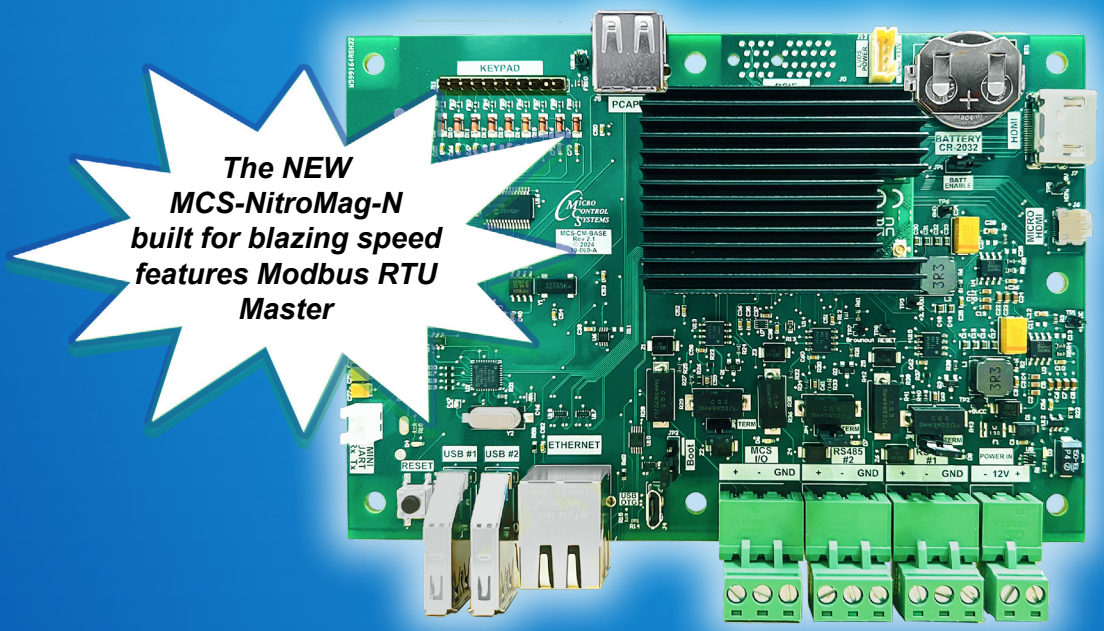
MCS-NitroMag-N

MODBUS GETTING STARTED



New Generation of MCS-MAGNUM "Smaller Footprint"

Engineered for advanced HVAC/R applications

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

MICRO CONTROL SYSTEMS

5580 Enterprise Parkway / Fort Myers, FL 33905 / Phone: 239-694-0089
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TABLE OF CONTENTS

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.

