-8 you can display and modify information with either of the following methods:

- Using the keypad/display at the MCS-8 –
This part of the system is designed for the local HVAC/R. The display is structured to provide the information that would be seen via gauges, a meter, an amp probe, a temperature measuring device, etc. as well as information on alarms, lockouts and current control states.
- Using an optional 'Windows' based system, PC-Connection
The 'Windows' based system will provide the local HVAC/R person as well as the building management person with complete information on the unit utilizing the power of 'Windows'. Complete presentation on current status, alarms, setpoints, run times, cycles, etc. are available. In addition, graphing is available from history as well as current dynamic graphing.

The following sections describe how to use the MCS-8's keypad and display. For information on using the PC-Connection program see the user's manual supplied with the software.

Using the Keypad/Display

With the keypad/display the user can monitor the chiller's operating conditions, system alarms, operating schedules and has the ability to utilize diagnostic tools. With the proper authorization level the user has the ability to clear system alarms, system lockouts, change setpoints, change the status of a setpoint (i.e. auto/manual) and operating schedules.

Keypad Structure

The keypad information in the MCS-8 controller is organized in a two-part menu structure to provide quick access. ('DISPLAY STATUS' and 'ENTRY')

♦ <u>DISPLAY STATUS</u>- This section provides the current status of the following:
- Current status of Compressor, Condenser and Evaporator relay outputs.
 ('ON', 'OFF, 'LOCKED OFF' and 'MANUAL')
- Current values of Temperatures, Amperes, Pressures and Digital inputs.
 (Digital inputs consist of Phase Loss, Run/Stop, Pump Down, Evaporator Flow, etc.)

♦ <u>ENTRY</u>- This section provides the current information related to the operation of the unit and the ability to alter certain portions of data. :
- Service Diagnostics provides Control States, Authorization, Sensor Offsets, etc.
- Setpoints allows changing parameters currently running the unit.
- Manual allows placing Relay outputs, Analog outputs or Sensors inputs in manual.
- Program Options provides access to Date, Time etc functions.

