+12 MAGNUM

Basic Getting Started Manual

MCS-MAGNUM SOFTWARE V17.0
MCS-MAGNUM HARDWARE 9.1+
TOUCHSCREEN FIRMWARE 3.0+

Keypad - Panel Mount

MCS-MAGNUM-N-12

Keypad - Door Mount

MCS-MAGNUM - 15.4-12
Control Cabinet

MCS Total Solution for all your Control Needs

Energy Efficient and RoHS Compliant
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Chapter - 1. Introduction to Magnum

Magnum V17.0 software has been designed to control many different types of compressors of both fixed and variable capacity, as well as many additional features. Supported control options include multiple liquid line solenoids, electronic expansion valves (EXVs), liquid injection, economizers, hot gas bypass, variable frequency drives (VFDs), digital scrolls, and many more.

Applications vary from control of a single compressor, to complex multiple compressor systems. In all applications, however, safety and operating efficiency is of primary importance. The controller interface is made to be informative and meaningful, with built-in logic to prevent unsafe operating conditions from occurring. This helps reduce or even completely eliminate nuisance alarms.

1.1. Magnum V17 Software Control Point Capacity

Circuits (compressors): Up to 20
Steps per circuit: Up to 4
Relay Outputs: Up to 80
Analog Outputs: Up to 28
Sensor Inputs: Up to 112
Setpoints: 255
Alarm Memory: 100

Magnum Hardware Supported by Magnum V17.0 Software

The following MCS boards can be connected together through the MCS-I/O communications terminal block:

- MCS-Magnum-N-12 (10 ROs, 12 SIs, 4 Digital SIs, and 4 AOs)
- MCS-IO Base and Ext. (16 SIs, 4 AOs, 10 ROs)
- MCS-RO Base and Ext. (10 ROs)
- MCS-SI Base and Ext. (16 SIs and 4 AOs)

The versatility of the Magnum-N-12 offers the user much flexibility in configuring the controls in an economical way. The limitation is not the number of boards but the total number of points.

1.2. About the Magnum

The Magnum-N-12 is a rugged microprocessor controller designed for the harsh environment of the HVAC/R industry. It is designed to provide primary control without needing mechanical controls. It will interface locally with a null modem serial cable, remotely through an Ethernet connection, and also through building management systems. The Magnum offers a great deal of flexibility with adjustable setpoints and control options that can be set prior to activating a system or even when the unit is operational. The Magnum is designed to safeguard the system being controlled, minimize the need for manual intervention, and to provide a simple but meaningful user interface.

Additional information on the MCS-MAGNUM and related products can be found in a presentation available on our web site at:

http://www.mcscontrols.com/presentations.html
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Manuals are available on our website:
www.mcscontrols.com

+12 MAGNUM
MCS-CONNECT
MCS-TOUCHSCREEN

We have created over 100 application notes on ‘how to’
for the operation of the +12 MAGNUM, MCS-CONNECT and
MCS-TOUCHSCREEN
These can be found on our website under APPLICATION NOTES
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Chapter - 3.  PC Support Software for Magnum

MCS-Connect provides both local and remote communications to the Magnum, independent of software type. Local communications can be either through an RS485 or Ethernet connection. This program displays the status of the controller, and changes can be made to the system with proper authorization. Configuration files can be transmitted to or received from a Magnum unit. The Magnum automatically performs history logging and this program allows the data to be presented in a useful graph form. A manual created in a PDF format is available on our web site: www.mcscontrols.com, or available in other formats upon request.

3.1. Requirements for PC Software

To install and run the program, we suggest the following system requirements:

Minimum System Required to Run Program

- PC with a Pentium-class processor
- Windows 7 or later operating system or
- Linux operating system
- Minimum 1GB of RAM
- Minimum 4GB Drive
- 14.4k baud modem or higher for remote communications
- 1280 x 800 pixel or higher display

Additional information on the setup and using MCS-CONNECT can be found on our web site. Both an Instruction Manual and Powerpoint presentation are available at:

http://www.mcscontrols.com/#null
Chapter - 4.  Network - RS-485 Connection

The next few pages show recommended network setups for communication to your controller, using products from MCS.

4.1. MCS 485 Network

The MCS 485 Network can support up to 20 Magnums and their associated I/O boards. Access to this network can be remotely, through a 14.4K Baud modem. When using the dialup connection through a modem there is no degradation in the performance of the network.

Each Magnum in the network must be assigned a unique address in the configuration file. This address will be the key in establishing communications with the appropriate Magnum system. It can be viewed or changed from the LCD / keypad of the unit with Factory authorization.

RS485 transmissions should not exceed 1 mile without a repeater.
5.1. RJ45 using a Crossover Ethernet Cable

When connecting directly through the 10 MBPS Ethernet port on the Magnum from a PC it is necessary to use a crossover Ethernet cable.
Chapter - 6. Network Connection–Remote

6.1. Remote using Ethernet

When connecting directly through the 10 MBPS Ethernet port on the Magnum from a PC it is necessary to use a crossover Ethernet cable to the MCS-WIRELESS MODEM.

MCS-WIRELESS MODEM is shipped from the factory with the IP address configured for you. Instructions on how to setup your PC to communicate with the MCS-WIRELESS MODEM will be included.
**Chapter - 7. MCS-MAGNUM**

**7.1. MCS-Magnum Revision 9.2**

**MCS-MAGNUM-N-12**

**Specifications**

**Controller**

- Dimensions: 12.0"w, 8.0"h, 2.0"d
- Mounting Holes: Mounts on a backplane using eight #6 sheet metal screws
- Operating Temperature: -40°F to +158°F (-40°C to +70°C)
- Operating Humidity: 0-95% Non-Condensing
- Storage Temperature: -40°F to +158°F (-40°C to +70°C)
- Microprocessor: Zilog eZ80 Acclaim! @ 50mhz
- Sensor Inputs (SI): 12 inputs 0-5vdc (10-bit A/D)
- Digital Inputs: 4 inputs 0 or 5vdc only
- Relay Outputs (RO): 10 outputs 6.3amps @ 230vac
- Analog Outputs (AO): 4 outputs 0-10vdc
- Printed Circuit Board: Six layer with separate power and ground planes

**Input Power (Standard)**: 12vdc

- 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

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Chapter - 8. Preparing to Upgrade an Existing Chiller

8.1. Step 1- Open MCS Supplied Upgrade Kit
(Usually fits in a 16” x 16” x 16” box)

- Verify Packing list of all MCS parts
- Obtain Spiral Binder (Divided in up to 4 sections):
  - Getting Started Manual
  - MCS-Config printout (Inputs, outputs, setpoints, etc.)
  - Drawings of each MCS printed circuit board with wiring connections
  - Specification sheet for each MCS part

8.2. Step 2- Plan to Mount New Microprocessor

- Keypad / Display
  - Chiller Installed Outside- You should use a Panel mount which you install inside the existing rain proof enclosure.
  - Chiller Installed Inside- You should use a Door mount with a Template for mounting.

