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COMMUNICATIONS SETUP

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COMMUNICATIONS SETUP

FRICK QUANTUM HD UNITY COMPRESSOR CONTROL PANEL

Version 10.5x - 11.x, 12.x

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CONTENTS

Section 9 - Q5 Processor Board And Interface

Section 10 - Appendices

SECTION 1

INTRODUCTION TO THE QUANTUM™ HD UNITY CONTROL SYSTEM

Introduction to Quantum™ HD Unity

DESCRIPTION

The Quantum™ HD Unity control panel consists of a hardware platform which incorporates the Q5 or Q6 main processor board and an interface board for the Q5 processor board. The user can use the interface board to make external communications connections to both the Q5 and Q6 processor. Additionally, analog and digital signals are handled through discrete interconnected analog and digital boards. The user can use a 15 in. color LED graphic display, touch screen interface, and physical keypad to access and view data.

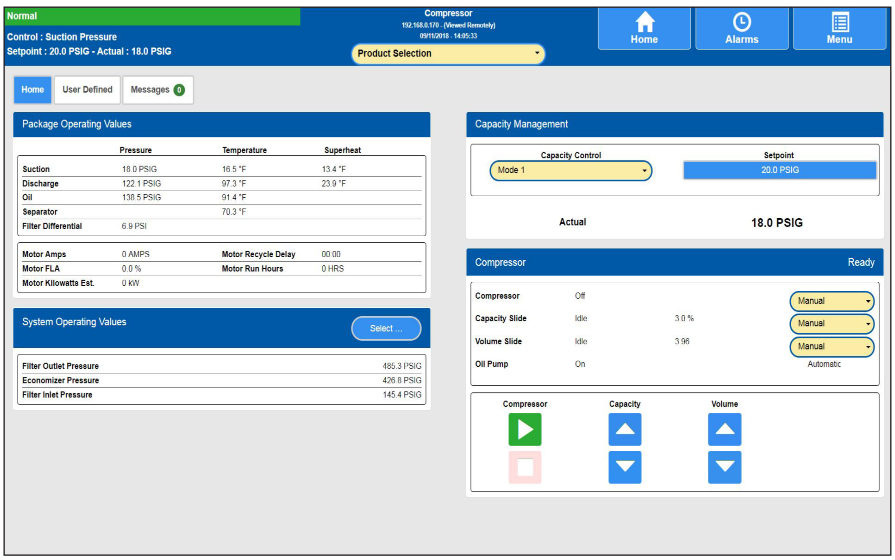
The Quantum™ HD Unity software is based on a Web Browser format, and has the capability of communication through both Ethernet and Serial protocols.

The Quantum™ HD Unity Compressor interface can be accessed using the latest versions of several tested and approved web browsers:

- Google Chrome
- Mozilla Firefox

The following screen is representative of what the operator will see after the unit has been powered up. This is called the Home screen. Be aware that the content of this screen may differ from situation to situation, based upon the actual configuration and installed options.

THE OPERATING/HOME SCREEN



HOW TO USE THIS MANUAL

The purpose of this manual is provide the necessary information (for example, protocols, data registers, or wiring) to allow the end user to reliably communicate with the Quantum™ HD Unity various communications methods (to be described later) for the purpose of obtaining and sending data and/or for compressor control.

The Quantum™ HD Unity does NOT begin any communications conversations on its own, it only responds to queries (requests) from external devices.

For Ethernet communications, refer to the section entitled Ethernet and Networking. Ethernet does not require any jumpers to be installed.

For information on software protocols, refer to **Sections 2, 3 and 4**.

To access specific data within the Quantum™ HD Unity, refer to **Section 6** (Data Tables).

For information specific to the Q6 processor board, refer to **Section 8**.

For Q5 serial communications connections, refer to **Section 9** for the correct wiring and jumper settings of RS-422, or RS-485.

Ethernet and Networking

DESCRIPTION

FRICK® Controls uses Ethernet as the primary method of connecting one or multiple Quantum™ HD Unity panels to a common computer network. In the past, this interconnection would have been done by serial protocol wiring, such as RS-422/485. But with the capabilities of today's technology, Ethernet is the quickest and most efficient way of providing this connectivity.

Whereas the old serial communications methods (RS232, for example) were slow by today's standards (kbit/s transmission speed), Ethernet is available in three speeds: 10 Mbps, 100 Mbps, and 1 Gbps.

NOTICE

For connection examples, see Section 9 (Appendix B and C) of this manual entitled Quantum™ HD Unity Local Ethernet Configurations and Quantum™ HD Unity Ethernet Network Configurations.

Ethernet is a data and information sharing system. It is a method of connecting one computer to many others on a common network. This network can consist of both hardwired connections, and wireless devices, hence the name Ethernet.

Any Windows or Linux based computer is capable of accessing this network. All that is needed is either a modem, USB port, or an Ethernet port. These devices provide the necessary point of connection for one end (branch) of the connection (a home computer for instance). The other point that completes the connection is usually provided by an Internet Service Provider (or ISP). The Internet Service Provider usually has a very large network router, or means of bring in many individual connections. The router then assigns a discrete and individual address to each connection (much like a street address). This address is known as an Internet Protocol address (IP). The IP address consists of a series of 4 to 12 digits, and is normally transparent to the end user.

For individuals familiar with using the internet, they are familiar that every time they activate their web browser (the software that allows your computer to connect), there is an address bar that appears near the top of the screen. This address bar is where you would enter the IP address of the computer or network that you would like to communicate with. To make this simpler, these numeric IP addresses are also coded to allow alpha-numeric names to be masked over them, so that rather than having to enter an address of 216.27.61.137, you can simply enter in www.jci.com, as an example. Although the actual process is more detailed and complicated than this basic explanation, the end result is that most of the work is being done invisibly.

The following write up describes how to set up the Quantum™ HD Unity to do this behind the scenes work, so that it can communicate both at the Internet level, and at a local Ethernet level.

CABLING

Each Quantum™ HD Unity Ethernet connection must be individually cabled (known as a homerun) direct from a switch or computer using a CAT5e cable. Unlike RS422/485 communications which allowed for cable daisy-chaining, Ethernet connections do not allow this.

This type of cabling is designed to handle the 100-Mbps speed needed by Ethernet. Both ends of each cable must have an RJ-45 connector attached. The RJ-45 connector looks similar to the RJ-11 connector on the end of a telephone cord but is slightly larger (and not compatible). You can buy CAT5e cables in predetermined lengths with the connectors already attached (for short runs), or you can buy the cable in rolls, cut it to length and install the RJ-45 connectors to the ends (up to 100 m for each cable run).

Although FRICK Controls recommends the use of shielded, twisted pair CAT5e cable, if the cable is not properly constructed and tested, it can actually be more detrimental to the network than unshielded cable. As long as all of the cables that are used have been properly constructed AND tested, either shielded or unshielded are acceptable. This is mostly due to the excellent (electrical) noise immunity that is inherent with Ethernet componentry.

NOTICE

Follow standard networking procedures for the interconnections of all components. For individual cable runs in excess of 300 ft (~100 m), a Switch/Hub must be used for each additional run. Do not use more than two Switches/Hubs on any cable run.

Cabling Do's and Don'ts – FRICK Controls recommends the following guidelines when installing and using CAT5e Ethernet cable:

Do:

- Run all cables in a star (homerun) configuration.
- Keep all individual cable lengths under 300 ft. If greater distances are needed, use a switch/hub every 300 ft (minimum.)
- Ensure that the twists of the wire pairs within the cable are maintained from end to end.
- Make gradual bends in the cable. Keep each bend radius over 1 in.
- Keep all cables tie wrapped neatly.
- Try to maintain parallel cable runs where possible.
- Keep the cable as far away as possible from EMI sources (motors, transformers, solenoids, or lighting, for example).
- Label the ends of each cable, to facilitate troubleshooting and identifying in the future.
- Test each individual cable run with an approved CAT5 E cable tester. A TONING alone test is NOT acceptable.
- Use rubber grommets anywhere that the cable enters through a hole in a metal panel.
- ALWAYS obey local, national and fire building codes.

Don't:

- Don't install cable taut, cables must always have some play or slack in them.
- Don't over-tighten cable ties.
- Don't splice a cable. If a break occurs, or the length is not long enough (under 300 ft), replace the entire run with an intact length.
- Don't tie cables to electrical conduits.
- Don't strip more than 1 in. from the end of each cable when installing end connectors.
- Don't sharply bend or kink the cable.
- Don't mix 568A and 568B wiring at the same installation. 568B is the most common wiring.
- Don't use excessive force when pulling cable.

Don't tie shields to ground at both ends. This may create a ground loop. Tie shield to ground at one end only.

RJ-45 CONNECTORS

Ethernet network cables require the use of industry standard RJ-45 plugs as shown below, for the termination of all cables:

Figure 1: Typical RJ-45 Connector

THE HUB

A Hub is a common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN (Local Area Network). They also contain multiple ports. When a data packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.

THE SWITCH

Network Switches look nearly identical to hubs, but a switch generally contains more intelligence than a hub. By delivering messages only to the connected device that it was intended for, network switches conserve network bandwidth and offer generally better performance than hubs.

A Managed Switch is capable of inspecting the data packets as they are received, determining the source and destination device of a packet, and forwarding that packet appropriately.

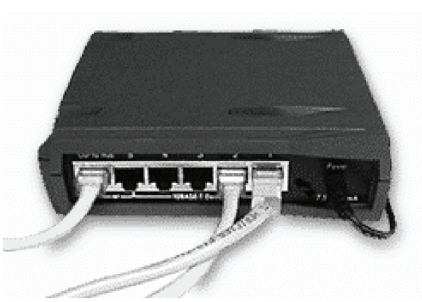


Figure 2: Typical Switch

The Switch takes the signal from each computer/Quantum™ HD Unity and sends it to all of the other computers/HD Unity panels in your plant or office. Switches come in several sizes, noted by the number of ports available -- a four-port Switch can connect four computers, an eight-port Switch can connect up to eight computers and so on. So, if you start with a four-port Switch but eventually add more panels, you can buy another Switch and connect it to the one you already have, increasing the potential number of panels on your network.

Note: If you want to connect one computer to one Quantum™ HD Unity, you can avoid the switch and use a crossover Cat5e cable. With a crossover cable, you directly connect one Ethernet device to the other without a switch. To connect more than two you need a Switch.

See Figure 3 for crossover cable example:

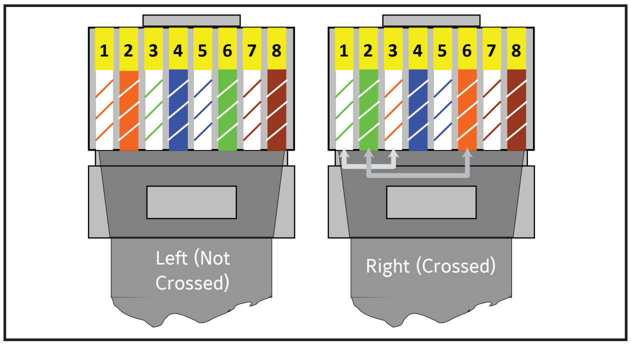


Figure 3: Both ends of a crossover-cable

Table 1: CAT5e Ethernet cable color codes

Wire No.	Wire Color	Wire No.	Wire Color
1	White / orange stripe	1	White / green stripe
2	Orange / white stripe	2	Green / white stripe
3	White / green stripe	3	White / orange stripe
4	Blue / white stripe	4	Blue / white stripe
5	White / blue stripe	5	White / blue stripe
6	Green / white stripe	6	Orange / white stripe
7	White / brown stripe	7	White / brown stripe
8	Brown / white stripe	8	Brown / white stripe

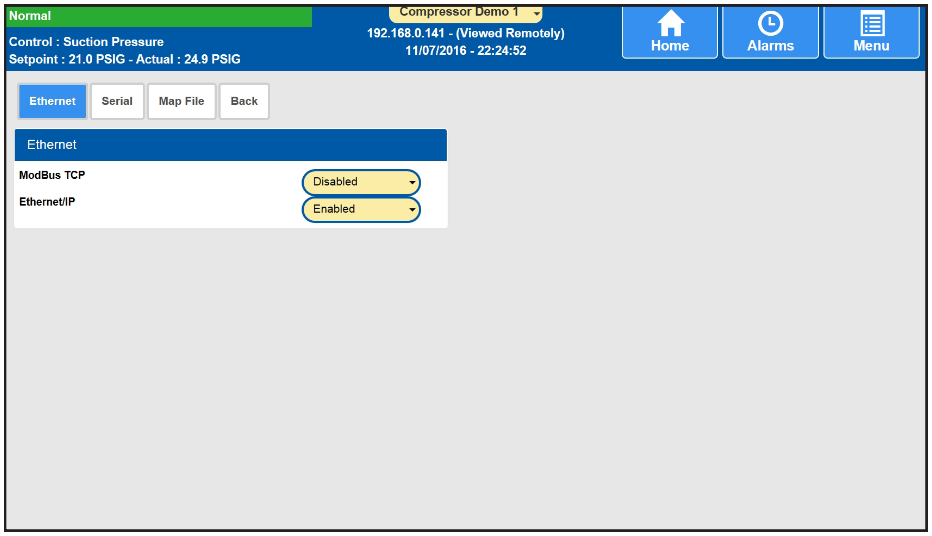
You most likely won't have any type of automated installation software because of the large number of possible configurations in an Ethernet network. This means it is necessary to manually configure all the options. To configure these options for the Quantum™ HD Unity, see *Communications - Ethernet*.

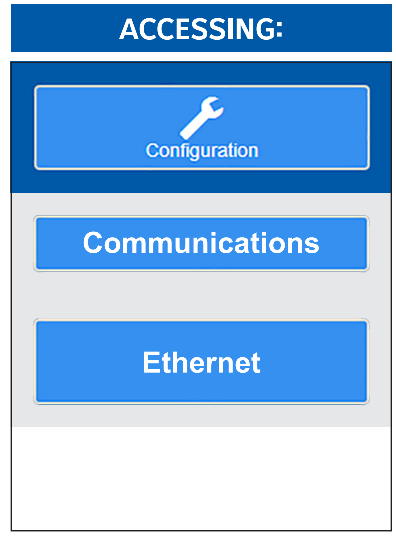
Table 2: Ethernet Components

Component	Description
Cable	Shielded solid 4-pair* (1000 Ft)
	Shielded solid 4-pair*
	Un-shielded solid 4-pair**
	Un-shielded solid 4-pair** (1000 Ft)
Crimp Tool	RJ-45 Crimp tool
Connectors	RJ-45 For Shielded 4-pair solid wire cable
	RJ-45 For Un-shielded 4-pair solid wire cable
Cable Tester	Ethernet Cable Tester – Continuity only
	Complete Cable I/O Qualification Tester
Switches	5 RJ-45 port
	7 RJ-45 Port and 1 ST Fiber Optic Port
	8 RJ-45 port

* STP = Shielded Twisted Pair
** UTP = Unshielded Twisted Pair

CONFIGURATION – COMMUNICATIONS (ETHERNET)





DESCRIPTION: This screen is used to enable or disable basic connectivity settings.

ETHERNET PROTOCOLS

The following fields are provided:

Modbus TCP
- Disabled
- Enabled

Ethernet/IP
- Disabled
- Enabled

NOTE: A valid internet account and connection must be available for this feature to function.

SECTION 2
SERIAL COMMUNICATIONS & PROTOCOL

Serial Communications

DESCRIPTION

RS-422/RS-485 DESCRIPTION

When serial communications started moving into the industrial environment, it was quickly noted that because of the high electrical noise potential from electric motors, valves, solenoids, or fluorescent lighting, that the noise immunity characteristics of RS-232 protocol was grossly lacking. Additionally, the distances between the communicating equipment on the factory floor was much greater than that within the typical office environment. For these reasons, RS-422 and RS-485 were developed.

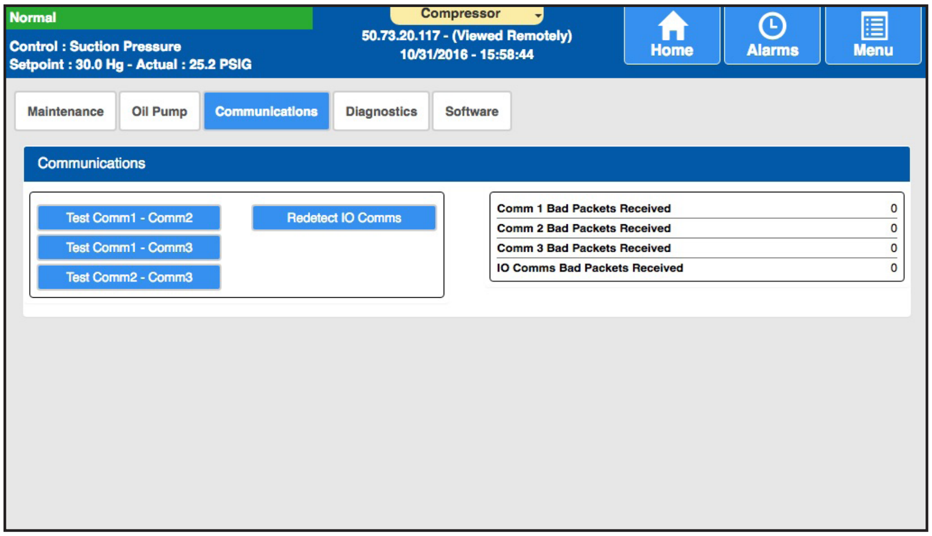
- RS-422 is a full duplex communications hardware protocol. This means that it data can be sent and received simultaneously. FRICK Controls uses a 4-wire system for RS-422 (two transmit wires and two receive wires). Advantages of RS-422 over RS-232 is that up to 30 Quantum™ controllers may be simultaneously connected using a daisy-chain wiring scheme (to be explained later), and that the distances involved can be much greater (typically up to 2000 ft for the total cable run), much greater noise immunity than RS-232.
- RS-485 is a half duplex bus. This means that it can only send data, or receive data at any given time. It cannot do both at the same time. FRICK Controls uses a 2-wire system for RS-485 one positive transmit/receive wire and one negative transmit/receive wire). Up to 30 Quantum™ controllers may be simultaneously connected up to a total distance of 2000 ft using a daisy-chain wiring scheme (to be explained later). One advantage to using RS-485 as opposed to RS-422 is that only a single twisted pair cable need to be run to all devices (while RS-422 requires a double twisted pair cable), much greater noise immunity than RS-232.

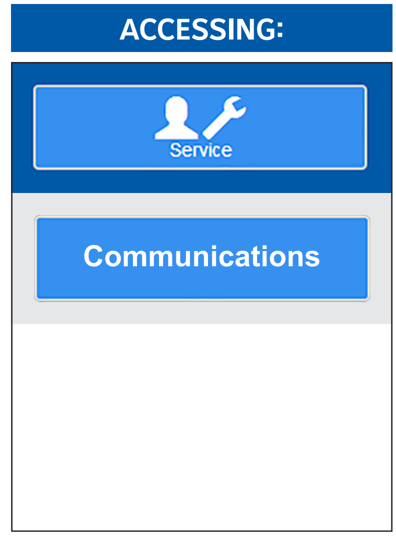
SERIAL COMMUNICATIONS SETUP

After the serial communications wiring has been connected, and jumpers correctly set, the Quantum™ HD Unity software needs to be setup to match that of the device(s) that it is to communicate with.

The following page is where this information can be found:

SERVICE – COMMUNICATIONS





DESCRIPTION: This screen allows the technician to perform system checks on serial communications. This section provides hardware setup and Communications Loopback Testing instructions.

The following buttons are provided:

- Test Com-1 - Com-2 - Test checks the hardware of both ports.
- Test Com-2 - Com-3 - Test checks the hardware of both ports.
- Test Com 3 - Com-1 - Test checks the hardware of both ports.
- Redetect I/O Comms - This selection provides a method to detect all connected Analog and Digital boards.

The following are some of the things that can occur that would cause an I/O board to stop communicating with the Q5 or Q6 processor board, and would require that you Redetect I/O Comms:

- A board has been removed, and power was turned on with the board removed. Select [Redetect I/O Comms].
- A communication failure occurs for a board because it is not connected. Select [Redetect I/O Comms].

If any of these things occur, a communications error shutdown will be issued until this key is selected. Always view the **About** screen to see what has been detected. In any other condition, do not Select [Redetect I/O Comms] until discussing the problem with the FRICK Service Group.

COMMUNICATIONS LOOPBACK TEST

Verifying the proper operation of the following communications ports:

- Com-1 (P10) and Com-2 (P11): RS-422/485
- Com-2 (P10) and Com-3 (P16): RS-485
- Com-1 (P11) and Com-3 (P16): RS-485

By using a loopback test harness (as explained in the following text), the technician has the ability to locally test the Quantum™ HD Unity communications hardware and jumper configuration.