The Micro Control Center Keypad Display Quick Reference

- No authorization is required in the DISPLAY STATUS section for viewing information.
- Pressing a key selects the 1st two lines of data. Repressing the same key selects the next two lines, etc.
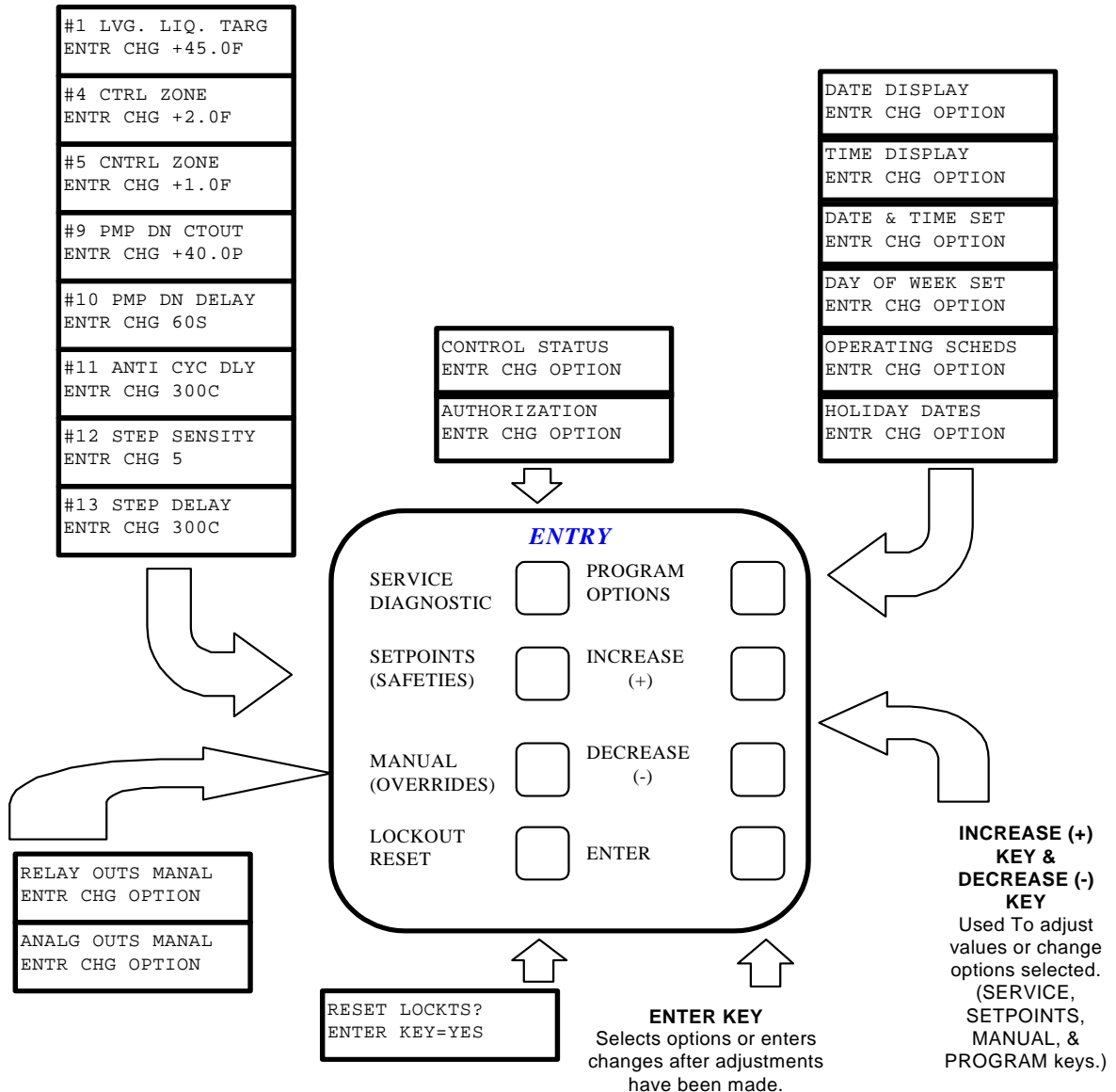- The ALARM STATUS displays all alarms and lockouts while LOCKOUT STATUS displays only active lockouts.
- The "+" and "-" keys may be used with alarm & lockout status to allow scrolling.
- If one or more MCS-I/O or MCSRO8 or MCSSI8-16 units are connected to a MCS-8r the data will be presented in a continuous sequence.
- ADDITIONAL STATUS information shows names, total, run hours and starts for all RO's.
- SYSTEM PRESSURE displays information by circuit, SP suction pressure, DP discharge pressure, OPD oil pump differential, AMP or motor fault / superheat.
- LOCKOUT STATUS for lockouts is caused either by suction, discharge, oil or amps; the actual value at the time of the lockout of the associated sensor is displayed.

```
COMP1           ON
LLS 1           ON

ULS1-1         OFF
COMP2           ON
```

```
LVG. LIQ
RETLIQ.

AMB.TMP.   115.4F
EMG STOP       OFF
```

```
FAN 1&2         ON
FAN 3&4         ON

FAN 5&6         ON
FAN 7&8         ON

FAN 9&10        ON
FAN 11&12       ON
```

```
LLS2            ON
ULS2-1         OFF

COMP3           ON
LLS3            ON

ULS3-1         OFF
```

```
1  SP   DP   OPD AMP
   82  243   24 ---

2  SP   DP   OPD AMP
   83  233   26 ---

3  SP   DP   OPD AMP
   80  225   25 ---
```

```
PMP DWW1       OFF
PMP DWW2       OFF

PMP DWW3       OFF
FLOW SW         ON
```

DISPLAY STATUS

COMPRESSOR STATUS	1	SYSTEM PRESSURE	5
CONDENSOR STATUS	2	SYSTEM SENSORS	6
EVAPORATOR STATUS	3	ADDITIONTAL STATUS INFO.	7
ALARM STATUS	4	LOCKOUT STATUS	8

```
LVG.LIQ. 44.8F
RET.LIQ. 53.7F

PUMP            ON
FLOW SW         ON
```

```
COMP1 =   1015H
STARTS=0000210

LLS1  =   1015H
STARTS =000210

ULS1-1 = 0080H
STARTS = 00210
```

```
NEWEST ALRMS 1ST
ENTR VIEW/OPTION

LOW SUCTION
APR 26 0:28:37

POWER RETURNED
APR 22 8:15:01

POWER FAILED
APR 22 8:10:15

END OF ALARMS
ENTR VIEW/OPTIONS
```

Chiller Configuration Example

- Three reciprocating compressors
- One unloader solenoid per compressor
- One liquid line solenoid per compressor
- Twelve condenser fans (6 RO'S)
- Suction & discharge pressure per compressor
- Oil pressure per compressor
- Leaving liquid temperature sensor
- Return liquid temperature sensor
- Ambient temperature sensor

```
NEWEST LKOUT 1ST
ENTR NEW/OPTION

LOST IO SHUTDOWN
APR 22   8:15:00

END OF LOCKOUTS
ENTR VIEW OPTION
```