- Mount electronics in dry location.
- Do not mount in enclosure with Frequency Drive or High Voltage.
- Avoid mounting in front of or close to High Voltage Contactors.

- **High Voltage wiring should be run separate from Low Voltage wiring.**
- All wiring to Analog Sensors must be with shielded cable.
- When running shielded cable in areas with high voltage avoid running parallel. (Run perpendicular)
- Allow adequate space on all sides of MCS boards to run cables and plug in communication cables.
- If at all possible, avoid splicing shielded cable. If a splice is required please do the following:
  - Splice in an area where no high voltage is within three (3) feet.
  - Splice in a dry area.
  - Splice all wires including Drain wire with butt connectors or solder. (Foil shield need not be connected. Tape connections.) Stagger where butt connectors are made to avoid bulky connections.

**GROUND CONNECTIONS**
- It is important to provide a good earth ground to the 120 VAC power input to the printed circuit boards.
- Do not jumper the ground connections to MCS boards. Each printed MCS board should have its ground wired directly to ground with a wire made as short as possible (12AWG).

8.3. Step 3- Prepare to Start the Unit

- 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:
  - Keep main power to compressors off. Keep high voltage breakers off or pull fuses to compressors.
  - Turn on 120 VAC control power.
• Get authorized on the MCS-Magnum controller. (via the keypad or MCS-Connect.)
• Put each Relay Output in ‘MANUAL ON’ and verify the appropriate contractor 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.
• Place each digital Sensor Input in ‘MANUAL ON’ to verify the correct value.
• Verify all Analog Sensors are within reasonable tolerances.
• Remove the Packard connector from each pressure transducer. Verify the computer reads -99.9P on the correct sensor.
• Calibrate pressure transducer offsets.
• If you have any Analog Outputs, verify they are correct. Manually set analog values to 0%, 50%, and 100%

After testing all Outputs and Inputs, make sure all ROs, SIs and AOs are in ‘AUTO’ mode.

Through the keypad, clear alarms and point information under ‘Service Diagnostics’ with factory authorization.

If any compressor is in Lockout, perform a Lockout Reset to clear.

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

• Verify / set ‘Full Load Amps’
• Verify / set ‘Target’ (supply air / leaving liquid)
• ‘Low Suction, Freeze’
• ‘High Disc’ based on water or air-cooled
• ‘Condenser’ setpoints

You are now ready to turn on main power

Once main power is ON verify the following:

• All Relay Outputs are in ‘AUTO’ (Not ‘Lockout’)
• Flow switch is ‘ON’ or ‘YES’
• RUN/STOP is in ‘RUN’
• Assuming additional capacity is required, the control state should go to ‘LOADING’. Once the delay has reached zero, the lead compressor will turn on. (If a screw with oil - the oil pump will come on first)
• When the compressor comes on, the LLS should open. (There may be a pre-pump out to eliminate liquid from reaching the compressor for direct expansion systems.)
• Watch suction, discharge, amps etc. to verify the unit is running normally.
• For screw compressors: Verify if the load and unload pulse timing setpoints 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 deadband setpoints if the system seems to hunt. (Amp deadband should be about 3-4% of FLA).

Fine-tuning should now be done. (ROC, step delay, control zone, etc.)
Chapter - 9.  MCS-CONNECT

MCS-CONNECT software is part of the MCS Support System. Its purpose is to provide both local and remote communication for MCS micro controllers either by themselves, or as part of a network.

MCS-CONNECT supports the following controllers:

• MCS-MAGNUM controller
• MicroMag controller

MCS-CONNECT permits the user to monitor the status of the micro controller in real time and, with proper authorization, changes can be made to the system. In as fast as 10 seconds, configuration files can be transmitted to, or received from an MCS micro controller.

Another powerful feature of MCS-CONNECT is its ability to graph event history. Since MCS controllers automatically perform history logging, the user can select which inputs or outputs to graph and view the results either in real time, or over a user selectable period of time.

MCS-CONNECT supports the SAVE of history data in the GRAPH function as a *.txt file. This allows the user to bring the data up in MCS-CONNECT off line, or in a spreadsheet program such as Microsoft Excel.

Updates for MCS-CONNECT can be downloaded directly from the MCS website under “Support”, PC Software.

The program is available as Microsoft Windows based software or as Linux based software.

You can find complete installation and setup for MCS-CONNECT in the manual located on the MCS website.

MCS has over a hundred APP Notes on ‘HOW TO’ for our products. They can be found at:

http://www.mcscontrols.com/appNotes.html
9.1. **Scan for Controller**

Once connected, click on the MCS-CONNECT program to open. If you are connected using the MCS-485-USB cable use the serial button to scan for the controller.

Next screen shows MCS-CONNECT scan for controller. Click anywhere in the row to open your controller.

Next screen shows "Status screen" for the controller.

A Powerpoint presentation on MCS-CONNECT can be found on our web site at:

http://www.mcscontrols.com/presentations.html
Chapter - 10. Getting to know your Touchscreen

On the following pages we will acquaint you with the function and use of the MCS-TOUCHSCREEN, plus introduce you to the graphics that we have incorporated into the design.

OEMs with additional training and the Graphic Builder, will be able to make changes to the graphics and help manage with all the information the MCS controller has available to provide.

TOUCHSCREENS

The MCS-TOUCHSCREEN has a new Weather Proof Touchscreen interface designed to simplify user access with the MCS-Magnum and MCS-MicroMag. MCS-Connect can be utilized to provide both graphics and service mode access for technicians.

Information and graphics on the MCS-TOUCHSCREEN are shown on high resolution (1280x800) LCD display with LED back lighting, which guarantees long-life operation.

The high resolution screen makes it easy for the user to manage complex installations quite easily. It also ensures that the pages can be navigated in a fast and straightforward manner. Up to 60 MCS controllers can be connected to a MCS-TOUCH via RS485 or Ethernet.

Utilizing a gasket for an environment seal provides the MCS-TOUCHSCREEN with a NEMA4 rating.

Depending on the Box Enclosure you choose, an installation can be either indoor or outdoor.

A NEMA4 Box Enclosure must be used for outdoor installation or for areas that are subject to water wash-down or extreme harsh environments. The MCS-TOUCH temperature range is -20°C to 70°C / -4°F to 158°F.

The Magnum can be installed without the Keypad Display using the new Touchscreens.

GRAPHICS FOR TOUCHSCREENS

With the new Graphical Interface and MCS-Connect, you now have a better view of your controller’s many functions as shown on the screen to the right.

The graphics package is pre-installed and can be customized by OEMs with the MCS Graphic Builder or custom build by MCS for your clients.