HARDWARE SETUP FOR TESTING RS-422

To create the communications loopback harness for RS-422 testing, use the following example(s):

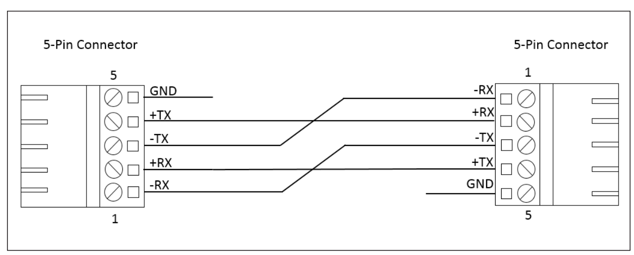


Figure 4: Q5 RS-422 Test Harness

> **NOTICE**
> **This test harness is for Q5 only. The RS-422 Com port for the Q6 cannot be tested this way.**

Set the communications jumpers as follows for RS-422:

Table 3: Q5 RS-422/485 Test Configuration

Comm 1	Comm 2	Function	Jumper Setting	
J1	J7	RS-422 (4-Wire) **Default**	3 2 1	1 - 2 Closed
		RS-485 (2-Wire)	3 2 1	2 - 3 Closed
J2	J13	Pull Down **Default**		1 Pin Only
J3	J16	Pull Up **Default**		1 Pin Only
J5	J17	RS-422 **Default**		1 Pin Only
		RS-485		1 - 2 Closed
J6	J18	RS-422 **Default**		1 Pin Only
		RS-485		1 - 2 Closed
J4	J22	High Speed Target **Default**		1 - 2 Closed

NOTE: The triangle symbol (◁) denotes Pin 1 on connectors.
(Comms 3 and 4 have no jumpers)

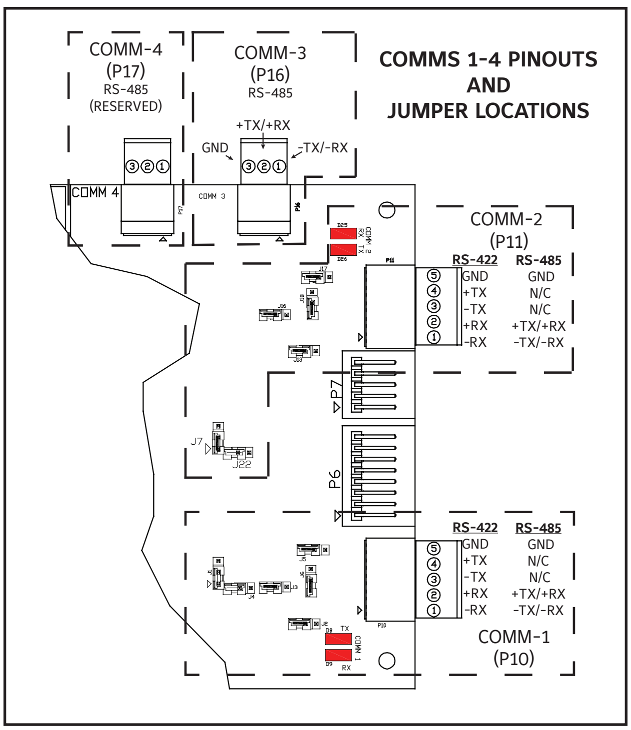


Figure 5: Q5 Comms 1-4 Connector and Jumper Locations for RS-422/485

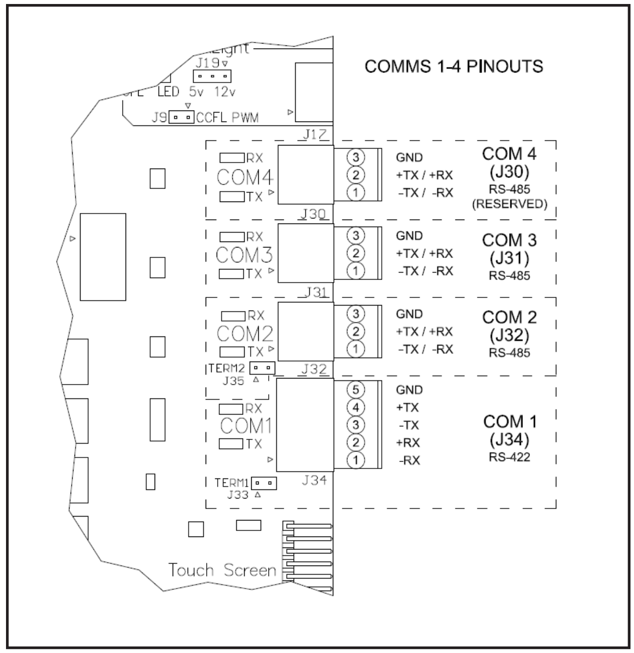


Figure 6: Q6 Comms 1-4 Connector Locations for RS-422/485

HARDWARE SETUP FOR TESTING RS-485

To create the communications loopback harness for RS-485 testing, use the following example(s):

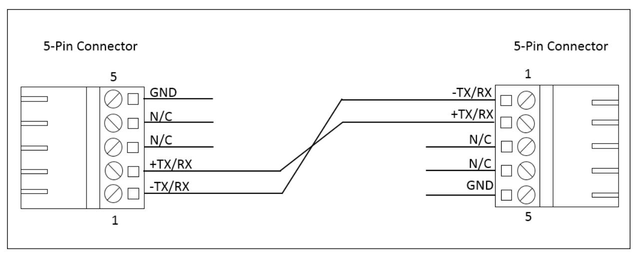


Figure 7: Q5 RS-485 Test Harness A: 5-pin to 5-pin

Set the communications jumpers as follows for RS-422:

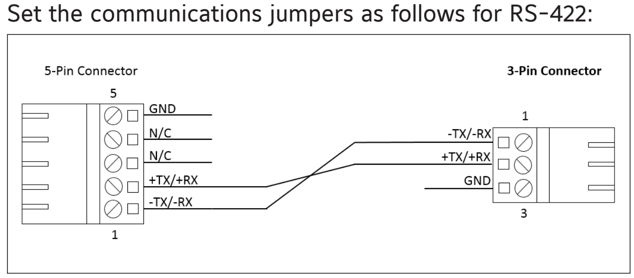


Figure 8: Q5 RS-485 Test Harness B: 5-pin to 3-pin

Set the communications jumpers to RS-485, as seen in the Q5 RS-422/485 Test Configuration.

Com-1 – Com-2 Test: Plug in the 485 Test Harness A between Com-1 and Com-2

Com-1 – Com-3 Test: Plug in the 485 Test Harness B into Com-1 and Com-3

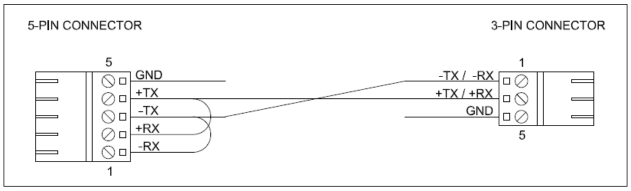


Figure 9: Q6 RS-485 Test Harness A: 5-pin to 5-pin

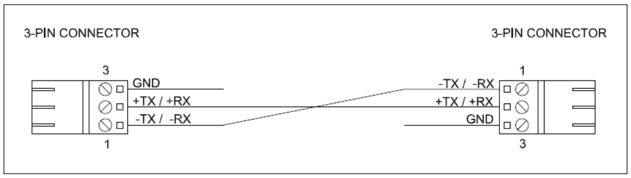


Figure 10: Q6 RS-485 Test Harness B: 3-pin to 3-pin

Set the communications jumpers to RS-485, as seen in the Q6 RS-422/485 Test Configuration

Com-2 – Com-3 Test: Plug in the 485 Test Harness A between Com-2 and Com-3

On the Q6 processor board, only Com-2 to Com-3 can be tested.

PERFORMING THE COMMUNICATIONS LOOPBACK TEST

Note: The user must be logged in as a Service Level user to access this feature.

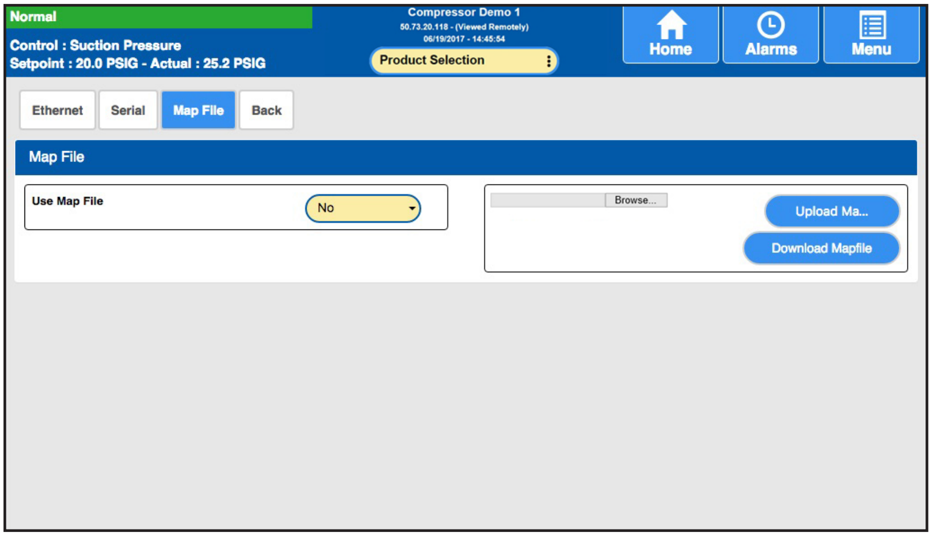
Navigate to the Service - Communications screen as seen on the previous page.

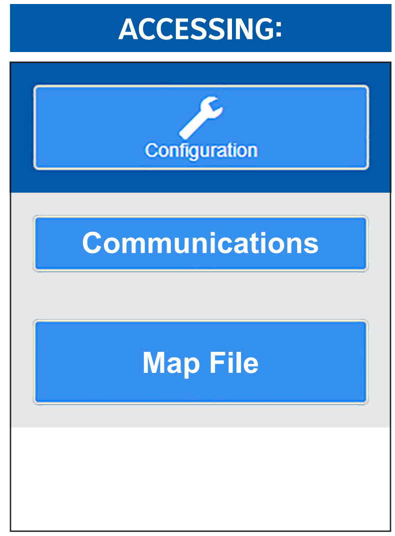
Ensure that the proper test harness is installed and the associated jumpers are in their correct positions for the particular test to be performed. (Per the Hardware Setup section)

Pressing the appropriate test key will initiate the test. While the test is running the screen will dim and a loading circle will appear.

- If the test passed, a dialogue box appears with the message, **Loop Back Test Passed.**
- If the test failed, a dialogue box appears with the message, **Loop Back Test Failed.**

USING THE MAP FILE





DESCRIPTION: Use this screen to upload the MapFile from the Quantum™ HD Unity to a USB Flash Drive or download the MapFile from a USB Flash Drive to the Quantum™ HD Unity.

MAP FILE

The following selections are provided:

Map File - Because the addressing scheme between the Quantum™ version 5.0x and earlier software and the Quantum™ LX, HD, and Unity versions 6.00 and later software is not the same, this utility was created. The map file is a conversion utility that can be used to allow a communications application that was previously written by the user under the Quantum™ version 5.0x and earlier to function properly with the HD Unity by redirecting the old addresses to the new HD Unity addresses. A pull down menu is provided to select from the following:

- **No -** Do not use map file, the user is either not going to be using external communications, or they will be writing the communication application based upon the HD Unity addresses.
- **Yes -** The user has an application that was previously written for the Quantum™ version 5.0x or earlier, and they want to use the same code for the HD Unity.

Two keys are located at the right hand side of the screen. The following describes their function:

Upload MapFile.txt to USB Device –

1. Insert a USB memory stick into the device.
2. Press **Upload MapFile.txt to USB Device** to upload the MapFile.txt file to the USB stick.

Download MapFile.txt from USB Device –

1. After modifying the MapFile.txt file, insert the USB memory stick back into the device.
2. Press **Download MapFile.txt from USB Device** to download the MapFile.txt file to the Quantum™ HD Unity.

CREATING AND USING THE MAP FILE

Since the Quantum™ HD Unity addressing scheme is different from the older Quantum version, a map needs to be created to re-direct the old address requests to the new address.

The MapFile is simply a text file that is created and formatted in such a way that when downloaded to the Quantum™ HD Unity, it will cause the specified addresses (as listed in the MapFile) to be re-mapped from an older version Quantum™ program to the Quantum™ HD Unity.

As an example, assume that you have an existing communications monitoring application that was written around the Quantum™ software (Ver. 5.0x or ealier), and you'd like to include the Quantum™ HD Unity panel addresses in this same application. The values that you'd like to read from the Quantum™ HD Unity are:

- Discharge Temperature
- Oil Temperature
- Discharge Pressure
- Suction Pressure

The first thing that you would need to know is the addresses that the original communications application would be looking at for these values. For the Quantum™, the original FRICK addresses would have been:

- 129 Discharge Temperature
- 130 Oil Temperature
- 135 Discharge Pressure
- 136 Suction Pressure

Next you need to refer to the data tables shown later in this manual to locate the FRICK addresses that the Quantum™ HD Unity uses for these values. The following list shows the Quantum™ HD Unity addresses:

- 2012 Discharge Temperature
- 2013 Oil Temperature
- 2003 Discharge Pressure

- 2002 Suction Pressure

If you need to create a new MapFile, the format for creating the MapFile.txt is:

129,2012;Discharge Temperature

Where:

129	=	Quantum™ address
2012	=	Quantum™ HD Unity address
Discharge Temperature	=	Description

NOTICE

There is a default MapFile that will contain many of the standard pressure and temperature addresses. It is best to begin with the default MapFile and edit it if needed.

129,2012;Discharge Temperature
130,2013;Oil Temperature Compressor
135,2003
136,2002

Notice that each line contains two numeric values, with a comma separating them. There are no spaces. The first value of each line is the Quantum™ address, followed by a comma and a second value which is the address within the Quantum™ HD Unity. You may optionally add a semi-colon (;) followed by the description for each row if desired. Be sure that there are no spaces on any of the lines.

Once finished entering all of the addresses (and descriptions if desired), save the file to a USB device, using the file name of MapFile.txt.

You can then use the USB device to download the address conversion to the Quantum™ HD Unity following the instructions provided on the previous page.

This mapping process will work for FRICK addresses, as well as Allen-Bradley and Modbus. Refer to the following examples for FRICK and Allen-Bradley (Modbus follows the same principle):

FRICK addresses:

- 129,2012;Discharge Temperature
- 131,2014;Oil Separator Temperature
- 134,2007;Filter Pressure
- 135,2003;Discharge Pressure
- 136,2002;Suction Pressure
- 138,2010;System Discharge Pressure
- 128,2011;Suction Temperature

Allen-Bradley addresses:

- N10:3,N30:6;Filter Differential Pressure
- N10:5,N40:19;Compressor/Drive Type
- N10:7,N40:14;Regulation Mode
- N10:9,N40:0;Compressor Status
- N10:10,N40:5;Warning
- N10:11,N40:4; Shutdown
- N10:15,N40:70;Compressor Start Status
- 10:17,N40:10;Compressor Type

Figures 11 and 12 show the locations for inserting the USB thumb drive:

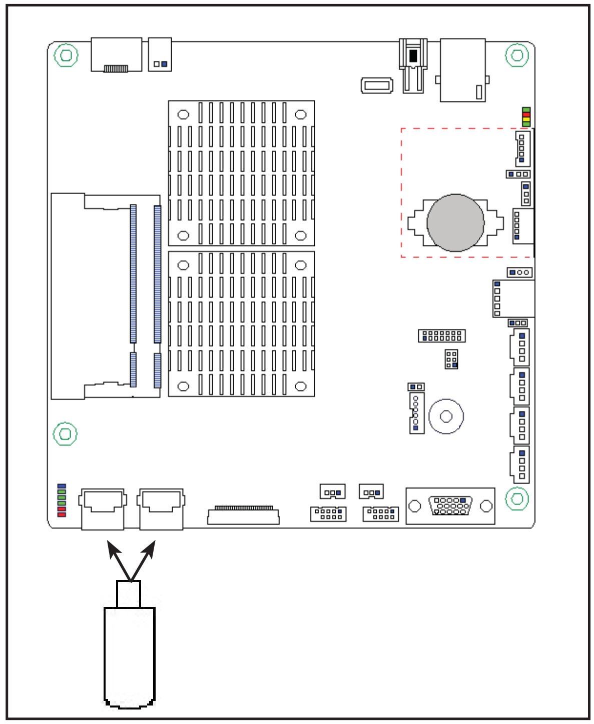


Figure 11: Q5 Processor Board USB Locations

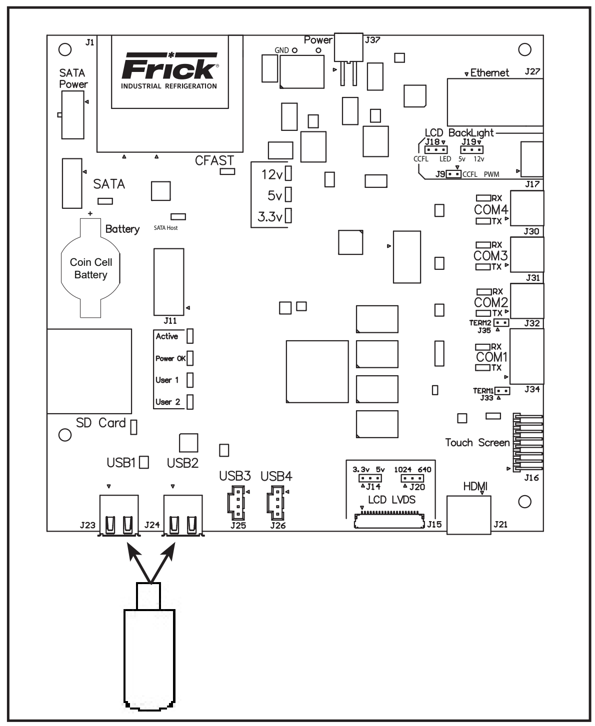


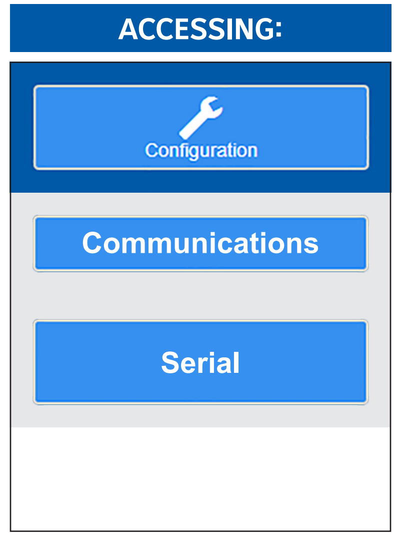
Figure 12: Q6 Board USB Locations

NOTICE

USB drive devices that are Windows FAT32, NTFS or FAT format or Linux ext2 format have been verified to function properly.

Although numerous brands and storage sizes of USB drives have been tested for compatibility with the Quantum HD Unity system, there is a possibility that not all USB thumb drives will work.

CONFIGURATION – COMMUNICATIONS (SERIAL)



DESCRIPTION: This screen is used to set the Serial communications parameters for Com-1, Com-2 and Com 3.

> **NOTICE**
>
> For Q5 boards, Com-1 and Com-2 may be either RS-422 or RS-485. Com-3 must be RS-485 only. For Q6 boards, Com-1 and Com-2 RS-485 only.

The following setpoints are provided (these settings are identical for Com-1, Com-2 and Com-3:

> **NOTICE**
>
> The setpoints must match the host device, such as a programmable logic controller (PLC) Control System.

COM-1 (2 AND 3)

Status - Shows the current communications status of the port. The possible messages are:

- **Off -** No communications are currently taking place. NOTE: A delay of 15 seconds or more of inactive communications (time between valid responses) will cause this message to display.
- **Active -** Valid communications are actively occurring.
- **Failed -** An invalid command was received by the port. This could be due to a bad checksum value, a wiring issue, or hardware problem at either the transmitting (host) or receiving (Quantum™ HD Unity) end.

Baud Rate - The baud rate defines the speed at which external communications can occur. The higher the baud rate, the faster the communications. A pop-up menu is provided to select from the following:

- 1200
- 2400
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

Data Bits - The number of bits in a transmitted data package. A pop-up menu is provided:

- 7
- 8

Stop Bits - A bit(s) which signals the end of a unit of transmission on a serial line. A pop-up menu is provided to select from the following:

- 1
- 2

Parity - Parity checking refers to the use of parity bits to check that data has been transmitted accurately. The parity bit is added to every data unit (typically seven or eight data bits) that is transmitted. The parity bit for each unit is set so that all bytes have either an odd number or an even number of set bits. Parity checking is the most basic form of error detection in communications. A pop-up menu is provided:

- None
- Even
- Odd

Protocol - A protocol is the special set of rules that each end of a communications connection use when they communicate. A pull down menu is provided to select from the following FRICK recognized protocols:

- None
- FRICK
- Modbus ASCII
- Modbus RTU
- AB DF1 Full Duplex
- AB DF1 Half Duplex
- SSW Motor Starter
- DBS Motor Starter (Use Com-3)
- Vyper™ (Use Com-3)
- SSW Motor Starter

An additional button is provided to allow the user to set the Panel ID for this unit:

Panel ID - A number that is used by an external communications application, to converse to individual compressors. On interconnected systems, this number must be unique. Valid values are 0 to 99.

Table 4: Serial Communication Setup

Use the following form to record all settings:

Compressor ID	_______ (0 - 255)		
	Com 1 (RS-422/485)	**Com 2 (RS-422/485)**	**Com 3 (RS-485)**
Baud Rate	☐ 1200	☐ 1200	☐ 1200
	☐ 2400	☐ 2400	☐ 2400
	☐ 4800	☐ 4800	☐ 4800
	☐ 9600	☐ 9600	☐ 9600
	☐ 19200	☐ 19200	☐ 19200
	☐ 38400	☐ 38400	☐ 38400
	☐ 57600	☐ 57600	☐ 57600
	☐ 115200	☐ 115200	☐ 115200
Data Bits	☐ 7	☐ 7	☐ 7
	☐ 8	☐ 8	☐ 8
Stop Bits	☐ 1	☐ 1	☐ 1
	☐ 2	☐ 2	☐ 2
Parity	☐ None	☐ None	☐ None
	☐ Even	☐ Even	☐ Even
	☐ Odd	☐ Odd	☐ Odd
Protocol	☐ None	☐ None	☐ None
	☐ Frick	☐ Frick	☐ Frick
	☐ Modbus ASCII	☐ Modbus ASCII	☐ Modbus ASCII
	☐ Modbus RTU	☐ Modbus RTU	☐ Modbus RTU
	☐ AB DF1 Full Duplex	☐ AB DF1 Full Duplex	☐ AB DF1 Full Duplex
	☐ AB DF1 Half Duplex	☐ AB DF1 Half Duplex	☐ AB DF1 Half Duplex
	☐ DBS Motor Starter	☐ DBS Motor Starter	☐ DBS Motor Starter
	☐ SSW Motor Starter	☐ SSW Motor Starter	☐ SSW Motor Starter
	☐ Vyper	☐ Vyper	☐ Vyper
	☐ None	☐ None	☐ None
Map File	☐ No	☐ No	☐ No
	☐ Yes	☐ Yes	☐ Yes

Serial Protocol

DESCRIPTION

The use of serial communication protocols permits data transmission between devices. Protocol determines how contact is established and how the query (question) and response (answer) takes place. The information in a message command requires:

- The identity of the intended receiver (ID #)
- What the receiver is to do (read or write to a setpoint, for example)
- Data needed to perform an action (the value of a setpoint to be changed)
- A means of checking for errors (checksum).

When using any of the communications ports, check what communication protocol has been selected from the **Configuration > Communications > Serial** screen. The baud rate, data bits, stop bits, parity, and connection type of all Com ports, as well as the panel ID number, are also changed from this screen. Match them with the setup of the other device.

NOTICE

The data communication protocols are continuously being expanded and improved. Consult FRICK Controls for the exact details on your particular unit before developing system software to interface with the panel.