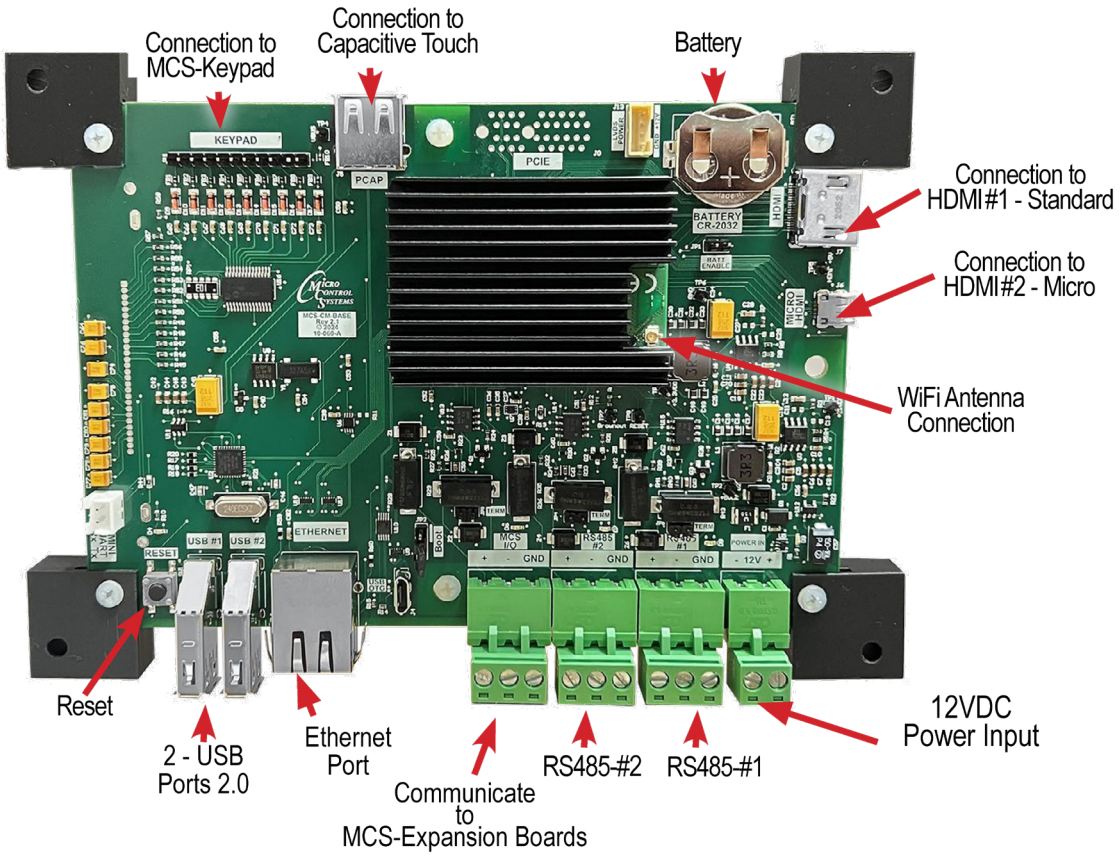
- In terms of protocol support, the NitroMag controller functions as a Modbus RTU Master capable of supporting up to 20 Modbus devices. It also supports BACnet IP, BACnet MSTP, Modbus IP, and Modbus RTU, enabling seamless integration with building automation and control systems. This combination of processing power, connectivity, memory, and protocol compatibility makes the MCS-NitroMag an ideal solution for modern, high-performance HVAC/R control applications.

MCS-NitroMag-N

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.