Additional information on the setup and using your Touchscreen and Graphics can be found on our web site, along with additional App. notes concerning the Touchscreens.

http://www.mcscontrols.com/manuals.html
Chapter - 11. Touchscreen’s Interface

Your touchscreen is shipped installed with the latest Linux operating system, MCS-Connect and additional files for displaying your graphics.

INCLUDED COMPONENTS

100W Single Output Power Supply for Touchscreen
Resistant to short circuiting, overloading, and over voltage.
Operating temperature up to 158°F (70 °C)

MCS-TOUCHSCREEN MOTHERBOARD - FRONT

MCS-TOUCHSCREEN MOTHERBOARD - BACK
Chapter - 12. Site Documents

12.1. Documents, Spec Sheets, Drawings, etc.
Stored in the Touchscreen’s flash memory you will find pdf’s and documents pertaining to the building of your unit. Each unit’s configuration is different, so the ‘SITE DOCUMENTS’ file will pertain to that unit only.
An example of the contents of the ‘SITE DOCUMENTS’ folder may contain:

1. DRAWINGS (PDF’S) of the components used in this unit
2. EXAMPLE OF MANUALS (if installed in your unit)
   a. Getting Started Manual
   c. Touchscreen Manual
   d. EXV Manual
   e. BMS-GATEWAY Startup Guide
   f. Additional manual may be stored here depending on the configuration of the unit

3. SPECIFICATION SHEETS
   Each part installed should have a spec (data) sheet included in the ‘SITE DOCUMENTS’ folder

4. CONFIGURATION FILE - This is the key file in building your unit. If your config file is somehow corrupted, this is the original file used and may need to be re-installed. Call MCS-SUPPORT for help in re-installing this file to your controller.

To locate the ‘SITE DOCUMENTS’ folder:
1. Navigate to the ‘MCS TOOLS folder’ on your desktop
2. Double click on folder to open
Chapter - 13. Main Screen

The Main Screen on the Touchscreen is displayed below showing the MCS logo, plus:

1. MCS-Connect icon
2. On Screen Keypad icon
3. MCS Tools, icon
4. Touchscreen Software Version
5. Touchscreen - LOCKED OR UNLOCKED
6. Time of Day

13.1. COMPANY GRAPHICS

If your touchscreen came pre-installed with the ‘Graphic Package’, OEM’s and trained Installers will be able to modify some of the displays after the initial installation using the Graphic Builder if they are authorized.

With its 1280x800 Resolution, the display is sharp and easy to read. Making use of the ‘Stylus pen’, and the on screen keypad adjustments are easy and lets the technician check readouts as to the status of the controller.

The Touchscreen now comes with a Linux operating system.

The latest 15.4 touchscreens, firmware version 3.0 +, comes with a 9 point calibrating software program for pin point accuracy.
Chapter - 14. Touchscreen Keypad

14.1. KEYPAD -
On the main screen, click on Keypad Icon as shown in screen 1.

14.2. ‘ON SCREEN KEYPAD’
Screen 2 shows keypad display. Use the stylus and keypad to enter or make adjustments.
Chapter - 15. Touchscreen Utilities

15.1. Utilities folder and its sub folders

1. Navigate to the ‘MCS TOOLS folder’ on your desktop.
2. Double click on folder to open.
3. Double click on the ‘Utilities’ sub folder to view contents.

4. Screen 3 below displays the difference utilities build into the system.

Brief descriptions of these files will be shown on the following pages in this manual.

15.1.1 Calibrate Touchscreen

Your touchscreen comes with a software program which will allow you to calibrate your touchscreen stylus pen to pin point the accuracy. When you touch an area on the screen the stylus point aligns with the screen area. We will describe how to do this later in this manual.

15.1.2 Leafpad

Leafpad is a text editing program enabling you to make changes to text files.

15.1.3 LX Terminal

LXTerminal is the LXDE version of a terminal emulator. It is used by programmers who are familiar with the Linux operating system.

15.1.4 MCS Website

If you are connected to the internet where this touchscreen is installed, you will be directed to the MCS web site by clicking on this icon.

15.1.5 Network Connections

Clicking on this icon will direct you to a program which will allow you to setup your communications to the company’s network and controllers.
15.1.6 **Reboot**
Clicking on this icon will reboot your touchscreen.

15.1.7 **Setting Time and Date - MCS-TOUCHSCREEN**

1. Navigate to the ‘MCS TOOLS’ folder on your desktop.
   Double click on folder to open.

2. Double click on the ‘Utilities’ sub folder to view contents.

3. Double Click ‘Time And Date’ to make changes
4. Screen opens- click on ‘Unlock’
   You must be authorized to make these changes.

5. Using the keypad, enter password “mcs’ (lower case)

6. Click ‘Authenticate’ to unlock

7. Make changes to date or time and click to ‘Lock’.
Chapter - 16. Network

16.1. Setting Up Network For Communication With Your Controller

At the touchscreen main screen, click on ‘MCS TOOLS’ folder as seen screen 1.

16.2. Utilities Folder

Screen 2 appears, click on ‘Utilities’ to view contents of folder. Click on ‘Network Connections’ as shown in screen 3.
16.2.1 Network Connections Screen

Next display, screen 9-4 shows network communication screen. Your touchscreen will show ‘Wired connection’, click to add.

Screen 5, click to ‘Edit’ this connection.
16.2.2 Adding IP Address

On screen 6, set ‘Method’ to ‘Manual’ click on ‘IPV4’ than click on ‘Address’, enter the IP address, the netmask and gateway addresses. Click to save to touchscreen memory.
Chapter - 17. MCS-CONNECT

17.1. MCS-CONNECT Shortcut on Desktop

1. Click on the MCS-Connect.

2. This will launch the MCS-Connect main screen.
3. Click on Serial or Ethernet to scan for your controller.

4. Screen below shows available controllers on your network.
Chapter - 18. MCS-Connect Communication

1. At the ‘Desktop screen’ click on the ‘MCS-CONNECT shortcut’.
2. Click on ‘Setup’ at the MCS-CONNECT’ screen.

3. Next screen is the setup screen for communicating with your controller or PC.

4. You can change the “Com port’ and 'Baud Rate” depending on how you are communicating with your controller or computer.
Chapter - 19. UnLocking / Locking Touchscreen

19.1. Unlocking the Touchscreen.

1. Click on the ‘MCS TOOLS’ folder on the desktop, ‘Memory Lock’ sub folder will appear when this file is opened.

2. Double click on the ‘Memory lock’ folder

3. Double click on the ‘Unlock_Memory’sh icon

4. Next screen, click on ‘Execute’

5. Touchscreen will perform a restart
Re-Locking Touchscreen

1. Double click the ‘MCS TOOLS’ Icon on the Desktop.
2. Double click ‘Memory Lock’ sub directory.
3. Double click ‘Lock Memory’.
4. Click ‘EXECUTE’. The touchscreen will reboot.