The Micro Control Center Keypad Display Quick Reference-*ENTRY KEYS*

- The ENTRY keys (SERVICE, SETPOINT, MANUAL and PROGRAM) provide menu items, some of which when selected will present sub menus. Not all options shown are available in all versions of software.)
- When making value changes the INCREASE (+) & DECREASE (-) keys may be held for continuous updating.
- Enter authorization code at the authorization function within the SERVICE DIAGNOSTIC key menu.
- Different items will appear depending on the package configuration and options selected.
- Units may be English or Metric.
- The clock is factory set at EST or EDST based on time of year

```
#1 LVG. LIQ. TARG
ENTR CHG +45.0F
```

```
#4 CTRL ZONE
ENTR CHG +2.0F
```

```
#5 CNTRL ZONE
ENTR CHG +1.0F
```

```
#9 PMP DN CTOUT
ENTR CHG +40.0P
```

```
#10 PMP DN DELAY
ENTR CHG 60S
```

```
#11 ANTI CYC DLY
ENTR CHG 300C
```

```
#12 STEP SENSITY
ENTR CHG 5
```

```
#13 STEP DELAY
ENTR CHG 300C
```

```
DATE DISPLAY
ENTR CHG OPTION
```

```
TIME DISPLAY
ENTR CHG OPTION
```

```
DATE & TIME SET
ENTR CHG OPTION
```

```
DAY OF WEEK SET
ENTR CHG OPTION
```

```
OPERATING SCHEDS
ENTR CHG OPTION
```

```
HOLIDAY DATES
ENTR CHG OPTION
```

```
CONTROL STATUS
ENTR CHG OPTION
```

```
AUTHORIZATION
ENTR CHG OPTION
```

ENTRY

SERVICE DIAGNOSTIC	PROGRAM OPTIONS
SETPOINTS (SAFETIES)	INCREASE (+)
MANUAL (OVERRIDES)	DECREASE (-)
LOCKOUT RESET	ENTER

```
RELAY OUTS MANAL
ENTR CHG OPTION
```

```
ANALG OUTS MANAL
ENTR CHG OPTION
```

```
RESET LOCKTS?
ENTER KEY=YES
```

INCREASE (+) KEY & DECREASE (-) KEY
Used To adjust values or change options selected. (SERVICE, SETPOINTS, MANUAL, & PROGRAM keys.)

ENTER KEY
Selects options or enters changes after adjustments have been made.

Key Keypad Functions

The authorization code is a special four-character code that enables access in to the MCS-8 system. The code must be numeric with values between 1 and 8. Each system can have up to 15 different authorization codes. This provides the capability of issuing different codes to different people if desired. Currently there are four levels of authorization, which provide different capabilities with in the system. The authorization code and the associated level cannot be displayed or viewed in an MCS-8 system. These are established when building the configuration file in the PConfig program. The authorization codes must be protected and remain confidential, if they are compromised unauthorized personnel can gain access to the system.

From the Keypad/Display the following changes can be made based upon the authorization level:

FUNCTION	VIEW	SERVICE	SUPERVI-SORY	FACTORY
Acknowledge Alarms	No	Yes	Yes	Yes
Sensor Offsets	No	Yes	Yes	Yes
Sensor Type	No	Yes	Yes	Yes
Clear Alarm History	No	No	No	Yes
Clear Point Information	No	No	No	Yes
Date & Time Set	Yes	Yes	Yes	Yes
Day of Week Set	Yes	Yes	Yes	Yes
Change No Flow Lockout or Shut Down	No	No	No	Yes
Change Rotate Yes or No	No	No	No	Yes
Change Manual/Auto Settings	No	No	Yes	Yes
Change Setpoint Values*	No	Yes	Yes	Yes
Change Operating Schedules	No	Yes	Yes	Yes
Lock Out Reset	Yes	Yes	Yes	Yes

How To Get Authorized?

The MCS-8 keypad 'AUTHORIZATION' function can be found under the 'SERVICE DIAGNOSTIC' key on the 'ENTRY' section of the keypad.

Press the Service Diagnostic key until the Authorization Screen appears. The following appears in the display box.	`AUTHORIZATION` `ENTER CHG/OPTION`
Press the Enter key and the following appears.	`ENTER AUTH  #XXXX` `THEN   'ENTER'   KEY`
Enter the proper four digit authorization number and press the ENTER key. Each 'X' is changed to '0' as the numbers are entered. If a correct authorization code was entered the following display occurs:	`AUTH = FACTORY` `SEL   NEXT   OPTION`
If an incorrect authorization code is entered the following diplay appears:	`AUTH   # INVALID` `SEL   NEXT   OPTION`

How To Change Setpoints?

Using the 'SETPOINT' key on the 'ENTRY' section of the keypad press until the setpoint to be change is located. (Once the setpoint key has been pressed you may use the 'INCREASE' and 'DECREASE' keys to position yourself to the setpoint desired.)

Press the 'SETPOINT' key until the setpoint you want to change appears. Assuming you want to change 'LEV. LIQ. TARG' the following appears in the display box.	```# 1 LEV. LIQ. TARG``` ```ENTR CHG + 45.0F```
Press the Enter key and the following appears.	```# 1 LEV. LIQ. TARG``` ```ENTR +/- + 45.0F```
Press the 'INCREASE' or DECREASE' key to adjust the setpoint to the new value. Assuming we pressed the 'INCREASE' key to reach 46 we would see the following:	```# 1 LEV. LIQ. TARG``` ```ENTR +/- + 45.0F```
If we are correctly authorizated the following will be displayed.	```# 1 LEV. LIQ. TARG``` ```CHG MADE + 45.0F```

How To Place a Relay out, Analog out or Sensor input in Manual ON or OFF?