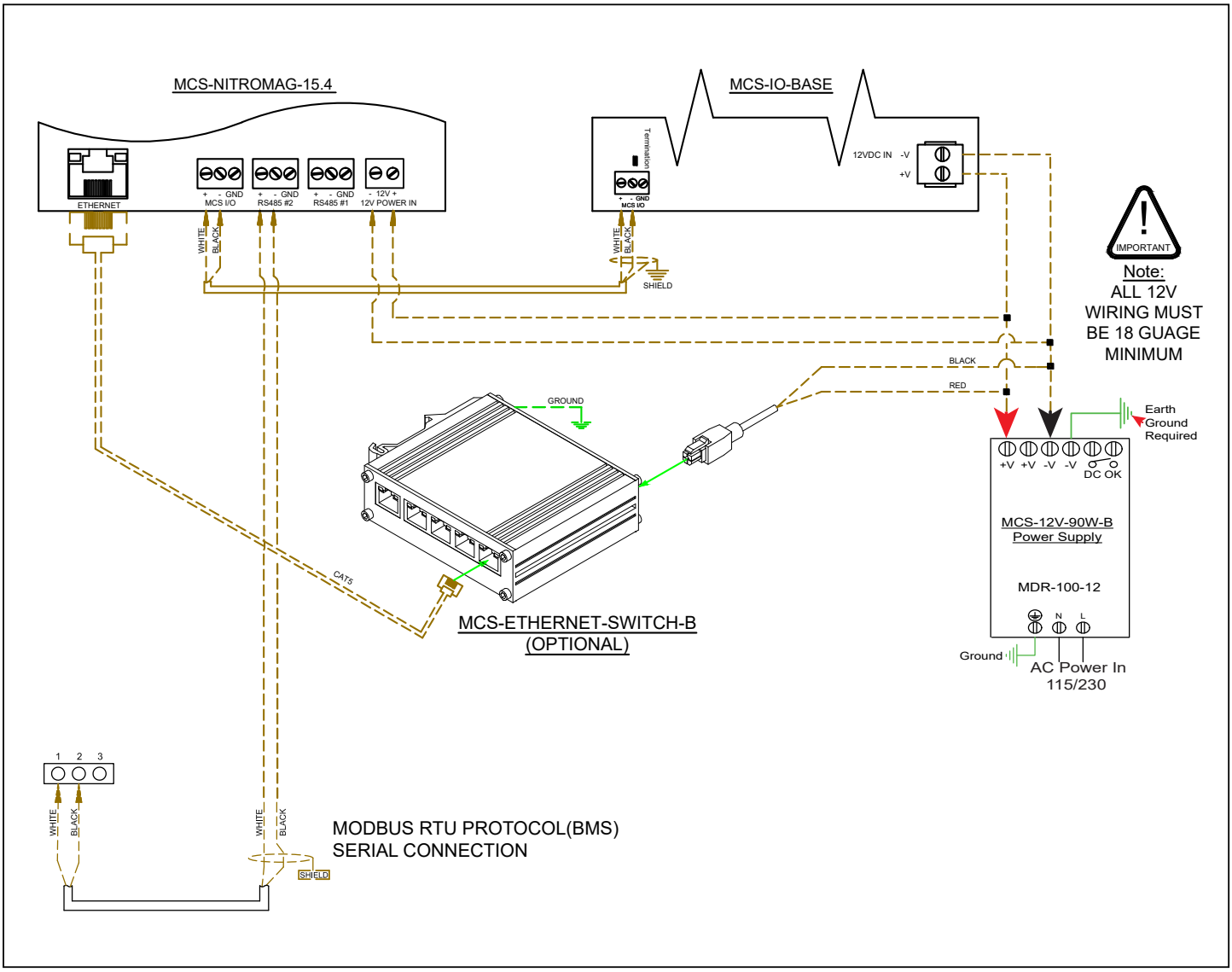
- BMS NETWORK CONNECTIVITY
  BUILD IN SUPPORT - Modbus RTU Master
  Protocols - BACnet IP, BACnet MSTP, Modbus IP, Modbus RTU Slave
  (N2 coming soon) (LonTalk requires MCS-BMS-GATEWAY)

- 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 MODBUS RTU MASTER supports up to 20 MODBUS devices e.g., VFD's, KW Meter, Compressors.

Using MCS-CONFIG, a configuration 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.

