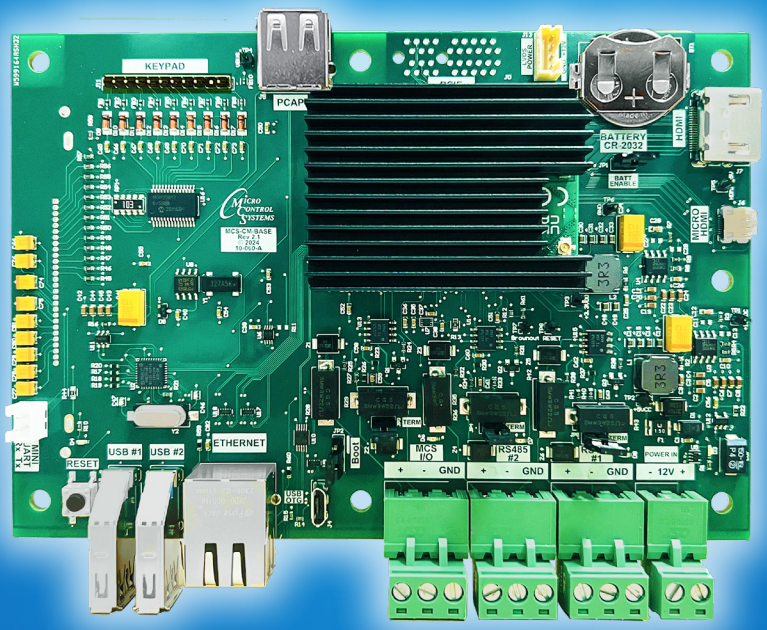
MCS-Nitromag-N

Basic Getting Started Manual

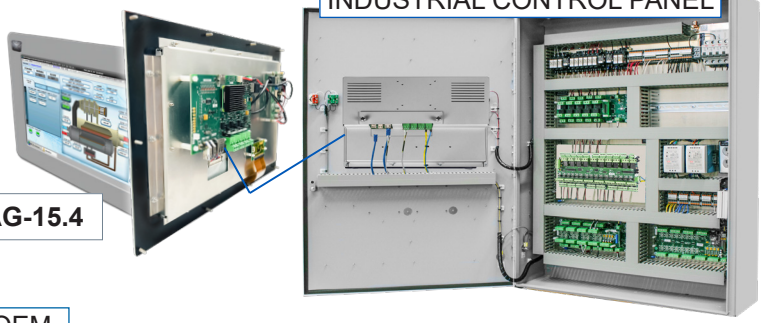
Version 1.3



New Generation of MCS-MAGNUM "Smaller Footprint"

Engineered for advanced HVAC/R applications

MCS-NITROMAG
INDUSTRIAL CONTROL PANEL



MCS-NITROMAG-15.4

MCS-NitroMag-OEM

MCS-NitroMag-DOOR

MCS-NitroMag-PANEL

MICRO CONTROL SYSTEMS

5580 Enterprise Parkway / Fort Myers, FL 33905 / Phone: 239-694-0089
www.mcscontrols.com

REV. - 07-03-2025

ORIGINAL EQUIPMENT MANUFACTURERS AND CONTRACTORS
LICENSED WITH MICRO CONTROL SYSTEMS
HAVE EXPRESSED WRITTEN PERMISSION
TO MAKE TWO ADDITIONAL COPIES OF THE CONTENTS
OF THIS MANUAL OR PUBLICATION

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Table of Contents

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INTRODUCTION TO THE MCS-NITROMAG

Introducing the latest additions to our product lineup. There are six basic versions of the MCS-NITROMAG each will need to connect to an MCS Expansion Board to complete the system.

- **MCS-NITROMAG-N**
- **MCS-NITROMAG-15.4**
- **MCS-OEM- (MCS-NITROMAG and Keypad)**
- **MCS-NITROMAG-DOOR (MCS-NITROMAG and Keypad)**
- **MCS-NITROMAG-DOOR-NEMA4 (MCS-NITROMAG and Keypad)**
- **MCS-NITROMAG-PANEL (MCS-NITROMAG and Keypad)**

MCS-NitroMag - Microprocessor @ 1.5GHz

- The MCS-NitroMag is a powerful, next-generation microprocessor-based controller engineered for advanced HVAC/R applications. At its core is a Broadcom quad-core processor running at 1.5GHz, providing the processing power necessary to handle complex operations with speed and efficiency. Designed for integration flexibility, the MCS-NitroMag interfaces seamlessly with MCS expansion and extension boards, supporting up to 144 sensor inputs (SI), 90 relay outputs (RO), and 36 analog outputs (AO), making it highly adaptable for a variety of system configurations.

- Connectivity is a standout feature of the NitroMag controller, with built-in WiFi, dual HDMI ports, Ethernet (supporting 10/100Mbps/1Gbps), two USB 2.0 ports, and two user-configurable RS485 ports that support baud rates up to 115200. These options provide robust and versatile communication capabilities for both local and remote access. The MCS-NitroMag also features a significant upgrade in memory compared to previous MCS controllers, offering 16 GB of eMMC flash storage and 2 GB of DDR3 RAM—more than double the available memory of earlier models—allowing for faster performance and increased data handling capacity.

- In terms of protocol support, the NitroMag controller functions as a Modbus RTU Master capable of supporting up to 10 Modbus devices. It also supports BACnet IP, BACnet MSTP, Modbus IP, and Modbus RTU, enabling seamless integration with building automation and control systems. This combination of processing power, connectivity, memory, and protocol compatibility makes the MCS-NitroMag an ideal solution for modern, high-performance HVAC/R control applications.

MCS-NITROMAG-N FIRMWARE

MCS-NitroMag 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. MCS-NitroMag V19+ Software Control Point Capacity

- Circuits (compressors): Up to 20
- Steps per circuit: Up to 4
- Relay Outputs: Up to 90
- Analog Outputs: Up to 36
- Sensor Inputs: Up to 144
- Setpoints: 255
- Alarm Memory: 100

MCS-NitroMag Hardware Supported by MCS-NitroMag-N V19.0 + Software

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

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 MCS-NitroMag-N 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 MCS-NitroMag-N

The MCS-NitroMag-N 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 MCS-NitroMag-N 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 MCS-NitroMag-N is designed to safeguard the system being controlled, minimize the need for manual intervention, and to provide a simple but meaningful user interface.

MCS-Connect provides both local and remote communications to the MCS-NitroMag-N, 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 MCS-NitroMag-N unit. The MCS-NitroMag-N 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.

1.3. Requirements for PC Software

To install and run MCS-CONNECT, we suggest the following system requirements:
Minimum System Required to Run Program

- PC with a Pentium-class processor
- Windows 10 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

PREPARING SOFTWARE AND FIRMWARE

1.4. Step 1- Open MCS Supplied Upgrade Kit

- **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

1.5. Step 2- Plan to Mount New Microprocessor

- **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 12 VDC/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).**

1.6. 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.)**

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
- MCS-NitroMag controller
- MicroMag controller

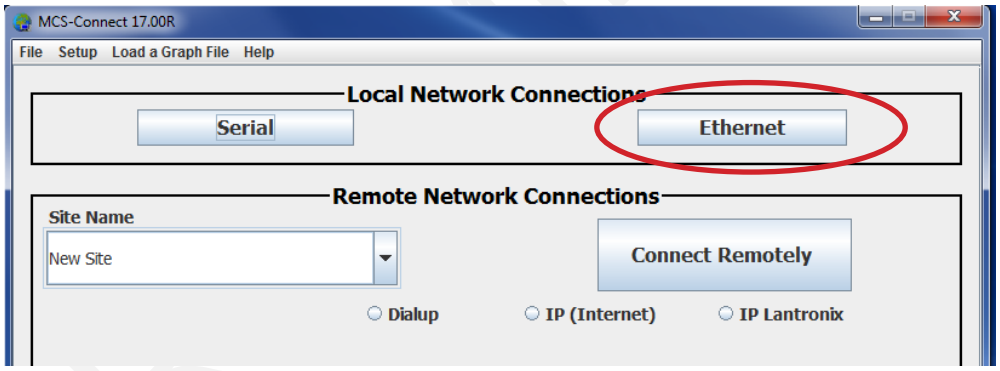
1.7. Communicating with MCS-CONNECT

1. MCS-CONNECT must be setup for the correct network address for your buildings IP address in order to connect to your controllers.
2. Configuration files and Firmware software can be changed based on your authorization to make those changes.
3. Information for makeing changes can be found in the MCS-CONNECT latest manual located on:

   www.https://mcscontrols.com/manuals.html

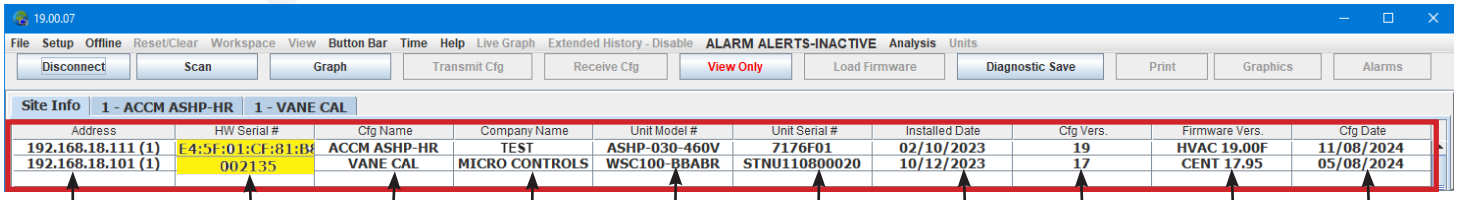
Scan for Controller

Once connected, click on the MCS-CONNECT program to open.Changes to the config and firmware software can be changed if you are authorized. Click on the Ethernet tab to open available controllers.



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

(if there is a RED line through your controller, you need to update the config file/firmware.)



Controller IP Address #1

HW Serial# **MCS-NitroMag starts with Alpa letter**

IMPORTANT

Config Name

Company Name

Unit Model #

Unit Serial #

Config Installed Date

Config Version

Firmware Version

Config Date

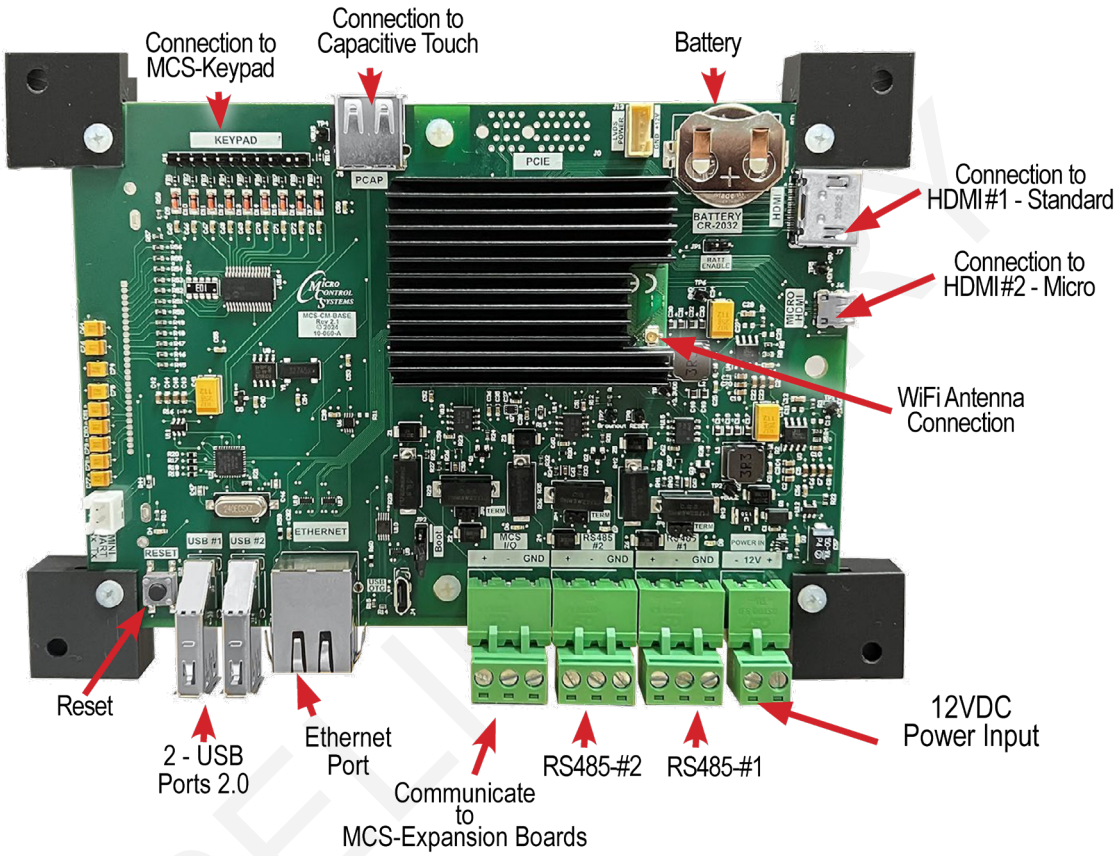
Click or scan with mobile phone for MCS-CONNECT MANUAL

MCS-NITROMAG-N COMPONENTS

1.8. Components of MCS-NITROMAG-N

NITROMAG OPERATION SYSTEM - REV 1.05 & up

NITROMAG HVAC FIRMWARE - REV 19.00E & up



1.8.1 Connection to MCS-KEYPAD

Plug in for MCS-Kepad-OEM, MCS-Replacement Keypad

Connection to Capactive Touchscreen

The MCS-TOUCH-15.4 capacitive touchscreen interface designed to simplify user access with the MCS-NITROMAG utilizing MCS-Connect to provide both graphics and service mode access to technicians.

1.8.2 Battery

Battery backup (Type BR2032)

1.8.3 Connection to HDMI-STANDARD and HDMI-MINI PORTS

MCS-NITROMAG supports two HDMI 2.0 interfaces, each one capable of driving 4 k images.

1.8.4 WiFi Antenna Connection and Setup

Latest operating system now sets the NitroMag as a hotspot through the Wifi interface. The Wifi will show as NitroMag-{MAC_ADDRESS} as the SSID. The password for the hotspot is MCSadmin22.

The hotspot can be connected to with your PC's Wifi to wirelessly get connected through MCS-Connect.

The antenna connection is used to connect to a small antenna supplied with each unit. The antenna is mounted on the front of the MCS-NITROMAG-15.4, MCS-NITROMAG-DOOR and the

MCS-NITROMAG-DOOR-NEMA4. Antennas are supplied separate for the MCS-NITROMAG-OEM and the MCS-NITROMAG-PANEL.

The MCS-NITROMAG is supplied with an on-board wireless module supporting both:

2.4, 5.0 GHz 8.02 b/g/n/ac wireless

Bluetooth 5.0, BLE

1.8.5 RESET BUTTON

Computer Reset - Press the hardware reset button on the MCS-Controller to re-start up the controller..

1.8.6 USB PORTS

2 USB type B 2.0 ports 480Mbps signaling.

1.8.7 ETHERNET PORT

Supports 10 Mbps/100 Mbps/1Gbps)

1.8.8 COMMUNICATION to MCS-EXPANSION BOARDS

The MCS-NITROMAG needs one or more MCS-EXPANSION BOARDS to comminicate to the system it is monitoring.

1.8.9 RS-485 PORTS

Each port suports up to 115200 baud rate.

1.8.10 BMS NETWORK CONNECTIVITY

BUILD IN SUPPORT - Modbus RTU Master

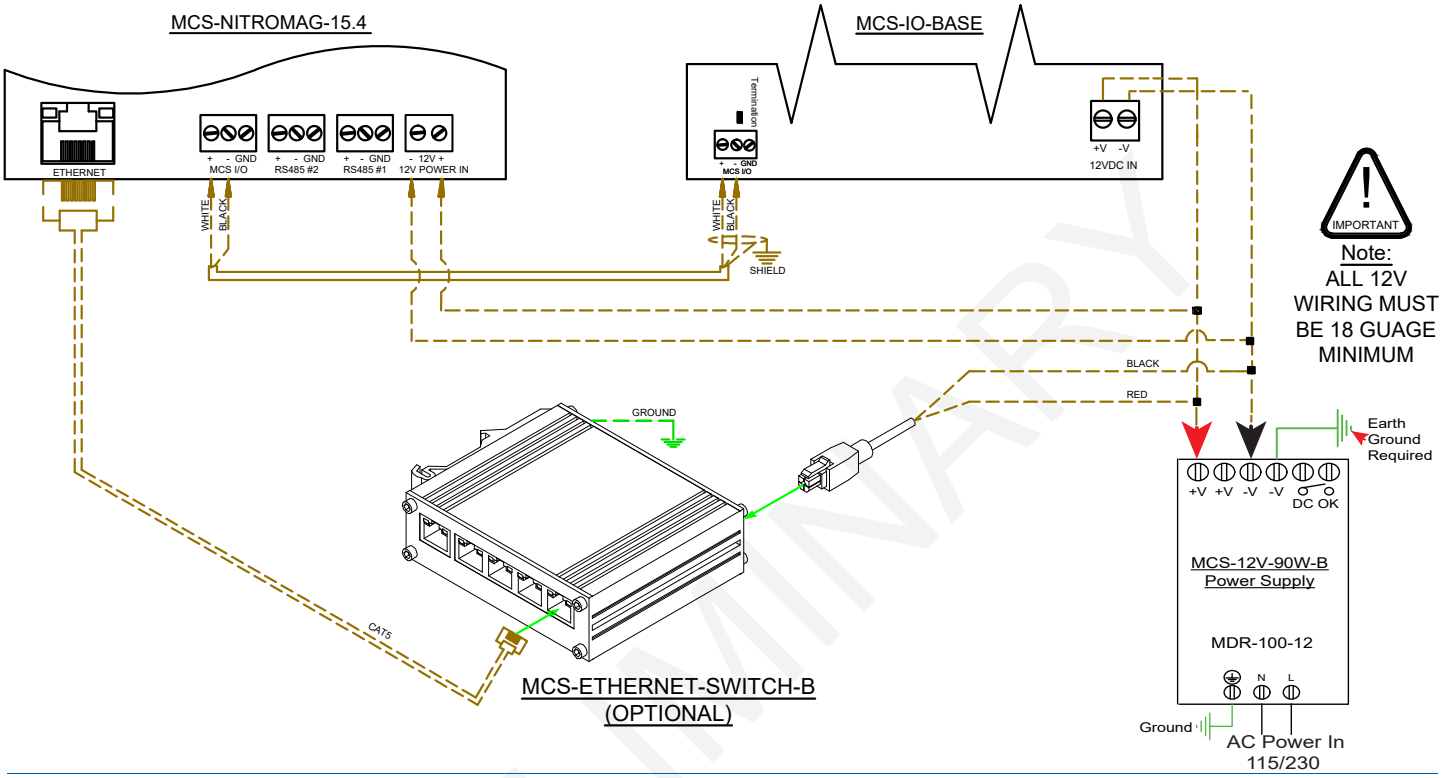
Protocols - BACnet IP, BACnet MSTP, Modbus IP, Modbus RTU Slave(N2 coming soon)

(LonTalk requires MCS-BMS-GATEWAY)

1.8.11 MODBUS MASTER

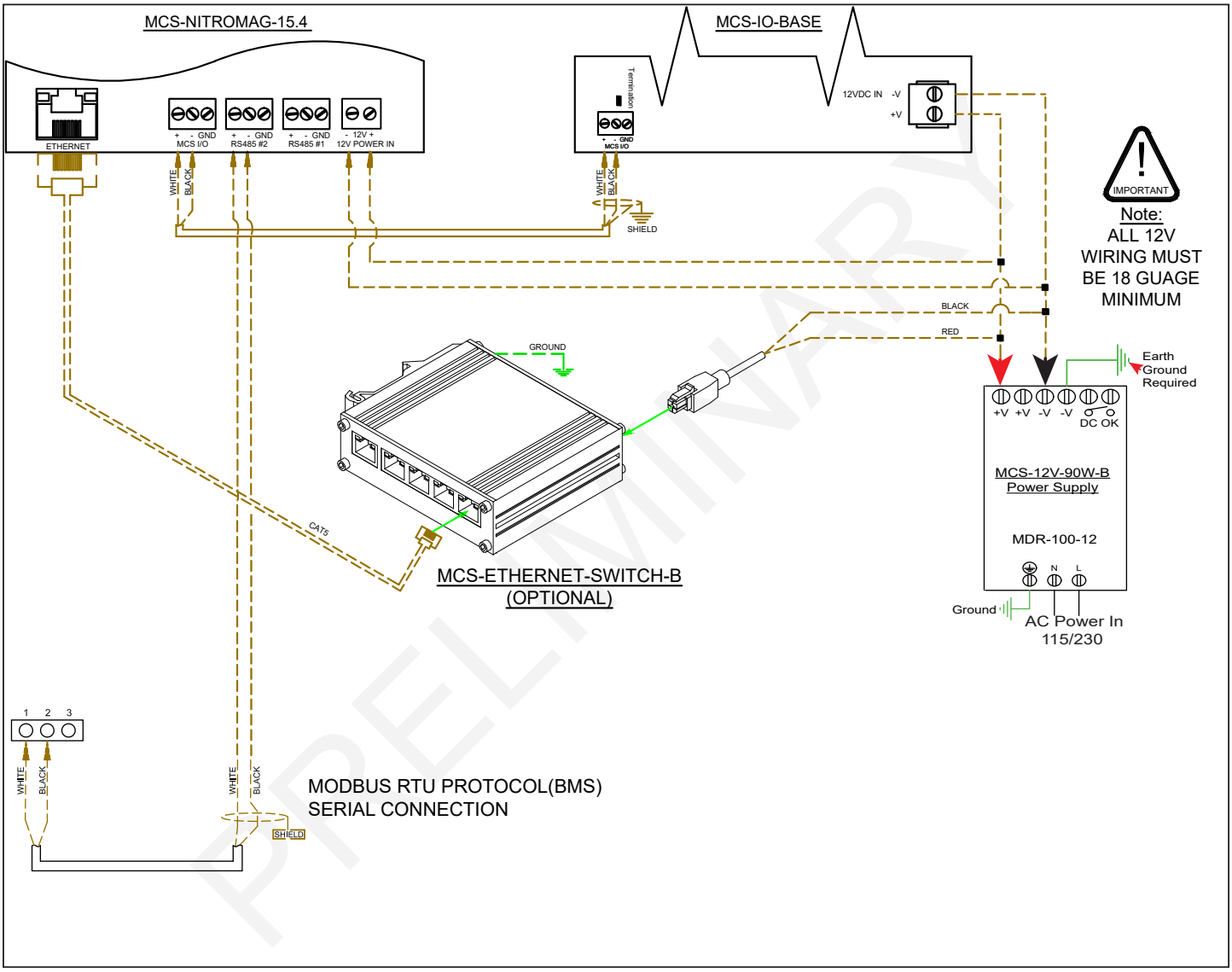
BUILD IN SUPPORT - Supports up to 20 Modbus devices e.g., VFD’s KW Meter, Compressors. (MCS-Modbus I/O no longer required).

MCS-NitroMag Customer Installation



NETWORK - RS-485 CONNECTION

MCS-NitroMag-N communicated through the MCS-I/O communication port at 38,400 baud rate.
The firmware includes a MODBUS INTERFACE which enables it to act as a MODBUS MASTER using the MODBUS RTU protocol, which allows communication with the MODBUS slave for parameter access over the RS485 communication port on the MCS-Nitromag-N.



The MCS-NitroMag-N is configured through the MCS-CONFIG firmware. The MODUS RTU MASTER supports up to 10 MODBUS decives e.g., VFD's, KW Meter, Compressors.

Using MCS-CONFIG firmware, a configutation file is created based on the slave parameters.

Each parameter is assigned a pre-programmed register number.

Those register numbers are named in the configuration file, which will display in MCS-CONNECT when viewing the controller.

The register parameters will be assigned to Sensors inputs, Relay outputs and Analog outputs to relay the information from the MODBUS slave.

The next pages shows information on how this is setup in the MCS-CONFIG file.

NETWORK CONNECTION–REMOTE

1.9. Remote using Ethernet

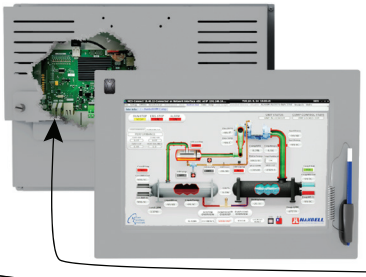
When connecting directly through the 10/100 MBPS Ethernet port on the MCS-NitroMag-N from a PC.

IMPORTANT

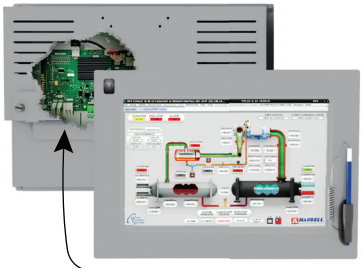
It is necessary to use a crossover Ethernet cable to the MCS-WIRELESS MODEM.

MCS-NitroMag #1
Static IP: 192.168.18.101
Subnet mask: 255.255.255.0
Default Gateway: 192.168.18.1
TCP/IP Port: 5001

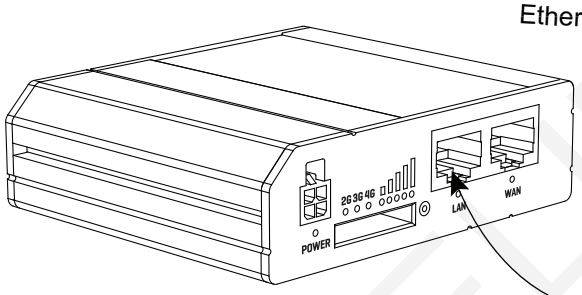
MCS-NitroMag #2
Static IP: 192.168.18.102
Subnet mask: 255.255.255.0
Default Gateway: 192.168.18.1
TCP/IP Port: 5002



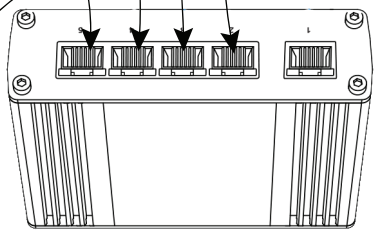
MCS-NitroMag #3
Static IP: 192.168.18.103
Subnet mask: 255.255.255.0
Default Gateway: 192.168.18.1
TCP/IP Port: 5002



Ethernet Cable



MCS-WIRELESS-MODEM-B
Static IP: 192.168.18.01
Subnet mask: 255.255.255.0
Default Gateway: 192.168.18.1



MCS-ETHERNET SWITCH-B

OPEN VPN

See Label for actual settings

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.

