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MICRO CONTROL SYSTEMS

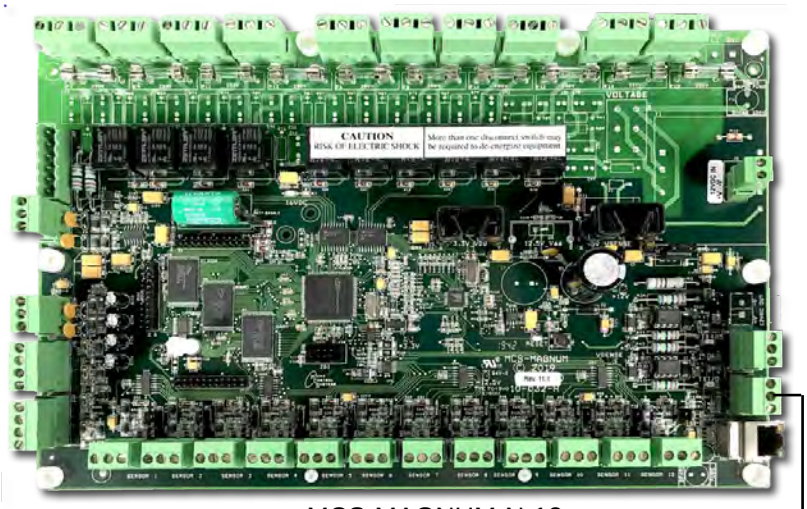
5580 Enterprise Pkwy.
Fort Myers, FL 33905

Office: 239-694-0089
Fax: 239-694-0031

www.mcscontrols.com

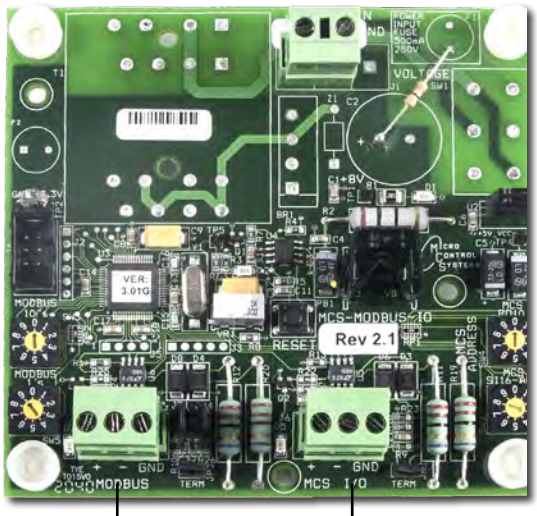
MCS-MODBUS-IO

GETTING STARTED
USER MANUAL



MCS-MAGNUM-N-12

SLAVE - VFD



Communicating between MCS-MAGNUM, MCS-MODBUS and VFD or other slaves

MCS-MODBUS IO-12

MCS Total Solution for all your Control Needs

See Appendix section in back of Manual for quick steps for MCS-MODBUS-IO-12 functions

RoHS Compliant

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

Micro Control Systems, Inc.
5580 Enterprise Parkway
Fort Myers, Florida 33905
PH:(239) 694-0089 FAX:(239) 694-0031
www.mcscontrols.com

Table of Contents

Chapter - 1. Introduction to ModBus Protocol

1.1. What is Modbus Protocol?

Modbus is a serial communication protocol. In simple terms, it is a method used for transmitting information over serial lines between electronic devices. The device requesting the information is called the Modbus Master and the devices supplying information are Modbus Slaves. In a standard Modbus network, there is one Master and up to 247 Slaves, each with a unique Slave Address from 1 to 247. The Master can also write information to the Slaves.

1.2. What is it used for?

The **MCS-MODBUS-IO-12** gives the MCS-MAGNUM the ability to act as a Modbus Master using the Modbus RTU Protocol. This allows the MCS-MAGNUM to communicate to Modbus slave devices (such as Variable Frequency Drives, Compressors, etc.) to send and access parameters from the slave devices.

The MCS-MODBUS-IO-12 performs like a MCS-RO10 and MCS-SI16-AO4 to the MCS-MAGNUM. This allows the MCS-MAGNUM to control 10 relays, 4 analog outputs and read 16 sensors.

Multiple MCS-MODBUS-IO-12 boards may be connected to the MCS-MAGNUM following MCS-I/O standards.

MCS-MODBUS-IO-12 has the capability to be configured over MCS-Connect to communicate with any Modbus slave devices that support Modbus RTU Protocol.

By using the MCS-MODBUS-IO-12 in your control system, the MCS-Magnum is able to collect data points from the Modbus device and the user can view these data points using MCS-Connect.

1.3. RTU MODE

When controllers are setup to communicate on a Modbus network using RTU (Remote Terminal Unit) mode, each 8–bit byte in a message contains two 4–bit hexadecimal characters. The main advantage of this mode is that its greater character density allows better data throughput than ASCII for the same baud rate.

Each message must be transmitted in a continuous stream.

The format for each byte in RTU mode is:

Coding System:	8–bit binary, hexadecimal 0–9, A–F
	Two hexadecimal characters contained in each 8–bit field of the message
Bits per Byte:	1 start bit
	8 data bits, least significant bit sent first
	1 bit for even/odd parity; no bit for no parity
	1 stop bit if parity is used; 2 bits if no parity
Error Check Field:	Cyclical Redundancy Check (CRC)

1.4. RTU Framing

In RTU mode, messages start with a silent interval of at least 3.5 character times. This is most easily implemented as a multiple of character times at the baud rate that is being used on the network (shown as T1–T2–T3–T4 in the figure below). The first field then transmitted is the device address.

The allowable characters transmitted for all fields are hexadecimal 0–9, A–F. Networked devices monitor the network bus continuously, including during the ‘silent’ intervals. When the first field (the address field) is received, each device decodes it to find out if it is the addressed device.

Following the last transmitted character, a similar interval of at least 3.5 character times marks the end of the message.

A new message can begin after this interval.
The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 character times occurs before completion of the frame, the receiving device flushes the incomplete message

and assumes that the next byte will be the address field of a new message.

Similarly, if a new message begins earlier than 3.5 character times following a previous message, the receiving device will consider it a continuation of the previous message. This will set an error, as the value in the final CRC field will not be valid for the combined messages. A typical message frame is shown below.

START	ADDRESS	FUNCTION	DATA	CRC CHECK	END
T1–T2–T3–T4	8 BITS	8 BITS	n x 8 BITS	16 BITS	T1–T2–T3–T4

Figure 4 RTU Message Frame

1.5. How the Address Field is Handled

The address field of a message frame contains eight bits (RTU). Valid slave device addresses are in the range of 0 – 247 decimal. The individual slave devices are assigned addresses in the range of 1 – 247. A master addresses a slave by placing the slave address in the address field of the message. When the slave sends its response, it places its own address in this address field of the response to let the master know which slave is responding.

Address 0 is used for the broadcast address, which all slave devices recognize. When Modbus protocol is used on higher level networks, broadcasts may not be allowed or may be replaced by other methods. For example, Modbus Plus uses a shared global database that can be updated with each token rotation.

1.6. Modbus Protocol

If the slave device takes the requested action without error, it returns the same code in its response. If an exception occurs, it returns:

1000 0011 (Hexadecimal 83)

In addition to its modification of the function code for an exception response, the slave places a unique code into the data field of the response message. This tells the master what kind of error occurred, or the reason for the exception.

The master device's application program has the responsibility of handling exception responses. Typical processes are to post subsequent retries of the message, to try diagnostic messages to the slave, and to notify operators.

- **Contents of the Data Field**

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. These can be made from a pair of ASCII characters, or from one RTU character, according to the network's serial transmission mode.

The data field of messages sent from a master to slave devices contains additional information which the slave must use to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field.

For example, if the master requests a slave to read a group of holding registers (function code 03), the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master contains the data requested. If an error occurs, the field contains an exception code that the master application can use to determine the next action to be taken.

The data field can be nonexistent (of zero length) in certain kinds of messages. For example, in a request from a master device for a slave to respond with its communications event log (function code 0B hexadecimal), the slave does not require any additional information. The function code alone specifies the action.

1.7. How the Function Field is Handled

The function code field of a message frame contains two characters (ASCII) or eight bits (RTU). Valid codes are in the range of 1 – 255 decimal. Of these, some codes are applicable to all Modicon controllers, while some codes apply only to certain models, and others are reserved for future use.

When a message is sent from a master to a slave device the function code field tells the slave what kind of action to perform. Examples are to read the ON/OFF states of a group of discrete coils or inputs; to read the data contents of a group of registers; to read the diagnostic status of the slave; to write to designated coils or registers; or to allow loading, recording, or verifying the program within the slave.

When the slave responds to the master, it uses the function code field to indicate either a normal (error–free) response or that some kind of error occurred (called an exception response). For a normal response, the slave simply echoes the original function code. For an exception response, the slave returns a code that is equivalent to the original function code with its most–significant bit set to a logic 1.

For example, a message from master to slave to read a group of holding registers would have the following function code:

0000 0011 (Hexadecimal 03)

1.8. What is a function code?

The second byte sent by the Master is the Function code. This number tells the slave which table to access and whether to read from or write to the table.

Function Code	Action	Table Name
01 (01 hex)	Read	Discrete Output Coils
05 (05 hex)	Write single	Discrete Output Coil
15 (0F hex)	Write multiple	Discrete Output Coils
02 (02 hex)	Read	Discrete Input Contacts
04 (04 hex)	Read	Analog Input Registers
03 (03 hex)	Read	Analog Output Holding Registers
06 (06 hex)	Write single	Analog Output Holding Register
16 (10 hex)	Write multiple	Analog Output Holding Registers

1.9. Modbus “Registers”

Are just data values in the slave (server).

If you are writing a slave, its up to you where the data is kept in the slave. You might for example have several arrays of data and simply store the data in there. The “registers” are just part of your program. The Modbus protocol describes what the data should look like when it goes out on the wire. It doesn’t tell you how to write your program.

A client (master) sends a request to a server (slave). For example, if a client sends a request for function 2 with a quantity of 1 and an address of 5, the server will respond with the value of whatever was in the memory location it calls “discrete input 5”.

The register locations don’t even necessarily have to exist. Suppose for example you are making a very

simple server (slave) device that acts as an input device with 6 inputs. If we take the above example (function 2, quantity 1, address 5), then the server simply has to read the state of the input and send an appropriate reply to the client. As long as the client gets the reply it was expecting, it’s happy.

If you have a server with a large register map (data table), then it can be simpler to implement it as an array (or several arrays) of data. The communications routines then just have to read the appropriate array locations to get the data they need. You can overlap these arrays if you wish so that for example coils are stored in holding registers, or holding registers are the same as input registers. Or, you can make them all separate.

Another way of putting this is that normally a server (slave) is something that performs a job, and the client (master) is something that asks for the job to be done. Modbus is simply the language that both parties use to talk to each other. How the job actually gets done is up to the server.

1.10. Exception Errors

If an error occurs, standard Modbus exception codes are returned in the Modbus packet. The following table, reprinted from the *Modicon Modbus Protocol Reference Guide*, shows the Modbus exception codes.

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the slave.
02	ILLEGAL DATA AD-DRESS	The data address received in the query is not an allowable address for the slave.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the slave.
04	SLAVE DEVICE FAIL- URE	An unrecoverable error occurred while the slave was attempting to perform the requested action.
05	ACKNOWLEDGE	The slave has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a time- out error from occurring in the master. The master can next issue a Poll Pro- gram Complete message to determine if process-ing is completed.
06	SLAVE DEVICE BUSY	The slave is engaged in processing a long-duration program command. The master should retransmit the message later when the slave is free.
07	NEGATIVE ACKNOWL-EDGE	The slave cannot perform the program function received in the query. This code is returned for an unsuccessful programming request using function code 13 or 14 decimal. The master should request diagnostic or error infor- mation from the slave.
08	MEMORY PARITY ERROR	The slave attempted to read extended memory, but detected a parity error in the memory. The master can retry the request, but service may be required on the slave device.

1.11. What is a Modbus Map?

A modbus map is simply a list for a slave device that defines

- what the data is (eg. pressure or temperature readings)
- where the data is stored (which tables and data addresses)
- how the data is stored (data types, byte and word ordering)

Additional information on the MODBUS Protocol can be found at:

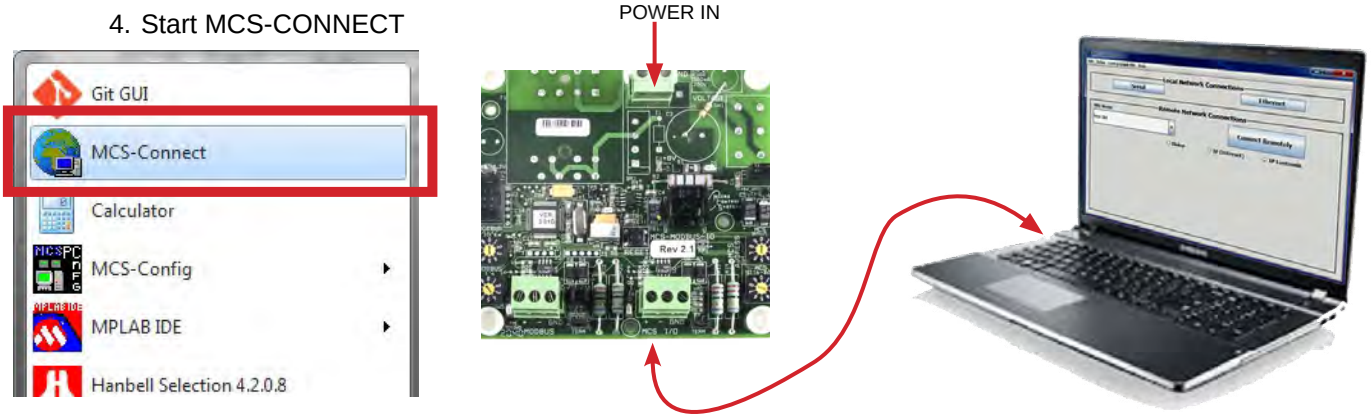
http://www.simplymodbus.ca/index.html

Chapter - 2. MCS-MODBUS-IO-12 Communication

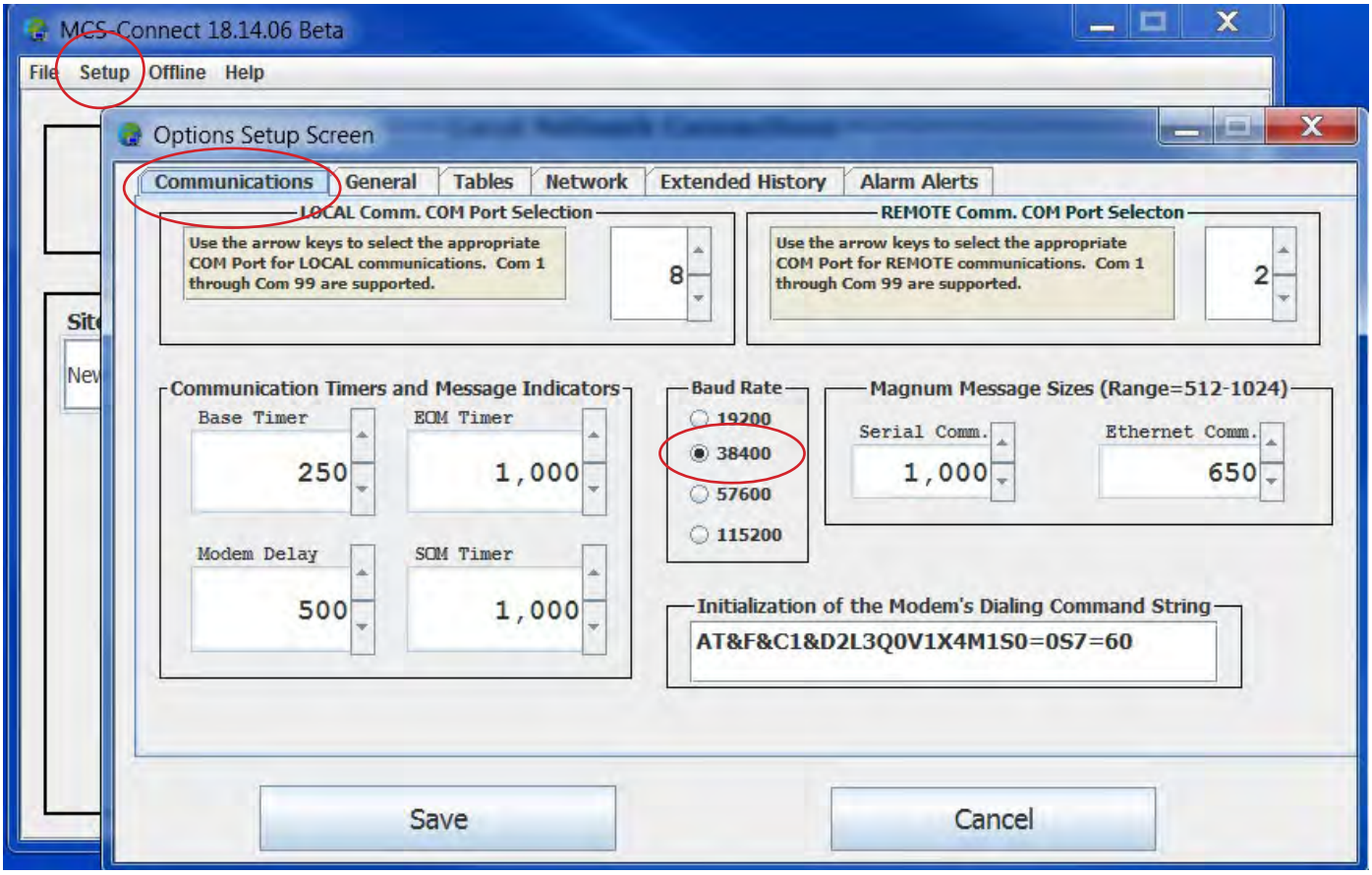
2.1. Communicating with MCS-CONNECT

Follow the steps below to wire and setup communication with the MODBUS BOARD.

1. Use a MCS-USB-485 cable to connect from your PC to the MCS-MODBUS-IO-12.
2. Connect the RS485 to the MCS-MODBUS-IO-12
3. Connect the USB cable to your PC
4. Start MCS-CONNECT

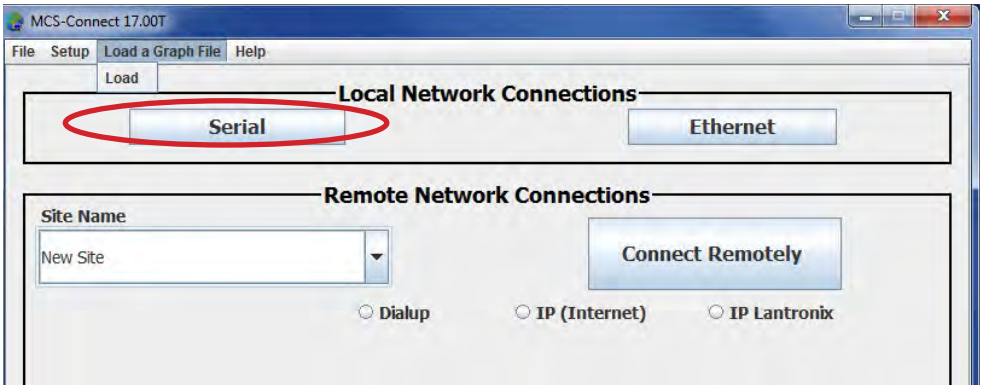


5. Click on Setup at the top menu tab in MCS-CONNECT

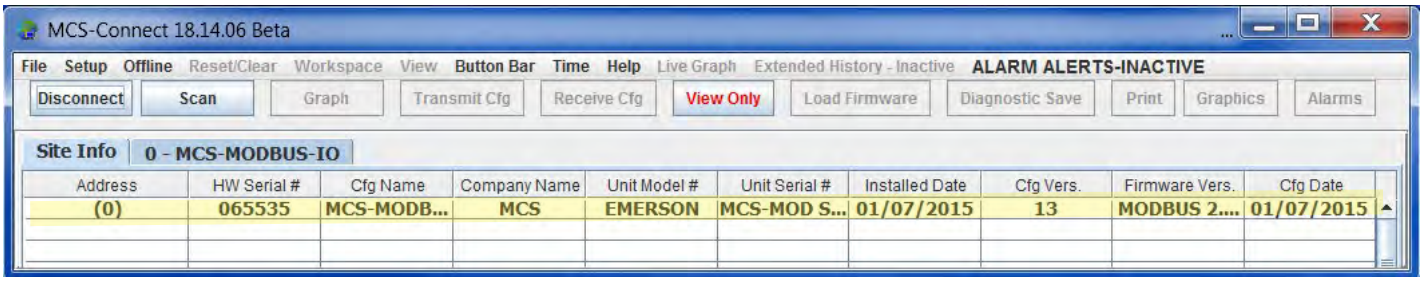


6. On the communication screen, ensure your LOCAL Comm COM Port Selection is set up to the correct port. Change the Baud Rate to 38400.
7. Click Save once you have made your changes.

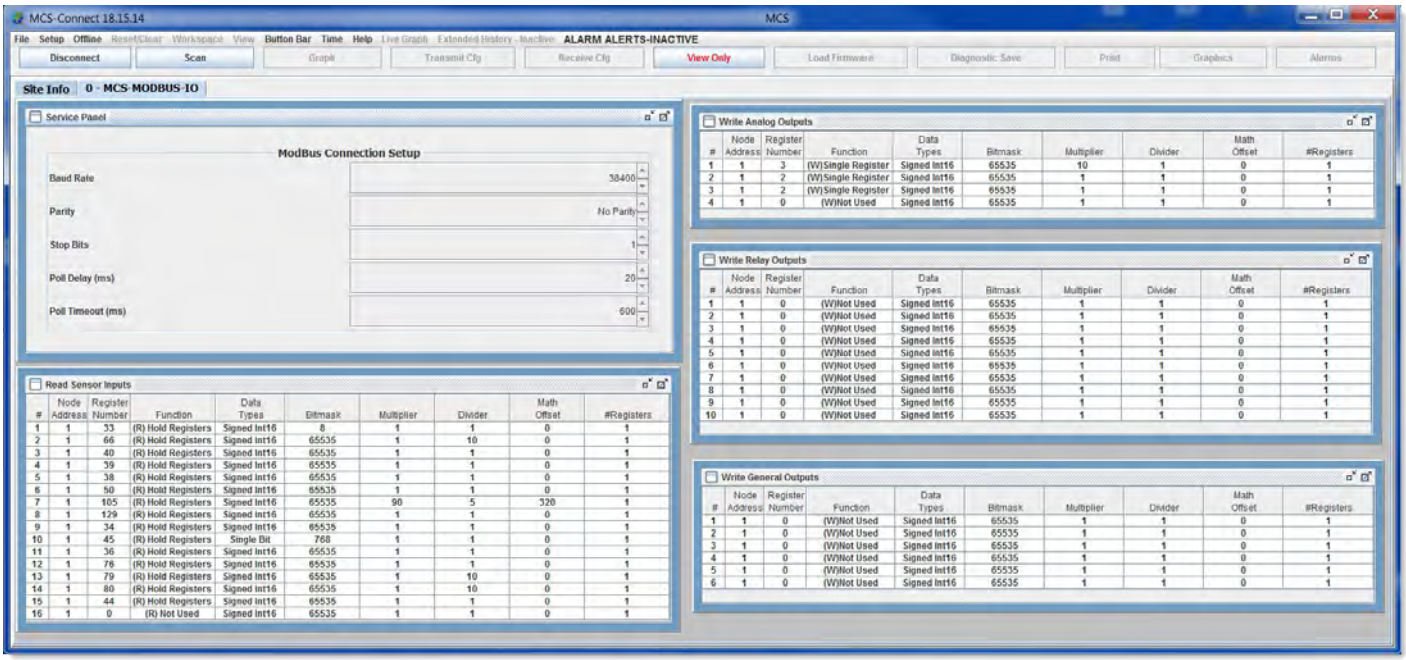
8. Back in the main screen, click Serial.



9. Once the MCS-MODBUS-IO shows up, click on the MCS-MODBUS-IO-12 unit.



10. Next Screen shows the Status of the MCS-MODBUS and its various Screens



Chapter - 3. Program Type Preprogram Select Settings

The MCS-MODBUS-IO-12 has pre-defined configurations that are field selectable via the PROGRAM TYPE dials, up to 99 different slave devices, ***one Modbus per slave***. Eleven (15 slave devices have been pre-programmed into the firmware for common slave devices as shown in the chart below. Number 17-99 are reserved for future use as we program them into the Modbus firmware.

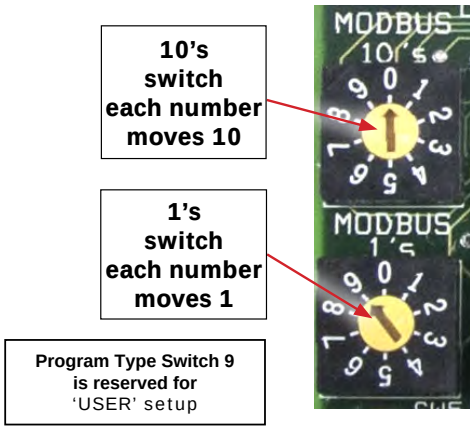
* **Number 9** has been set aside for **'USERS'** to setup custom configurations for slave devices that have not been pre-programmed.

To set the number '0' start with the bottom switch marked 'MODBUS 1's' and set the switch to '0'.

Example: to dial 11, set bottom switch marked 'MODBUS 1's to '1' and top switch marked 'MODBUS 10's' to '1'.

PROGRAM SELECT CHART

Firmware Ver. 3.01H	
PROGRAM SELECT	**CONFIGURATION NAME**
0	YASKAWA VFD A1000-HARDWIRED / MODBUS
1	TURBOCOR CMP
2	Reserved for future
3	DANFOSS VLT DRIVE
4	BITZER Compressor
5	DANFOSS CDS 303 DRIVE
6	EMERSON_CSD-100
7	MCS-POWERMETER 3037
8	RUKING_VFD
* 9	USER
10	ABB AC880
11	EMERSON EVC-1150B
12	SKF/MBC
13	KEB VFD
14	SKF/MBC - TANDEM
15	KEB VFD - TANDEM
16	ABB-ACH580
17-99	Reserved for Future Development



NOTE: PROGRAM SELECT '0' - YASKAWA VFD A1000

When setting up the Yaskawa A1000 if B1-02 on the Yaskawa A1000 is set to '1' the unit is 'HARDWIRED' to the MAGNUM.
If set to '2' the Yaskawa is using the MCS-MODBUS to communicate with the MAGNUM.

MCS YASKAWA AC DRIVE - A1000 SETTINGS

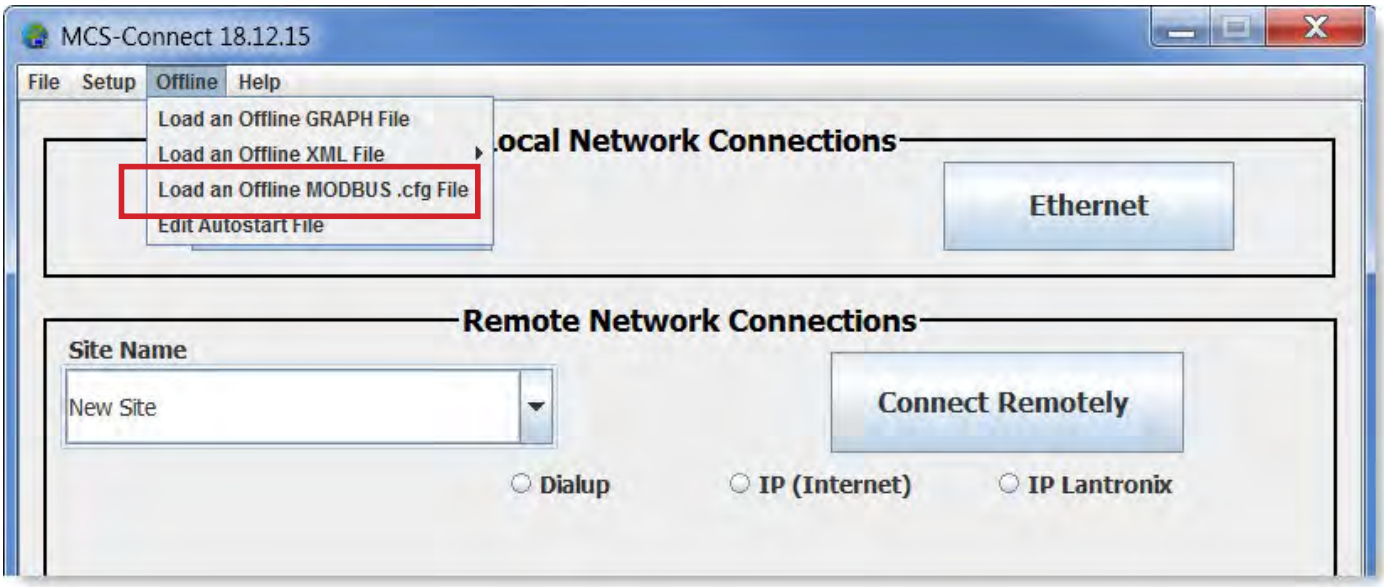
HANBELL(MODBUS)VFD SETTINGS

Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
A1000 Parameters & Values			Parameter Description	Comments
#	Value	Comments	Default values in parenthesis (xxxxxx)	YEA / Mfg / User
A1-02	0	V/f	"Control Method Select": 0=V/f; 1=V/f w/PG; 2=(Open Loop); 3=Closed Loop	
B1-01	2	Freq Ref Sel	Sets Modbus Communication Action - 1=Hardwired; 2=Modbus; 3=Option	
B1-02	2		"Run Cmd Select: 0=Operator; 1=Hardwired; 2=Modbus; 3=Option	RUN=Contact Closure at S1-SN

Chapter - 4. USER Custom Programming Switch '9'

4.1. SETTING UP CUSTOM PROGRAM FOR YOUR DEVICE

1. Set the **'PROGRAM SELECT SWITCH' to '9' on the MCS-MODBUS-IO-12.**
2. Start MCS-CONNECT version 18.00 or higher.
3. At the startup screen, Click on the 'OFFLINE' menu bar as shown below.
4. Click on 'Load an Offline MODBUS .cfg file that you created or was send to you for your device.
5. Search on your computer for your MODBUS .cfg file



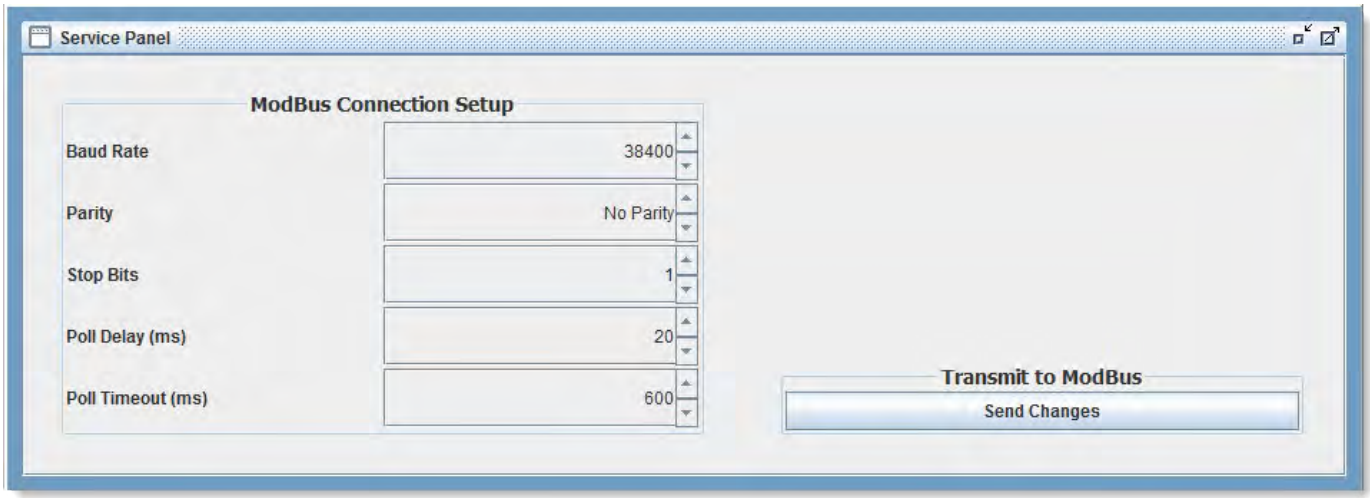
4.1.1 Data Input

When MSC-Connect opens, the screen will display the following five block windows:

The information concerning the 'Registers' that you want to read or write to comes from the manufacture of the slave device.

NOTE: Some manufactures show the number as a hex number: example 21H. When converted to a decimal number, it would be shown in MCS-CONNECT as 33 as the 'REGISTER NUMBER'.

4.1.2 Service Panel-MODBUS CONNECTION SETUP - MCS-CONNECT



This window block is to setup the MCS-MODBUS-IO-12 communication port parameters for the slave devices.

Refer to your slave device User Manual for details about the correct values to setup the communication port.

- **Baud Rate: In this field enter the Device communication Baud Rate.**
- **Parity bit: In this field enter the Device communication Parity Bit.**
- **Stop Bit: In this field enter the Device communication Stop Bit.**
- **Poll Delay (ms): This is for future use and is not yet implemented.**
- **Poll Timeout (ms): This is for future use and is not yet implemented.**

4.1.3 Read Sensor Inputs

This window block is to configure the following ModBus options:

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	33	(R) Hold Registers	Not Used	8	1	1	0	1
2	1	66	(R) Hold Registers	Not Used	65535	1	10	0	1
3	1	40	(R) Hold Registers	Not Used	65535	1	1	0	1
4	1	39	(R) Hold Registers	Not Used	65535	1	1	0	1
5	1	38	(R) Hold Registers	Not Used	65535	1	1	0	1
6	1	50	(R) Hold Registers	Not Used	65535	1	1	0	1
7	1	105	(R) Hold Registers	Not Used	65535	90	5	320	1
8	1	129	(R) Hold Registers	Not Used	65535	1	1	0	1
9	1	34	(R) Hold Registers	Not Used	65535	1	1	0	1
10	1	45	(R) Hold Registers	Single Bit	768	1	1	0	1
11	1	36	(R) Hold Registers	Not Used	65535	1	1	0	1
12	1	76	(R) Hold Registers	Not Used	65535	1	1	0	1
13	1	79	(R) Hold Registers	Not Used	65535	1	10	0	1
14	1	80	(R) Hold Registers	Not Used	65535	1	10	0	1
15	1	44	(R) Hold Registers	Not Used	65535	1	1	0	1
16	1	0	(R) Not Used	Not Used	65535	1	1	0	1

- **Node Address** (Slave Address): In this column enter the Device slave address that identifies the specific device in the network.
- **Register Number** (Data Address): In this column enter the register address that you need to read to.
- **Function** (Function Code): in this column you will find the following options:
  - Read Single Coil: Read Discrete Output Coils.
  - Read Single Register: Read Analog Output Holding Registers.
  - Read input Register: Read Analog Output Registers.
- **Data type:** In this column you will find the following options:

  Some devices support 32 bit floating point values that are encoded according to IEEE Standard 754. Those devices required two 16-bit addresses to hold a 32-bit float value. In this case it is also necessary to select 2 registers in the #Register column.
- **Bitmask** The Bitmask is used to easily check the state of individual bits regardless of the other bits.

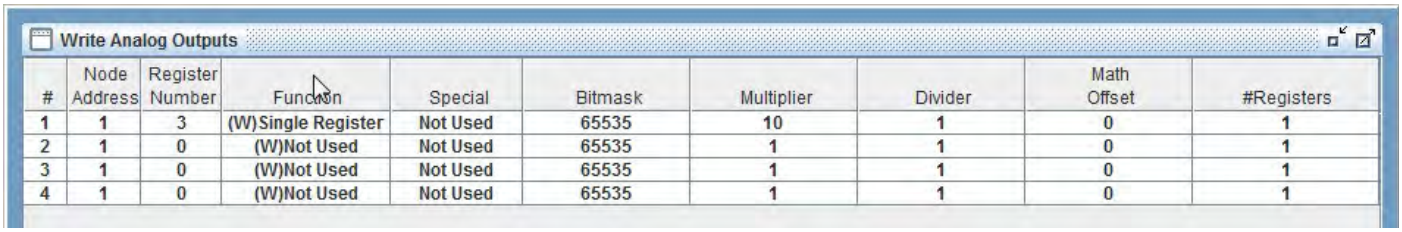
  Example: Let use the Drive Status (U1-12 Register) of the VFD YASKAWA AC Drive-A1000 HHP

No. (Addr. Hex)	Name	Description	Analog Output Level
U1-12 (4B)	Drive Status	All Modes Verifies the drive operation status. U1-12=00000000 1 During run 1 During zero-speed 1 During REV 1 During fault reset signal input 1 During speed agree 1 Drive ready 1 During alarm detection 1 During fault detection	No signal output available

In this example let say that we want to know if the Driver is running (bit 0), also we want to check for fault detection (bit 8). The bit mask in binary should look like this 10000001, this value has to be converted to hex to enter the value in the Bitmask column, so the value to be entered will be 0x81.