When the Lock Memory file is pressed it does an automatic reboot and autostarts MCS-Connect. Check the top right corner of the desktop to make sure the touchscreen is locked.
Chapter - 20. Calibrating Touchscreen

20.1. USING CALIBRATING SOFTWARE

At the main menu:

1. Click on the ‘MCS TOOLS folder’
2. Click on the ‘Utilities’ folder
3. Click on ‘Calibrate Touchscreen’
4. Calibration software will open.
20.1.1 CALIBRATING WITH NEW 9 POINT SOFTWARE
The screen below shows calibration for the touchscreens.

*(only one target point will display at a time)*

The first target point will display on the left top side of your screen.

1. Position your stylus pen point as close to the center of the target as you can.

   **BE CAREFUL NOT TO PRESS ON THE SCREEN IN OTHER AREAS.**

2. After touching the left top target, the next target will appear in the top center and continue to display as per the screen below until all '9 target points' have been calibrated.

If satisfied with the calibration, go to the next step. If needed, rerun the calibration tool.

3. After you calibrated all 9 points on the screen you will be returned to the desktop.
Chapter - 21. MCS-MAGNUM KEYPAD

21.1. MCS-MAGNUM KEYPAD - Keys and their functions

- LCD DISPLAY - displays current condition of controller. Pressing the Menu key, displays the 10 available Menu items.
  - FUNCTION KEYS - F1, F2, F3 are used to Page Up and Page Down as shown below, F2 - PG↑(page up), F3 - PG↓(page down). Function keys are also used when an numerical digit is needed, F1 = 1, F2 = 2, F3 = 3.
  - ARROW KEYS - ↑↓←→used to move between items on screen and also as numerical digits are needed.
    - ENTER KEY - used to accept highlighted item on screen and to move to next screen.
    - MENU KEY - used to move to main menu, also used as numerical digit 8.

Additional information on the use of the MCS-KEYPAD can be found in a presentation available on our web site at:
http://www.mcscontrols.com/presentations.html
Chapter - 22. Using the Keypad and its Display Screens

The display screens shown on the following pages show a configuration setup for an HVAC system using two screw compressors. For purpose of display, the sensors and relays are set to manual mode.

To reach the Main Menu press the Menu button after powering up. Based on the highlighted menu option when the enter key (↵) is pressed will bring up one of the following screens.

22.1. Menu Key - Pressing the ‘Menu’ key shows the following:

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>SCREEN TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:47</td>
<td>Main Menu</td>
</tr>
<tr>
<td>16:47</td>
<td>-Status</td>
</tr>
<tr>
<td>16:47</td>
<td>-Setpoints</td>
</tr>
<tr>
<td>16:47</td>
<td>-Outputs</td>
</tr>
<tr>
<td>16:47</td>
<td>-Serv Tools</td>
</tr>
<tr>
<td>16:47</td>
<td>-Inputs</td>
</tr>
<tr>
<td>16:47</td>
<td>-Lockout RST</td>
</tr>
<tr>
<td>16:47</td>
<td>-Alarms</td>
</tr>
<tr>
<td>16:47</td>
<td>-Lockout ALM</td>
</tr>
<tr>
<td>16:47</td>
<td>-Graphs</td>
</tr>
<tr>
<td>16:47</td>
<td>-Passwords</td>
</tr>
<tr>
<td>16:47</td>
<td>Help</td>
</tr>
<tr>
<td></td>
<td>LARGE</td>
</tr>
</tbody>
</table>

22.2. Status: Unit in Power up mode

Unit is powered up Run/Stop SW is off. Press F3 to see next screen:
Pressing the Page Down F3 button shows the next Circuit Status screen:

Pressing the Page Down F3 button shows the next Circuit Status screen:

Pressing the Page Down F3 button shows the next Circuit Status screen:
Pressing the Page Down F3 button shows the next Circuit Status screen:

```
HH:MM  DESCRIPTION
CIRCUIT CURRENT CONTROL STATE
LEV/ENT TIME IN CURRENT STATE
SAT SUCT. SUCT SHEAT SAT.COND. DISC SHEAT
TEMP TEMP TEMP TEMP

PAGE UP↑  PAGE DOWN↓
```

Pressing the Page Down F3 button shows the next Circuit Status screen:

```
HH:MM  DESCRIPTION
EXV 2 STATUS LEV/ENT
OPENING EXV 2 TIME IN THIS MODE
PROVIDES VALVE %, TIME TO NEXT CHANGE, SUPERHEAT & RATE OF CHANGE, PROVIDES CONTROL & TARGET

PAGE UP↑  PAGE DOWN↓
```

22.3. Outputs

Selecting the ‘Outputs’ menu option shows the first 4 Relay Outputs:

```
HH:MM  MAIN MENU
PRESS MENU KEY TO VIEW OUTPUTS
PRESS ← ENTER
```

```
HH:MM  SCREEN TITLE
LEFT/RIGHT ARROW
THE 1ST FOUR RELAY OUTPUTS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER TO DISPLAY ANALOG OUTPUTS
PAGE UP / DOWN DISPLAYS NEXT 4 OUTPUTS
```
Pressing \( \text{ENTER} \) shows the value of output:

![Screen showing outputs]

**22.4. Inputs**

Selecting the 'Inputs' menu option shows the first 4 Sensor Inputs:

![Screen showing inputs]

Pressing \( \text{Enter} \) brings up the value of the highlighted Sensor input:

![Screen showing input details]

**DESCRIPTION**

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>SCREEN TITLE</th>
<th>LEFT/RIGHT ARROW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THE 1ST FOUR ANALOG OUTPUTS ARE PRESENTED</td>
<td>← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION</td>
</tr>
<tr>
<td></td>
<td>KEY F1 ALLOWS THE USER TO RETURN TO RELAY OUTPUTS</td>
<td>PRESS ( \leftarrow ) MENU TO RETURN TO MAIN MENU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>MAIN MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRESS MENU KEY TO VIEW INPUTS</td>
</tr>
<tr>
<td></td>
<td>PRESS ( \leftarrow ) ENTER</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>SCREEN TITLE</th>
<th>LEFT/RIGHT ARROW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THE 1ST FOUR INPUT SENSORS ARE PRESENTED</td>
<td>← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION</td>
</tr>
<tr>
<td></td>
<td>KEY F1 ALLOWS THE USER TO RETURN TO RELAY OUTPUTS</td>
<td>PRESS ( \leftarrow ) MENU TO RETURN TO MAIN MENU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>INPUT SHOW CURRENT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRESS ( \leftarrow ) ENTER TO CHANGE VALUE</td>
</tr>
</tbody>
</table>
Changing a Value of a Sensor Input- press ↵ Enter:

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NEXT SCREEN SHOWS HIGHER AUTH NEEDED TO CHANGE VALUE</td>
</tr>
<tr>
<td></td>
<td>PRESS ↵ ENTER TO RETURN TO INPUTS</td>
</tr>
<tr>
<td></td>
<td>OR PRESS MENU TO ENTER PASSWORDS TO CHANGE TO HIGHER AUTHORIZATION</td>
</tr>
</tbody>
</table>