Using the 'MANUAL key on the 'ENTRY' section of the keypad press until the category to be changed is located. (RELAY OUTs, ANALG OUTs or SENSOR INs) Assuming we are going to place a condenser fan in manual on we would do the following: (Assume our relay output is named "FAN 1")

Press the MANUAL key until the "RELAY OUTs MANUAL Screen appears. The following appears in the display box.	```RELAY OUTs MANAL``` ```ENTER CHG/OPTION```

Press the Enter key and the following appears. This is a function of the first relay output. We are assuming here that ours is 'COMP1'.	```COMP1```
	``` OFF```
	```ENTER CHG/OPTION```

We now press the + or – key until we reach the desired relay output. (In our example this is 'FAN 1')	```FAN 1```
	``` OFF```
	```ENTER CHG/OPTION```

Pressing the 'ENTER' key now puts us in the change mode.	```FAN 1```
	``` AUTO```
	```ENTER OR```

Pressing the '+' key now changes to another mode. The three modes for a relay output are 'AUTO, MANON & MANOFF'. You may use the + or – key to circle in either direction.	```FAN 1``` ``` MANON```
Pressing the 'ENTER' key now makes the changes. The relay output will be placed in MANUAL ON. The display will indicate the change.	```FAN 1``` ``` MANON```

How To Review the current 'STATE' of the Machine?
The MCS-8 controller is a state computer, that is, decisions are made based upon setpoints, timers and sensor inputs, the controller moves from one state to another. The controller will change states to ensure the proper functioning of the chiller package.

As we review the various states, we must remember that a chiller package consists of a number of different parts or functions: the compressors and their related items such as unloaders hot gas bypasses, etc.; evaporator; and condensing functions. To control these functions the states will be divided into three sections:

- CAPACITY CONTROL STATES
- CIRCUIT CONTROL STATES
- CONDENSER CONTROL STATES

Both the CAPACITY CONTROL STATES and CIRCUIT CONTROL STATES are displayed on the 2x16 BACKLIT LCD by depressing the SERVICE DIAGNOSTICS and the ENTER key when the option displayed is CONTROL STATUS.

A. CAPACITY CONTROL

Screen 1.	State Time in State	`UNIT IS UNLOADED` `TIMER=26:19:11`
Screen 2.	Integration accumulator value Controlling Slope	`STEP DELAY=180` `RATE OF CHG+ 0.0`
Screen 3.	Steps wanted on Actual steps on	`STEPS WANTED=  0` `ACTUAL STEPS=  0`
Screen 4.	Slide position in % FLA	`SLIDE WANTED= 50`

B. CIRCUIT CONTROL

Screen 1.	State Time in State	`1<-CMP IS OFF` ` 50%FLA 26:45:55`

(Note: There will be a circuit screen for each circuit displayed)

How To Display Pressures & Superheat by Circuit
Pressing the '**SYSTEM PRESSURE'** key you will get the following:

Screen 1.	Cir 1 Suct, Disc, Oil Diff, Amps	`1 SP DP  OPD AMP` ` 66 192  59 194`
Screen 2.	Suct tmp, Saturated tmp & Superheat tmp	`1 SUCT SAT SHEAT` ` 53F  38F +14.9F`
Screen 3.	Disc, Saturated tmp & Superheat tmp	`1 DISC SAT SHEAT` `127F  87F +40.1F`

Mounting & Wiring MCS Equipment.

1   MOUNT ELECTRONIC EQUIPMENT IN A DRY LOCATION.

2   DO NOT MOUNT IN ENCLOSURE WITH FREQUENCY DRIVE.

3   TRY TO AVOID MOUNTING DIRECTLY IN FRONT OF HIGH VOLTAGE CONTACTORS.

4   HIGH VOLTAGE WIRING SHOULD BE KEPT SEPARATE FROM LOW VOLTAGE WIRING.

5   ALL WIRING TO SENSOR INPUTS MUST BE SHIELDED CABLE.

6   WHEN RUNNING SHIELDED CABLE IN AREAS WITH HIGH VOLTAGE, AVOID RUNNING
      PARARELL WITH HIGH VOLTAGE WIRING. (Run perpendicular)

7   ALLOW ADAQUATE ROOM ON EITHER SIDE OF BOARDS TO RUN CABLES.

8   AVOID SPLICES IN SHIELDED CABLES. IF A SPLICE IS REQUIRED PLEASE DO THE
      FOLLOWING:

 8.1   SPLICE IN AN AREA WHERE NO HIGH VOLTAGE IS WITHIN THREE (3) FEET.

 8.2   SPLICE IN A DRY AREA.

 8.3   SPLICE ALL WIRES INCLUDING DRAIN LEAD WITH BUTT CONECTORS OR SOLDER. (Foil
        shield need not be connected. Tape connections.)