- **Multiplier:** This value is used to display the value with the decimal place moved to the right.
- **Divider:** This value is used to display the value with the decimal place moved to the left.
- **Math offset:** use this value if an offset is need to display the adjusted value.
- **#Register:** enter the number of consecutive registers that you want to read.

4.1.4 Write Analog Outputs



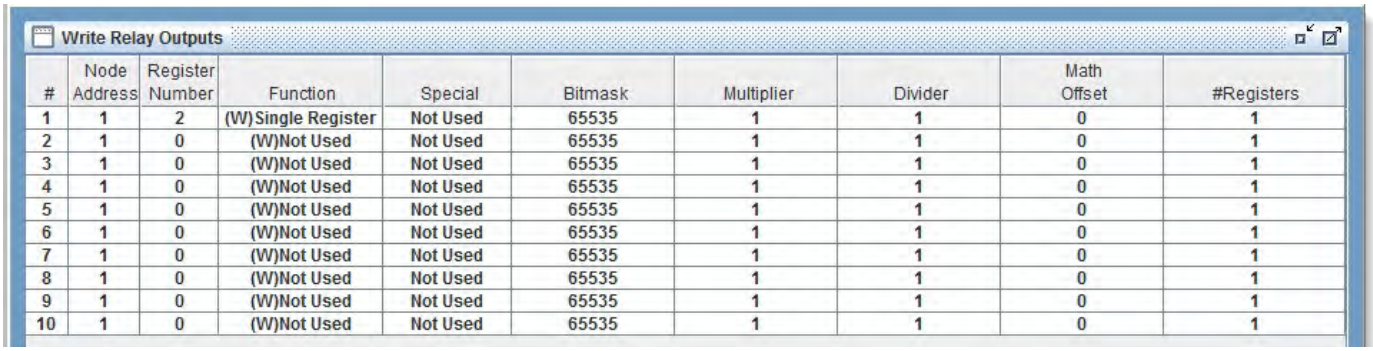
Write Analog Outputs

#	Node Address	Register Number	Function	Special	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	3	(W) Single Register	Not Used	65535	10	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1

This window block is to configure the following ModBus options:

- **Node Address** (Slave Address): In this column enter the Device slave address that identifies the specific device in the network.
- **Register Number** (Data Address): In this column enter the register address that you need to write to.
- **Function** (Function Code): in this column you will find the following options:
  - Write Single Register: Write Analog Output Holding Registers.
  - Write Multi Register: Write Analog Output Registers.
- **Data Type**: Not Available for Write Registers
- **Bitmask:** The Bitmask is used to easily change the state of individual bits regardless of the other bits.
- **Multiplier:** This value is used to display the value with the decimal place moved to the right
- **Divider:** This value is used to display the value with the decimal place moved to the left
- **Math offset:** use this value if an offset is need to display the adjusted value
- **#Register:** enter the number of consecutive registers that you want to write

4.1.5 Write Relay Outputs



Write Relay Outputs

#	Node Address	Register Number	Function	Special	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2	(W) Single Register	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1
5	1	0	(W)Not Used	Not Used	65535	1	1	0	1
6	1	0	(W)Not Used	Not Used	65535	1	1	0	1
7	1	0	(W)Not Used	Not Used	65535	1	1	0	1
8	1	0	(W)Not Used	Not Used	65535	1	1	0	1
9	1	0	(W)Not Used	Not Used	65535	1	1	0	1
10	1	0	(W)Not Used	Not Used	65535	1	1	0	1

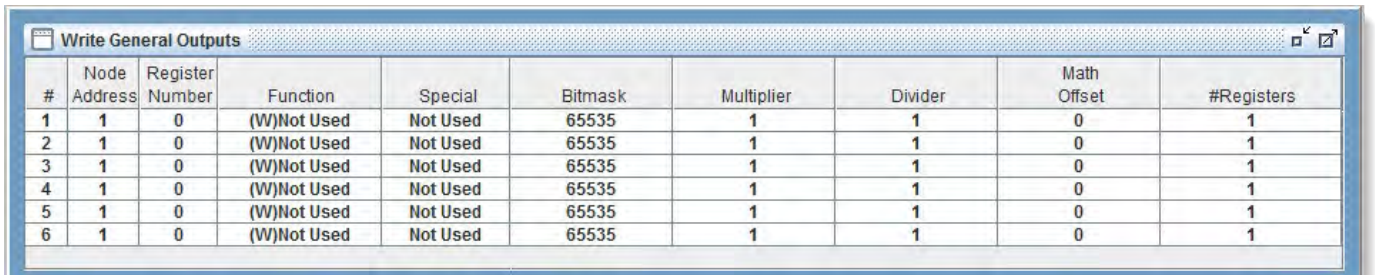
This window block is to configure the following ModBus options:

- **Node Address** (Slave Address): In this column enter the Device slave address that identifies the specific device on the network.
- **Register Number** (Data Address): In this column enter the register address that you need to write to.
- **Function** (Function Code): in this column you will find the following options:

- Write Single Coil: Write Analog Output Holding Registers.
- Write Multi Register: Write Analog Output Registers.

- **Data Type**: Not Available for Write Registers
- **Bitmask** The Bitmask is used to easily change the state of individual bits regardless of the other bits.
- **Multiplier:** This value is used to display the value with the decimal place moved to the right
- **Divider:** This value is used to display the value with the decimal place moved to the left
- **Math offset:** use this value if an offset is needed to display the adjusted value
- **#Register:** enter the number of consecutive registers that you want to write

4.1.6 Write General Outputs



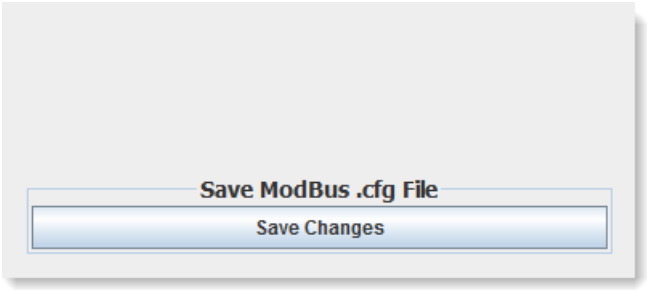
#	Node Address	Register Number	Function	Special	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1
5	1	0	(W)Not Used	Not Used	65535	1	1	0	1
6	1	0	(W)Not Used	Not Used	65535	1	1	0	1

This block window is for future use and is not yet implemented.

For more information about MODBUS communication refer to http://www.simplymodbus.ca

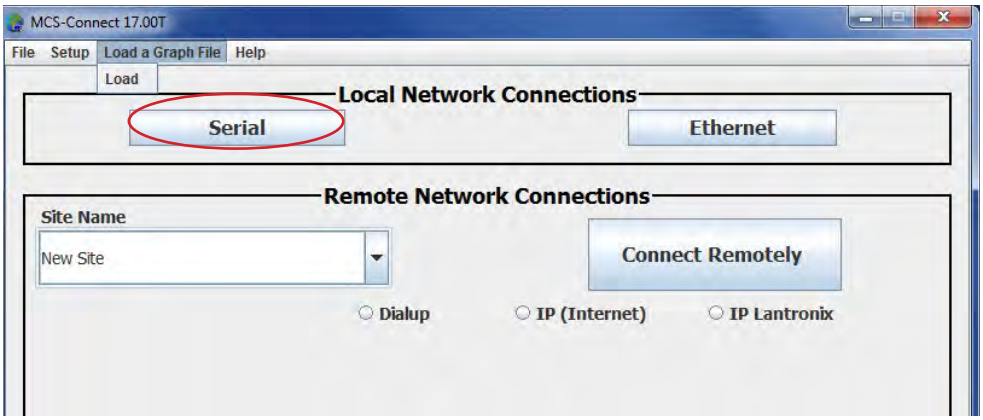
4.1.7 Once you have completed the 'USER CUSTOM SETUP'

Click **'SAVE CHANGES' which will save the MODBUS .cfg file to your computer hard drive.**

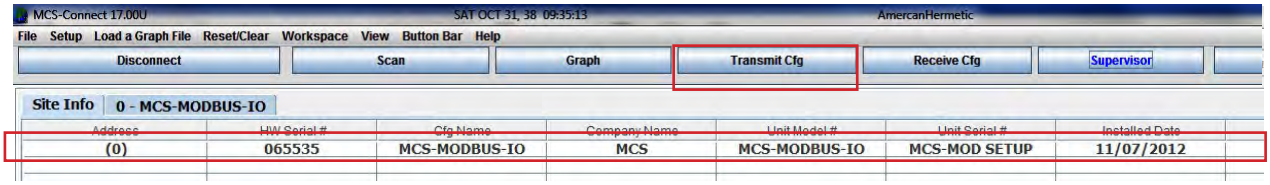


4.1.8 LOAD THE NEW .CFG FILE TO YOUR MODBUS

1. Back in the main screen, click Serial.
2. Scan for your MODBUS controller.



3. Once the MCS-MODBUS-IO loads, click on the MCS-MODBUS-IO-12 unit.



4. Click ‘TRANSMIT CFG’ to load your new config file for the ‘USER’ (9) setting on the MCS-MODBUS’
5. **IMPORTANT - Make sure you set your program select switch to the number ‘9’ position**.

Chapter - 5. MCS-MAGNUM - Modbus Typical Network

5.1. A typical network layout will consist of the MASTER and slaves.

Below is a diagram showing an MCS-MAGNUM (master) communicating with an MCS-RO-BASE/EXT, MCS-SI-BASE/EXT expansion boards, and two MCS-MODBUS-IO-12 Boards over the MCS I/O network.

The MCS-MODBUS-IO-12 performs like a MCS-RO10 and MCS-SI16-AO4 to the MCS-MAGNUM. This allows the MCS-MAGNUM to control 10 relays, 4 analog outputs and read 16 sensors.

The master, MCS-MAGNUM uses the MODBUS RTU protocol to communicate with the two slave devices, 'YASKAWA A1000' (pre-defined in MCS-Modbus #'0') and Danfoss VLT (pre-defined in MCS-Modbus #3) as shown in the example.

The MCS-MODBUS-IO-12 has configurations for these slave devices that are field selectable via the PROGRAM TYPE dial.

The MCS-MAGNUM is programed to check the pre-determined 'registers' of these slave devices and through the MCS-MODBUS can read and write to them.

MCS-MAGNUM

MCS I/0

MCS-MODBUS-IO-12
#2 (MCS-RO-BASE)
#2 (MCS-SI-BASE)
MCS I/0

MCS-RO-BASE #1

MCS I/0

YASKAWA
A1000 VFD

MCS-MODBUS-IO-12
#3 (MCS-RO-BASE)
#3 (MCS-SI-BASE)
MCS I/0

MCS-SI-BASE #1

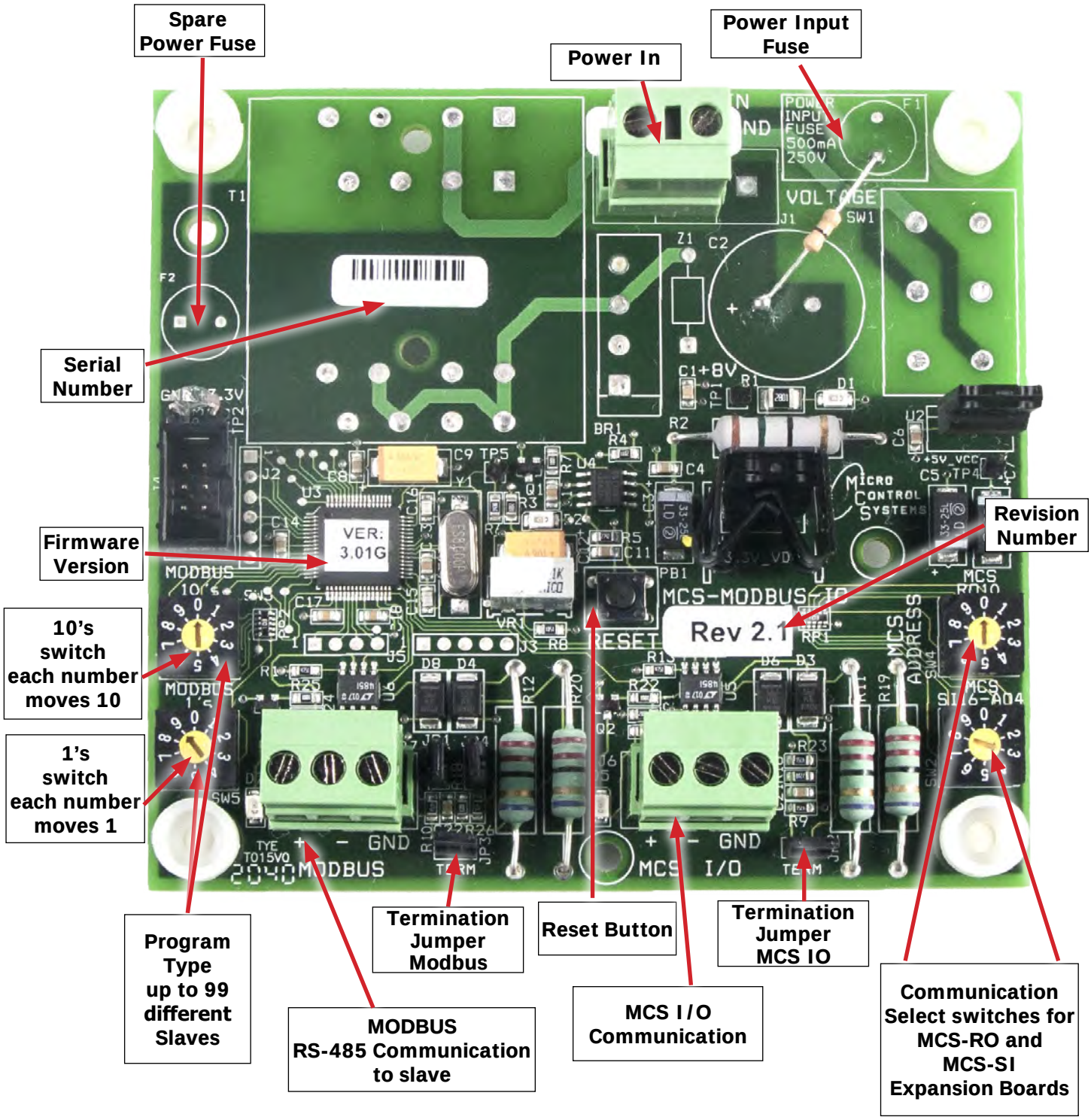
MCS I/0

DANFOSS
VLT

Chapter - 6. MCS-MODBUS-IO-12 BOARD

The **MCS-MODBUS-IO-12** gives the MCS-MAGNUM the ability to act as a Modbus Master using the Modbus RTU Protocol. This allows the **MCS-MAGNUM** to communicate to Modbus slave devices (such as Variable Frequency Drives, Compressors, etc.) to send and access parameters.

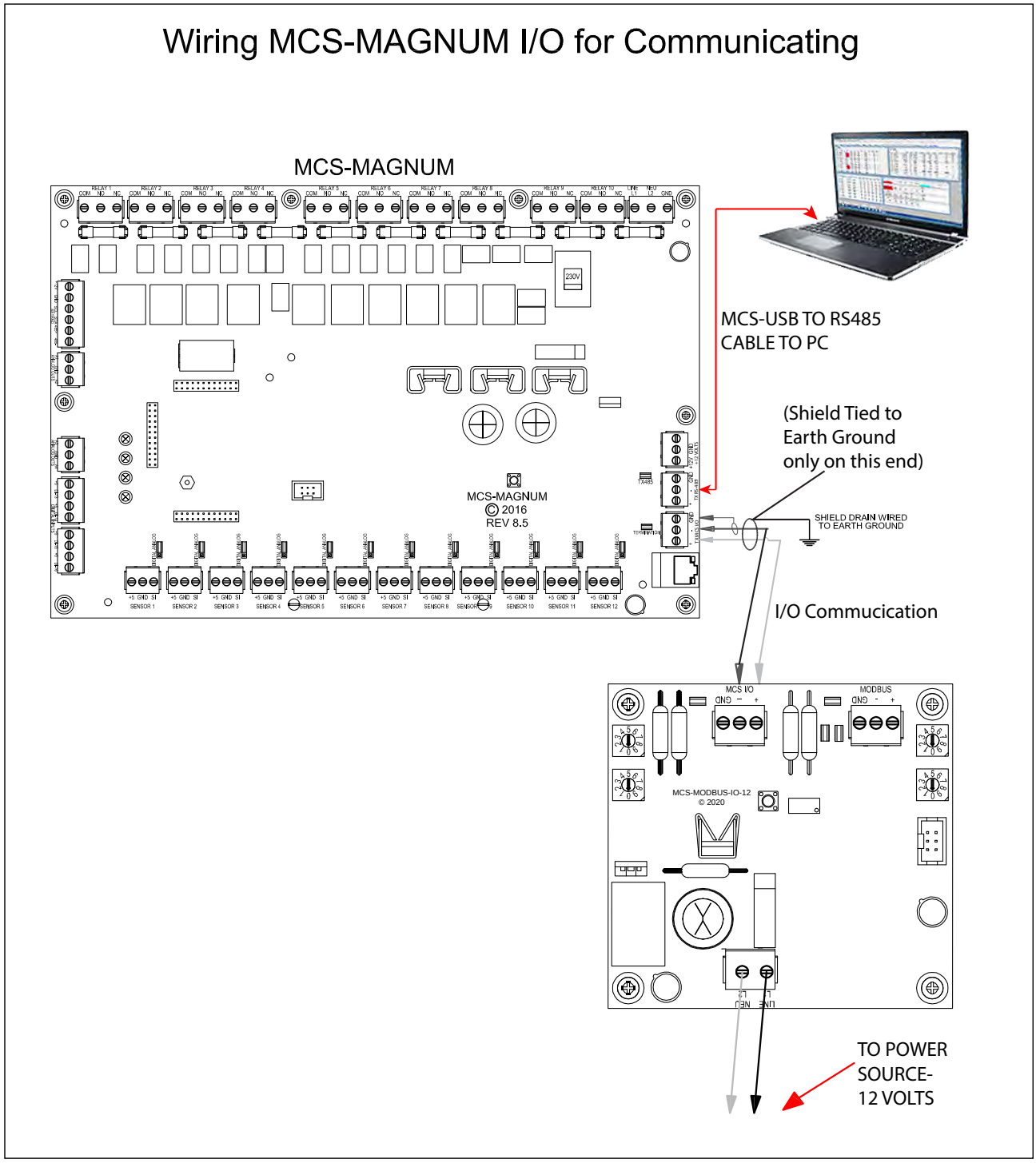
The MCS-MODBUS-IO-12 performs like a **MCS-RO** and **MCS-SI** to the MCS-MAGNUM. This allows the MCS-MAGNUM to control 10 relays, 4 analog outputs and read 16 sensors.



Chapter - 7. Wiring Diagrams

7.1. Wiring MCS-MAGNUM I/O for communicating

MCS-MAGNUM I/O Communication to MCS-MODBUS. Communicating from MCS-MAGNUM to PC using a MCS-USB-485 cable.

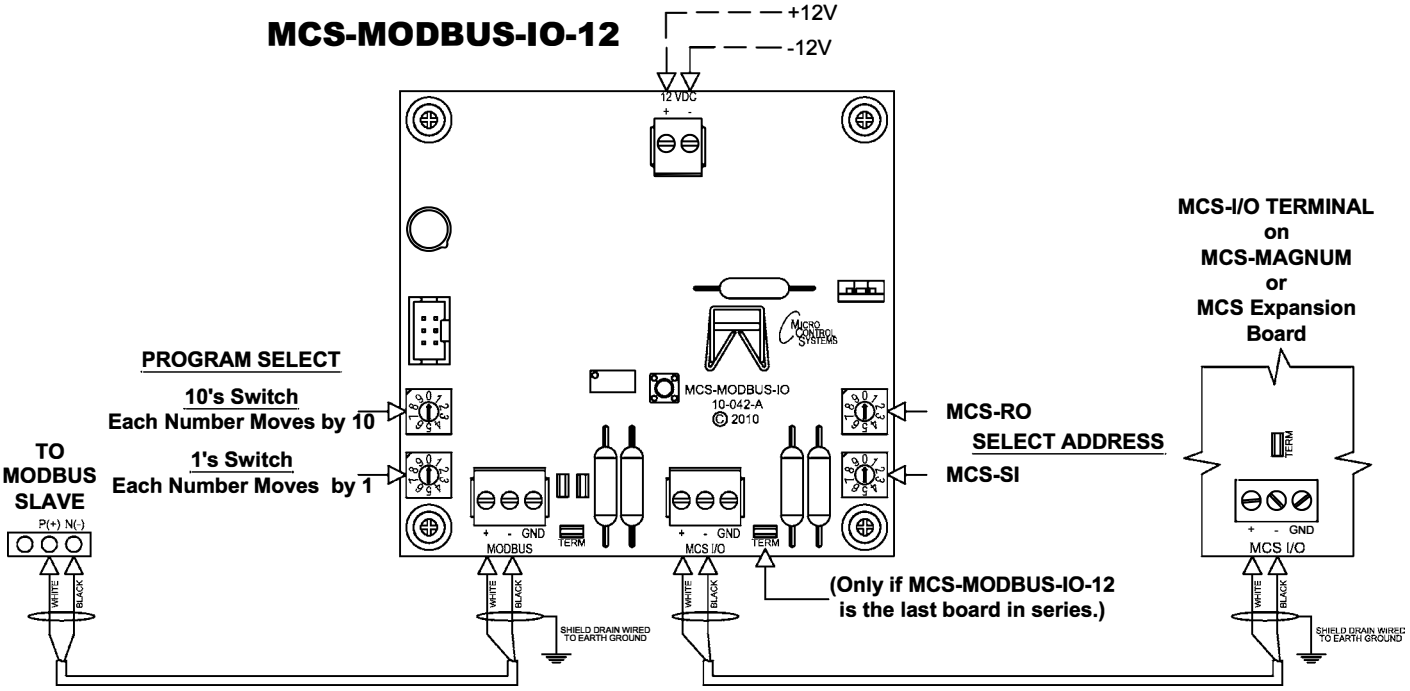


For communication to PC, use a MCS-USB-RS485 CABLE to USB port on PC.

7.2. Wiring to MCS-MAGNUM with MCS Expansion Board

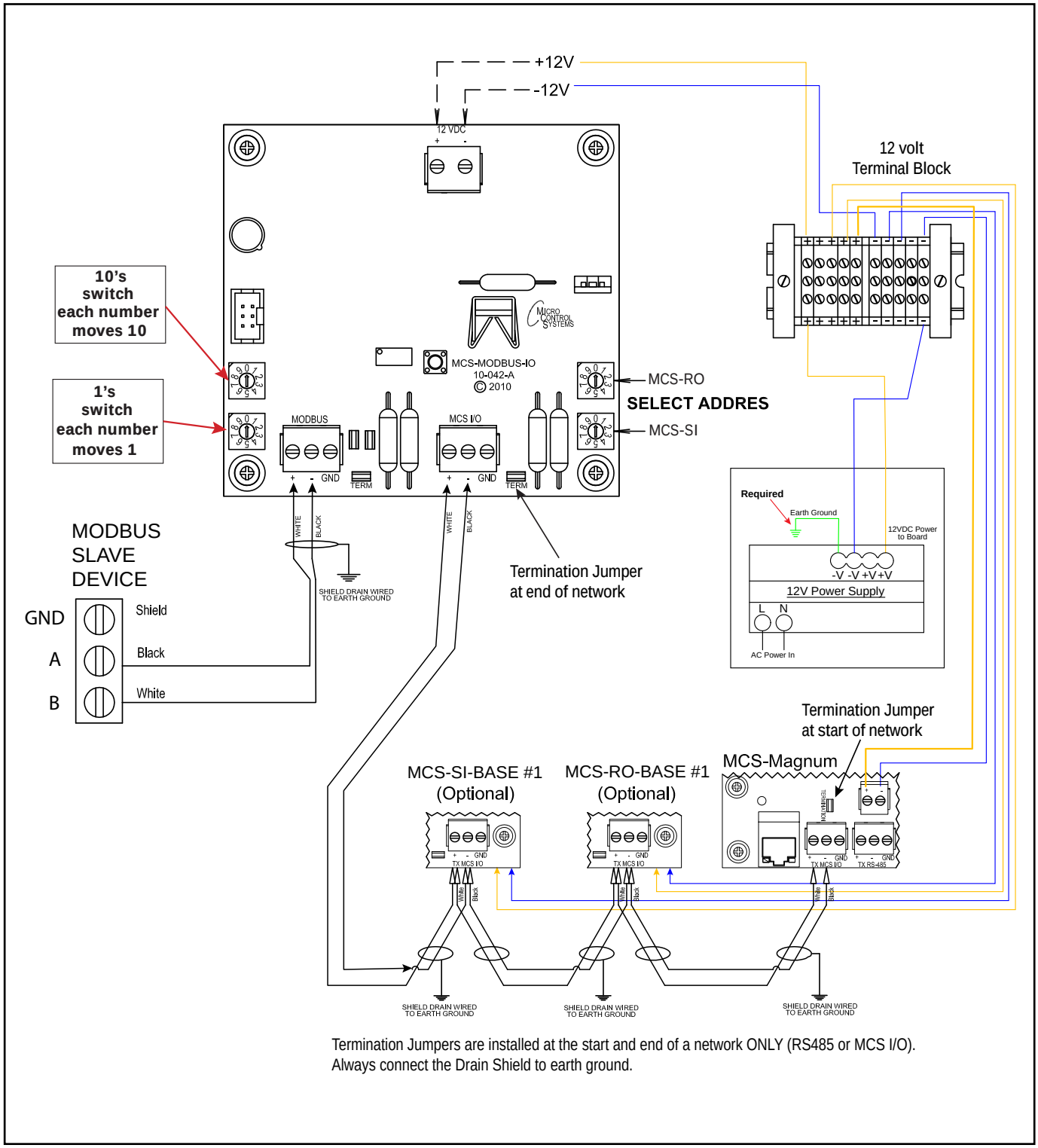
MCS-MODBUS-IO-12

To MCS-MAGNUM or MCS Expansion Board Wiring Diagram



Firmware Ver. 3.01H	
PROGRAM SELECT	CONFIGURATION NAME
0	YASKAWA VFD A1000-HARDWIRED / MODBUS
1	TURBOCOR CMP
2	Reserved for future
3	DANFOSS VLT DRIVE
4	BITZER Compressor
5	DANFOSS CDS 303 DRIVE
6	EMERSON_CSD-100
7	MCS-POWERMETER 3037
8	RUKING_VFD
9	USER
10	ABB AC880
11	EMERSON EVC-1150B
12	SKF/MBC
13	KEB VFD
14	SKF/MBC - TANDEM
15	KEB VFD - TANDEM
16	ABB-ACH580
17-99	Reserved for Future Development

7.3. Wiring from Power Supply, MCS Controller, MCS-Modbus, to Modbus Slave



Termination Jumpers are installed at the start and end of a network ONLY (RS485 or MCS I/O).
Always connect the Drain Shield to earth ground.

Chapter - 8. Pre-Programmed for Slave Devices

8.1. Yaskawa GA800/A1000 HARDWIRED Mapping Details (Hardwired and Modbus)

PROGRAM SELECT '0'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | 0 - MCS-MODBUS-IO

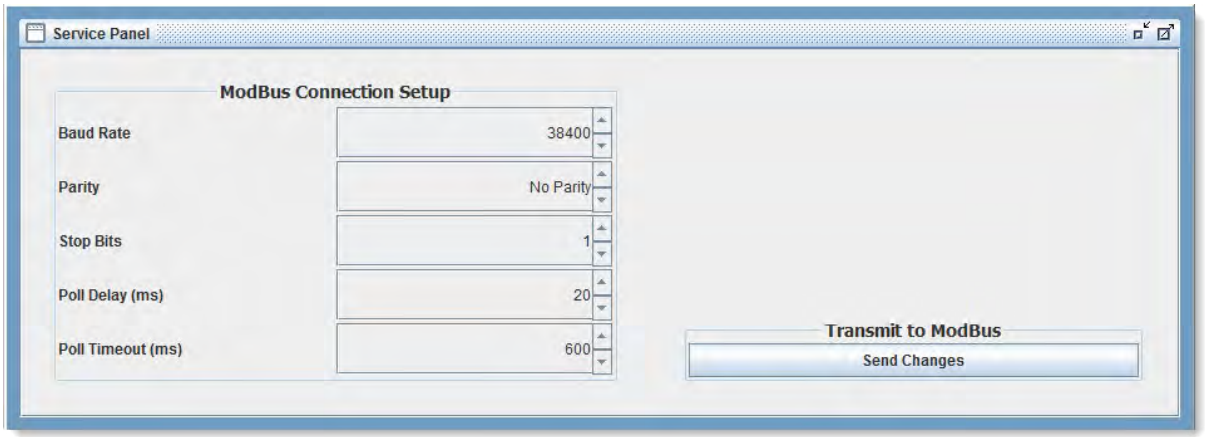
Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	MCS YASKAWA HW

8.1.1 Yaskawa GA/800/A1000 MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Special	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1
5	1	0	(W)Not Used	Not Used	65535	1	1	0	1
6	1	0	(W)Not Used	Not Used	65535	1	1	0	1

8.1.2 Yaskawa GA800/A1000 MCS-MODBUS Communication Setup



8.1.3 Yaskawa GAS800/A1000 MODBUS Read Sensor Inputs
15 Sensors pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	33	(R) Hold Registers	Not Used	8	1	1	0	1
2	1	66	(R) Hold Registers	Not Used	65535	1	10	0	1
3	1	40	(R) Hold Registers	Not Used	65535	1	1	0	1
4	1	39	(R) Hold Registers	Not Used	65535	1	1	0	1
5	1	38	(R) Hold Registers	Not Used	65535	1	1	0	1
6	1	50	(R) Hold Registers	Not Used	65535	1	1	0	1
7	1	105	(R) Hold Registers	Not Used	65535	90	5	320	1
8	1	129	(R) Hold Registers	Not Used	65535	1	1	0	1
9	1	34	(R) Hold Registers	Not Used	65535	1	1	0	1
10	1	45	(R) Hold Registers	Single Bit	768	1	1	0	1
11	1	36	(R) Hold Registers	Not Used	65535	1	1	0	1
12	1	76	(R) Hold Registers	Not Used	65535	1	1	0	1
13	1	79	(R) Hold Registers	Not Used	65535	1	10	0	1
14	1	80	(R) Hold Registers	Not Used	65535	1	10	0	1
15	1	44	(R) Hold Registers	Not Used	65535	1	1	0	1
16	1	0	(R) Not Used	Not Used	65535	1	1	0	1

8.1.4 Yaskawa GA800/A1000 MODBUS Write Analog Outputs
3 Analog Outputs pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	3	(W)Single Register	Signed Int16	65535	10	1	0	1
2	1	2	(W)Single Register	Signed Int16	65535	1	1	0	1
3	1	2	(W)Single Register	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.1.5 Yaskawa GA800/A1000 Write Relay Outputs
No Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

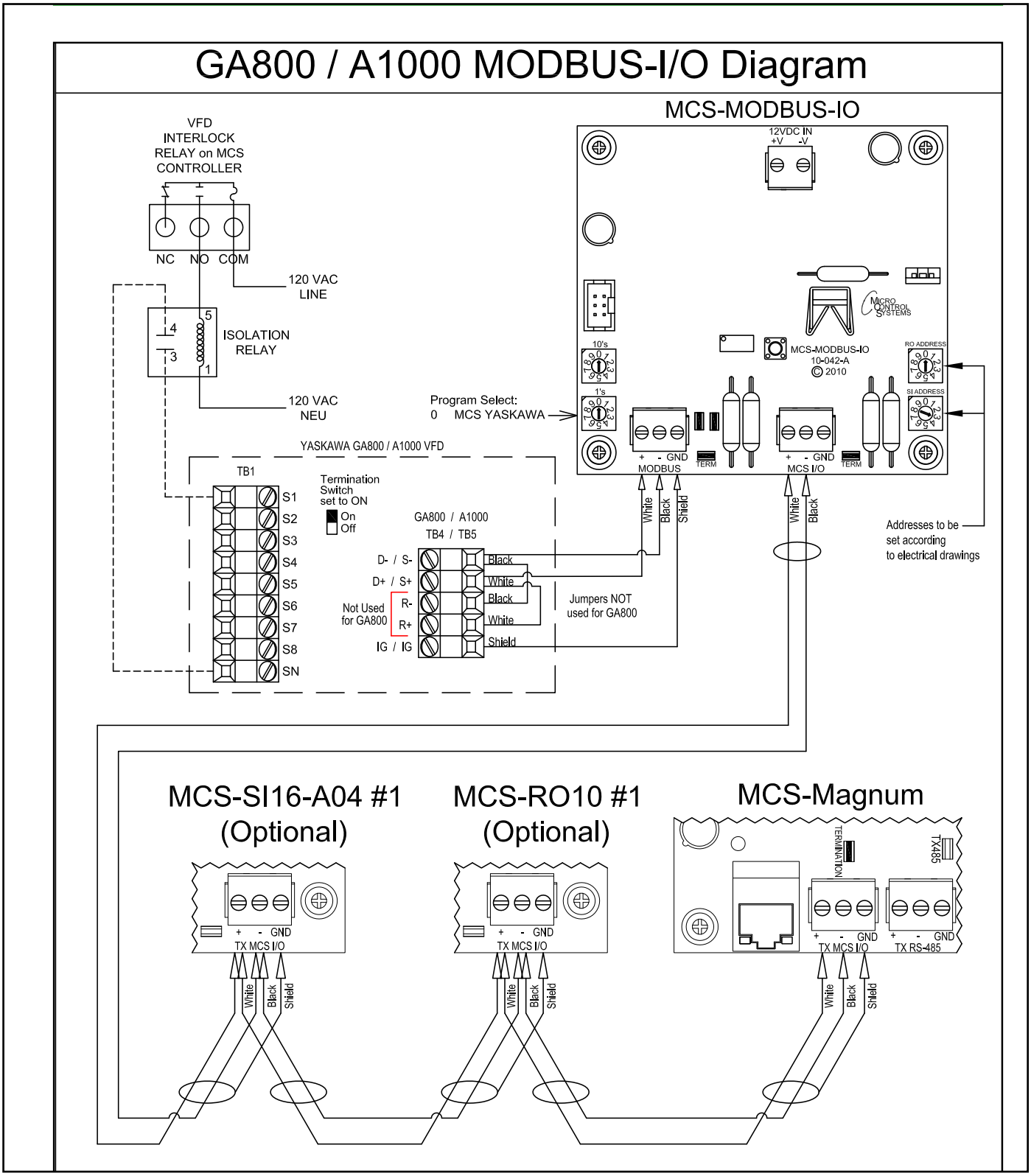
8.1.6 Yaskawa GA800 / A1000 Setup for MCS-Modbus I/0

Below are the parameters that can be setup using the Yaskawa A1000 communicating to the MCS-MODBUSI/O. See wiring for Yaskawa GA800/ A1000 to MCS-MODUBS next page.

Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
A1000 Parameters & Values			Parameter Description	Comments
#	Value	Comments	Default values in parenthesis (xxxxxx)	YEA / Mfg / User
A1-02	0	V/f	"Control Method Select": 0=V/f; 1=V/f w/PG; 2=(Open Loop); 3=Closed Loop	
B1-01	2	Freq Ref Sel	Sets Modbus Communication Action - 1=Hardwired; 2=Modbus; 3=Option	
B1-02	2		"Run Cmd Select: 0=Operator; 1=Hardwired; 2=Modbus; 3=Option	RUN=Contact Closure at S1-SN
B1-03	1		"Stop Method": 0=(Ramp); 1=Coast; 2=DC Inj; 3=Coast w/timer	
B1-04	1	Disable Rev	"Reverse Operation": 0=(Enabled); 1=Disabled	
B1-07	1	Accept Run	"Local/Remote Run": 0=(Cycle Ext Run); 1=Accept Ext Run	
B1-08	1	All Menus	"Run Cmd" Accepted: 0=(Only in Operation Menu); 1=All Menus	
B1-17	1	Accept Run	"Run Cmd at PowerUp": 0=(Cycle Ext Run); 1=Accept Run cmd	
C1-01	10		"Acceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)	
C1-02	10		"Deceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)	
C6-01	0		"Drive Duty Select": 0=Heavy Duty HD; 1=(Normal Duty ND)	
C6-02	1		"Carrier Frequency" selection. PM motor, default '2' = 5.0 kHz Heavy Duty performance, default '1' = 2.0 kHz Normal Duty performance, default '7' Swing PWM 1	
D2-02	35%		"Freq Ref Lower Limit": Default=0% (range=0.0 - 110% of Parm E1-04)	35% of E1-04 value
E1-01			"Input Voltage": Default= 230,460, 575 (range=depends on voltage class)	User must set "Input Voltage"
E1-05			MAXIMUM VOLTAGE 220 / 440	User must set motor voltage
E2-01			"Motor Rated FLA": Set per motor nameplate FLA	"Use MCC"
H1-01	25		Terminal S1 Interlock (N.C. always detected, coast to stop)	
* H4-02	50%		Terminal FM VDC output	Limit (50% = 5 VDC
H5-01	1	Drive Address	Sets the drive slave address used for communications	
H5-02	5	Comm Speed	Sets the Modbus communications speed	38400bps
H5-03	0	Parity Select	Sets the parity bit to no parity	
H5-04	1	1=Coast to Stop	Stopping Method After Communication Error	
L1-01	2	Inv Duty VT	"Motor Overload Protection": 0=Disabled; 1=(General); 2=Inv Duty VT	
L2-01	2	CPU Active	"Momentary Power Loss": 0=(Disabled); 1=L2-02; 2=Power restored CPU	
L5-01	0		"Number of Auto Restarts": Default=0 (range=0 - 10).	
O1-03	0		Sets the unit to display Hz for frequency reference and motor speed.	