QUANTUM™ HD UNITY COMMUNICATIONS PROTOCOL LIST

The Quantum™ HD Unity controller can communicate through the following serial connection software protocols:

- FRICK
- Allen-Bradley DF-1 Full Duplex
- Allen-Bradley DF-1 Half Duplex
- Modbus ASCII
- Modbus RTU

CHECKLIST FOR SETTING UP COMMUNICATION

1. Decide which Quantum™ protocol you can communicate with and want to use.
2. Setup your device's communication port with the proper parameters and select a baud rate.
3. Next, setup the Quantum™ HD Unity for the desired communication protocol. Select the protocol from the Serial screen.
4. Set the baud rate of the Com Port to coincide with the setup of your device's communication port.
5. Enter the Quantum™ HD Unity ID. This will be used to identify commands that are sent to it.
6. Wire to the first Quantum HD Unity panel through RS-422, or RS-485 to the Quantum™ HD Unity Com Port.
7. Send a single command to read data from this Quantum™ HD Unity using its ID.
8. Check if you received a data response at your device.
9. Troubleshooting when you don't receive a data response:

- Check to see if the status of the Com Port on the Communications screen is showing **ACTIVE** or **OFF**.
- **ACTIVE** is shown only when the Quantum™ HD Unity understands it is receiving a properly composed message.
- Check that the RX I/O communication activity lamp on the Q5 interface board or Q6 Processor board is blinking as it receives the instruction from your device (Com 1 or 2 only).
- A steady lit RX LED or one that isn't lighting, are signs of improper wiring. (Com 1 or 2 only)
- If the RX LED is properly blinking, then check if the TX LED is blinking in response (Com 1 or 2 only).
- If the TX is not blinking then check the communication protocol setup at the panel, the panel's ID and the Com Port baud rate setting (Com 1 or 2 only).
- If the TX is blinking, then check that the Com Port communication jumpers are correct (Q5 only).

NOTICE

A useful tool for troubleshooting is Windows HyperTerminal. Refer to the HyperTerminal Setup section in this manual for more information.

If you properly receive data and need to communicate to more than one panel, then setup and wire to another panel. Reference the wiring diagram drawings in the back of this manual. Send a single command to read data from this Quantum™ HD Unity using its ID and troubleshoot as above, if necessary. To prevent noise feedback, which is possible when communicating over a long distance, only install the termination jumpers on the last panel.

FRICK Protocol

DESCRIPTION

All commands for FRICK protocols must be in ASCII to be recognized (see the Conversion Chart For Decimal / Hexadecimal / ASCII, located later in this manual). The commands can be in upper or lower case letters. A compressor with an ID code of [00] is considered disabled. ID codes from [01] through [99] are valid and recognized by the Quantum™ HD Unity.

FRICK # PROTOCOL SPECIFICATIONS

FRICK # protocol consists of commands that are available for most other existing models of FRICK compressor control panels. The FRICK # protocol does not use a checksum. It is better to use FRICK Quantum™ ($) protocol when only communicating to Quantum™ panels.

When there is more than one panel, a Quantum™ HD Unity can be wired from its communications ports to another panels' ports, or can be wired to Port 1 of a RWB, RDB, RXB or RXF Micro Plus panel.

Table 5: Communications Port #1 Pinouts

Frick® RWB, RDB, RXB, or RXF Panel Frick® # Communications Port #1 RS-422 Pinout
9 - TX (Transmit) 8 + TX (Transmit) 5 - RX (Receive) 4 + RX (Receive)

The following is a complete list of available FRICK Protocol # commands:

Table 6: FRICK # Protocol Commands

Command Code and Description		
I	=	Returns compressor status **(I)**nformation
R	=	Compressor sta**(R)**t control
S	=	Compressor **(S)**top control
A	=	Return full load **(A)**mps information
V	=	Slide **(V)**alve/Slide stop control
MC	=	Change **(M)**ode of **(C)**ompressor
MV	=	Change **(M)**ode of Slide **(V)**alve
P	=	Return **(P)**ressures information
T	=	Return **(T)**emperatures information
Q	=	**(Q)**uery setpoints data
C	=	Enter **(C)**hange setpoints mode
F	=	Return **(F)**ailures
KF	=	**(K)**Clear **(F)**ailures
KR	=	**(K)**Clear remaining **(R)**ecycle delay time

All data is returned as integer values. If decimal positions are assumed, then divide the data by the proper multiple of 10 to get the actual value.

Temperature data, except for Suction Temperature, is returned in the current temperature units as 3 characters with no decimal position. For example, 032 would represent 32°F if the panel temperature units are in Fahrenheit, or it would represent 32°C, if the panel temperature units are in Celsius. Suction Temperature is returned as 4 characters with a + or − as the leading character. For example, −010 would represent −10 degrees).

Pressure data is usually returned in the current pressure units. However, the filter differential reading is always returned in psia. When in psig or in psia, the pressure data is returned as 3 characters with no decimal position. However; in order to show the full transducer range, the #IDPS command returns 4 characters with one decimal position assumed. The #IDI, and #IDPA commands return 3 characters that assume one decimal position; 99.9 is the highest value that can be returned. When in psig, suction pressure is returned in psia. When in Bar and BarA, the pressure data is returned as 4 characters with two decimal positions assumed. When in KpaA, the pressure data is returned as 4 characters with no decimal position.

The following is a detailed description of each command:

RETURN COMPRESSOR STATUS INFO:				**#IDI**
Command structure:				
Command	Description			
#	Start of command sequence			
ID	Compressor **(ID)** code (01, 14, for example)			
I	Return Status **(I)**nformation command			
Returned Answer, ie: 090RRRN340				
Character Position	Description of returned data			
1, 2, 3	Slide Valve position.			
4	**R**	=	**(R)**emote	(Slide Valve)
	A	=	**(A)**uto	
	M	=	**(M)**anual	
5	**R**	=	**(R)**unning	(Start Status)
	O	=	**(O)**ff	
	S	=	**(S)**lide Valve too high	
	P	=	**(P)**ermissive Start not energized	
	I	=	d**(I)**fferential Pressure too high	
	T	=	s**(T)**opping	
	X	=	Au**(X)** not energized	
	U	=	**(U)**nable to start	
6	**R**	=	**(R)**emote	(Compressor mode)
	M	=	**(M)**anual	
	A	=	**(A)**uto	
7	**C**	=	**(C)**utout (Shutdown)	(Alarm Status)
	A	=	**(A)**larm	
	N	=	**(N)**ormal	
8, 9, 10	Suction value in PSIA.			
	CR, LF (Carriage Return, Line Feed)			

NOTICE

The following control commands are for remote control of a compressor. The control panel must be in Compressor and Capacity Remote Com modes for remote control operation.

COMPRESSOR START CONTROL: #IDRID

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
R	Sta**(R)**t compressor command.
ID	**(ID)** code repeated for verification

NOTE: The compressor must be in the remote Start Mode for this command to be executed.

Returned answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	CR, LF (Carriage return, line feed)

Compressor Stop Control: #IDSID

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
S	**(S)**top compressor command.
ID	**(ID)** code repeated for verification

NOTE: The compressor must be in the remote Start mode for this command to be executed.

Returned answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	CR, LF (Carriage return, line feed)

RETURN FULL LOAD AMPS COMMAND: #IDA

Command structure:

Command	Description
#	Start command sequence
ID	Compressor (ID) code (01, 14, for example)
A	Return Full Load (A)mps command

Returned Answer:

When using the **A** command, the returned Full Load Amps will be:

XXX = 3 characters followed by a CR, LF.

SLIDE VALVE CONTROL COMMANDS: #IDVLXX #IDVS #IDVUXX

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
V	Slide **(V)**alve / Slide Stop command
L	**(L)**oad Slide Valve command
U	**(U)**nload Slide Valve command
XX = 00	Turns selected output off
XX = 01 to 15	Turns selected output on for XX seconds
S	Return **(S)**lide Valve position value

If the command was #01VL00, then the load Slide Valve output on compressor #1 would be turned off. If the command was #01VL05, then the load Slide Valve output on compressor #1 would be turned on for 5 seconds, and would then automatically turn off. **NOTE: the Slide Valve must be in the remote mode for this command to be executed. Time is not accrued, each command restarts timer.**

Returned Answer (for L or U commands):

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	(Carriage return, line feed.)

Returned Answer (for S command):

Character Position	Description of returned data
1, 2, 3	Slide Valve position.
	CR, LF (Carriage return, line feed)

RETURN SLIDE STOP POSITION COMMAND: #IDVP

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
V	Slide **(V)**alve / Slide Stop command
P	Return Slide Stop **(P)**osition value

Returned Answer:

Character Position	Description of returned data
1, 2	Slide Stop position, i.e. 25 = 2.5
	CR, LF (Carriage return, line feed)

CHANGE COMPRESSOR MODE COMMAND: #IDMCmID

Command structure:

Command			Description
#			Start command sequence
ID			Compressor (ID) code (01, 14, for example)
MC			Change (M)ode of (C)ompressor
	=	O	(O)ff
m	=	A	(A)uto
	=	R	(R)emote
ID			(ID) code repeated for verification

Returned Answer:

Character Position	Description
1	(A)cknowledge
2, 3	(ID) code verified
	(Carriage return, line feed)

CHANGE SLIDE VALVE MODE COMMAND: #IDMVmID

Command structure:

Command			Description
#			Start command sequence
ID			Compressor **(ID)** code (01, 14, for example)
MV			**(M)**ode of Compressor Slide **(V)**alve
	=	O	**(O)**ff
m	=	A	**(A)**uto
	=	R	**(R)**emote
ID			**(ID)** code repeated for verification

Returned Answer:

Character Position	Description
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	(Carriage return, line feed)

RETURN PRESSURES COMMAND: #IDPX

Command structure:

Command			Description
#			Start command sequence
ID			Compressor **(ID)** code (01, 14, for example)
P			Return **(P)**ressures command
	=	S	Return **(S)**uction Pressure (PSIA)
	=	D	Return **(D)**ischarge Pressure (g/hg)
X	=	O	Return **(O)**il Pressure (g)
	=	F	Return **(F)**ilter differential Pressure
	=	A	Return **(A)**ll pressures as a string of data

Command Examples: (Compressor #01 is used here)

#01PS	Returns the Suction Pressure
#01PD	Returns the Discharge Pressure
#01PO	Returns the Oil Pressure
#01PF	Returns the Filter Differential Pressure
#01PA	Returns All pressures

Note: Don't send CR or LF

Returned Answer:

If using the S command the returned pressure will be:

XXXX = 4 characters followed by a CR, LF.

If using the D, O or F commands, the returned pressure will be:
XXX = 3 characters followed by a CR, LF.

If using the A command, the returned data would be:

XXXXXXXXXXXX = 12 characters followed by a CR, LF.

RETURN TEMPERATURES COMMAND: #IDTX

Command structure:

Command			Description
#			Start command sequence
ID			Compressor **(ID)** code (01, 14, for example)
T			Return **(T)**emperature command
	=	S	Return **(S)**uction Temperature
	=	D	Return **(D)**ischarge Temperature
X	=	O	Return **(O)**il Temperature
	=	P	Return Se**(P)**arator Temperature
	=	A	Return **(A)**ll temps as a string of data

Command Examples: (Compressor #01 is used here)

#01TS	Returns the Suction Temperature
#01TD	Returns the Discharge Temperature
#01TO	Returns the Oil Temperature
#01TP	Returns the Separator Temperature
#01TA	Returns All Temperatures

Note: Don't send CR or LF

Returned Answer:

If using the S command the returned temp. will be:
+/-XXX = The first character will be a + or -, followed by 3 characters and ending with a CR, LF.

If using the D, O or P commands, the returned temp. will be:
XXX = 3 characters followed by a CR, LF.

If using the A command, the returned data would be:
XXXXXXXXXXXX = 12 characters followed by a CR, LF.

QUERY SETPOINTS DATA: #IDQ1

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
Q1	**(Q)**uery Setpoints command

Returned Answer:

Character Position	# Byte(s)	Setpoint (Name/Comment)
1	1	Always 0
2, 3, 4, 5	4	Capacity Control Setpoint, 3 chars followed by g or h
14, 15	2	Prop band
16, 17	2	Dead band
18, 19	2	Cycle time
20, 21, 22, 23	4	Future
24, 25, 26, 27	4	Future
28, 29, 30, 31	4	Future
32, 33	2	Future
34, 35	2	Future
36, 37	2	Future
38, 39, 40, 41	4	High Discharge Pressure Shut-down
42, 43, 44, 45	4	High Discharge Pressure Warning
46	1	ID (tenths position byte)
47	1	ID (ones position byte)
48	1	ID Checksum of all data (pos. 1 to 47)
49	1	CR code 13
50	1	LF code 10
51	1	0 null terminator char.

QUERY SETPOINTS DATA: #IDQ2

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
Q2	**(Q)**uery Setpoints command

Returned Answer:

Character Position	# Byte(s)	Setpoint (Name/Comment)
1, 2, 3	3	Future
4, 5, 6	3	Future
7, 8, 9	3	MLC amps stop load
10, 11, 12	3	MLC amps force unload
13, 14, 15	3	CT factor
16, 17	2	Recycle delay (setpoint, not time left)
18	1	Aux 1 0 = Warning 1 = Shutdown
19	1	Aux 1 0 = NO 1 = NC
20	1	Aux 2 0 = Warning 1 = Shutdown
21	1	Aux 2 0 = NO 1 = NC
22	1	Future
23, 24	2	Future
25	1	Future
26	1	Future
27, 28	2	Future
29	1	Future
30	1	ID (tenths position byte)
31	1	ID (ones position byte)
32	1	ID Checksum of all data (pos. 1 to 47)
33	1	CR code 13
34	1	LF code 10
35	1	0 null terminator char.

QUERY SETPOINTS DATA: #IDQ3

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
Q3	**(Q)**uery Setpoints command

Returned Answer:

Character Position	# Byte(s)	Setpoint (Name/Comment)
1, 2, 3, 4	4	Spaces
5, 6, 7, 8	4	Future
9	1	Setback active 1 = Yes 0 = No
10, 11, 12, 13	4	Auto. Cycling compressor Start
14, 15, 16, 17	4	Auto. Cycling compressor Stop
18, 19	2	Future
20, 21	2	Future
22, 23	2	Autocycle minimum Slide Valve
24	1	Autocycle active 1 = Yes 0 = No
25, 26, 27, 28	4	Future
29, 30, 31, 32	4	Future
33, 34	2	Future
35, 36	2	Future
37, 38	2	Future
39	1	Future
40	1	ID (tenths position byte)
41	1	ID (ones position byte)
42	1	ID Checksum of data (positons 1-47)
43	1	CR code 13
44	1	LF code 10
45	1	0 null terminator char.

CHANGE SETPOINTS COMMAND: #IDC

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
C	**(C)**hange setpoint command
xx	Which setpoint
xxx	New value
y	g or h for gauge or inches

The following is the complete list of setpoints that may be changed while in the change setpoints command:

01xxxy	Capacity Control Setpoint (y deleted for KpaA & BarA ver.)
02xxxy	Change Low Suction Shutdown Setpoint (y deleted for KpaA & BarA ver.)
03xxxy	Capacity Low Suction Alarm Setpoint (y deleted for KpaA & BarA ver.)
04xxx	Change High Press. Shutdown Setpoint (xxxx is used for KpaA & BarA ver.)
05xxx	Change High Press. Alarm Setpoint (xxxx is used for KpaA & BarA ver.)
06xxx	Change MLC Stop Load Setpoint
07xxx	Change MLC Force Unload Setpoint
08xx	Change Recycle Delay Setpoint
09xxx	Change CTF Setpoint
10xx	Proportional Band
11xx	Dead Band
12xx	Cycle Time
01	Compressor ID code

Returned Answer:

Axxxx	The new setpoint which was sent followed by a carriage return, line feed. BAD followed by the ID, CR, LF if unsuccessful.

Returned Example 1: If #01C01300g01 is sent:

The capacity control setpoint would be changed to 30.0g and the returned answer is A300g followed by a CR, LF.

Returned Example 2: If #01C0711001 is sent:

The MLC force unload setpoint would be changed to 110% and the returned answer is A110 followed by a CR, LF.

Returned Example 3: If #01C0520002 is sent:

The returned answer is BAD followed by the ID number and a CR, LF.

RETURN FAILURE COMMAND: #IDF

Command structure:

Command	Description
#	Start command sequence
ID	Compressor (ID) code (01, 14, for example)
F	Return Discrete (F)ailures List

Returned Answer:

Character Position	Alarm Description	
1	High Discharge Pressure Shutdown	0 = Safe 1 = Shutdown
2	High Discharge Pressure Warning	0 = Safe 1 = Warning
3	Low Suction Pressure Shutdown	0 = Safe 1 = Shutdown
4	Low Suction Pressure Warning	0 = Safe 1 = Warning
5	Low Oil Pressure Shutdown and/or Differential Oil Pressure Shutdown	0 = Safe 1 = Shutdown
6	Low Oil Pressure Warning	0 = Safe 1 = Warning
7	High Oil Temp. Shutdown	0 = Safe 1 = Shutdown
8	High Oil Temp. Warning	0 = Safe 1 = Warning
9	Low Oil Temp. Shutdown	0 = Safe 1 = Shutdown
10	Low Oil Temp. Warning	0 = Safe 1 = Warning
11	High Discharge Temp. Shutdown	0 = Safe 1 = Shutdown
12	High Discharge Temp. Warning	0 = Safe 1 = Warning
13	Compressor Aux. Fail- Shutdown	0 = Safe 1 = Shutdown
14	Pump Aux. Fail- Shutdown	0 = Safe 1 = Shutdown
15	Oil Level Shutdown	0 = Safe 1 = Shutdown
16	Unused - 0	
17	High Oil Filter Pressure Warning	0 = Safe 1 = Warning
18	Unused - 0	
19	Aux. 1 Alarm/Shutdown	0 = Safe 1 = Shutdown
20	Aux. 2 Alarm/Shutdown	0 = Safe 1 = Shutdown
21	Low Motor Current - Shutdown	0 = Safe 1 = Shutdown
22	Sensor Fault	0 = Safe 1 = Warning
23	Unused - 0	
24	Unused - 0	

CLEAR FAILURE COMMAND: #IDKFID

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
KF	**(K)**Clear **(F)**ailures
ID	**(ID)** code repeated for verification

Returned Answer:

Character Position	Description
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	(Carriage return, line feed)

CLEAR ANTIRECYCLE COMMAND: #IDKRID

Command structure:

Command	Description
#	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
KR	**(K)**Clear **(R)**ecycle Delay
ID	**(ID)** code repeated for verification

Returned Answer:

Character Position	Description
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	(Carriage return, line feed)

QUANTUM™ $ PROTOCOL SPECIFICATIONS

Quantum™, Quantum™ LX, and the Quantum™ HD Unity. use Quantum™ ($) protocol commands. This protocol has been modified slightly for the Quantum™ LX and HD Unity, in that the D command has been eliminated, and the addressing structure has changed. Any previously configured Quantum™ protocol applications that had been written for Quantum™ still work for Quantum LX, HD, and HD Unity, by using the Map File on the *Communications Screen*.

Unless otherwise shown, 9 characters are returned from the Quantum™ for a data value. The data value includes two decimal fields and the first character position is either a **-** if the value is negative, or it is **+** if the value is positive. For example, if the data's value is 25.5; then the value **+00002550** is sent. All temperatures are in degree C and all pressures are in psia. A mode such as Slide Valve mode is returned as an integer value that represents the mode that it is in. For example, a **+00000000** is sent if it is in manual, or a **+00000100** is sent if it is in automatic, or a **+00000200** is sent if it is in remote. The value zero **+00000000** is used to represent an **OFF** status and a **DISABLED** option. The value one **+00000100**, which is received as a 1, is used to represent an **ON** status and an **ENABLED** option. Setpoints are only changed if the value sent is within the acceptable range. Reference the FRICK Quantum™ publication *Control Panel Maintenance 090.070-M* for the setpoints default settings and ranges. The checksum is the 2 byte hexadecimal sum of each character within the command or returned answer excluding the command type identifier, **$**. If the command's checksum is replaced with **??**, the Quantum™ returns a response without using checksum error checking on the received command (refer to the *Data Packet* section for more information). If the Quantum™ detects a checksum error, a N (Not Acknowledged), the Compressor ID code, 02, Carriage return, and Linefeed are returned.

This document demonstrates how to communicate to the Quantum™ panel using the tables that appear on the following pages.

DATA PACKET

If you were interested in viewing the information that is contained in any of the accessible Quantum™ addresses, refer to the table entitled RETURN DATA VALUE FROM TABLE $IDT1 table later in this section.

The quickest way to demonstrate this protocol is through Hyperterminal (see the section entitled Hyperterminal later in this manual). After setting up Hyperterminal and ensuring that all wiring and jumper configurations are correct, type a *$* symbol. This is the character that will alert all of the Quantum™ panels on the communications line that data is on its way. Following the $ symbol, type the ID code of the Quantum™ that you wish to query (for instance *01* for the first Quantum™). After the ID number, type a *T1*. The protocol code in the Quantum™ recognizes this portion of the data packet as a request for the data from a memory location (address).

Up to now you have typed the following information: *$01T1*. Now you to need specify the address(s) that you wish to query. Up to sixteen addresses may simultaneously be requested. The format for this entry must be in the form of four digits, so if you want to query the FRICK address for Suction Pressure (address 2002), simply enter the value *2002*. Your command line now looks like this: $01T12002.

If you would like to view additional addresses, simply continue to append the address numbers to this command (up to sixteen total). For this example, we will only use the one address (2002 for Suction Pressure). The next thing that must be done is to enter a checksum value. You may elect to type in a *??* as a wildcard if you do not have the time to figure the correct checksum, however, the information that is returned may or may not always be reliable. The checksum will ensure reliability.

To arrive at the checksum value for the command you have just typed, you need to convert each ASCII digit into hexadecimal (do not include the $ symbol). For this example, you will need to take the first digit 0, and referring to the Conversion Chart at the end of this section, look down the ASCII column until you find 0. You will notice that the Hexadecimal equivalent for ASCII 0 is 30 hex. Repeat the process of looking up each digit in the ASCII column, and finding its equivalent in the Hexadecimal column, and write each value down. When all eight (minimum) digits (01T12002) have been converted to hexadecimal, you will need to add the eight values together. Remember, the values are in hexadecimal format, not decimal. If you are not familiar with hexadecimal math, you can use the calculator that comes with Microsoft Windows. Look at the following chart:

ASCII VALUE OF DATA PACKET		HEXADECIMAL EQUIVALENT
0		30
1		31
T		54
1		31
2		32
0		30
0		30
2		32
Hex Total	=	1AA

The answer that is arrived at from the previous chart is 1A8.

NOTICE

For any calculation that results in an answer of more than two digits, use only the right most two digits, and disregard all digits to the left.

This becomes the checksum for the data packet, and is appended to the end of the data that has so far been typed in.

The result looks like this:

$01T12002A8

Pressing the **Enter** key displays an immediate response. The format of this response resembles something (but not necessarily exactly) like:

A01+00006166B6

Referring to the RETURN DATA VALUE FROM TABLE $IDT1 table on the next page, we find that the first line of the response, **A01**, indicates that an Acknowledgement (**A**) was received from device 01 (**01**). This is followed by **+00006166** (Suction Pressure). The plus (**+**) symbol indicates a positive value, followed by 00006166. Since there are two decimal positions assumed, **0006166** equals 61.66 psia. Using the +/- symbols as a delimiter in the above example, each section of 8 digits can be interpreted as the actual value being returned from each of the address queries. The B6 value at the very end of the response is the checksum value that the Quantum™ returned, not actual data.