MCS-NITROMAG WITH KEYPADS

NITROMAG KEYPAD OPERATION SYSTEM - REV 1.05 & up

NITROMAG HVAC FIRMWARE - REV 19.00E & up

1.10. MCS-NITROMAG-OEM

The **MCS-NitroMag-OEM** is a control system containing a Keypad, a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GB.

The MCS-NitroMag-OEM features an easy-to-use keypad with three function keys, four directions keys and two selection keys (Menu & Enter).

The display LCD is 128 x 64 dot pixel graphics, 2.8” diagonal viewing area with White characters on a dark back-ground (reversible). Includes a NEMA Type 1 faceplate for easy mounting to an enclosure door.

1.10.1 MOUNTING

- Template mount and wiring instructions with shipment.
- 8 pre-drilled holes for mounting
- Connection to MCS EXPANSION BOARDS using MCS-I/O Comm Port.

1.11. MCS-NITROMAG-DOOR

The MCS-NitroMag-DOOR is a control system containing a Keypad, a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GB. Includes a NEMA Type 1 faceplate for easy mounting to an enclosure door.
The Keypad is idential as the MCS-NITROMAG-OEM with the same features as explaned above.

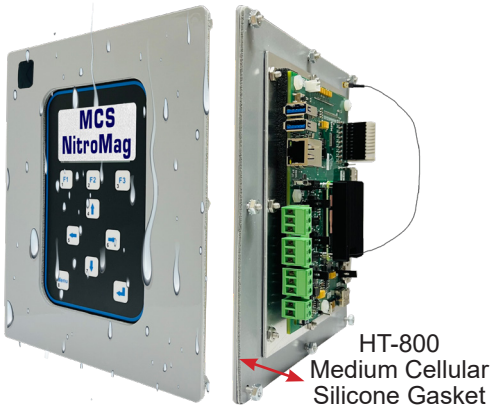
1.11.1 MOUNTING

- Template mount and wiring instructions with shipment.
- Mounts using supplied #6-32 Kep nut
- Connection to MCS EXPANSION BOARDS using MCS-I/O Comm Port.

1.12. MCS-NITROMAG-DOOR-NEMA

The MCS-NitroMag-DOOR-NEMA4 has been sealed in its own frame using a new Gasket (HT-800 Medium Cellular Silicone). It features an easy-to-use keypad with three function keys, four directions keys and two selection keys (Menu & Enter).

The Keypad is idential as the MCS-NITROMAG-OEM with the same features as explaned above.



1.12.1 MOUNTING

- Template mount and wiring instructions with shipment.
- Mounts using supplied #6-32 Kep nut
- Connection to MCS EXPANSION BOARDS using MCS-I/O Comm Port.

1.13. MCS-NITROMAG-PANEL

The MCS-NitroMag-PANEL is a control system containing a Keypad, a processor, memory, eMMC Flash, and supporting power circuitry. The Broadcom quad-core processor delivers a blazing speed of 1.5GB.

The Keypad is idential as the MCS-NITROMAG-OEM with the same features as explaned above.

1.13.1 MOUNTING

- Template mount and wiring instructions with shipment.
- Mounts on a backplane using four #6 (6-32) sheet metal screws.
- Connection to MCS EXPANSION BOARDS using MCS-I/O Comm Port.

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MCS-NITROMAG-15.4 TOUCHSCREEN

Latest MCS-NitroMag Operating System and above

Click on the QR code for information on MCS-NitroMag

Click or scan with mobile for more information.

CAPACITIVE TOUCHSCREEN'S INTERFACE

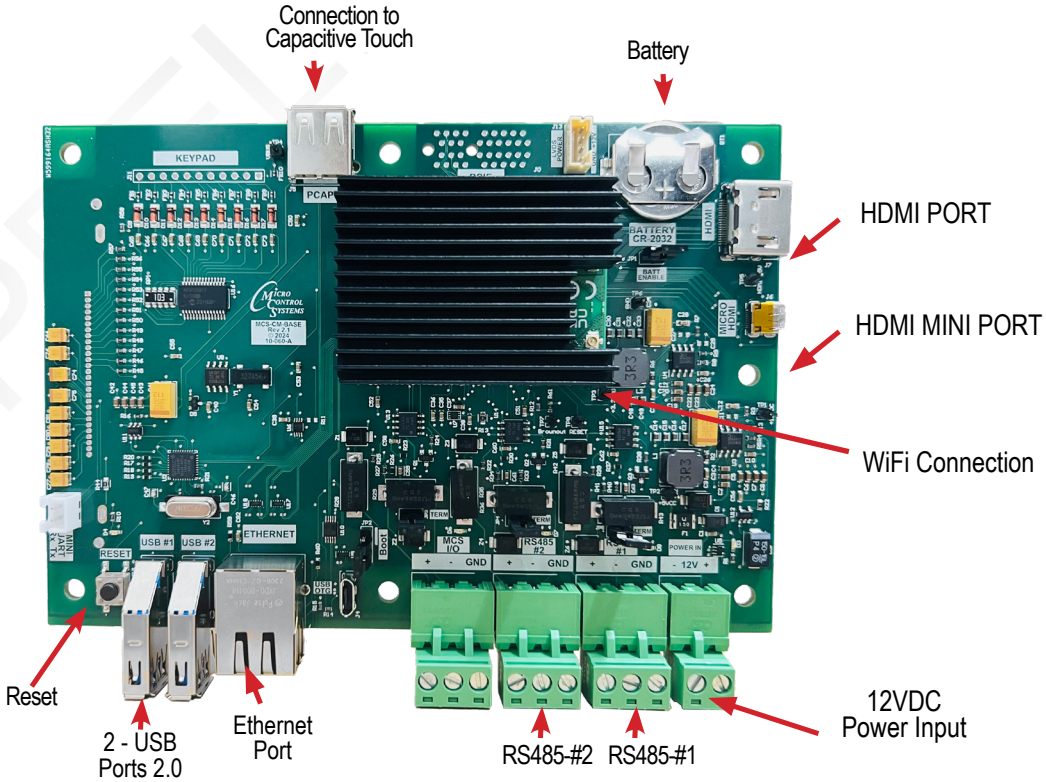
Your touchscreen is shipped installed with the latest Linux operating system, MCS-Connect and additional files for displaying your graphics.

Vesa Mount Back - 15.4"

INCLUDED COMPONENTS

90W Single Output Power Supply for Touchscreen
Resistant to short circuiting, overloading, and over voltage.
Operating temperature up to 158F (70 °C)

1.1. MCS-NitroMag MOTHERBOARD - FRONT



SECTION- 1. CAPACITIVE TOUCH SITE DOCUMENTS

1.1. 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 contains 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)

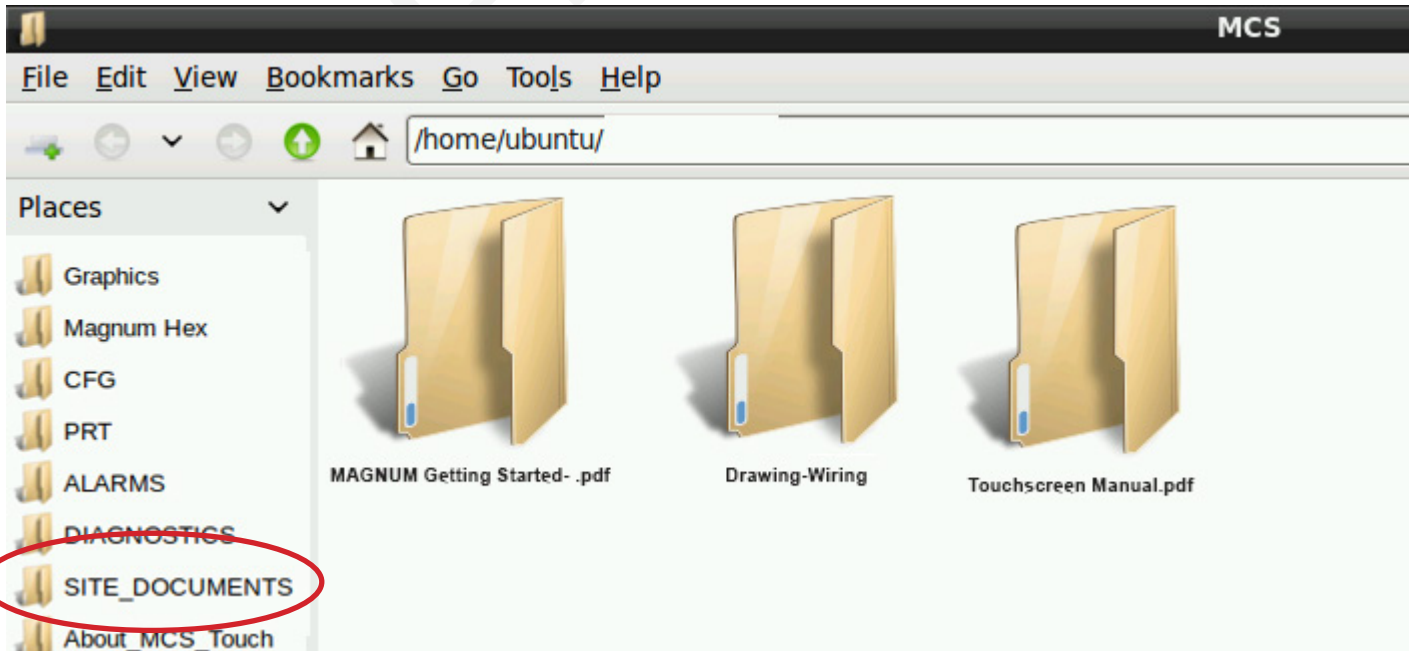
a. Getting Started Manual
b. Keypad Manual
c. Touchscreen Manual
d. EXV Manual
e. BMS-GATEWAY Startup Guide
f. Additional manual may be stored here depending on the configuration of the unit

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
3. Click on Site _Documents under Places on left.



SECTION- 2. CAPACITIVE TOUCH MAIN SCREEN

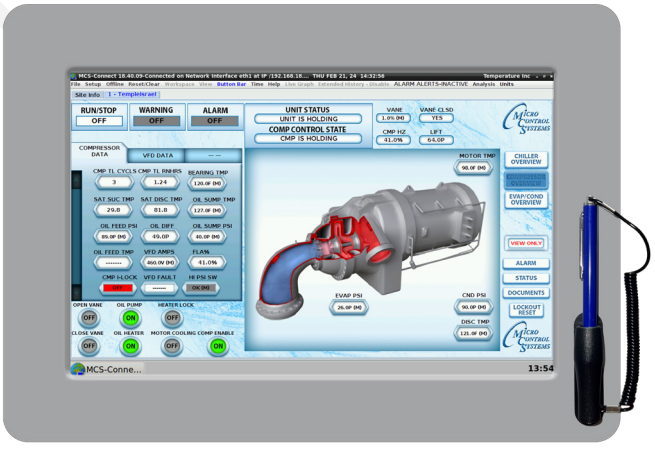
2.1. Layout of Main Screen on the Touchscreen

1. MCS Tools, icon
2. On Screen Keypad icon
3. MCS-Connect icon
4. Touchscreen Software Version
5. Time of Day (click to change)

2.2. 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.



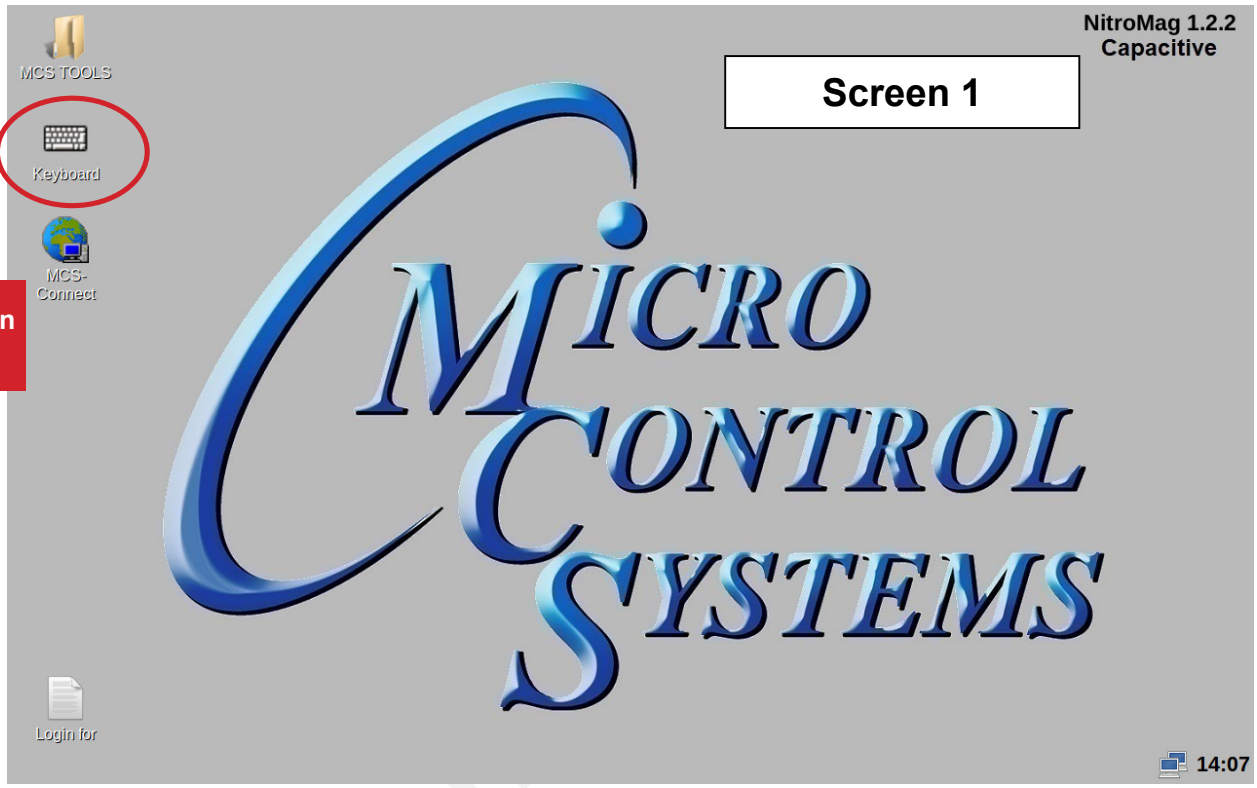
The Touchscreen now comes with a new Linux operating system version MCS 1.2.2 and above

Calibrating software is not needed for the capacitive touchscreens shipped after February 2024.

SECTION- 3. CAPACITIVE TOUCH KEYPAD

3.1. KEYPAD -

On the main screen, click on Keyboard Icon as shown in screen 1.



3.2. 'ON SCREEN KEYPAD'

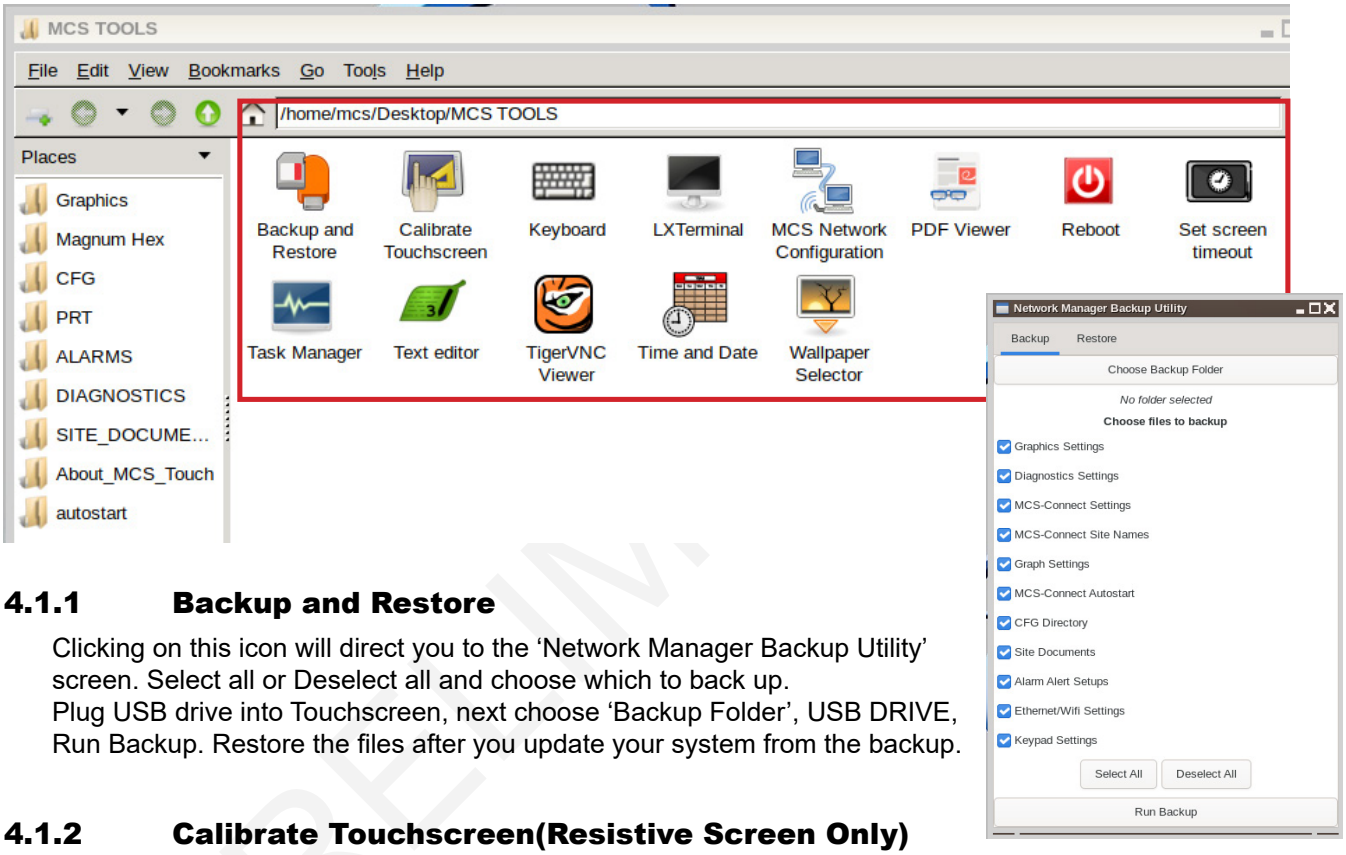
Screen 2 shows keyboard display. Use the stylus and keypad to enter or make adjustments.

SECTION- 3. CAPACITIVE TOUCH MCS-TOOLS

4.1. MCS-TOOLS folder and its sub folders

1. **Navigate to the '<u>MCS TOOLS folder</u>' on your desktop.**
2. **Double click on folder to open.**

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



4.1.1 Backup and Restore

Clicking on this icon will direct you to the 'Network Manager Backup Utility' screen. Select all or Deselect all and choose which to back up.
Plug USB drive into Touchscreen, next choose 'Backup Folder', USB DRIVE, Run Backup. Restore the files after you update your system from the backup.

4.1.2 Calibrate Touchscreen(Resistive Screen Only)

NOTE: Calibration is not necessary on the New Capacitive Touch.

In the new version of Linux software, MCS 1.02 software is provided to calibrate your ***resistive touchscreen*** to pin point the accuracy on the touchscreen. 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 under the ***Resistive Touchscreen shipped prior to February, 2024***.

4.1.3 Keyboard

Clicking on this icon will open the on screen keyboard.

4.1.4 LX Terminal

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

4.1.5 Advanced Network Configuration

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.

4.1.6 PDF Viewer

Allows the tech to open a PDF viewer.

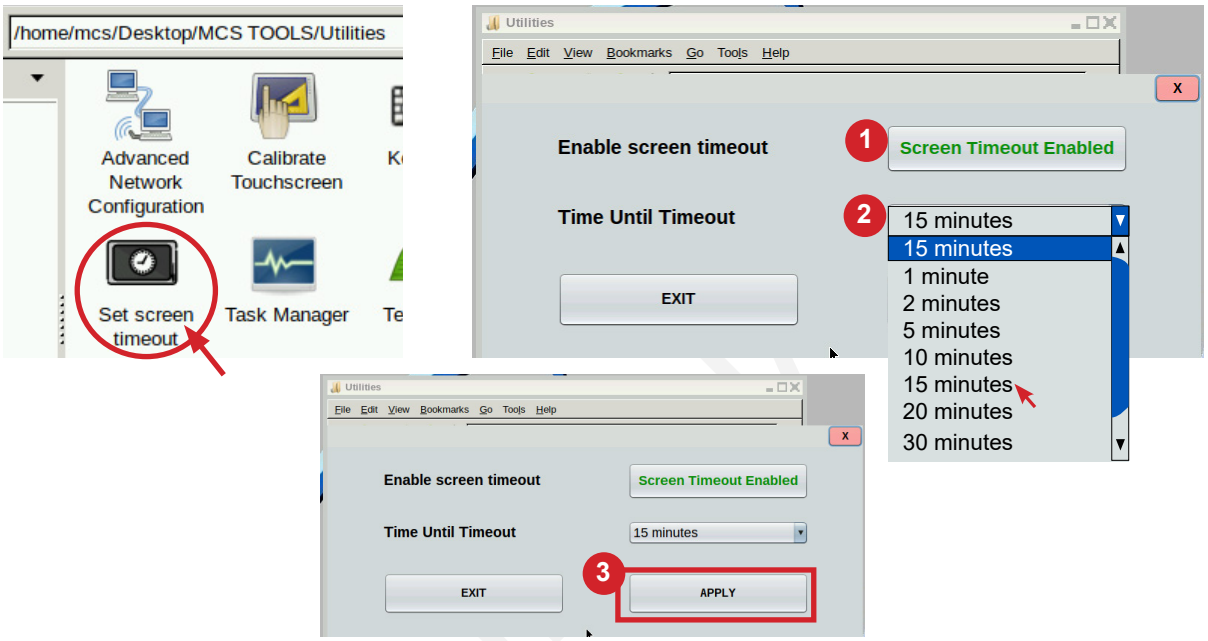
4.1.7 Reboot

Clicking on this icon will reboot your touchscreen.

4.1.8 Set screen timeout

Clicking on this icon allows the tech to set the amount of time that the screen will go into a screen timeout.

1. Click on 'Timeout Enabled' to set the time.
2. Click on 'Time Until Timeout' drop down arrow to show times available, choose time.
3. Click to 'APPLY'



4.1.9 Task Manager

Clicking on this icon that lets you manage, search, filter and terminate processes if necessary.

4.1.10 Text Editor

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

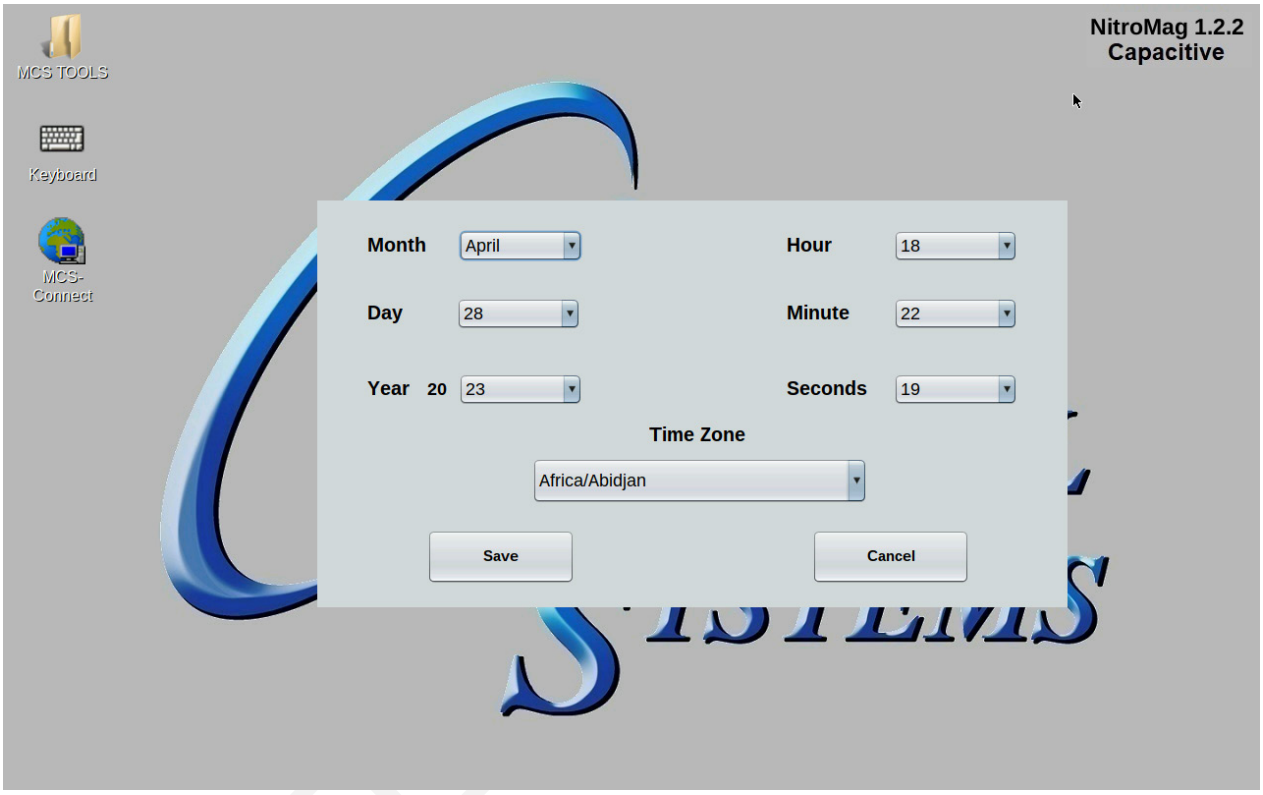
4.1.11 TigerVNC Viewer

TigerVNC is a high-performance, platform-neutral implementation of VNC (Virtual Network Computing), a client/server application that allows users to launch and interact with graphical applications on remote machines.