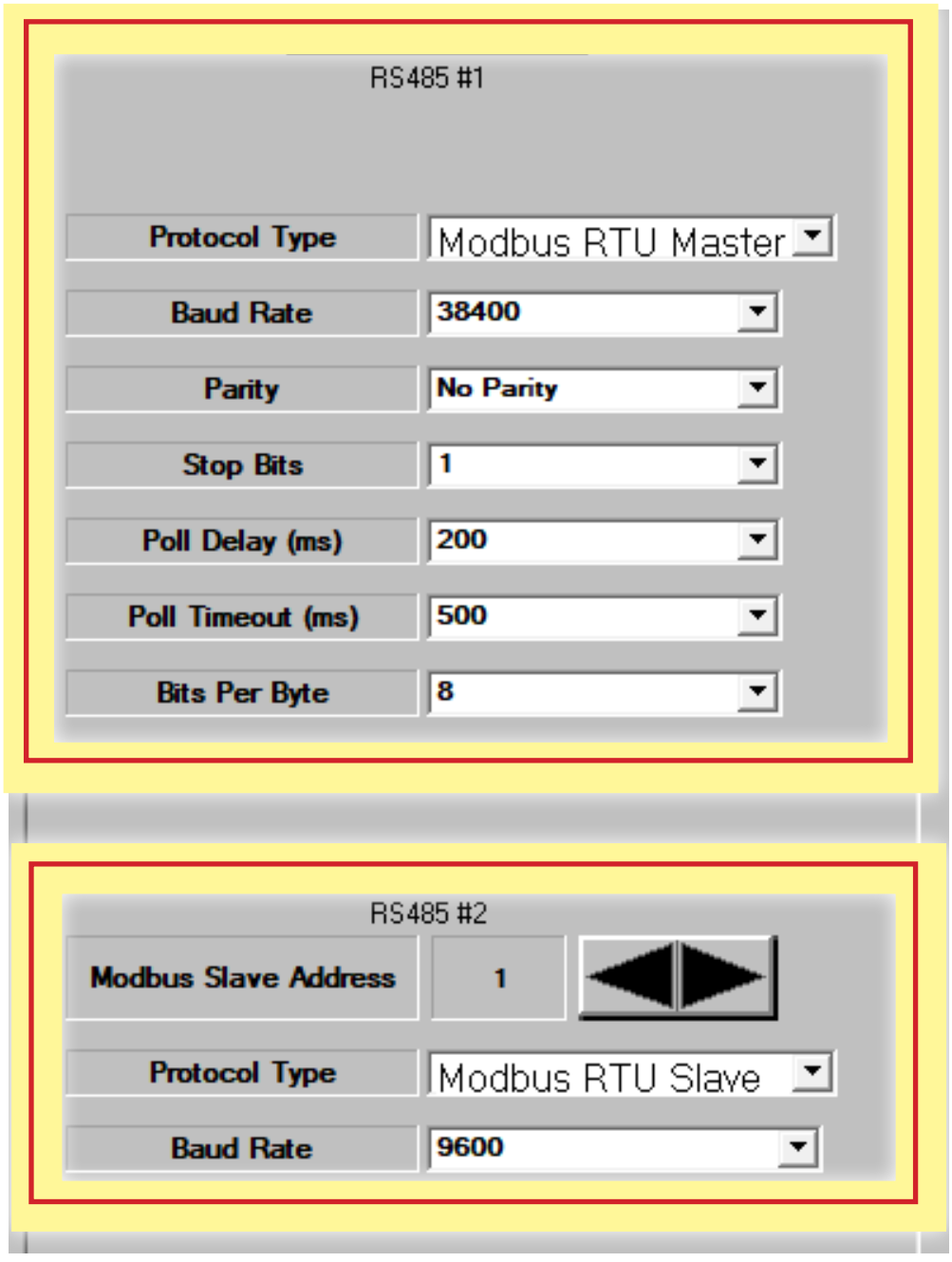
The next pages shows information on how this is setup in the MCS-CONFIG file.

MODBUS / MCS-CONFIG Setup

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.



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, 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 configuration 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)

MODBUS / MCS-CONFIG Setup

1. MODBUS DEVICE LIST

Currently Editing Device Named: Comp1A1000

Modbus Device List

Modbus Devices Setup

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

Modbus Data Types
Not Set
Not Set
Not Set
Not Set

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					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