The following is a complete list of available $ command types:

COMMAND CODE and DESCRIPTION

CA	=	Clear Alarms
CL	=	Compressor load
CP	=	Compressor stop
CS	=	Change a setpoint in the Table
CT	=	Compressor Start
CU	=	Compressor unload
D1	=	Operating Status Display Page 1
D2	=	Operating Status Display Page 2
D3	=	Operating Status Display Page 3
D4	=	Operating Status Display Page 4
F1	=	Warnings/Shutdowns Annunciation Page 1
F2	=	Warnings/Shutdowns Annunciation Page 2
F3	=	Warnings/Shutdowns Annunciation Page 3
MA	=	Compressor mode – Autocycle
MM	=	Compressor mode – Manual
MR	=	Compressor mode – Remote
S2	=	Compressor sequence – activate
S3	=	Compressor sequence – de-activate
T1	=	Read a value from the Table
VA	=	Slide Valve mode – Automatic
VR	=	Slide Valve mode – Remote

CLEAR ALARMS COMMAND: $IDCA

Command structure:

Command	Description
$	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
CA	**(C)**lear **(A)**larms
CS	Checksum
CR	Carriage Return

Returned Answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

SLIDE VALVE CONTROL COMMANDS: $IDCLXX

Command structure:

Command	Description
$	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
C	Slide Valve/Slide Stop **(C)**ommand
L	**(L)**oad Slide Valve command
U	**(U)**nload Slide Valve Command
XX = 00	Turns selected output off.
XX=01 to 15	Turns selected output on for XX seconds.
CS	Checksum
CR	Carriage Return

If the command is $01CL00, then the load Slide Valve output on compressor #1 would be turned off. Time is not accrued, each command restarts timer. **NOTE: the Slide Valve must be in the remote mode for this command to be executed.**

Returned Answer (for L or U commands):

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

COMPRESSOR STOP COMMAND: $IDCP

Command structure:

Command	Description
$	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
CP	**(C)**ompressor **(S)**top
CS	Checksum
CR	Carriage Return

Returned Answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

CHANGE SETPOINT COMMAND: $IDCS

Command structure:

Command	Description
$	Start of command sequence
ID	Compressor (ID) code
CS	**(C)**hange **(S)**etpoint in Table address
0000	Frick®'s Table address of the setpoint
+/-	Polarity indicator (for the new setpoint)
0000 0000	Value of the new setpoint. Decimal point assumed to two places (0000 00.00)
CS	Checksum
CR	Carriage Return

Returned Answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

COMPRESSOR START COMMAND: $IDCT

Command structure:

Command	Description
$	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
CT	**(C)**ompressor S**(T)**art
CS	Checksum
CR	Carriage Return

Returned Answer:

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

SLIDE VALVE CONTROL COMMANDS: $IDCUXX

Command structure:

Command	Description
$	Start command sequence
ID	Compressor **(ID)** code (01, 14, for example)
C	Slide Valve/Slide Stop **(C)**ommand
U	**(U)**nload Slide Valve command
XX = 00	Turns selected output off
XX=01 to 15	Turns selected output on for XX seconds
CS	Checksum
CR	Carriage Return

If the command is $01CU05, then the load Slide Valve output on compressor #1 would be turned on for 5 seconds, and would then automatically turn off. Time is not accrued, each command restarts timer. NOTE: the Slide Valve must be in the remote mode for this command to be executed.

Returned Answer (for L or U commands): A01

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
	Carriage Return, Line Feed

RETURN OPERATING STATUS – Page 1 Data: **$IDD1**

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
D1	Operating Status **(D)**ata – Page **(1)** command.
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
4-12	Suction Pressure
13-21	Suction Temperature
22-30	Discharge Pressure
31-39	Discharge Temperature
40-49	Oil Pressure
49-57	Oil Temperature
58-66	Filter Differential
67-75	Motor Current
76-84	FLA%
85-93	Kilowatts
94-102	Slide Valve
103-111	Slide Stop
112-120	Process Temperature
121, 122	Checksum, Carriage Return, Line Feed if successful

RETURN OPERATING STATUS – Page 2 Data: **$IDD2**

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
D2	Operating Status **(D)**ata – Page **(2)** command.
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code verified
4-12	Alarm Status
13-21	Shutdown Status
22-30	Running Status
31-39	Slide Valve Load
40-49	Slide Valve Unload
49-57	Slide Stop Increase
58-66	Slide Stop Decrease
67-75	Stop Load/Force Unload Code
76-84	Separator Temperature
85-93	Balance Piston Pressure
94-102	Process Variable
103-111	Compressor Mode
112, 113	Checksum, Carriage Return, Line Feed if successful

RETURN OPERATING STATUS – Page 3 Data: **$IDD3**

Command structure:

Command	Description
$	Start of command sequence
ID	Compressor **(ID)** code (01, 14, for example)
D3	Operating Status **(D)**ata – Page **(3)** command
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code
4-12	Communication Port 1 Code
13-21	Communication Port 2 Code
22-30	I/O Communication Port Code
31-39	Capacity Control Mode
40-48	Process Control
49-57	Oil Pump Mode
58-66	Oil Pump Code
67-75	Oil Heater Code
76-84	Process Setpoint
85-93	Slide Valve Mode
94-102	Slide Stop Mode
103-111	Runtime Hours
112, 113	Checksum, Carriage Return, Line Feed if successful

RETURN OPERATING STATUS – Page 4 Data: **$IDD4**

Command structure:

Command	Description
$	Start of command sequence
ID	Compressor **(ID)** code (01, 14, for example)
	Operating Status **(D)**ata – Page **(4)** command
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
4-12	Date as 00/00/00
13-22	Time as hh:mm:ss
23-29	Remaining Recycle time as mm:ss
30, 31	Checksum, Carriage Return, Line Feed if successful

RETURN Alarms & Shutdowns – Page 1 Data: **$IDF1**

Command structure:

Command	Description
$	Start of command sequence
ID	Compressor **(ID)** code (01, 14, for example)
F1	**(F)**ailure Annunciation command Page **(1)**
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code
4-6	Message Code 1
7-14	Date 1 as mm/dd/yy
15-22	Time 1 as hh:mm:ss
23	Space
24-26	Message Code 2
27-34	Date 2 as mm/dd/yy
35-42	Time 2 as hh:mm:ss
43	Space
44-46	Message Code 3
47-54	Date 3 as mm/dd/yy
55-62	Time 3 as hh:mm:ss
63	Space
64-66	Message Code 4
67-74	Date 4 as mm/dd/yy
75-82	Time 4 as hh:mm:ss
83	Space
84-86	Message Code 5
87-94	Date 5 as mm/dd/yy
95-102	Time 5 as hh:mm:ss
103	Space
104-106	Message Code 6
107-114	Date 6 as mm/dd/yy
115-122	Time 6 as hh:mm:ss
123	Space
124-125	Checksum, Carriage Return, Line Feed if successful

RETURN Alarms & Shutdowns – Page 2 Data: **$IDF2**

Command structure:

Command	Description
$	Start of command sequence
ID	Compressor **(ID)** code (01, 14, for example)
F2	**(F)**ailure Annunciation command Page (2)
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
4-6	Message Code 7
7-14	Date 7 as mm/dd/yy
15-22	Time 7 as hh:mm:ss
23	Space
24-26	Message Code 8
27-34	Date 8 as mm/dd/yy
35-42	Time 8 as hh:mm:ss
43	Space
44-46	Message Code 9
47-54	Date 9 as mm/dd/yy
55-62	Time 9 as hh:mm:ss
63	Space
64-66	Message Code 10
67-74	Date 10 as mm/dd/yy
75-82	Time 10 as hh:mm:ss
83	Space
84-86	Message Code 11
87-94	Date 11 as mm/dd/yy
95-102	Time 11 as hh:mm:ss
103	Space
104-106	Message Code 12
107-114	Date 12 as mm/dd/yy
115-122	Time 12 as hh:mm:ss
123	Space
124, 125	Checksum, Carriage Return, Line Feed if successful

RETURN Alarms & Shutdowns – Page 3 Data: **$IDF3**

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
F3	**(F)**ailure Annunciation command Page **(3)**
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
4-6	Message Code 13
7-14	Date 13 as mm/dd/yy
15-22	Time 13 as hh:mm:ss
23	Space
24-26	Message Code 14
27-34	Date 14 as mm/dd/yy
35-42	Time 14 as hh:mm:ss
43	Space
44-46	Message Code 15
47-54	Date 15 as mm/dd/yy
55-62	Time 15 as hh:mm:ss
63	Space
64-66	Message Code 16
67-74	Date 16 as mm/dd/yy
75-82	Time 16 as hh:mm:ss
83	Space
84-86	Message Code 17
87-94	Date 17 as mm/dd/yy
95-102	Time 17 as hh:mm:ss
103	Space
104-106	Message Code 18
107-114	Date 18 as mm/dd/yy
115-122	Time 18 as hh:mm:ss
123	Space
124, 125	Checksum, Carriage Return, Line Feed if successful

RETURN Data Value From Table: $IDT1

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor (ID) code (01, 14, for example)
T1	Return the value of a Table address.
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000	Frick® Address (s) of data value in Table. Up to 16 different addresses can be requested. Example # 1: if requesting Suction Temperature only, command would be (to compressor ID of 1); **$01T10128CSCR**. Example # 2: If requesting address 128 through 136, the command would be: **$01T1012801290130013101320133013401350136CSCR**.
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
4-End	Value(s) of requested data. CS (Checksum followed by CR, LF) if successful. The response to example # 1 above would look like: **A01+000018731F**, the plus symbol (+) indicates that the data value returned is positive. The response to example # 2 above would look like: **A01+00001873+00004901+00002949+00005652-0027249+00008211+00013354+00000656+0000288109**

NOTICE

The following commands are for remote control of a compressor. Set a compressor in both remote compressor mode and remote Slide Valve or capacity mode for remote control.

COMPRESSOR MODE – AUTOCYCLE COMMAND: $IDMA

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
MA	**(M)**ode **(A)**utocylce
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful

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COMPRESSOR MODE – MANUAL COMMAND: $IDMM

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
MM	**(M)**annual **(M)**ode
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful

COMPRESSOR MODE – REMOTE COMMAND: $IDMR

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
MR	**(M)**ode **(R)**emote
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful

COMPRESSOR SEQUENCE – ACTIVATE COMMAND: $IDS2

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
S2	**(S)**equence Activate (2)
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful

COMPRESSOR SEQUENCE – DE-ACTIVATE COMMAND: $IDS3

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
S3	**(S)**equence Activate **(3)**
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful

SLIDE VALVE MODE – AUTOMATIC COMMAND: $IDVA

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
VA	Slide **(V)**alve Mode **(A)**utomatic
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful.

SLIDE VALVE MODE – REMOTE COMMAND: $IDVR

Command structure:

Command	Description
$	Start of command sequence.
ID	Compressor **(ID)** code (01, 14, for example)
VR	Slide **(V)**alve Mode **(R)**emote
CS	Checksum
CR	Carriage Return

RETURNED ANSWER,

Character Position	Description of returned data
1	**(A)**cknowledge
2, 3	**(ID)** code.
	Carriage Return, Line Feed if successful.

SECTION 3

QUANTUM™ HD UNITY ALLEN-BRADLEY COMMUNICATION AND PROGRAMMING OVERVIEW

Quantum™ HD Unity Allen-Bradley Communication

This section contains programming examples for reading data from and writing data to the FRICK Quantum control panel from an Allen Bradley (AB) SLC500 or PLC5 processor. Allen Bradley (AB) RSLogix500 programming software has been used for the following examples, however, these examples can also be used for the AB RSLogix5 software.

OVERVIEW OF HALF AND FULL DUPLEX THEORY

To provide for the reading and writing of data to Quantum™ HD Unity panels using Allen-Bradley communication, the Quantum™ HD Unity has an Allen-Bradley DF1 communication driver that recognizes either half or full duplex SLC 500 protected typed logical read and write commands (either half or full duplex must be selected). Half-duplex simply means that data can only be sent in one direction at a time (the concept of how a walkie-talkie works). Using full-duplex, data can be sent and received simultaneously (the concept of how a telephone works). This is a Master / Slave multi-drop communication method.

The Quantum™ HD Unity talks Allen-Bradley SLC protocol and is programmed to resemble an Allen-Bradley SLC500 slave station. The customer's PLC or DCS must be setup to initiate the reading and writing of data to a Quantum™ HD Unity. The Quantum™ HD Unity does not initiate any communications. The panel ID number is used as its station address and the target node. With the AB PLC, the MSG (Message) instruction is used to send read and write requests. A DCS (Distributed Control System) will use a SLC 500 DF1 protocol driver to send protected typed logical read with 3 address fields and protected typed logical write requests with 3 address fields to a Quantum™ HD Unity. Fifty (50) data elements can be read with one read.

Setpoints are changed by sending a write command to one element. Changing a setpoint causes the Quantum™ HD Unity to save the new setpoint to Flash memory (non-volatile memory).

Be careful not to continuously request a setpoint change. It is to be expected that communications may slow down during the process of writing setpoints or clearing alarms. Both of these processes involve writing to either EEPROM or Flash Memory and does take some time. If communication requests are being sent faster than once every couple of seconds, there will be temporary slowdowns during these processes.

Additionally, keeping the Quantum™ HD Unity busy writing to Flash memory will interfere with the communications to its I/O Boards. A communication failure to an I/O board will cause the compressor to shutdown. Control commands such as starting the compressor are also sent with a write command. For more detail and a list of the data, reference the Quantum™ HD Unity Data Table section. For details about the actual protocol, reference the AB publication 1770-6.5.16 *DF1 Protocol and Command Set Reference Manual.*

Because overrun can occur, set up the baud rate and commands to produce the most desired throughput. Have the master station set the Stop Bit and Parity to match the Quantum™ HD Unity, Duplicate Detect disabled, and Error Detect set for BCC or CRC.

When communication is between either your programming software and a Quantum™ HD Unity or an Allen-Bradley PLC and a Quantum™ HD Unity on a multi-drop link, the devices depend on a DF1 Master to give each of them polling permission to transmit in a timely manner. As the number of Quantum™ HD Unity slaves increase on the link, the time between when each panel is polled also increases. This increase in time may become larger if you are using low baud rates. As these time periods grow, the timeouts such as the message timeout, poll timeout and reply timeout may need to be changed to avoid loss of communication.

ACK Timeout - The amount of time in 20 milliseconds increments that you want the processor to wait for an acknowledgment to the message it has sent before the processor retries the message or the message errors out.

Reply Message Wait Time - Define the amount of time in 20 millisecond increments that the master station will wait after receiving an ACK (to a master-initiate message) before polling the remote station for a reply. Choose a time that is, at minimum, equal to the longest time that a remote station needs to format a reply packet. Some remote stations can format reply packets faster than others.

Message Timeout - Defines the amount of time in seconds that the message will wait for a reply. If this time elapses without a reply, the error bit is set, indicating that the instruction timed out. A timeout of 0 seconds means that there is no timer and the message will wait indefinitely for a reply. Valid range 0-255 seconds.

NOTICE

Make sure the Allen-Bradley PLC and the programming software is the most recent software revision. Some revisions have been made that do not allow the SLC Typed Logical Read/Write Message Command.

SLC-500 - SUGGESTED SETUP

The following are representations of the channel configuration screens from the AB RSLogix500 programming software for the SLC500. Enter values as shown in order to establish communications using AB Protocol.

This section contains programming examples for reading data from and writing data to the FRICK Quantum control panel from an Allen Bradley (AB) SLC500 or PLC5 processor. Allen Bradley (AB) RSLogix500 programming software has been used for the following examples, however, these examples can also be used for the AB RSLogix5 software.

CHANNEL CONFIGURATION

- Configure the communication channel – Channel 0:
- Current Communication Mode: System
- Communication Driver: DF1 Half-Duplex Master or DF1 Full-Duplex
- Baud Rate: 19200 (suggested)
- Stop Bits: 1 (suggested)
- Duplicate Detect: Disabled
- ACK Timeout (x20ms): 30
- Message Retries: 3
- Parity: None (suggested)
- Station Address (Source ID): 5 (Master's DF1 selected ID#)
- Error Detect: BCC / CRC
- RTS off Delay (x20ms): 0
- RTS Send Delay (x20ms): 0
- Pre-Send Time Delay (x1 ms): 0
- Control Line: No Handshaking
- Polling Mode: Message Based (do not allow slave to initiate messages)
- Priority Polling Range - Low: 255, High: 0
- Normal Polling Range - Low: 255, High: 0
- Normal Poll Group Size: 0
- Reply Message Wait Time (x20ms): 20
- System Mode Driver: DF1 Half-Duplex Master or DF1 Full-Duplex
- User Mode Driver: Generic ASCII
- Write Protect: DISABLED
- Mode Changes: DISABLED
- Mode Attention Character: \0x1b (default)
- System Mode Character: S (default)
- User Mode Character: U (default)
- Edit Resource/File Owner Timeout (Sec): 60
- Passthru Link ID (decimal): 1

READ MESSAGE SETUP EXAMPLE

- Read/Write Message
- Type: Peer-To-Peer
- Read/Write: Read
- Target Device: 500 CPU
- Local/Remote: Local
- Control Block: N11:0
- Control Block Length: 14
- Channel: 0
- Target Node: 2 (002) (this is the Quantum™ Panel ID)
- Local File Address: N12:0
- Target File Address/Offset: N10:0
- Message Length in Elements: 50
- Message Time-out (seconds): 15

(Refer to the *Allen-Bradley Programming Overview Section* for more information)

WRITE MESSAGE SETUP EXAMPLE

- Read/Write Message
- Type: Peer-To-Peer
- Read/Write: Write
- Target Device: 500 CPU
- Local/Remote: Local
- Control Block: N11:0
- Control Block Length: 14
- Channel: 0
- Target Node: 2 (002) (this is the Quantum™ HD Unity Panel ID)
- Local File Address: N12:0
- Target File Address/Offset: N55:3
- Message Length in Elements: 1
- Message Time-out (seconds): 15

Enter 20 into N12:0 to send the command to set the compressor in remote mode.

(Refer to the *Allen-Bradley Programming Overview Section* for more information)

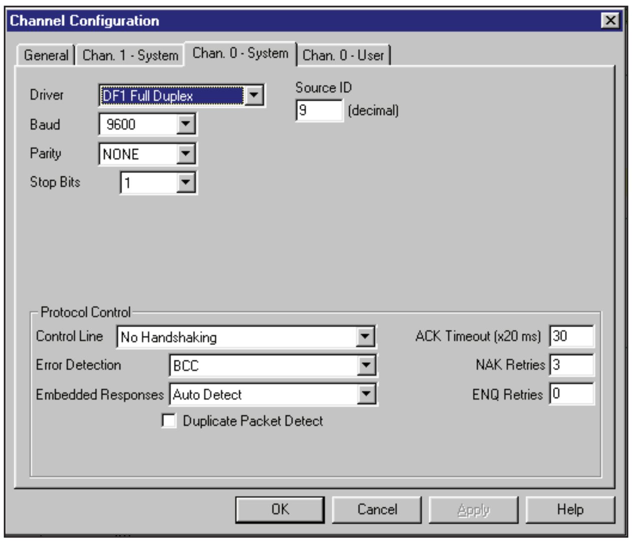
Allen-Bradley Programming Overview

This section contains programming examples for reading data from, and writing data to the FRICK Quantum™ HD Unity control panel from an Allen Bradley (AB) SLC 500 processor. AB RSLogix500 programming software has been used for the following examples, however, these examples can also be used for the AB RSLogix5 software.

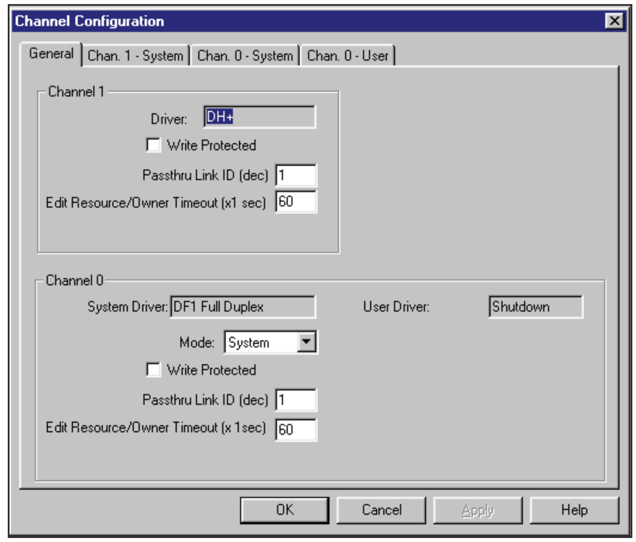
CHANNEL CONFIGURATION

The following are representations of the channel configuration screens from the AB RSLogix500 programming software for the SLC 500. Enter values as shown in order to establish communications using AB Protocol.

GENERAL CONFIGURATION



SYSTEM CONFIGURATION



MESSAGE SEQUENCE LOGIC

Use the logic outlined in Figure 13 to sequence read and write messages to the Quantum™ HD Unity panel. This logic prevents hang up due to lost communications or message errors.

All Read and Write values must be interpreted as Signed 16 bit Integers (INT array).

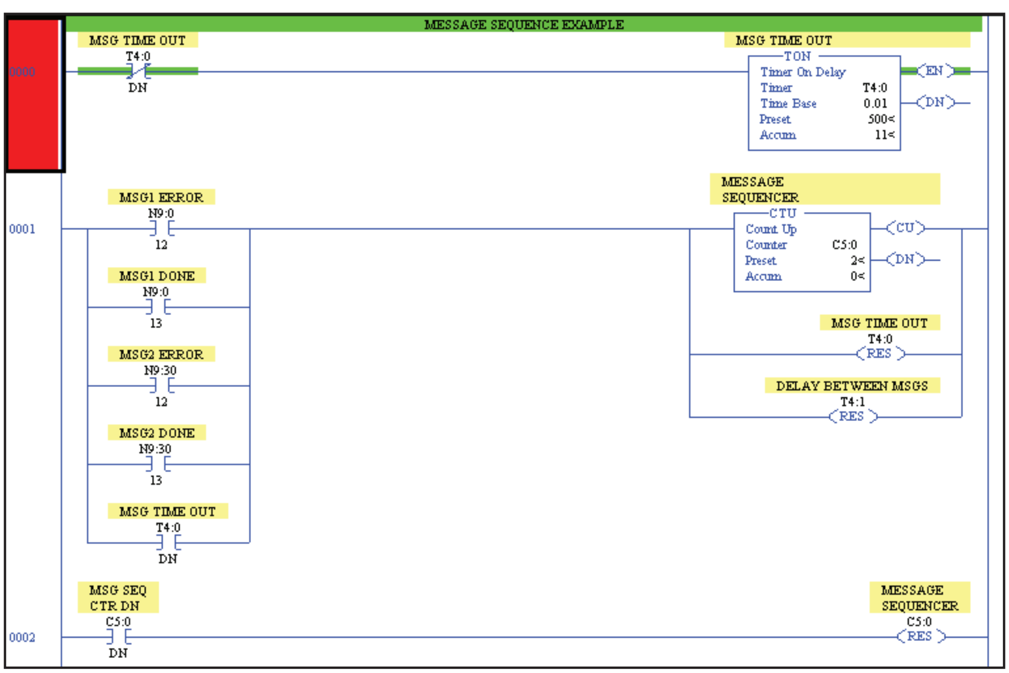


Figure 13: Message Sequence Logic Example

MESSAGE READ LOGIC

Use the following logic to read data from the Quantum™ HD Unity panel. To read more data or to read data from several compressors, copy / paste these rungs as needed then modify the control block and setup screen parameters accordingly. The following message read instruction will be executed whenever counter 5:0 (logic shown above) is equal to 0.