4.1.12 Time and Date

Clicking on this icon allow the tech to setup the time and date.

1. **Navigate to the 'MCS TOOLS' folder on your desktop.**
   Double click on folder to open.
2. Double Click **'Time And Date'** to make changes
3. Next screen will allow you to change time and date.
4. Click to save your changes.



4.1.13 Wallpaper Selector

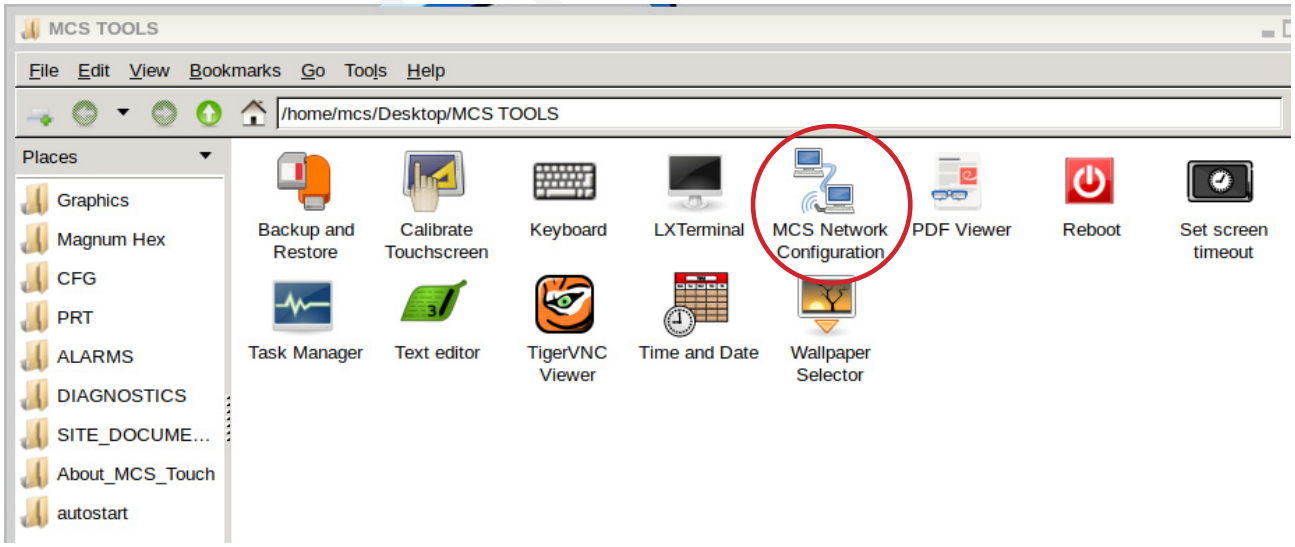
Set up for OEM only.

SECTION- 5. CAPACITIVE TOUCH NETWORK

5.1. Setting Up Network For Communication With Your Controller

At the touchscreen main screen, click on **'MCS TOOLS' folder' as** seen screen 1.

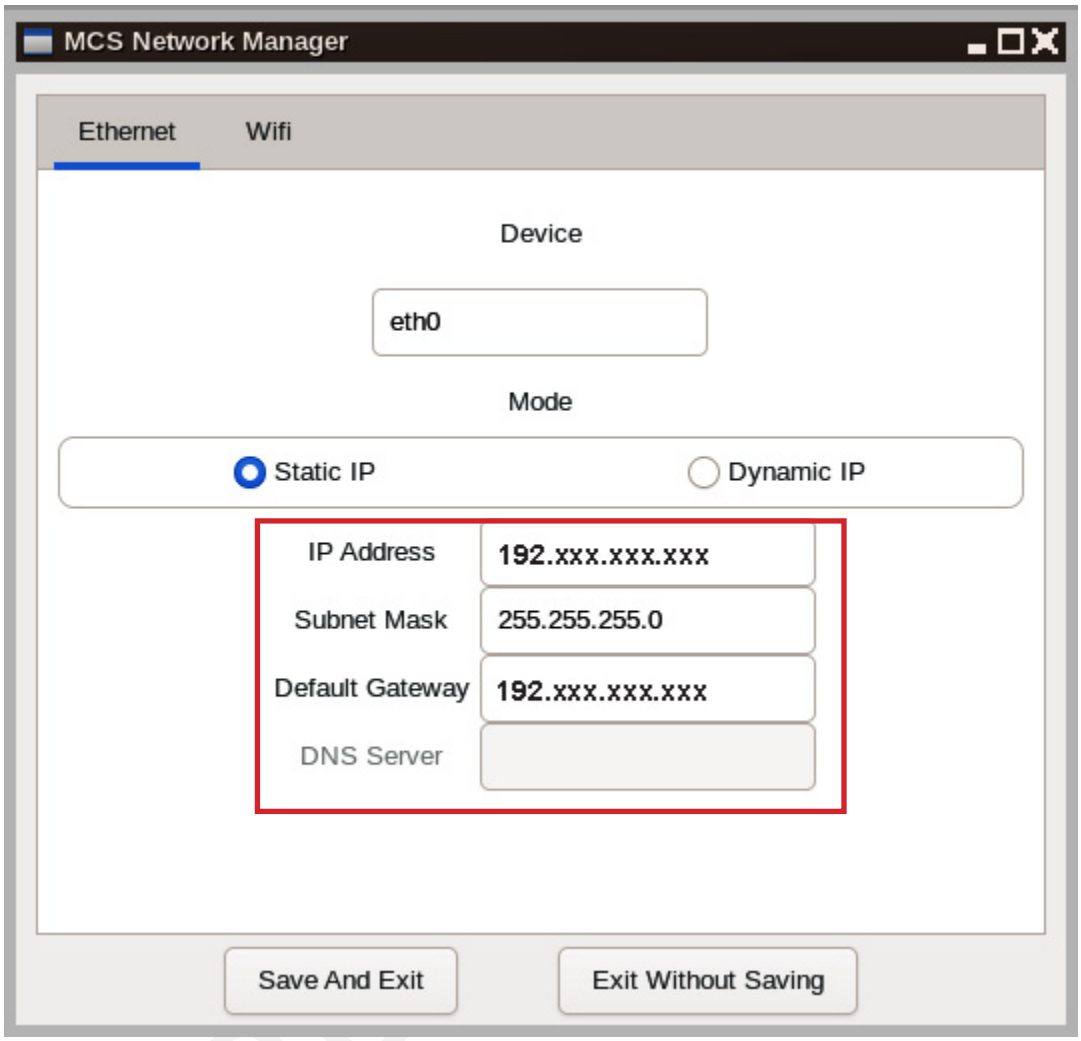
5.2. MCS TOOLS Folder



Click **'Advanced Network'** as shown.

5.2.1 Advanced Network Screen

Next display, shows network communication screen. Your touchscreen will show **'Ethernet'**.

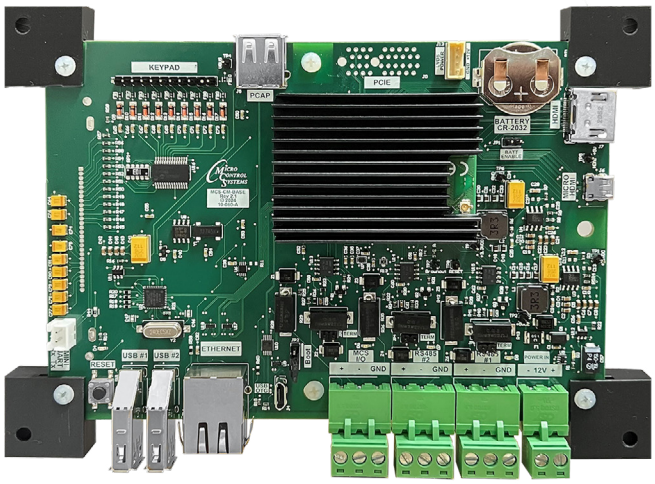


5.2.1.1. Selecting a Ethernet Port

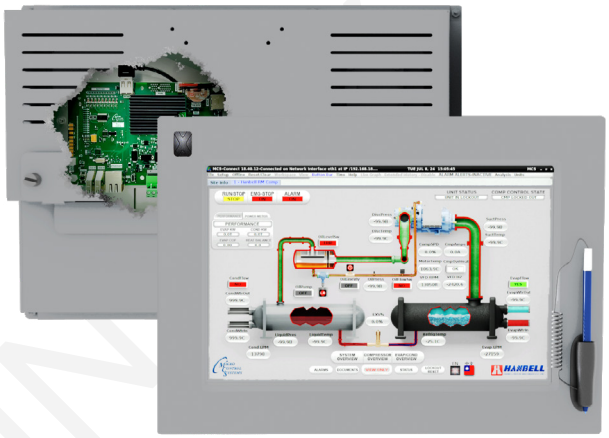
1. Go to the Ethernet tab.
2. Choose either Static IP or Dynamic IP
3. Setup the following to connect to the network in your location.
   a. IP Address
   b. Subnet Mask
   c. Default Gateway

MCS-NITROMAG SETTING UP WiFi

MCS-NitroMag WiFi Setup



MCS-NitroMag-N



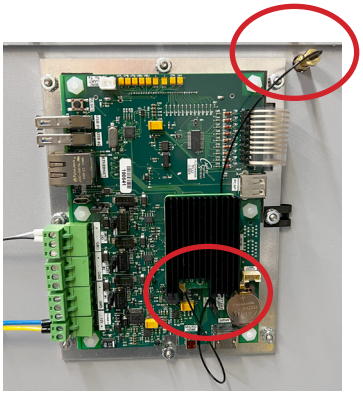
MCS-NitroMag-15.4

MCS-NitroMag-OEM

WiFi Antenna shipped with
MCS-NItromag-OEM
& MCS-NitroMag-PANEL

MCS-NitroMag-PANEL

WiFi Antenna
(Slim Mount Style)



WiFi Antenna shipped connected
to MCS-NitroMag-DOOR
MCS-NitroMag-DOOR-NEMA4
MCS-NitroMag-15.4

1.1. WiFi Connection

The MCS-NitroMag-N is equipped with 2.4 GHz, 5.0 GHz 802.11 b/g/n ac wireless.

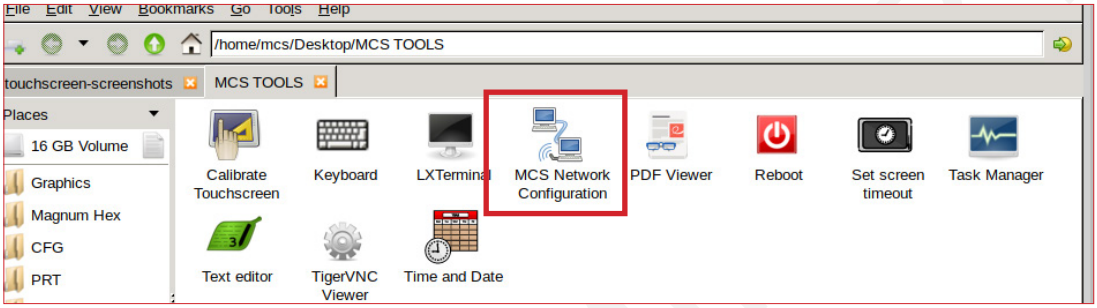
A Wi-Fi antenna converts radio frequency (RF) waves, which contain packets of information, into electrical signals, or electrical signals into RF. This conversion method permits wireless devices such as routers, smartphones, laptops, and tablets to communicate wirelessly.

The board included an external antenna connection, If used it should be positioned outside an encloser or panel that is not surrounded by metal, including any ground plane.

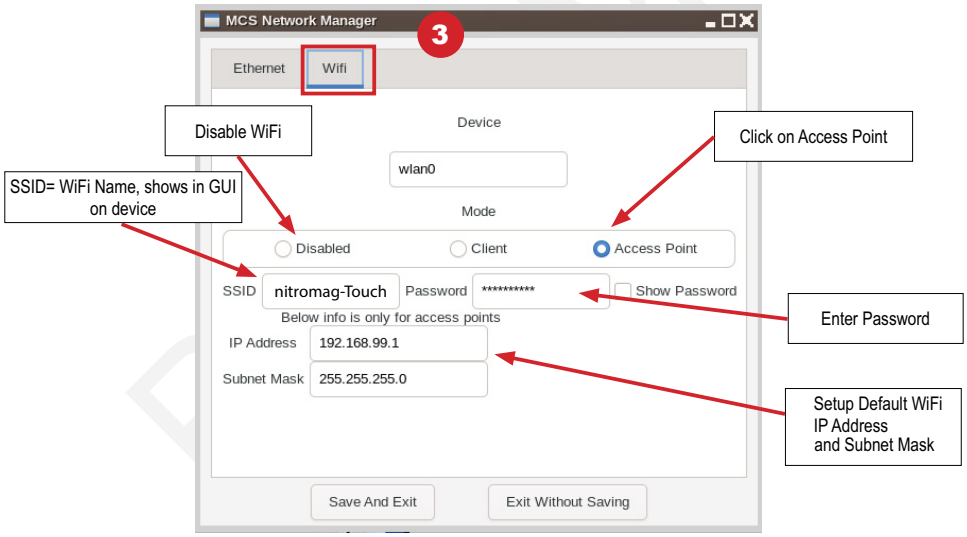
The hotspot can be connected to your PC's Wifi to wirelessly get connected through MCS-NitroMag-N.

1.1.1 Setup for Connecting to WiFi

1. Click on Touchscreen **MCS TOOLS** on the desktop.
2. Next click on **MCS-NETWORK CONFIGURATION.**

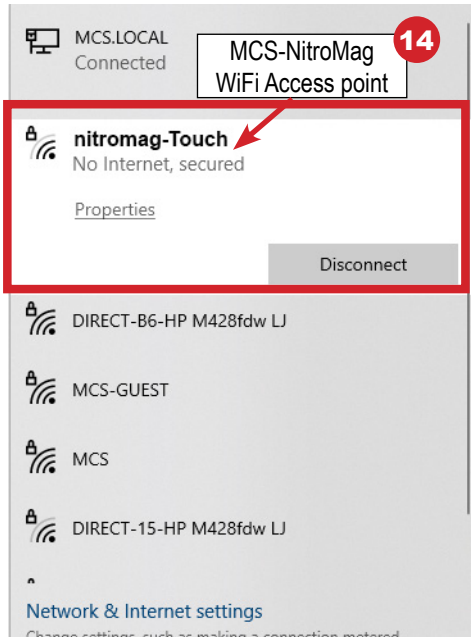


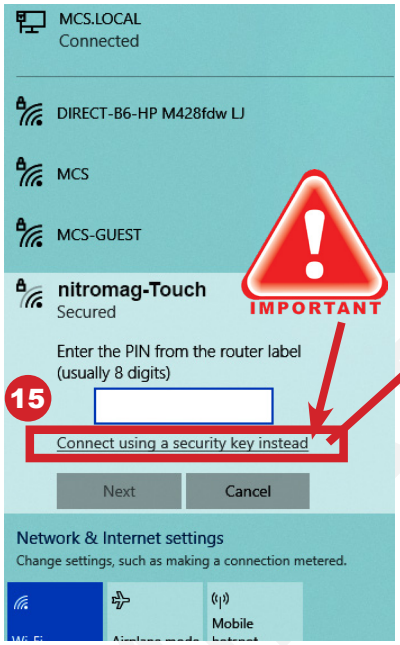
3. Click on the **WiFi** tab to setup the Access point for the WiFi.

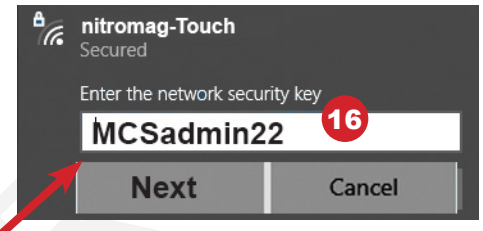


4. Click on **'ACCESS POINT'**
5. Click on **'SSID'** and enter a name for your WiFi.
6. Enter the defautl '**IP ADDRESS'** for your new WiFi network.
7. Enter a **'PASSWORD'**
8. Enter the **'SUBNET MASK'**, default **'255.255.255.0'**
9. Save and Exit

11. Open your mobile phone / computer and view the GUI connection for the MCS-NitroMag.
12. This works just as you'd expect it to with Laptops or smart phones.
13. Refresh your WiFi, your new hotspot will be ready to connect.
14. Click on GUI, sample **'nitromag-Touch'**.



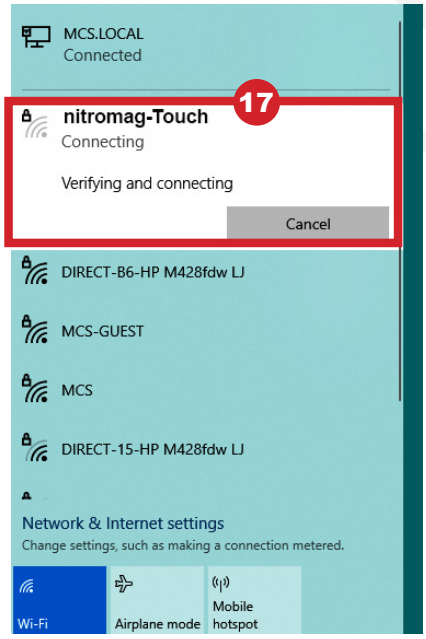




15. Click on the **"Connect using a security key instead"**

NOTE: THE SECURITY KEY IS THE PASSWORD YOU ENTERED IN THE WIFI ACCESS POINT

16. Enter the Password (default password: MCSadmin22) entered in the WiFi setup in the previous screen.
17. Next screen shows **'CONNECTING, VERIFYING AND CONNECTING'**



SECTION- 6. Update MCS-CONNECT for Capacitive Touch

NOTE: MAKE SURE YOU DOWNLOAD THE LATEST LINUX VERSION OF MCS-CONNECT FROM OUR WEBSITE AT:

http://www.mcscontrols.com/software.html

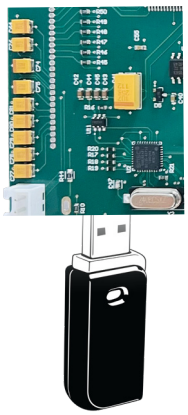
This will walk you through updating MCS-CONNECT on your Capacitive touch screen.

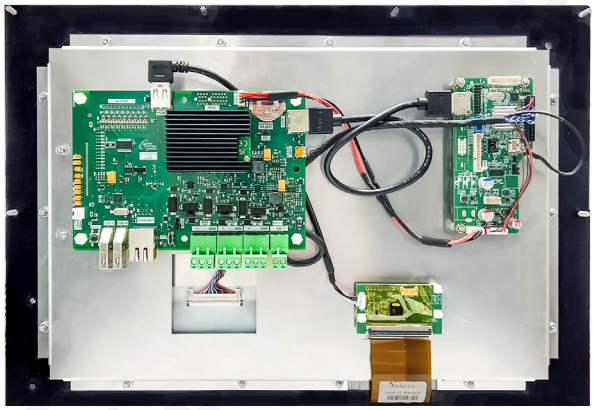
1. Format a new USB drive prior to installing this update, insert into your computer.
2. Go to the MCS-WEBSITE and down the latest MCS-CONNET for your touchscreen.

Please Note
Locate the Serial Number on your touchscreen board and follow the installation procedure for proper deployment.

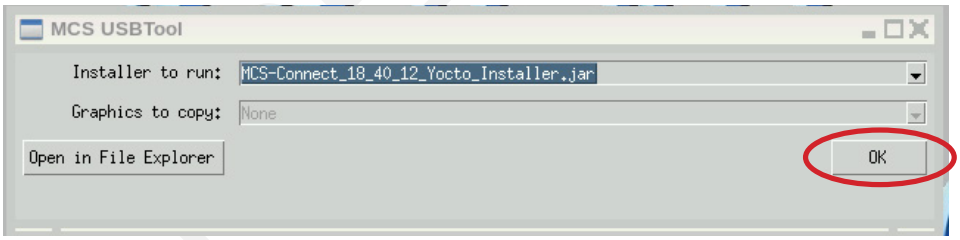
3. Save the correct file to the attached USB drive on your computer.
4. Insert the USB drive into the back of the touchscreen.

On back of touchscreen, locate the USB PORT as shown on screen 2 and insert the USB drive with the new version of MCS-CONNECT.



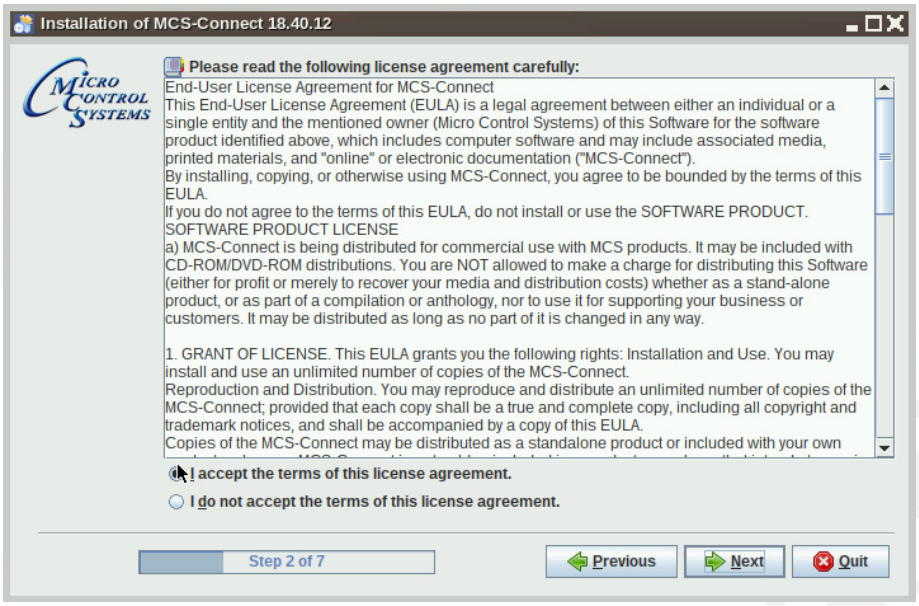


The below screen will appear, click OK.

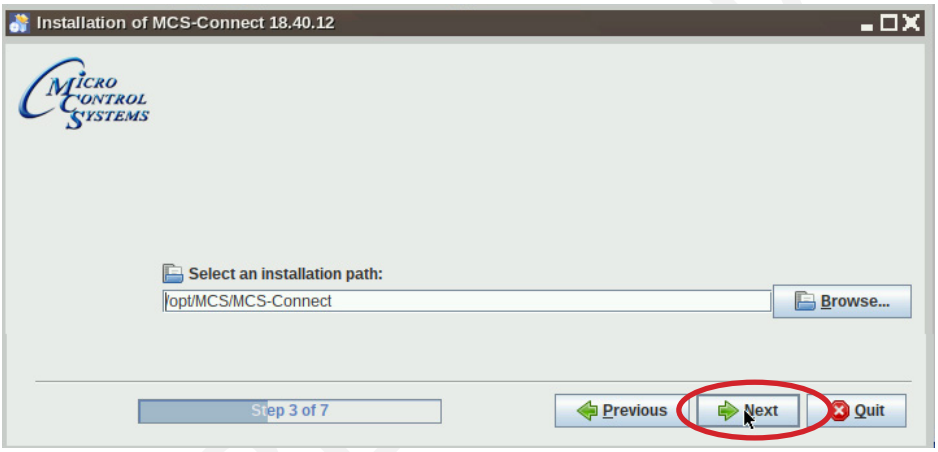


5. Click ‘Next” to continue.

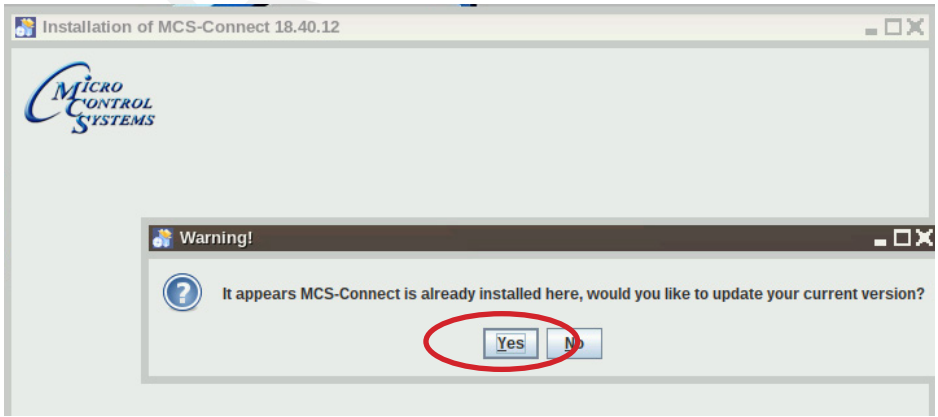
6. Click to accept terms of license agreement, click ‘Next’ to continue.