*Factory default setting - 1F - Must be changed: Arrow to H5 01 - Arrow right till '01' I
Arrow right- change '1' to '0' and change 'F' to '1'

8.1.7 YASKAWA GA800 / A1000 MODBUS- I-0 Diagram

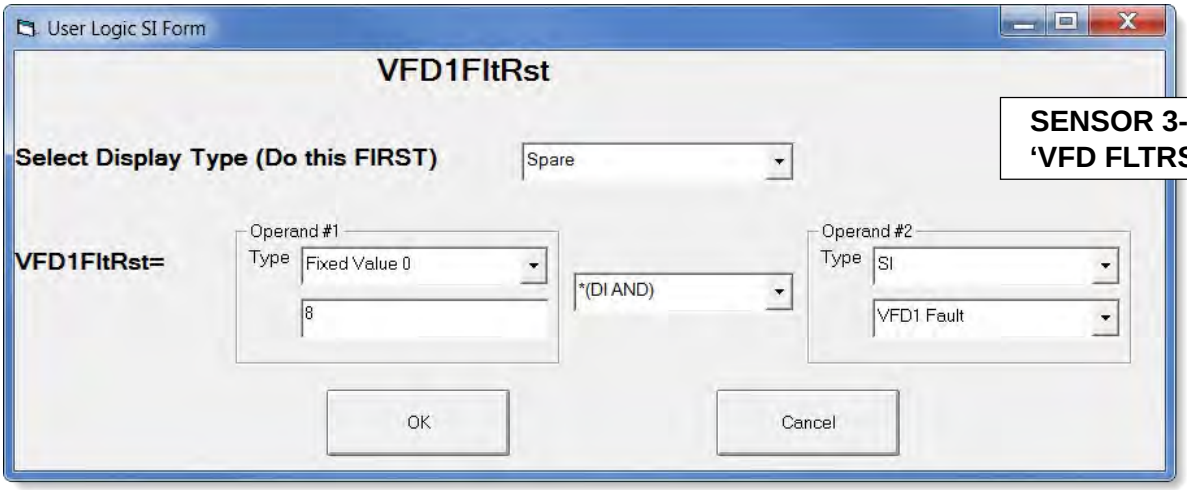


8.1.8 MCS-MAGNUM YASKAWA GA800/A1000 VFD SENSOR INPUT CONFIGURATION

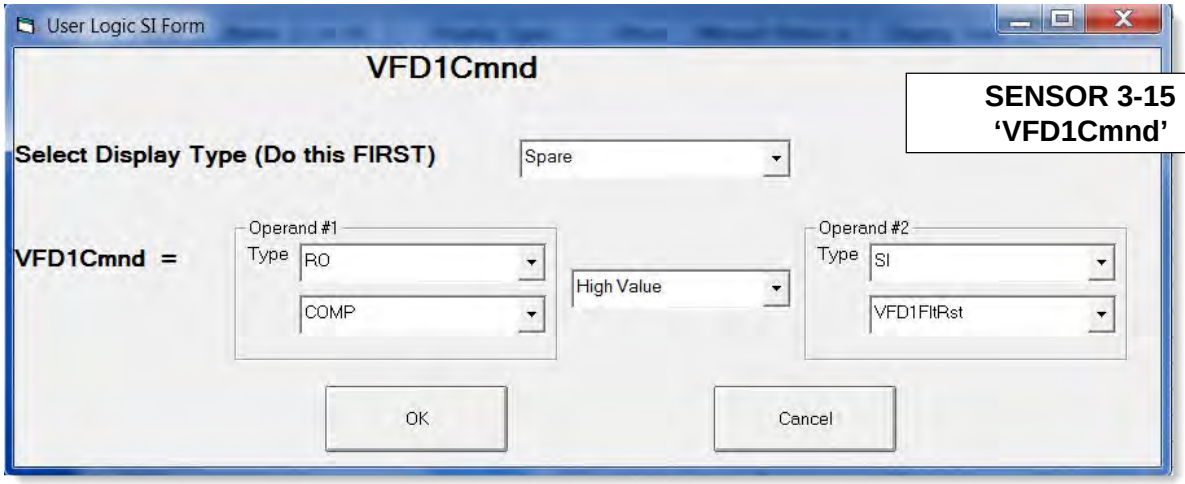
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
3-1	VFD1 Fault	MODBUS	Not Used	0	OFF/ON	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
3-2	VFD1 Load%	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	DEC1NOCH
3-3	VFD1 KW	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	KW
3-4	VFD1 Amps	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
3-5	VFD1 Volts	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec
3-6	VFD1DC Bus	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
3-7	VFD1 HSink	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	TEMP
3-8	VFD1FLT#	ModbusHex	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
3-9	VFD1 Local	MODBUS	Not Used	0	OFF/ON	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
3-10	Load%Ref 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	100	0	Spare
3-11	SPARE3-11	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-12	SPARE3-12	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-13	SPARE3-13	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-14	VFD1FltRst	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
3-15	VFD1Cmnd	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare

8.1.8.1. SENSOR INPUT - 2 USER LOGIC SCREENS (yellow)



SENSOR 3-14 'VFD FLTRST'



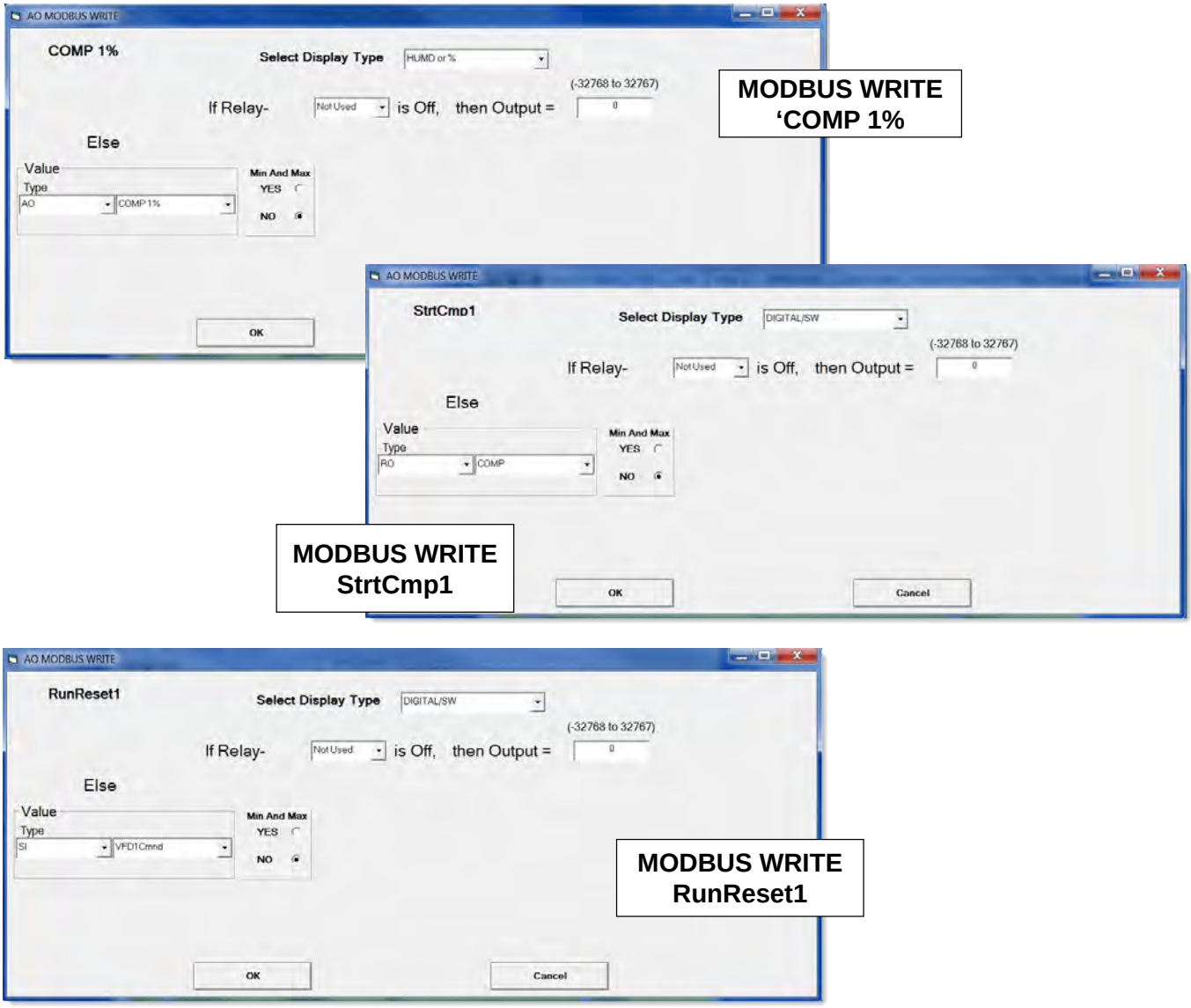
SENSOR 3-15 'VFD1Cmnd'

8.1.9 MCS-MAGNUM - YASKAWA GA800/A1000 VFD Analog Output CONFIGURATION

Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-4	SPAREM-4	Standard	NO		SPARE
1-1	SPARE1-1	Standard	NO		SPARE
1-2	SPARE1-2	Standard	NO		SPARE
1-3	SPARE1-3	Standard	NO		SPARE
1-4	SPARE1-4	Standard	NO		SPARE
2-1	SPARE2-1	Standard	NO		SPARE
2-2	SPARE2-2	Standard	NO		SPARE
2-3	SPARE2-3	Standard	NO		SPARE
2-4	SPARE2-4	Standard	NO		SPARE
3-1	COMP 1%	Modbus Write	NO		HUMD or %
3-2	StrtCmp1	Modbus Write	NO		DIGITAL/SW
3-3	RunReset1	Modbus Write	NO		DIGITAL/SW

Analog Output - 3 MODBUS WRITE SCREENS (yellow)



8.2. TURBOCOR Mapping - PROGRAM SELECT '1'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	TURBOCOR

8.2.1 TURBOCOR MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	57	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	38	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	39	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	40	(W)Not Used	Signed Int16	65535	1	1	0	1

8.2.2 TURBOCOR MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	No Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

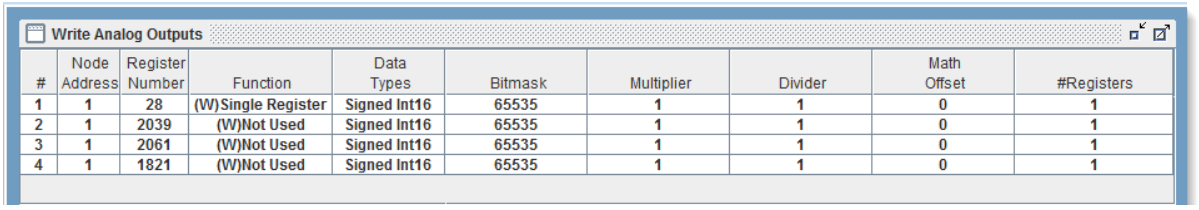
8.2.3 TURBOCOR MODBUS Read Sensor Inputs
13 Sensors Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	26	(R) Hold Registers	Signed Int16	65535	1	1	0	1
2	1	29	(R) Hold Registers	Signed Int16	65535	1	1	0	1
3	1	30	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	31	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	33	(R) Hold Registers	Signed Int16	65535	1	1	0	1
6	1	37	(R) Hold Registers	Signed Int16	65535	1	1	0	1
7	1	105	(R) Hold Registers	Signed Int16	65535	1	1	0	1
8	1	56	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	1	55	(R) Hold Registers	Signed Int16	65535	1	1	0	1
10	1	100	(R) Hold Registers	Signed Int16	65535	1	1	0	1
11	1	397	(R) Hold Registers	Signed Int16	65535	1	1	0	1
12	1	23	(R) Hold Registers	Signed Int16	65535	1	1	0	1
13	1	233	(R) Hold Registers	Signed Int16	65535	1	1	0	1
14	1	98	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	106	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	107	(R) Not Used	Signed Int16	65535	1	1	0	1

8.2.4 TURBOCOR MODBUS Write Analog Outputs

1 pre-programmed Analog Outputs available.

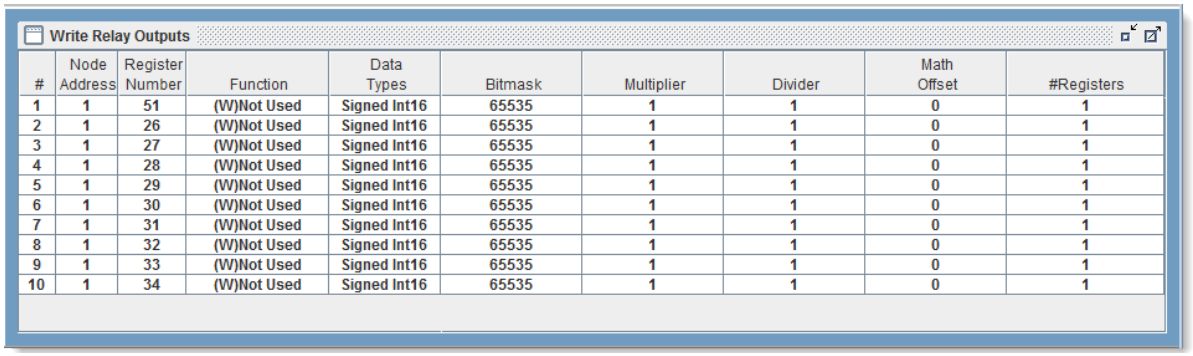


Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	28	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	2039	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	2061	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	1821	(W)Not Used	Signed Int16	65535	1	1	0	1

8.2.5 TURBOCOR Write Relay Outputs

No Relay Outputs have been pre-programmed.



Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	51	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	26	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	27	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	28	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	30	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	31	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	32	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	33	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	34	(W)Not Used	Signed Int16	65535	1	1	0	1

8.2.6 TURBOCOR Setup for MCS-Modbus I/0

Below are the parameters that can be setup using the Turbocor communicating to the MCS-MODBUSI/O.

See wiring for Turbocor to MCS-MODBUS next page.

The **Service Monitoring Tools Software** communicates with the compressor via the using the RS-432 connection at the Compressor I/O Board.

Communication requires a MCS-USB-RS432 cable for the computer.

JUMPER	FUNCTION AND SETUP
JP2	**Modbus termination jumper: install the jumper if Modbus is used and if the Modbus connection is at the end of a run**

8.2.6.1. How to Establish Communication

Data communication between a PC and the compressor I/O board can be established via a RS-432 cable connection using the **Service Monitoring Tool Software.**

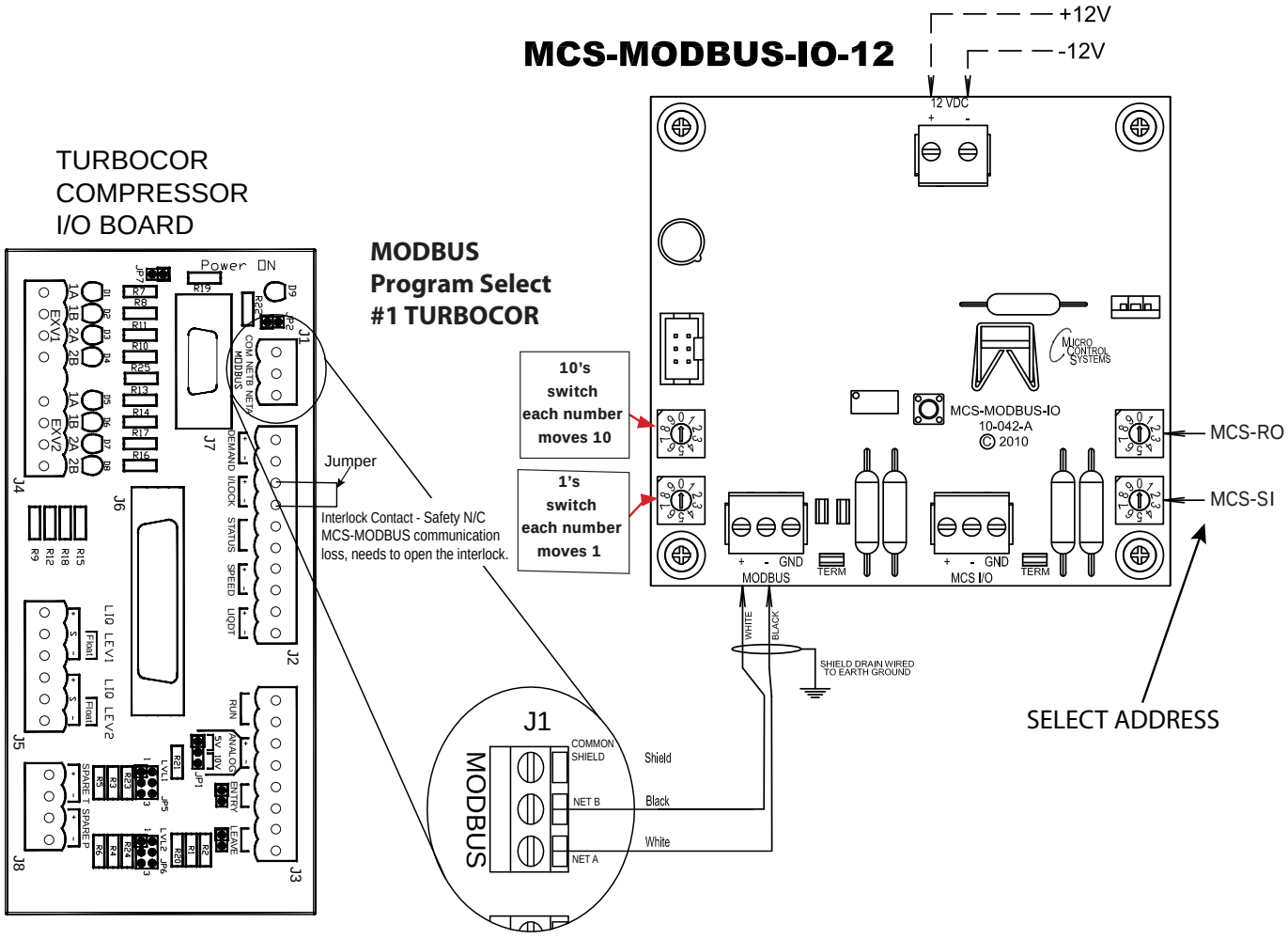
RS-485 Data Communication

Setup the correct parameters for communicating with the MCS-MODBUS-IO-12:

1. Communication PROTOCOL with the compressor via RS485 using Modbus (RTU).
2. The Turbocor is connected using a 2-wire connector on J1 (communication port).
3. The termination should be set as per the drawing on the next page.
4. MODBUS RS-485 ADDRESS: **1**
5. RS-485 BAUD RATE: **38400**
6. NUMBER OF STOP BITS: **1**
7. PARITY: **NO**

8.2.7 TurboCor Wiring Diagram - to Modbus
MCS Expansion Boards/MCS-MAGNUM

Wiring from MCS-MODBUS-IO-12 to TurboCor Compressor I/O Board



8.2.8 MCS-MAGNUM TURBOCOR Sensor Inputs **(13) Configuration**

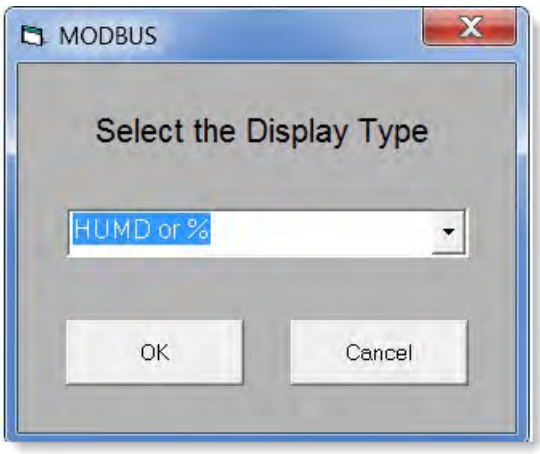
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	CmpFault 1	TurboCorFault	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	1	Not Used	Not Used	Not Used	Not Used
1-2	Ctrl Mode1	ModbusHex	Not Used	Closed=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
1-3	IgvOpen%1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	HUMD or %
1-4	SuctPsi 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	-14.7	PSI GAGE
1-5	DiscPsi 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	-14.7	PSI GAGE
1-6	CavityTmp1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	5	9	-273.1	TEMP
1-7	InvertTmp1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	5	9	-273.1	TEMP
1-8	ChokSpeed1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	RPM'S
1-9	SurgSpeed1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	RPM'S
1-10	ActSpeed1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	RPM'S
1-11	ComPSIRat1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	DEC2NOCH
1-12	CmpAmps1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	0.1	0	AMPS/CT
1-13	M Igv1Stps	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-14	CmpKW 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	KW

8.2.9 **MCS-MAGNUM TURBOCOR Analog Inputs (1) Configuration**

Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	EXV 1&2%	Standard	YES		SPARE
M-2	SubClr EXV	Standard	NO		SPARE
M-3	SPAREM-3	Standard	NO		SPARE
M-4	SPAREM-4	Standard	NO		SPARE
1-1	DEMAND% 1	Modbus	NO		HUMD or %
1-2	SPARE1-2	Standard	NO		SPARE
1-3	SPARE1-3	Standard	NO		SPARE
1-4	SPARE1-4	Standard	NO		SPARE
2-1	DEMAND% 2	Modbus	NO		HUMD or %



8.3. DANFOSS VLT FC102 Mapping - PROGRAM SELECT '3'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	DANFOSS VLT

8.3.1 DANFOSS VLT FC102 MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	57	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	38	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	39	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	40	(W)Not Used	Signed Int16	65535	1	1	0	1

8.3.2 DANFOSS VLT FC102 MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	No Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

8.3.3 DANFOSS VLT FC102 MODBUS Read Sensor Inputs
15 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	16710	(R) Hold Registers	Single Bit	16	1	1	0	1
2	1	16710	(R) Hold Registers	Single Bit	8	1	1	0	1
3	1	16030	(R) Hold Registers	Single Bit	512	1	1	0	1
4	1	16030	(R) Hold Registers	Single Bit	2048	1	1	0	1
5	1	16900	(R) Hold Registers	High Byte	65535	1	1	0	2
6	1	16900	(R) Hold Registers	Low Byte	65535	1	1	0	2
7	1	15010	(R) Hold Registers	Signed Int16	65535	1	100	0	2
8	1	15020	(R) Hold Registers	Signed Int16	65535	1	1000	0	2
9	1	16100	(R) Hold Registers	Signed Int16	65535	1	1	0	2
10	1	16120	(R) Hold Registers	Signed Int16	65535	1	1	0	1
11	1	16130	(R) Hold Registers	Signed Int16	65535	1	1	0	1
12	1	16140	(R) Hold Registers	Signed Int16	65535	1	10	0	2
13	1	16170	(R) Hold Registers	Signed Int16	65535	1	1	0	2
14	1	16300	(R) Hold Registers	Signed Int16	65535	1	1	0	1
15	1	16340	(R) Hold Registers	Signed Int16	65535	1	1	0	1
16	1	16340	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.3.4 DANFOSS VLT FC102 Analog Outputs

3 Analog Outputs pre-programmed in software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2811	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	3020	(W)Multi. Registers	Signed Int16	65535	100	1	0	2
3	1	3030	(W)Multi. Registers	Signed Int16	65535	100	1	0	2
4	1	1821	(W)Not Used	Signed Int16	65535	1	1	0	1

8.3.5 DANFOSS VLT FC102 Relay Outputs

1 Relay Output pre-programmed in software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2810	(W)Single Register	Signed Int16	65535	8	1	1140	1
2	1	2810	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	27	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	28	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	30	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	31	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	32	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	33	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	34	(W)Not Used	Signed Int16	65535	1	1	0	1

8.3.6 DANFOSS VLT FC102 Setup for MCS-Modbus I0

Below are the parameters that must be setup to physically establish and configure communication between the Danfoss FC Series and a controller using the MCS-MODBUS-IO-12.

See wiring for Danfoss VLT FC102 to MCS-MODBUS next page.

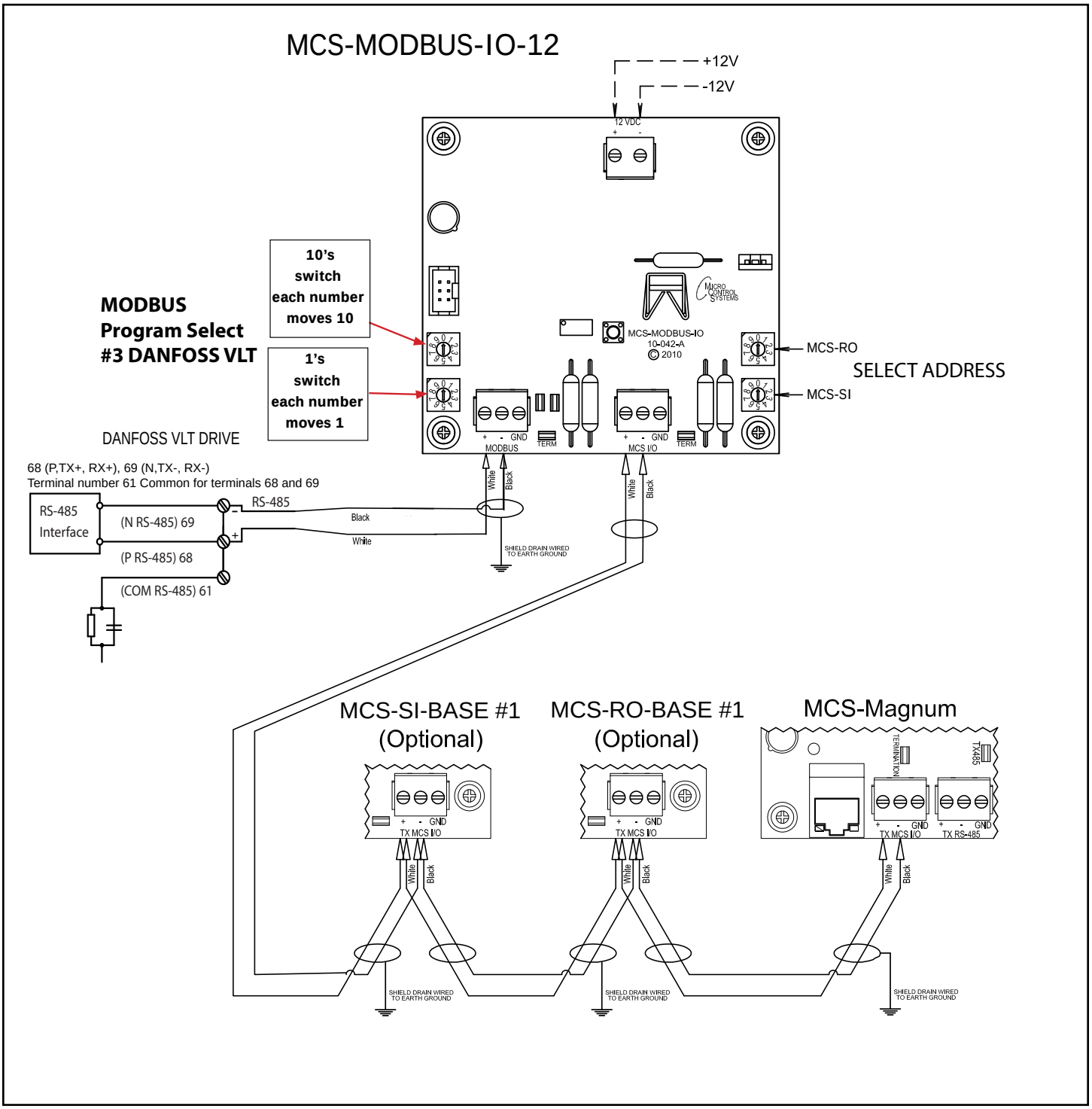
PARAMETER DESCRIPTION	VFD PARAMETER # FC102	SETTING DESCRIPTION	SETTING VALUE
Control Site	8-01	Control Word Only	2
Protocol	8-30	Modbus RTU	2
Address	8-31		1
Baud Rate	8-32	38400	4
Parity / Stop Bits	8-33	No Parity / 1 Stopbit	2

Reference Function	3-04	External / Preset	1
Reference 1 Source	3-15	No Function	0
Reference 2 Source	3-16	No Function	0
Relay 1	5-40	Running	5
Relay 2	5-40	Alarm / Warning	10
Control Source	8-02	FC Port	1
Reset Mode	14-20	Infinite Auto Reset	13
Automatic Restart Time	14.21	Seconds	Default 10

8.3.7 DANFOSS VLT FC102 Wiring Diagram - To Modbus/MCS Expansion Boards/MCS-MAGNUM

IMPORTANT

Use terminal 37 as input for safe stop. In rare cases, control cables more than 100 m (330 ft) and analog signals result in 50/60 Hz earth loops due to noise from mains supply cables. If this situation occurs, break the screen or insert a 100 nF capacitor between screen and chassis. Connect the digital and analog in- and outputs separately to the frequency converter common inputs (terminal 20, 55, 39) to avoid earth currents affecting the system.

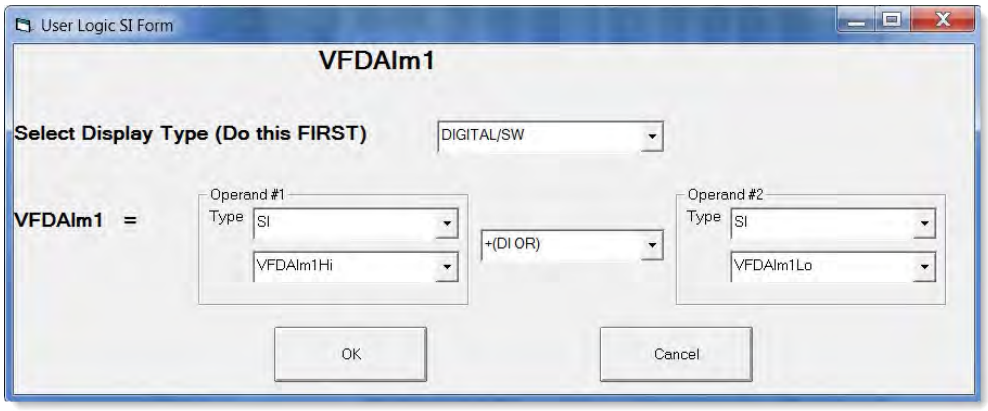


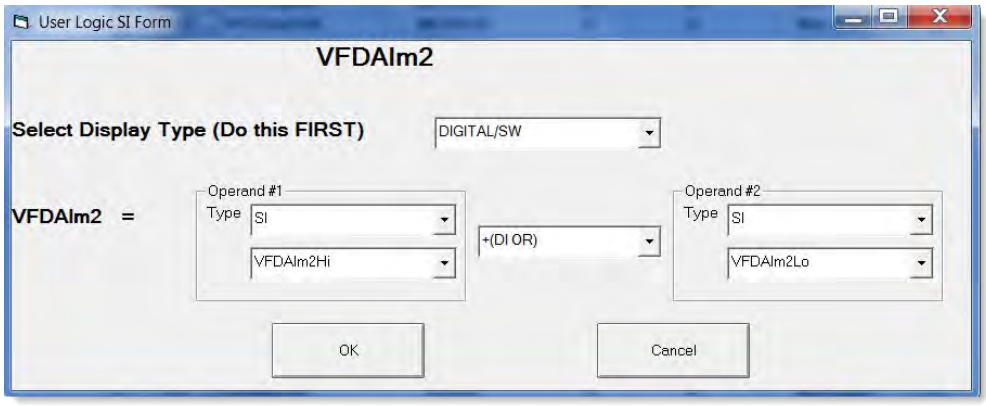
8.3.8 MCS-MAGNUM - Danfoss VLT FC102 -Sensor Input (15) Configuration

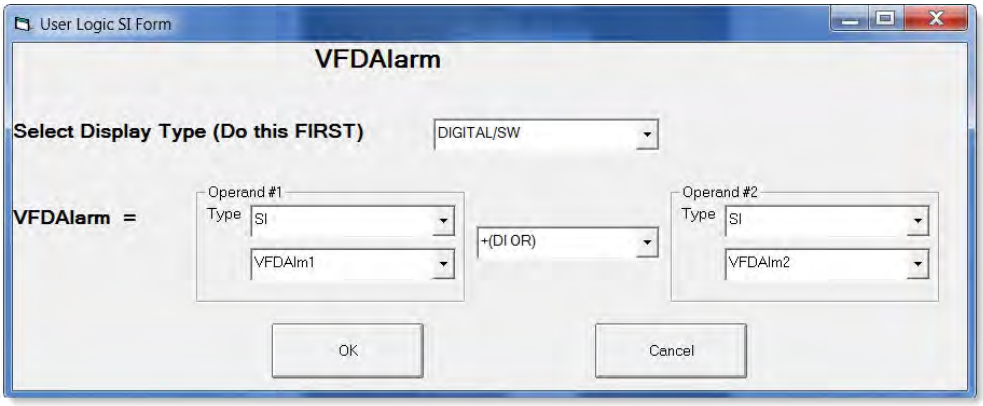
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1 ...	TripStatus	MODBUS	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto ...	Not Used	1	1	0	DIGITAL/SW
1-2 ...	RunStatus	MODBUS	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto ...	Not Used	1	1	0	DIGITAL/SW
1-3 ...	AutoCntrl	MODBUS	Not Used	Open=OFF	STOP/RUN	Not Used	Not Used	Auto ...	Not Used	1	1	0	DIGITAL/SW
1-4 ...	OperStatus	MODBUS	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto ...	Not Used	1	1	0	DIGITAL/SW
1-5 ...	AlarmHi	DanFltHi	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto ...	Not Used	Not Used	Not Used	Not Used	Not Used
1-6 ...	AlarmLo	DanFltLo	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto ...	Not Used	Not Used	Not Used	Not Used	Not Used
1-7 ...	100RunHrs	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	1	1	0	HOURS
1-8 ...	MWhCounter	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	1	1	0	Spare
1-9 ...	Power(KW)	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	1	10	0	DEC1NOCH
1-10 ...	MtrVoltage	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	1	1	0	VOLTS-1Dec
1-11 ...	Frequency	MODBUS	0	60	Not Used	Not Used	Not Used	Auto ...	Not Used	1	1	0	DEC1NOCH
1-12 ...	MtrAmps	MODBUS	0	55	Not Used	Not Used	Not Used	Auto ...	Not Used	10	10	0	DEC1NOCH
1-13 ...	MtrRPM	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	1	10	0	RPM'S
1-14 ...	DCVoltage	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	10	10	0	VOLTS-0Dec
1-15 ...	HeatSnkTmp	MODBUS	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	9	0.5	32	TEMP
1-16 ...	SPARE1-16	SPARE	0	0	Not Used	Not Used	Not Used	Auto ...	Not Used	Not Used	Not Used	Not Used	Not Used

8.3.9 Sensor Input (2) VFD Alarm Logic



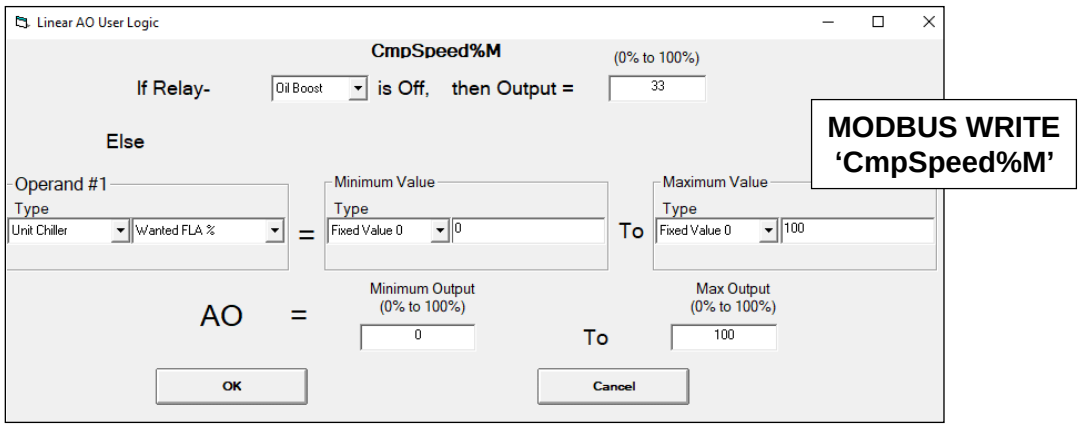




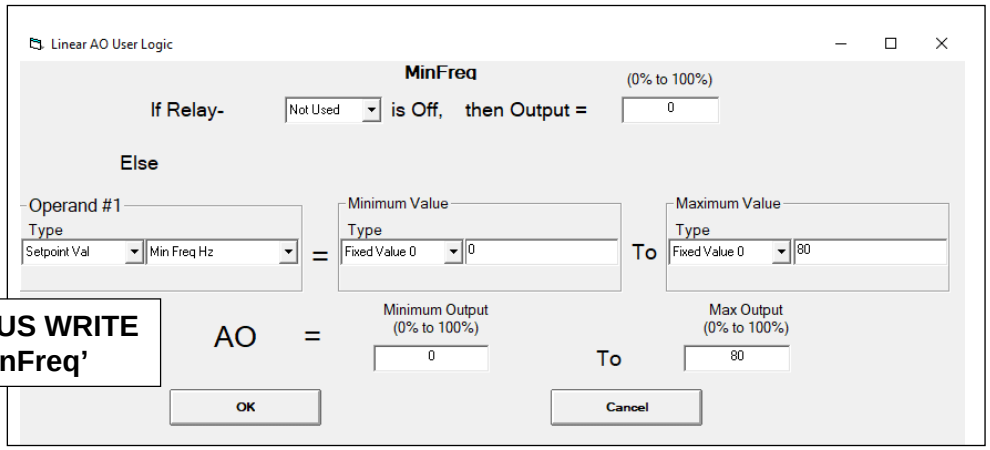
8.3.10 MCS-MAGNUM - DANFOSS VLT FC102 Analog Output (3) Configuration