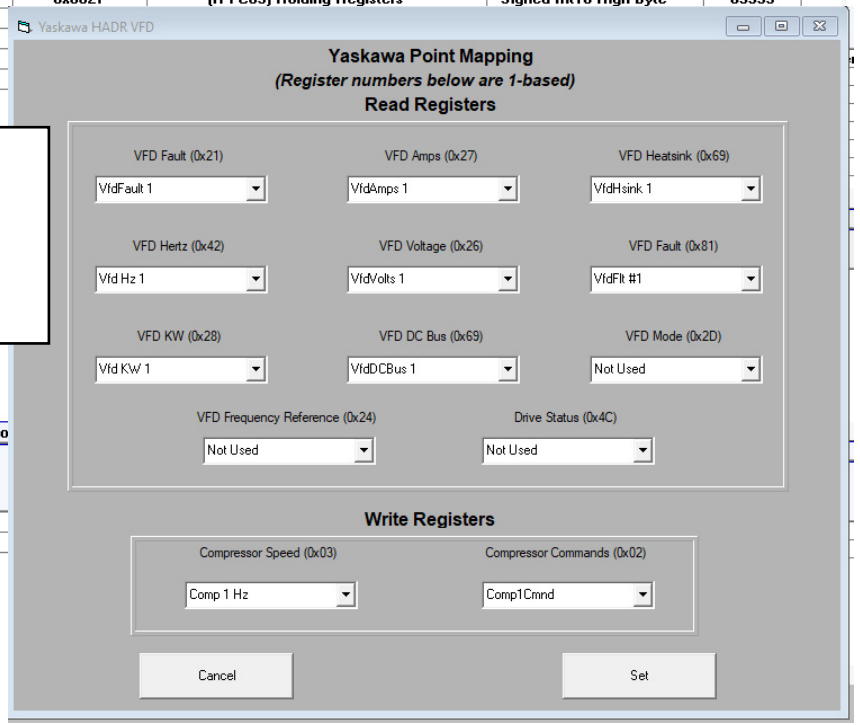
#	Name

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



EXAMPLE OF CONFIG SETUP FOR MODBUS SLAVES

MCS-CONNECT - Startup

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

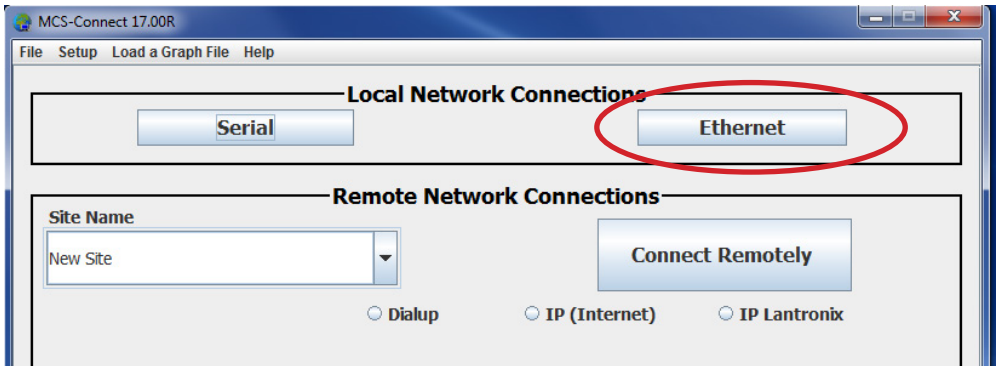
5. Communicating with MCS-CONNECT