### 22.5. Alarms

Selecting the ‘Alarms’ menu option shows the first 2 alarms:

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>MENU KEY, SELECT ALARMS ↵ ENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THIS WILL ALLOW USER TO DISPLAY DETAILS OF THE ALARMS</td>
</tr>
<tr>
<td></td>
<td>THERE ARE A MAXIMUM OF 100 ALARMS</td>
</tr>
<tr>
<td></td>
<td>PRESENTED TWO TO A SCREEN WITH MOST CURRENT FIRST</td>
</tr>
</tbody>
</table>

Continue pressing the Page Down or Page Up buttons to scroll through all the Alarm screens:

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>ALARMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THE FIRST TWO ALARMS ARE PRESENTED</td>
</tr>
<tr>
<td></td>
<td>†† ALLOWS THE USER TO SCROLL THROUGH THE ALARMS</td>
</tr>
<tr>
<td></td>
<td>PAGE UP / DOWN DISPLAYS NEXT ALARMS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HH:MM</th>
<th>ALARMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THE NEXT TWO ALARMS ARE PRESENTED</td>
</tr>
<tr>
<td></td>
<td>†† ALLOWS THE USER TO SCROLL THROUGH THE ALARMS</td>
</tr>
<tr>
<td></td>
<td>PAGE UP / DOWN DISPLAYS NEXT ALARMS</td>
</tr>
</tbody>
</table>
Selecting the ‘Graphs’ menu option shows the following:

Press Enter key to change Sample Rate - you must be authorized to make this change:

Next Screen shows change made with proper authorization:
22.7. Setpoints

Selecting the ‘Setpoints’ menu option shows the first 4 setpoints- continue to page 4 to see all setpoints:

Pressing the Enter key shows value of setpoint 1:

Press Enter key to change value of setpoint 1:

Setpoint 1 value shown
Setpoints values can be changed based on authorization level
Press → ENTER KEY TO CHANGE VALUE

Value shows new change
Press → ENTER KEY TO ACCEPT VALUE
Change made with proper authorization:

```
17:01 Setpoints
N cool TARGET
| Change Made |
1 | Set |
2 | Lpt |
3 | Exit |
8 | Chan Liq Inv Setp |
```

HH:MM

CHANGE MADE
NEW VALUE HAS BEEN SENT TO THE CONTROLLER
PRESS ← MENU TO RETURN TO MAIN MENU

### 22.8. Service Tools

Selecting the ‘Service Tools’ menu option shows the following submenu:

```
17:02 Serv Tools
-RS485 Network: i |
-Ethernet Network |
-System Info |
-Time / Date |
-Display |
```

Pressing the down arrow shows the rest of the submenu options:

```
17:03 Serv Tools
-RS485 Network: i |
-Ethernet Network |
-System Info |
-Time / Date |
```

HH:MM

SERV TOOLS
THE SERV TOOL OPTIONS ARE DISPLAYED
↑ ↓ KEYS ALLOW THE USER TO SCROLL THROUGH THE OPTIONS
FUNCTION KEYS ALLOW PAGE UP/DOWN
PRESS ↓ PG DOWN SELECT SYSTEM INFO

HH:MM

MENU KEY, SELECT SERV TOOLS, PRESS (→) ENTER
THIS WILL ALLOW USER TO DISPLAY DETAILS OF SERV TOOLS

HH:MM

CHANGE MADE
NEW VALUE HAS BEEN SENT TO THE CONTROLLER
PRESS ← MENU TO RETURN TO MAIN MENU
Pressing the down arrow shows the rest of the submenu options:

Pressing the down arrow shows the rest of the submenu options:

Pressing the down arrow shows the rest of the submenu options:

Pressing the down arrow shows the rest of the submenu options:
Pressing the down arrow shows the rest of the submenu options:

22.9. Lockout Reset

Selecting the ‘Lckout RST’ menu option shows the following:

22.10. Lockout Alarms

For more information, refer to page 43.
Selecting the ‘Lckout ALM’ menu option shows the first 2 Lockout alarms:

![Image of Lckout ALM menu]

22.11. **Passwords**

Selecting the ‘Passwords’ option shows the following:

![Image of Passwords menu]

Enter your Password by using the number keys, F1, F2, etc. An asterisk will appear - passwords are 4 numbers:

![Image of Enter Password]

As each digit is entered an (*) asterick shows up on display. When completed press enter (+)
Entering the incorrect password will keep the system in the ‘View mode’ until the correct password is entered:

Screen shows correct password entered for ‘Factory Authorization’:

Micro Control Systems has a wealth of information available in Powerpoint presentations and PDF format on our web site at:

http://www.mcscontrols.com/presentations.html
Chapter - 23. Main Menu Function Keys

23.1. MAIN MENU

HH:MM
PRESS MENU KEY
F1 KEY FOR HELP
PRESS ← ENTER

23.2. HELP DISPLAY

HH:MM
DESCRIPTION OF THE SYMBOLS USED TO MOVE CURSOR & KEYS USED TO ENTER PASSWORD

23.3. LARGE TYPE DISPLAY

HH:MM
PRESS F3 KEY AT MAIN MENU

HH:MM
DISPLAY SHOWS LARGE TYPE OF STATUS WINDOW

The authorization code is a special four-character code that enables access into the Magnum system. The code must be numeric with values between 1 and 8 if it is entered from the Keypad/Display. If the Magnum is being accessed through MCS-Connect, the code may consist of any valid alpha/numeric characters. Each system can have up to 15 different authorization codes. There are four levels of authorization, which provide different capabilities within the system. The authorization codes cannot be viewed in a Magnum system. These are established when building the configuration file in MCS-Config.

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

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>VIEW</th>
<th>USER</th>
<th>SERVICE</th>
<th>SUPERVISOR</th>
<th>FACTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor offsets</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Sensor diagnostics</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Date and time set</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Day of week set</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Change No Flow Lockout or shut down</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Change rotate Yes or No</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Change Manual/Auto settings</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Change setpoint values</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>YES</td>
</tr>
<tr>
<td>Change operating schedules</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Change holiday dates</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Lockout Reset</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>YES</td>
</tr>
<tr>
<td>Change RS485 network settings</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Change Ethernet network settings</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Adjust Keypad/Display contrast</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

* Setpoints may have individual authorization levels; you must have the proper authorization to view or edit them.

** See the Setup screen of the configuration for authorization level(s) that are allowed unlimited resets per day. Authorization levels below ‘Auth Level Bypass’ are allowed only a limited number of resets. Authorization levels at and above ‘Auth Level Bypass’ are allowed unlimited lockout resets.