Analog Output Information Screen

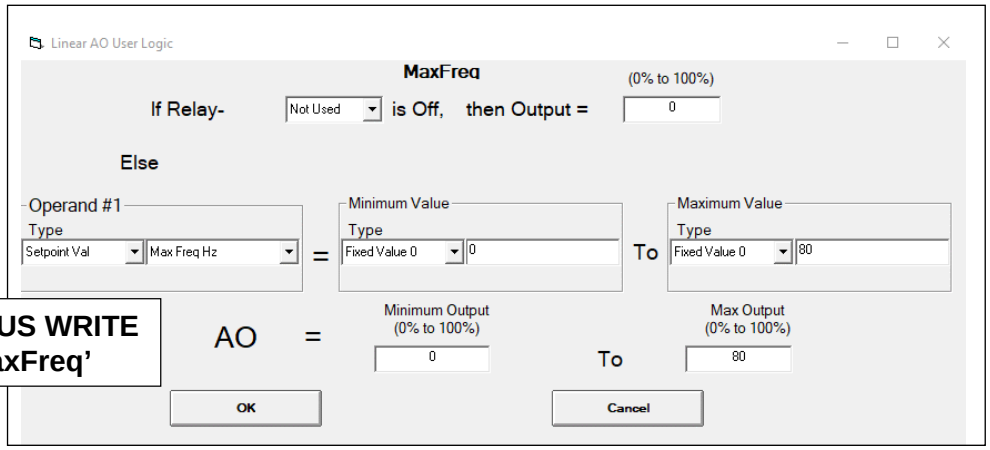
	Point Number	Name	Control Type	Invert	Comments	Modbus Display Type	Feedback Sensor
	1-1 ...	CmpSpeed%M	Linear/Modbus	NO	...	Spare	Not Used
	1-2 ...	MinFreq	Linear/Modbus	NO	...	Spare	Not Used
	1-3 ...	MaxFreq	Linear/Modbus	NO	...	Spare	Not Used



MODBUS WRITE 'CmpSpeed%M'



MODBUS WRITE 'MinFreq'



MODBUS WRITE 'MaxFreq'

8.4. Bitzer CSVH Compressor Mapping - PROGRAM SELECT '4'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	BITZER

8.4.1 Bitzer Compressor MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	57	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	38	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	39	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	40	(W)Not Used	Signed Int16	65535	1	1	0	1

8.4.2 Bitzer Compressor MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	No Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

8.4.3 Bitzer Compressor MODBUS Read Sensor Inputs
12 Sensors Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	10002	(R) Input Registers	Signed Int16	65535	1	1	0	1
2	1	11001	(R) Input Registers	Signed Int16	65535	1	1	0	1
3	1	11002	(R) Input Registers	Signed Int16	65535	1	1	0	1
4	1	12001	(R) Input Registers	Signed Int16	65535	1	1	0	1
5	1	12002	(R) Input Registers	Signed Int16	65535	1	10	0	1
6	1	12003	(R) Input Registers	Signed Int16	65535	1	10	0	1
7	1	12006	(R) Input Registers	Signed Int16	65535	1	1	0	1
8	1	13001	(R) Input Registers	Signed Int16	65535	1	1	0	1
9	1	14011	(R) Input Registers	Signed Int16	65535	1	1	0	1
10	1	12007	(R) Input Registers	Signed Int16	65535	1	1	0	1
11	1	14101	(R) Input Registers	Signed Int16	65535	1	1	0	1
12	1	14102	(R) Input Registers	Signed Int16	65535	1	1	0	1
13	1	14011	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	10001	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	106	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	107	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.4.4 Bitzer Compressor MODBUS Write Analog Outputs
1 Analog Output pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	112	(W)Single Register	Signed Int16	65535	10	1	0	1
2	1	2039	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	2061	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	1821	(W)Not Used	Signed Int16	65535	1	1	0	1

8.4.5 Bitzer Compressor Write Relay Outputs
1 Relay Output pre-programmed into software.

Write Relay Outputs

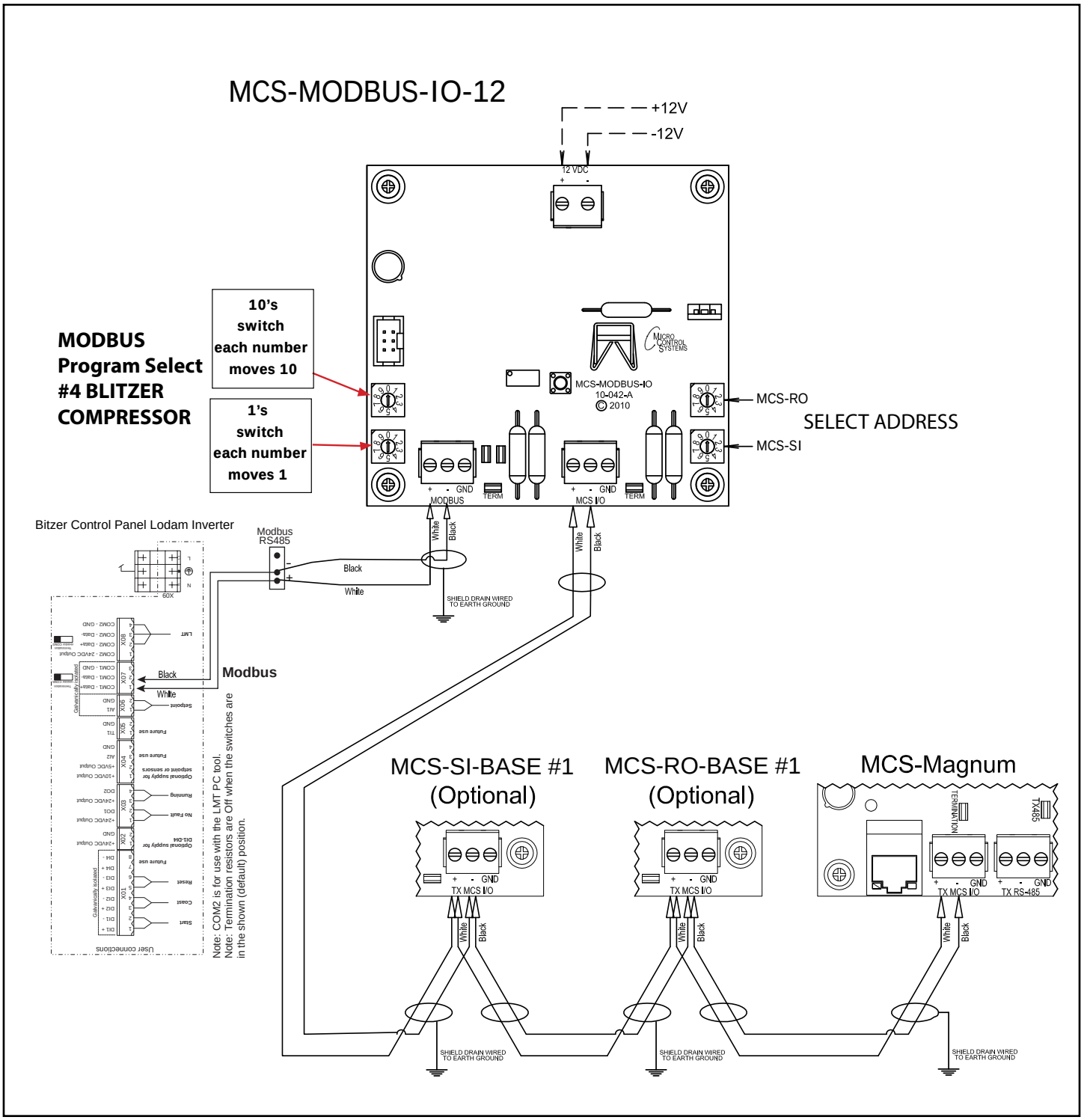
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	111	(W)Single Register	Signed Int16	65535	72	1	1079	1
2	1	26	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	27	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	28	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	30	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	31	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	32	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	33	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	34	(W)Not Used	Signed Int16	65535	1	1	0	1

8.4.6 Bitzer Wiring Diagram

To Modbus/MCS Expansion Boards/MCS-MAGNUM

8.4.6.1. Compressor Control Module CM-RC-01

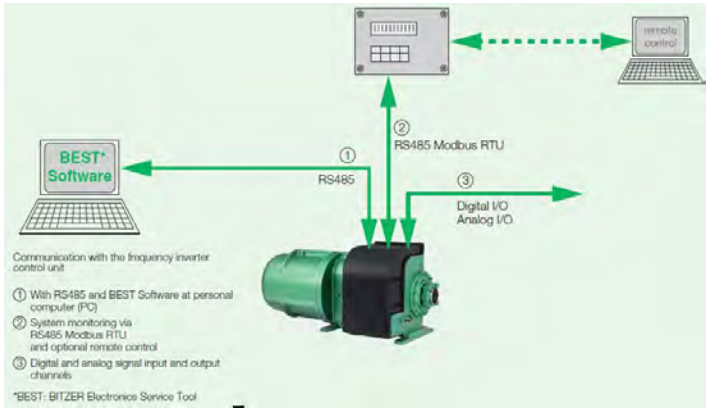
The compressor control module (Lodam Frequency Converter) compares the measured values with the programmed data, sending signals via Modbus to the MCS-MAGNUM or MCS Expansion Boards.



8.4.6.2. Initial setup for communication from Bitzer to MCS-MODUS

Bitzer control module Lodam Frequency Converters(FC)

1. Communication PROTOCOL with the FC is via RS485 using Modbus (RTU).
2. The FC is connected using a 2-wire connector on COM1 (X07 communication port).
3. The termination should be set as per the drawing on the previous page
4. MODBUS ADDRESS: **1**
5. BAUD RATE: **38400**
6. NUMBER OF STOP BITS: **1**
7. PARITY: **NO PARITY**



Status LED's
After a power-up sequence is completed the green LED Operation should be On.
If the yellow or the red LED is on, there is an alarm condition.

Communication LED's
If the green COM1 LED is flashing, the Modbus communication is active.
If the green COM2 LED is flashing, communication with LMT is active.

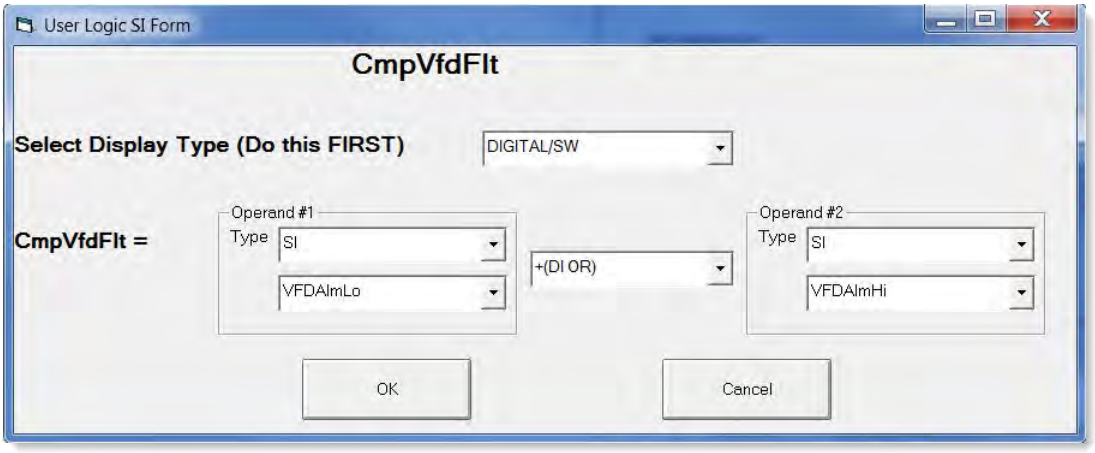
8.4.7 **MCS-MAGNUM - Bitzer Screw Compressor Configuration** (Lodam Frequency Converter)

8.4.7.1. Sensor Input (12) Information from MCS-CONFIG - Example

Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	CMP RPM	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	RPM'S
1-2	VFD ALM LO	BitFltLo	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-3	VFD ALM HI	BitFltHi	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-4	OIL TEMP	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	9	5	32	TEMP
1-5	SUCT PSI	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	14.5	1	-14.7	PSI GAGE
1-6	DISC PSI	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	14.5	1	-14.7	PSI GAGE
1-7	ENVLP STAT	BitEnvSt	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-8	MOTOR TMP	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	9	5	32	TEMP
1-9	DC LinkVlt	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
1-10	EnvelopZn	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-11	IGBT Temp	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	9	5	32	TEMP
1-12	ColdPlatTp	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	9	5	32	TEMP

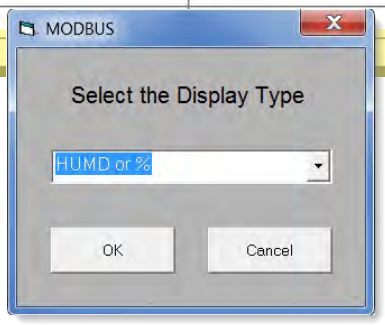
Sensor Input (1) User Logic Screen (Yellow)



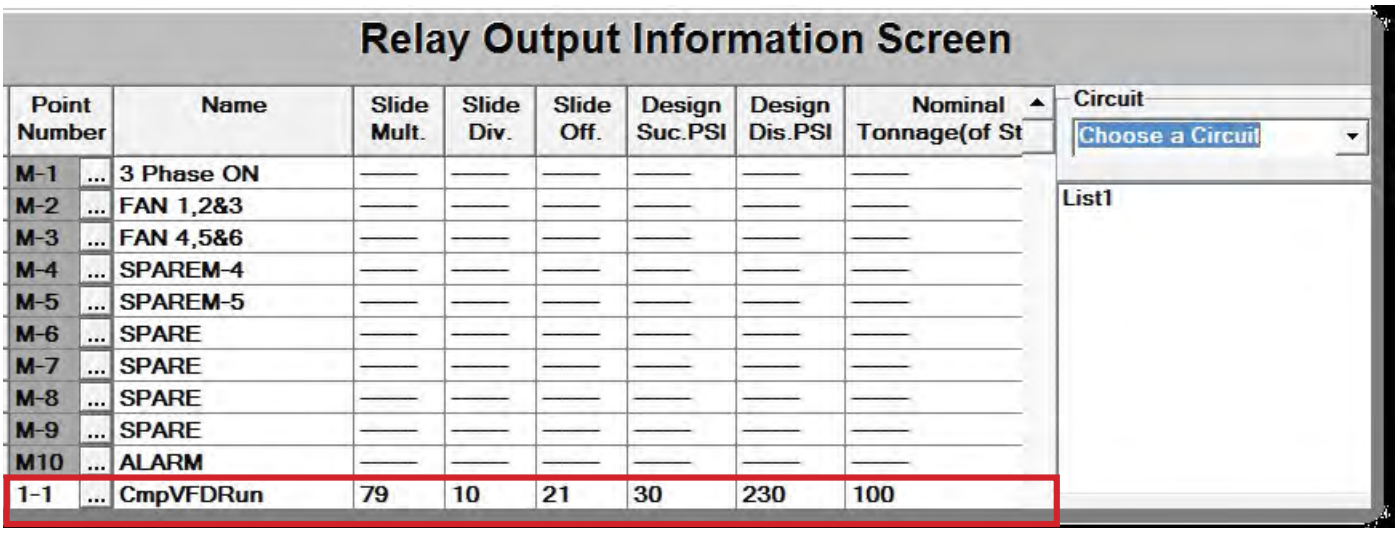
8.4.7.2. Analog Output (1) Information from MCS-CONFIG

Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Typ
M-1	EXV 1 %	Standard	NO		SPARE
M-2	Cond Fan %	Standard	NO		SPARE
M-3	SPAREM-3	Standard	NO		SPARE
M-4	SPAREM-4	Standard	NO		SPARE
1-1	CMP SPD%	Modbus	NO		HUMD or %



8.4.7.3. Relay Output (1) Information from MCS-CONFIG



Relay Output Information Screen

Point Number		Name	Slide Mult.	Slide Div.	Slide Off.	Design Suc.PSI	Design Dis.PSI	Nominal Tonnage(of St
M-1	...	3 Phase ON	——	——	——	——	——	——
M-2	...	FAN 1,2&3	——	——	——	——	——	——
M-3	...	FAN 4,5&6	——	——	——	——	——	——
M-4	...	SPAREM-4	——	——	——	——	——	——
M-5	...	SPAREM-5	——	——	——	——	——	——
M-6	...	SPARE	——	——	——	——	——	——
M-7	...	SPARE	——	——	——	——	——	——
M-8	...	SPARE	——	——	——	——	——	——
M-9	...	SPARE	——	——	——	——	——	——
M10	...	ALARM	——	——	——	——	——	——
1-1	...	CmpVFDRun	79	10	21	30	230	100

Circuit

Choose a Circuit

List1

8.5. DANFOSS CDS 303 - PROGRAM SELECT '5'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	DANFOSS CDS

8.5.1 DANFOSS CDS 303 MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	57	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	38	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	39	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	40	(W)Not Used	Signed Int16	65535	1	1	0	1

8.5.2 DANFOSS CDS 303 MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	19200
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

8.5.3 DANFOSS CDS 303 MODBUS Read Sensor Inputs
15 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2910	(R) Hold Registers	Signed Int16	65535	1	1	0	1
2	1	16100	(R) Hold Registers	Signed Int16	65535	1	1	0	2
3	1	16120	(R) Hold Registers	Signed Int16	65535	1	1	0	2
4	1	16140	(R) Hold Registers	Signed Int16	65535	1	1	0	2
5	1	16170	(R) Hold Registers	Signed Int16	65535	1	1	0	2
6	1	16300	(R) Hold Registers	Signed Int16	65535	1	16	0	1
7	1	16340	(R) Hold Registers	Signed Int16	65535	1	1	0	1
8	1	16900	(R) Hold Registers	High Byte	65535	1	1	0	2
9	1	16900	(R) Hold Registers	Low Byte	65535	1	1	0	2
10	1	16910	(R) Hold Registers	High Byte	65535	1	1	0	2
11	1	16910	(R) Hold Registers	Low Byte	65535	1	1	0	2
12	1	16920	(R) Hold Registers	High Byte	65535	1	1	0	2
13	1	16920	(R) Hold Registers	Low Byte	65535	1	1	0	2
14	1	16930	(R) Hold Registers	High Byte	65535	1	1	0	2
15	1	16930	(R) Hold Registers	Low Byte	65535	1	1	0	2
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.5.4 DANFOSS CDS 303 MODBUS Write Analog Outputs
2 Analog Outputs pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2810	(W) Single Register	Signed Int16	65535	64	10	1084	1
2	1	2811	(W) Single Register	Signed Int16	65535	16384	1000	0	1
3	1	23	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	24	(W)Not Used	Signed Int16	65535	1	1	0	1

8.5.5 DANFOSS CDS 303 Write Relay Outputs
No Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	25	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	26	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	27	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	28	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	30	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	31	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	32	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	33	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	34	(W)Not Used	Signed Int16	65535	1	1	0	1

8.5.6 DANFOSS CDS 303 Setup for MCS-Modbus I0-12

Below are the parameters that can be setup using the Danfoss CDS 303 communicating to the MCS-MODBUS IO-12.

See wiring for Danfoss to MCS-MODUBS previous page.

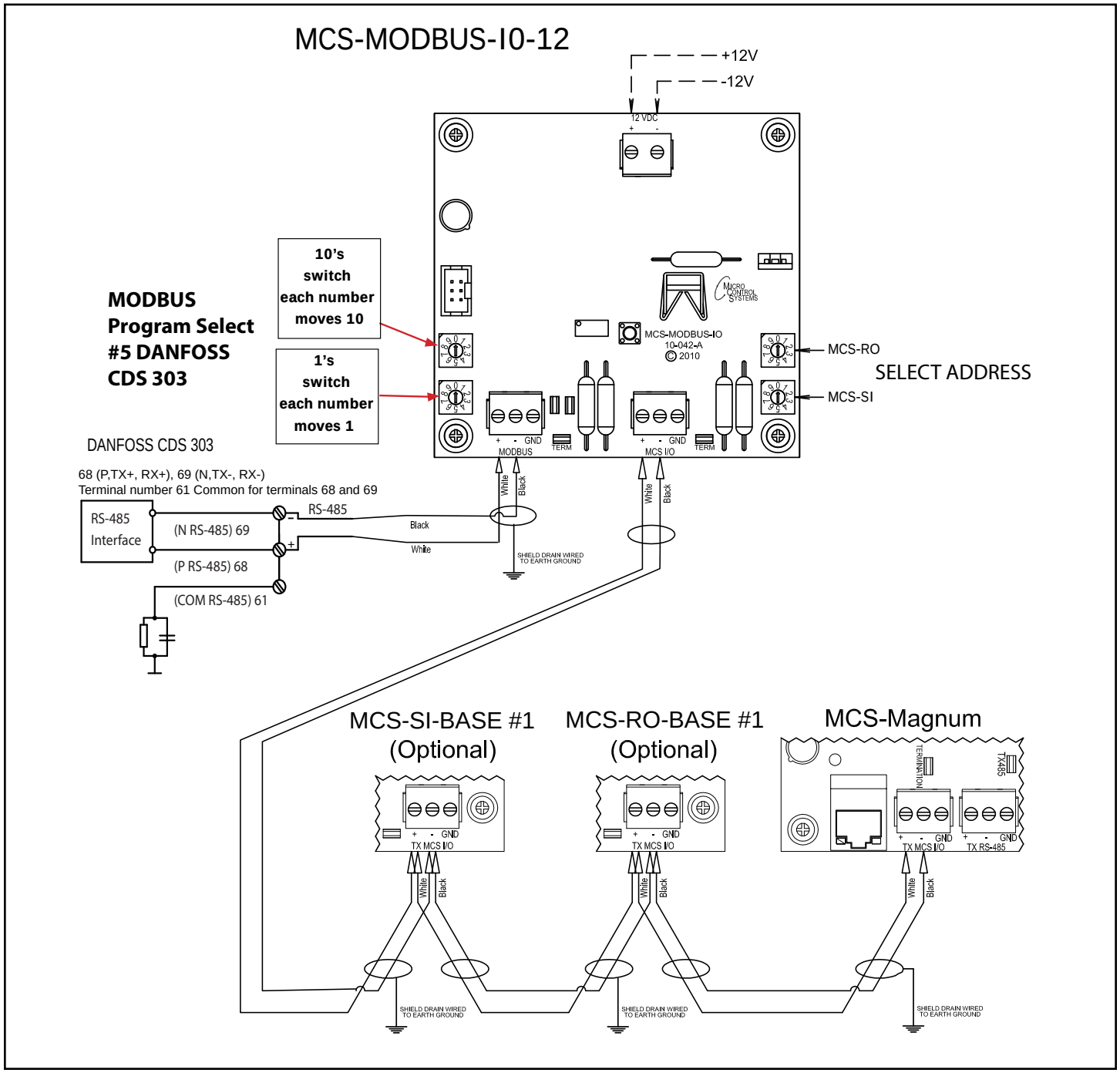
PARAMETER DESCRIPTION	VFD PARAMETER # FC102	SETTING DESCRIPTION	SETTING VALUE
Control Site	8-01	Control Word Only	2
Protocol	8-30	Modbus RTU	2
Address	8-31	1	1
Baud Rate	8-32	19200	3
Parity / Stop Bits	8-33	No Parity / 1 Stopbit	0

Reference Function	3-04	External / Preset	1
Reference 1 Source	3-15	No Function	0
Reference 2 Source	3-16	No Function	0
Relay 1	5-40	Running	5
Relay 2	5-40	Alarm / Warning	10

8.5.7 DANFOSS CDS 303 Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

IMPORTANT

Use terminal 37 as input for safe stop. In rare cases, control cables more than 100 m (330 ft) and analog signals result in 50/60 Hz earth loops due to noise from mains supply cables.
If this situation occurs, break the screen or insert a 100 nF capacitor between screen and chassis.
Connect the digital and analog in- and outputs separately to the frequency converter common inputs (terminal 20, 55, 39) to avoid earth currents affecting the system.

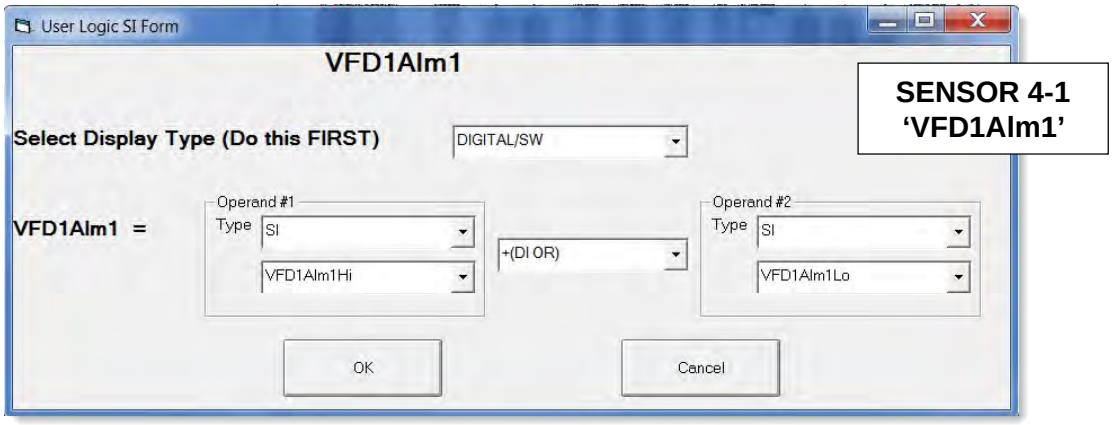


8.5.8 MCS-MAGNUM - DANFOSS CDS 303 SENSOR INPUTS (11) Configuration
2 COMPRESSORS

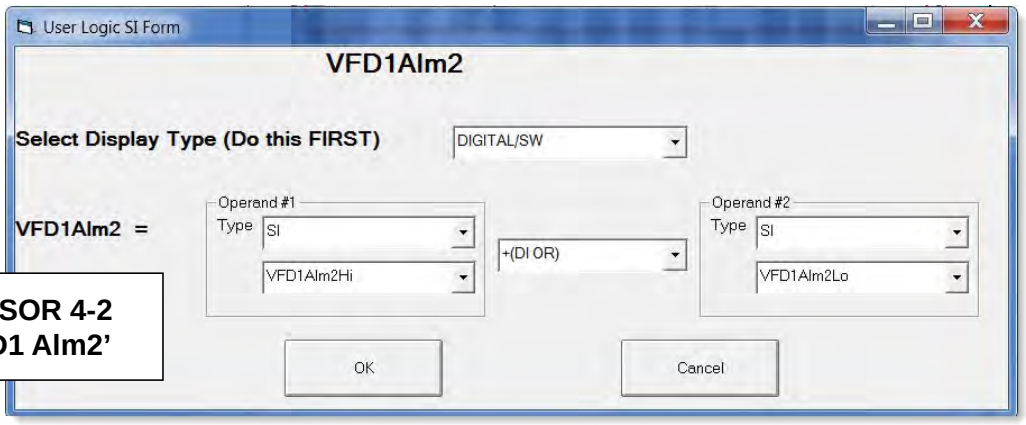
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
2-1	VFDStatus1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	SECONDS
2-2	VFD KW 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	KW
2-3	VFD Volt 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	10	1	0	VOLTS-1Dec
2-4	VFD Amps 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	AMPS/CT
2-5	VFD RPM 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	RPM'S
2-6	VFDDCVolt1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
2-7	VFDTemp 1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	90	5	32	TEMP
2-8	VFD1Alm1Hi	DanFltHi	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	1	Not Used	Not Used	Not Used	Not Used
2-9	VFD1Alm1Lo	DanFltLo	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	1	Not Used	Not Used	Not Used	Not Used
2-10	VFD1Alm2Hi	DFlt2Hi	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	1	Not Used	Not Used	Not Used	Not Used
2-11	VFD1Alm2Lo	DFlt2Lo	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	1	Not Used	Not Used	Not Used	Not Used
2-12	SPARE2-12	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-13	SPARE2-13	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-14	SPARE2-14	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-15	SPARE2-15	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-16	SPARE2-16	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-1	VFDStatus2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	SECONDS
3-2	VFD KW 2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	KW
3-3	VFD Volt 2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	10	1	0	VOLTS-1Dec
3-4	VFD Amps 2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	AMPS/CT
3-5	VFD RPM 2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	RPM'S
3-6	VFDDCVolt2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
3-7	VFDTemp 2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	90	5	32	TEMP
3-8	VFD2Alm1Hi	DanFltHi	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	2	Not Used	Not Used	Not Used	Not Used
3-9	VFD2Alm1Lo	DanFltLo	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	2	Not Used	Not Used	Not Used	Not Used
3-10	VFD2Alm2Hi	DFlt2Hi	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	2	Not Used	Not Used	Not Used	Not Used
3-11	VFD2Alm2Lo	DFlt2Lo	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	2	Not Used	Not Used	Not Used	Not Used
3-12	SPARE3-12	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-13	SPARE3-13	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-14	SPARE3-14	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-15	SPARE3-15	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-16	SPARE3-16	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
4-1	VFD1Alm1	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
4-2	VFD1Alm2	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
4-3	VFD1Alarm	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
4-4	VFD1Reset	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
4-5	VFD1RstCmd	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	MAX STP

Sensor Inputs (5) User Logic used (Yellow)

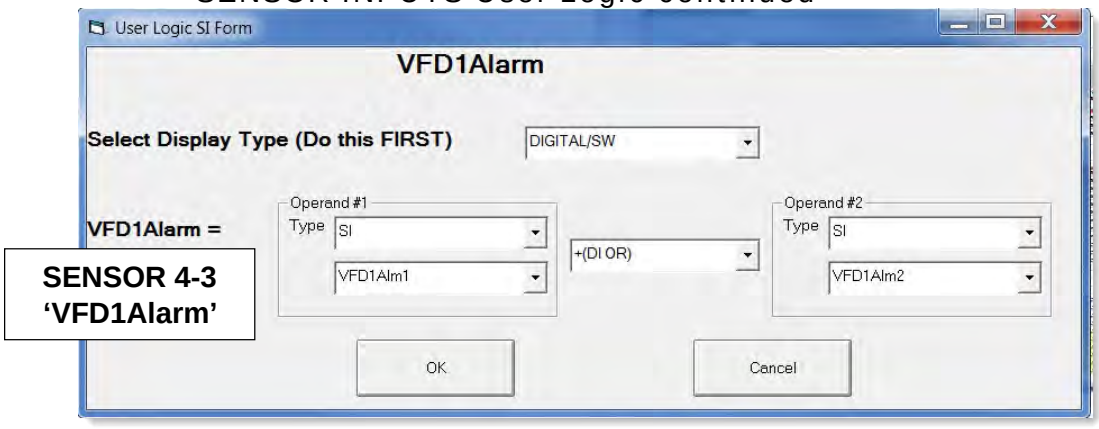


SENSOR 4-1 'VFD1Alm1'

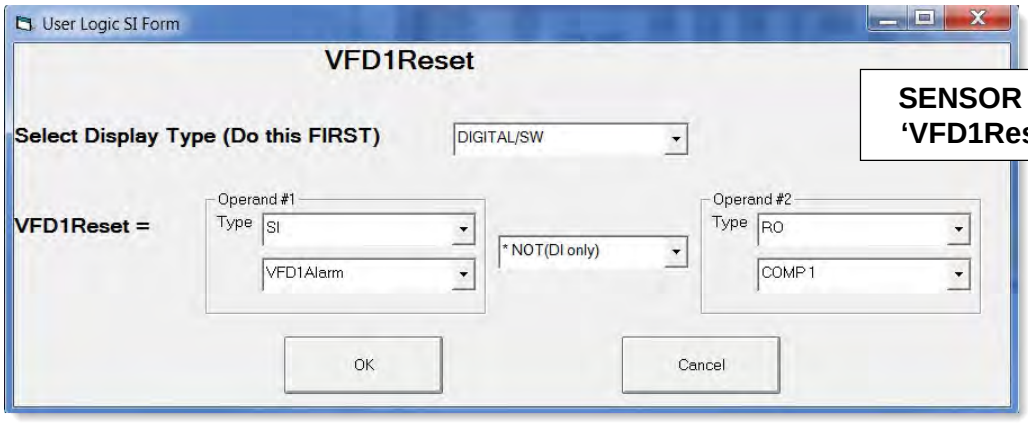


SENSOR 4-2 'VFD1 Alm2'

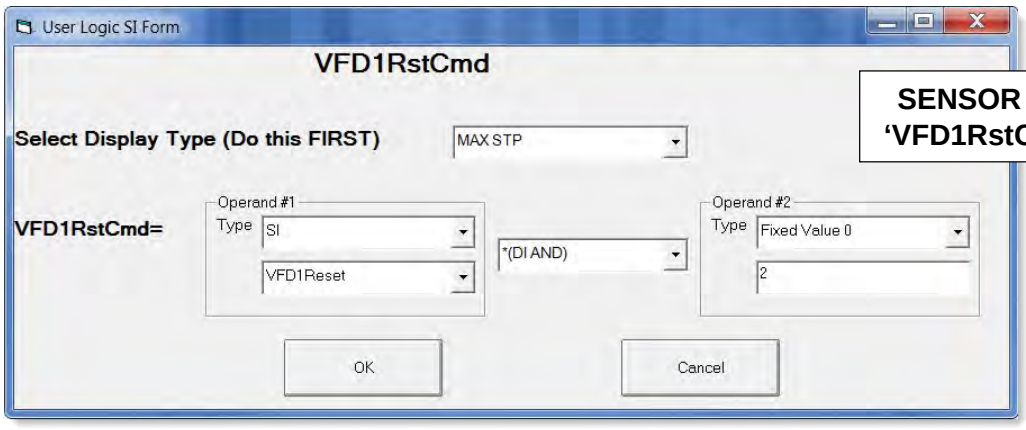
SENSOR INPUTS User Logic continued



SENSOR 4-3 'VFD1Alarm'



SENSOR 4-4 'VFD1Reset'



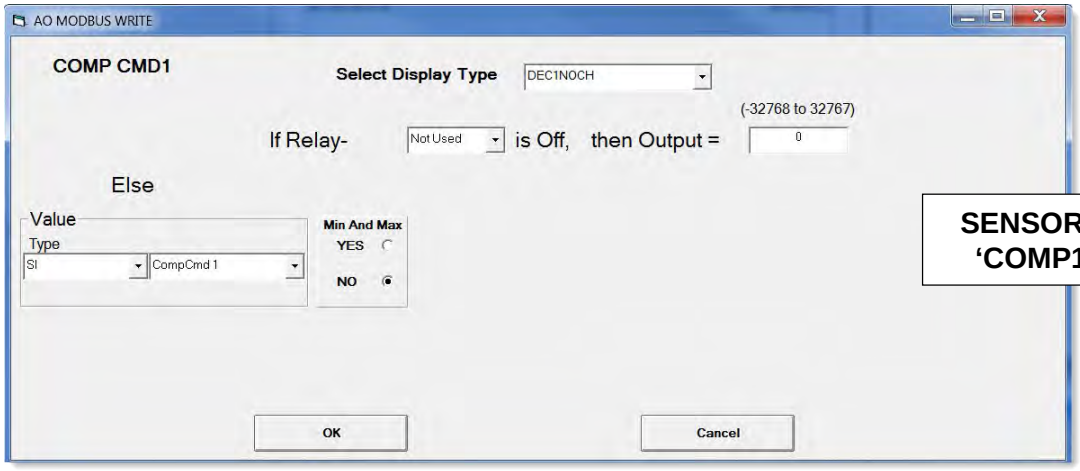
SENSOR 4-5 'VFD1RstCmd'

8.5.9 MCS-MAGNUM - DANFOSS CDS 303 (2) ANALOG OUTPUTS

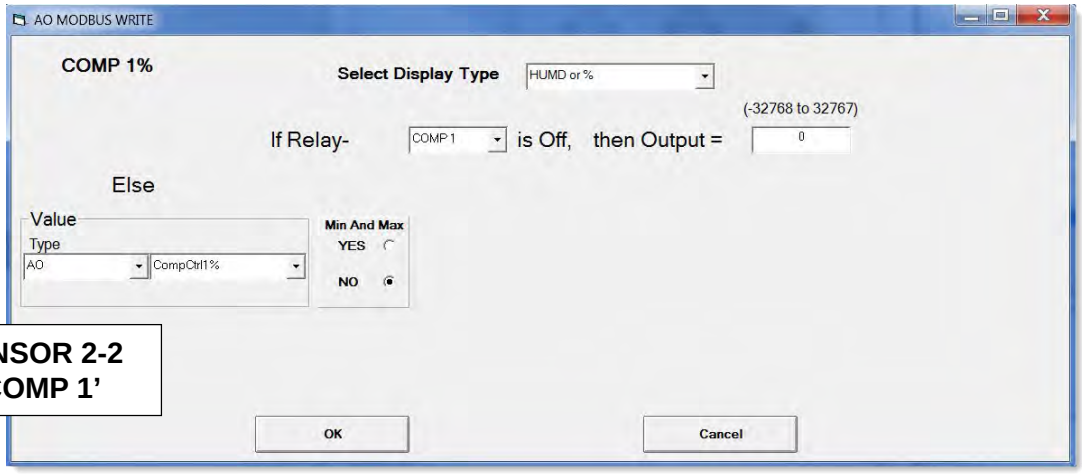
Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	CND VALVE%	Standard	NO		SPARE
M-2	CompCtrl1%	Standard	NO		SPARE
M-3	EXV1 %	Standard	NO		SPARE
M-4	SPAREM-4	Standard	NO		SPARE
1-1	SPARE1-1	Standard	NO		SPARE
1-2	CompCtrl2%	Standard	NO		SPARE
1-3	EXV2 %	Standard	NO		SPARE
1-4	SPARE1-4	Standard	NO		SPARE
2-1	COMP CMD1	Modbus Write	NO		DEC1NOCH
2-2	COMP 1%	Modbus Write	NO		HUMD or %

Analog Output (2) Modbus Write (yellow)



SENSOR 2-1 'COMP1%'



SENSOR 2-2 'COMP 1'

8.6. Emerson CSD-100 Mapping - PROGRAM SELECT '6'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus)

Site Info | **0 - MCS-MODBUS-IO**

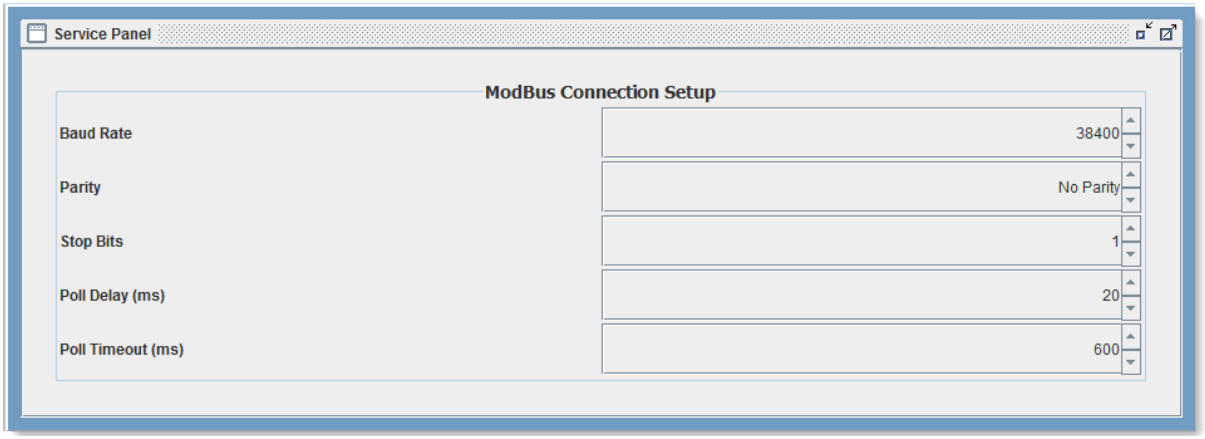
Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	EMERSON

8.6.1 Emerson CSD-100 MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	24	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.6.2 Emerson CSD-100 MCS-MODBUS Communication Setup



8.6.3 Emerson CSD-100 MODBUS Read Sensor Inputs
5 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	31	(R) Hold Registers	Signed Int16	65535	1	1	0	1
2	1	57	(R) Hold Registers	Signed Int16	65535	1	1	0	1
3	1	22	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	23	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	21	(R) Hold Registers	Signed Int16	65535	1	1	0	1
6	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.6.4 Emerson CSD-100 MODBUS Write Analog Output
3 Analog Outputs pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	19	(W)Single Register	Signed Int16	65535	720	100	0	1
2	1	25	(W)Single Register	Signed Int16	65535	1	10	0	1
3	1	26	(W)Single Register	Signed Int16	65535	1	10	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.6.5 Emerson CSD-100 Write Relay Outputs
2 Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Single Register	Signed Int16	65535	65535	1	34	1
2	1	20	(W)Single Register	Signed Int16	65535	16	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.6.5.1. Initial setup for communication from EMERSON to MCS-MODUS

EMERSON COPELAND SCROLL CONTROLS

Communication PROTOCOL RS485 using Modbus (RTU).