9   IT IS IMPORTANT TO PROVIDE A GOOD EARTH GROUNT TO THE 120 VAC POWER INPUT TO
      THE PRINTED CIRCUIT BOARDS.

How To Startup the Machine.

1   Relay Output Check - Once the microprocessor has been completely wired a dry test of the wiring should be done. To accomplish this use the following procedure:

   1.1   Keep main power to compressors off. Keep high voltage breakers off or pull fuses to compressors.

   1.2   Turn on 120 Vac control power.

   1.3   Get authorized on the MCS-8 controller. (Either via the keypad or PConnection.)

   1.4   Put each relay output in 'MANUAL ON' and verify the appropriate contactor or solenoid turns on. When testing the wiring to a Liquid Line Solenoid be careful not to leave it on too long if the system uses an expansion valve.)

   1.5   Place each digital sensor input in 'MANUAL ON' to verify the correct value. i.e. 'RUN/STOP', 'FLOW', etc are correct.

   1.6   Verify all analog sensors are within reason.

   1.7   Calibrate pressure transducer offsets.

   1.8   If you have any analog outputs verify they are correct. Set analog manual values to '0%, 50%, and 100%'.

2   At the completion of the point's checkout, make sure all RO, SI & AO are in 'AUTO' mode.

3   Through the keypad, under SERVICE DIAGNOSTICS' clear alarms & point information if you are factory authorized.

4   If any circuits are in 'LOCKOUT' reset.

5   All setpoints should be displayed on MCS-8 and reviewed for correctness. Specific attention should be paid to the following Setpoints:

   5.1   Verify / set 'FULL LOAD AMPS' (1 per compressor)

   5.2   Verify / set 'TARGET' (supply air / leaving liquid)

   5.3   'LOW SUCTION, FREEZE', etc based on refrigerant, etc.

   5.4   'HIGH DISC' based on water or air-cooled.

   5.5   'Condenser ' setpoints.

6   You are now ready to turn on main power.

7   Once main power is on verify the following:

   7.1   All relay outputs are in 'AUTO'. (Not "'LOCKOUT')

   7.2   FLOW is 'ON' or 'YES'.

   7.3   RUN/STOP is in 'RUN'.

   7.4   Assuming capacity is required the control state should go to 'STEP+'. Once the integration has reached the setpoint the lead compressor will turn on. (If a screw with oil the oil pump will come on 1st.)

   7.5   When the compressor come on the LLS should open. (There may be a pre pump out to eliminate liquid from getting to the compressor. Direct expansion systems.)

   7.6   Watch suction, discharge, amps etc to verify package running OK.

   7.7   If a screw compressor you need to verify if the load & unload pulse timing setpoint need adjusting. The pulse should allow the slide to move so the amps are moving but not overshooting the target. You may need to also adjust the amp dead band setpoints if the system seems to hunt. (For a FLA of 100 amps the amp + & - setpoints should be 1.5. For a FLA of 350 the amp + & - setpoint should be about 3.0.

8   Fine-tuning should now be done. (Slope, step delay, control zone, etc setpoints.)

The MCS Sensors Quick Reference Sheet

Temperature & Humidity Sensors

MCS-T100 (SI #1 through 8, REV 1.5 & higher)

1. Connects to 1 of MCS Sensor Inputs 1through 8
2. Shielded cable GND drain must be connected to SI 'GND'
3. Temp MCS-8 SI (inputs 1-8) jumper setting is 'ANALOG'
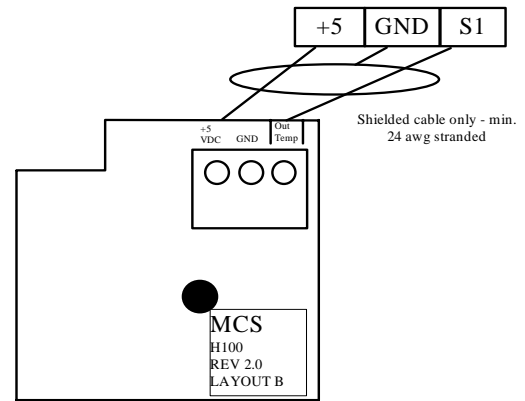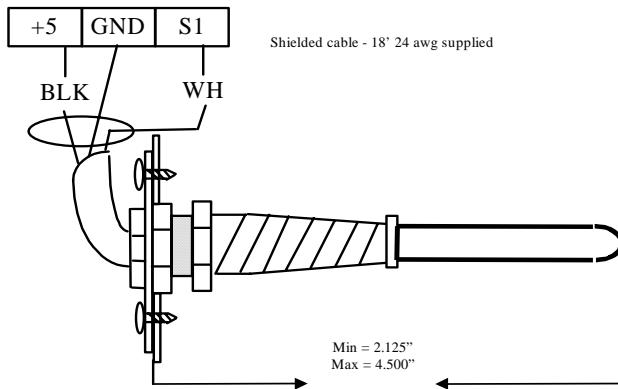
MCS Sensor Input Terminal Strips