*** Firmware Version 17.62M, ‘Change RS485 network settings - SERVICE or greater.’
Chapter - 25. Schedule Function

To make changes to the schedule, you must be authorized at USER level or above. Once authorized, double click on a day to change its scheduled on/off times, and the following pop-up will appear:

Within this dialog box, you are able to select up to 2 different start/stop times per day. Make sure the times do not conflict with each other (Note: the Magnum software uses 24 hour time, not 12 hour am/pm). If you only need one on and off time, then leave the second on/off times at zero.

In addition to the standard 7 day schedule, up to 8 individual dates throughout the year may be specified to run a special holiday schedule. The holiday on/off times are set up in the same way as above for the days of the week. To select the dates on which to run the holiday schedule, double click on the 8 holiday slots to bring up the following pop-up box in which to input the holiday’s month and day:

During the times when the unit is scheduled to be off, the Unit Status will change to “SCHEDULED OFF”, and the compressor(s) state will change to “CMP IS OFF”. No compressors will be allowed to run until the next time the unit is scheduled to be on.

If no schedule is specified by the user and the default settings are kept, then the unit will run based solely off the control sensor regardless of time or date.

Two Schedules per day, per loop are supported in the Setpoints,
# Chapter - 26. Schedule for Loop Water Control

<table>
<thead>
<tr>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>61</td>
<td>86</td>
<td>111</td>
<td>136</td>
<td>161</td>
<td>186</td>
<td>211</td>
<td>Sch1 On LP1</td>
<td>Starting time for the first schedule for this loop. The schedule is expressed in military time. For example: start at 6:45AM would be entered as 0645: start a 2:00PM would be entered as 1400. <strong>This schedule will not be tested, always true, if this set point is inactive.</strong></td>
</tr>
<tr>
<td>37</td>
<td>62</td>
<td>87</td>
<td>112</td>
<td>137</td>
<td>162</td>
<td>187</td>
<td>212</td>
<td>Sch1 Dur LP1</td>
<td>Duration of the first schedule for this loop is expressed in minutes. If a schedule is to be true for 5 hours, then 300 will be entered. Note the schedule can cross mid-night. For example if a schedule is true from 7:00AM until 5AM of the next day: Sch1 On LP1 is 0700 and Sch1 Dur LP1 is 1320. The duration is for 22 hours or 1320 minutes.</td>
</tr>
<tr>
<td>38</td>
<td>63</td>
<td>88</td>
<td>113</td>
<td>138</td>
<td>163</td>
<td>188</td>
<td>213</td>
<td>Sch2 On LP1</td>
<td>Starting time for the second schedule for this loop. The schedule is expressed in military time. For example: start at 10:05AM would be entered as 1005: start a 10:10PM would be entered as 2210. <strong>This schedule will not be tested, always true, if this set point is inactive.</strong></td>
</tr>
<tr>
<td>39</td>
<td>64</td>
<td>89</td>
<td>114</td>
<td>139</td>
<td>164</td>
<td>189</td>
<td>214</td>
<td>Sch2 Dur LP1</td>
<td>Duration of the second schedule for this loop is expressed in minutes. If a schedule is to be true for 3 hours and 15 minutes, then 195 will be entered. Note the schedule can cross mid-night. For example if a schedule is true from 11:00PM until 6:15AM of the next day: Sch2 On LP1 is 2300 and Sch2 Dur LP1 is 435. The duration is for 7 hours and 15 minutes or 435 minutes.</td>
</tr>
</tbody>
</table>
Chapter - 27. BMS Communication Protocols

The MCS-Magnum supports as standard: BACnet IP, Modbus RTU, and Modbus TCP/IP protocols. Using the MCS-BMS-GATEWAY, the MCS-Magnum can also support Johnson N2, LonTalk and Bacnet MSTP. Supported baud rates for Modbus RTU and Johnson N2 are 4800bps, 9600bps, 19200bps, 38400bps, and 57600bps.

27.1. MCS-Magnum to BMS Connections
27.2. Multiple MCS-MAGNUM BMS RS485 Wiring Diagram

*Note:
Every RS485 Cable must have shield connected to ground at one end only and the other end of the shield must be isolated (not connected/touching ground).
27.3. **MCS-MAGNUM BMS Protocols**

The following protocols are available with the Magnum. Changes can be made to the settings using the Keypad or MCS-CONNECT.

1. **BACnet IP**
2. **MCS PROTOCOL**
3. **MODBUS RTU PROTOCOL**
4. **ETHERNET PROTOCOL**
5. **MODBUS IP (this protocol is always active)**

### 27.3.1 Bacnet over IP Protocol

The BACNET DEVICE ID is a five-digit number. The first three digits are based on MCS’s BACnet Vendor ID 181, and the last two are set by the BACnet/MSTP address.

```
    181    XX
  ↓  ↓
Bacnet  Bacnet IP
Vendor 181  Address
```

In case the end user would like to set up an ID other than 181-XX, there is an extended BACnet setting that can only be set in MCS Config.

**The following changes can be made using the Keypad or can be made using MCS-CONNECT SERVICE MENU.**

The BACnet IP address can be verified and changed (with the proper authorization code) from the Keypad/LCD. The following steps will display the BACnet IP Network address, and the TCP/IP port:

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Use ↑ arrow to **BACnet Setting** then press Enter.
- Select address then press Enter. Change the address so it matches the last two digits of the device ID then press Enter.
- Use ↓ arrow to tab to the TCP/IP address.
- Select address then press Enter. Change the address and port to match your device.

### 27.3.2 Ethernet Network Protocol

The following steps will display the **ETHERNET NETWORK** settings:

*If you are going to manually assign the IP Address, Subnet Mask, and Default Gateway:*

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select Ethernet Network then press Enter.
- Set “DYNAMIC IP” to NO.
- Set the “IP Address”.
- Set the “Subnet Mask”.
- Set “Default Gateway”.
- Reset Magnum for change to take effect.

*If you are going to let your network assign the IP Address, Subnet Mask, and Default Gateway:*

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select Ethernet Network then press Enter.
- Set “DYNAMIC IP” to YES.
- Connect the MCS-Magnum to the network and power up the board.
### 27.3.3 MODBUS RTU Protocol

The Modbus RTU address can be verified and changed (with the proper authorization code) from the keypad/LCD or using MCS-CONNECT.

The following steps will display the Modbus RTU Network address, and the Baud Rate:

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select RS485 Network then press Enter.
- Select Protocol then press Enter. Change the protocol to Modbus RTU.
- Select address then press Enter. Change the address then press Enter.
- Select Baud then press Enter. Set the baud rate then press Enter.
- Connect the communication wires to the TX RS485 three-position terminal located above the Ethernet connector.
- Reset Magnum for change to take effect.

### 27.3.4 MODBUS TCP/IP Protocol

*This protocol is always active.*

Make sure the MCS-Magnum network settings are set correctly.

*If you are going to manually assign the IP Address, Subnet Mask, and Default Gateway.*

Press the Menu key, select Serv Tools, and then press the Enter key.