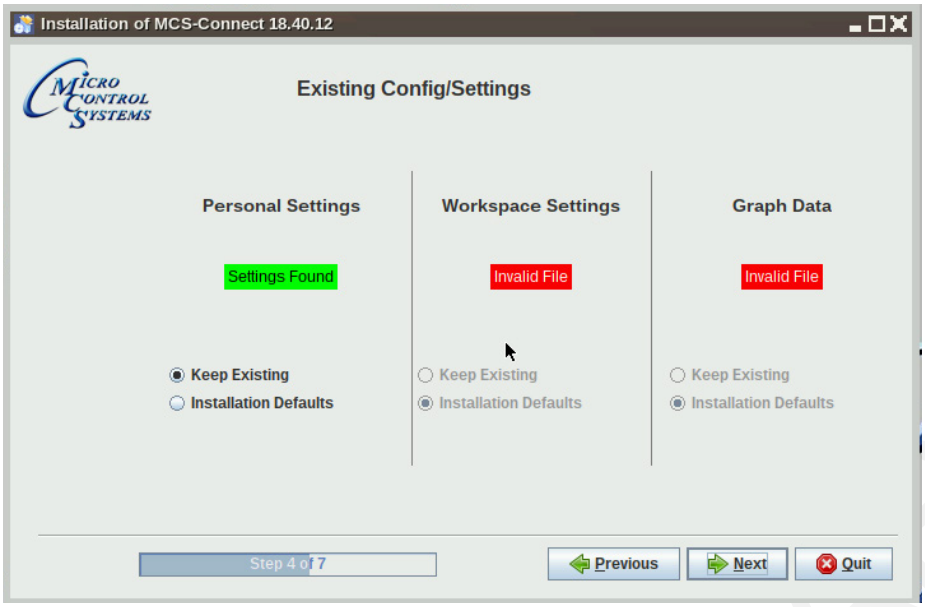
7. Select the installation path as shown.



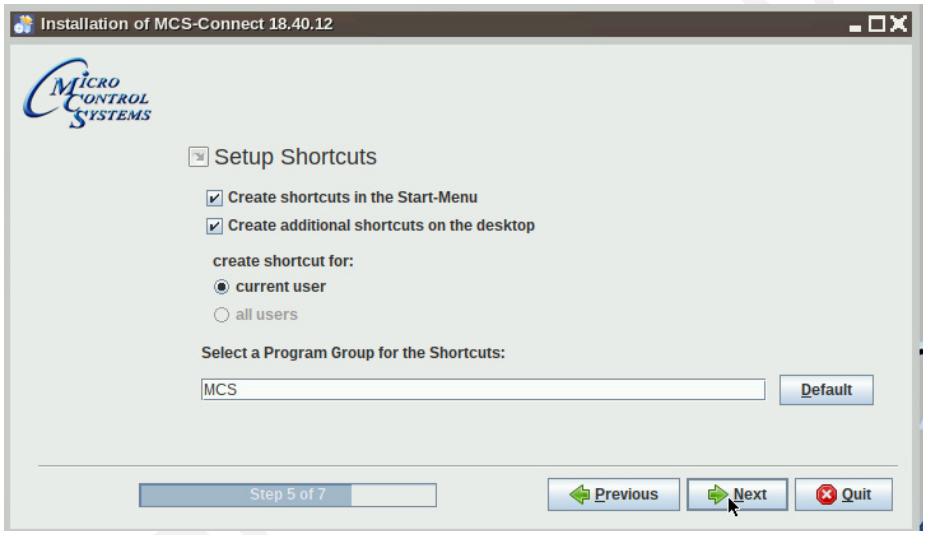
8. Next screen, click ‘Yes’ to update the current version on the touchscreen.



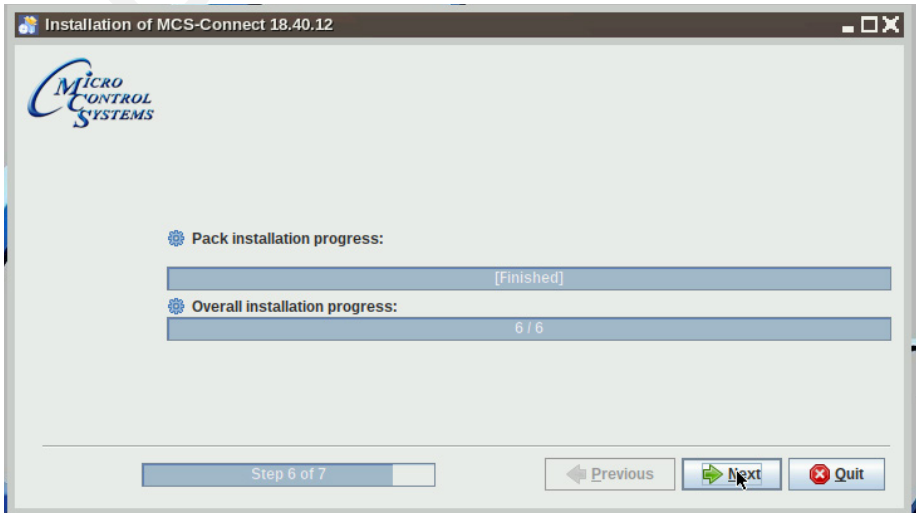
9. Click ‘Next’, to allow existing Config/Settings, click “Next’.



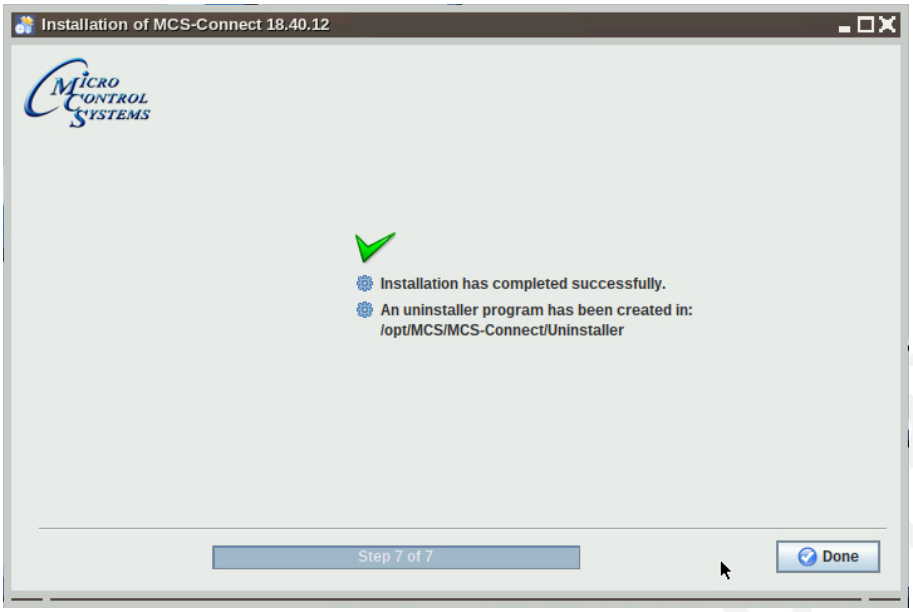
10. Setup Shortcuts, click to check boxes for Start-Menu and shortcuts on the desktop, click next.



11. Next screen shows progress bar.

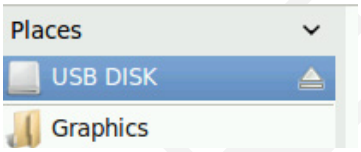


12. Last screen shows installation has completed successfully.
The installation placed an ‘unstaller program in /opt/MCS-CONNECT/Uninstaller.



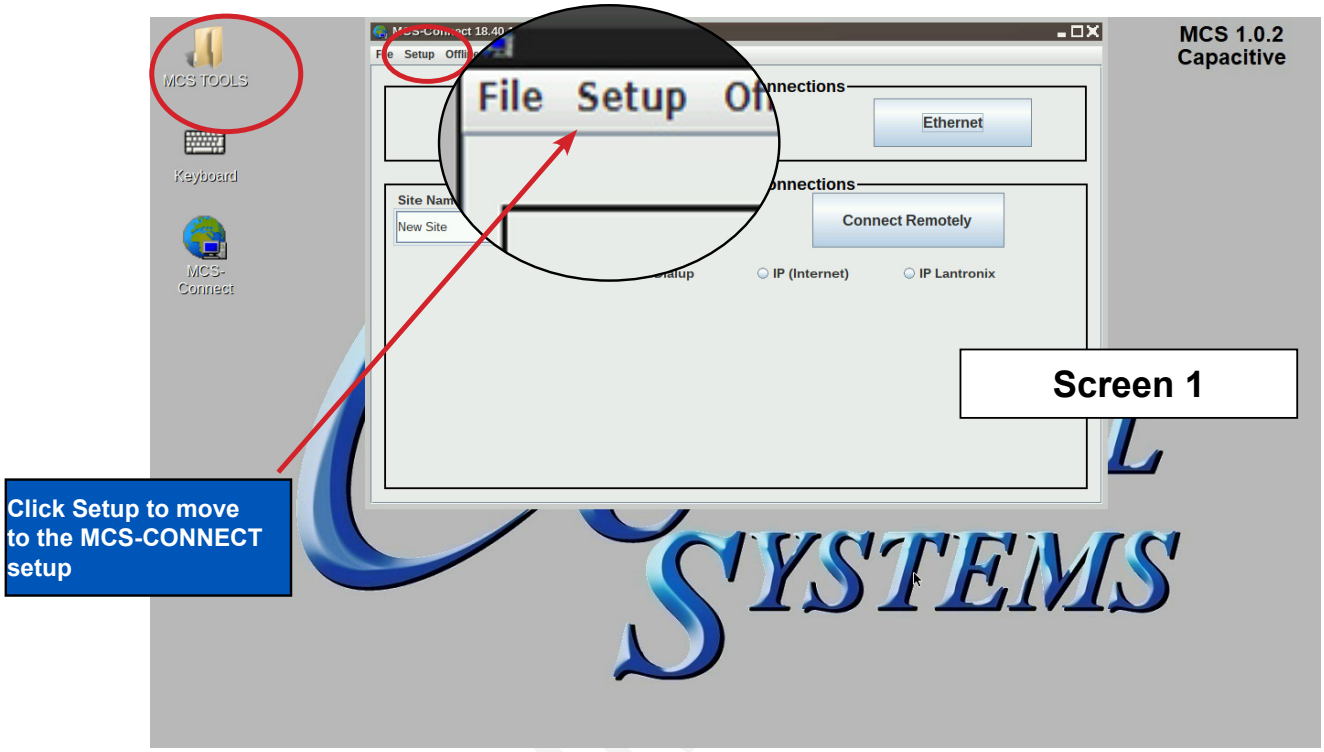
13. Double click on the USB drive on the desktop, opens in file manager.

14. Click on ‘ARROW’ to eject and remove from the back of the touchscreen.

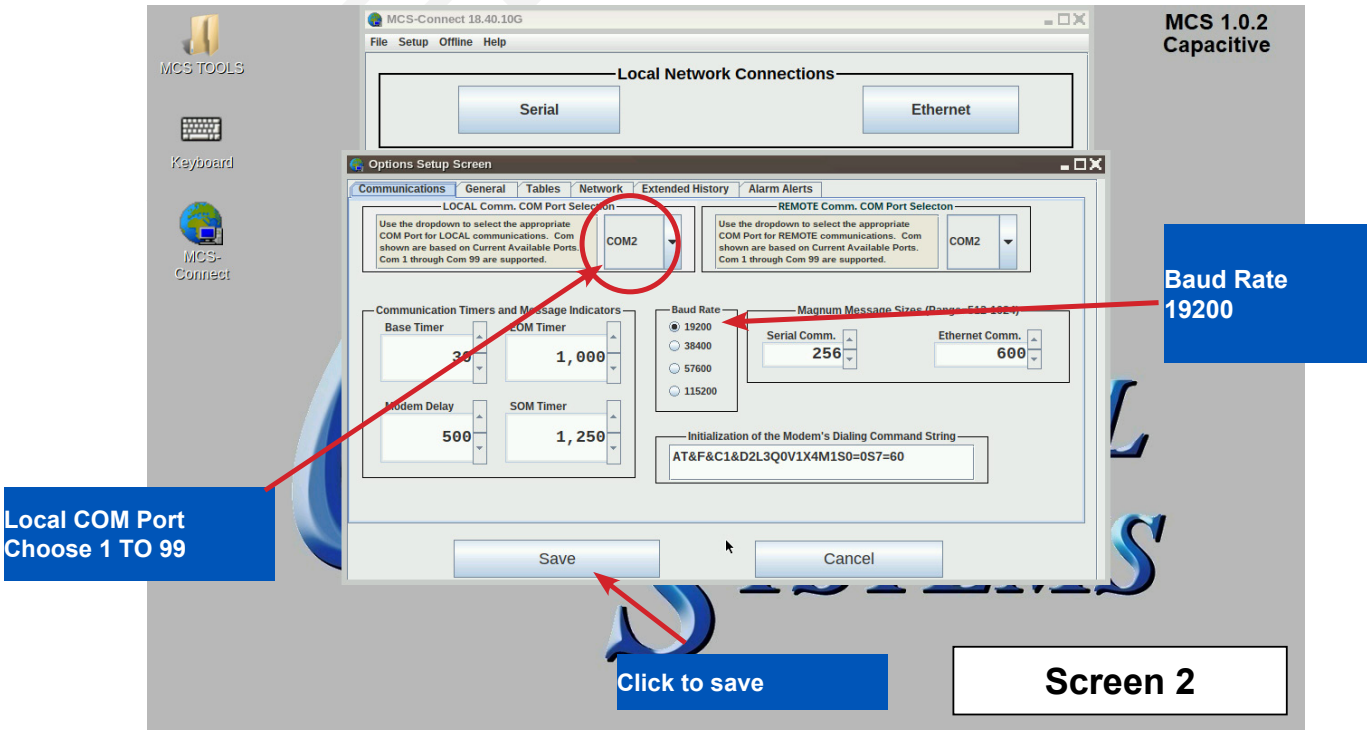


SECTION- 7. MCS-CONNECT COMMUNICATION

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

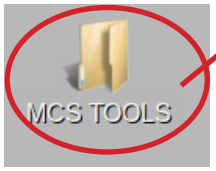


3. Next screen is the setup screen for communicating with your controller or PC.
4. You can change the "Com port' and 'Baud Rate" depending on how you are communicating with your controller or computer.



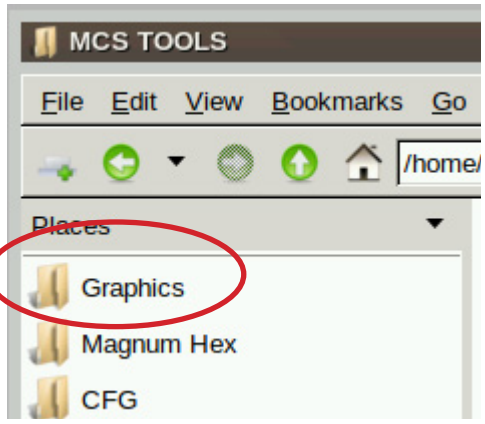
SECTION- 8. Updating Graphics for Capacitive Touch

1. Click on the 'MCS TOOLS' folder on the desktop.



FOR MORE DETAILED INFORMATION FOR REPLACING YOUR GRAPHICS CLICK ON QR CODE BELOW FOR APP135A ON MCS WEBSITE

2. When MCS TOOLS opens, Double click on the 'GRAPHICS' on the left in the bookmarks.

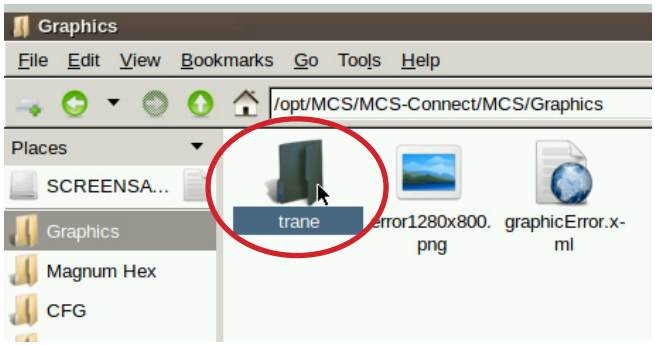


8.1. DELETE THE SUB FOLDER FOR YOUR GRAPHICS

IF YOU HAVE NOT MADE A BACKUP OF THE FILES IN GRAPHICS FOLDER - STOP

BACKUP NOW TO A FORMATTED USB STICK AND SAVE THESE BEFORE PROCEEDING TO THE NEXT STEP.

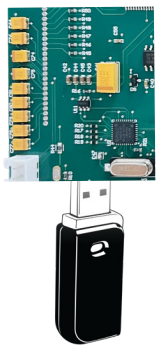
1. Delete the existing Graphic file in the graphics folder
2. In this case the example shows 'TRANE' for graphics sub folder.
3. DELETE THIS SUB FOLDER ONLY, CLICK WITH STYLES PEN, HOLD AND A DROP-DOWN MENU APPEARS, 'DRAG TO MOVE TO TRASH'

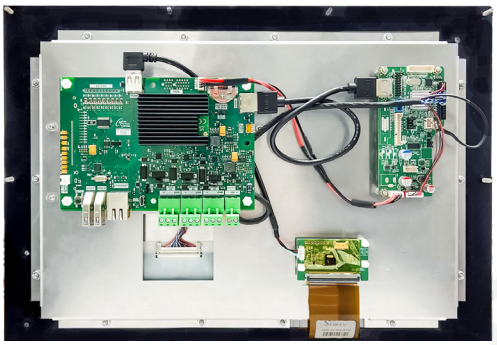


8.1.1 NEXT STEP FOR INSTALLING THE NEW GRAPHICS FOLDER

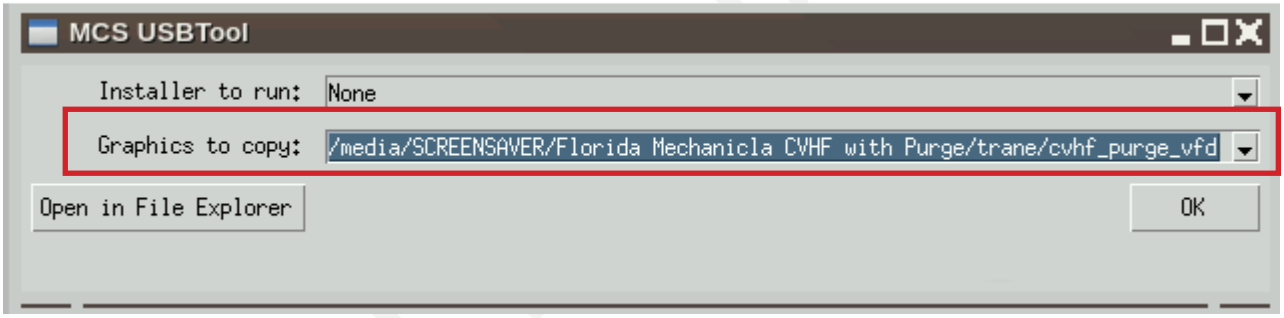
Continue to next page.

1. Download the emailed file from OEM or MCS to your computer desktop.
2. Click on file to unzip (DO NOT COPY UNZIPPED FILE).
3. Click on folder which contains your graphic file.
4. Copy new graphics file to a formatted USB Stick.
5. Plug the USB Stick with the new graphics file into the back of the touchscreen.

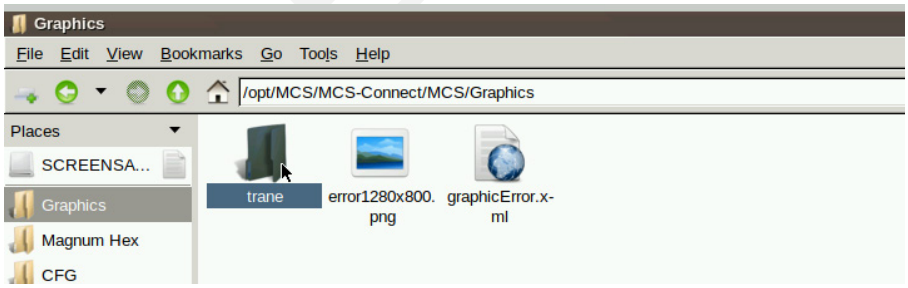




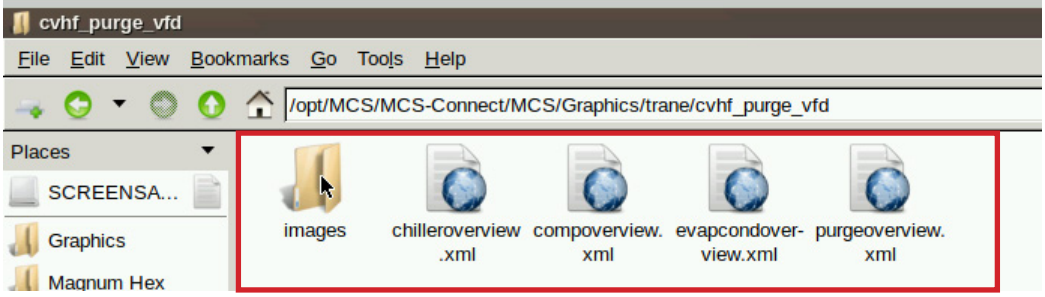
6. USB disk opens, click on small arrow for ‘Graphics to copy”, click okay.
7. File that will be copied to the ‘Graphics folder in the bookmarks.



8. On bookmarks Places, click on Graphics, Your new graphic files will be in the subfolder of the Graphics folder. Example shows file that was placed in this folder ‘TRANE’.



9. (Generic names can be used for different chillers (Trane, Carrier, etc.)
10. Double click on the subfolder “Trane” to see files needed for the replaced graphics.



KEYPAD - LOADING SOFTWARE - FIRMWARE, CONFIG

Firmware Compatibility: Each firmware version (e.g., HVAC 17.25) must use the corresponding MCS-CONFIG file version (e.g., version 17). Using a different version of the configuration file for the firmware can cause the system to malfunction.

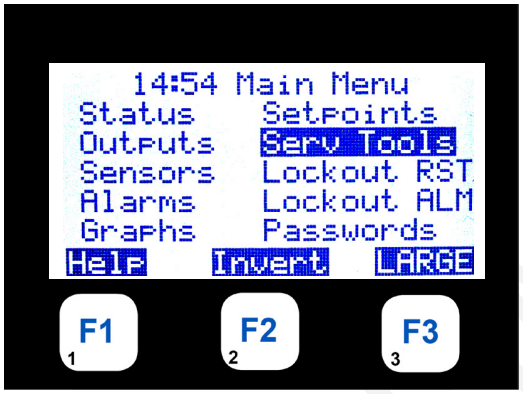
Update Files Before Updating Firmware: It's important to make sure that you have the latest configuration files before attempting to update the firmware on the controller.

Go to : https://www.mcscontrols.com/NitroMagSoftware.html

Download the correct FIRMWARE (HVAC, RTU, CENT, RFR) to your desktop

Insert the USB DRIVE into one of the USB DRIVES on the Keypad.