Set parameter 29.011 bit 8 to 1 (0000000100000000 This will enable the drive to receive instruction from MCS-MODBUS-IO-12)

Set parameter 07.024 to 00.000 then pres the Red Button

Set parameter 07.000 to “SAFE” then pres the Red Button

BAUD RATE: Emerson VFD parameter 11.025 - 19200 DEFAULT

PARITY Emerson VFD parameter 11.024 - 8 bit/NP/2 (Default)

DRIVE KEYPAD

1. Escape button
2. Auto (blue) button
3. Hand (green)
4. Navigation keys (x4)
5. Stop / Reset / OFF (red) button
6. Enter button

NOTE

The red stop button is also used to reset the drive.

8.6.7 Emerson CSD-100 Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

Communications connections

The drive offers a 2 wire 485 interface. This enables the drive set-up, operation and monitoring to be carried out with a PC or controller if required.

Figure 4-24 Location of the comms connectors

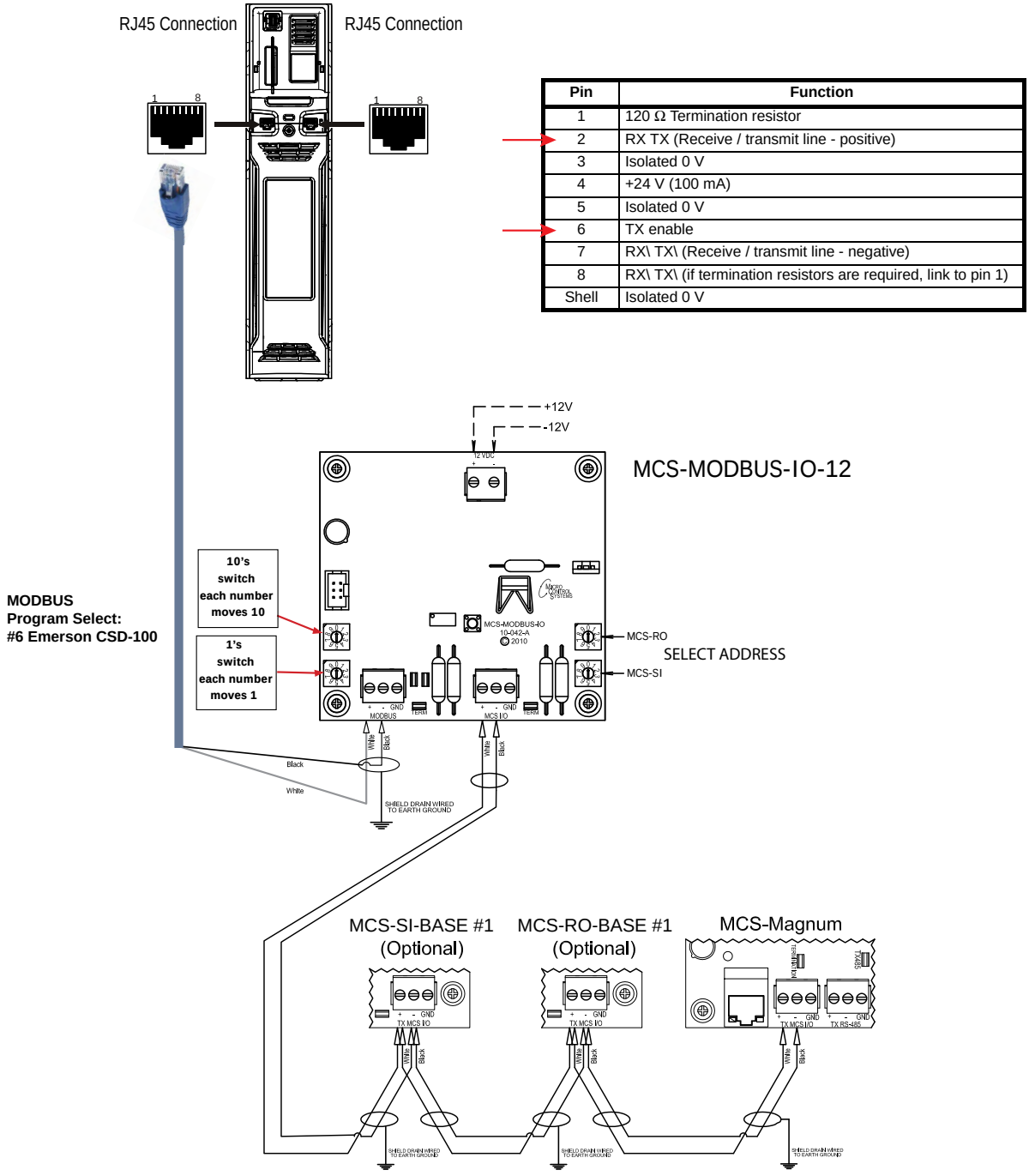
The 485 option provides two parallel RJ45 connectors are provided allowing easy daisy chaining. The drive only supports MODBUS RTU protocol. See Table 4-13 for the connection details.

NOTE

Standard Ethernet cables are not recommended for use when connecting drives on a 485 network as they do not have the correct twisted pairs for the pinout of the serial comms port.

Table 4-13 Serial communication port pin-outs

Pin	Function
1	120 Ω Termination resistor
2	RX TX (Receive / transmit line - positive)
3	Isolated 0 V
4	+24 V (100 mA)
5	Isolated 0 V
6	TX enable
7	RX\ TX\ (Receive / transmit line - negative)
8	RX\ TX\ (if termination resistors are required, link to pin 1)
Shell	Isolated 0 V

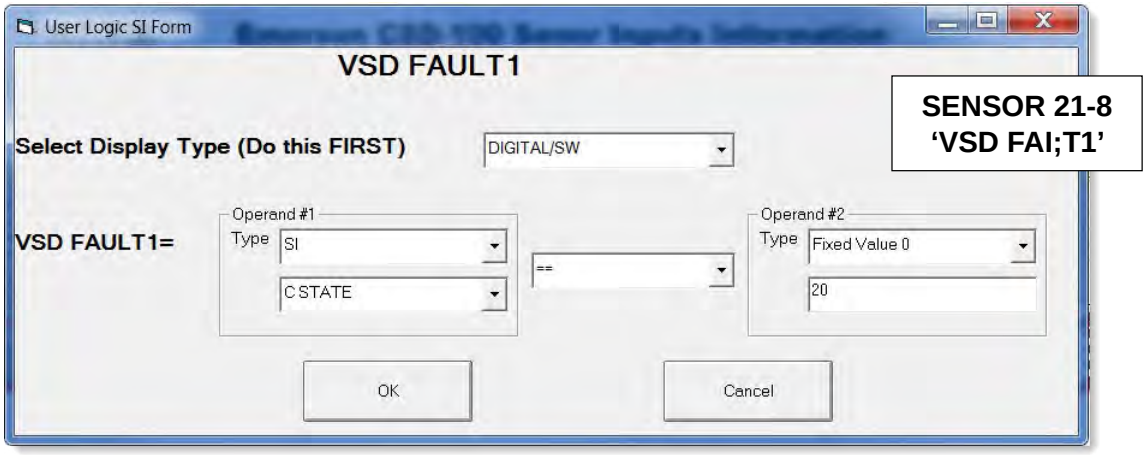


8.6.7.1. MCS-MAGNUM -Emerson CSD-100 - Sensor Inputs (5) **Configuration**

Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-8	VSD FAULT1	User Logic	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
1-9	SPARE1-9	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-10	SPARE1-10	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-11	SPARE1-11	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-12	SPARE1-12	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-13	SPARE1-13	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-14	SPARE1-14	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-15	CHW RESET	TRGTRST	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-16	HOTWTR RST	TRGTRST	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-1	DiscLnTmp	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
2-2	C STATE	MODBUS	0	20	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
2-3	C ALERTS	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
2-4	C WARNINGS	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
2-5	C TRIP	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare

Sensor Input (1) Point Number 1-8 - User Logic (yellow)



Relay Output Information Screen

Point Number	Name	Slide Mult.	Slide Div.	Slide Off.	Design Suc.PSI	Design Dis.PSI	Nominal Tonnage(of Step)	EXV Start (When Lead)	Type	EXV Load Adjust %	EXV Unld Adjust %
1-1	COMP 1	——	——	——	——	——	0	40	Step w\ EXV	40	40
1-2	LockOutRst	——	——	——	——	——	——	——	Standard	——	——

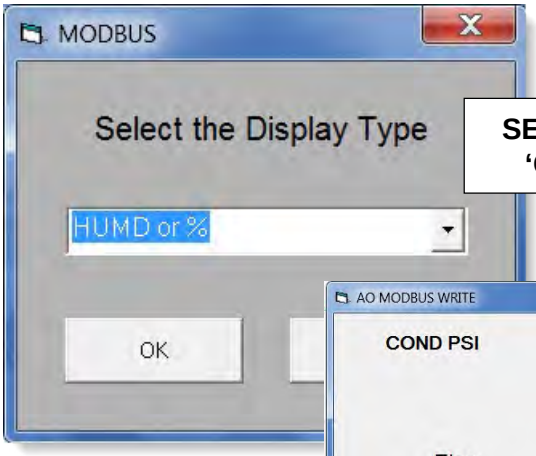
Circuit: Choose a Circuit

List1

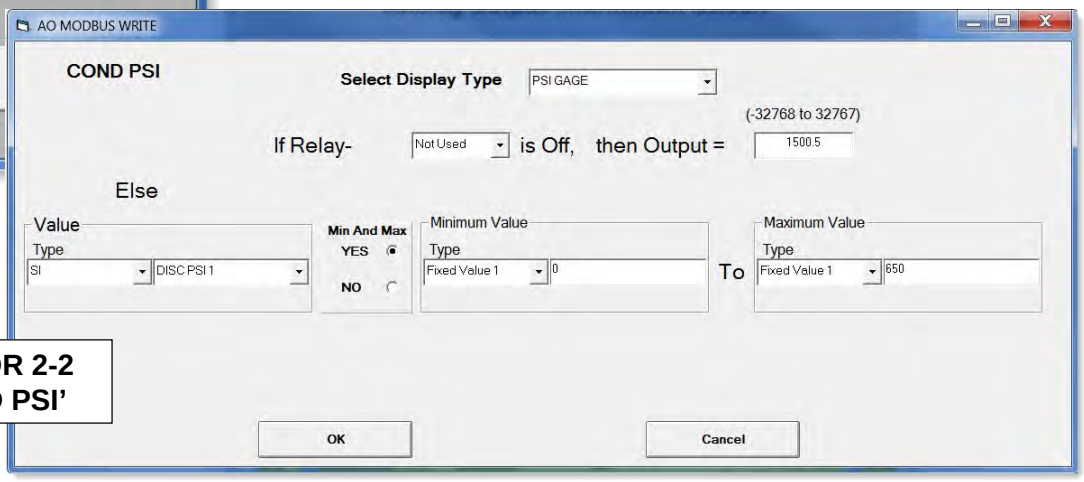
8.6.6 MCS-MAGNUM - - Emerson CSD-100 Analog Outputs (3) **Configuration**

Analog Output Information Screen

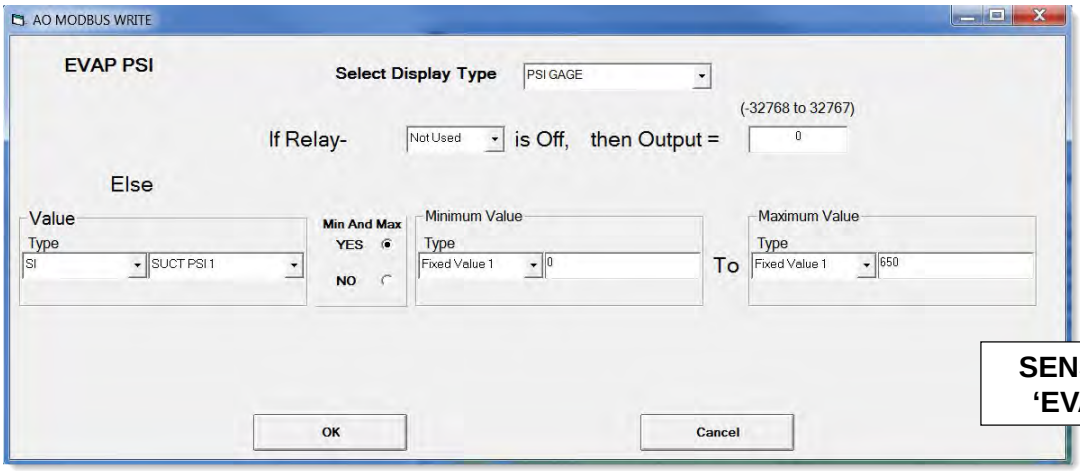
Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	CND VALVE%	Standard	NO		SPARE
M-2	SPAREM-2	Standard	NO		SPARE
M-3	EXV 2%	Standard	NO		SPARE
M-4	SPAREM-4	Standard	NO		SPARE
1-1	SPARE1-1	Standard	NO		SPARE
1-2	SPARE1-2	Standard	NO		SPARE
1-3	EXV 1%	Standard	NO		SPARE
1-4	SPARE1-4	Standard	NO		SPARE
2-1	COMP 1%	Modbus	NO		HUMD or %
2-2	COND PSI	Modbus Write	NO		PSI GAGE
2-3	EVAP PSI	Modbus Write	NO		PSI GAGE



SENSOR 2-1 'COMP%'



SENSOR 2-2 'COND PSI'



SENSOR 2-3 'EVAP PSI'

8.7. MCS-POWERMETER 3037 Mapping - PROGRAM SELECT '7'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

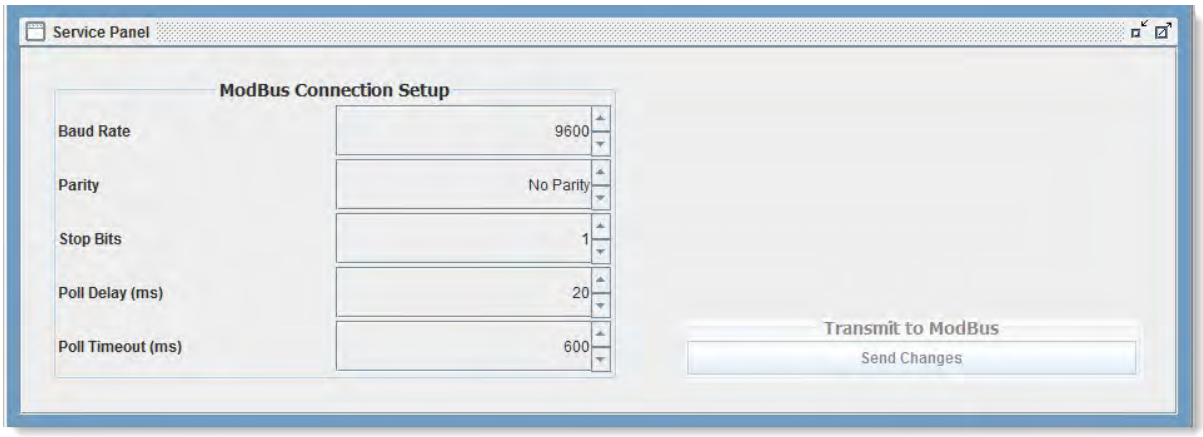
Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	KW POWERSCOUT

8.7.1 MCS-POWERMETER MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1
5	1	0	(W)Not Used	Not Used	65535	1	1	0	1
6	1	0	(W)Not Used	Not Used	65535	1	1	0	1

8.7.2 MCS-POWERMETER MCS-MODBUS Communication Setup



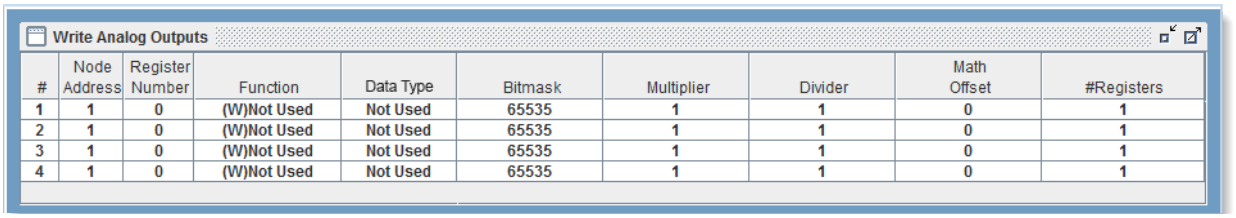
8.7.3 MCS-POWERMETER MODBUS Read Sensor Inputs
11 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	4003	(R) Hold Registers	Not Used	65535	1	1	0	1
2	1	4004	(R) Hold Registers	Not Used	65535	1	1	0	1
3	1	4005	(R) Hold Registers	Not Used	65535	1	1	0	1
4	1	4015	(R) Hold Registers	Not Used	65535	1	1	0	1
5	1	4056	(R) Hold Registers	Not Used	65535	1	1	0	1
6	1	4057	(R) Hold Registers	Not Used	65535	1	1	0	1
7	1	4058	(R) Hold Registers	Not Used	65535	1	1	0	1
8	1	4019	(R) Hold Registers	Not Used	65535	1	1	0	1
9	1	4020	(R) Hold Registers	Not Used	65535	1	1	0	1
10	1	4021	(R) Hold Registers	Not Used	65535	1	1	0	1
11	1	4001	(R) Hold Registers	Power Mtr	65535	1	1	0	1
12	1	0	(R) Not Used	Not Used	65535	1	1	0	1
13	1	0	(R) Not Used	Not Used	65535	1	1	0	1
14	1	0	(R) Not Used	Not Used	65535	1	1	0	1
15	1	0	(R) Not Used	Not Used	65535	1	1	0	1
16	1	0	(R) Not Used	Not Used	65535	1	1	0	1

8.7.4 MCS-POWERMETER MODBUS Write Analog Outputs

No Analog Outputs pre-programmed into software.

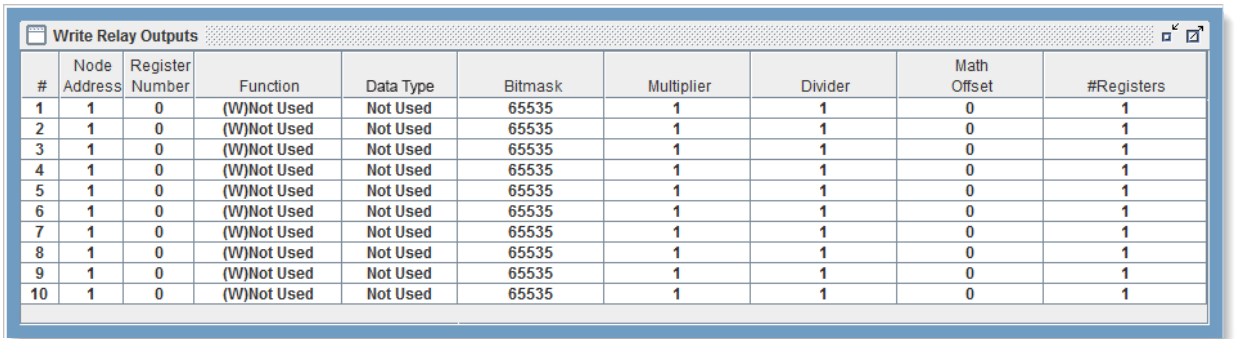


Write Analog Outputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1

8.7.5 MCS-POWERMETER Write Relay Outputs

No Relay Outputs pre-programmed into software.

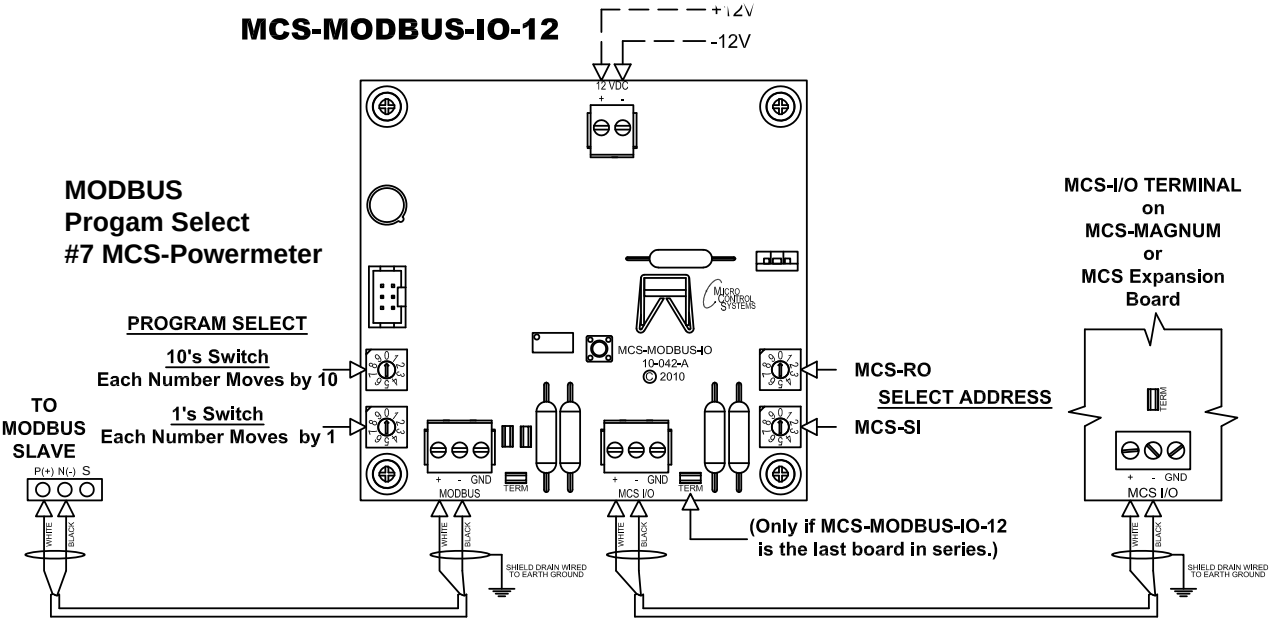


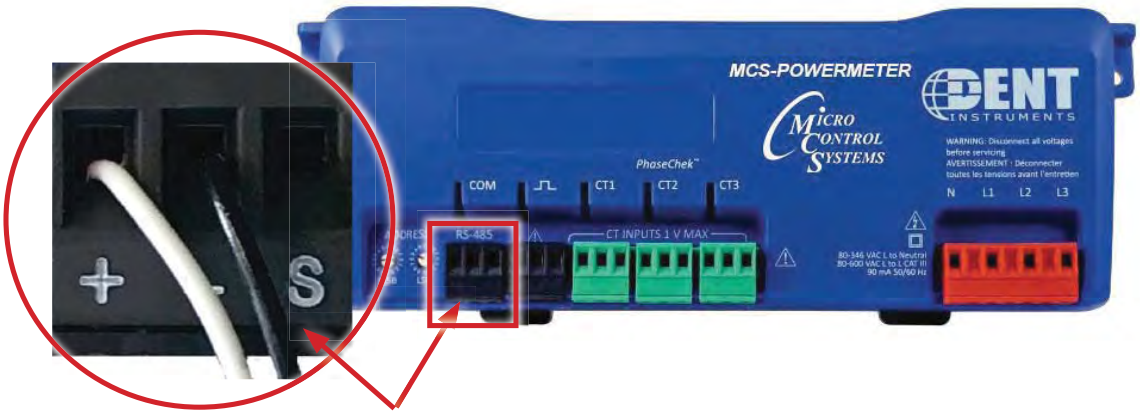
Write Relay Outputs

#	Node Address	Register Number	Function	Data Type	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Not Used	65535	1	1	0	1
2	1	0	(W)Not Used	Not Used	65535	1	1	0	1
3	1	0	(W)Not Used	Not Used	65535	1	1	0	1
4	1	0	(W)Not Used	Not Used	65535	1	1	0	1
5	1	0	(W)Not Used	Not Used	65535	1	1	0	1
6	1	0	(W)Not Used	Not Used	65535	1	1	0	1
7	1	0	(W)Not Used	Not Used	65535	1	1	0	1
8	1	0	(W)Not Used	Not Used	65535	1	1	0	1
9	1	0	(W)Not Used	Not Used	65535	1	1	0	1
10	1	0	(W)Not Used	Not Used	65535	1	1	0	1

8.7.6 MCS-POWERMETER Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

A two wire plus shielded cable is connected between the MCS-MODBUS and the MCS-POWERMETER. Requires firmware 2.02I or better





RS-485 Connection from MCS-MODBUS

Address for MCS-POWERMETER and MCS-MODBUS

The address for I/O communication over the RS-485 protocol is set using the address switches located on the MCS-POWERMETER. The address must match that of the MCS-MODBUS that is communicating with it.

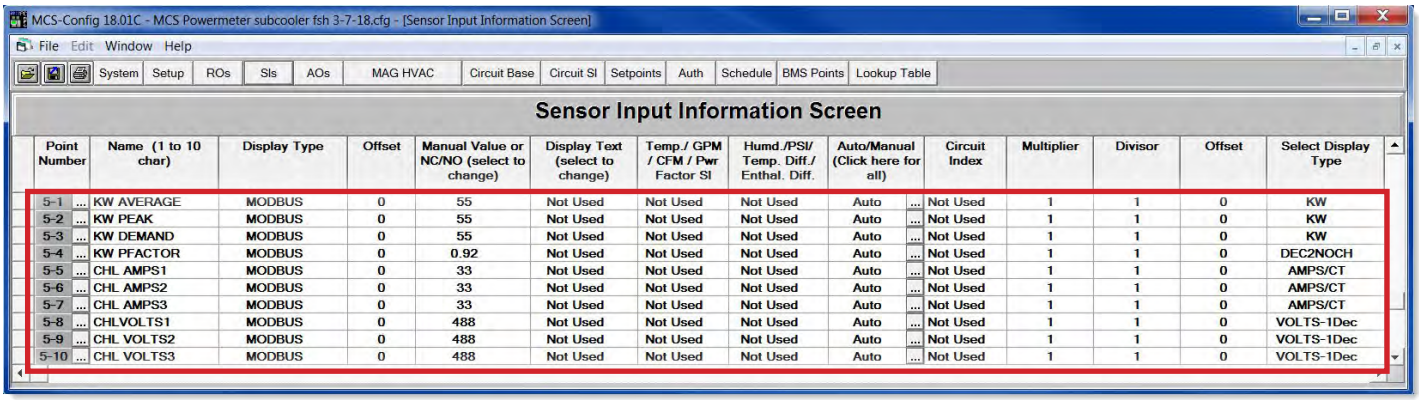
MSB SWITCH = 0

LSB SWITCH = 1

THE MCS-POWERMETER IS SHIPPED FROM MCS WITH THE DEFAULT ADDRESS SETTING OF 1 AS SHOWN ABOVE.

THE ADDRESS YOU USE MUST MATCH THE SETTING ON THE MCS-MODBUS.