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

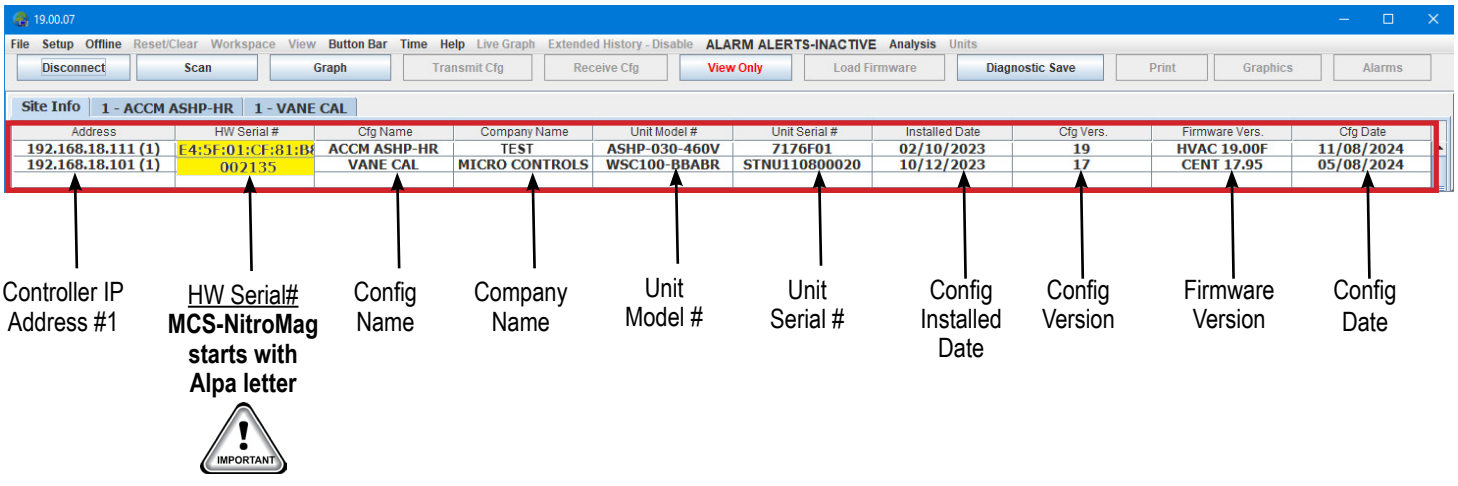
Scan for Controller

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.)

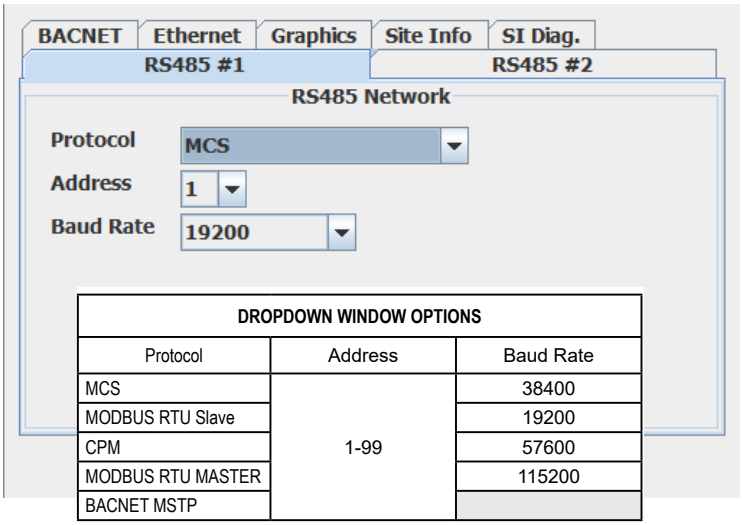


6. RS485 PORTS SETUP(service menu, MCS-CONNECT)

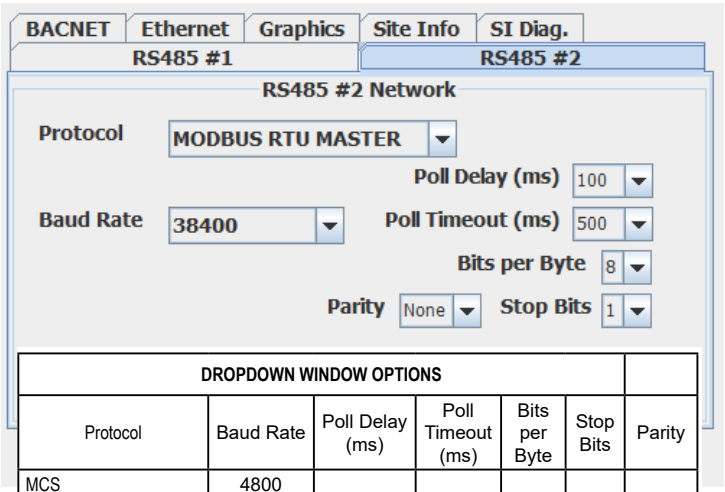
RS-485 Ports..... 2 @ up to 115200 baud rate