DELAY BETWEEN MESSAGES

The delay timer on rung 3 must be used when communicating to the Quantum™ HD Unity with the 100ms preset as shown. This time delay may be decreased when communicating to more than one compressor provided the messages are alternated between compressors. This time delay is not required for Quantum™ V. 5.0x or earlier.

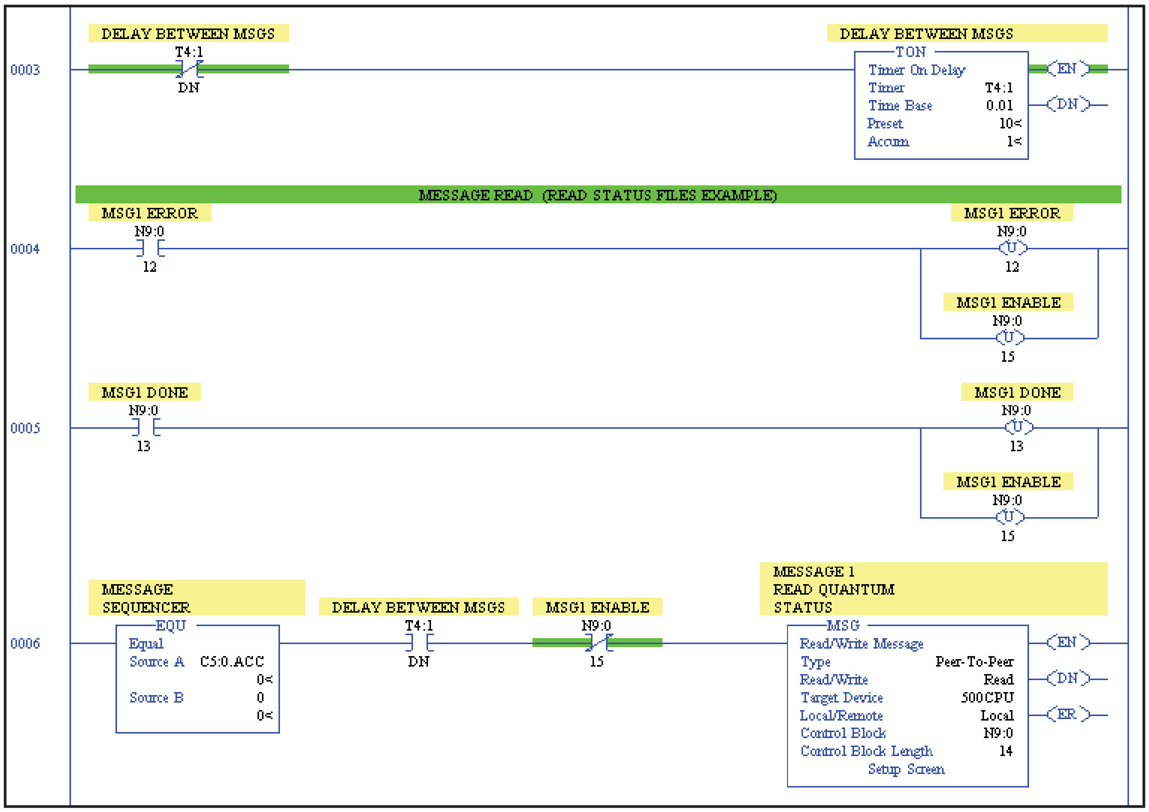
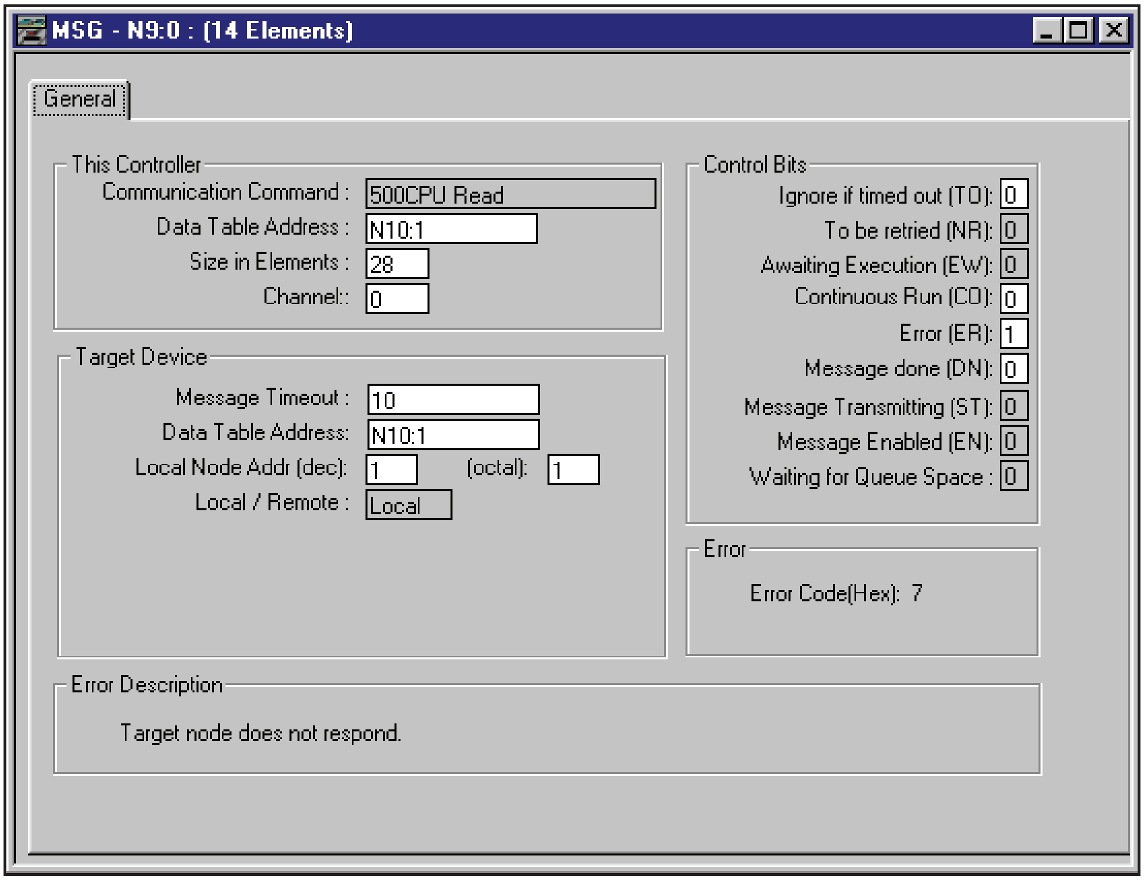


Figure 14: Message Read Logic Example

MESSAGE READ SETUP SCREEN

The following setup screen is programmed to obtain 28 consecutive data files from the Quantum™ HD Unity (ID#1) N10:1 register and place them into the SLC500's N10:1 through N10:28 register. The target address must be changed to for the Quantum™ HD Unity.



THIS CONTROLLER: SLC500

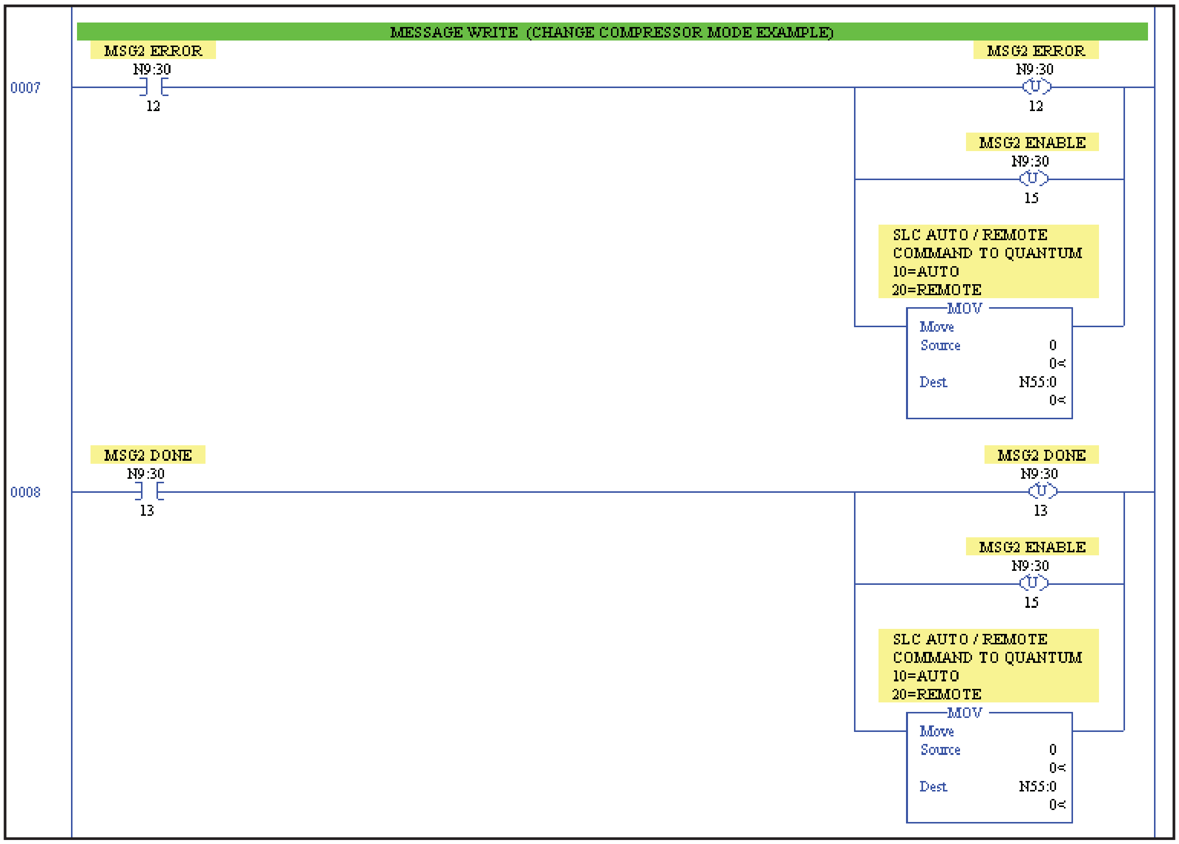
- Data Table Address: Data file location in the SLC500
- Size in Elements: # of data file to read
- Channel: Port location on the SLC processor (Channel 0 is the RS-232 port)

TARGET DEVICE: QUANTUM™ PANEL

- Data Table Address: Data file location in the Quantum™ HD Unity controller.
- Local Node: Quantum™ HD Unity ID# (Octal)

MESSAGE WRITE LOGIC

Use the following logic to write data from the Quantum™ HD Unity panel. To write more data or to write data to several compressors, copy / paste these rungs as needed then modify the control block and setup screen parameters accordingly. The following write message instruction will be executed when counter 5:0 (logic shown above) is equal to 1 and when called upon by the change compressor mode bit B3/2. When B3/2 is off, the counter will be incremented to execute the next message in the sequence.



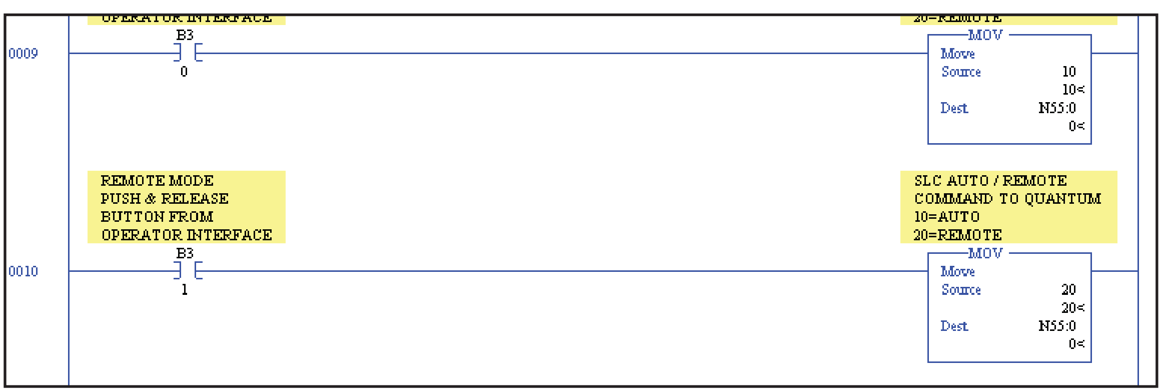


Figure 15: Message Write Logic Example

MESSAGE WRITE LOGIC (Continued)

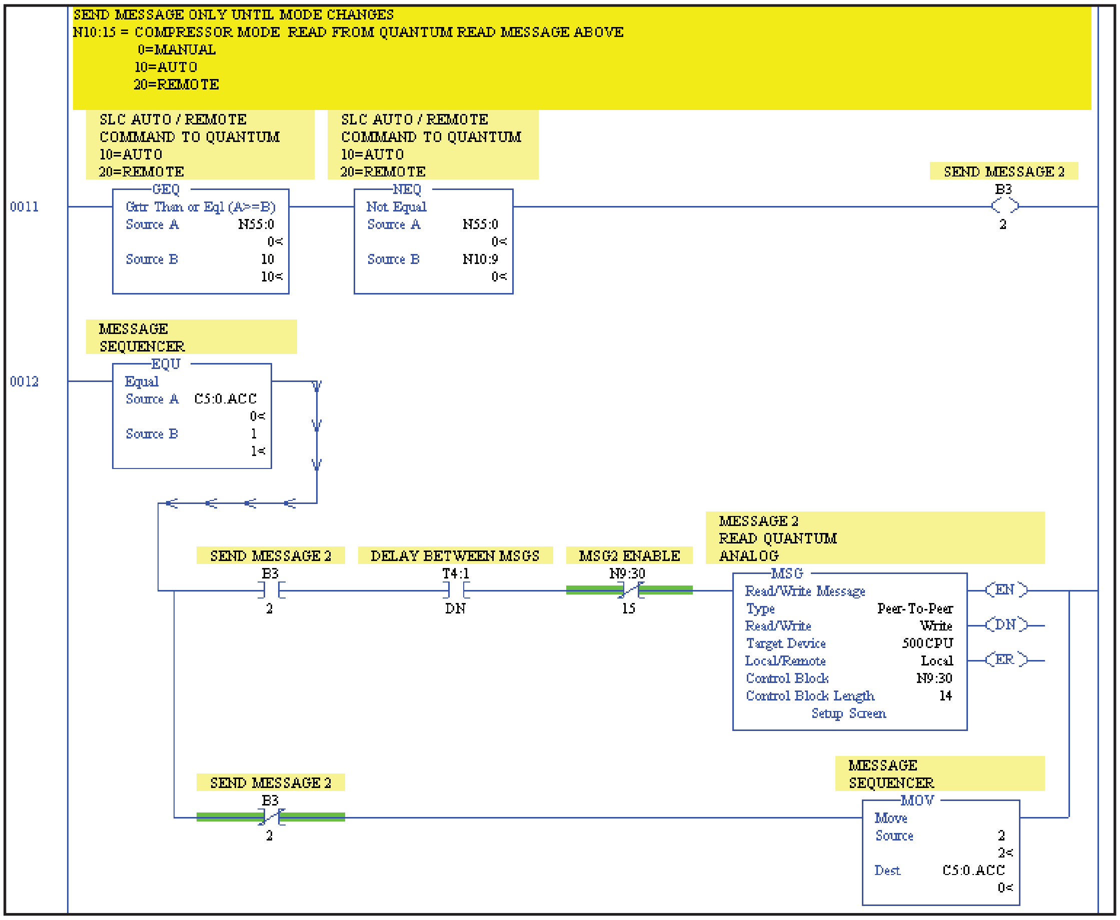
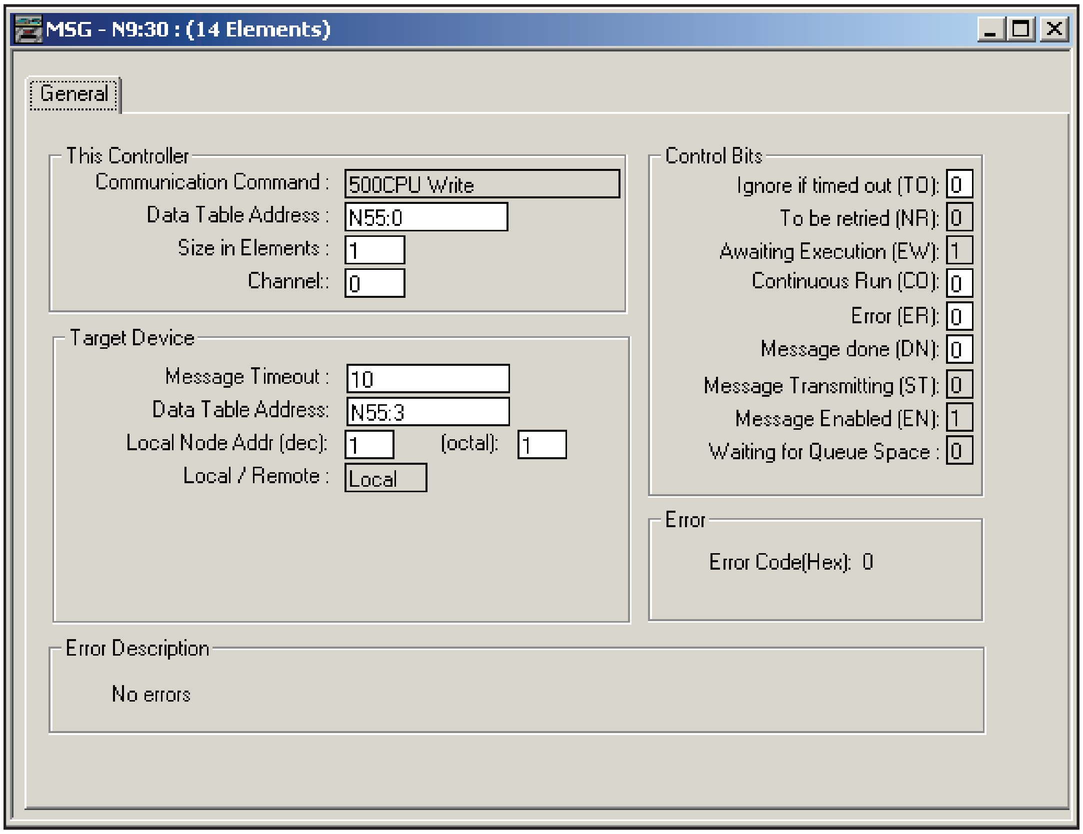


Figure 16: Message Write Logic Example (continued)

MESSAGE WRITE SETUP SCREEN

The following setup screen is programmed to write the compressor mode to the Quantum™ HD Unity (ID#1) N55:3 data file from the SLC500's N55:3 data file. The target address must be changed to for the Quantum™ HD Unity.



THIS CONTROLLER: SLC500

- Data Table Address: Data file location in the SLC500
- Size in Elements: # of data file to read
- Channel: Port location on the SLC processor (Channel 0 is the RS232 port)

TARGET DEVICE: QUANTUM™ PANEL

- Data Table Address: Data file location in the Quantum™ controller.
- Local Node: Quantum™ ID# (Octal)

ALLEN-BRADLEY DATA ACCESS

Data passed to and from the Quantum™ HD Unity are integer values with one decimal field assumed unless shown otherwise or the command is sent to select two decimal fields. For example, if the data's value is 25.5 then the value 255 is sent. All temperatures are in degree C and all pressures are in psia unless the command is sent to select the units of the panel. A mode such as Slide Valve mode is sent as an integer value that represents the mode it is in. For example, a 0 is sent if it is in manual, or a 10 is sent if it is in automatic, or a 20 is sent if it is in Remote Communications.

The value zero (0) is used to represent an OFF status and a DISABLED option. The value one (1), which is received as a 10, is used to represent an ON status and an ENABLED option. Only data values that are designated as setpoints are modifiable. Read Only is used to help identify what data is not modifiable. The setpoint range is checked to see if it is an allowed setting. If it is not allowed, the setting is not changed. Reference the Quantum™ HD Unity Data Tables in this manual for the address listing and description of data.

A command has been provided that selects whether data to and from the Quantum™ HD Unity will be returned in the units that are the default (pressure in psia and temperature in Degree C) or in the units that are selected to display at the panel.

ETHERNET/IP

The Quantum™ HD Unity supports the use of EtherNet/IP (as described on the ab.com website, under the EtherNet/IP heading). Address mapping follows the Allen-Bradley N: format, as shown in the Data Tables under the heading of AB Address.

SECTION 4
Modbus PROTOCOL

Modbus Protocol

GENERAL DESCRIPTION

Modbus Protocol is a messaging structure developed by Modicon in 1979, used to establish master-slave/client-server communication between intelligent devices. It is a standard, truly open and the most widely used network protocol in the industrial manufacturing environment. The Modbus protocol provides an industry standard method that Modbus devices use for parsing messages.

Since Modbus protocol is a messaging structure, it is independent of the underlying physical layer. It is traditionally implemented using RS-232, RS-422, or RS-485 communications hardware. With the Quantum™ HD Unity, Modbus TCP can also be used as it applies to Ethernet networks.

The Quantum™ HD Unity controller is setup to communicate on standard Modbus networks using either ASCII (American Standard Code for Information Interchange), RTU or TCP/IP.

The Quantum™ HD Unity provides the capability to interface with other devices that support serial data communications using the Modbus protocol. This is a Master / Slave multi-drop communication method whereby the Quantum™ HD Unity is setup to be a Modbus Slave. The customer's PLC (Programmable Logic Controller) or DCS (Data Communications System, such as a desktop or laptop computer) must be setup as a Modbus Master. The Master initiates the reading and writing of data (queries) to a Quantum™ HD Unity. The Quantum™ HD Unity does not generate its own data, it will only reply to a request by the Master.