8.7.6.1. MCS-MAGNUM - MCS-POWERMETER Senor Inputs (10) Configuration



Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
5-1	KW AVERAGE	MODBUS	0	55	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	KW
5-2	KW PEAK	MODBUS	0	55	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	KW
5-3	KW DEMAND	MODBUS	0	55	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	KW
5-4	KW PFACTOR	MODBUS	0	0.92	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	DEC2NOCH
5-5	CHL AMPS1	MODBUS	0	33	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
5-6	CHL AMPS2	MODBUS	0	33	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
5-7	CHL AMPS3	MODBUS	0	33	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
5-8	CHLVOLTS1	MODBUS	0	488	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec
5-9	CHL VOLTS2	MODBUS	0	488	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec
5-10	CHL VOLTS3	MODBUS	0	488	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec

8.8. RUKING-(COPELAND) Mapping - PROGRAM SELECT '8'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	RUKING VFD

8.8.1 RUKING MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.8.2 RUKING MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	19200
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

8.8.3 RUKING MODBUS Read Sensor Inputs
10 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	45	61	(R) Hold Registers	Signed Int16	65535	1	2	0	1
2	45	67	(R) Hold Registers	Signed Int16	65535	1	256	0	1
3	45	69	(R) Hold Registers	Signed Int16	65535	1	256	0	1
4	45	71	(R) Hold Registers	Signed Int16	65535	1	32	0	1
5	45	74	(R) Hold Registers	Signed Int16	65535	1	32	0	1
6	45	78	(R) Hold Registers	Signed Int16	65535	1	32	0	1
7	45	81	(R) Hold Registers	Signed Int16	65535	1	1	0	1
8	45	82	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	45	85	(R) Hold Registers	Signed Int16	65535	1	1	0	1
10	45	86	(R) Hold Registers	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
13	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.8.4 RUKING MODBUS Write Analog Outputs

1 Analog Output pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	45	102	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

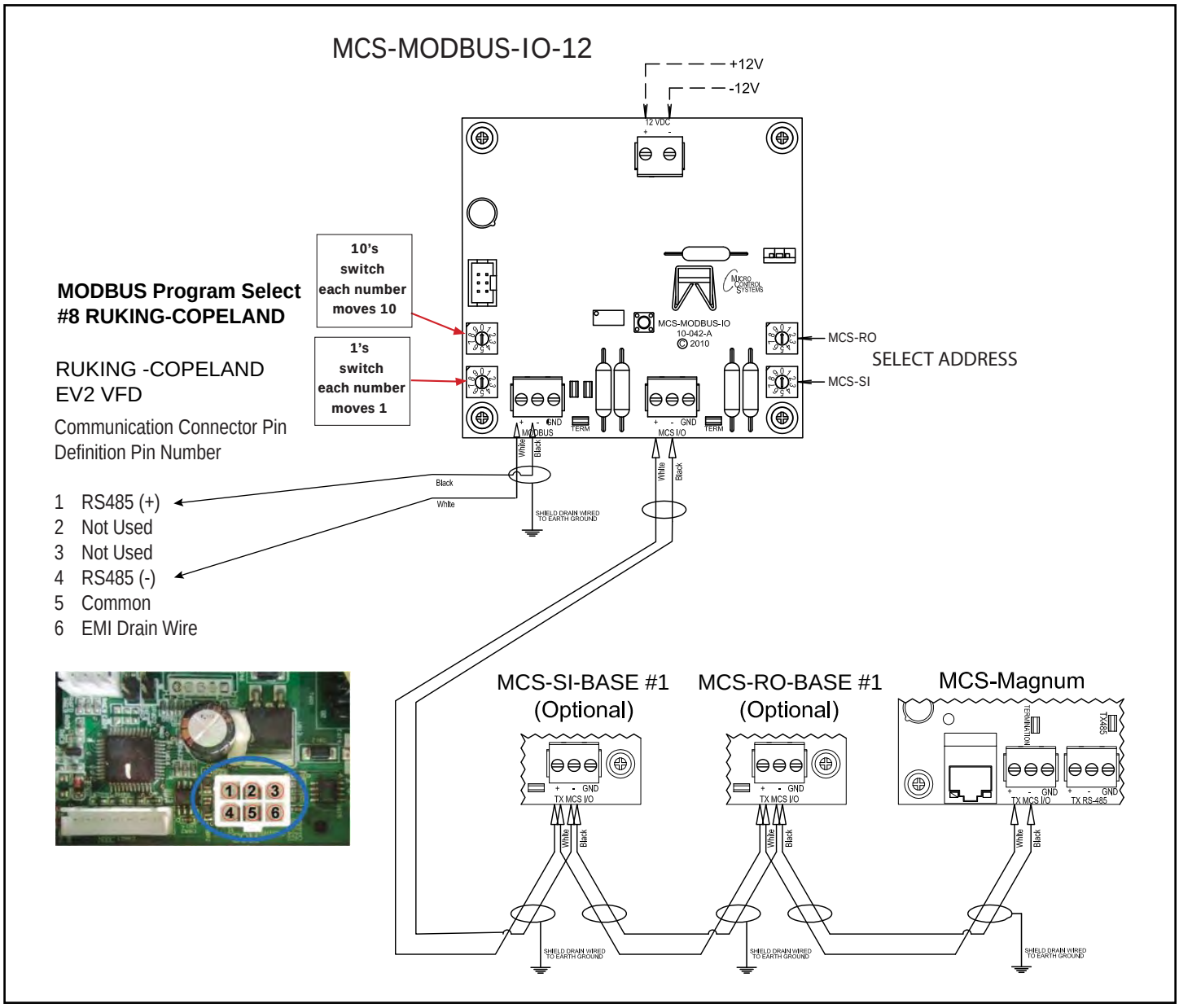
8.8.5 RUKING Write Relay Outputs

2 Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	45	101	(W)Single Register	Signed Int16	65535	1	1	0	1
2	45	104	(W)Single Register	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.8.9 RUKING Wiring Diagram
To Modbus/MCS Expansion Boards/MCS-MAGNUM

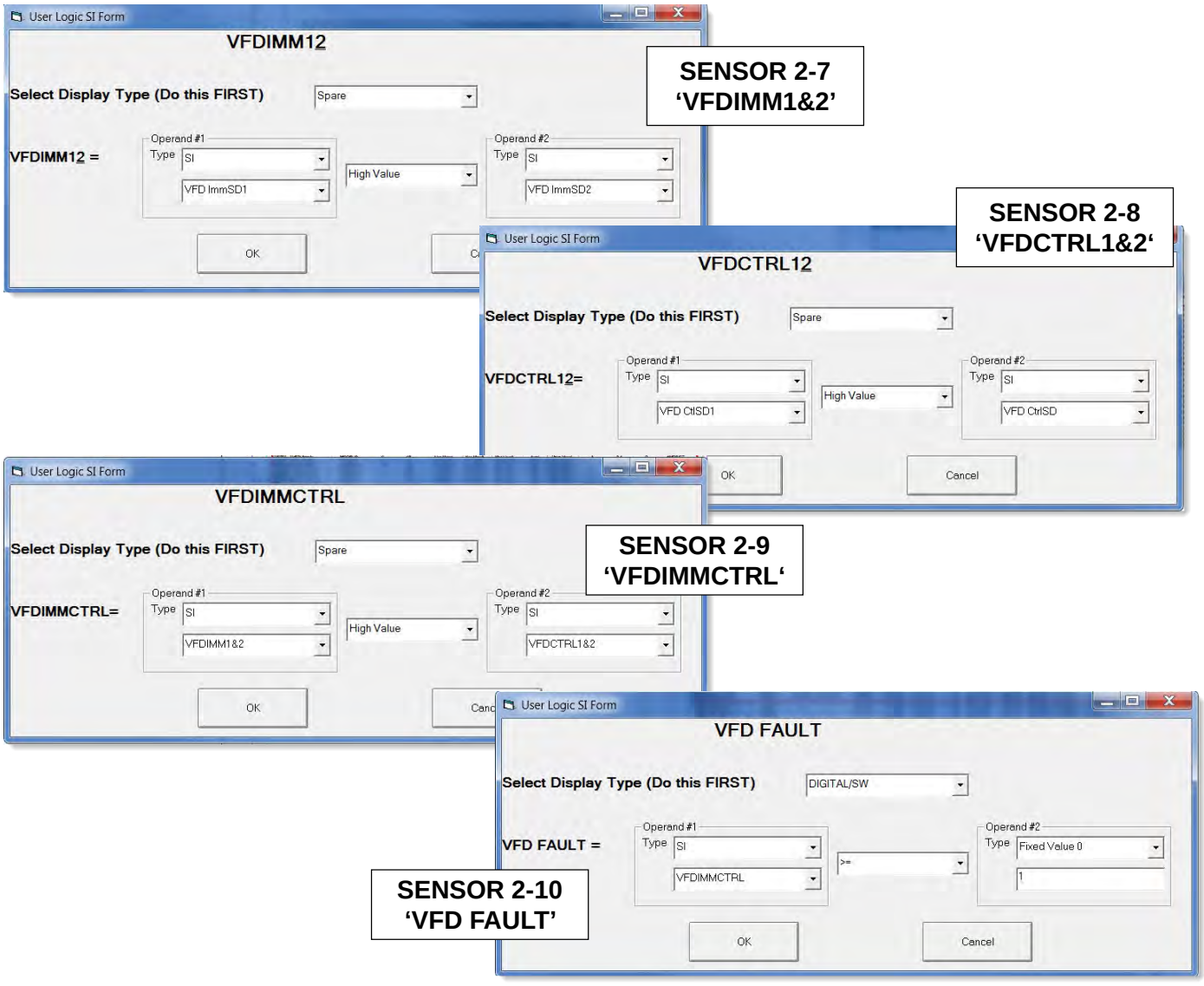


8.8.8 MCS-MAGNUM - Ruking Sensor Inputs (10) Configuration

Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	VFD CmpRPM	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-2	VFD AmpIn	MODBUS	0	10	Not Used	Not Used	Not Used	Auto	Not Used	1	0.1	0	AMPS/CT
1-3	VFD AmpOut	MODBUS	0	10	Not Used	Not Used	Not Used	Auto	Not Used	1	0.1	0	AMPS/CT
1-4	VFD InvTmp	MODBUS	0	76	Not Used	Not Used	Not Used	Auto	Not Used	9	0.5	32	TEMP
1-5	VFD PFCTmp	MODBUS	0	78	Not Used	Not Used	Not Used	Auto	Not Used	9	0.5	32	TEMP
1-6	VFD DisTmp	MODBUS	0	140	Not Used	Not Used	Not Used	Auto	Not Used	9	0.5	32	TEMP
1-7	VFD ImmSD1	RKNG F1	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-8	VFD CtlSD1	RKNG F2	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-9	VFD ImmSD2	RKNG F3	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-10	VFD CtrlSD	RKNG F4	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-11	SPARE1-11	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-12	SPARE1-12	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-13	SPARE1-13	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-14	SPARE1-14	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-15	SPARE1-15	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-16	SPARE1-16	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
2-1	SUB COOL	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	TEMP
2-2	UNT STATE	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	CYCLES/CFM
2-3	CMP STATE	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	CYCLES/CFM
2-4	EXV STATE	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	CYCLES/CFM
2-5	SUPERHT	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	TEMP
2-6	RPM CALC	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	RPM'S
2-7	VFDIMM1&2	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
2-8	VFDCTRL1&2	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
2-9	VFDIMMCTRL	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
2-10	VFD FAULT	User Logic	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW

Sensor User Logic (4) (yellow)

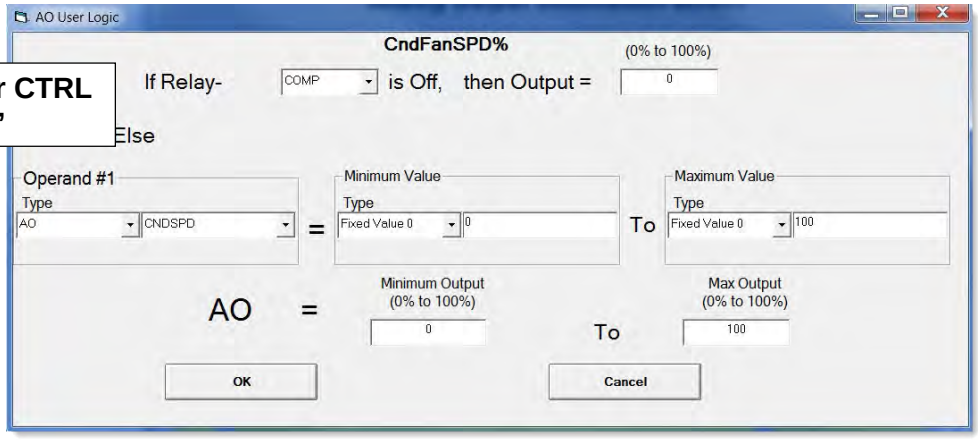


8.8.6 MCS-MAGNUM - Ruking Analog Outputs, Linear CTRL Modbus write (3) **Config.**

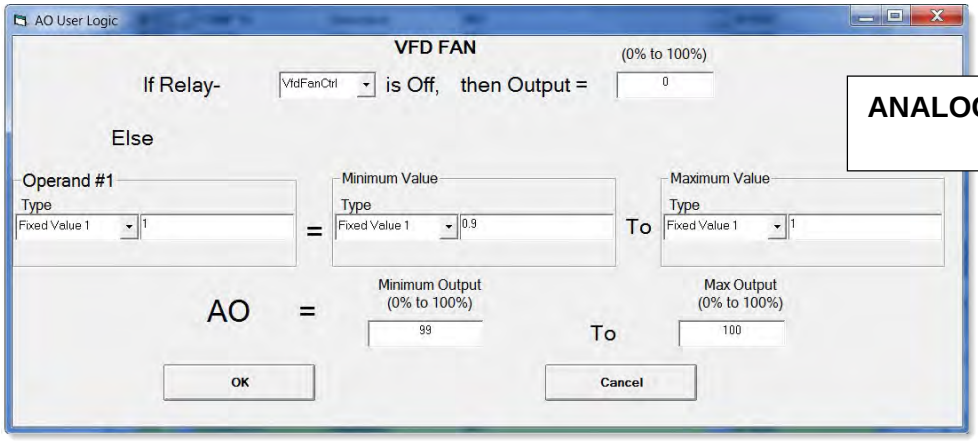
Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	COMP %	Standard	NO		SPARE
M-2	EXV %	Standard	NO		SPARE
M-3	CndFanSPD%	Linear CTRL	NO		SPARE
M-4	VFD FAN	Linear CTRL	NO		SPARE
1-1	COMP SPEED	Modbus Write	NO		RPM'S
1-2	SPARE1-2	Standard	NO		SPARE
1-3	SPARE1-3	Standard	NO		SPARE
1-4	CNDSPD	Standard	NO		SPARE

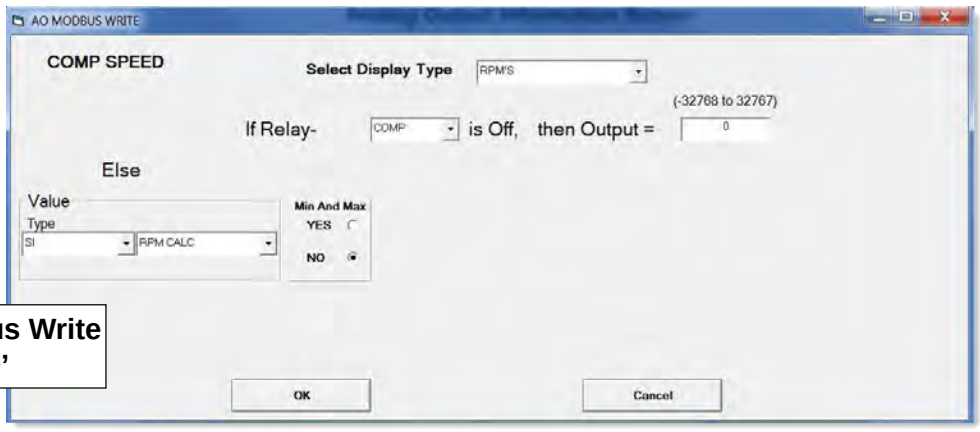
ANALOG M-3 - Linear CTRL 'CndFanSPD%'



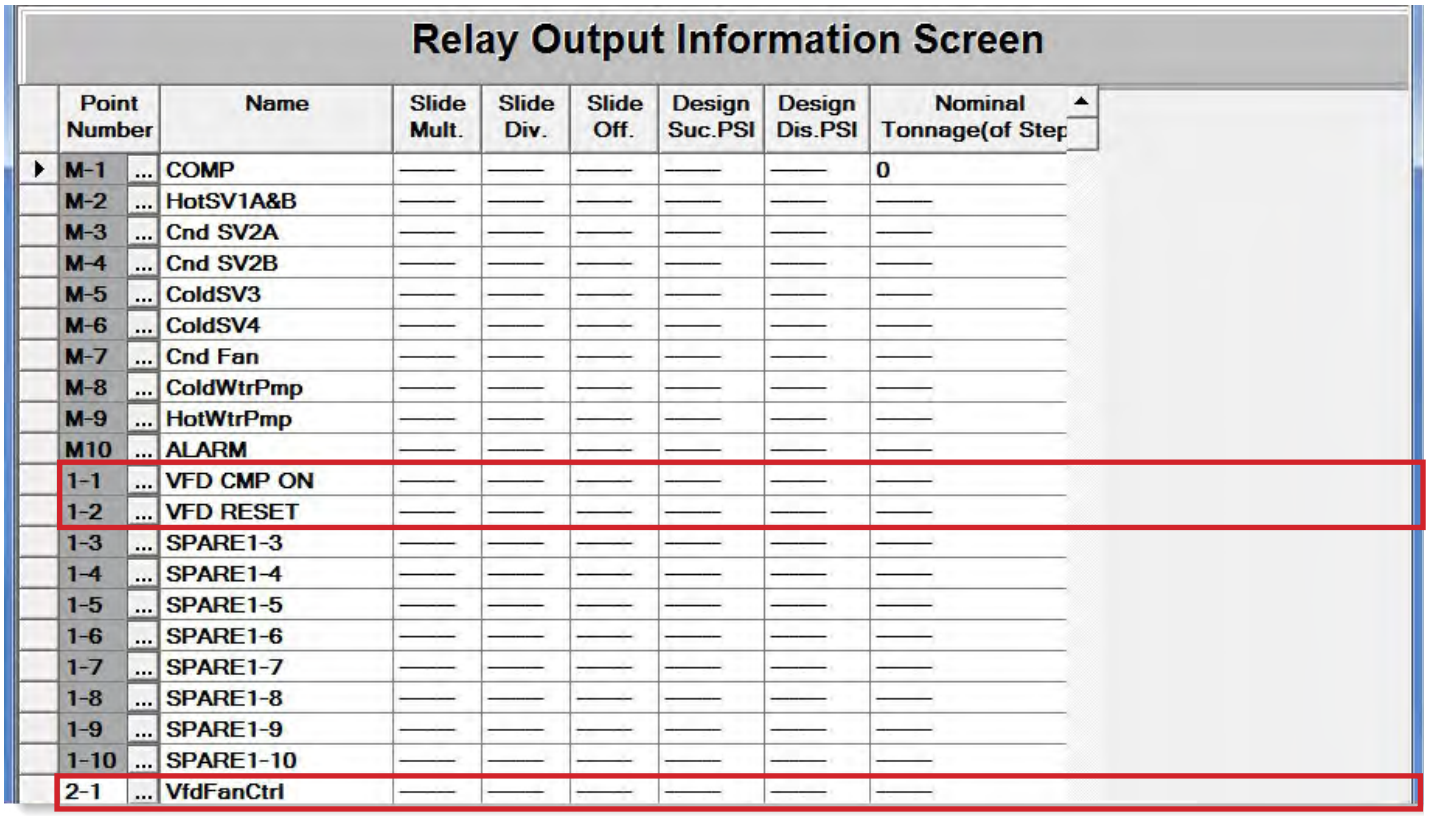
ANALOG M-4 -Linear CTRL 'VFD FAN'



ANALOG 1-1 - Modbus Write 'COMP SPEED'



8.8.7 Ruking Relays Outputs (3)



Relay Output Information Screen

Point Number	Name	Slide Mult.	Slide Div.	Slide Off.	Design Suc.PSI	Design Dis.PSI	Nominal Tonnage(of Step
M-1 ...	COMP	———	———	———	———	———	0
M-2 ...	HotSV1A&B	———	———	———	———	———	———
M-3 ...	Cnd SV2A	———	———	———	———	———	———
M-4 ...	Cnd SV2B	———	———	———	———	———	———
M-5 ...	ColdSV3	———	———	———	———	———	———
M-6 ...	ColdSV4	———	———	———	———	———	———
M-7 ...	Cnd Fan	———	———	———	———	———	———
M-8 ...	ColdWtrPmp	———	———	———	———	———	———
M-9 ...	HotWtrPmp	———	———	———	———	———	———
M10 ...	ALARM	———	———	———	———	———	———
1-1 ...	VFD CMP ON	———	———	———	———	———	———
1-2 ...	VFD RESET	———	———	———	———	———	———
1-3 ...	SPARE1-3	———	———	———	———	———	———
1-4 ...	SPARE1-4	———	———	———	———	———	———
1-5 ...	SPARE1-5	———	———	———	———	———	———
1-6 ...	SPARE1-6	———	———	———	———	———	———
1-7 ...	SPARE1-7	———	———	———	———	———	———
1-8 ...	SPARE1-8	———	———	———	———	———	———
1-9 ...	SPARE1-9	———	———	———	———	———	———
1-10 ...	SPARE1-10	———	———	———	———	———	———
2-1 ...	VfdFanCtrl	———	———	———	———	———	———

8.9. ABB - AC880 Mapping - PROGRAM SELECT '10'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	ABB ACS880 VFD

8.9.1 ABB MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	57	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	38	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	39	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	40	(W)Not Used	Signed Int16	65535	1	1	0	1

8.9.2 ABB MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	19200
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

8.9.3 ABB MODBUS Read Sensor Inputs

9 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	101	(R) Hold Registers	Signed Int16	65535	18	100	0	1
2	1	114	(R) Hold Registers	Signed Int16	65535	1	1	0	1
3	1	107	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	113	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	111	(R) Hold Registers	Signed Int16	65535	1	10	0	1
6	1	511	(R) Hold Registers	Signed Int16	65535	1	1	0	1
7	1	611	(R) Hold Registers	Invert DI	8	1	8	0	1
8	1	421	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	1	422	(R) Hold Registers	Signed Int16	65535	1	1	0	1
10	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
13	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.9.4 ABB MODBUS Write Analog Outputs

3 Analog Outputs pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2	(W)Single Register	Signed Int16	65535	20	1	0	1
2	1	1	(W)Single Register	Signed Int16	65535	1	1	1150	1
3	1	1	(W)Single Register	Signed Int16	65535	1	1	1150	1
4	1	24	(W)Not Used	Signed Int16	65535	1	1	0	1

8.9.5 ABB Write Relay Outputs

No Relay Outputs pre-programmed into software.

Write Relay Outputs

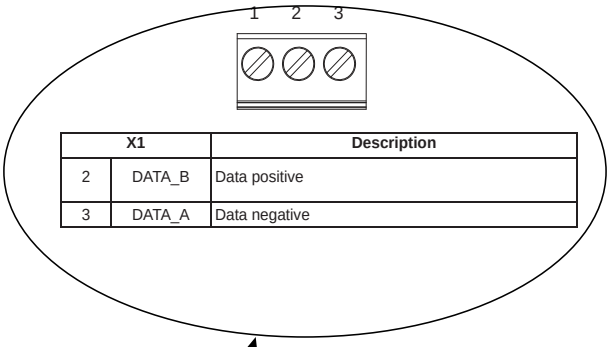
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	25	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	26	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	27	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	28	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	29	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	30	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	31	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	32	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	33	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	34	(W)Not Used	Signed Int16	65535	1	1	0	1

8.9.6 ABB - AC880 Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

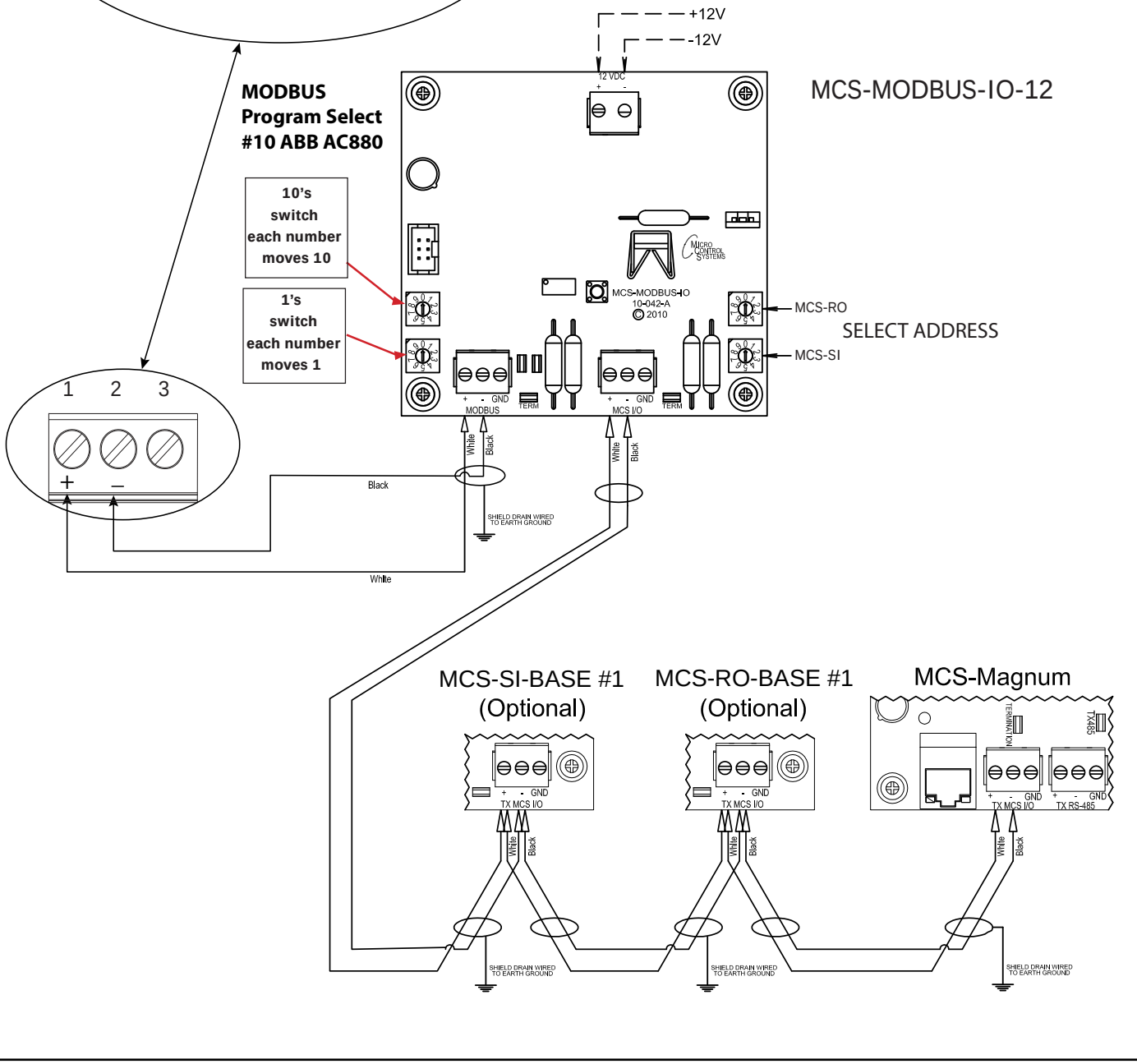
Connecting the module to the RS-485 network

Connect the bus cable to connector X1 on the adapter module.

The pin allocation of the X1 connector is shown below.



X1		Description
2	DATA_B	Data positive
3	DATA_A	Data negative

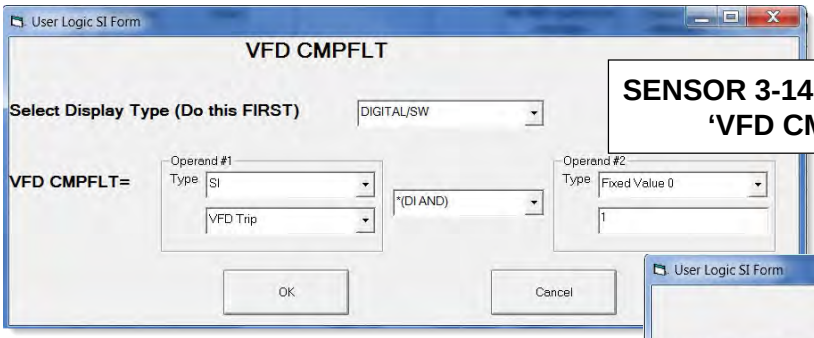


8.9.8 MCS-MAGNUM - ABB Sensor Inputs (9) Configuration

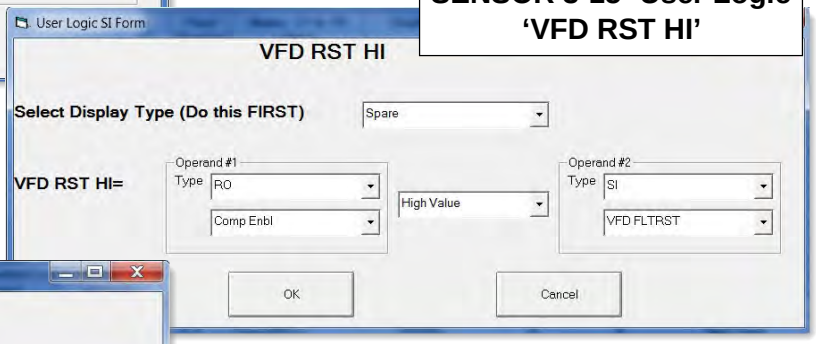
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
3-1	VFD Speed	MODBUS	0	10	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
3-2	VFD KW	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
3-3	VFD Amps	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	DEC2NOCH
3-4	VFD Volts	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	DEC2NOCH
3-5	VFD DC Bus	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec
3-6	VFD HSink	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	REF LEVEL
3-7	VFD Trip	MODBUS	Not Used	0	OFF/ON	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
3-8	VFD Fault1	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
3-9	VFD Fault2	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
3-10	Spare3-10	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-11	Spare3-11	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
3-12	UnitInL/O	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
3-13	CtlRun/Stp	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Manual ON	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
3-14	VFD CMPFLT	User Logic	Not Used	Closed=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
3-15	VFD RST HI	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
3-16	VFD FLTRST	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
4-1	VFD CMD	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare

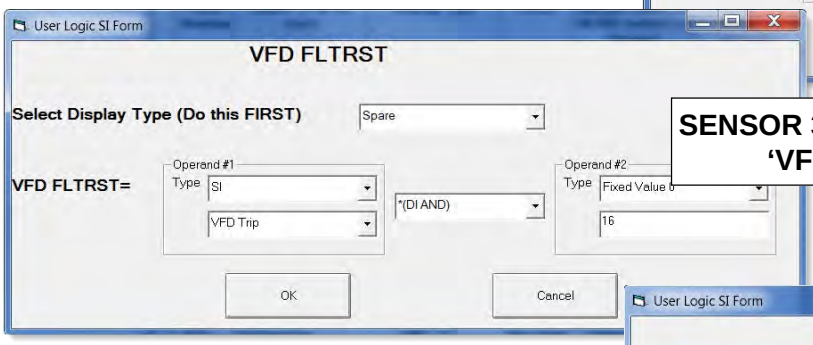
Sensor User Logic (4) (Yellow)



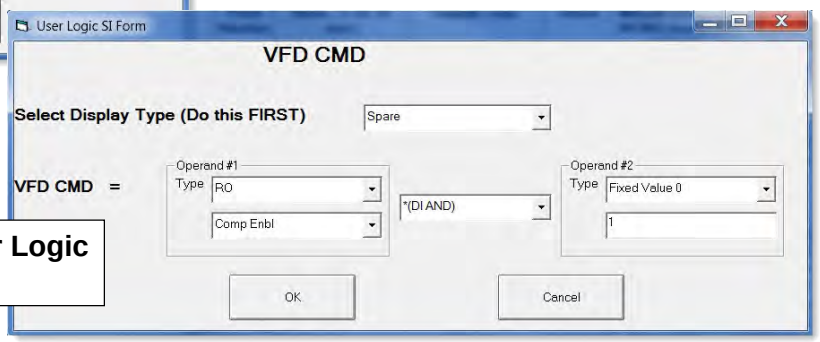
SENSOR 3-14 - User Logic 'VFD CMPFLT'



SENSOR 3-15- User Logic 'VFD RST HI'



SENSOR 3-16 - User Logic 'VFD FLTRST'

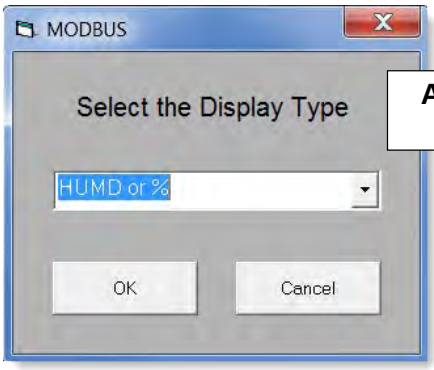


SENSOR 4-1 - User Logic 'VFD CMD'

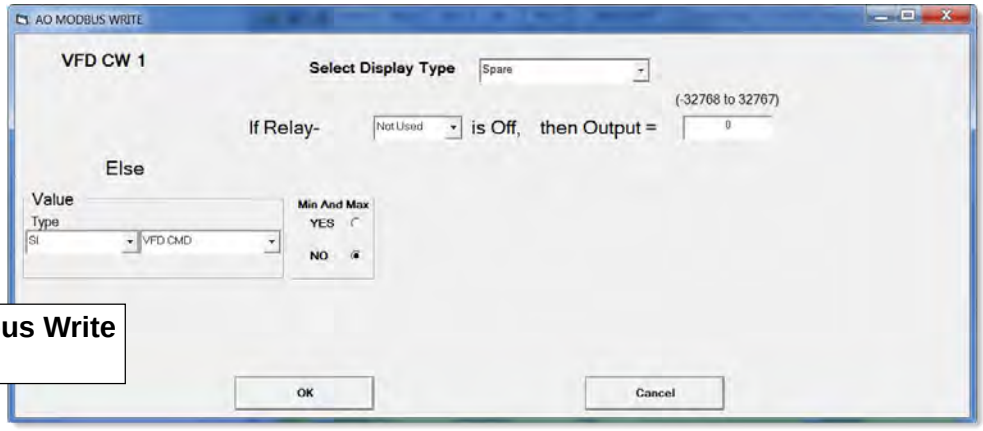
8.9.7 MCS-MAGNUM ABB - Analog Outputs / Modbus write (3) (Yellow)

Analog Output Information Screen

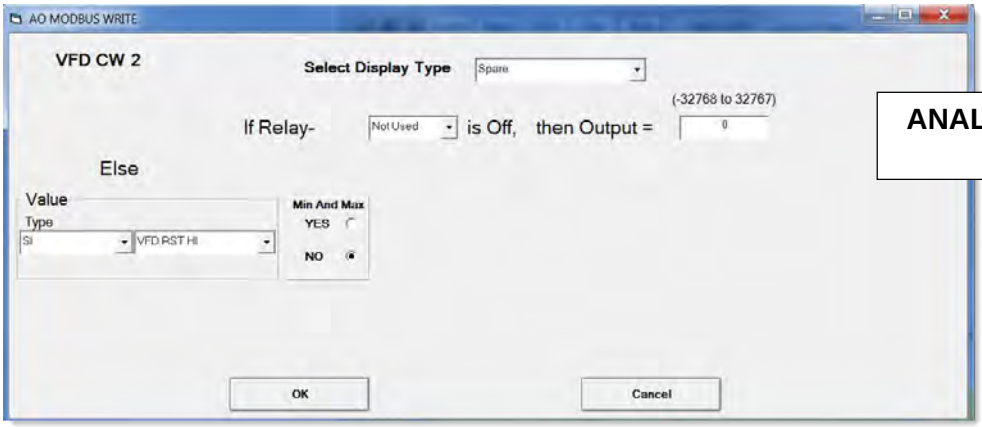
Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	SPARE M-1	Standard	NO		SPARE
M-2	SPARE M-2	Standard	NO		SPARE
M-3	SPARE M-3	Standard	NO		SPARE
M-4	SPARE M-4	Standard	NO		SPARE
1-1	SPARE1-1	Standard	NO		SPARE
1-2	SPARE1-2	Standard	NO		SPARE
1-3	SPARE1-3	Standard	NO		SPARE
1-4	SPARE1-4	Standard	NO		SPARE
2-1	SPARE2-1	Standard	NO		SPARE
2-2	SPARE2-1	Standard	NO		SPARE
2-3	SPARE2-1	Standard	NO		SPARE
2-4	SPARE2-1	Standard	NO		SPARE
3-1	COMP SPEED	Modbus	NO		HUMD or %
3-2	VFD CW 1	Modbus Write	NO		Spare
3-3	VFD CW 2	Modbus Write	NO		Spare



ANALOG 3-1 - Modbus 'COMP SPEED %'



ANALOG 3-2 - Modbus Write 'VFD CW 1'



ANALOG 3-3 - Modbus Write 'VFD CW 2'

8.10. EMERSON EVC-1150B Mapping - PROGRAM SELECT '11'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	ABB ACS880 VFD

8.10.1 EMERSON EVC-1150B MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	24	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.10.2 EMERSON EVC-1150B MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	No Parity
Stop Bits	1
Poll Delay (ms)	20
Poll Timeout (ms)	600

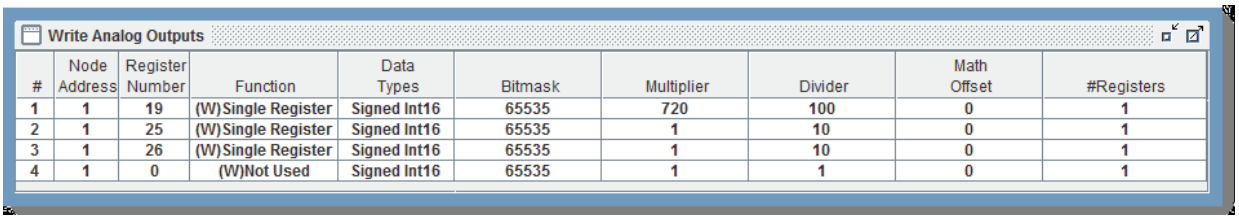
8.10.3 EMERSON EVC-1150B MODBUS Read Sensor Inputs
5 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	31	(R) Hold Registers	Signed Int16	65535	1	1	0	1
2	1	57	(R) Hold Registers	Signed Int16	65535	1	1	0	1
3	1	22	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	23	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	21	(R) Hold Registers	Signed Int16	65535	1	1	0	1
6	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
13	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

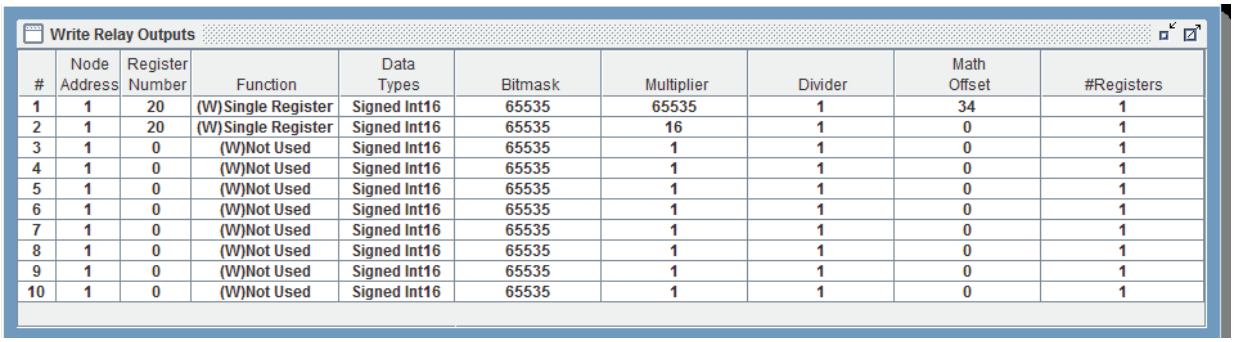
8.10.4 EMERSON EVC-110B MODBUS Write Analog Outputs
3 Analog Outputs pre-programmed into software.



Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	19	(W)Single Register	Signed Int16	65535	720	100	0	1
2	1	25	(W)Single Register	Signed Int16	65535	1	10	0	1
3	1	26	(W)Single Register	Signed Int16	65535	1	10	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.10.5 EMERSON EVC-1150B Write Relay Outputs
2 Relay Outputs pre-programmed into software.



Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20	(W)Single Register	Signed Int16	65535	65535	1	34	1
2	1	20	(W)Single Register	Signed Int16	65535	16	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.10.6 EMERSON EVC-1150B Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

Communications connections

The drive offers a 2 wire 485 interface. This enables the drive set-up, operation and monitoring to be carried out with a PC or controller if required.