+5	GND	S1

BLK   WH

Shielded cable - 18' 24 awg supplied
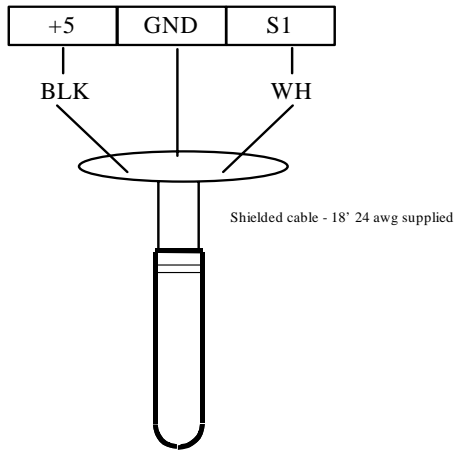
MCS-T100

MCS-ZONE (SI #1 through 8, REV 1.5 & higher)

1. Connects to 1 of MCS Sensor Inputs 1 through 8
2. Shielded cable GND drain must be connected to SI 'GND'
3. Temp MCS-8 SI (inputs 1-8) jumper setting is 'ANALOG'

MCS Sensor Input Terminal Strips
SENSOR (x)

+5	GND	S1

Shielded cable only - min. 24 awg stranded

+5 VDC   GND   Out Temp

MCS
H100
REV 2.0
LAYOUT B

MCS-ZONE

MCS-SAIR (SI #1 through 8, REV 1.5 & higher)

1. Connects to 1 of MCS Sensor Inputs 1through 8
2. Shielded cable GND drain must be connected to SI 'GND'
3. Temperature MCS-8 SI (input 1-8) jumpers setting to Analog'
4. Minimum extension inside duct 2.25"
5. Normal extension, as shown, 4.00".

MCS Sensor Input Terminal Strips

+5	GND	S1

Shielded cable - 18' 24 awg supplied

BLK   WH

Min = 2.125"
Max = 4.500"

MCS-SAIR

MCS-HUMD (SI #1 through 8, REV 1.5 & higher)

1. Connects to 2 of MCS Sensor Inputs 1 through 8
2. Humidity MCS-8 SI (input 1-8) jumper setting is ANALOG'
3. +5 vdc & GND are common (only one connection required)
4. Temp. MCS-8 SI (input 1-8) jumper setting is 'ANALOG'
5. Shielded cable GND drain must be connected to SI 'GND'

MCS Sensor Input Terminal Strips
**+12 OUT   SENSOR (x1)   SENSOR(x2)**

+12	GND		+5	GND	S1		+5	GND	S1

+5 VDC   GND   Out Temp

+12 VDC

GND

Humd Out

circuits
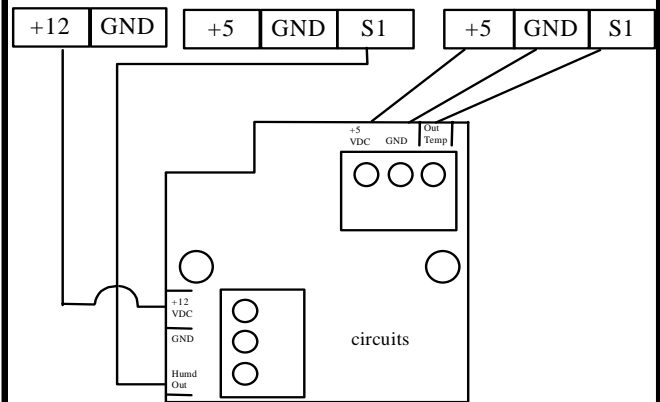
MCS-H100

Pressure Sensor & Digital inputs

MCS-TI-500-xx (SI #1 thru 8, REV 1.5 & higher)

1. MCS-TI-500-xx pressure transducer (3 wire 0-5 vdc)
2. Wiring for 3 wire to SI# 1 through 8
3. Jumper settings for SI# 1 through 8 is 'ANALOG'
4. Pressure range 0 - 500 psi

MCS Sensor Input Terminal Strips
SENSOR (x)

+5	GND	S1

RED   BLK   WH or CLEAR

Shielded cable - (20' or 40' 22 awg supplied)