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		

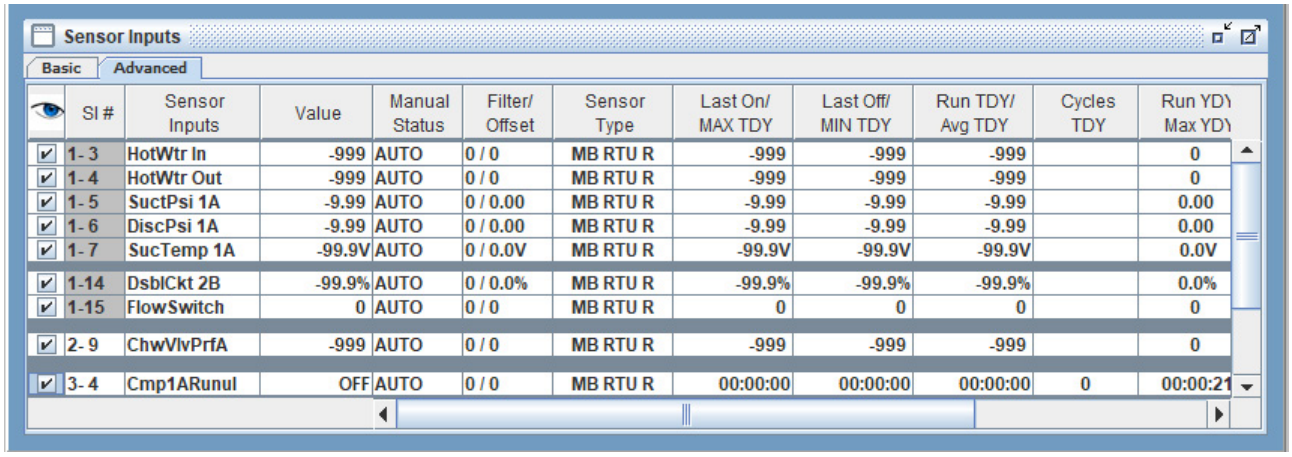


DROPDOWN WINDOW OPTIONS						
Protocol	Baud Rate	Poll Delay (ms)	Poll Timeout (ms)	Bits per Byte	Stop Bits	Parity
MCS	4800	10 ↓ 1000	100 ↓ 2000	7 or 8	1 or 2	None Even Odd
MODBUS RTU Slave	9600					
CPM	19200					
MODBUS RTU MASTER	38400					
	57600					
	115200					

7. SENSOR INPUTS

Sample - ABB MODBUS Read Sensor Inputs

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

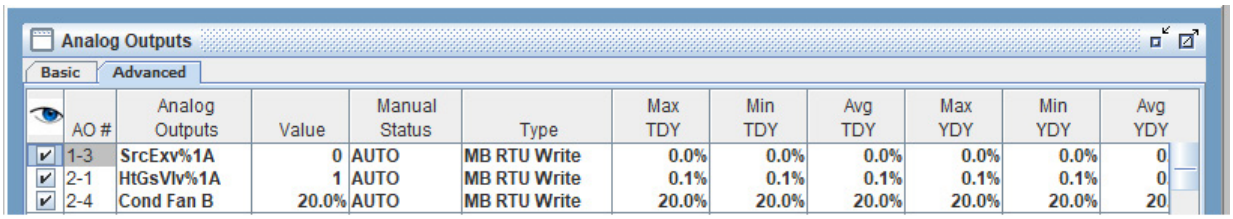


	SI #	Sensor Inputs	Value	Manual Status	Filter/ Offset	Sensor Type	Last On/ MAX TDY	Last Off/ MIN TDY	Run TDY/ Avg TDY	Cycles TDY	Run YDY Max YDY
☑	1-3	HotWtr In	-999	AUTO	0 / 0	MB RTU R	-999	-999	-999		0
☑	1-4	HotWtr Out	-999	AUTO	0 / 0	MB RTU R	-999	-999	-999		0
☑	1-5	SuctPsi 1A	-9.99	AUTO	0 / 0.00	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)**