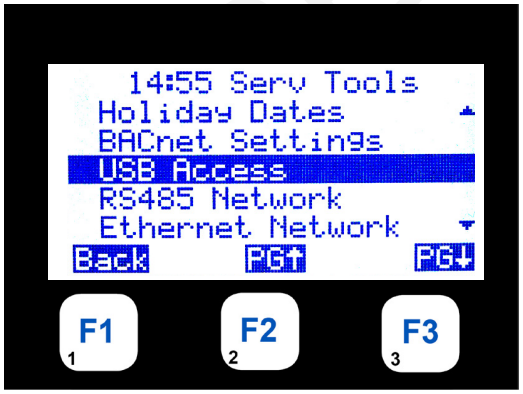
1. Loading Keypad Software



DESCRIPTION

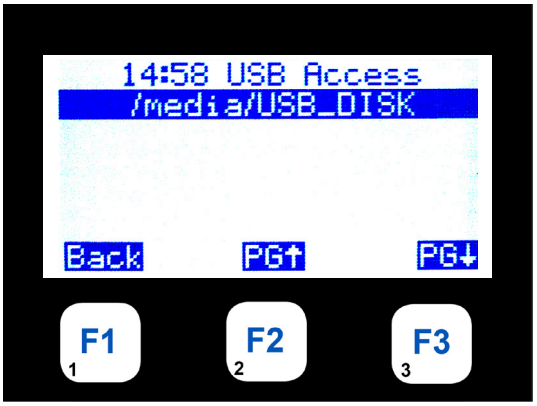
HH:MM	MAIN MENU
	MENU KEY, SELECT SERV TOOLS, PRESS (↵) ENTER
	THIS WILL ALLOW USER TO DISPLAY
	DETAILS OF SERV TOOLS
	← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
	KEY F1 ALLOWS THE USER TO ACCESS HELP MENU
	PRESS ↵ MENU TO RETURN TO MAIN MENU

2. USB ACCESS



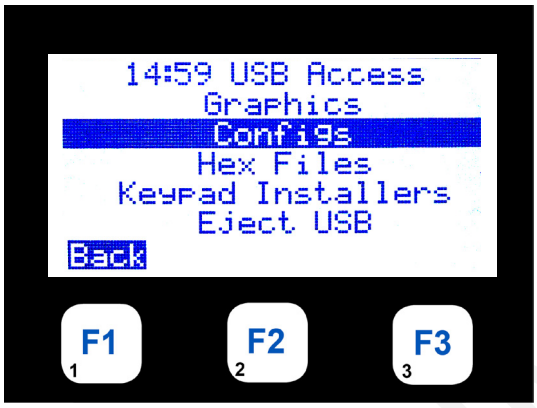
HH:MM	SERV TOOLS
	SELECT USB ACCESS, PRESS (↵) ENTER
	THIS WILL ALLOW USER TO DISPLAY
	DETAILS OF USB ACCESS

3. MEDIA/USB DISKCONFIGS



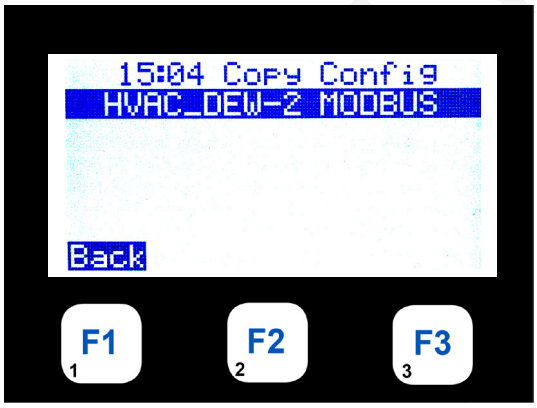
HH:MM	USB ACCESS
	SELECT /MEDIA/USB_DISK, PRESS (↵) ENTER
	THIS WILL ALLOW USER TO DISPLAY
	DETAILS OF MEDIA ON USB DISK

4. Laoding Config file

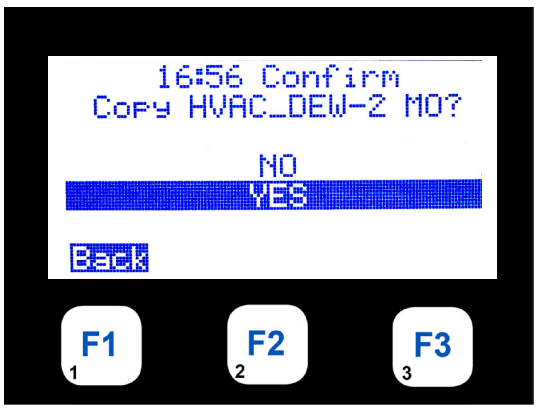


HH:MM	USB ACCESS
	SELECT CONFIGS, PRESS (↵) ENTER
	THIS WILL ALLOW USER TO DISPLAY
	DETAILS OF CONFIG FILE ON USB DISK
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

5. Config File Found

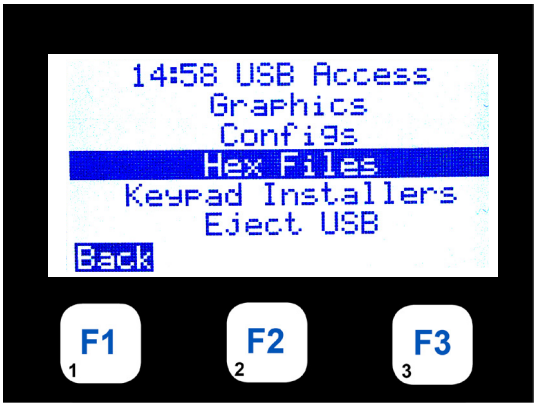


HH:MM	COPY CONFIG
	SELECT CONFIG FILES, PRESS (↵) ENTER
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU



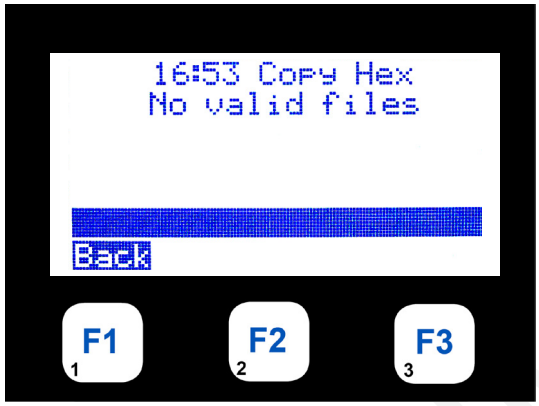
HH:MM	CONFIRM
	SELECT NO / YES, PRESS (↵) ENTER
	LOADING NEW CONFIG FILE
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

6. Hex Files (Firmware HVAC, ETC)

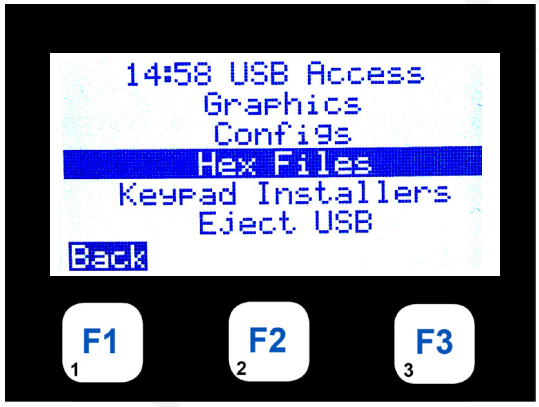


HH:MM	USB ACCESS
	SELECT HEX FILES, PRESS (↵) ENTER
	LOADING NEW HEX / FIRMWARE FILE
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

7. No Valid Files found

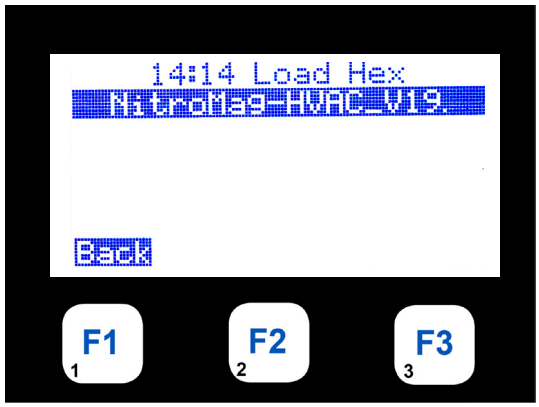


HH:MM	COPY HEX
	NO VALID FILES
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU



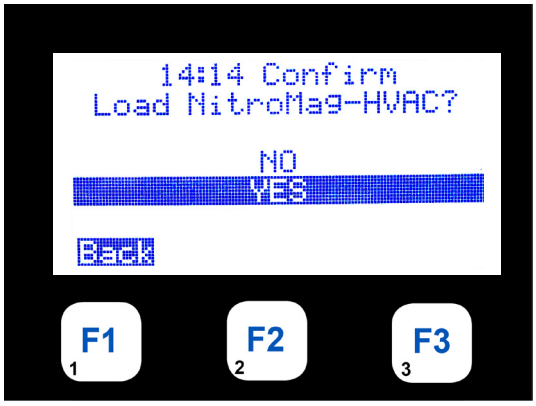
HH:MM	USB ACCESS
	SELECT HEX FILES, PRESS (↵) ENTER
	LOADING NEW HEX/FIRMWARE FILE
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

8. Valid Hex File Found



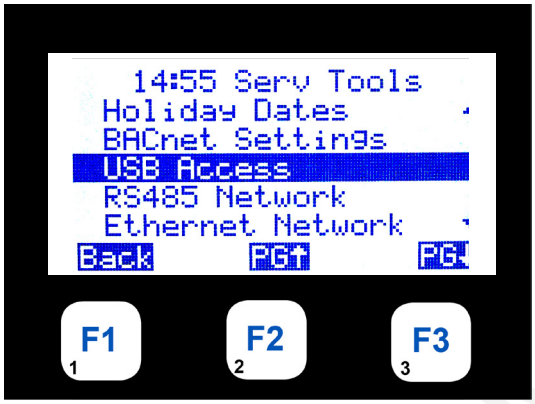
HH:MM	COPY HEX
	SELECT HEX FILE, PRESS (↵) ENTER
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

9. Select Hex file - Loading New Hex File



HH:MM	CONFIRM
	SELECT NO / YES, PRESS (↵) ENTER
	LOADING NEW HEX FILE
	KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

10. USB Access

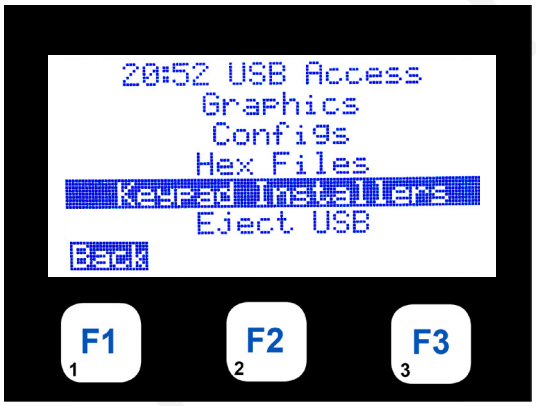


HH:MM USB ACCESS

SELECT HKEYPAD INSTALLERS
FILES, PRESS (↵) ENTER

KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

11. Keypad Installers



HH:MM USB ACCESS

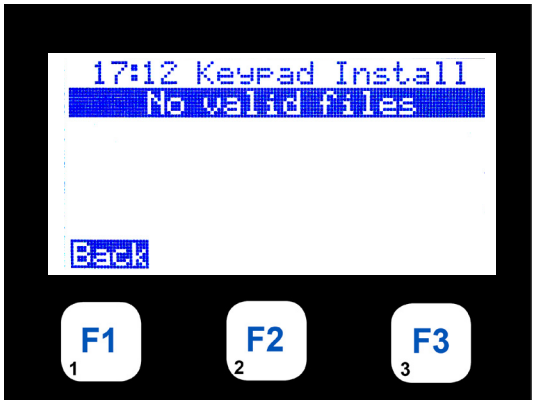
KEYPAD INSTSALLERS

FILES, PRESS (↵) ENTER

LOADING NEW KEYPAD INSTALLERS FILE

KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

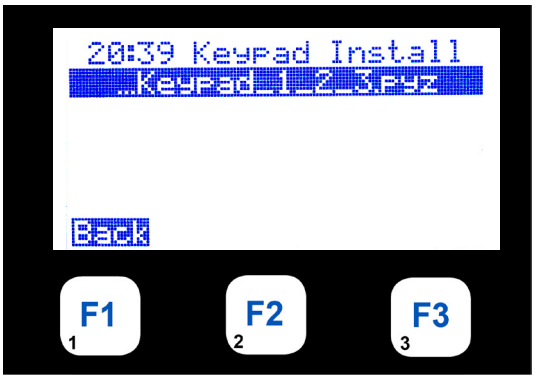
12. No Valid Files Found



HH:MM KEYPAD INSTALL

NO VALID FILES

KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU



HH:MM KEYPAD INSTALL

FILES, PRESS (↵) ENTER

LOADING NEW KEYPAD INSTALLERS FILE

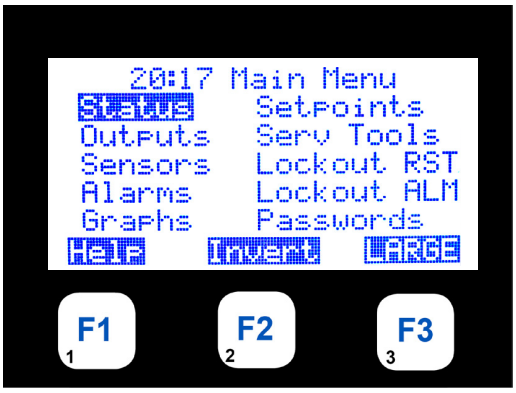
KEY F1 ALLOWS THE USER GO BACK TO USB ACCESS MENU

USING THE KEYPAD AND 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.

14. Menu Key - Pressing the 'Menu' key shows the following:



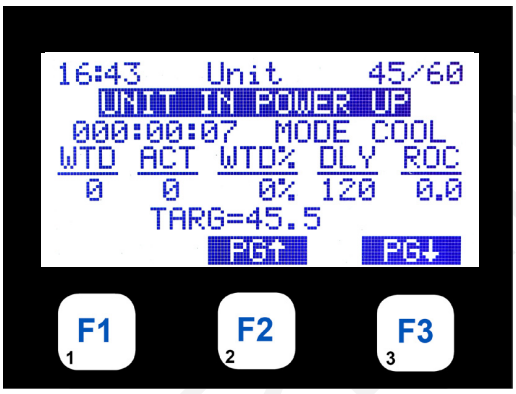
DESCRIPTION

HH:MM	SCREEN TITLE
-CONTROL STATUS DISPLAY	-ACTIVE SETPOINTS DISPLAY
-RELAY/ANALOG DISPLAY	-SERVICE TOOLS DISPLAY
-SENSOR INPUT DISPLAY	-LOCKOUT RESET DISPLAY
-ALARM DISPLAY	-LOCKOUT ALARM DISPLAY
-GRAPHING DISPLAY	-PASSWORD DISPLAY
HELP	-LARGE

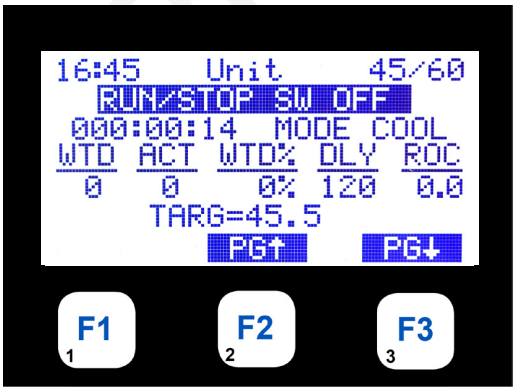
NOTE: Your Keypad LCD can be setup in your configution file so that the LCD will continuously scroll the status of the controller you are monitoring. When a button is pressed, the LCD will stop scrolling and move to view that item. There will be a 15 minute pause before the Keypad LCD will start scrolling.

15. Status: Unit in Power up mode

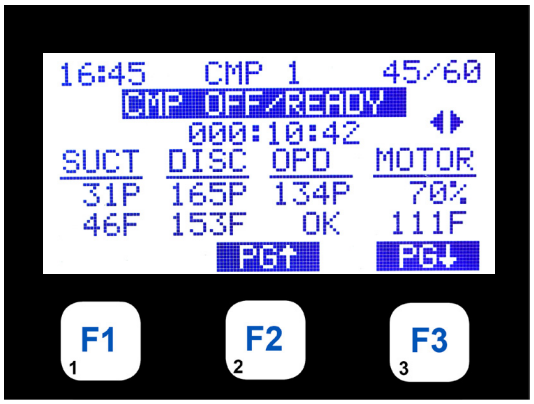
Unit is powered up Run/Stop SW is off. Press F3 to see next screen:



HH:MM	CHILLER UNIT	LEV/ENT
UNIT IN POWER UP		
TIME IN CURRENT STATE		
WANTED #STEPS	ACTUAL #STEPS	WANTED% ACTUAL%
DELAY NEXT CHG	SLOPE DIRECTION	
TARGET SET POINT + TARGET RESET		
	PAGE UP↑	PAGE DOWN↓

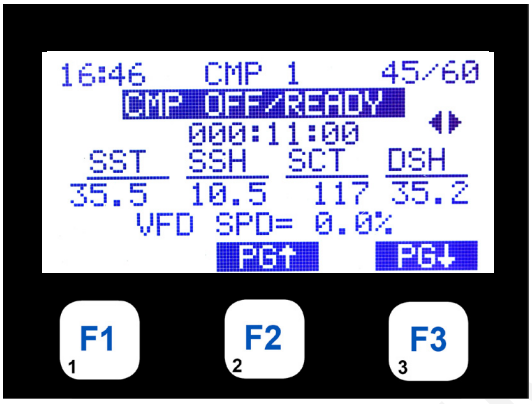


HH:MM	CHILLER UNIT	LEV/ENT
RUN/STOP SW OFF		
TIME IN CURRENT STATE		
WANTED #STEPS	ACTUAL #STEPS	WANTED% ACTUAL%
DELAY NEXT CHG	SLOPE DIRECTION	
TARGET SET POINT + TARGET RESET		
	PAGE UP↑	PAGE DOWN↓

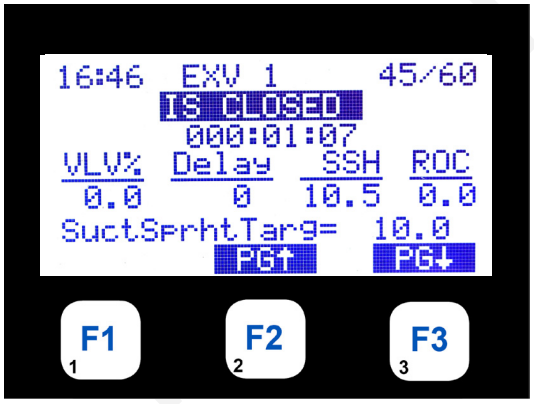


DESCRIPTION

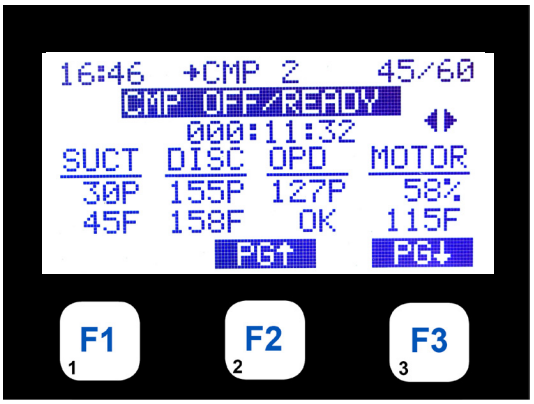
HH:MM	CMP 1		LEV/ENT
CMP OFF/READY			
TIME IN CURRENT STATE			
SUCTION PRESSURE TEMP	DISCHARGE PRESSURE TEMP	OIL DIFFERENTIAL PRESSURE STATUS	MOTOR AMP % STATUS
	PAGE UP↑		PAGE DOWN↓



HH:MM	CMP 1		LEV/ENT
CURRENT CONTROL STATE			
TIME IN CURRENT STATE			
SAT.SUCT TEMP	SUCTS HEAT TEMP	SAT.COND. TEMP	DISC SHEAT TEMP
		PAGE UP↑	PAGE DOWN↓

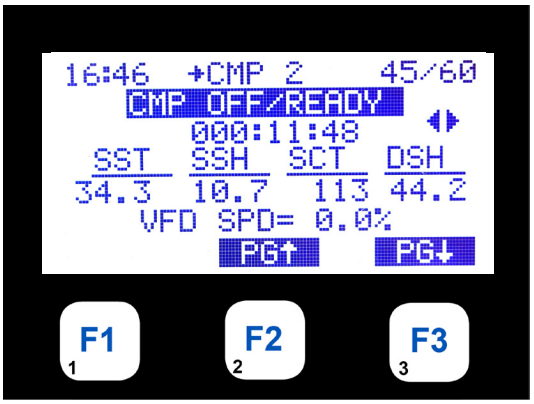


HH:MM	EXV 1 STATUS	LEV/ENT
	VALVE IS CLOSED	
	TIME IN THIS MODE	
	PROVIDES VALVE %, TIME TO NEXT CHANGE, SUPERHEAT & RATE OF CHANGE, PROVICES CONTROL & TARGET	
	PAGE UP↑	PAGE DOWN↓



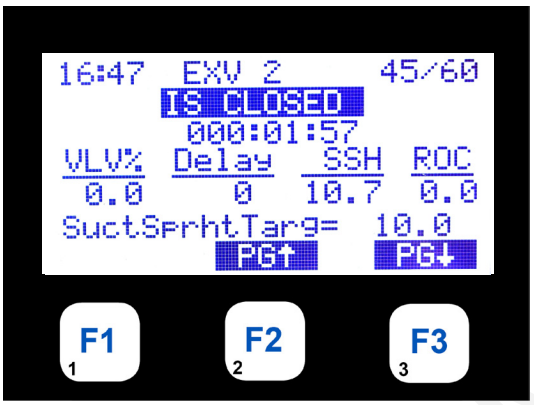
HH:MM	CMP 2		LEV/ENT
CMP OFF/READY			
TIME IN CURRENT STATE			
SUCTION PRESSURE TEMP	DISCHARGE PRESSURE TEMP	OIL DIFFERENTIAL PRESSURE STATUS	MOTOR AMP % STATUS
	PAGE UP↑		PAGE DOWN↓

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



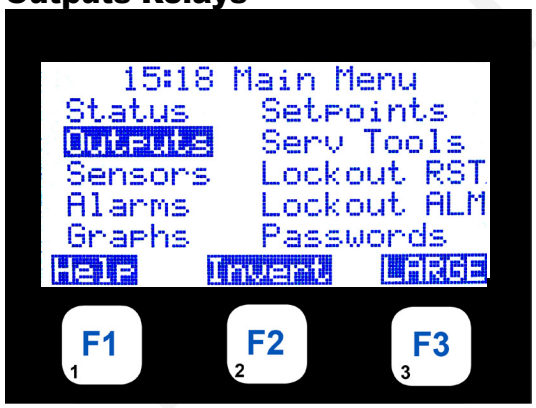
DESCRIPTION

HH:MM	CIRCUIT			LEV/ENT
	CURRENT CONTROL STATE			
	TIME IN CURRENT STATE			
SAT.SUCT. TEMP	SUCT SHEAT TEMP	SAT.COND. TEMP	DISC SHEAT TEMP	
		PAGE UP↑		PAGE DOWN↓

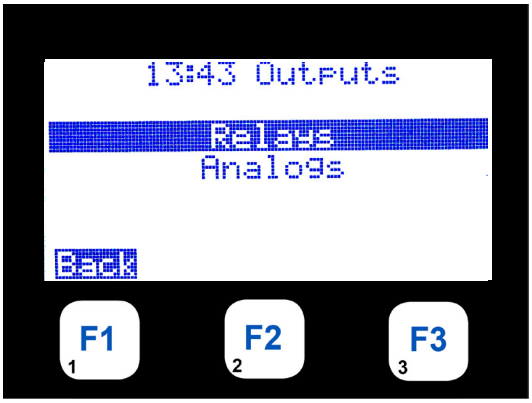


HH:MM	EXV 2 STATUS	LEV/ENT
	OPENING EXV 2	
	TIME IN THIS MODE	
	PROVIDES VALVE %, TIME TO NEXT CHANGE, SUPERHEAT & RATE OF CHANGE, PROVICES CONTROL & TARGET	
	PAGE UP↑	PAGE DOWN↓

16. Outputs-Relays

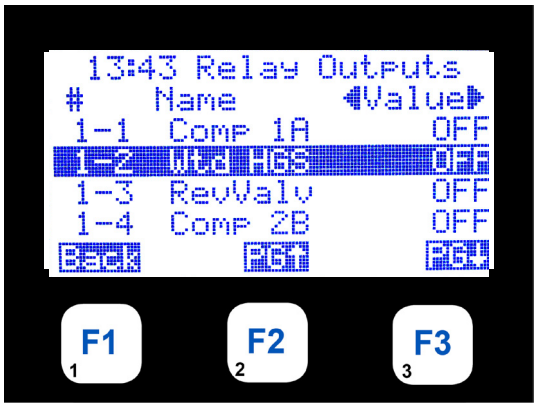


HH:MM	MAIN MENU
	OUTPUTS
	PRESS MENU KEY TO VIEW OUTPUTS
	PRESS ↵ENTER



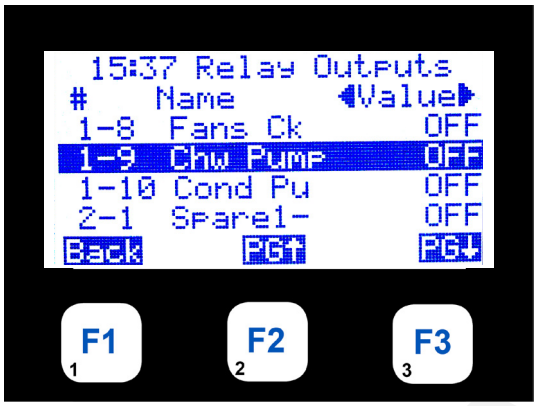
HH:MM	OUTPUTS
	RELAYS
	PRESS ↵ENTER TO VIEW RELAYS

Pressing the Page Down F3 button shows the 1st four Relays:



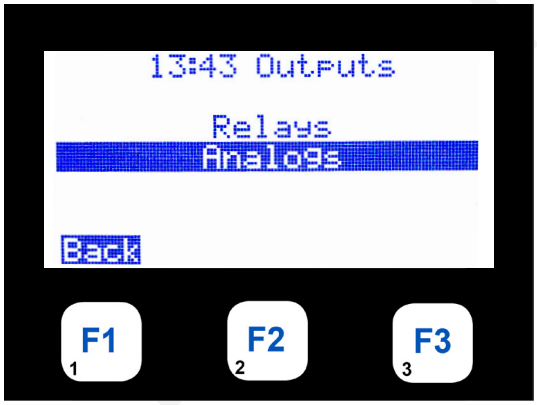
HH:MM RELAY OUTPUTS
NAME ◀ VALUE ▶
THE 1ST FOUR RELAY OUTPUTS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER GO BACK TO OUTPUTS
PAGE UP / DOWN DISPLAYS NEXT 4 RELAYS INPUTS

Pressing the Page Down F3 button shows the next four Relays:



HH:MM RELAY OUTPUTS
NAME ◀ VALUE ▶
THE NEXTFOUR RELAY OUTPUTS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER GO BACK TO OUTPUTS
PAGE UP / DOWN DISPLAYS NEXT 4 RELAYS INPUTS

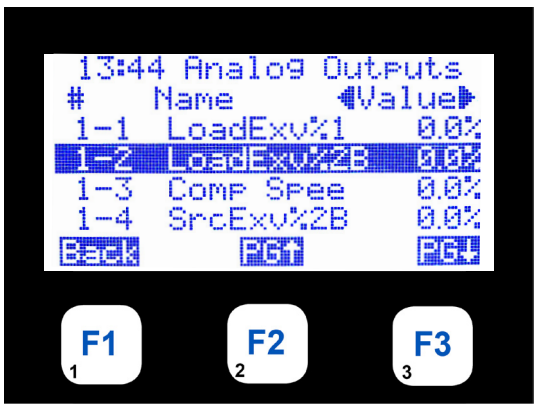
18. Outputs-Analog



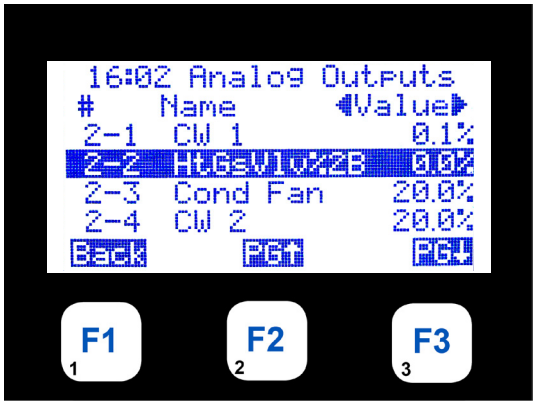
HH:MM OUTPUTS

ANALOGS

PRESS ↵ ENTER TO ANALOGS



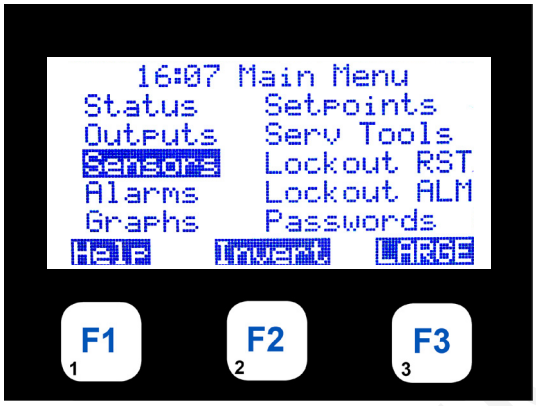
HH:MM ANALOG OUTPUTS
NAME ◀ VALUE ▶
THE 1ST FOUR ANALOG OUTPUTS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER TO DISPLAY ANALOG OUTPUTS
PAGE UP / DOWN DISPLAYS NEXT 4 ANALOG INPUTS