The Quantum™ HD Unity ID number is used as the Modbus Slave address (for ASCII and RTU). The Master uses Function Code 3 (Read Holding Registers) to send a request to read data from the Quantum™ HD Unity. The Master uses Function Code 6 (Load Register) to request to change a setpoint or to send a command such as starting the compressor. Up to one hundred and twenty-five (125) data elements can be read with one read request.

The address references are numbered relative to the FRICK addresses in the Quantum™ HD Unity Data Table (see Modbus
Addressing Note in the Quantum™ HD Unity Data Table section of this manual for additional information).

The Quantum™ only accepts one value with a Load Register request. Changing a setpoint causes the Quantum™ to save the new setpoint to nonvolatile memory. Be careful not to continuously request a setpoint change. Keeping the Quantum™ HD Unity busy writing to memory will interfere with the Quantum™ HD Unity communicating to its I/O boards. A communication failure to an I/O board will cause the compressor to shutdown. For more detail and a list of the data, reference the Quantum™ HD Unity Data Table section of this manual. For details about the actual protocol, reference the Modicon website at http://www.Modbus.com.

MODBUS TCP/IP (ETHERNET)

TCP/IP is the common transport protocol of the Internet and is actually a set of layered protocols, providing a reliable data transport highway between Quantum™ HD Unity panels and an Ethernet network. Ethernet has become the standard for factory networking, replacing many of the data-bus systems used in the past.

Modbus TCP/IP simply takes the Modbus instruction set and transparently wraps TCP/IP around it. Unlike Modbus ASCII and RTU, there no parameters that need to be set (such as baud rate, or data bits for example).

NOTICE

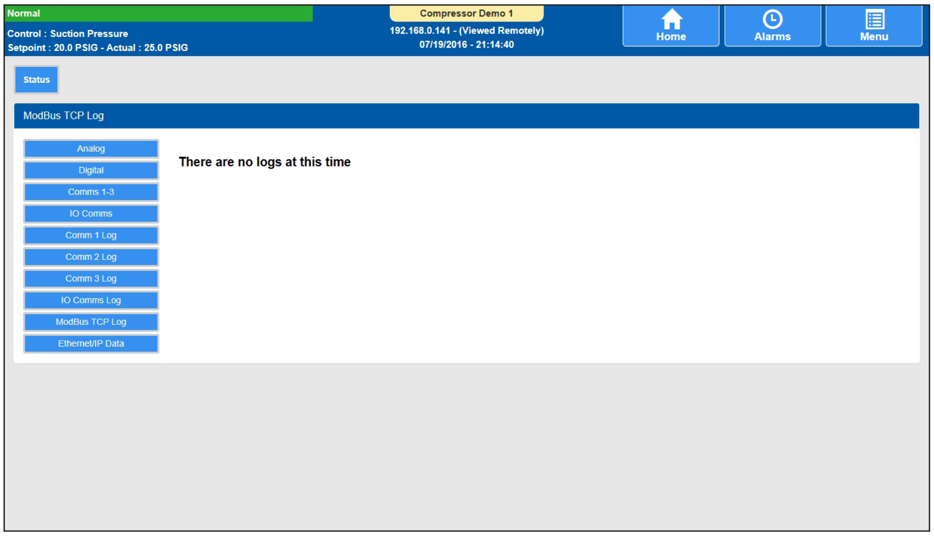
When using Modicon Setup Software, ensure that:

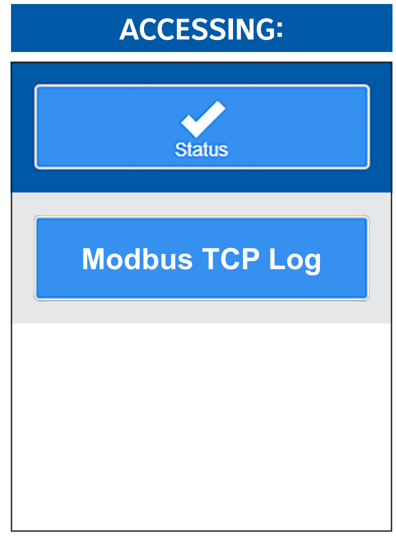
- **Head number = Rack Position (position of Ethernet card in its rack)**
- **Socket # = 502**

FRICK Controls uses function codes 3 (Read), 6 (Write) and 16 (Multiple Write) of the TCP/IP protocol. Use port 502 for Modbus TCP/IP communications. The value used for the Modbus ID must be greater than zero.

The Port 502 is fixed value in the Quantum HD Unity and is not User changeable. Do not confuse this Port with the Web Server Port on the Network Settings screen.

STATUS – MODBUS TCP LOG





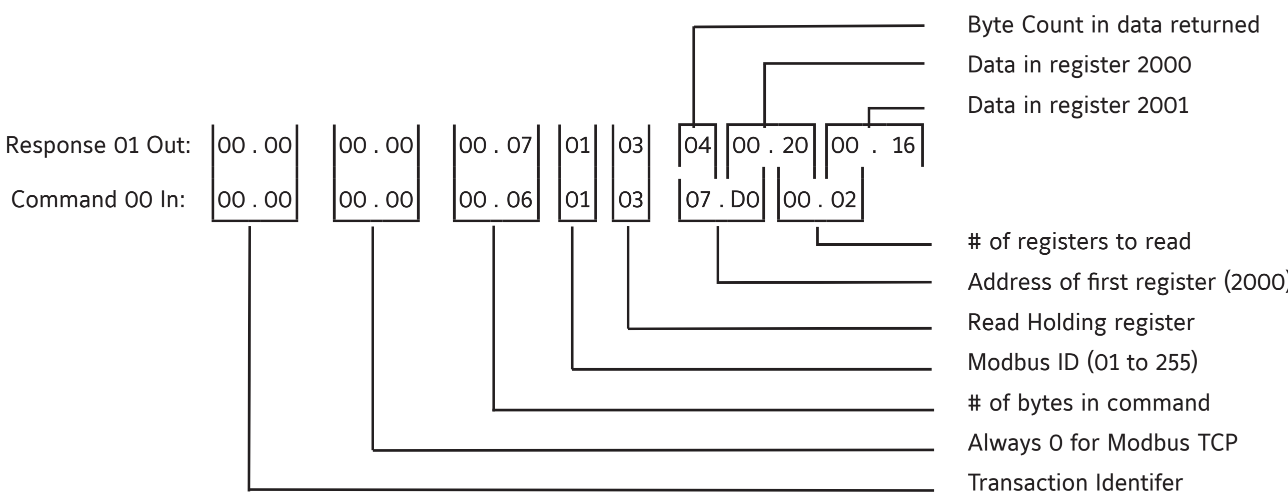
DESCRIPTION: This screen allows the technician to view all of the Modbus TCP communications information that the Quantum™ HD Unity is receiving and transmitting.

Each time a new command is sent or received, the screen update with the new information.

The top line of data is the most recent activity. At the left of each line, check whether the data is IN or OUT (Receive or Send), and the actual data (in Hexadecimal format). This information can be used to compare against the data being sent and received at the other end of the communications link, to verify proper operation.

Refer to the following table for an example of how the data packets are created, using the data that has been shown on the above screen:

All Read and Write values must be interpreted as Signed 16 bit Integers.



MODBUS ASCII (SERIAL COMMUNICATIONS)

In the ASCII Transmission Mode (American Standard Code for Information Interchange), each character byte in a message is sent as 2 ASCII characters. This mode allows time intervals of up to a second between characters during transmission without generating errors. Some particulars about Modbus ASCII:

- The device address field of the message frame contains two characters (16 bits).
- The function code field of the message frame will contain two characters (16 bits).
- Word size is selectable.
- Error checking is accomplished using LRC (Longitudinal Redundancy Check).
- Hyperterminal can be used to test communications.

MODBUS RTU (SERIAL COMMUNICATIONS)

In RTU (Remote Terminal Unit) Mode, each 8-bit message byte contains two 4-bit hexadecimal characters, and the message is transmitted in a continuous stream. The greater effective character density increases throughput over ASCII mode at the same baud rate. Some particulars about Modbus RTU:

- The device address field of the message frame contains 8 binary bits.
- The function code field of the message frame will contain 8 binary bits
- Word size is selectable.
- Error checking is accomplished using CRC (Cyclical Redundancy Check).
- Hyperterminal cannot be used to test communications.

SERIAL PORT CONFIGURATION OF THE MASTER

- 7 or 8 Bits a Character (Data Bits)
- Odd, Even, or No Parity
- 1 or 2 Stop Bits
- No Handshake

DATA PACKET

The Modbus protocol establishes the format for the Master's query by creating a message (data packet) as follows:

- Assign the device address (Quantum™ panel ID #). The address field of a message frame contains two characters for ASCII, or 8 bits for RTU. Valid Quantum™ device addresses are in the range of 01 – 99 decimal. A master addresses a Quantum™ by placing the Quantum™ address in the address field of the message. When the Quantum™ sends its response, it places its own address in this address field of the response to let the Master know which Quantum™ is responding.
- An 8-bit function code defining the requested action (Query):
- Function Code 3 - to read holding registers (sends a request to read data from the Quantum™).
- Function Code 6 to load a register (to request to change a setpoint or to send a command such as starting the compressor), or a function code 16 (RTU only) to load multiple registers.
- Any data to be sent (Response). The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. These are to be made from a pair of ASCII characters (ASCII), or one 8-bit for RTU. The data field of messages sent from a Master to the Quantum™ devices contains additional information which the Quantum™ 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. If no error occurs, the data field of a response from a Quantum™ 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.
- An error-checking field.

THE QUERY

The function code in the query tells the addressed Quantum™ what kind of action to perform. The data bytes contain any additional information that the Quantum™ will need to perform the function. For example, function code 03 will query the Quantum™ to read holding registers and respond with their contents. The data field must contain the information telling the Quantum™ which register to start at and how many registers to read. The error check field provides a method for the Quantum™ to validate the integrity of the message contents.

THE RESPONSE

If the Quantum™ makes a normal response, the function code in the response is an echo of the function code in the query. The data bytes contain the data collected by the Quantum™, such as register values or status. If an error occurs, the function code is modified to indicate that the response is an error response, and the data bytes contain a code that describes the error. The error check field allows the master to confirm that the message contents are valid.

DATA FIELD

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. For ASCII, these can be made from a pair of ASCII characters. For RTU, this is one 8-bit number.

The data field of messages sent from a master to the Quantum™ devices contains additional information which the Quantum™ 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 Quantum™ 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 no error occurs, the data field of a response from a Quantum™ 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.

ERROR CHECKING

ASCII

In ASCII mode, when data is transmitted to and from the Quantum™ Controller, each message has an Error Checking value appended to the end of the message. Longitudinal Redundancy Check, or LRC, is used as the method for verifying that the ASCII message sent from the transmitting device was properly received by the receiving device.

The Longitudinal Redundancy Check (LRC) field is one byte, containing an eight-bit binary value. The LRC value is calculated by the transmitting device, by adding together successive eight-bit bytes of the message, discarding any carries, and then two's complementing the result. It is performed on the ASCII message field contents excluding the colon character that begins the message, and excluding the CRLF pair at the end of the message. The LRC is then appended to the message as the last field preceding the CRLF (Carriage – Line Feed) characters. Each new addition of a character that would result in a value higher than 255 decimal simply rolls over the field's value through zero. Because there is no ninth bit, the carry is discarded automatically.

The receiving device recalculates an LRC during receipt of the message, and compares the calculated value to the actual value it received in the LRC field. If the two values are not equal, an error results.

RTU

In RTU mode, messages include an error–checking field that is based on a Cyclical Redundancy Check (CRC) method. The CRC field checks the contents of the entire message. It is applied regardless of any parity check method used for the individual characters of the message.

The CRC field is two bytes, containing a 16–bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal an error results.

The CRC is started by first preloading a 16–bit register to all 1's. Then a process begins of applying successive 8–bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each 8–bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place.

This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next 8–bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

FRAMING

A message frame is used to mark the beginning and ending point of a message allowing the receiving device to determine which device is being addressed and to know when the message is completed. It also allows partial messages to be detected and errors flagged as a result.

ASCII

In ASCII mode, messages start with a colon (:) character (3A hex), and end with a carriage return-line feed (CRLF) pair (0D and 0A hex).

The allowable characters transmitted for all other fields are hexadecimal 0 - 9, A - F.

All Quantum™ panels connected to the network monitor the network bus continuously for the colon character. When one is received, each Quantum™ decodes the next field (the address field) to find out if it is the addressed device.

A Modbus message is placed by the transmitting device into a frame that has a known beginning and ending point. This allows receiving devices to begin at the start of the message, read the address portion and determine which device is addressed, and to know when the message is completed. Partial messages can be detected and errors can be set as a result.

A typical message frame as sent by the Master is shown below:

START	ADDRESS	FUNCTION	DATA	LRC CHECK	END
:	01	03	00870001	74	CRLF
1 CHAR	2 CHAR	2 CHAR	8 CHAR	2 CHAR	2 CHAR
Start of message	Quantum™ ID	Function		CRC Error Correction Code	End of message

00 = H. O. Address
87 = L. O. Address
00 = H. O. # of data registers
01 = L. O. # of data registers

RTU

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, because 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	LRC CHECK	END
T1-T2-T3-T4	8 Bits	8 Bits	N x 8 Bits	16 Bits	T1-T2-T3-T4
Start of message	Quantum™ ID	Function		CRC Error Correction Code	End of message

00 = H. O. Address
87 = L. O. Address
00 = H. O. # of data registers
01 = L. O. # of data registers

ASCII Query (Read) Example

To demonstrate how an address within the Quantum™ may be read, the following test can be performed using Windows HyperTerminal (NOTE: Hyperterminal cannot be used to test RTU or TCP/IP).

As an example, a Modbus command will be created and sent to obtain the actual Discharge Pressure value of a compressor. Using the address tables found later in this manual, locate the address for Discharge Pressure. In this case, it is FRICK Address 2003 (decimal). Since this is the only address we are interested in obtaining the value of, send the following message:

: 01 03 07 D3 00 01 21 CRLF

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
H. O. address (hex): 07
L. O. address (hex): D3
H. O. # of Data Registers: 00
L. O. # of Data Registers: 01
Error Correction Code: 21
Carriage Return - Line Feed: CRLF

Look at this message on a more basic level, to understand how the address that we are requesting is arrived at. We want to know the actual value of the Discharge Pressure, FRICK Address 2003 (decimal).

The first part of the message will be a Colon (:). This represents a heads up alert that data is coming:

: 01 06 1B EE 03 E8 05 CRLF

Where:
Message Start: :
Quantum™ ID #: 01
Write Function: 06
H. O. address (hex): 1B
L. O. address (hex): EE
H. O. # of Data Value: 03
L. O. # of Data Value: E8
Error Correction Code: 05
Carriage Return - Line Feed: CRLF

Any time that a message is sent, all of the Quantum™ panels on the Modbus network will become active, communications-wise, after the Colon appears. Next, the panels will look at the first byte following the Colon (:). If this byte equals the Panel ID # of the particular Quantum™ being queried, it will immediately finish reading the remainder of the message. If the byte does not equal its ID #, the message will be ignored.

: 01 06 1B EE 03 E8 05 CRLF

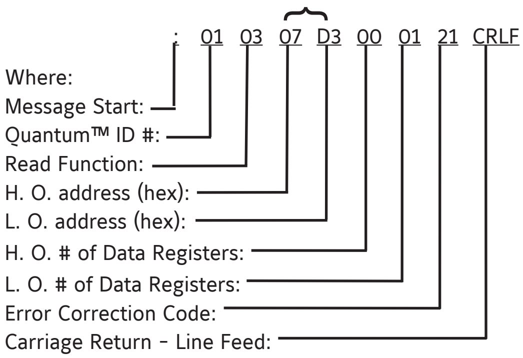
Where:
Message Start: :
Quantum™ ID #: 01
Write Function: 06
H. O. address (hex): 1B
L. O. address (hex): EE
H. O. # of Data Value: 03
L. O. # of Data Value: E8
Error Correction Code: 05
Carriage Return - Line Feed: CRLF

In this particular example, we are strictly looking to request to view a data value, so we will be performing a read function (03):

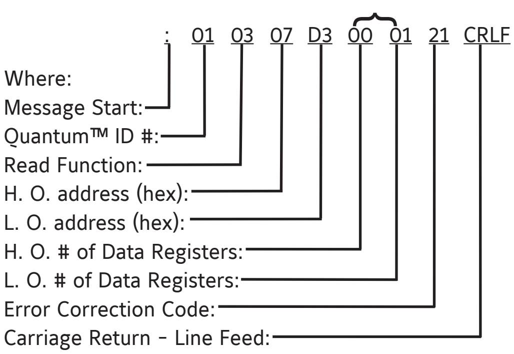
: 01 03 07 D3 00 01 21 CRLF

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
H. O. address (hex): 07
L. O. address (hex): D3
H. O. # of Data Registers: 00
L. O. # of Data Registers: 01
Error Correction Code: 21
Carriage Return - Line Feed: CRLF

22003 decimal equals 07D3 hex. Looking at our example, we see that we need a H.O. (High Order) address and a L.O. (Low Order) address. Since all data sent and received is in ASCII Hex Byte format, we need to look at D3 Hex as the Low Order portion of the address. The High Order portion is 07. Now our decimal 2003 is formatted as 07D3 Hex.



Since we are only looking for this one address, and no other, we can say that we are only looking for one Data Address. Our Data Address part of the data packet is also looking for a High and a Low Order value. Fortunately, the number one (1) is the same in decimal as it is in Hex. This means the Low Order Address is 01 (hex). The High Order Address is 00 (hex), so our decimal 1 is formatted as 0001 (hex).

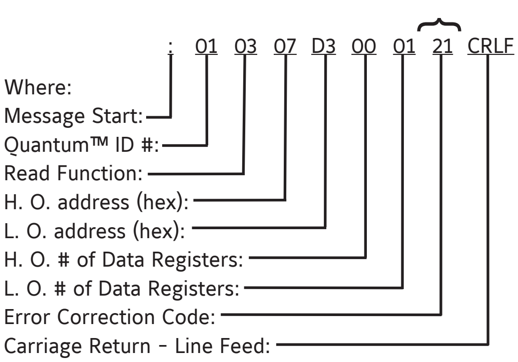


In order to ensure that the Quantum™ in question receives the data request accurately, we must append an Error Check byte to the end of the message. This is accomplished by adding each of the byte pairs (hex) that we have generated thus far:

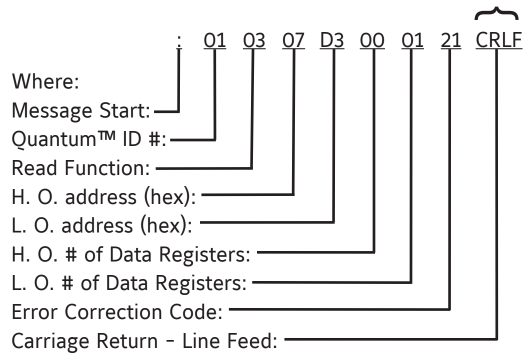
01 + 03 + 07 + D3 + 00 + 01 = DF hex

Next, subtract DF (hex) from 100 (hex):

100 (hex) - DF (hex) = 21 (hex)



After the entire data packet has been created, simply press the **[Enter]** key, a Line Feed will automatically be sent also.

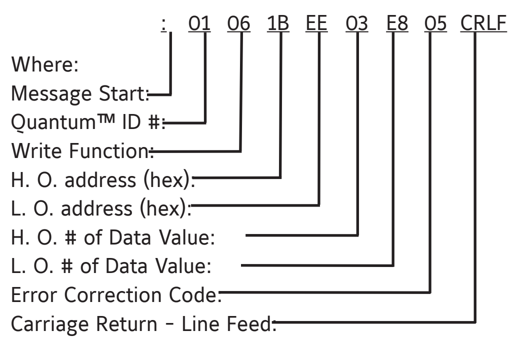


ASCII Write Example

To demonstrate how an address within the Quantum™ HD Unity may be written to, the following test can be performed using Windows HyperTerminal (NOTE: Hyperterminal cannot be used to test RTU or TCP/IP communications).

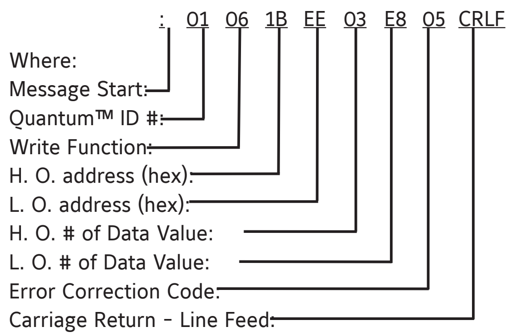
As an example, a Modbus command will be created and sent to the Quantum™ to set Regulation Mode 1 Setpoint to 100.0 psia. First, be aware that data sent to and received by the Quantum™ has one decimal place assumed. This means that to send the value of 100.0, you actually need to send 1000. Using the address tables found later in this manual, locate the address for the Regulation Mode 1 Setpoint. In this case, it would be FRICK Address 7150 (decimal).

Since this is the only address we are interested in writing to, send the following message:

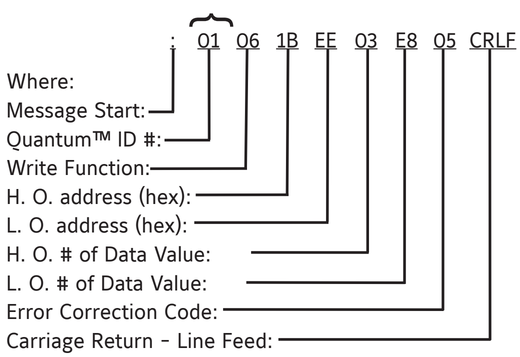


Look at this message on a more basic level, to understand how the address that we are writing to is arrived at. We want to send the value of 1000 (100.0) to the Regulation Mode 1 Setpoint, FRICK Address 7150 (decimal).

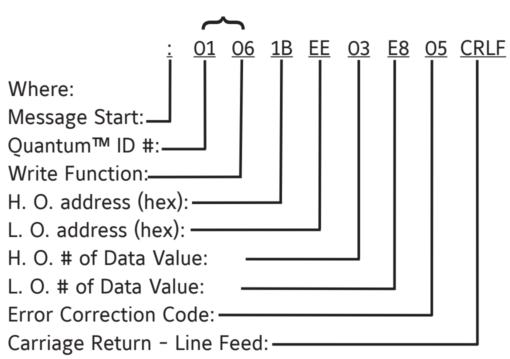
The first part of the message will be a Colon (:). This represents a heads up alert that data is coming down the line.