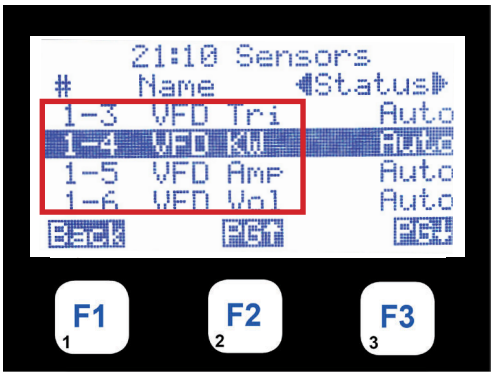
	AO #	Analog Outputs	Value	Manual Status	Type	Max TDY	Min TDY	Avg TDY	Max YDY	Min YDY	Avg YDY
☑	1-3	SrcExv%1A	0	AUTO	MB RTU Write	0.0%	0.0%	0.0%	0.0%	0.0%	0
☑	2-1	HtGsVlv%1A	1	AUTO	MB RTU Write	0.1%	0.1%	0.1%	0.1%	0.1%	0
☑	2-4	Cond Fan B	20.0%	AUTO	MB RTU Write	20.0%	20.0%	20.0%	20.0%	20.0%	20

MODBUS POINTS/REGISTERS VIEWED ON KEYPAD

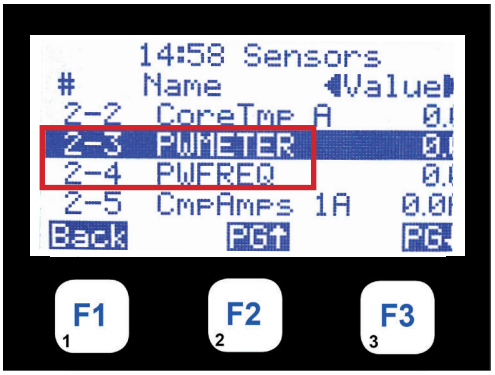
1. SENSORS/RELAYS/ANALOG

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

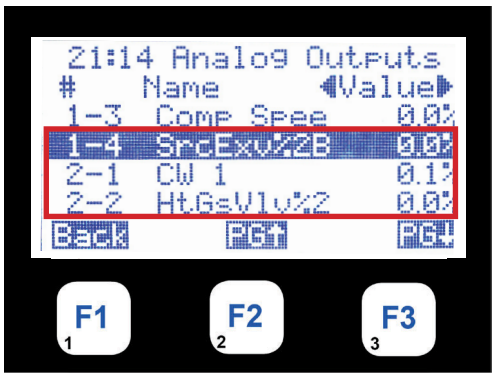
The MCS-CONFIG setup is shown on the following pages as a reference as how they are programmed in the configuration file for your controller.



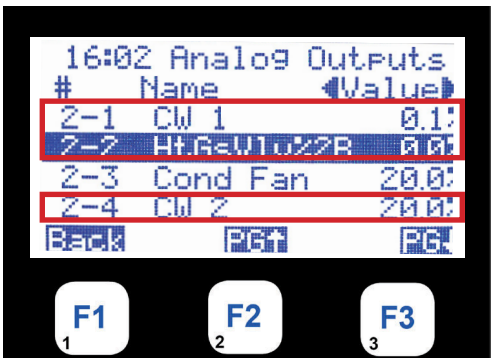
HH:MM
MODBUS SLAVE SENSORS SETUP IN CONFIGURATION FILE FOR CONTROLLER
SENSORS SHOW MODBUS SETUP - RS 485 #1
PG ↓ CONTINUES TO NEXT SYSTEM INFO OR
PRESS ↵ MENU TO RETURN TO MAIN MENU



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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