DESCRIPTION

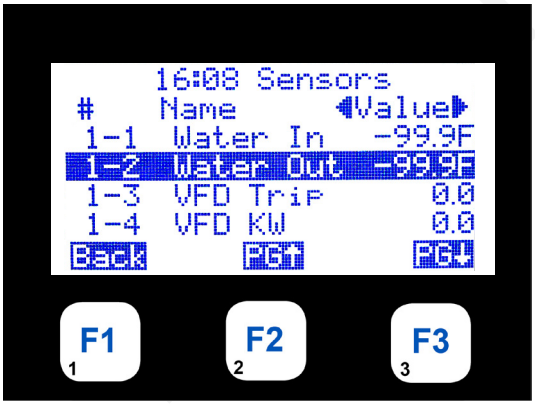
HH:MM ANALOG OUTPUTS
NAME ◀ VALUE ▶
THE NEXT FOUR ANALOG OUTPUTS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER GO BACK
PAGE UP / DOWN DISPLAYS NEXT 4 ANALOG INPUTS

19. SENSORS



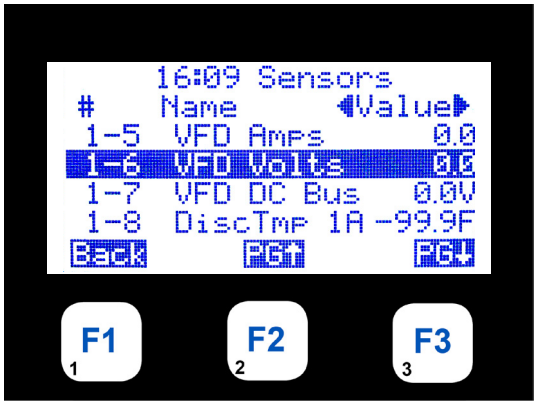
HH:MM MAIN MENU
SENSORS
PRESS MENU KEY TO VIEW SENSORS
PRESS ↵ ENTER

Selecting the 'Sensors' menu option shows the first 4 Sensors:



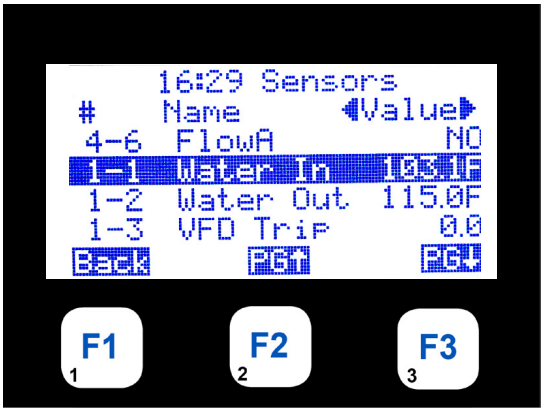
HH:MM SENSORS
NAME ◀ VALUE ▶
THE 1ST FOUR SENSORS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER TO RETURN TO SENSORS
PRESS ↵ MENU TO RETURN TO MAIN MENU

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



HH:MM SENSORS
NAME ◀ VALUE ▶
THE NEXT FOUR SENSORS ARE PRESENTED
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION
KEY F1 ALLOWS THE USER TO RETURN TO SENSORS
PRESS ↵ MENU TO RETURN TO MAIN MENU

Press ↵ Enter key to change value of setpoint 1:

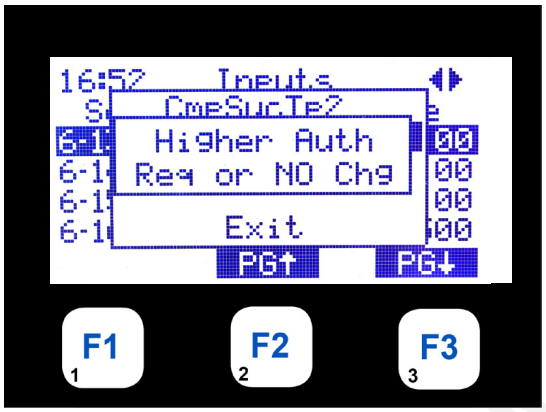


DESCRIPTION

HH:MM	SENSORS	
#	NAME	◀ VALUE ▶

SETPOINT 1-1 VALUE SHOWN
SETPOINTS VALUES CAN BE CHANGED
BASED ON AUTHORIZATION LEVEL
PRESS ↵ ENTER KEY TO CHANGE VALUE

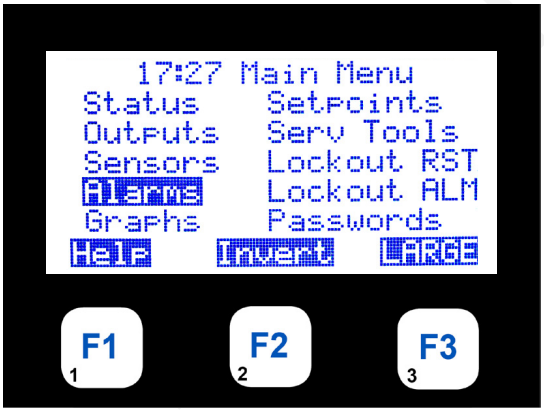
Change made with proper authorization:



HH:MM

NEXT SCREEN SHOWS HIGHER AUTH NEEDED
TO CHANGE VALUE
PRESS ↵ ENTER TO RETURN TO SENSORS
OR PRESS MENU TO ENTER PASSWORDS TO CHANGE TO
HIGHER AUTHORIZATION

20. ALARMS

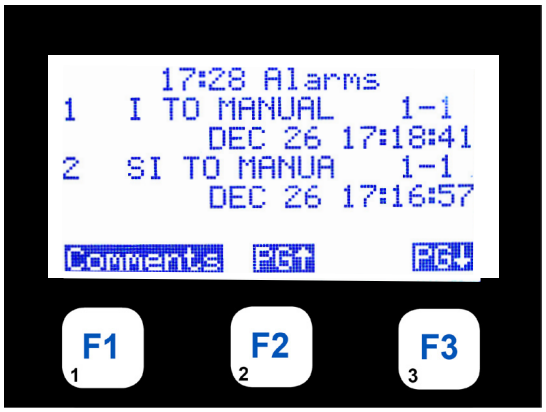


HH:MM MAIN MENU

ALARMS

MENU KEY, SELECT ALARMS ↵ ENTER
THIS WILL ALLOW USER TO DISPLAY DETAILS OF THE ALARMS
THERE ARE A MAXIMUM OF 100 ALARMS
PRESENTED TWO TO A SCREEN WITH MOST CURRENT FIRST

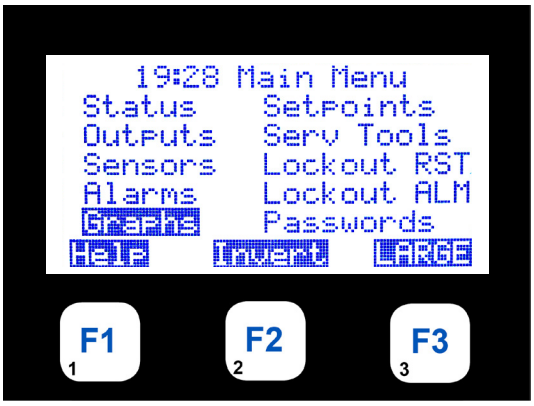
Selecting the 'Alarms' menu option shows the first 2 alarms:



HH:MM ALARMS

THE FIRST TWO ALARMS ARE PRESENTED
↓↑ ALLOWS THE USER TO SCROLL THROUGH THE ALARMS
PAGE UP / DOWN DISPLAYS NEXT ALARMS

21. GRAPHS



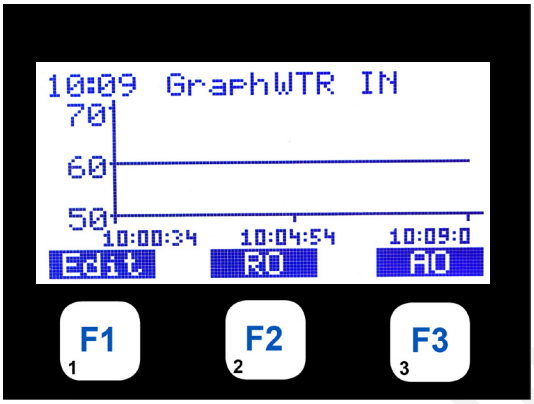
DESCRIPTION

HH:MM MAIN MENU

GRAPHS

MENU KEY, SELECT GRAPHS, PRESS (↵) ENTER
THIS WILL ALLOW USER TO DISPLAY DETAILS OF A GRAPH
ONE ITEM IS GRAPHED AT A TIME
IT WILL BE PLOTTED IN REAL TIME

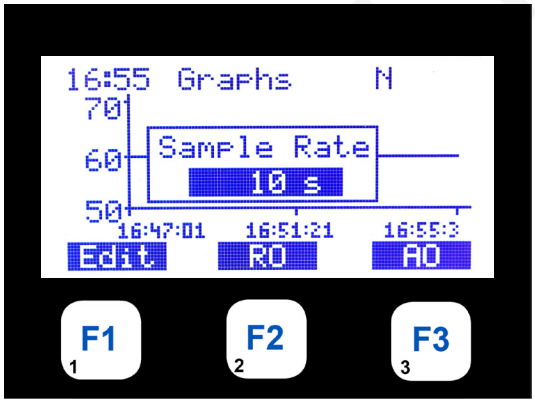
Selecting the 'Graphs' menu option shows the following:



HH:MM

MENU KEY, SELECT GRAPHS, PRESS (↵) ENTER
THIS WILL ALLOW USER TO DISPLAY DETAILS OF A GRAPH
ONE ITEM IS GRAPHED AT A TIME
IT WILL BE PLOTTED IN REAL TIME

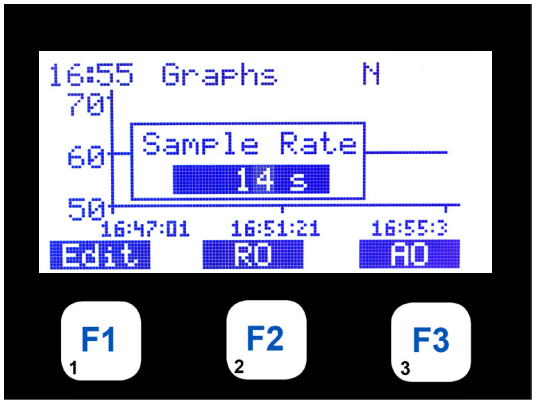
Press ↵ Enter key to changeSampe Rate - you must be authorized to make this change:



HH:MM GRAPHS

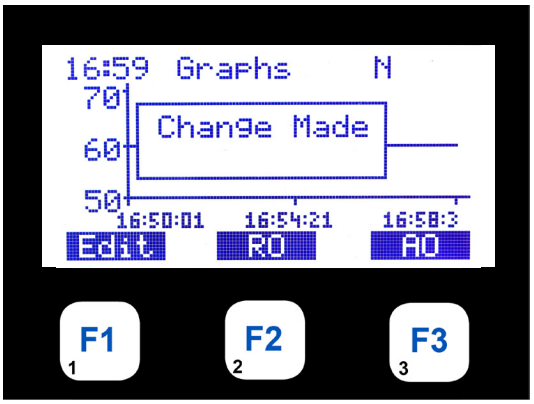
PRESSING F1 "EDIT' BRINGS UP THIS DISPLAY
WITH CURRENT VALUE HIGHLIGHTED
PRESS THE ↵ ENTER KEY
USING ↓↑ ADJUST THE SAMPLE RATE

Next Screen shows change made with proper authorization



HH:MM GRAPHS

ONCE THE SAMPLE RATE IS CORRECT
PRESS THE ↵ ENTER KEY
NOTE YOU MUST BE AUTHORIZED TO MAKE THE CHANGE

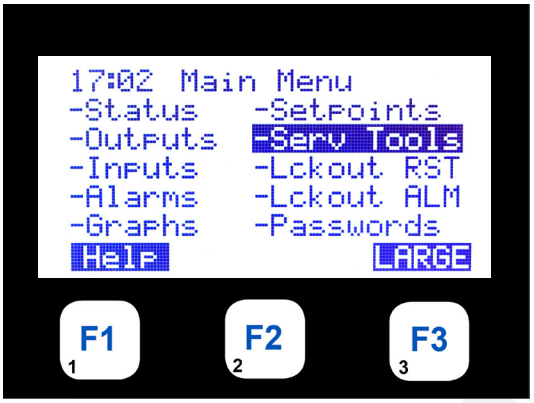


DESCRIPTION

HH:MM GRAPHS

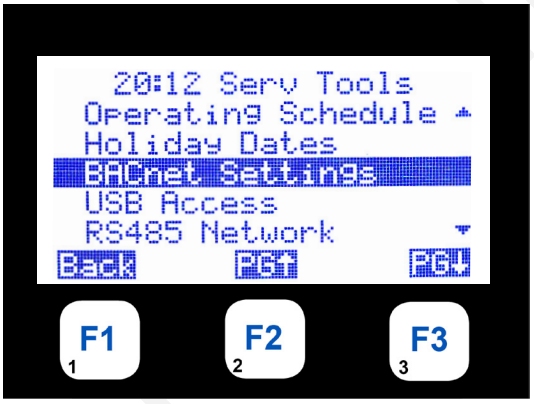
NEW SAMPLE RATE HAS BEEN MADE
PRESS THE ↵ ENTER KEY
PRESS ↵ MENU TO RETURN TO MAIN MENU

22. SERV TOOLS



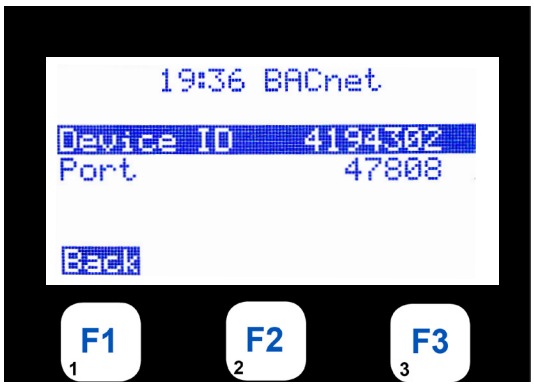
HH:MM MAIN MENU
MENU KEY, SELECT SERV TOOLS, PRESS (↵) ENTER
THIS WILL ALLOW USER TO DISPLAY
DETAILS OF SERV TOOLS

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



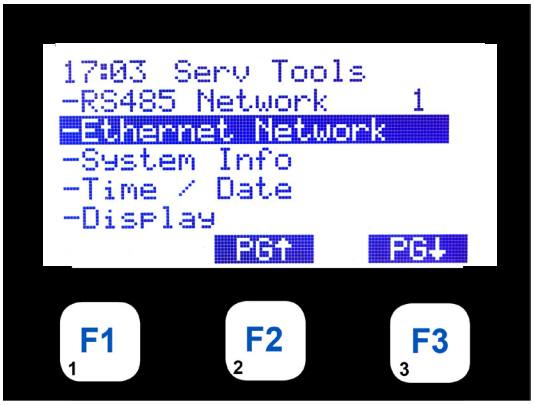
HH:MM SERV TOOLS-BACNET SETTING
THE SERV TOOL OPTIONS ARE DISPLAYED
↑ ↓ KEYS ALLOW THE USER TO SCROLL
THROUGH THE OPTIONS
FUNCTION KEYS ALLOW PAGE UP/DOWN
PRESS ↓ PG DOWN SELECT SYSTEM INFO

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



HH:MM BACNET
SELECT SYSTEM INFO - BACNET ADDRESS
PRESS (↵) ENTER TO SELECT
FUNCTION KEYS ALLOW PAGE UP/DOWN

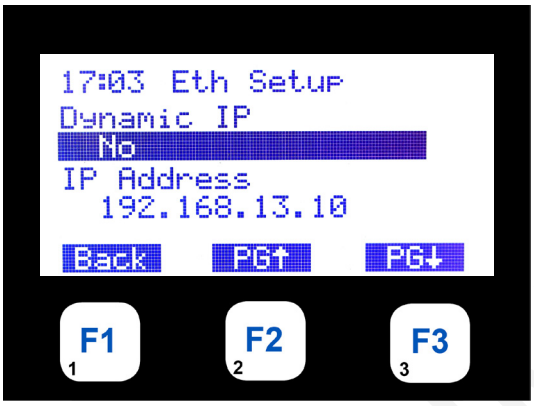
Pressing the down arrow shows the rest of the submenu options:



DESCRIPTION

HH:MM SERV TOOLS
SELECT SYSTEM INFO - ETHERNET NETWORK
PRESS (↵) ENTER TO SELECT
FUNCTION KEYS ALLOW PAGE UP/DOWN

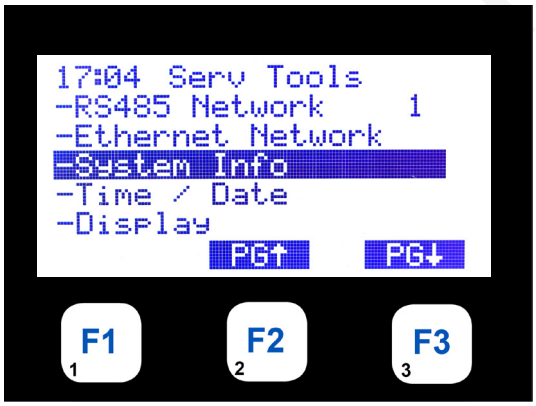
Pressing the down arrow shows the rest of the submenu options:



HH:MM ETH SETUP

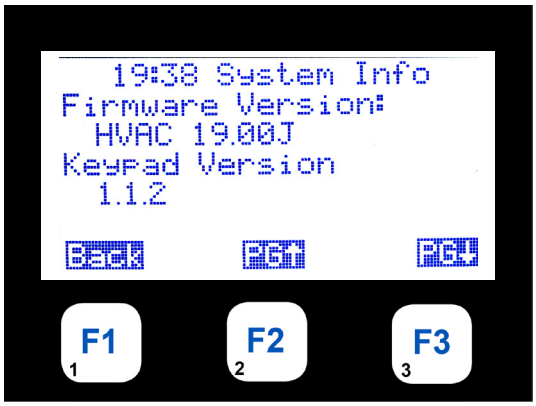
SCREEN SHOWS ETHERNET SETUP
DYNAMIC IP
& IP ADDRESS SETTING
PRESS ↓ PG DOWN CONTINUES NEXT SERV TOOLS

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



HH:MM SERV TOOLS
SYSTEM INFO
PRESS↵ENTER KEY TO SELECT

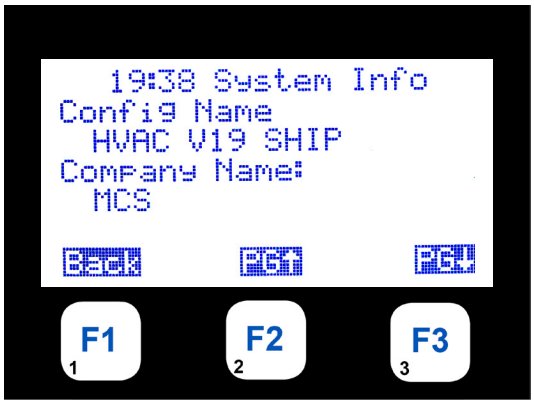
Pressing the down arrow shows the rest of the submenu options:



HH:MM SYSTEM INFO

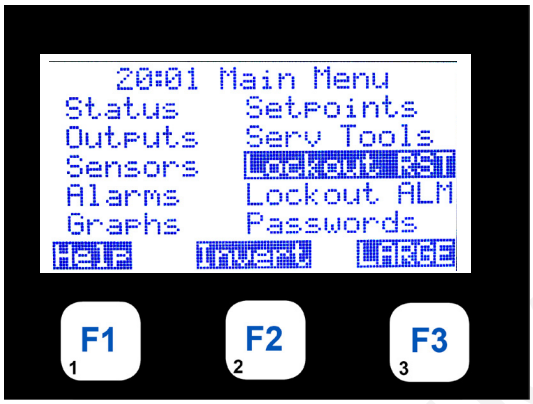
SHOWS FIRMWARE VERSION
& CONFIG NAME
PG ↓ CONTINUES TO NEXT SYSTEM INFO

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

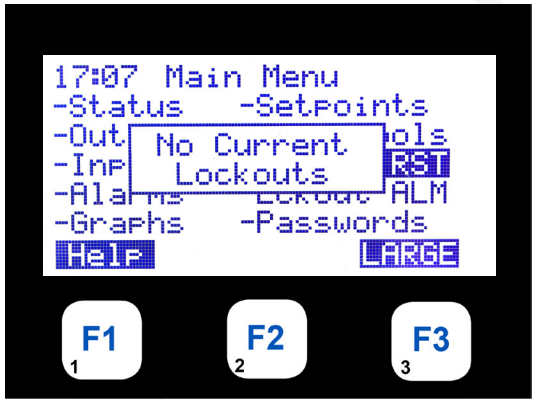


DESCRIPTION

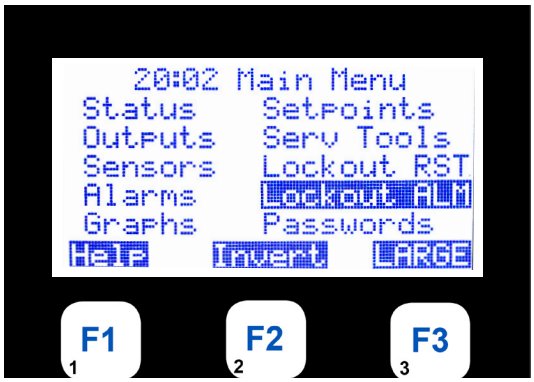
HH:MM SYSTEM INFO
SHOWS CONFIG VERSION NUMBER
& CONFIG DATE
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU



HH:MM MAIN MENU
MENU KEY, SELECT LCKOUT RST
↵ ENTER KEY
THIS WILL ALLOW USED TO
DISPLAY ANY LOCKOUTS

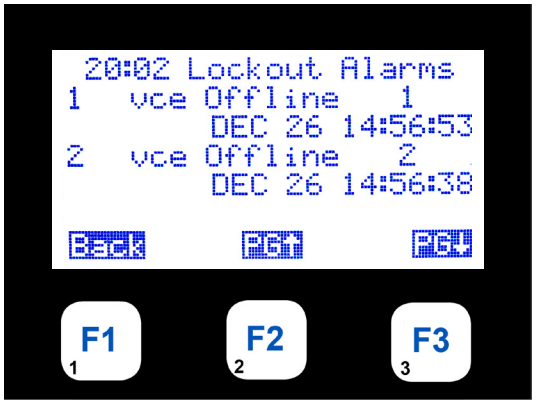


HH:MM MAIN MENU
IF NO LOCKOUTS EXIST YOU WILL BE NOTIFIED
IF THE UNIT IS IN LOCKOUT YOU WILL BE ALLOWED TO RESET.
YOU ARE LIMTED TO 10 RESETS A DAY
MAKE SURE THE CAUSE OF THE RESET IS FIXED
BEFORE TRYING AGAIN



HH:MM MAIN MENU
MENU KEY, SELECT LCKOUT ALARMS, PRESS (↵) ENTER
THIS WILL ALLOW USER TO
DISPLAY ANY LOCKOUTS ALARMS

Selecting the ‘Lckout ALM’ menu option shows the first 2 Lockout alarms:



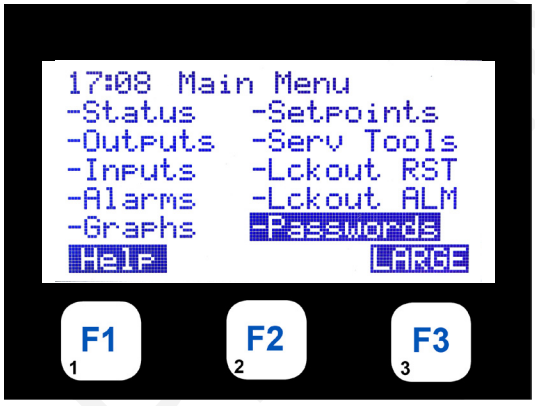
DESCRIPTION

HH:MM LOCKOUT ALARMS SYSTEM INFO LOCKOUT ALARM

23. Passwords - Numerical

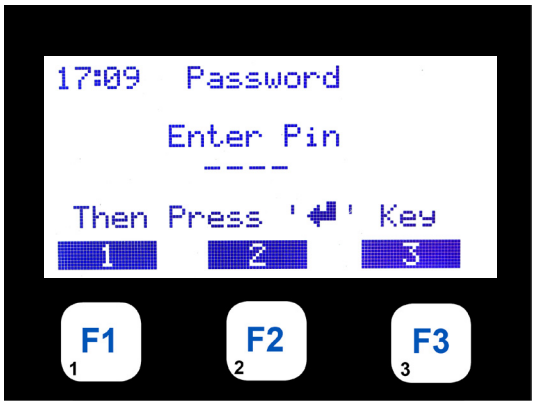
Selecting the ‘Passwords’ option shows the following:
Enter your Password by using the number keys, F1, F2, etc. An astrict will appear - passwords are 4 Numeric numbers
Entering the incorrect password will keep the system in the ‘View mode’ until the correct password is entered:

Using the Keypad keys enter your numerical code:



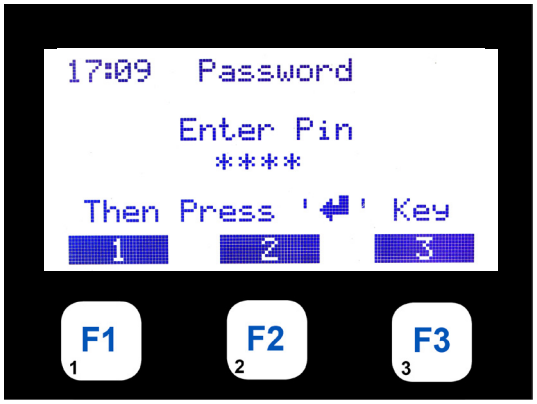
HH:MM MAIN MENU MENU KEY, SELECT PASSWORD, PRESS (↵) ENTER THIS WILL ALLOW USER TO GET AUTHORIZED

Entering the incorrect password will keep the system in the ‘View mode’ until the correct password is entered:



HH:MM PASSWORD ENTER YOUR 4 DIGIT PASSWORD ALPHA OR NUMERICAL CAN BE USED ENTER FROM KEYPAD CAN BE ANY COMBINATION FROM LAPTOP

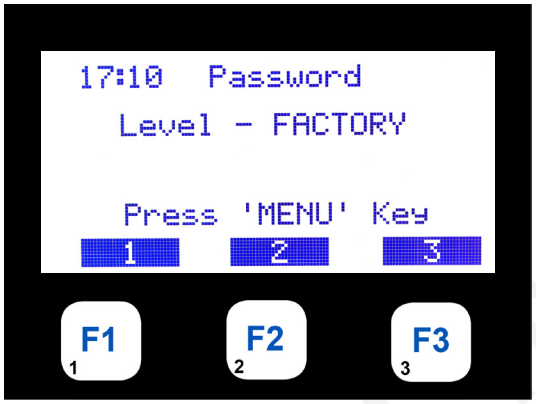
If correct password is entered screen will shown correct authorization:



DESCRIPTION

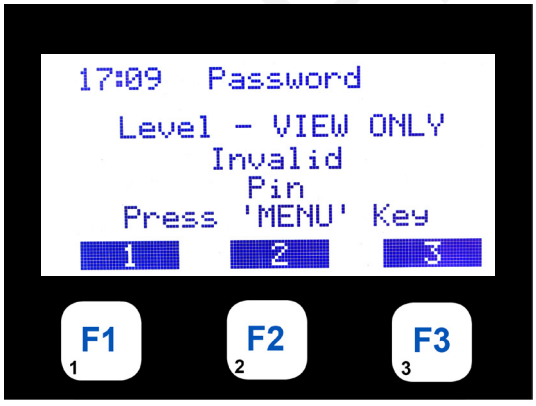
HH:MM PASSWORD
AS EACH DIGIT IS ENTERED AN (*) ASTERICK SHOWS UP ON DISPLAY
WHEN COMPLETED PRESS ENTER (↵)

Screen shows correct password entered for 'Factory Authorization':



HH:MM PASSWORD
IF AN INCORRECT PASSWORD IS ENTERED
YOU WILL BE NOTIFIED AT WHAT LEVEL YOU ARE AUTHORIZED
PRESS ENTER (↵)

Entering the incorrect password will keep the system in the 'View mode' until the correct password is entered:



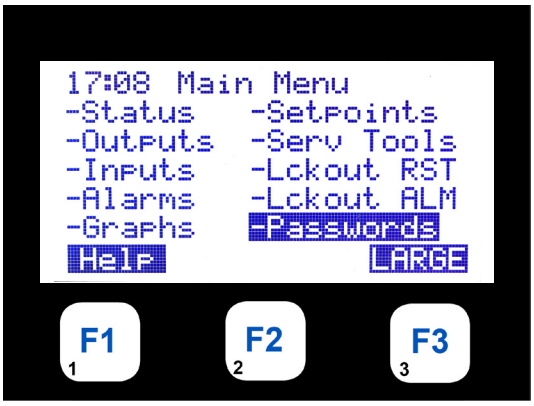
HH:MM PASSWORD
INVALID PIN WAS ENTERED,
THE SYSTEM WILL MOVE TO "VIEW ONLY"
UNTIL THE CORRECT PASSWORD IS ENTERED

24. Passwords - ALPHA / NUMERICAL

Selecting the ‘Passwords’ option shows the following:

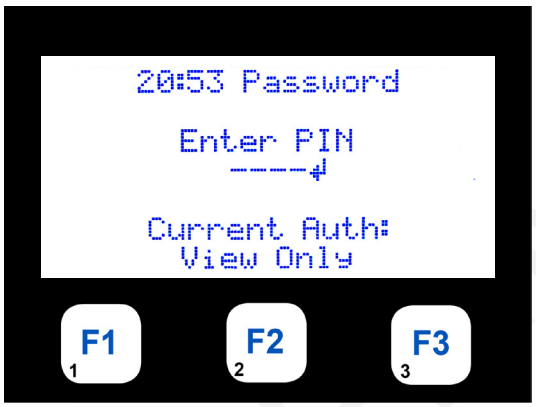
Click on Passwords to enter your **ALPHA** / **NUMERICAL** password:

Press the F1 key activates the ALPHA / NUMERICAL control, begin entering your password:



DESCRIPTION

HH:MM	MAIN MENU
MENU KEY, SELECT PASSWORD, PRESS (↵) ENTER	
THIS WILL ALLOW USER TO GET AUTHORIZED	



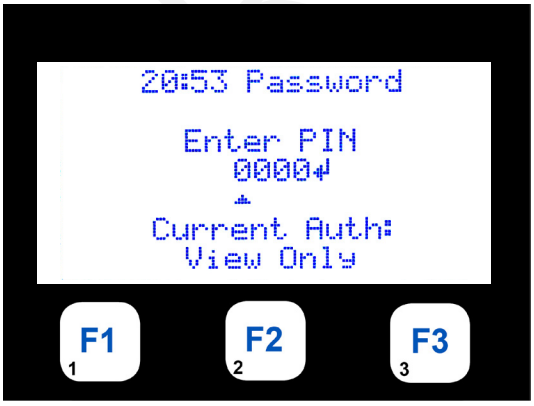
HH:MM PASSWORD

PRESS F1 KEY TO ACTIVE ALPHA/NUMERICAL

ALPHA OR NUMERICAL CAN BE USED

ENTER FROM KEYPAD

CAN BE ANY COMBINATION

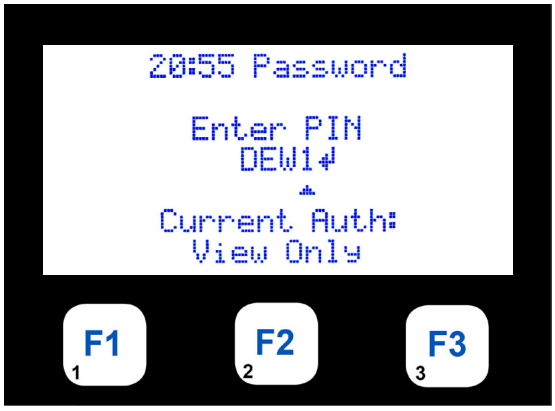


HH:MM PASSWORD

SCREEN SHOWS 1ST POSITION WITH UP ▲ ARROW UP ON DISPLAY

USING THE UP ▲ ARROW OR DOWN ▼ ARROW SCROLL NUMBERS OR APHA LETTERS TO ENTER YOUR 1ST LETTER / NUMBER

USE THE (→) RIGHT ARROW TO MOVE TO THE 2ND POSITION AND 3RD, 4TH POSITONS



DESCRIPTION

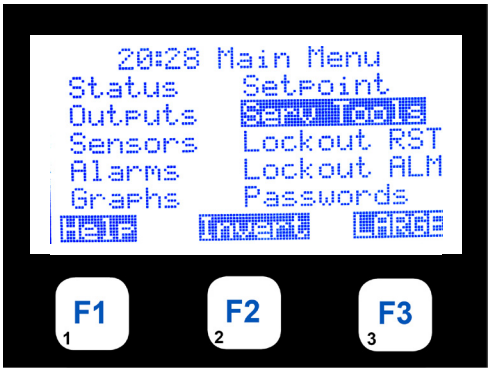
HH:MM PASSWORD
PIN ENTERED
CLICK ON ENTER ↵TAB
YOU WILL BE NOTIFIED AT WHAT
LEVEL YOU ARE AUTHORIZED
PRESS ENTER (↵)

When all positions are filled, click on the (↵) enter tab on the keypad

HH:MM PASSWORD
AUTH SUCCESS!
SET TO 'FACTORY'
CLICK ON (↵) ENTER
PRESS ↵ MENU TO RETURN TO MAIN MENU

KEYPAD WIFI SETUP

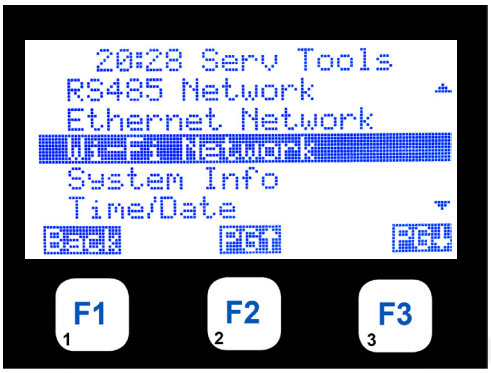
1. MAIN MENU



DESCRIPTION

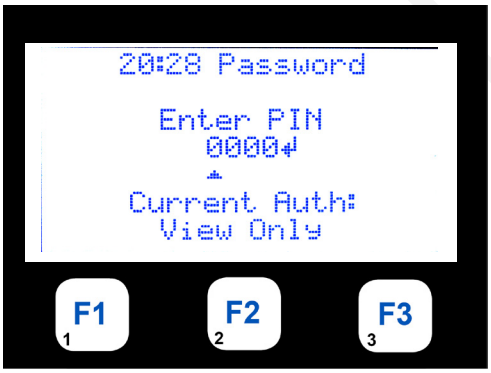
HH:MM	MAIN MENU
	MENU KEY, SELECT SERV TOOLS, PRESS (↵) ENTER THIS WILL ALLOW USER TO DISPLAY DETAILS OF SERV TOOLS

2. Wi-Fi Network



HH:MM	SERV TOOLS	
	WIFI NETWORK	
BACK	PG UP↑	PG DOWN↓

3. ENTER PASSWORD

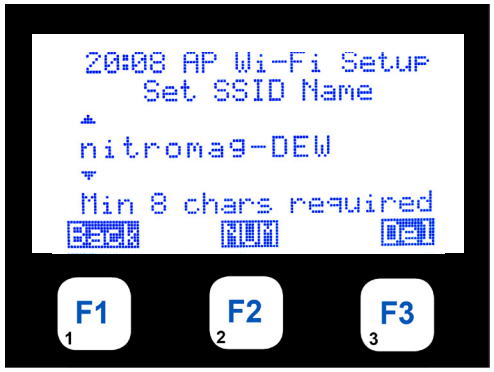


HH:MM	PASSWORD
	ENTER PIN
	CURRENT AUTH: VIEW ONLY

4. AUTH SUCCESS

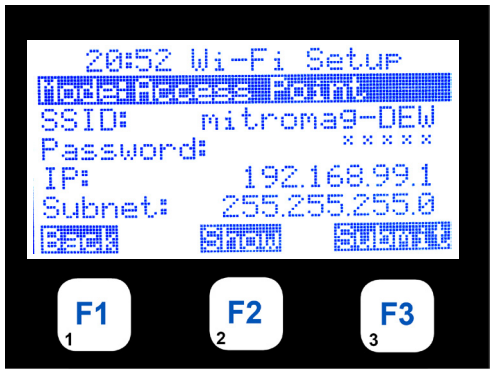
HH:MM	CONTROL ON
	DISPLAY SHOWS LARGE TYPE OF STATUS WINDOW

5. Wi-Fi Setup Screen

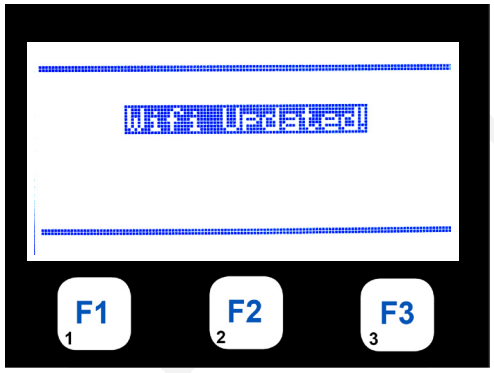


DESCRIPTION

HH:MM	AP WIFI SETUP	
	SET SSID NAME	
	NAME	
	MIN 8 CHARS REQUIRED	
BACK	NUM	DEL



HH:MM	WI-FI SETUP	
MODE: ACCESS POINT		
SSID: NAME FOR WIFI		
PASSWORD XXXXX		
IP: ADDRESS		
SUBMIT: 255.255.255.0		
BACK	SHOW	SUBMIT



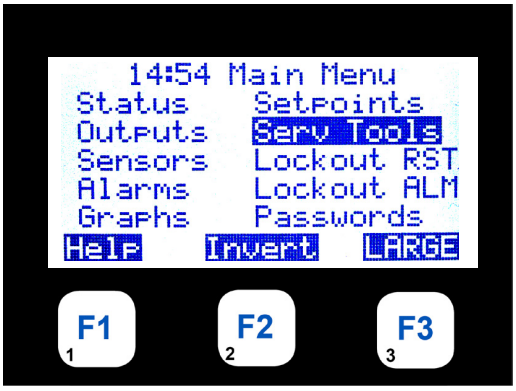
WIFI UPDATED

MAIN MENU FUNCTION KEYS

The display screens shown on the following pages show how to use the **'BACKUP/RESTORE** utility in the **'SERV TOOLS'.**

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.

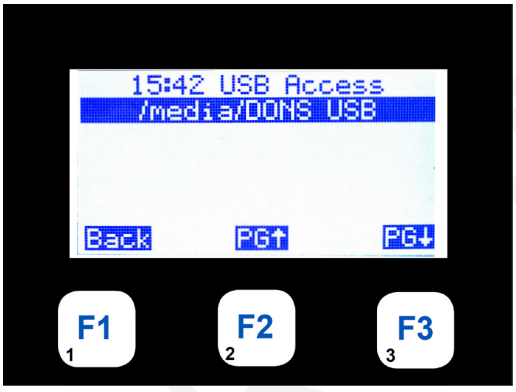
1. Menu Key - Pressing the 'Menu' key shows the following:



DESCRIPTION

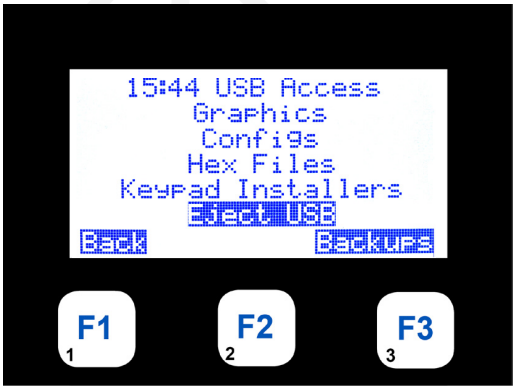
HH:MM	MAIN MENU
MENU KEY, SELECT SERV TOOLS, PRESS (↵) ENTER	
THIS WILL ALLOW USER TO DISPLAY	
DETAILS OF SERV TOOLS	
← → ↓ ↑ KEYS ALLOW THE USER TO SCROLL THROUGH THE DATA FUNCTION	
KEY F1 ALLOWS THE USER TO ACCESS HELP MENU	
PRESS ↵ MENU TO RETURN TO MAIN MENU	

2. USB DRIVE INSERTED - Click on /media/USB DRIVE



HH:MM	USB ACCESS /MEDIA/BONS USB	
BACK	PG↑	PG↓

3. Click on Backups



HH:MM	USB ACCESS GRAPHICS CONFIGS HEX FILES KEYPAD INSTALLERS EJECT USB	
BACK		BACKUPS

AUTHORIZATION FUNCTION

The authorization code is a special four-character code (Alpha or Numeric) that enables access in to the MCS-NicroMag system.

If the MCS-NitroMag is being accessed through MCS-Connect, the code may consist of any valid alpha/numeric characters. Each MCS-NitroMag 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 MCS-NitroMag system. These are established when building the configuration file in MCS-NitroMag Config.

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

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

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

The number of lockout reset per day is limited. MCS-NitroMag configuration defines the number of reset per day and what level of authorization is allow to bypass the limit of reset per day.

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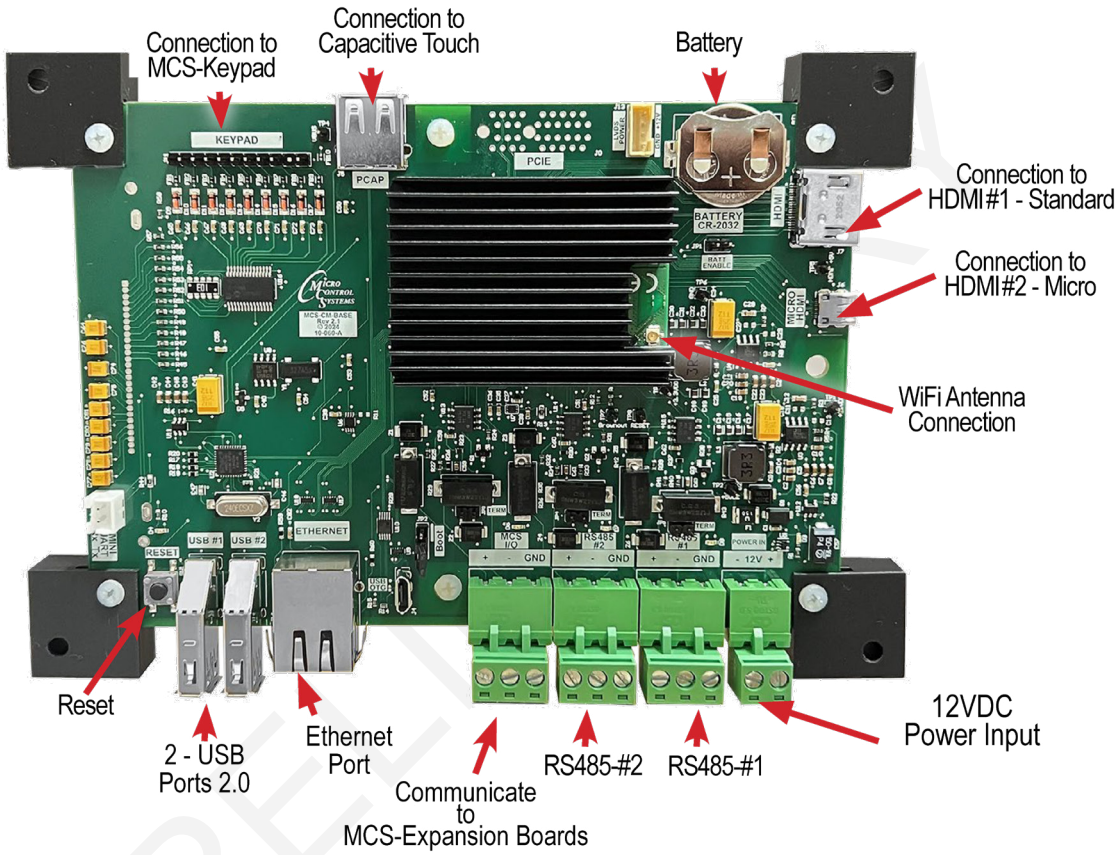
MCS-NITROMAG / MODBUS

1. Components of MCS-NitroMag-N

NITROMAG OPERATION SYSTEM - REV 1.05 & up

NITROMAG HVAC FIRMWARE - REV 19.00E & up

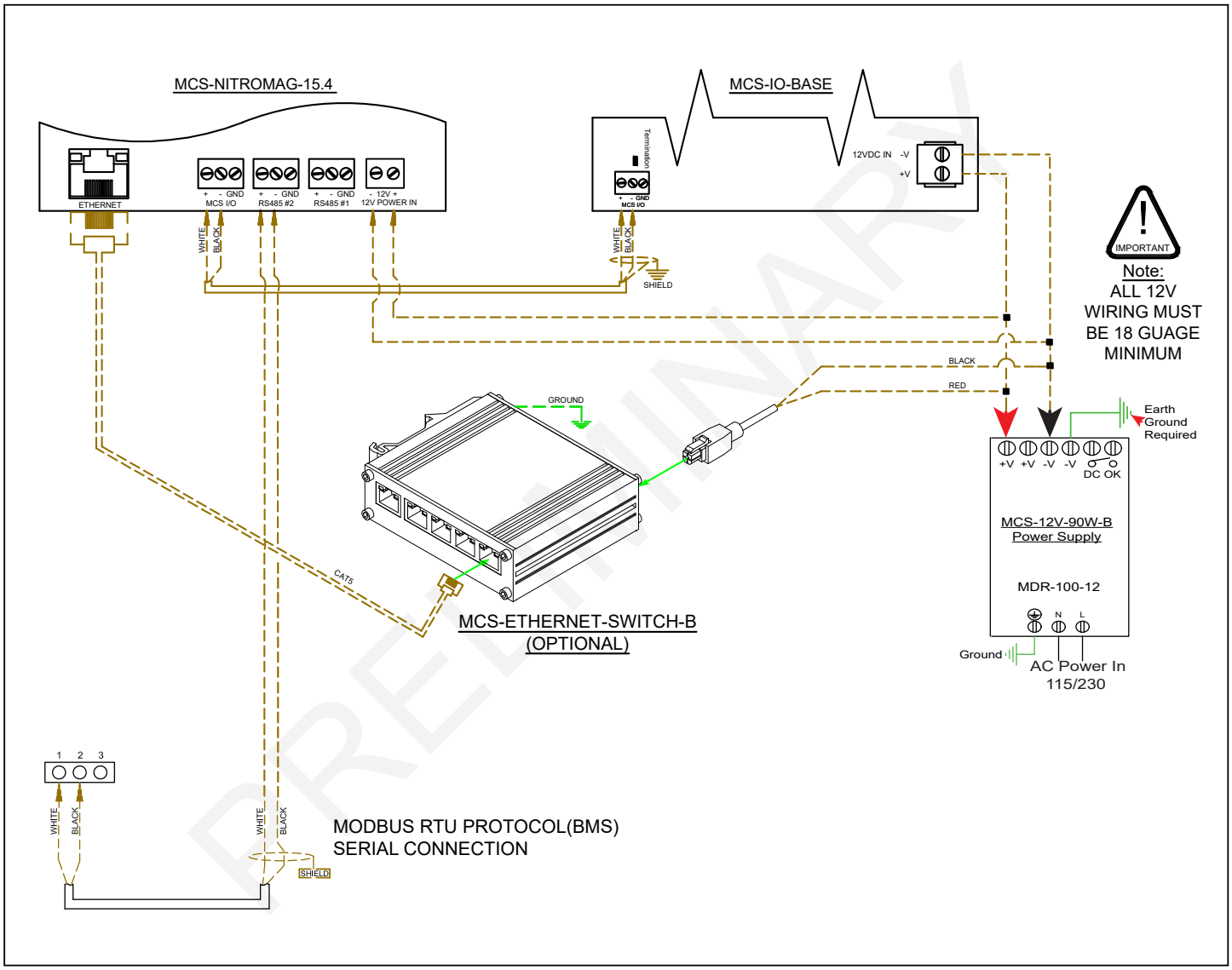


- RS-485 PORTS
  Each port suports up to 115200 baud rate.
- BMS NETWORK CONNECTIVITY
  BUILD IN SUPPORT - Modbus RTU Master
  Protocols - BACnet IP, BACnet MSTP, Modbus IP, Modbus RTU Slave
  (N2 coming soon) (LonTalk requires MCS-BMS-GATEWAY)
- MODBUS MASTER

  BUILD IN SUPPORT - Supports up to 20 Modbus devices e.g., VFD's KW Meter, Compressors.
  (MCS-Modbus I/O no longer required).

WIRING TO SLAVE / MCS-IO-BASE

MCS-NitroMag-N communicated through the MCS-I/O communication port at 38,400 baud rate.
The firmware includes a MODBUS INTERFACE which enables it to act as a MODBUS MASTER using the MODBUS RTU protocol, which allows communication with the MODBUS slave for parameter access over the RS485 communication port on the MCS-Nitromag-N.



The MCS-NitroMag-N is configured through the MCS-CONFIG firmware. The MODUS RTU MASTER supports up to 20 MODBUS decives e.g., VFD's, KW Meter, Compressors.

Using MCS-CONFIG firmware, a configutation file is created based on the slave parameters.

Each parameter is assigned a pre-programmed register number.

Those register numbers are named in the configuration file, which will display in MCS-CONNECT when viewing the controller.

The register parameters will be assigned to Sensors inputs, Relay outputs and Analog outputs to relay the information from the MODBUS slave.