Figure 4-24 Location of the comms connectors

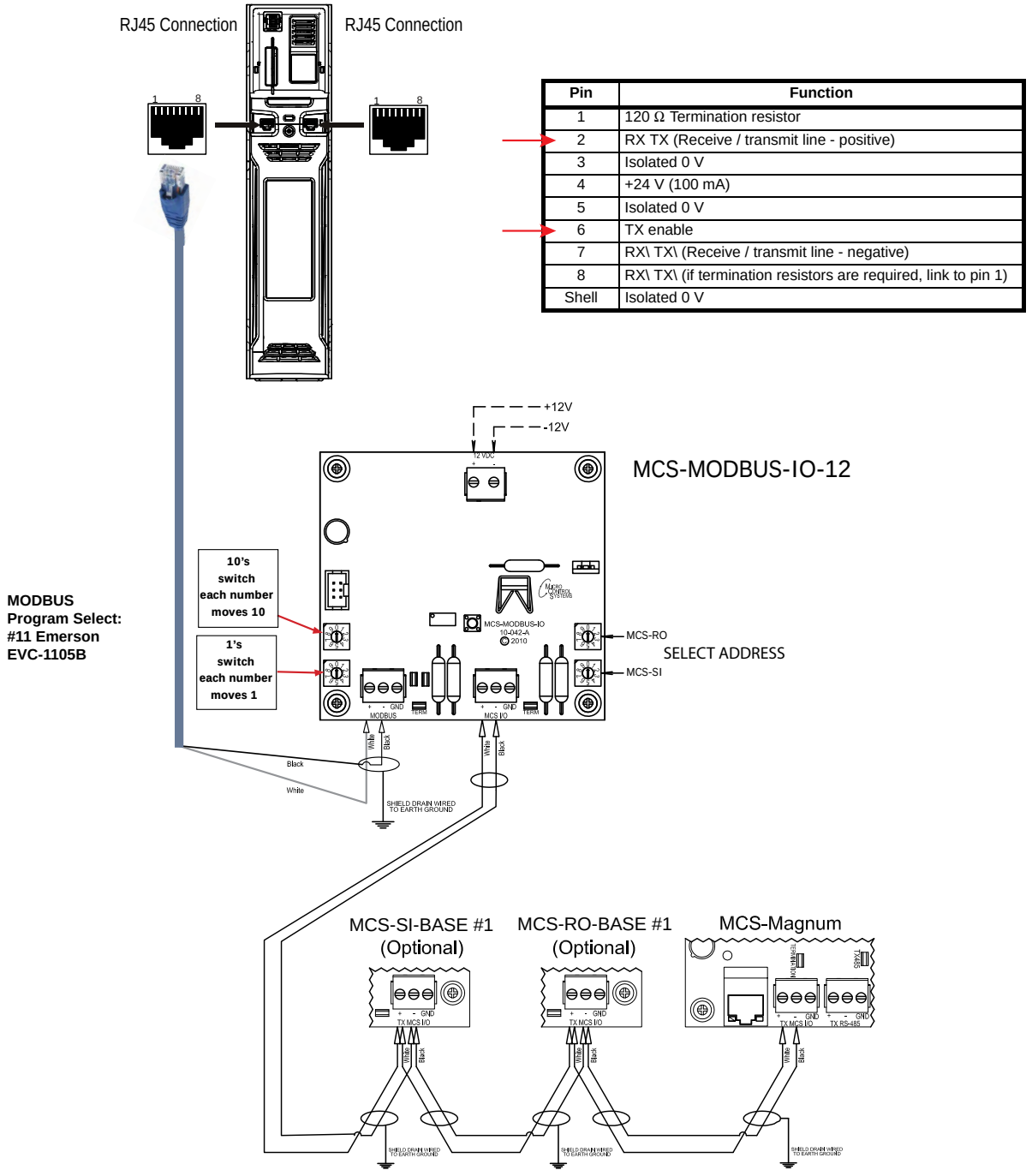
The 485 option provides two parallel RJ45 connectors are provided allowing easy daisy chaining. The drive only supports MODBUS RTU protocol. See Table 4-13 for the connection details.

NOTE

Standard Ethernet cables are not recommended for use when connecting drives on a 485 network as they do not have the correct twisted pairs for the pinout of the serial comms port.

Table 4-13 Serial communication port pin-outs

Pin	Function
1	120 Ω Termination resistor
2	RX TX (Receive / transmit line - positive)
3	Isolated 0 V
4	+24 V (100 mA)
5	Isolated 0 V
6	TX enable
7	RX\ TX\ (Receive / transmit line - negative)
8	RX\ TX\ (if termination resistors are required, link to pin 1)
Shell	Isolated 0 V

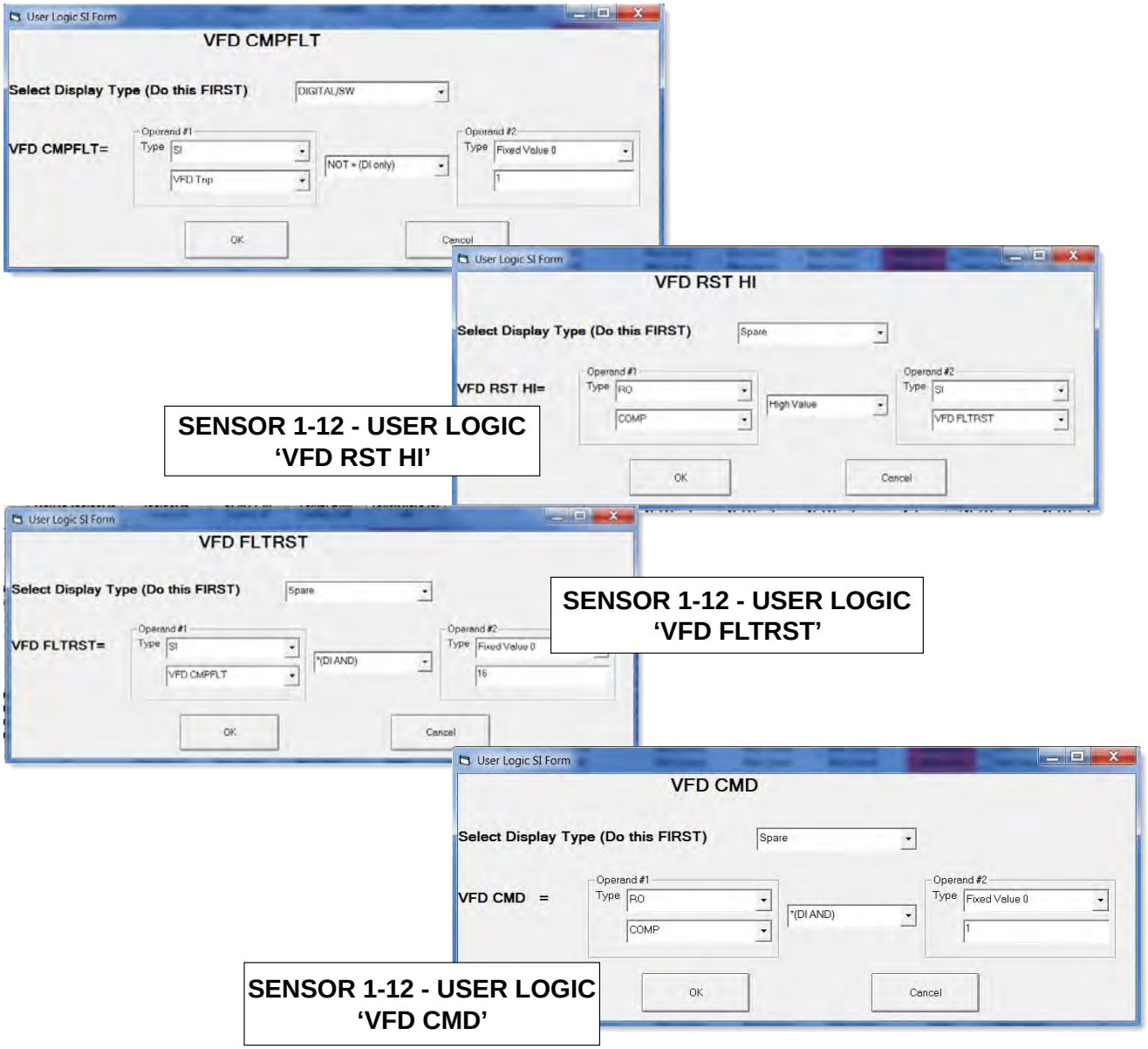


8.10.7 MCS-MAGNUM Emerson EVC 1150B Sensor Inputs (7) - Configuration

Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	VFD Speed	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
1-2	VFD KW	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	TEMP
1-3	VFD Amps	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-4	VFD Volts	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-5	VFD DC Bus	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	RPM'S
1-6	VFD HSink	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-7	VFD Trip	MODBUS	Not Used	0	OFF/ON	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
1-8	SPARE 1-8	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-9	SPARE 1-9	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-10	SPARE 1-10	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-11	SPARE1-11	SPARE	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-12	VFD CMPFLT	User Logic	Not Used	Open=OFF	OFF/ON	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	DIGITAL/SW
1-13	VFD RST HI	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
1-14	VFD FLTRST	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
1-15	VFD CMD	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare

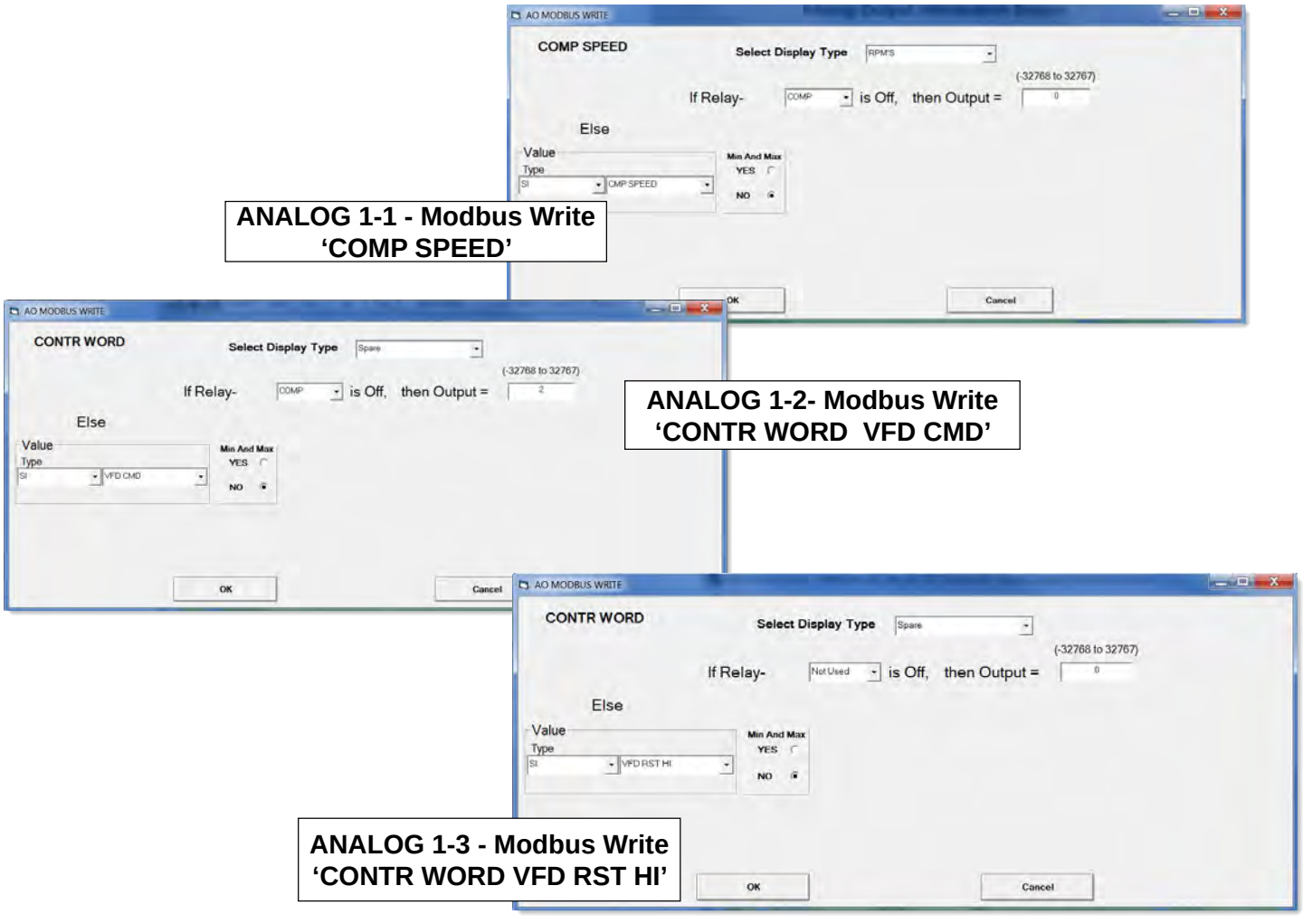
Sensor User Logic (4) (yellow)



8.10.8 MCS-MAGNUM - Emerson EVC-1150B Analog Outputs (3) Configuration

Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type
M-1	COMP %	Standard	NO		SPARE
M-2	EXV %	Standard	NO		SPARE
M-3	CndFanSPD%	Linear CTRL	NO		SPARE
M-4	VFD FAN	Linear CTRL	NO		SPARE
1-1	COMP SPEED	Modbus Write	NO		RPM'S
1-2	VFD CMD	Modbus Write	NO		Spare
1-3	VFD RST HI	Modbus Write	NO		Spare
1-4	MONITOR	Modbus	NO		Spare



8.11. SKF Magnetic Bearing Controller Mapping - PROGRAM SELECT '12'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	SKF BEARING

8.11.1 SKF BEARING-MBC MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	272	(W)Single Register	Startup Msg	65535	1	1	1	1
2	1	273	(W)Single Register	Startup Msg	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.11.2 SKF BEARING-MBC MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	100
Poll Timeout (ms)	500

8.11.3 SKF BEARING-MBC MODBUS Read Sensor Inputs

8 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	420	(R) Hold Registers	Invert DI	65535	1	1	0	1
2	1	418	(R) Hold Registers	Invert DI	65535	1	1	0	1
3	1	444	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	387	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	411	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
6	1	413	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
7	1	388	(R) Hold Registers	Signed Int16	65535	1	1	0	1
8	1	443	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
13	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.11.4 SKF BEARING-MBC MCS-MODBUS Write Analog Outputs
0 Analog Outputs pre-programmed into software.

Write Analog Outputs

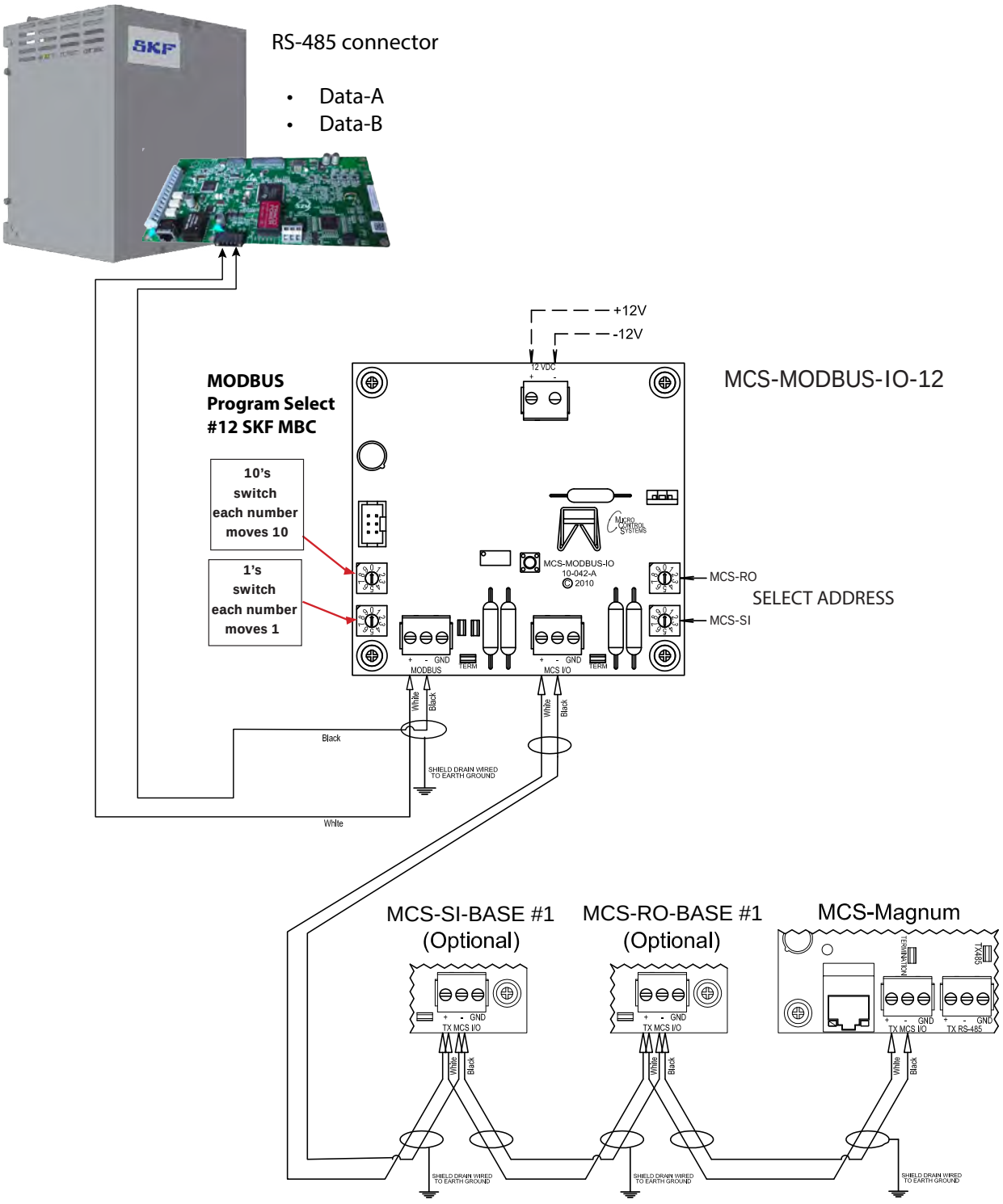
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.11.5 SKF BEARING-MBC - MCS MODBUS Write Relay Outputs
3 Relay Outputs pre-programmed into software.

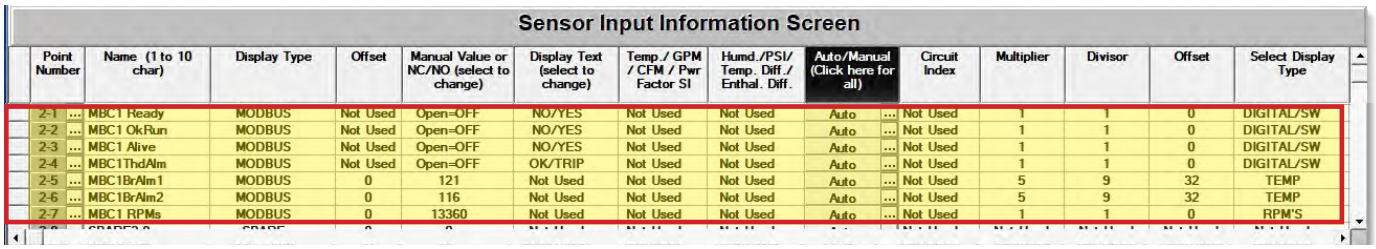
Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	274	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	275	(W)Single Register	Signed Int16	65535	1	1	0	1
3	1	270	(W)Single Register	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.11.6 SKF BEARING-MBC - Wiring Diagram
To Modbus/MCS Expansion Boards/MCS-MAGNUM



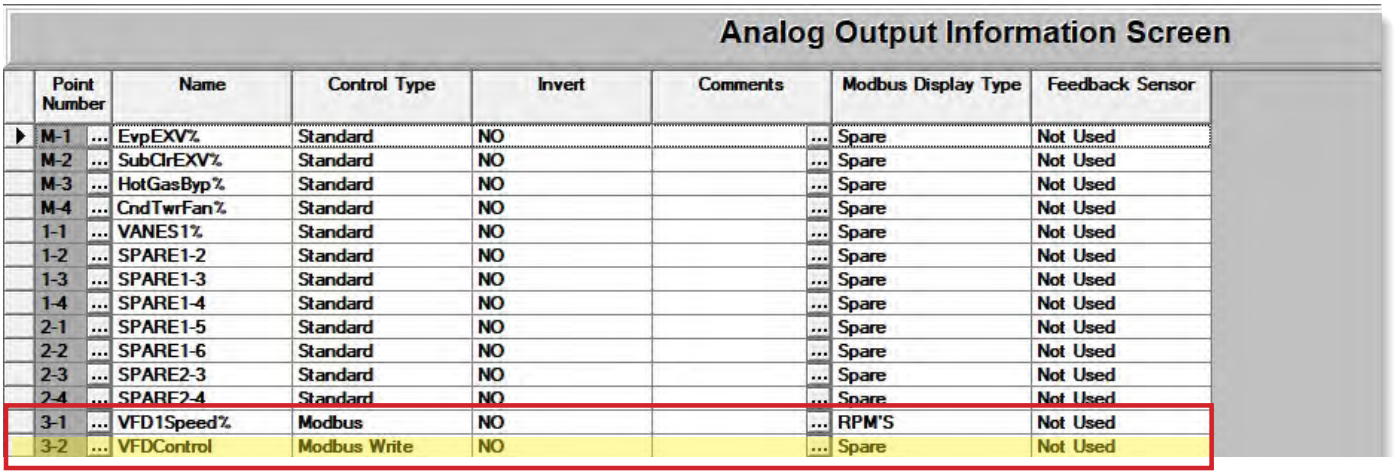
8.11.7 MCS-MAGNUM - SKF BEARING-MBC Sensor Inputs (7) - Configuration



Sensor Input Information Screen

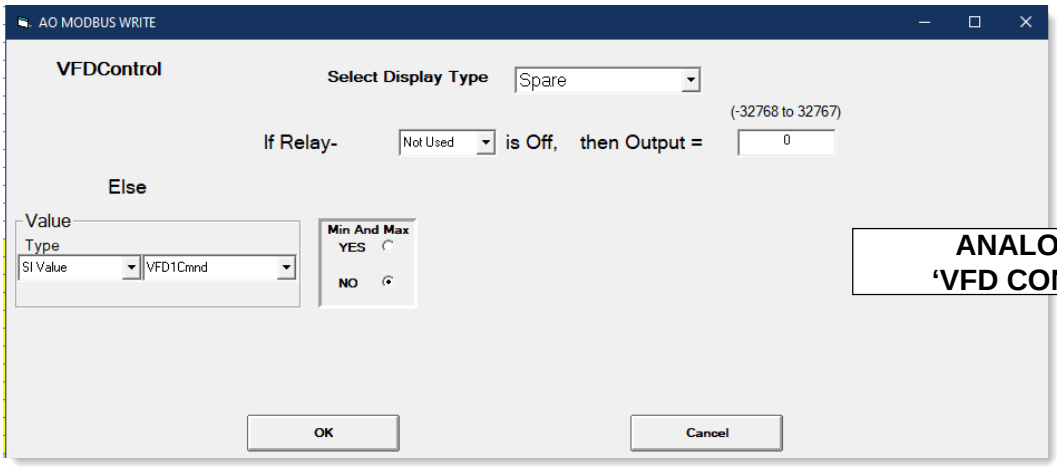
Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
2-1	MBC1 Ready	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-2	MBC1 OkRun	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-3	MBC1 Alive	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-4	MBC1ThdAlm	MODBUS	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-5	MBC1BrAlm1	MODBUS	0	121	Not Used	Not Used	Not Used	Auto	Not Used	5	9	32	TEMP
2-6	MBC1BrAlm2	MODBUS	0	116	Not Used	Not Used	Not Used	Auto	Not Used	5	9	32	TEMP
2-7	MBC1 RPMs	MODBUS	0	13360	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	RPM'S

8.11.8 MCS-MAGNUM - SKF BEARING-MBC Analog Outputs (2) - Configuration



Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type	Feedback Sensor
M-1	EvpEXV%	Standard	NO		Spare	Not Used
M-2	SubClrEXV%	Standard	NO		Spare	Not Used
M-3	HotGasByp%	Standard	NO		Spare	Not Used
M-4	CndTwrFan%	Standard	NO		Spare	Not Used
1-1	VANES1%	Standard	NO		Spare	Not Used
1-2	SPARE1-2	Standard	NO		Spare	Not Used
1-3	SPARE1-3	Standard	NO		Spare	Not Used
1-4	SPARE1-4	Standard	NO		Spare	Not Used
2-1	SPARE1-5	Standard	NO		Spare	Not Used
2-2	SPARE1-6	Standard	NO		Spare	Not Used
2-3	SPARE2-3	Standard	NO		Spare	Not Used
2-4	SPARE2-4	Standard	NO		Spare	Not Used
3-1	VFD1Speed%	Modbus	NO		RPM'S	Not Used
3-2	VFDControl	Modbus Write	NO		Spare	Not Used



ANALOG 3-2
'VFD CONTROL'

8.12. KEB F5A - MCS-MODBUS Mapping - PROGRAM SELECT '13'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.
(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | **0 - MCS-MODBUS-IO**

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	KEB F5 A

8.12.1 KEB F5A - MCS-MODBUS ONE-TIME WRITES 0- INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.12.2 KEB F5A - MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	No Parity
Stop Bits	1
Poll Delay (ms)	100
Poll Timeout (ms)	500

8.12.3 KEB F5A - MCS-MODBUS Read Sensor Inputs
6 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	8244	(R) Hold Registers	Signed Int16	2	1	1	0	1
2	1	8244	(R) Hold Registers	Signed Int16	4	1	1	0	1
3	1	8246	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	8720	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	8786	(R) Hold Registers	Signed Int16	65535	1	1	0	2
6	1	8725	(R) Hold Registers	Signed Int16	65535	1	1	0	2
7	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.12.4 KEB F5A - MCS-MODBUS Write Analog Outputs
2 Analog Outputs pre-programmed into software.

Write Analog Outputs

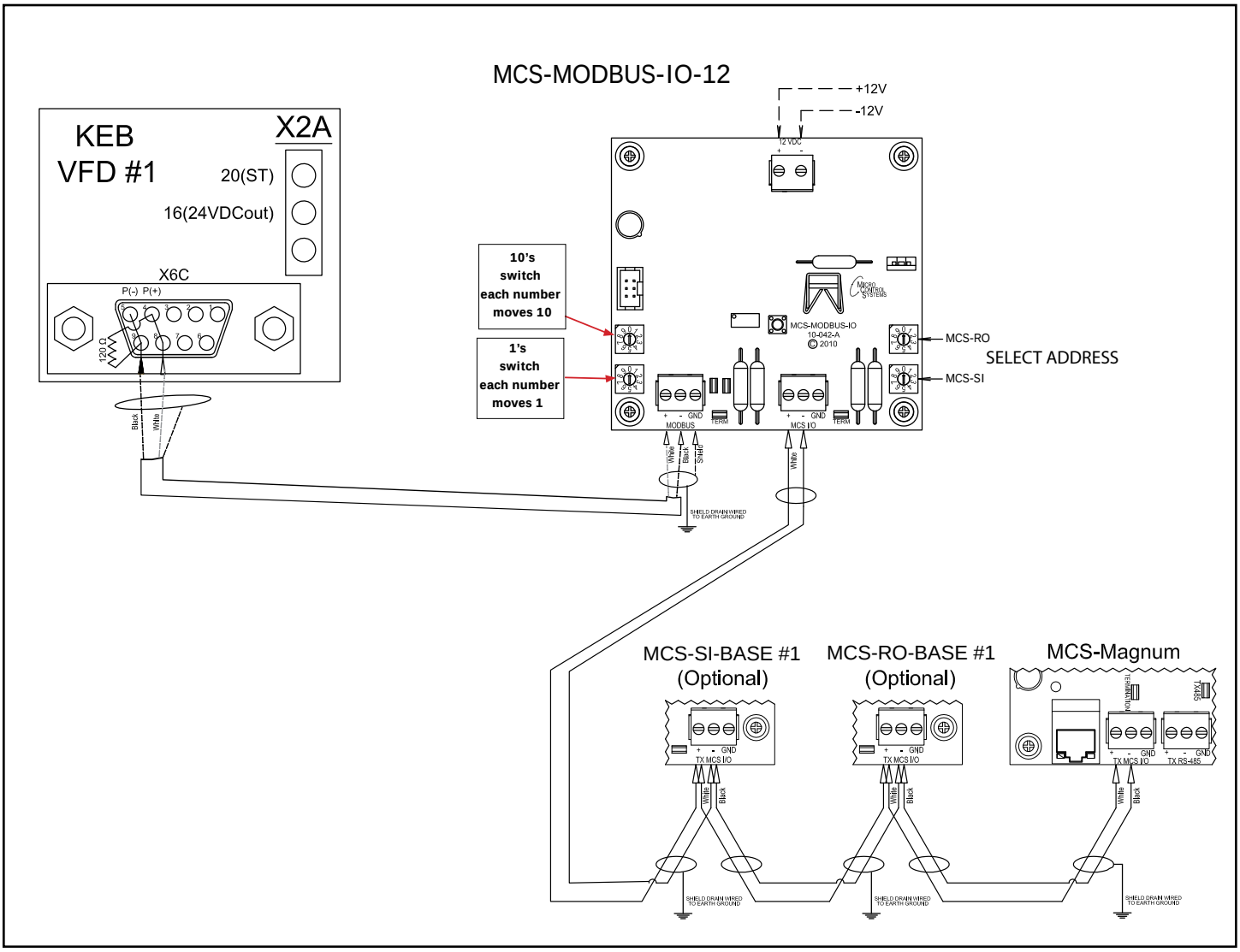
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	8245	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	8243	(W)Single Register	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.12.5 KEB F5A - MCS-MODBUS Write Relay Outputs
0 Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.12.6 KEB F5A - Wiring Diagram
To Modbus/MCS Expansion Boards/MCS-MAGNUM



8.12.7 MCS-MAGNUM - KEB F5A - Sensor Inputs (6) - Configuration

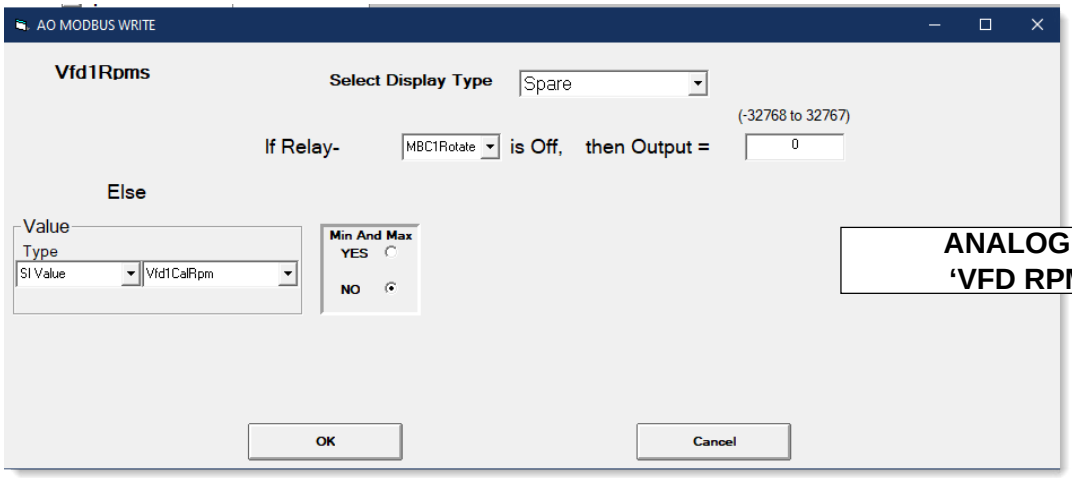
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
2-1	VFD1 Alarm	MODBUS	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
2-2	VFD1Proof	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
2-3	VFD1 RPMs	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	10	0	RPM'S
2-4	VFD1 AMPS	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	AMPS/CT
2-5	VFD1 KW	MODBUS	0	121	Not Used	Not Used	Not Used	Manual	Not Used	1	10	0	KW
2-6	VFD1 Volts	MODBUS	0	1160	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	VOLTS-0Dec

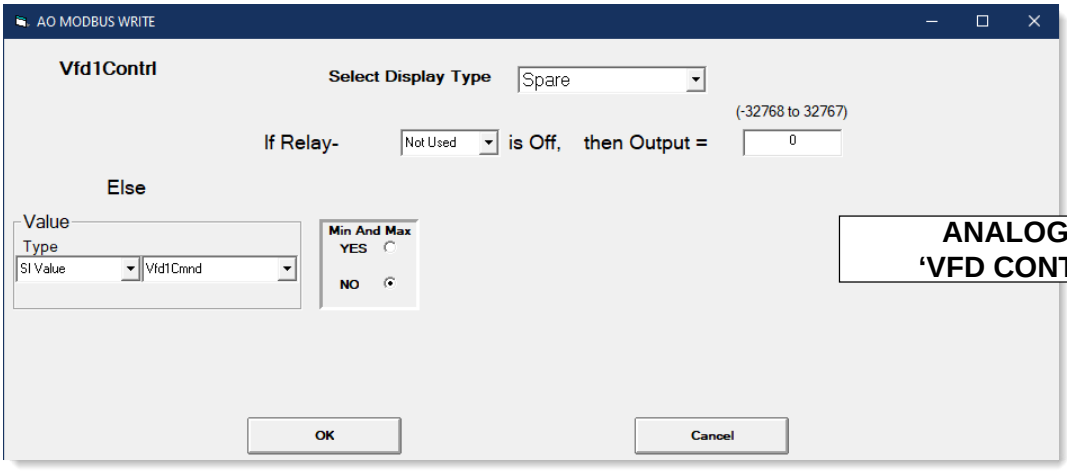
8.12.8 MCS-MAGNUM - KEB F5A Analog Outputs (2) - Configuration

Analog Output Information S

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type	Feedback Sensor
M-1	EvpEXV1	Standard	NO		Spare	Not Used
M-2	EvpEXV2	Linear CTRL	NO		Spare	Not Used
M-3	HotGasByp	Linear 2-10vdc	NO		Spare	Not Used
M-4	CTFanSpeed	Standard	NO		Spare	Not Used
1-1	SPARE1-1	Standard	NO		Spare	Not Used
1-2	SPARE1-2	Standard	NO		Spare	Not Used
1-3	SPARE1-3	Standard	NO		Spare	Not Used
1-4	SPARE1-4	Standard	NO		Spare	Not Used
2-1	Vfd1Rpms	Modbus Write	NO		Spare	Not Used
2-2	Vfd1Contrl	Modbus Write	NO		Spare	Not Used



ANALOG 2-1 'VFD RPMS'



ANALOG 2-1 'VFD CONTROL'

8.13. SKF Magnetic Bearing Controller - TANDEM Mapping - PROGRAM SELECT '14'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

Site Info | 0 - MCS-MODBUS-IO

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	SKF BEARING

(Screen shots from MCS-CONNECT, readings from Modbus

8.13.1 SKF Magnetic Bearing Controller - TANDEM - MODBUS ONE-TIME WRITES

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	272	(W) Single Register	Startup Msg	65535	1	1	1	1
2	1	273	(W) Single Register	Startup Msg	65535	1	1	0	1
3	2	272	(W) Single Register	Startup Msg	65535	1	1	1	1
4	2	273	(W) Single Register	Startup Msg	65535	1	1	0	1
5	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1

8.13.2 SKF Magnetic Bearing Controller - TANDEM - MODBUS Comm. Setup

Service Panel

ModBus Connection Setup

Baud Rate	38400
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	100
Poll Timeout (ms)	500

8.13.3 SKF Magnetic Bearing Controller - TANDEM - MODBUS Read Sensor Inputs 16 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	420	(R) Hold Registers	Invert DI	65535	1	1	0	1
2	1	418	(R) Hold Registers	Invert DI	65535	1	1	0	1
3	1	444	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	387	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	411	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
6	1	413	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
7	1	388	(R) Hold Registers	Signed Int16	65535	1	1	0	1
8	1	443	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	2	420	(R) Hold Registers	Invert DI	65535	1	1	0	1
10	2	418	(R) Hold Registers	Invert DI	65535	1	1	0	1
11	2	444	(R) Hold Registers	Signed Int16	65535	1	1	0	1
12	2	387	(R) Hold Registers	Signed Int16	65535	1	1	0	1
13	2	411	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
14	2	413	(R) Hold Registers	Float-LSB	65535	1000	1	0	2
15	2	388	(R) Hold Registers	Signed Int16	65535	1	1	0	1
16	2	443	(R) Hold Registers	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.13.4 SKF Magnetic Bearing Controller - TANDEM - MODBUS Write Analog Outputs (0) Analog Outputs pre-programmed into software.