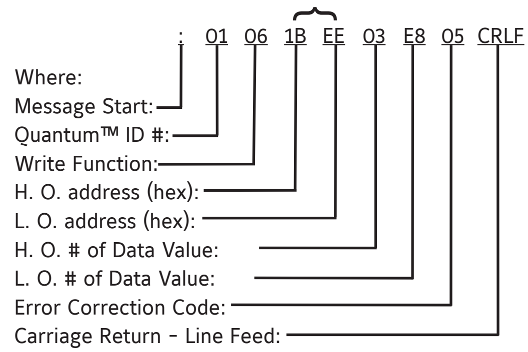
Any time that a message is sent, all of the Quantum™ panels that are on the Modbus network will become active, communications wise, after the Colon appears. Next, all panels will look at the first byte following the Colon (:). If this byte equals the Panel ID # of the particular Quantum™ being queried, it will immediately finish reading the remainder of the message. If the byte does not equal its ID #, the
message will be ignored.



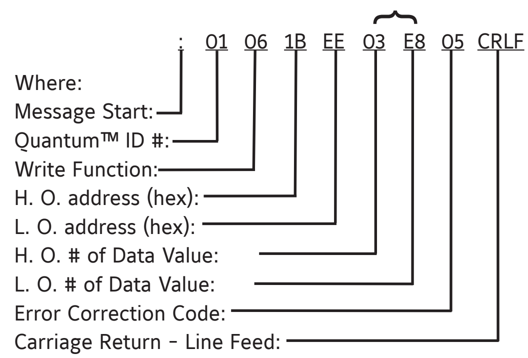
In this particular example, we are strictly looking to write a data value, so we will be performing a write function (06):



7150 decimal equals 1BEE hex. Looking at our example we see that we need a H.O. (High Order) address and a L.O. (Low Order) address. Since all data sent and received is in ASCII Hex Byte format, we need to look at EE Hex as the Low Order portion of the address. The High Order portion is 1B. Now our decimal 7150 is formatted as 1BEE Hex.



The value that we wish to send is 100.0 (1000). The Data Value part of the data packet is looking for a High and a Low Order value. The number 1000 (dec) must be converted to hexadecimal. This conversion results in a value of 03E8 (hex). Separating 03E8 into two bytes results in the Low Order Value of E8 (hex) and the High Order Value of 03 (hex):



In order to ensure that the Quantum™ in question receives the data request accurately, we must append an Error Check byte to the end of the message. This is accomplished by adding each of the byte pairs (hex) that we have generated thus far:

01 + 06 + 1B + EE + 03 + E8 = 1FB hex

Normally, we would subtract 1FB (hex) from 100 (hex), as in the previous read example. However, in this case we see that 1FB hex is greater than 100 hex. Since the math in this particular example would yield a negative number (FFFF FFFF FFFF FF05), we need to modify the value of 1FB in order to provide a positive result. This is accomplished quite simply by dropping the most left hand digit (1FB becomes FB), and then subtracting FB hex from 100 hex:

100 (hex) - FB (hex) = 05 (hex)

: 01 06 1B EE 03 E8 05 CRLF

Where:
Message Start: :
Quantum™ ID #: 01
Write Function: 06
H. O. address (hex): 1B
L. O. address (hex): EE
H. O. # of Data Value: 03
L. O. # of Data Value: E8
Error Correction Code: 05
Carriage Return - Line Feed: CRLF

After the entire data packet has been created, simply press the **[Enter]** key, a Line Feed will automatically be sent also.

: 01 06 1B EE 03 E8 05 CRLF

Where:
Message Start: :
Quantum™ ID #: 01
Write Function: 06
H. O. address (hex): 1B
L. O. address (hex): EE
H. O. # of Data Value: 03
L. O. # of Data Value: E8
Error Correction Code: 05
Carriage Return - Line Feed: CRLF

ASCII Response Example

If the packet was properly received by the Quantum™, an immediate response displays in HyperTerminal. In the Query Response (read function) example used earlier, a response of :01030205D025 (hex) was received.

: 01 03 02 05 D0 25

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
# of Bytes Returned: 02
Data: 05 D0
Error Correction Code: 25

Once again, the first part of the message will be a Colon (:). This represents a heads up alert that data is coming down the line, but because the data is coming from the Quantum™ to the Master this time, the Master will accept it.

After having received the Colon (:), the Master will look at the two bytes that follows it, so that it may determine from which Quantum™ the message is coming from.

: 01 03 02 05 D0 25

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
# of Bytes Returned: 02
Data: 05 D0
Error Correction Code: 25

Now that the Master knows which panel is responding, it needs to known which function the panel is responding to. In this case, it sees that it is a read function, and the Quantum™ is merely returning a value that was previously requested.

: 01 03 02 05 D0 25

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
# of Bytes Returned: 02
Data: 05 D0
Error Correction Code: 25

The next byte tells the Master how many bytes of information are being returned as a response. In this case, there are two (2) bytes of valid data.

: 01 03 02 05 D0 25

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
# of Bytes Returned: 02
Data: 05 D0
Error Correction Code: 25

The next two bytes (in this case) are the actual data in response to our original request.

: 01 03 02 05 D0 25

Where:
Message Start: :
Quantum™ ID #: 01
Read Function: 03
# of Bytes Returned: 02
Data: 05 D0
Error Correction Code: 25

We need to know what this value means. To break it down, we must convert the pair of bytes from Hex to Decimal:

05DO (hex) = 1488 (decimal)

Data to and from the Quantum™ are integer values with one decimal field assumed unless shown otherwise or the command is sent to select two decimal fields.

From the previous paragraph, we can assume that there is one decimal place to be applied to the data value that was returned:

1488 (decimal) = 148.8 (decimal)

All temperatures are in degrees Celsius and all pressures are in psia unless the command is sent to select the units of the panel:

148.8 (decimal) = 148.8 psia

RTU Query (Read) Example

NOTICE

Hyperterminal cannot be used to test RTU.

In the following example, a Modbus command is sent to obtain the Discharge Pressure of a compressor. Refer to the following example to see what this message packet would look like:

START	ADD.	FUNC.	STARTING ADDRESS		# OF REGISTERS TO LOAD		CRC CHECK		END
T1-T2-T3-T4	01	03	07	D3	00	01	*	*	T1-T2-T3-T4

Start of message
Quantum™ ID
Function 03 = Read
07 = H. O. Address
D3 = L.O. Address
00 = H.O. # of Data Registers
01 = L.O. # of Data Registers
CRC Error Correction Code
End of message

* The CRC value is calculated by the transmitting device, which appends the CRC to the message.

RTU Response Example

Using the RTU Read example just shown, a typical response would look like:

START	ADD.	FUNC.	BYTE COUNT TO FOLLOW	ANSWER		CRC CHECK		END
T1-T2-T3-T4	01	03	02	04	23	*	*	T1-T2-T3-T4

Start of message
Quantum™ ID
Function 03 = Read
02 = 2 Bytes
04 = H.O. Value
23 = L.O. Value
CRC Error Correction Code
End of message

The returned value in the above example is 0423 hex. Converting this to decimal equates to 1059, and assuming a decimal point gives an answer of 105.9 (psia or Panel units, depending on which has been selected).

Modbus Notes

This has been an example of how the Quantum™ HD Unity uses Modbus Protocol. It is hoped that the information provided here will assist the end user in writing applications that will allow the Quantum™ to be implemented into networks that the customer may already have in use.

This information is subject to change at any time, and is provided as a reference only. Not all areas of the Modbus Protocol can be handled in this document. Some additional information regarding Modbus Protocol to be aware of:

- There are many versions of Modbus Protocol that are available, and an application that works properly on one system, may not function identically on another.
- Some versions of Modbus Protocol may require the user to increment any referenced addresses by 1 (one). For instance, if you want to look at FRICK Address 2003, you may need to actually look at address 2004. The Quantum™ addressing begins at 0 (zero), whereas some Modbus Protocols begin at 1 (one), so you may need to compensate.
- 7 or 8 bits selectable.
- 1 or 2 Stop bits selectable.
- Parity can be set to None, Odd or Even
- When using Modbus protocol (other than the Hyperterminal example shown earlier), it is necessary to use the Modbus Address column as shown in the Quantum™ Data Tables. These addresses work for most applications.
- Follow the FRICK specifications for data communications requirements.
- Hyperterminal can be used to test ASCII, but not RTU or TCP/IP communications.

NOTICE

Do not continuously request a setpoint change. Communications may slow down during the process of writing setpoints or clearing alarms. Both of these processes involve writing to either EEPROM or Flash Memory and does take some time. If communication requests are being sent faster than once every couple of seconds, there may be temporary slowdowns during these processes.

Modbus Data Access

Data passed to and from the Quantum™ are integer values with one decimal field assumed unless shown otherwise or the command is sent to select two decimal fields. For example, if the data's value is 25.5 then the value 255 is sent. All temperatures are in degree C and all pressures are in psia unless the command is sent to select the units of the panel. A mode such as Slide Valve mode is sent as an integer value that represents the mode it is in. For example, a 0 is sent if it is in manual, or a 10 is sent if it is in automatic, or a 20 is sent if it is in remote. The value zero (**0**) is used to represent an **OFF** status and a **DISABLED** option. The value one (**1**), which is received as a 10, is used to represent an **ON** status and an **ENABLED** option. Only data values that are designated as setpoints are modifiable. Read Only is used to help identify what data is not modifiable. The setpoint range is checked to see if it is an allowed setting. If it is not allowed, the setting is not changed. Reference the Quantum™ Data Tables in this manual for the address listing and description of data.

A command has been provided that selects whether data to and from the Quantum™ will be returned in the units that are the default (pressure in psia and temperature in Degree C) or in the units that are selected to display at the panel.

SECTION 5
HYPERTERMINAL

Using Hyperterminal

DESCRIPTION

HyperTerminal is a terminal emulation program available for the Microsoft Windows environment. HyperTerminal provides a method by which the end user may verify conclusively that their Quantum™ controller is functioning properly, and as designed, with respect to external communications to remote devices.

> **NOTICE**
>
> **Hyperterminal can only be used to test Modbus ASCII. It CANNOT be used to test Allen-Bradley or Modbus RTU or TCP/IP.**

Many times, the Quantum™ controller will be installed into an environment whereby the end user wishes to communicate to it, either through a PLC (Programmable Logic Controller), a desktop computer for the purpose of monitoring/controlling plant operations through HMI (Human Machine Interface), or any number of other communications applications.

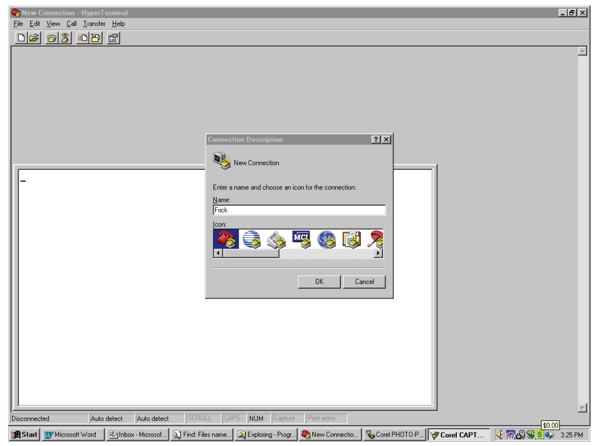
The purpose of this desired communications typically involves viewing and changing setpoints, starting and stopping a compressor, viewing alarm and shutdown information, and viewing current operating conditions.

When first connecting a Quantum™ panel to a communications network, it would be highly desirable to determine that all necessary parameters (jumper settings, panel setup, and cabling) are properly met so that communications may be established quickly with the Quantum™, so that time is not lost in trying to troubleshoot a potentially simple problem.

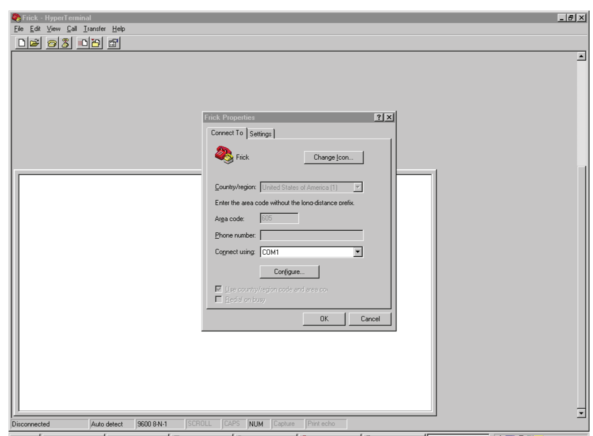
A connection from a Com port of a computer running Microsoft Windows can be used to connect to a serial port of the Quantum™.

SETTING UP HYPERTERMINAL

- You will need to locate either a lap top or desktop computer that has Hyperterminal installed.
- Turn on the power for the lap top.
- After the laptop has fully booted, locate the Hyperterminal program. (Hyperterminal is usually found in the Accessories folder). If Hyperterminal can't be found there, try using the Find File command, and search the entire hard drive.
- Be aware that the screens that are actually shown on the test computer may or may not appear exactly as shown here. Various versions of Windows can affect the appearance, as well as whether or not the screen has been maximized, or if it has been scaled to a smaller size. Regardless of how the screen work appears, the function of the screen work is what is important, and that function is not affected by the way the screen looks.
- Once Hyperterminal is located, execute it. A dialog box will appear. You will be prompted to enter a name for the New Connection. Type in whatever name you would like to use, FRICK was used in this example. This name also creates a file after you are finished, saving the setup parameters for future use. It is recommended that a name be chosen to reflect the type of Protocol that you will be using as you may wish to setup for various protocols. Once you have entered a name, click **OK**.



A new dialog box appears asking to select a Com port (choose the Com port that your communications cable is attached to, this will normally be Com-1). The phone number box is blank. Click on **OK**.

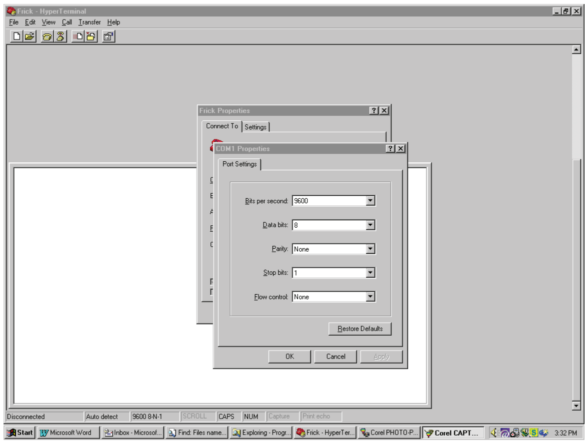


The Com-1 properties dialog box now appears. The parameters in this box must match the requirements of the protocol that you are wishing to use. The one box that normally would need to be changed from one protocol to the next is the Data Bits box.

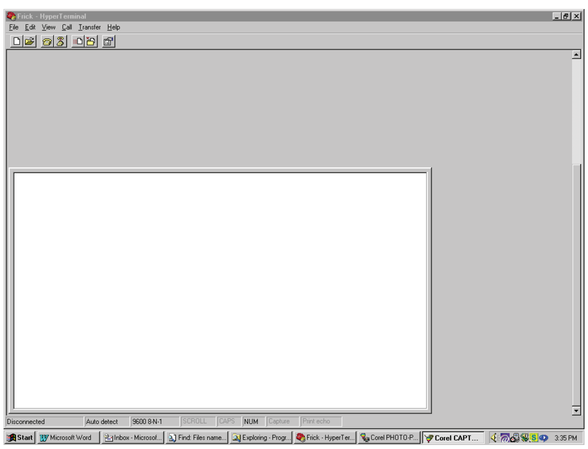
For the purpose of this document, FRICK # protocol will be used. Refer to the Modbus ASCII section of this manual for information on Modbus.

Set the five boxes as follows, then click **OK**.

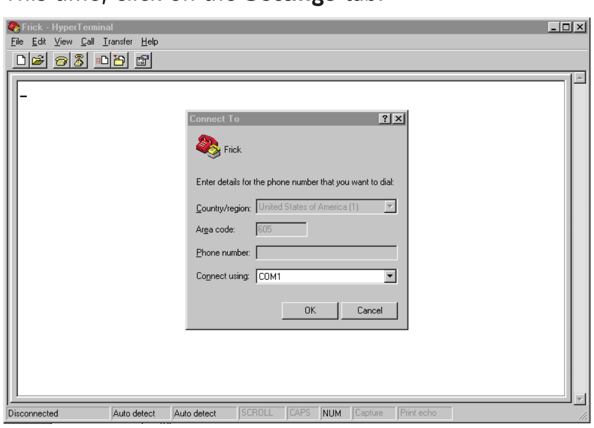
- Bits/s: 9600 (must match the Quantum™)
- Data bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control None



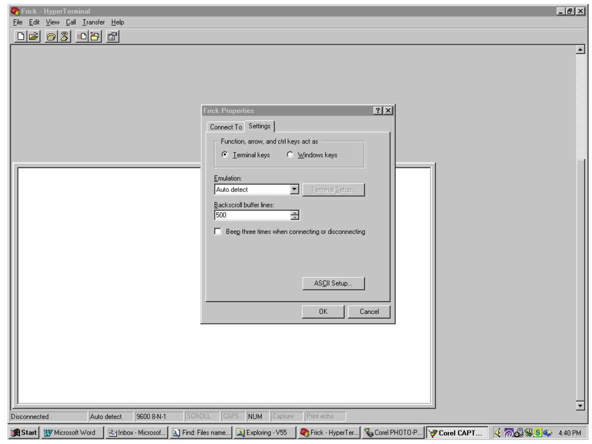
The following screen will appear. This is the screen whereby all communications (out of the computer, and into it) will be shown. When valid data is typed in here, then sent, the connected device recognizes and responds to that data, and a response will be shown below the sent data. Click on **File**.



A pull down menu appears. From this menu, locate and click on **Properties**. The following screen appears again. This time, click on the **Settings** tab.



The computer will need to be set up to match the documentation as presented here, for everything to look and work as shown later. To do this, click on **ASCII Setup.**



On the ASCII Setup screen, for best results, check the boxes according to the following chart:

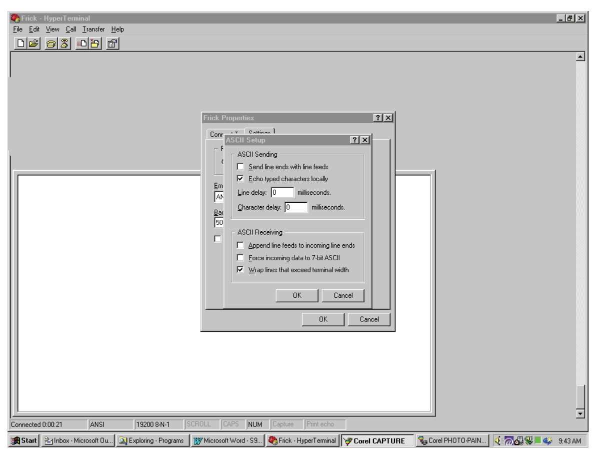
For Modbus ASCII:

- Send line ends with line feeds
- Echo typed characters locally
- Append line feeds to incoming line ends
- Wrap lines that exceed terminal width

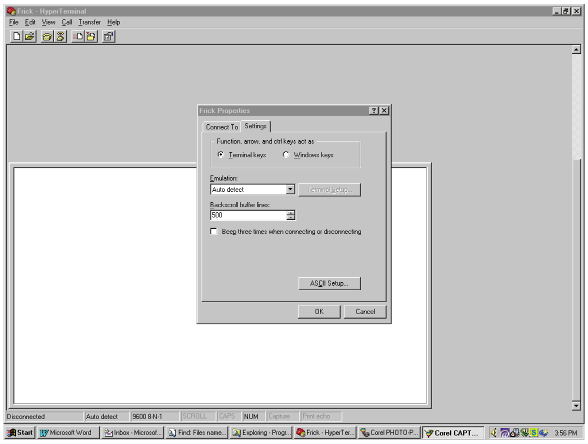
For FRICK protocols (# and $):

- Echo typed characters locally
- Append line feeds to incoming line ends
- Wrap lines that exceed terminal width

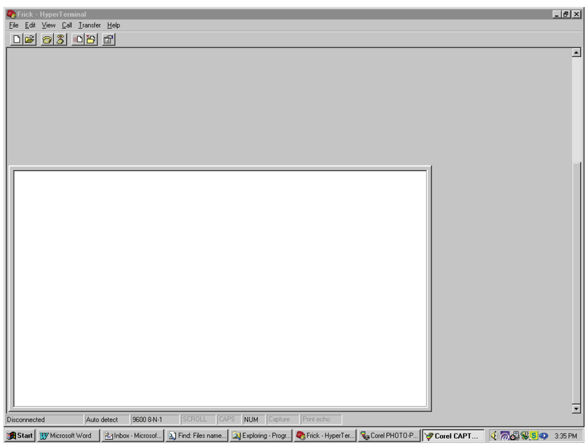
Leave everything else on this dialog box unchanged, then click on **OK**.



The **Properties** screen is shown again. Click on the **OK** button to proceed.

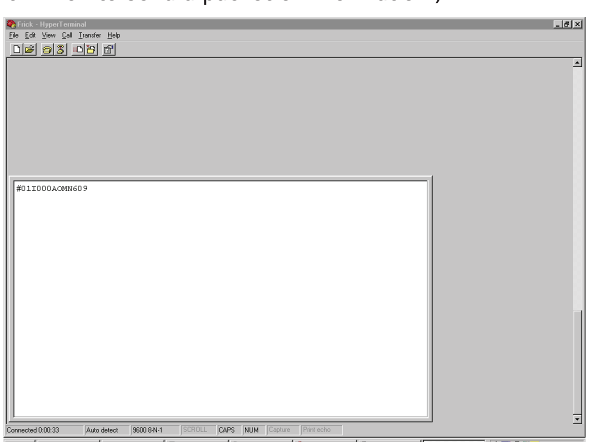


You will now be back to the main Hyperterminal communications screen. This screen will be blank. All communications, both from the computer, and to the computer (from the Quantum™), will appear on this screen.



TESTING COMMUNICATIONS

Set the keyboard for CAPS (so that all capital letters will be typed). Type in the following command: *#01I* then press **Enter**. (This command will request the Quantum™ with ID 01 to send a packet of Information.)



If the communications are working properly, an immediate response from the first Quantum™ occurs, resembling something, but not necessarily exactly, like **#01I000AOMN609**.

If this portion of the test has passed, you can try to communicate to the next or any Quantum™, by changing the value that you type into the HyperTerminal screen as follows:

Instead of #01, replace the 01 portion with the ID that you would like to access. For instance, if you want to talk to a fourth Quantum™ (ID 4), type in #04. This returns a message from that Quantum™.

This has been just a brief description of how to check your communications and verify that it is working. Greater detail can be found by consulting tables for each of the protocols in this manual.

GENERAL NOTES

Ensure that the Quantum™ communications parameters are correct. This setup can be found on the Communications screen. This info must match that of the device that you are trying to talk to at the other end.

There are two red LEDs associated with the Com port on the Quantum™ (TX & RX). Ensure that neither of these LEDs are on continuously. If one or the other (or both) are on constantly, disconnect the Com cable. If the status of the LEDs does not change, check the wiring connections to the Com port. Ensure that the wiring is not backwards. If the wiring is correct, power the Quantum™ down, then back up. If either or both of the LEDs are still on, a bad driver chip may be suspected on the Quantum™, indicating to replace the board.