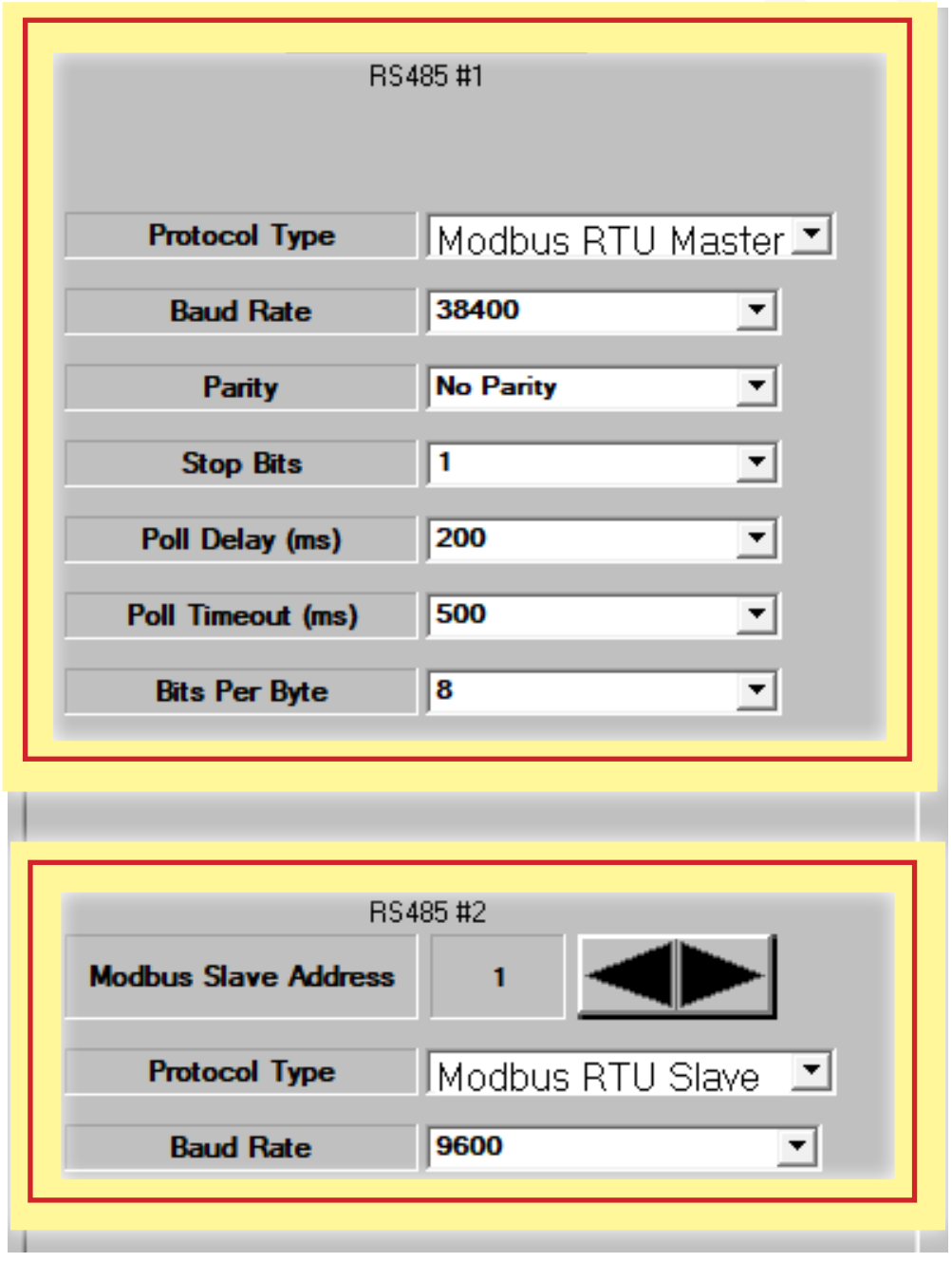
The next pages shows information on how this is setup in the MCS-CONFIG file.

WIRING TO SLAVE / MCS-IO-BASE

RS 485 ports Communication with MCS-NitroMag-N

MCS-CONFIG version 18.xxx.xx and up allows the programming of the RS485 ports in the setup section.

- Up to 20 MODBUS devices can be set up.
- RS 485 #1 and RS 485 #2 ports can be assigned as shown on the right.
- RS485 port #1 Protocol type can be set up as Modbus RTU Master.
- Port #2 can be set up as a MODBUS RTU slave.
- Check with the slave manufacturer to change the Baud Rate, Parity, and Stop Bits.



MCS-CONFIG - MODBUS DEVICE SETUP

1. Modbus RTU Master

BUILT IN SUPPORT

MCS-NitroMag-N Supports up to 20 Modbus devices e.g., VFD's KW, compressors.

(Modbus I/O no longer required)

Supports protocols BACnet IP, BACnet MSTP,L Modbus IP, Modbus RTU slave, Modbus RTU Master.

(Lontalk needs MCS-BMS-GATEWAY), N2 coming soon)

1.1. MODBUS SLAVES

Slaves are pre-programmed in the configuretaion file setup for your controller when shipped.

A sample configuration file is shown below and on the next page. MCS-NitroMag can be pre-rogrammed with the MODBUS write registers found in documentation supplied by the manufacturer using MCS-CONFIG software.

MODBUS Device Setup in MCS-CONFIG

Currently Editing Device Named: Test1

Modbus Devices Setup

#	Device Name	Device Address	RS485 Number	Configuration
1	Test1	1	RS485-2	Custom - Sample Slave
2	SPARE-2	0	Not Set	Not Used
3	SPARE-3	0	Not Set	Not Used
4	SPARE-4	0	Not Set	Not Used
5	SPARE-5	0	Not Set	Not Used

- 20 Devices can be added - (drop down window)
- Device Name can be edited
- Device Address is asigned
- Rs485 port number is assigned (RS485-2 default)
- Configuration is the Name of Slave (additional slaves can be programmed using Custom setting)

General Read/Write Modbus Master Points

Device Lockout	#	Register Number Offset	Register Number Offset (HEX)	Register Type	Modbus Data Types
No Lockout	1	84	0x0054	(R-FC01) Coil Status	Single Bit
No Lockout	2	0	0x0000	Not Set	Not Set
No Lockout	3	0	0x0000	Not Set	Not Set
No Lockout	4	0	0x0000	Not Set	Not Set
No Lockout					

- Register Number offset
- Register Number offset (HEX)
- Register Type (drop down window)
- Modbus data type (drop down window)

1. MODBUS DEVICE LIST

Currently Editing Device Named: Comp1A1000

Modbus Device List

Modbus Devices Setup

#	Device Name	Device Address	RS485 Number	Configuration	Modbus Data Types
1	Comp1A1000	1	RS485-1	YASKAWA GA800/A1000	Not Set
2	Comp2A1000	2	RS485-1	YASKAWA GA800/A1000	Not Set
3	ApmPowerMete	3	RS485-2	POWER METER APM PWR APO	Not Set
4	SPARE-4	0	Not Set	Not Used	Not Set
5	SPARE-5	0	Not Set	Not Used	

Line 1 information is added for the MODBUS Device

1. Device Name
2. Device Address
3. RS485 Port Number
4. Device Configuration setup
   a. Information is programmed into the MCS-CONFIG file
5. ***Sensors Inputs, Relay and Analog Outputs will populate when Configuration Device is chosen.***

2. SENSORS INPUTS

#	Name (1 to 10 char)	Display Type	Manual Value or NC/NO (select to change)	Select Display Type					Bitmask	MB
6-1	VfdFault 1	MB RTU Read	Closed=OFF	DIGITAL/SW					8	
6-2	Vfd Hz 1	MB RTU Read	45	DEC1NOCH				Byte	65535	
6-3	Vfd KW 1	MB RTU Read	17	KW	Comp1A1000	40	0x0028	(R-FC03) Holding Registers	Signed Int16 High Byte	65535
6-4	VfdAmps 1	MB RTU Read	75	AMPS/CT	Comp1A1000	39	0x0027	(R-FC03) Holding Registers	Signed Int16 High Byte	65535
6-5	VfdVolts 1	MB RTU Read	460	VOLTS-1Dec	Comp1A1000	38				
6-6	VfdDCBus 1	MB RTU Read	600	VOLTS-0Dec	Comp1A1000	50				
6-7	VfdHsink 1	MB RTU Read	105	TEMP	Comp1A1000	105				
6-8	VfdFlt #1	MB RTU Read	Open=OFF	DIGITAL/SW	Comp1A1000	129				

3. RELAY OUTPUTS

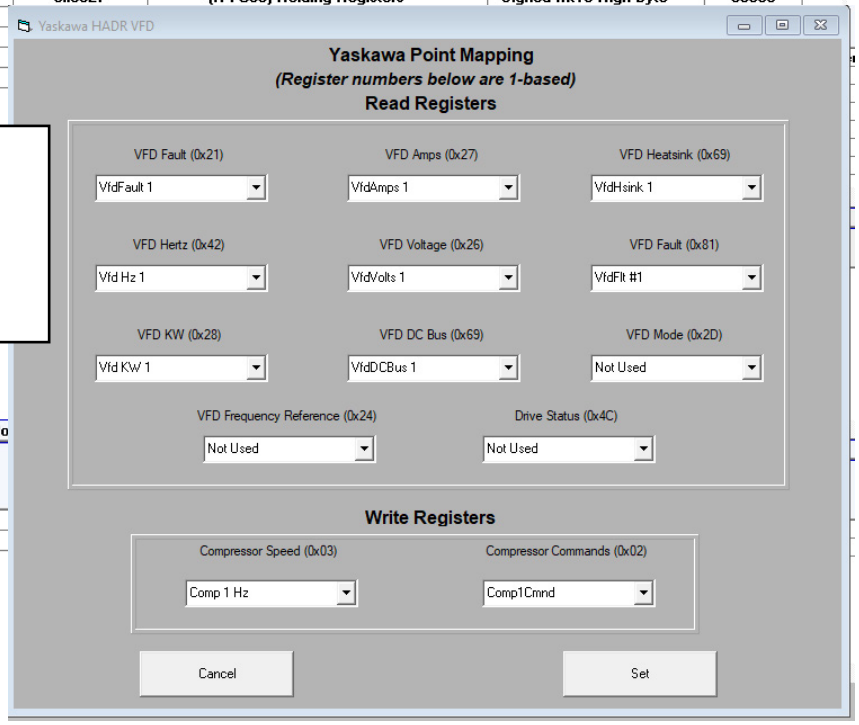
#	Name

1. A popup screen will show the registers (points) assigned to the MODBUS Device in HEX numbers.
2. Information for Sensors Inputs, Relay and Analog Out puts are populated after the Device Configuration is entered.

4. ANALOG OUTPUTS

Analog Output Modbus Master Po

#	Name	Control Type	Modbus Display Type	Device Name	Register Number Offset	Register Number Offset (HEX)
6-1	Comp 1 Hz	MB RTU AO Write	Spare	Comp1A1000	3	0x0003
6-2	Comp1Cmnd	MB RTU AO Write	Spare	Comp1A1000	2	0x0002



MCS-CONNECT - MODBUS DEVICE SETUP

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
- MCS-NitroMag controller
- MicroMag controller

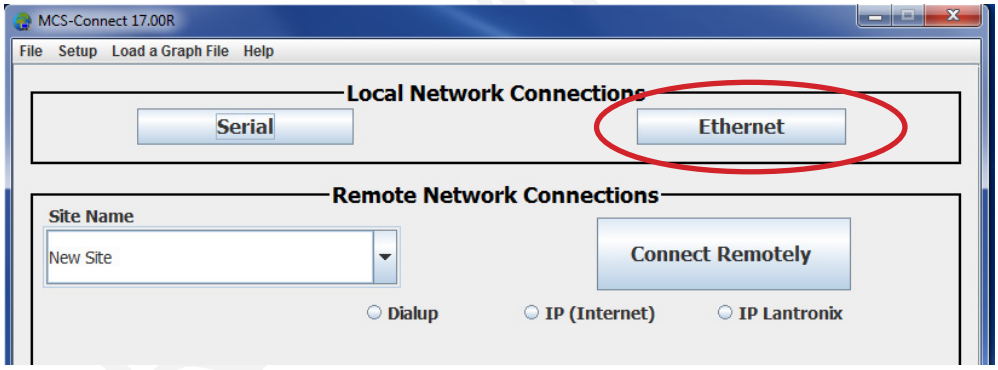
5. Communicating with MCS-CONNECT

1. MCS-CONNECT must be setup for the correct network address for your buildings IP address in order to connect to your controllers.
2. Configuration files and Firmware software can be changed based on your authorization to make those changes.
3. Information for makeing changes can be found in the MCS-CONNECT latest manual located on:

www.https://mcscontrols.com/manuals.html

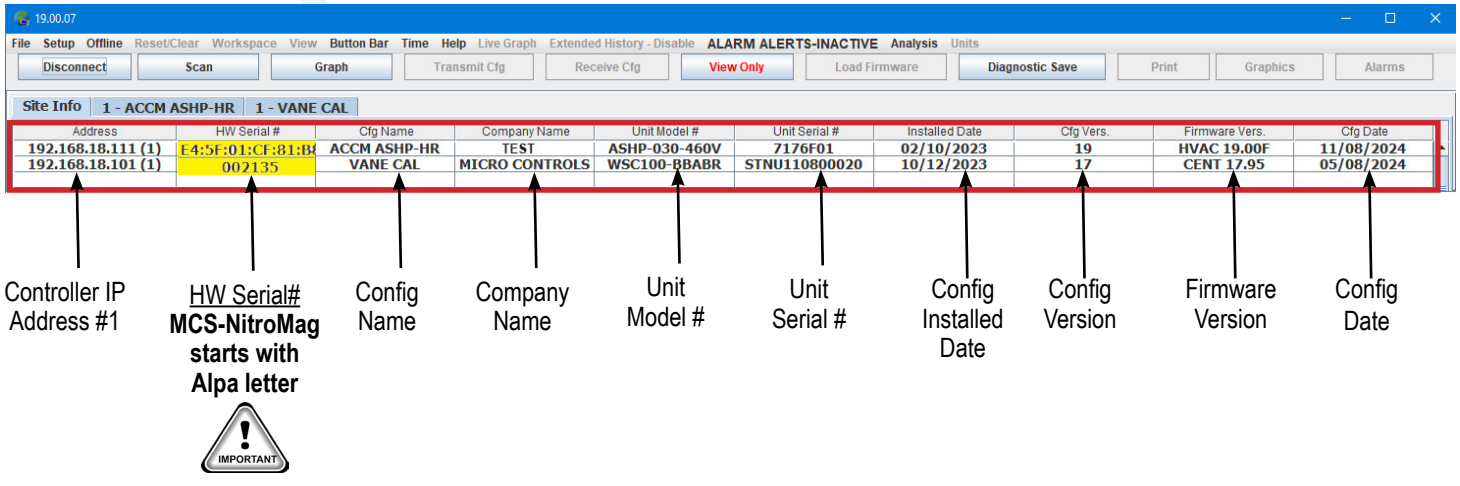
Scan for Controller

Once connected, click on the MCS-CONNECT program to open.Changes to the config and firmware software can be changed if you are authorized. Click on the Ethernet tab to open available controllers.



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

(if there is a RED line through your controller, you need to update the config file/firmware.)

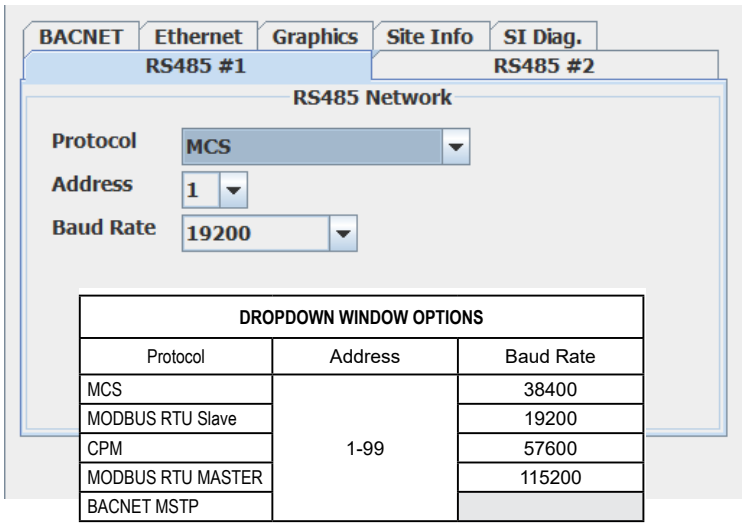


6. RS485 PORTS SETUP(service menu, MCS-CONNECT)

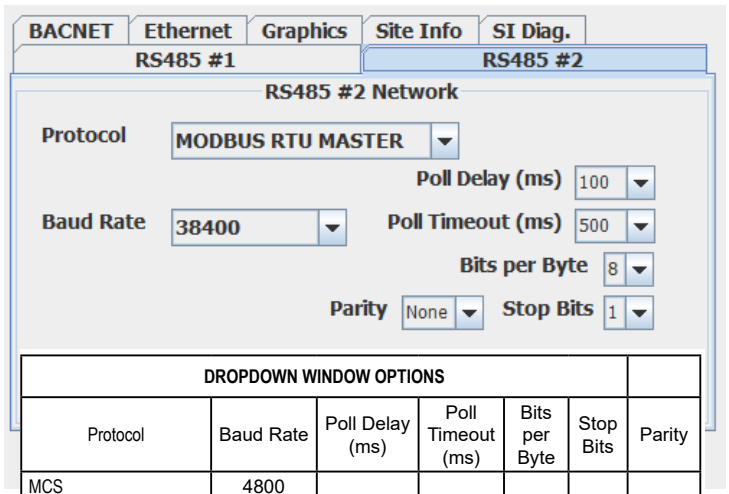
RS-485 Ports..... 2 @ up to 115200 baud rate

Sample Screens for setup MODBUS salve (receive Cfg file received)

1. RS485 #1 - Setup for MCS I/O communicating -19,200 baud - address #1
2. RS485 #2 - Setup for MODBUS RTU MASTER - 38,400 BAUD. Bits per Byte=8, Stop Bits= 1



DROPDOWN WINDOW OPTIONS		
Protocol	Address	Baud Rate
MCS	1-99	38400
MODBUS RTU Slave		19200
CPM		57600
MODBUS RTU MASTER		115200
BACNET MSTP		

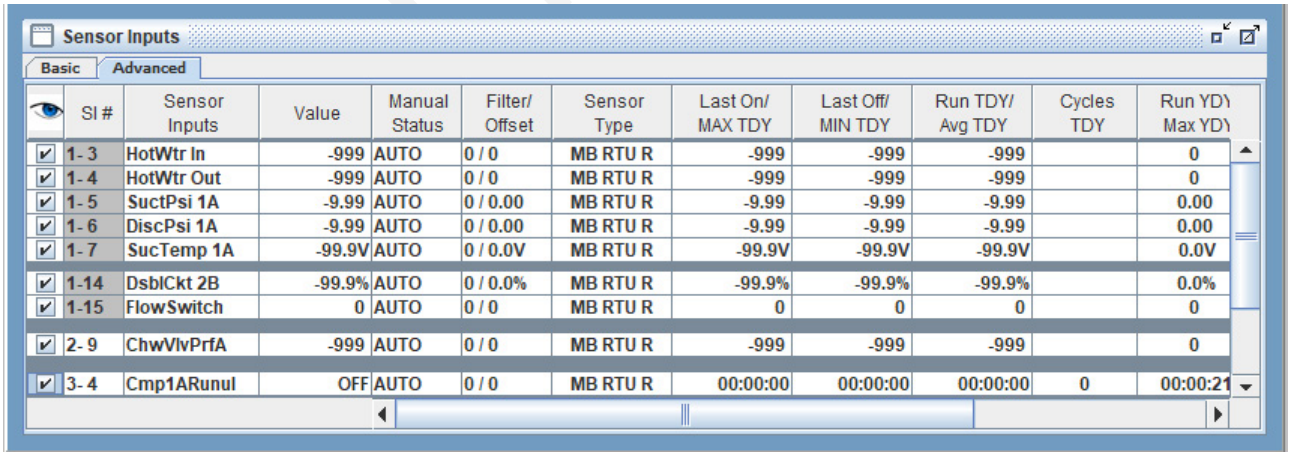


DROPDOWN WINDOW OPTIONS						
Protocol	Baud Rate	Poll Delay (ms)	Poll Timeout (ms)	Bits per Byte	Stop Bits	Parity
MCS	4800	10 ↓ 1000	100 ↓ 2000	7 or 8	1 or 2	None Even Odd
MODBUS RTU Slave	9600					
CPM	19200					
MODBUS RTU MASTER	38400					
	57600					
	115200					

7. SENSOR INPUTS

Sample - ABB MODBUS Read Sensor Inputs

9 Sensor Inputs pre-programmed into software. **(receive Cfg file received)**

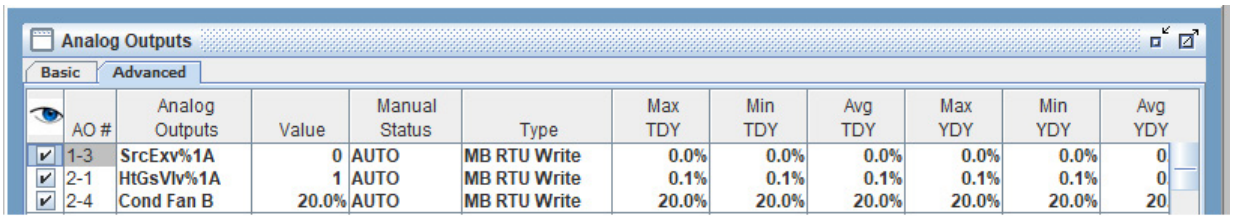


SI #	Sensor Inputs	Value	Manual Status	Filter/ Offset	Sensor Type	Last On/ MAX TDY	Last Off/ MIN TDY	Run TDY/ Avg TDY	Cycles TDY	Run YDY Max YDY
1- 3	HotWtr In	-999	AUTO	0 / 0	MB RTU R	-999	-999	-999		0
1- 4	HotWtr Out	-999	AUTO	0 / 0	MB RTU R	-999	-999	-999		0
1- 5	SuctPsi 1A	-9.99	AUTO	0 / 0.00	MB RTU R	-9.99	-9.99	-9.99		0.00
1- 6	DiscPsi 1A	-9.99	AUTO	0 / 0.00	MB RTU R	-9.99	-9.99	-9.99		0.00
1- 7	SucTemp 1A	-99.9V	AUTO	0 / 0.0V	MB RTU R	-99.9V	-99.9V	-99.9V		0.0V
1-14	DsblCkt 2B	-99.9%	AUTO	0 / 0.0%	MB RTU R	-99.9%	-99.9%	-99.9%		0.0%
1-15	FlowSwitch	0	AUTO	0 / 0	MB RTU R	0	0	0		0
2- 9	ChwVlvPrfA	-999	AUTO	0 / 0	MB RTU R	-999	-999	-999		0
3- 4	Cmp1ARunul	OFF	AUTO	0 / 0	MB RTU R	00:00:00	00:00:00	00:00:00	0	00:00:21

8. ANALOG OUTPUTS

Sample - ABB MODBUS Read Analog Outputs

3 Analog Outputs pre-programmed into software. **(receive Cfg file received)**



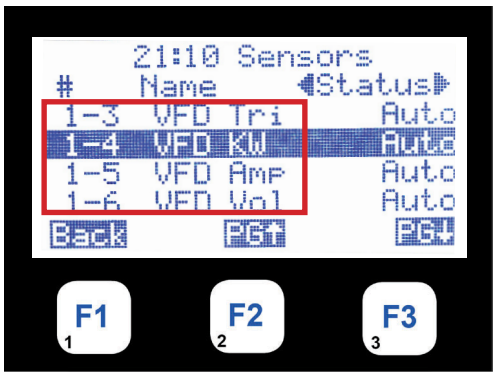
AO #	Analog Outputs	Value	Manual Status	Type	Max TDY	Min TDY	Avg TDY	Max YDY	Min YDY	Avg YDY
1-3	SrcExv%1A	0	AUTO	MB RTU Write	0.0%	0.0%	0.0%	0.0%	0.0%	0
2-1	HtGsVlv%1A	1	AUTO	MB RTU Write	0.1%	0.1%	0.1%	0.1%	0.1%	0
2-4	Cond Fan B	20.0%	AUTO	MB RTU Write	20.0%	20.0%	20.0%	20.0%	20.0%	20

MODBUS POINTS/VIEWED ON KEYPAD

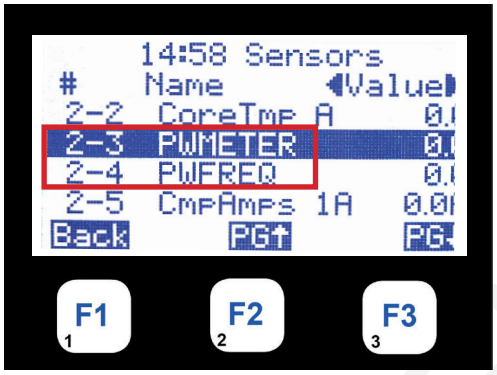
1. SENSORS/RELAYS/ANALOG

MODBUS RTU slave points are displayed on the Keypad under the “SENSOR, RELAY and ANALOG inputs and outputs as shown below.

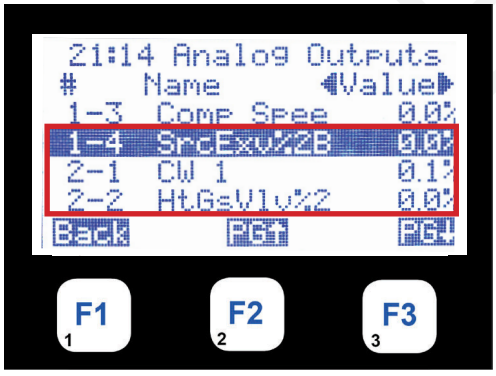
The MCS-CONFIG setup is shown on the following pages as a reference as how they are programmed in the configuration file for your controller.



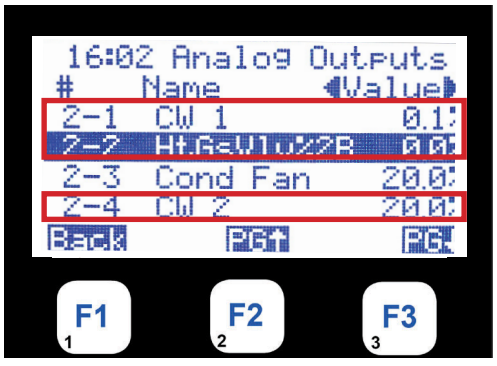
HH:MM
MODBUS SLAVE SENSORS SETUP IN CONFIGURATION FILE FOR CONTROLLER
SENSORS SHOW MODBUS SETUP - RS 485 #1
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU



HH:MM
MODBUS SLAVE SENSORS SETUP IN CONFIGURATION FILE FOR CONTROLLER
SENSORS SHOW MODBUS SETUP - RS 485 #2
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU



HH:MM
MODBUS SLAVE ANALOGS SETUP IN CONFIGURATION FILE FOR CONTROLLER
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU



HH:MM
MODBUS SLAVE ANALOGS SETUP IN CONFIGURATION FILE FOR CONTROLLER
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU

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