Write Analog Outputs

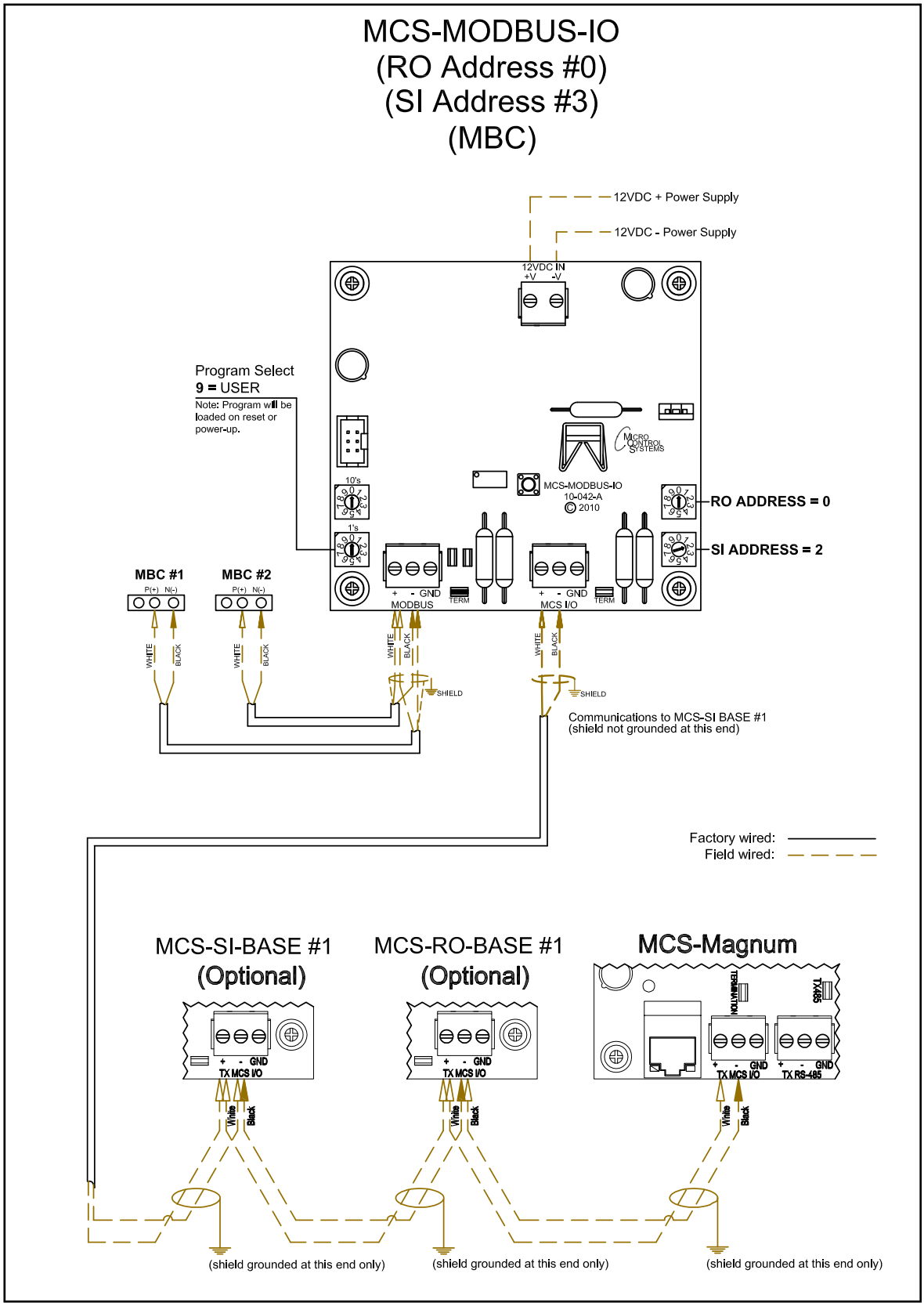
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.13.5 SKF Magnetic Bearing Controller - TANDEM- MODBUS Write Relay Outputs (6) Relay Outputs pre-programmed into software.

Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	274	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	275	(W)Single Register	Signed Int16	65535	1	1	0	1
3	1	270	(W)Single Register	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	2	274	(W)Single Register	Signed Int16	65535	1	1	0	1
6	2	275	(W)Single Register	Signed Int16	65535	1	1	0	1
7	2	270	(W)Single Register	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.13.6 SKF Magnetic Bearing Controller - TANDEM - Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM



8.13.7 MCS-MAGNUM - SKF Magnetic Bearing Controller - TANDEM - **Sensor Inputs (16) - Configuration**

Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	MBC1 Ready	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
1-2	MBC1 OkRun	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
1-3	MBC1Alarm1	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	Spare
1-4	MBC1Elong	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	VOLTS-0Dec
1-5	MBC1Brg1	MODBUS	0	2	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	DEC2NOCH
1-6	MBC1Brg2	MODBUS	0	2	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	DEC2NOCH
1-7	MBC1 HZ	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	0.1	0	DEC1NOCH
1-8	MBC1Status	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	SECONDS
1-9	MBC2 Ready	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
1-10	MBC2 OkRun	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Manual OFF	Not Used	1	1	0	DIGITAL/SW
1-11	MBC2Alarm1	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	Spare
1-12	MBC2Elong	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	VOLTS-0Dec
1-13	MBC2Brg1	MODBUS	0	2	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	DEC2NOCH
1-14	MBC2Brg2	MODBUS	0	2	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	DEC2NOCH
1-15	MBC2 HZ	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	0.1	0	DEC1NOCH
1-16	MBC2Status	MODBUS	0	0	Not Used	Not Used	Not Used	Manual	Not Used	1	1	0	SECONDS

8.13.8 MCS-MAGNUM - SKF Magnetic Bearing Controller - TANDEM - **Relay Outputs (6) - Configuration**

Relay Output Information Sc

Point Number	Name	Slide Mult.	Slide Div.	Slide Off.	Design Suc.PSI	Design Dis.PSI	Nominal Tonnage(of Step)	EXV Start (When Lead)	Type
M-1	ChWtrPmp1	------	------	------	------	------	------	------	Standard
M-2	ChWtrPmp2	------	------	------	------	------	------	------	Standard
M-3	CndWtrPmp	------	------	------	------	------	------	------	User Logic
M-4	CITwrFan1	------	------	------	------	------	------	------	Standard
M-5	CITwrFan2	------	------	------	------	------	------	------	Standard
M-6	CITwrFan3	------	------	------	------	------	------	------	Standard
M-7	SPAREM-7	------	------	------	------	------	------	------	Standard
M-8	SPAREM-8	------	------	------	------	------	------	------	Standard
M-9	Warning	------	------	------	------	------	------	------	Standard
M10	Alarm	------	------	------	------	------	------	------	Standard
1-1	MBC1Levit	------	------	------	------	------	0	30	Step w\ EXV
1-2	MBC1Rotate	------	------	------	------	------	------	------	Standard
1-3	MBC1Reset	------	------	------	------	------	------	------	Standard
1-4	SPARE1-4	------	------	------	------	------	------	------	Standard
1-5	MBC2Levit	------	------	------	------	------	0	30	Step w\ EXV
1-6	MBC2Rotate	------	------	------	------	------	------	------	Standard
1-7	MBC2Reset	------	------	------	------	------	------	------	Standard
1-8	SPARE1-8	------	------	------	------	------	------	------	Standard

8.14. KEB F5A-TANDEN - MCS-MODBUS Mapping - PROGRAM SELECT '15'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

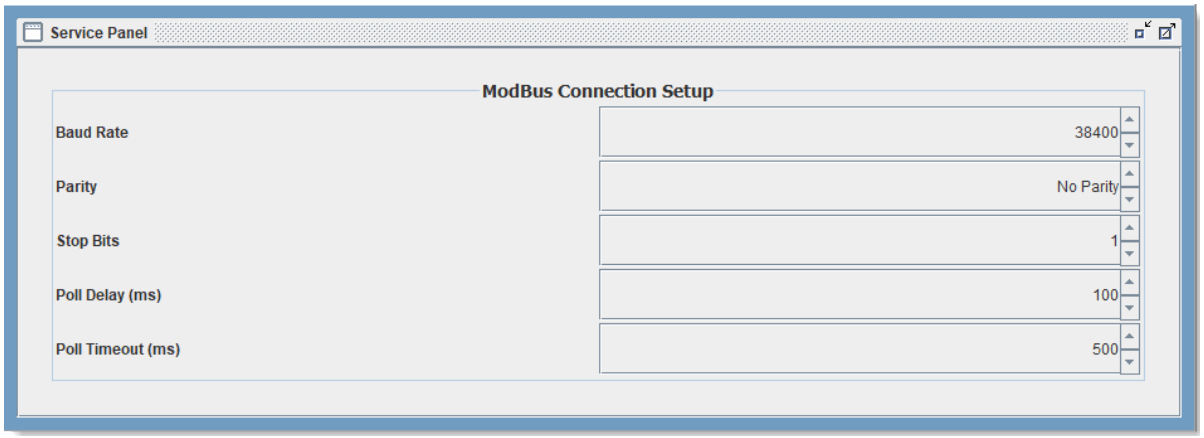
Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	KEB F5 A

8.14.1 KEB F5A-TANDEN - MCS-MODBUS ONE-TIME WRITES - INSTALLATION- 0

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.14.2 KEB F5A-TANDEN - MCS-MODBUS Communication Setup



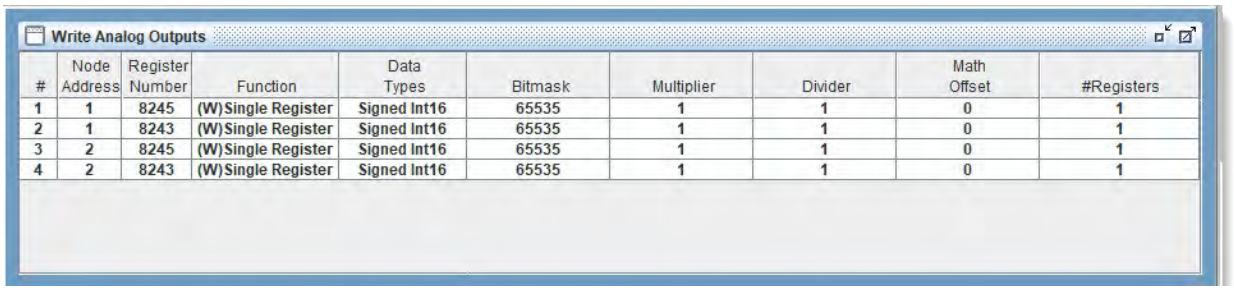
8.14.3 KEB F5A-TANDEN - MCS-MODBUS Read Sensor Inputs 12 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	8244	(R) Hold Registers	Signed Int16	2	1	1	0	1
2	1	8244	(R) Hold Registers	Signed Int16	4	1	1	0	1
3	1	8246	(R) Hold Registers	Signed Int16	65535	1	1	0	1
4	1	8720	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	8786	(R) Hold Registers	Signed Int16	65535	1	1	0	1
6	1	8725	(R) Hold Registers	Signed Int16	65535	1	1	0	1
7	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
8	2	8244	(R) Hold Registers	Signed Int16	2	1	1	0	1
9	2	8244	(R) Hold Registers	Signed Int16	3	1	1	0	1
10	2	8246	(R) Hold Registers	Signed Int16	65535	1	1	0	1
11	2	8720	(R) Hold Registers	Signed Int16	65535	1	1	0	1
12	2	8786	(R) Hold Registers	Signed Int16	65535	1	1	0	1
13	2	8725	(R) Hold Registers	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

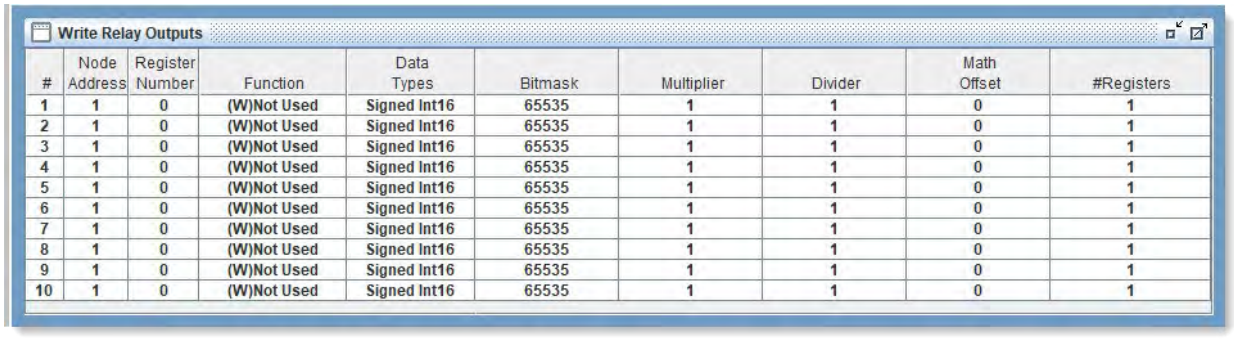
8.14.4 KEB F5A-TANDEN - MCS-MODBUS Write Analog Outputs
4 Analog Outputs pre-programmed into software.



Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	8245	(W)Single Register	Signed Int16	65535	1	1	0	1
2	1	8243	(W)Single Register	Signed Int16	65535	1	1	0	1
3	2	8245	(W)Single Register	Signed Int16	65535	1	1	0	1
4	2	8243	(W)Single Register	Signed Int16	65535	1	1	0	1

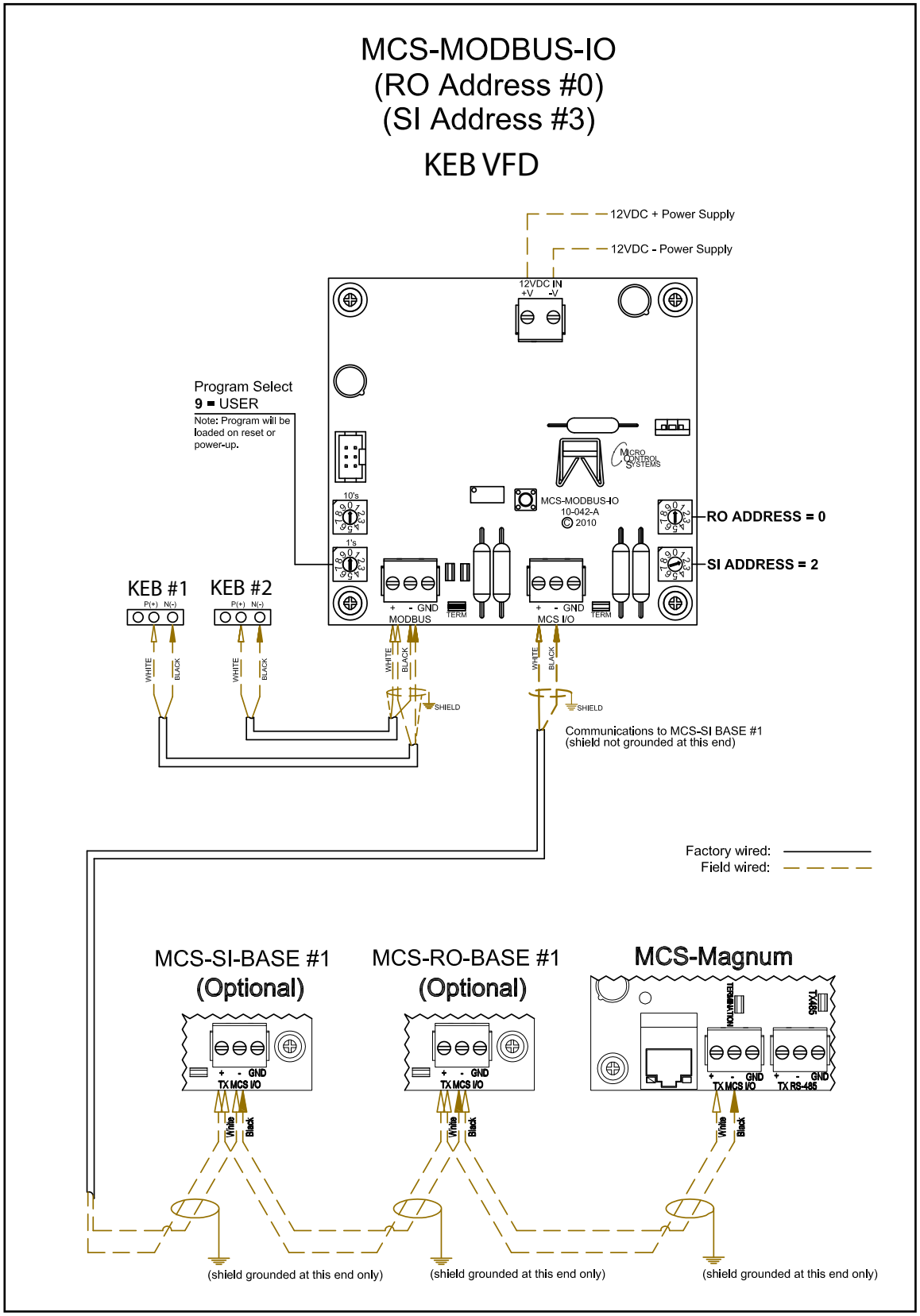
8.14.5 KEB F5A-TANDEN - MCS-MODBUS Write Relay Outputs
0 Relay Outputs pre-programmed into software.



Write Relay Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.14.6 KEB F5A-TANDEN - Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM



8.14.7 MCS-MAGNUM - KEB F5A-TANDEN Sensor Inputs (12) - Configuration

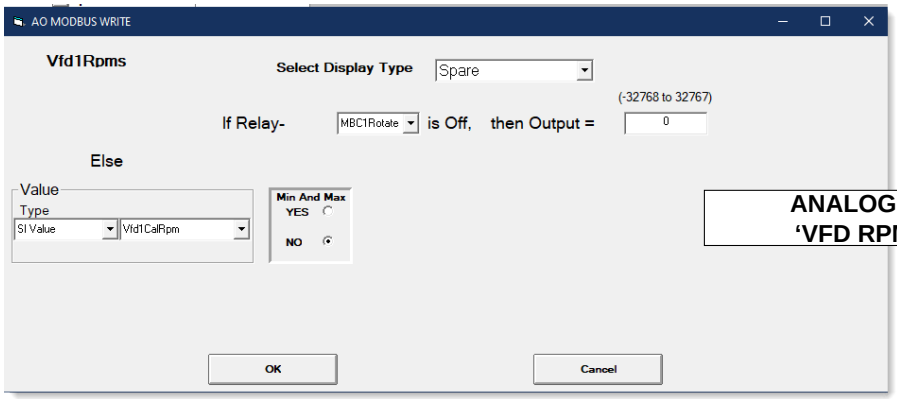
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Display Type	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Displa Type
2-1	VFD1 Alarm	MODBUS	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-2	VFD1Proof	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-3	VFD1 RPMs	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	RPM'S
2-4	VFD1 AMPS	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
2-5	VFD1 KW	MODBUS	0	121	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	KW
2-6	VFD1 Volts	MODBUS	0	1160	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
2-7	SucPsiCtrl	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	PSI GAGE
2-8	SucPStgCtl	User Logic	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	PSI GAGE
2-9	VFD2 Alarm	MODBUS	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-10	VFD2Proof	MODBUS	Not Used	Open=OFF	NO/YES	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
2-11	VFD2 RPMs	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	RPM'S
2-12	VFD2 AMPS	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	AMPS/CT
2-13	VFD2 KW	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	KW
2-14	VFD2 Volts	MODBUS	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec

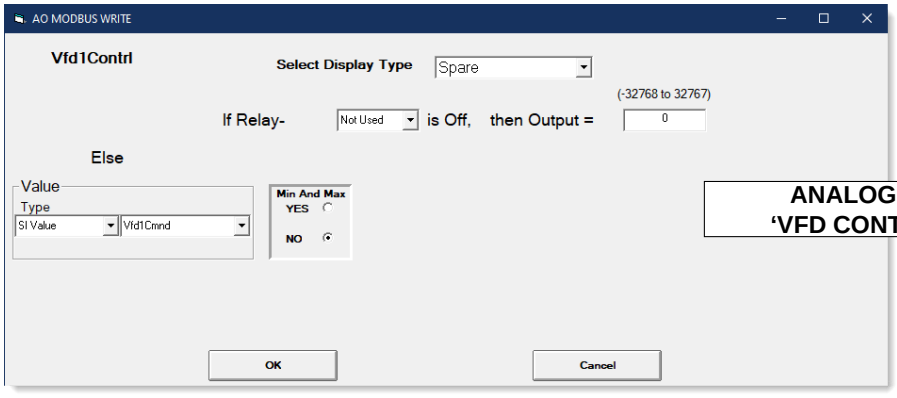
8.14.8 MCS-MAGNUM - KEB F5A-TANDEN Analog Outputs (4) - Configuration

Analog Output Information Screen

Point Number	Name	Control Type	Invert	Comments	Modbus Display Type	Feedback Sensor
M-1	EvpEXV1	Standard	NO		Spare	Not Used
M-2	EvpEXV2	Linear CTRL	NO		Spare	Not Used
M-3	HotGasByp	Linear 2-10vdc	NO		Spare	Not Used
M-4	CTFanSpeed	Standard	NO		Spare	Not Used
1-1	SPARE1-1	Standard	NO		Spare	Not Used
1-2	SPARE1-2	Standard	NO		Spare	Not Used
1-3	SPARE1-3	Standard	NO		Spare	Not Used
1-4	SPARE1-4	Standard	NO		Spare	Not Used
2-1	Vfd1Rpms	Modbus Write	NO		Spare	Not Used
2-2	Vfd1Contrl	Modbus Write	NO		Spare	Not Used
2-3	Vfd2Rpms	Modbus Write	NO		Spare	Not Used
2-4	Vfd2Contrl	Modbus Write	NO		Spare	Not Used



ANALOG 2-1
'VFD RPMS'



ANALOG 2-1
'VFD CONTROL'

8.15. ABB - ACH580 Mapping - PROGRAM SELECT '16'

Modbus to MCS-CONNECT will show all <u>available</u> pre-programmed register readings.

(Screen shots from MCS-CONNECT, readings from Modbus

Site Info | 0 - MCS-MODBUS-IO

Address	HW Serial #	Cfg Name	Company Name	Unit Model #
(0)	065535	MCS-MODBUS-IO	MCS	ABB ACH580 VFD

8.15.1 ABB MCS-MODBUS ONE-TIME WRITES - INSTALLATION

Write General Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W)Not Used	Signed Int16	65535	1	1	0	1

8.15.2 ABB MCS-MODBUS Communication Setup

Service Panel

ModBus Connection Setup

Baud Rate	19200
Parity	Even Parity
Stop Bits	1
Poll Delay (ms)	200
Poll Timeout (ms)	500

8.15.3 ABB MODBUS Read Sensor Inputs

8 Sensor Inputs pre-programmed into software.

Read Sensor Inputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	20212	(R) Hold Registers	High Byte	65535	1	100	0	2
2	1	20228	(R) Hold Registers	High Byte	65535	1	1	0	2
3	1	20214	(R) Hold Registers	High Byte	65535	1	1	0	2
4	1	113	(R) Hold Registers	Signed Int16	65535	1	1	0	1
5	1	111	(R) Hold Registers	Signed Int16	65535	1	1	0	1
6	1	511	(R) Hold Registers	Signed Int16	65535	10	1	0	1
7	1	611	(R) Hold Registers	Invert DI	8	1	1	0	1
8	1	401	(R) Hold Registers	Signed Int16	65535	1	1	0	1
9	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
11	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
12	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
13	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
14	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
15	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1
16	1	0	(R) Not Used	Signed Int16	65535	1	1	0	1

When writing controlling Modbus registers over the Modbus network using the MCS-MODBUS-IO, make sure the slave Modbus device is setup to find and set up the register to default to stop on loss of communication, or if not available hardwire the run/stop.

8.15.4 ABB MODBUS Write Analog Outputs

3 Analog Outputs pre-programmed into software.

Write Analog Outputs

#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	2	(W) Single Register	Signed Int16	65535	100	1	0	1
2	1	1	(W) Single Register	Signed Int16	65535	1	1	0	1
3	1	1	(W) Single Register	Signed Int16	65535	1	1	0	1
4	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1

8.15.5 ABB Write Relay Outputs

No Relay Outputs pre-programmed into software.

Write Relay Outputs

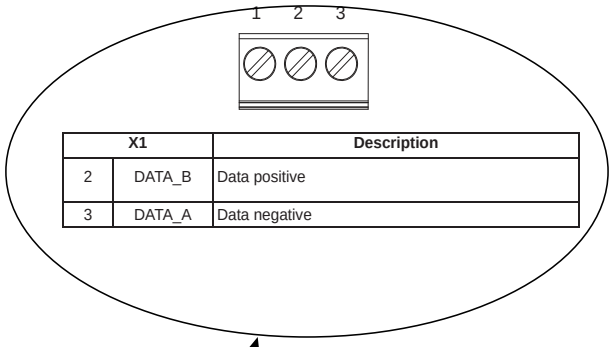
#	Node Address	Register Number	Function	Data Types	Bitmask	Multiplier	Divider	Math Offset	#Registers
1	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
2	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
3	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
4	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
5	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
6	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
7	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
8	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
9	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1
10	1	0	(W) Not Used	Signed Int16	65535	1	1	0	1

8.15.6 ABB - ACH580 Wiring Diagram To Modbus/MCS Expansion Boards/MCS-MAGNUM

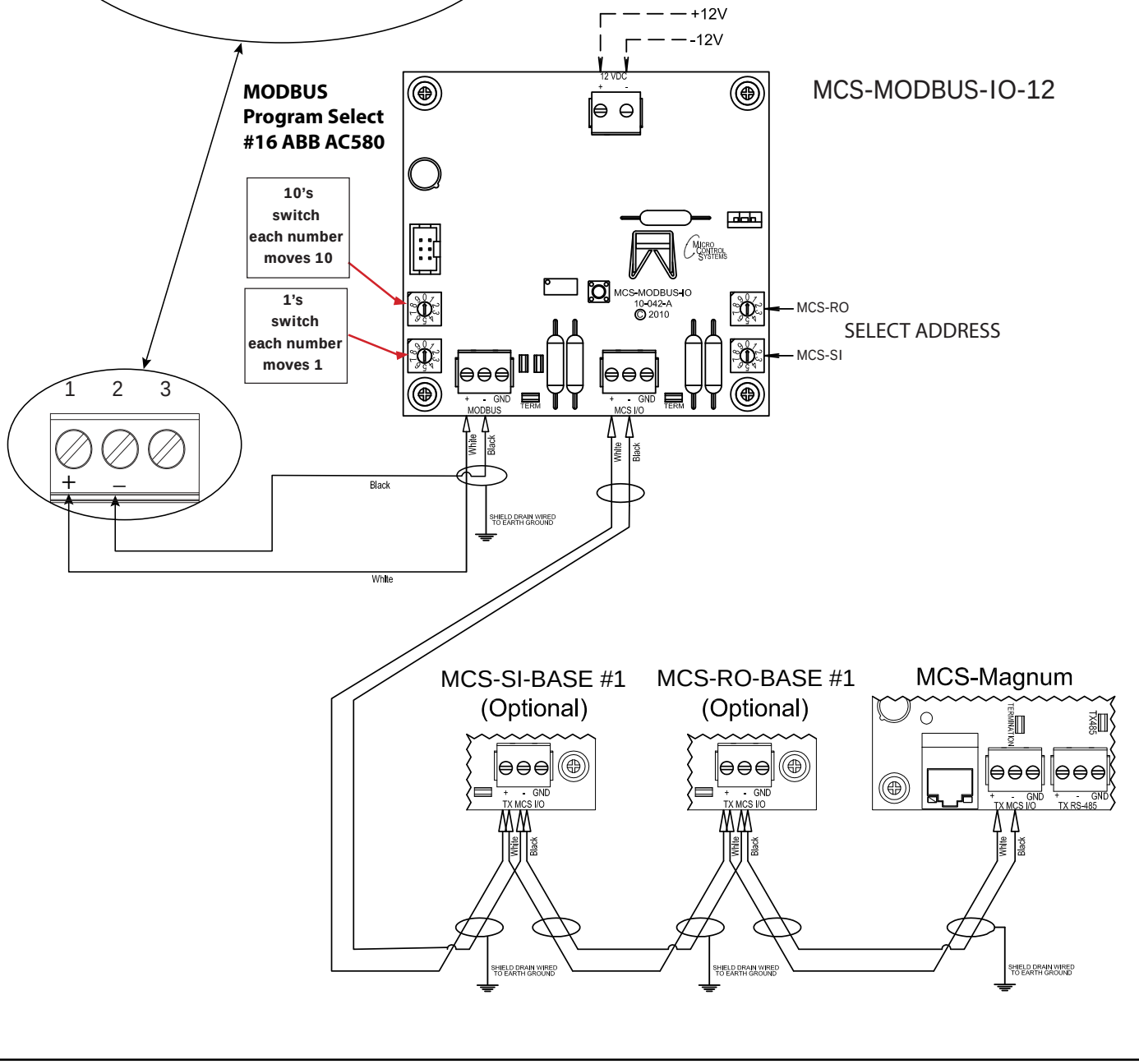
Connecting the module to the RS-485 network

Connect the bus cable to connector X1 on the adapter module.

The pin allocation of the X1 connector is shown below.



X1		Description
2	DATA_B	Data positive
3	DATA_A	Data negative



8.15.7 MCS-MAGNUM - ABB Sensor Inputs (9) - Configuration

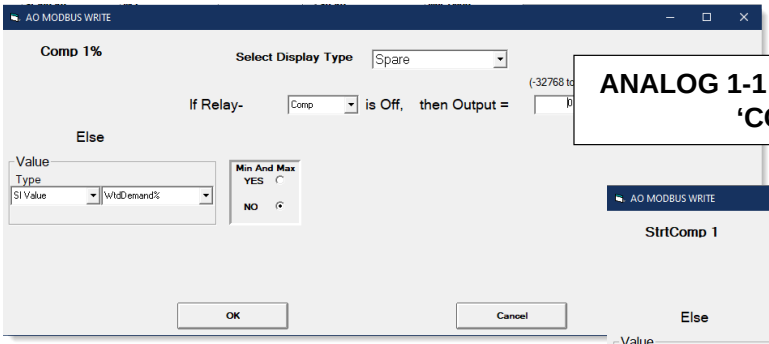
Sensor Input Information Screen

Point Number	Name (1 to 10 char)	Offset	Manual Value or NC/NO (select to change)	Display Text (select to change)	Temp./ GPM / CFM / Pwr Factor SI	Humd./PSI/ Temp. Diff./ Enthal. Diff.	Auto/Manual (Click here for all)	Circuit Index	Multiplier	Divisor	Offset	Select Display Type
1-1	VFD Speed	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	HOURS
1-2	VFD KW	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	KW
1-3	VFD Amps	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	10	0	AMPS/CT
1-4	VFD Volts	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-0Dec
1-5	VFD DC Bus	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	VOLTS-1Dec
1-6	VFD HtSink	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	REF LEVEL
1-7	VFD Trip	Not Used	Open=OFF	OK/TRIP	Not Used	Not Used	Auto	Not Used	1	1	0	DIGITAL/SW
1-8	Vfd1 Flt#	0	0	Not Used	Not Used	Not Used	Auto	Not Used	1	1	0	Spare
1-9	SPARE1-9	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-10	SPARE1-10	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-11	SPARE1-11	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-12	SPARE1-12	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-13	SPARE1-13	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Not Used
1-14	Vfd1FltRst	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare
1-15	Vfd1Cmnd	0	0	Not Used	Not Used	Not Used	Auto	Not Used	Not Used	Not Used	Not Used	Spare

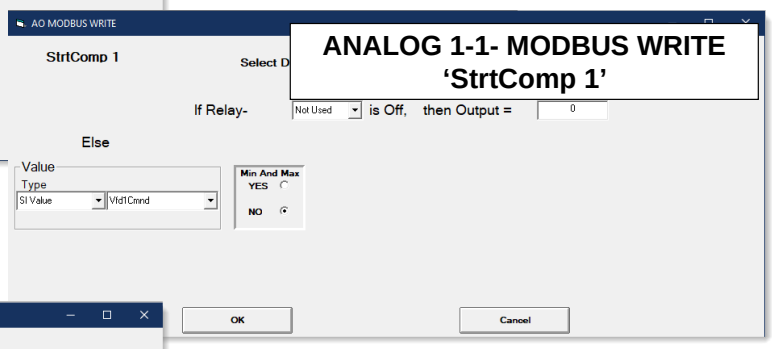
8.15.8 MCS-MAGNUM - ABB Analog Inputs - MODBUS WRITE (3) - Configuration

Analog Output Information Screen

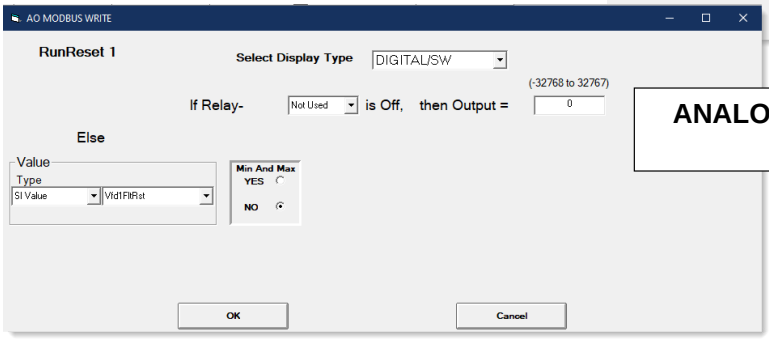
Point Number	Name	Control Type	Invert	Comments	Modbus Display Type	Feedback Sensor
M-1	Exv%	Standard	NO		Spare	Not Used
M-2	Cmp Spd%	Standard	NO		Spare	Not Used
M-3	SPAREM-3	Standard	NO		Spare	Not Used
M-4	SPAREM-4	Standard	NO		Spare	Not Used
1-1	Comp 1%	Modbus Write	NO		Spare	Not Used
1-2	StrtComp 1	Modbus Write	NO		DIGITAL/SW	Not Used
1-3	RunReset 1	Modbus Write	NO		DIGITAL/SW	Not Used



ANALOG 1-1 - MODBUS WRITE 'COMP 1%



ANALOG 1-1- MODBUS WRITE 'StrtComp 1'



ANALOG 1-3- MODBUS WRITE 'RunReset 1'

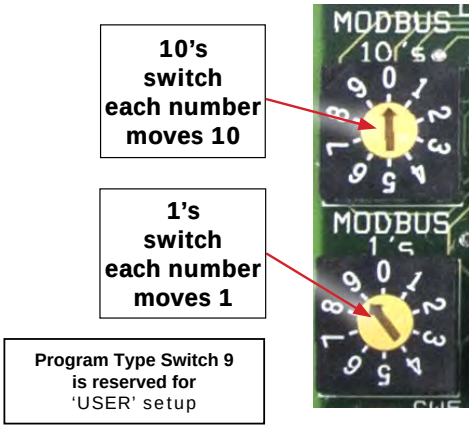
Chapter - 9. Appendix - Transmit New Config

Transmitting a new Config File to the MODBUS I/O Board

1. Consult with factory for obtaining the latest MCS-CONFIG file for your MCS-MODBUS-IO-12 Board.
2. Download the file sent to you from the factory to a location on your PC hard drive.
3. BEFORE POWERING UP THE MODBUS BOARD, SET THE PROGRAM TYPE SELECTOR SWITCH TO “9” (USER).

PROGRAM SELECT CHART

Firmware Ver. 3.01H	
PROGRAM SELECT	**CONFIGURATION NAME**
0	YASKAWA VFD A1000-HARDWIRED / MODBUS
1	TURBOCOR CMP
2	Reserved for future
3	DANFOSS VLT DRIVE
4	BITZER Compressor
5	DANFOSS CDS 303 DRIVE
6	EMERSON_CSD-100
7	MCS-POWERMETER 3037
8	RUKING_VFD
* 9	USER
10	ABB AC880
11	EMERSON EVC-1150B
12	SKF/MBC
13	KEB VFD
14	SKF/MBC - TANDEM
15	KEB VFD - TANDEM
16	ABB-ACH580
17-99	Reserved for Future Development



4. Connect a MCS-USB-RS485 cable from your PC to the MCS I/O port on the MCS-MODBUS Board.
5. Click on MCS-CONNECT to start the program.
6. Click on setup, communications, and change the baud rate to 38400.
7. Click on the found MODBUS I/O board. Click on the view button and you will be prompted for a password, just click OK (You do not have to be authorized to make this change)
8. Click ‘TRANSMIT CFG’ button.
9. Select the new ‘CONFIG’ file you just downloaded on your PC and begin transmitting to the controller.
10. When the Transmit is complete, disconnect from the MODBUS I/O Board and re-connect the MODBUS I/O Board to the MAGNUM communications and the MODBUS device.

Receiving a Config File from the MODBUS I/O Board

1. Connect a MCS-USB-RS485 cable from your PC to the MCS I/O port on the MCS-MODBUS.
2. Click on MCS-CONNECT to start the program.
3. Click on setup, communications, and change the baud rate to 38400.
4. Click on the found MCS I/O board to “RECEIVE” the config file.
5. Click the ‘RECEIVE CFG’ button.
6. You are presented with a screen for naming the file and saving to a directory on your PC hard drive.

Revision/Disclaimer Page

Date	Author	Description of Changes
03-10-16	DEW	Build manual
07-19-16	DEW	Changes made to charts
8-12-16	DEW	Edits form Max, add Danfoss CDS 303 charts
11-2-16	DEW	Edit Mapping Charts
11-7-16	DEW	Add new Modbus photo, make edits
11-9-16	DEW	Edit from Max add how to transmit new firmware
02-01-17	DEW	Add Fault Sensors to Turbo appendix
02-07--17	DEW	Correct names for Program Select
06-08-17	DEW	Update Yaskawa and Danfoss 303 mapping
06-13-17	DEW	Updated Progam Select
06-20-17	DEW	Updated Mapping Slaves
06-22-17	DEW	add info on accessing modbus config from MCS-CONNECT 18.12.15
09-19-17	DEW	Changes from Brian, change Program Switch descriptions
10-10-19-17	DEW	Add screens for Modbus settings for slaves 0-12
11-01-17	DEW	Add Wiring drawing to Manual
11-27-17	DEW	Correct drawing for Turbocor jumper
12-01-11-17	DEW	Add startup instructions and configs to each slave
04-04-6-18	DEW	Complete adding user logics, etc., updates from Brian and Max
10-09-19	DEW	CHANGE TO 12 VOLT
03-04-2020	DEW	Add setting for Yaskawa H5-04 setting
03-24-26-2021	DEW	FIX TRANSMIT NEW CONFIG,FIX DRAWINGS
05-24-2021	DEW	Add ABB 580 to manual - fix earth ground on all drawing
08-17-2021	DEW	Change config screen shot on Blitzer - Rev 3.02
10-20-21-2021	DEW	Make changes from Bill English, change all MCS-MODBUS-IO-12

Providing HVAC/R Control Solutions Worldwide

5580 Enterprise Pkwy. Fort Myers, FL 33905
Office: (239) 694-0089
Fax: (239) 694-0031
www.mcscontrols.com