MCS-TI-x00-yy
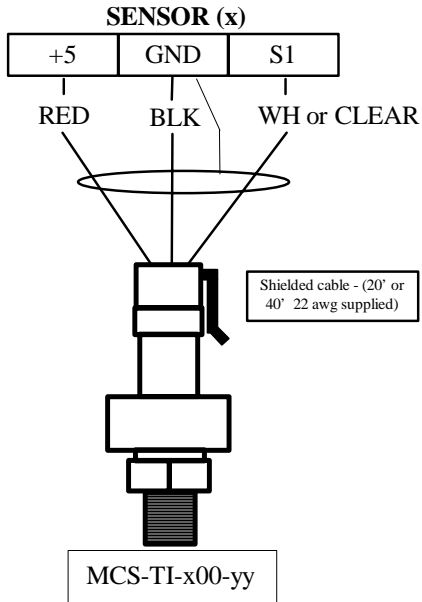
Dry Contact's (SI#1 through 8, REV 1.5 & higher)

1. Digital inputs for use on sensor inputs (SI 1-8)
2. Dry Contact MCS-8 SI (input 1-8) jumper setting is 'DIGITAL'
3. Verify with sensor diagnostic under service on keypad
4. Shielded cable GND drain must be connected to SI "GND"

MCS Sensor Input Terminal Strips
Sensor (x)

+5	GND	S1

Shielded cable - min. 24 awg stranded

MCS DRY CONTACT DI (SI 1-8)
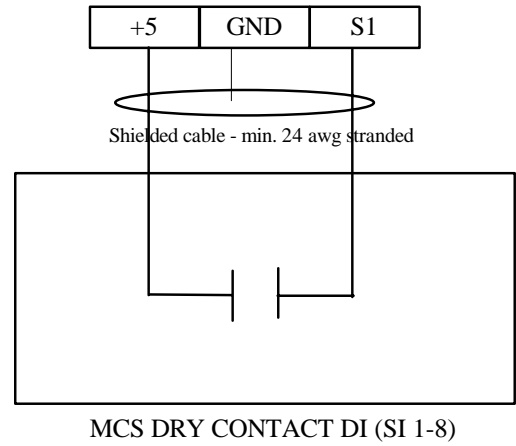
Misc. Printed Circuit Boards

MCS-CT-xxx (SI #1 through 8, REV 1.5 & higher)

1. Connects to 1 of MCS sensor inputs 1 through 8
2. The current transformer may be 100:5 or 250:5
3. The size of the CT (xxx) must be larger than FLA
4. AMPS jumper setting is 'ANALOG'
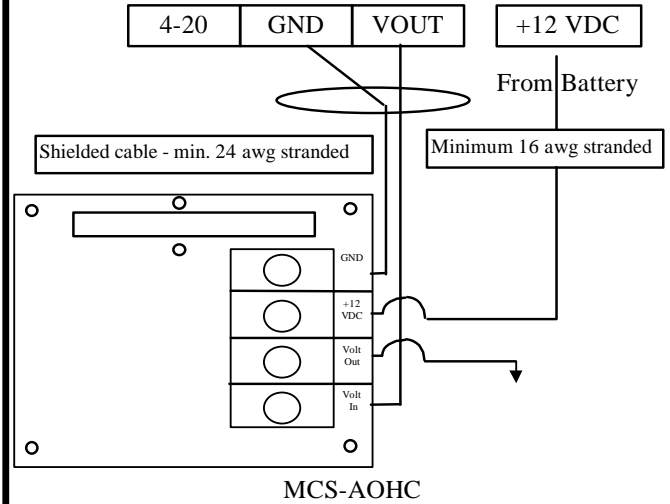5. For wiring only remove terminal block. DO NOT REMOVE PRINTED CIRCUIT BOARD.

MCS Sensor Input Terminal Strip Sensor (x)

+5	GND	S1

Shielded cable - min. 24 awg stranded

MCS-CT-xxx
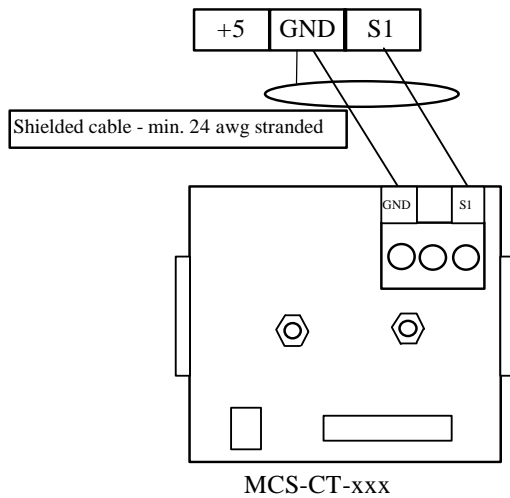
MCS-AOHC (AO, all revisions)