- Select Ethernet Network then press Enter.
- Set “DYNAMIC IP” to NO.
- Set the “IP Address”.
- Set the “Subnet Mask”.
- Set “Default Gateway”.
- Reset Magnum for change to take effect.

*If you are going to let your network assign the IP Address, Subnet Mask, and Default Gateway:*

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select Ethernet Network then press Enter.
- Set “DYNAMIC IP” to YES.
- Connect the MCS-Magnum to the network and power up the board.

### 27.3.5 Protocols using MCS-BMS-GATEWAY

The MCS-BMS-GATEWAY is a microprocessor based communication device that provides translation from BACnet IP to LonTalk, BACnet MSTP, or Johnson Control N2.

Information that can be transmitted includes the status of control points, alarm information, digital inputs, analog inputs or setpoints.

For more information on the MCS-BMS-GATEWAY please go to www.mcscontrols.com.

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A Powerpoint presentation on MCS NETWORK SOLUTIONS can be found on our web site at: [http://www.mcscontrols.com/presentations.html](http://www.mcscontrols.com/presentations.html)
Chapter - 28. The MCS Sensors Quick Reference Sheet

**DRIY CONTACT (DIGITAL INPUT)**

**AMPERAGE SENSOR (MCS-CTXXX)**

**TEMPERATURE SENSOR (MCS-T100)**

**PRESSURE SENSURE (MCS-XXX)**

**HUMIDITY SENSOR (MCS-HUMD-II)**

**VOLTAGE SENSOR (MCS-VOLTAGE)**

**NOTES:**

1. Sensors MUST use shielded cable and shield must not be broken. The shield must be connected only at the sensor input terminal block.

2. All sensor inputs are 0 to 5vdc.

3. Amp input sensors are field wired and must be shielded cable. They generate their own voltage and do not require 5vdc from the MCS unit.

4. Digital Input sensors are field wired and must be shielded cable. The 5vdc is taken out from the sensor terminal and wired through the switch. The jumper must then be set to digital.

5. Pressure and Temperature sensors are available with 20', 40', & 60' of cable.

6. Make sure the sensor jumper is in the correct position (Analog for analog Si, Digital for digital Si.)
# Troubleshooting Quick Reference Sheet

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POTENTIAL SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A sensor input reads -99.9</td>
<td>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 protects 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.</td>
</tr>
<tr>
<td>A sensor input reads +999.9</td>
<td>This indicates a shorted sensor input signal. Check sensor wiring for +5VDC shorted to signal etc. Check sensor for bad sensor.</td>
</tr>
<tr>
<td>A sensor is reading less then or greater than 3% off</td>
<td>This indicates the sensor needs to be calibrated. (You need to have a valid Authorization code to change sensor offsets) Press Service Diagnostics, press until LCD display s sensor offset option Press enter, 1st SI# and offset appears (i.e. Suction 1 = 0.0) Scroll using &quot;increase (+)/decrease (-)&quot; keys to find sensor to be calibrated Press enter, use the &quot;increase (+)/decrease (-)&quot; keys to change the calibration value. When value is correct, press enter.</td>
</tr>
<tr>
<td>LCD blank or flashing.</td>
<td>Indicates bad connection. Check wiring to keypad Could indicate bad software transfer, retransmitting may be necessary.</td>
</tr>
<tr>
<td>Lost I/O</td>
<td>Indicates communications problem. Verify RS485 LED blinking. Verify termination jumper only on JP4 on the MCS-Magnum and the last I/O board. Verify MCS-Magnum and each I/O’s address is set correctly. Verify wiring from the MCS-Magnum to each I/O is correct. Check fuses/120 VAC on I/O units</td>
</tr>
<tr>
<td>Invalid reading on one sensor input.</td>
<td>This indicates an input problem with 1 sensor. Verify jumper settings correct for that SI.</td>
</tr>
<tr>
<td>Invalid authorization</td>
<td>This indicates an invalid authorization number. Follow steps below for proper authorization Press ‘PASSWORDS’ at the main menu screen Press the ENTER key From the corresponding to your authorization # (4 digits) Press ENTER</td>
</tr>
</tbody>
</table>

Additional information on troubleshooting MCS-MAGNUM can be found on our web site at: [http://www.mcscontrols.com/presentations.html](http://www.mcscontrols.com/presentations.html)
Chapter - 30. Changing Address of Magnum

First, at the Main Menu use the arrow keys to navigate to Serv Tools:

Next, press the Enter key. You will see the following:

Use the up and down arrow keys to highlight Address:

Now press the Enter key. You should see something similar to the following:

Use the up and down arrow keys to select the Address number:

Finally, press the Enter key to make the change. In our example the RS-485 network address has been changed from 1 to 2:
Chapter - 31. Troubleshooting General Dead Board Symptoms

1. Ac Input fuse blown?
   - NO
   - YES
     - Replace fuse. If fuse blows again replace board

2. Voltage ok?
   - NO
     - Correct ac supply to board
   - YES
     - Measure voltage at ac input connector block and verify that it is within 10 percent of rated voltage

3. Software was corrupted?
   - NO
     - NO
     - Replace board
   - YES
     - YES
       - Is green 16VDC light on?
         - NO
           - Replace board
         - YES
           - NO
             - Press RESET button on board
           - YES
             - Is LCD backlight on?
               - NO
                 - Replace board
               - YES
                 - Is red? RESET light on all the line?
                   - NO
                     - Replace board
                   - YES
                     - Press RESET button on board

4. Board was locked up due to momentary power dip or spike?
   - NO
     - NO
       - Press RESET button on board
     - YES
       - Problem solved?
         - NO
           - Replace board
         - YES
           - NO
             - Turn power off, wait 10 seconds, turn power on
             - YES
               - Problem solved?
                 - NO
                   - Replace board
                 - YES
                   - NO
                     - Replace board
               - YES
                 - NO
                   - Replace board
                 - YES
                   - Board was locked up due to momentary power dip or spike
Chapter - 32. Troubleshooting Sensor Input Problems

If system uses expansion boards, verify MCS-I/O communication by seeing if red TX light blinks on all boards and also check for proper address jumper settings on all expansion boards.

Check that all sensor input Analog / Digital jumpers are set correctly and all sensors are set to AUTO.

Start

Are ALL sensors on the board not responding?

YES

Go to any sensor input on the board and measure dc voltage from +5 pin to ground

4.75 to 5.25 volts dc?

YES Replace board

NO

4.75 to 5.25 volts dc?

YES

Remove all sensor blocks from board, wait 10 seconds, then measure dc voltage from +5 pin of any sensor input on board to ground

NO

4.75 to 5.25 volts dc?

YES Reconnect Sensor 1 and measure dc voltage from +5 pin of any sensor input on board to ground

NO

The sensor or wiring to sensor you just reconnected is shorted to ground

The sensor or wiring to sensor you just reconnected is shorted to ground

Reconnect the next sensor and measure dc voltage from +5 pin of any sensor input on board to ground

NO

4.75 to 5.25 volts dc?

YES

The sensor or wiring to sensor you just reconnected is shorted to ground

NO

Board is defect and may have been damaged by overvoltage applied to a sensor input

Replace board

NO

Reconnect Sensor 1 and measure dc voltage from +5 pin of any sensor input on board to ground

NO

4.75 to 5.25 volts dc?

The sensor or wiring to sensor you just reconnected is shorted to ground

YES

Replace board

Defeat sensor or wiring to sensor

NO

Reads correctly?

YES

NO

If ANALOG sensor, connect MCS-SENSOR-TEST block (100 ohm 1/4 watt resistor from +5 to SI pin on connector base) and compare sensor reading to Appendix J.

If Digital sensor, connect jumper wire from +5 pin to SI pin on connector base and see if sensor reading changes from ON to OFF or OFF to ON.

The sensor or wiring to sensor you just reconnected is shorted to ground

YES

Shorted?

NO

Replace board
Chapter - 33. Troubleshooting Relay Output Problems

Start

If system uses expansion boards, verify MCS-I/O communication by seeing if red TX light blinks on all boards and also check for proper address jumper settings on all expansion boards.

Check that all relays are set to AUTO (See Appendix H)

Are all sensors on the board not responding?

YES

Turn power off, wait 10 seconds, turn power back on

NO

All relays work now?

YES

Replace board

NO

Board was locked due to momentary power dip or spike

Go to defect relay output, remove connector block and set relay to MANOFF

At the connector base is there less than 1 ohm of resistance between COM and NC

YES

Replace fuse and set relay to AUTO if fuse blows again after putting system back into normal operation, problem is due to defect outbound control device or a short in the wiring.

NO

Replace board

Is the relay output fuse blown?

YES

NO

Set relay to MANON

NO

Replace board

At the connector base is there less than 1 ohm of resistance between COM and NC

Board is ok. Set relay to AUTO and check wiring from relay output connector block to outbound controlled device. Also, if board is a MCS-I/O or RO8 refer to Appendix K for possible snubber network leakage issues and how to overcome them.
Chapter - 34. Troubleshooting Lost I/O Communication Problems

1. Start
   - Verify that address jumpers on all expansion boards are set correctly.

2. Does TX light on at least ONE expansion board blink?
   - NO
     - On Magnum board, turn power off, swap chips U12 and U13, turn power back on.
   - YES
     - Locate expansion board where TX LED is not blinking.

3. Does TX light on at least ONE expansion board blink?
   - NO
     - Replace Magnum board.
   - YES
     - Chip that was in U12 is defect.

4. Does board have power?
   - NO
     - Check wiring to an input block.
   - YES
     - Ac input fuse blown?
       - NO
         - Replace expansion board.
       - YES
         - Replace fuse, if fuse blows again, replace expansion board.

5. Is TX I/O light on the Magnum blinking?
   - NO
     - Turn power off to Magnum for 10 seconds, turn power back on.
   - YES
     - Does TX I/O light on the Magnum blink now?
       - NO
         - Does TX I/O light on the Magnum blink now?
           - NO
             - On Magnum board, turn power off, swap chips U12 and U13, turn power back on.
           - YES
             - Replace Magnum board.
         - YES
           - Chip that was in U12 is defective.
       - YES
         - Replace Magnum board.
APP #135 - Installing New Graphics

Installing New Graphics on Touchscreen

Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/3/19</td>
<td>DEW</td>
<td>Setting APP for installing new graphics for touchscreen</td>
</tr>
<tr>
<td>09-30-19</td>
<td>DEW</td>
<td>Edits from Bret, using winzip</td>
</tr>
</tbody>
</table>
INSERT A MEMORY STICK IN THE BACK OF THE TOUCHSCREEN

1. Screen will appear, highlight ‘Open in File Manager’ and click OK.
2. Make a backup of your Graphics file before proceeding with the new graphic install
3. Highlight your ‘Graphics Folder’ on left, click to open, than highlight the actual graphics folder on the right.
4. Click on ‘EDIT’ at top and click ‘COPY’
5. HIGHLIGHT THE ‘USB’ MEMORY STICK on the left side under places
6. Click on ‘EDIT’ and click ‘PASTE’
7. CHECK TO MAKE SURE YOU HAVE A BACKUP ON YOUR USB MEMORY STICK
8. Remove that USB memory stick
9. INSERT NEW USB memory stick with new graphics package

Unlocking the Touchscreen.

1. Click on the ‘MCS TOOLS’ folder on the desktop
2. Click on ‘MEMORY LOCK’
3. Click on ‘Unlock_Memory’
4. Click on ‘Execute’
5. Touchscreen will re-boot
6. When Touchscreen re-boots- NOTE ON TOP RIGHT THAT SCREEN IS ‘UNLOCKED’

Delete old Graphics Folder

1. On desktop, click on ‘MCS TOOLS’
2. Under places, locate your ‘GRAPHICS FOLDER’, CLICK TO OPEN
3. Locate the folder for your touchscreen graphics and highlight
4. Click on ‘EDIT’ move to trash
5. DO NOT DELETE ‘ERROR.JPG, GRAPHICeERROR.XML files

Install ‘New Graphics Folder’

1. Before saving the graphics to the USB MEMORY STICK BE SURE TO EXTRACT THEM FROM THE WINZIP FOLDER
2. Click on the USB memory stick
3. Highlight new ‘Graphics folder’ on the memory stick
4. Click on ‘EDIT’ at top
5. Click on ‘COPY’
6. Highlight ‘GRAPHICS’ under places
7. Click on ‘EDIT’ at top
8. Click on ‘PASTE’
9. Verify that the new Graphics file has been copied to your touchscreen Graphics folder

Re-lock Touchscreen

1. Click ‘HOME’ (House Icon) tab at top of screen to the left of your file path.
2. Click on ‘MEMORY LOCK’ folder
3. Click on ‘Lock_Memory’.
4. Click on ‘EXECUTE’
5. When touchscreen reboots, verify the touchscreen is ‘LOCKED’ AT TOP RIGHT OF SCREEN

ON MCS-CONNECT SCREEN
1. Click on ‘OFFLINE’ at top
2. Load an Offline XML file, Enable Auto Screen Refresh
3. Click to open your graphics folder in the graphics folder under places
4. Highlight ‘systemoverview.xml, and click open
5. When MCS-CONNECT opens, click on the ‘systemoverview.xml tab to open your graphics
6. Once you verified the graphics have been loaded, close MCS-CONNECT and re-connect to the controller and click on the graphics tab at the top right.

If you cannot view the new graphics package, please read your touchscreen manual located in your documents folder for detailed instructions on how to install new graphics

CONTACT SUPPORT FOR ADDITIONAL SUPPORT
Email: support@mcscontrols.com
239-694-0089