1. The AOHC requires a 12 VDC adequate current source (not 12 volt on MCS8)
2. The AOHC causes the current source to follow the MCS-AO
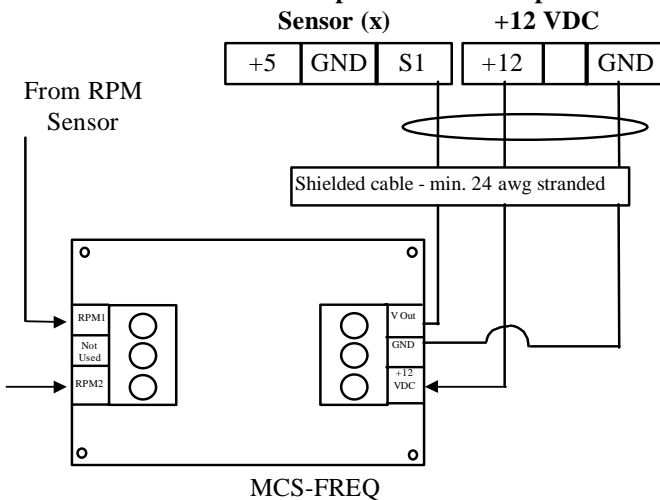3. Used for high AMP devices (5 amps DC maximum)

MCS Sensor Output Terminal

4-20	GND	VOUT		+12 VDC

From Battery

Shielded cable - min. 24 awg stranded

Minimum 16 awg stranded

MCS-AOHC

MCS-FREQ (SI #1 through 8, REV 1.5 & higher)

1. Connects to 1 of MCS sensor inputs 1 through 8
2. RPM MCS-8 SI (input 1-8) jumper setting is 'ANALOG'
3. Uses "HOOF" magnetic pickup sensor (9014)
4. For mounting, remove from snap track, mount snap track and cover mounting screw heads to avoid shorting

MCS Sensor Input Terminal Strips

Sensor (x)			+12 VDC		
+5	GND	S1	+12		GND

From RPM Sensor

Shielded cable - min. 24 awg stranded

MCS-FREQ

Trouble Shooting Quick Reference Sheet

PROBLEM	POTENTIAL SOLUTION
A sensor input reads -99.9	This indicates an open sensor input signal or 5 VDC problem. • Check sensor wiring for missing wire or poor connection. • Check sensor for bad sensor. If less than 5 VDC is on the sensor 5 VDC terminal block, the problem is with probably a shorted sensor. (A poly fuse protests the board) • Remove all sensor input terminals. • Wait about 1 min. or until 5 VDC restored at sensor input. • Connect terminals 1 at time until short reappears.
A sensor input reads +999.9	This indicates a shorted sensor input signal. • Check sensor wiring for +5VDC shorted to signal etc. • Check sensor for bad sensor.
A sensor is reading less then 3% off	This indicates the sensor needs to be calibrated. (You need to have a valid Auth code to change sensor offsets) • Press Service Diagnostics, press until LCD display s sensor offset option • Press enter, 1st SI# & offset appears (i.e. Suct 1 = 0.0) • Scroll using "increase (+)/decrease (-)" keys to find sensor to be calibrated Press enter, use the "increase (+)/decrease (-)" keys to change the calibration value. When value is correct, press enter.
'MCS CONTROLLER INITIALIZATION' on LCD display.	Indicates Micro in constant reset. • Check incoming power > 105 VAC or 22 VAC
Top row of LCD display all bars & 2nd row blank.	Indicates software chip problem possible. • Possible U11 software version incorrect or chip bad. • Possible U13 GAL chip incorrect or chip bad. • Possible bad connection or cable between LCD and MCS8
LCD blank.	Indicates bad connection. • Connector J2 on MCS not on or offset on connector. • Resistor adjustment VR1 out of adjustment.
Lost I/O	Indicates communications problem. • Verify RS485 LED blinking. • Verify termination jumper J6 only on at MCS-8 & last I/O. • Verify MCS-8 & I/O address's set correctly. • Verify wiring from MCS-8 to each I/O correct. • Check fuses/120 VAC on I/O units
Invalid reading on one sensor input.	This indicates an input problem with 1 sensor. • Verify jumper settings correct for that SI.
Changes to MCS not being made.	This indicates inability to write to chip U10. • Verify 'EEP WRITE ENABLE' jumper W6 is on. • Not authorized
Invalid authorization	This indicates an invalid auth #. Follow steps below for proper authorization • Press SERVICE DIAGNOSTICS until the auth. option appears • Press the ENTER key • From the "Display Status" press keys corresponding to your authorization # • Press ENTER

PROBLEM	POTENTIAL SOLUTION
SI from AMPS board 10 A low.	This indicates a problem with this SI only. • Jumper setting on this SI in wrong position. • Incorrect sensor type used.
INVALID CONFIG VER	Indicates layout of CFG wrong. • CFG layout for different version than software chip U11.
INVALID CONFIG TYPE	Indicates U10 CFG incompatible with U11 software. • Example U10 CFG for home while U11 for chiller.
INVALID CONFIG	Indicates Checksum invalid • Reload CFG
Sensor input believed invalid (Under Sensor Diagnostic Sub Menu)	• Verify Berg jumpers using Quick Reference Sheets • Check board version number • Check wiring of sensor