Once everything has been inspected (cables, jumpers, and setup), try to develop communications from the master. The LEDs on the Com port flicker as the Quantum™ communicates with the master. If nothing happens, consult the HyperTerminal section of this manual for more detailed troubleshooting.

If no data appears, or if the data does not match the specific protocol requirements that you are using, then check the following:

- Verify that the communications wiring matches that shown in the drawings at the end of this manual.
- Access the *Communications* screen and verify that the Quantum™ ID is set to the same value that you are trying to access. Also, check that the baud rate matches that of the setup in the properties section of the Hyperterminal example.
- Verify the position of the jumpers by comparing them with the section entitled Quantum™ Communications Jumpers.
- Ensure that the data that you have entered in Hyperterminal, exactly matches the example.
- Go back through the Setting up Hyperterminal section, and ensure that it has been followed exactly. Repeat the process if necessary.
- If you are using a converter card (to convert the RS-232 signal from the computer to RS-422 or RS-485), then either verify that the converter card is working properly with a different piece of known functioning equipment, or eliminate it completely by tying into the Quantum™ directly through RS-232 (Quantum™ 4 only).
- The Communications port on the computer is bad. Try to verify this by communicating to a different piece of known good equipment.

Table 7: Conversion Chart for Decimal / Hexadecimal / ASCII

Decimal (DEC)	Hexadecimal (HEX)	ASCII
0	0	ctrl @ NUL
1	1	ctrl A SOH
2	2	ctrl B STX
3	3	ctrl C ETX
4	4	ctrl D EOT
5	5	ctrl E ENQ
6	6	ctrl F ACK
7	7	ctrl G BEL
8	8	ctrl H BS
9	9	ctrl I HT
10	A	ctrl J LF
11	B	ctrl K VT
12	C	ctrl L FF
13	D	ctrl M CR
14	E	ctrl N SO
15	F	ctrl O SI
16	10	ctrl P DLE
17	11	ctrl Q DC1
18	12	ctrl R DC2
19	13	ctrl S DC3
20	14	ctrl T DC4
21	15	ctrl U NAK
22	16	ctrl V SYN
23	17	ctrl W ETB
24	18	ctrl X CAN
25	19	ctrl Y EM
26	1A	ctrl Z SUB
27	1B	ctrl [ESC
28	1C	ctrl \ FS
29	1D	ctrl] GS
30	1E	ctrl ^ RS
31	1F	ctrl _ US
32	20	SPACE
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_
96	60	'
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	▯
127	7F	DEL

SECTION 6
QUANTUM™ HD UNITY DATA TABLES

The following table shows the three protocol Address ranges that can be used for reading/writing data to and from the Quantum™ HD Unity controller; FRICK Addresses, Allen-Bradley (AB) Addresses, and Modbus Addresses. This table also shows the Data Table names, as well as the page numbers within this manual that the pertinent Data Tables may be found:

Table 8: Protocol Address Ranges and Index

Frick® Address Range	AB Address	Modbus Address	Data Table	Pages
1001 - 1061	N10:1 - N10:61	41002 - 41062	Digital Board Values	60 - 61
2000 - 2081	N20:0 - N20:81	42001-43001	Analog Board Values	62 - 63
3000 - 3081	N30:0 - N30:81	43001 - 43082	Calculated Values	64 – 65
4000 - 4566	N40:0 – N45:66	44001 - 44567	Mode Values	65 – 72
6000 - 6046	N60:00 - N60:46	46001 - 46047	Timer Values	73
7060 - 8558	N100:60 - N115:58	47061 - 48559	Setpoint Values	74 - 94
8910 - 8924	N119:10 - N119:24	48911 - 48925	Commands	95
8950 - 9007	N119:50 - N120:07	48951 - 49008	DBS Setpoint Values	96 - 97
9100 - 9101	N121:00 – N121:01	49101 - 49102	General Setpoint Values	97
9200 - 9314	N122:00 - N123:14	49201 - 49315	VSD (Vyper) Setpoint Values	97 - 99

Table 9: Digital Board Values (Read Only)

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data	Digital Board #	Channel #	Module Type
1001	N10:1	41002	R	Oil Level/Oil Switch	1	13	Input
1002	N10:2	41003	R	Capacity Decrease	1	6	Output
1003	N10:3	41004	R	Capacity Increase	1	5	
1004	N10:4	41005	R	Volume Decrease	1	8	
1005	N10:5	41006	R	Volume Increase	1	7	
1014	N10:14	41015	R	Economizer	1	11	Output
1015	N10:15	41016	R	Liquid Injection	1	9	
1020	N10:20	41021	R	Oil Heater	1	21	Output
1024	N10:24	41025	R	Hot Gas Bypass	1	16	Output
1026	N10:26	41027	R	Compressor Motor Start Signal	1	1	Output
1027	N10:27	41028	R	Compressor Motor Starter Feed-back	1	2	Input
1028	N10:28	41029	R	Oil Pump Start Signal	1	3	Output
1029	N10:29	41030	R	Oil Pump Feed-back	1	4	Input
1030	N10:30	41031	R	Full Flow Pump/Start Signal	None	0	Output
1032	N10:32	41033	R	Oil Pump #2 Start Signal	2	15	
1033	N10:33	41034	R	Oil Pump #2 Feed-back	2	16	Input
1036	N10:36	41037	R	High Liquid Level Shutdown	1	14	Input
1037	N10:37	41038	R	Regulator Mode A	1	19	
1038	N10:38	41039	R	Regulator Mode B	1	20	
1042	N10:42	41043	R	Shutdown	1	23	Output
1043	N10:43	41044	R	Warning	1	22	
1044	N10:44	41045	R	Balance Piston	1	12	
1045	N10:45	41046	R	Panel Heater	1	15	
1049	N10:49	41050	R	Permissive Start	2	17	Input
1050	N10:50	41051	R	Ready to Run	2	1	Output
1051	N10:51	41052	R	Remote Enabled	2	2	
1052	N10:52	41053	R	Recycle Delay	2	6	
1053	N10:53	41054	R	Remote Start/Stop	2	3	Input
1054	N10:54	41055	R	Remote Load	2	4	
1055	N10:55	41056	R	Remote Unload	2	5	
1056	N10:56	41057	R	Condenser Control Step 1	2	21	Output
1057	N10:57	41058	R	Condenser Control Step 2	2	22	
1058	N10:58	41059	R	Condenser Control Step 3	2	23	
1059	N10:59	41060	R	Condenser Control Step 4	2	24	
1060	N10:60	41061	R	Power Assist	1	24	
1061	N10:61	41062	R	Dx Circuit #1	2	19	
1062	N10:62	41063	R	Dx Circuit #2	2	20	

Table 9: Digital Board Values (Read Only) *(continued)*

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data	Digital Board #	Channel #	Module Type
1063	N10:63	41064	R	User Defined Digital Input #1	1	17	Input Input
1064	N10:64	41065	R	User Defined Digital Input #2	1	18	
1065	N10:65	41066	R	User Defined Digital Input #3	2	9	
1066	N10:66	41067	R	User Defined Digital Input #4	2	10	
1067	N10:67	41068	R	User Defined Digital Input #5	2	11	
1068	N10:68	41069	R	User Defined Digital Input #6	2	12	
1069	N10:69	41070	R	User Defined Digital Input #7	2	13	
1070	N10:70	41071	R	User Defined Digital Input #8	2	14	
1083	N10:83	41084	R	User Defined Digital Output #1	2	7	Output
1084	N10:84	41085	R	User Defined Digital Output #2	2	8	
1085	N10:85	41086	R	User Defined Digital Output #3	2	18	
1086	N10:86	41087	R	User Defined Digital Output #4	None	0	
1087	N10:87	41088	R	User Defined Digital Output #5	None	0	
1088	N10:88	41089	R	User Defined Digital Output #6	None	0	
1089	N10:89	41090	R	User Defined Digital Output #7	None	0	
1090	N10:90	41091	R	User Defined Digital Output #8	None	0	
1091	N10:91	41092	R	User Defined Digital Output #9	None	0	
1092	N10:92	41093	R	User Defined Digital Output #10	None	0	
1093	N10:93	41094	R	Main Oil Injection	None	0	
1094	N10:94	41095	R	Liquid Level Increase	None	0	
1095	N10:95	41096	R	Liquid Level Decrease	None	0	
1096	N10:96	41097	R	PLC Interlock	None	0	
1097	N10:97	41098	R	High VI Liquid Injection	1	10	
1000	N10:100	41101	R	Timed Digital Output A	None	0	
1101	N10:101	41102	R	Timed Digital Output B	None	0	
1102	N10:102	41103	R	Timed Digital Output C	None	0	
1103	N10:103	41104	R	Discharge Butterfly Valve Solenoid	None	0	

Table 10: Analog Board Values

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data	Analog Board #	Channel #	Module Type
2001	N20:1	42002	R	Volume Slide Position	1	15	Input
2002	N20:2	42003	R	Suction Pressure	1	9	
2003	N20:3	42004	R	Discharge Pressure	1	8	
2004	N20:4	42005	R	Oil Pressure (Compressor)	1	6	
2005	N20:5	42006	R	Main Oil Injection Pressure	2	15	
2007	N20:7	42008	R	Filter Pressure	1	7	Input
2009	N20:9	42010	R	Balance Piston Pressure	1	10	Input
2010	N20:10	42011	R	System Discharge Pressure	1	11	
2011	N20:11	42012	R	Suction Temperature	1	1	
2012	N20:12	42013	R	Discharge Temperature	1	2	
2013	N20:13	42014	R	Oil Temperature (Compressor)	1	3	
2014	N20:14	42015	R	Oil Separator Temperature	1	4	
2016	N20:16	42017	R	Process/Brine Temperature Leaving	1	5	Input
2017	N20:17	42018	R	Process/Brine Temperature Entering	2	4	
2026	N20:26	42027	R	Remote Control Setpoint	1	12	Input
2027	N20:27	42028	R	Motor Current	1	16	
2028	N20:28	42029	R	RPM (NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	2	16	
2029	N20:29	42030	R	KW Monitoring	None	0	
2031	N20:31	42032	R	User Defined Analog Input #1	2	5	Input
2032	N20:32	42033	R	User Defined Analog Input #2	2	6	
2033	N20:33	42034	R	User Defined Analog Input #3	2	7	
2034	N20:34	42035	R	User Defined Analog Input #4	2	8	
2035	N20:35	42036	R	User Defined Analog Input #5	2	9	
2036	N20:36	42037	R	User Defined Analog Input #6	2	10	
2037	N20:37	42038	R	User Defined Analog Input #7	2	11	
2038	N20:38	42039	R	User Defined Analog Input #8	2	12	
2039	N20:39	42040	R	User Defined Analog Input #9	2	13	
2040	N20:40	42041	R	User Defined Analog Input #10	2	14	
2041	N20:41	42042	R	User Defined Analog Input #11	1	24	
2051	N20:51	42052	R	PID #1	1	1	Output
2052	N20:52	42053	R	PID #2	1	2	
2053	N20:53	42054	R	PID #3	None	0	
2054	N20:54	42055	R	PID #4	None	0	
2055	N20:55	42056	R	PID #5	None	0	
2056	N20:56	42057	R	PID #6	None	0	
2057	N20:57	42058	R	PID #7	None	0	
2058	N20:58	42059	R	PID #8	None	0	

Table 10: Analog Board Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data	Analog Board #	Channel #	Module Type
2059	N20:59	42060	R	Analog Output #1	1	3	Output
2060	N20:60	42061	R	Analog Output #2	None	0	
2061	N20:61	42062	R	Analog Output #3	None	0	
2062	N20:62	42063	R	Analog Output #4	None	0	
2063	N20:63	42064	R	Analog Output #5	None	0	
2064	N20:64	42065	R	Analog Output #6	None	0	
2065	N20:65	42066	R	Analog Output #7	None	0	
2066	N20:66	42067	R	Analog Output #8	None	0	
2067	N20:67	42068	R	Manifold Pressure	2	3	Input
2068	N20:68	42069	R	Remote Capacity Position	1	13	
2069	N20:69	42070	R	Compressor VFD	2	3	Output
2070	N20:70	42071	R	Liquid Level	None	0	Input
2071	N20:71	42072	R	Compressor Vibration - Suction	1	17	
2072	N20:72	42073	R	Compressor Vibration - Discharge	1	18	
2073	N20:73	42074	R	Motor Vibration - Shaft Side	1	19	
2074	N20:74	42075	R	Motor Vibration - Opposite Shaft Side	1	20	
2075	N20:75	42076	R	Condenser Analog Step #1	1	5	Output
2076	N20:76	42077	R	Condenser Analog Step #2	1	6	
2077	N20:77	42078	R	Motor Temperature - Shaft Side	None	0	Input
2078	N20:78	42079	R	Motor Temperature – Opposite Shaft Side	None	0	
2079	N20:79	42080	R	Motor Stator #1 Temperature	1	21	
2080	N20:80	42081	R	Motor Stator #2 Temperature	1	22	
2081	N20:81	42082	R	Motor Stator #3 Temperature	1	23	
2082	N20:82	42083	R	Superheat Output #1	None	0	Output
2083	N20:83	42084	R	Superheat Output #2	None	0	
2084	N20:84	42085	R	Superheat Output #3	None	0	
2085	N20:85	42086	R	Analog output #10	None	0	
2086	N20:86	42087	R	Analog output #10	None	0	
2087	N20:87	42088	R	Analog output #11	None	0	
2088	N20:88	42089	R	Analog output #12	None	0	
2089	N20:89	42090	R	Analog output #13	None	0	
2090	N20:90	42091	R	Analog output #14	None	0	
2091	N20:91	42092	R	Analog output #15	None	0	
2092	N20:91	42093	R	Analog output #16	None	0	
2097	N20:97	42097	R	Discharge Butterfly Valve	None	0	
2098	N20:98	42098	R	Vyper Coolant Temperature	None	0	
2099	N20:99	42099	R	EZ Cool LIOC	None	0	
2100	N20:100	42100	R	Vyper Cooling Control Output	None	0	
2101	N20:101	42101	R	Outside Air Temperature	None	0	
2102	N20:102	42102	R	Outside Relative Humidity	None	0	
2103	N20:103	42103	R	Economizer Port Pressure	None	0	
2104	N20:104	42104	R	Economizer Butterfly Valve	None	0	

Table 11: Calculated Values

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data		Units
3000	N30:0	43001	R	Calculated Capacity		Percent (%)
3006	N30:6	43007	R	Filter Differential Pressure		Pressure (Magnitude)
3008	N30:8	43009	R	System Compression Ratio		Percent (%)
3017	N30:17	43018	R	New Event Flag		This register gets set to a value of one when a general event occurs and is logged (can be read through communications and gets cleared when the user navigates to the Events screen)
3018	N30:18	43019	R	Current Runtime		Hours
3019	N30:19	43020	R	Suction Superheat		Temperature (Magnitude)
3020	N30:20	43021	R	Discharge Superheat		
3021	N30:21	43022	R	Percent of Full Load Amps		Percent (%)
3033	N30:33	43034	R	Volume High End		Volts
3034	N30:34	43035	R	Volume Current Value		
3035	N30:35	43036	R	Volume Low End		
3036	N30:36	43037	R	Capacity High End		
3037	N30:37	43038	R	Capacity Current Value		
3038	N30:38	43039	R	Capacity Low End		
3039	N30:39	43040	R	Calculated Volume Ratio		Real
3058	N30:58	43059	R	Calculated Volume Ratio (Suction)		Real
3059	N30:59	43060	R	Calculated Volume Ration (Economizer)		
3060	N30:60	43061	R	Current Regulation Value		Pressure
3061	N30:61	43062	R	Current Regulation Setpoint		
3062	N30:62	43063	R	Estimated Kilowatts		kW
3063	N30:63	43064	R	Panel Temperature		Temperature
3070	N30:70	43071	R	Safety #1 Message (Most Recent)	Note 1	Integer
3071	N30:71	43072	R	Safety #2 Message		
3072	N30:72	43073	R	Safety #3 Message		
3073	N30:73	43074	R	Safety #4 Message		
3074	N30:74	43075	R	Safety #5 Message		
3075	N30:75	43076	R	Safety #6 Message		
3076	N30:76	43077	R	Safety #7 Message		
3077	N30:77	43078	R	Safety #8 Message		
3078	N30:78	43079	R	Safety #9 Message		
3079	N30:79	43080	R	Safety #10 Message		
3080	N30:80	43081	R	Total Run Time (Thousands)	Note 2	Real
3081	N30:81	43082	R	Total Run Time (Units)		

Table 11: Calculated Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/Write	Description of Data	Units
3102	N31:02	43103	R	Coalescer Filter Differential	Pressure (Magnitude)
3103	N31:03	43104	R	Calculated Superheat 1	Temperature (Magnitude)
3104	N31:04	43105	R	Calculated Superheat 2	Temperature (Magnitude)
3105	N31:05	43106	R	Calculated Superheat 3	Temperature (Magnitude)
3106	N31:06	43107	R	Thousands of Vyper Drive Total KW Hours	Real (#.##)
3107	N31:07	43108	R	Units of Vyper Drive Total Kw hours	Real (#.##)
3109	N31:09	43110	R	Vyper Drive Max Load FLA	Amps
3111	N31:11	43112	R	Saturated Discharge Temperature	Temperature
3112	N31:12	43113	R	Wet Bulb Temperature	Temperature
3113	N31:13	43114	R	Wet Bulb Saturated Control Temperature	Temperature
3118	N31:18	43119	R	New Maintenance Event Flag	This register gets set to a value of one when a maintenance event occurs and is logged (can be read through communications and gets cleared when the user navigates to the Events screen)
3136	N31:36	43137	R	1 x Rotational Speed - Compressor Bearing	In/Sec
3137	N31:37	43138	R	1 x Rotational Speed - Motor Bearing	In/Sec
3138	N31:38	43139	R	Motor Stator 1 to 2 Balance	Percent (%)
3139	N31:39	43140	R	Motor Stator 2 to 3 Balance	Percent (%)
3140	N31:40	43141	R	Motor Stator 3 to 1 Balance	Percent (%)

Note 1: See *Warning/Shutdown Message Codes* to determine which message is being displayed.

Note 2: To calculate the Total Run Time, use the following equation:
Total Run Time (Thousands) x 1000 + Total Run Time (Units) = Total Run Time

Table 12: Mode Values

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4000	N40:0	44001	R	Compressor Status	0 = Off 1 = Running 20 = Starting 30 = Stopping 31 = Stopping - High Capacity 32 = Stopping – Pumpdown 33 = Stopping – Cool Down Period
4001	N40:1	44002	R	Pump Type	0 = No Pump 1 = Full Time 2 = Cycling 3 = Demand 4 = Shaft Auxiliary 5 = Shaft
4002	N40:2	44003	R	Prelube	0 = Not in Prelube 1 = In Prelube
4003	N40:3	44004	R	Postlube	0 = Not in Postlube 1 = In Postlube
4004	N40:4	44005	R	Shutdown	0 = No Shutdowns 1 = Shutdown
4005	N40:5	44006	R	Warning	0 = No Warning 1 = Warning

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4006	N40:6	44007	R	Recycle Delay Time	0 = Not In Recycle Delay 1 = In Recycle Delay
4007	N40:7	44008	R	Compressor mode	0 = Manual 1 = Automatic 2 = Remote -- Communications 3 = Remote -- IO 5 = Remote – Sequencing 6 = Manual -- Browser
4008	N40:8	44009	R	Capacity Mode	0 = Manual 1 = Automatic 2 = Remote -- Communications 3 = Remote -- IO 4 = Remote -- 4-20 Input 5 = Remote – Sequencing 6 = Manual -- Browser
4009	N40:9	44010	R	Volume Mode	0 = Manual 1 = Automatic
4010	N40:10	44011	R	Compressor Type	0 = RWF 1 = RWBII 2 = RXB 3 = RXF 12-50 4 = RXF 58-101 5 = RDB 4-step 6 = RDB 3-step 7 = GSV II 8 = GST 9 = GSB 3-step 10 = YLC 11 = SC 12 = York S7 13 = York S5 14 = Other Manuf. 15 = Other Manuf (Mycom) 16 = Other Manuf (Kobe) 17 = Recip-0 18 = Recip-1 19 = Recip-2 20 = Recip-3
4014	N40:14	44015	R	Regulation Mode	0 = Regulation 1 1 = Regulation 2 2 = Regulation 3 3 = Regulation 4
4015	N40:15	44016	R	Regulation Mode 1 Direction	0 = Forward 1 = Backward
4016	N40:16	44017	R	Regulation Mode 2 Direction	
4017	N40:17	44018	R	Regulation Mode 3 Direction	
4018	N40:18	44019	R	Regulation Mode 4 Direction	
4019	N40:19	44020	R	Compressor/Drive Type	0 = Screw Comp. with Constant Electric Drive 1 = Screw Compressor with VFD Drive 2 = Screw Compressor with Engine Drive 3 = Screw Compressor with Turbine Drive 4 = Screw Compressor with DBS 5 = Screw Compressor with Vyper 6 =Screw Compressor with Vyper (4-20mA)

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4022	N40:22	44023	R	Load Inhibit / Force Unload	0 = None 1 = Inhibit-Motor Current 2 = Inhibit-Low Suction Regulation 1 3 = Inhibit-Low Suction Regulation 2 4 = Inhibit-Low Suction Regulation 3 5 = Inhibit-Low Suction Regulation 4 6 = Inhibit-High Discharge Temperature 7 = Inhibit-High Discharge Pressure Mode 1 8 = Inhibit-High Discharge Pressure Mode 2 9 = Inhibit-High Suction Pressure 10 = Inhibit-Low Oil Flow 11 = Inhibit-Separator Velocity 12 = Inhibit-Low RPMs 13 = Inhibit-High Manifold Pressure 14 = Inhibit-Regulation Mode 1 15 = Inhibit-Regulation Mode 2 16 = Inhibit-Regulation Mode 3 17 = Inhibit-Regulation Mode 4 18 = Inhibit-Starting 19 = Inhibit-Capacity Pulldown 20 = Inhibit-At Maximum Load 21 = Inhibit-Vyper Converter Heatsink Temperature 22 = Inhibit-Vyper Ambient Temperature 23 = Inhibit-Harmonic Filter Baseplate Temperature 24 = Inhibit-Vyper Baseplate Temperature 25 = Inhibit-Vyper Phase A Baseplate Temperature 26 = Inhibit-Vyper Phase B Baseplate Temperature 27 = Inhibit-Vyper Phase C Baseplate Temperature 28 = Inhibit - Low Proc. Leaving Temp. 29 = Inhibit – Low Engine JW Temperature 30 = Inhibit – Maximum Capacity Position 31 = Inhibit – Minimum Capacity Position 50 = Force Unload-Volume Increase 51 = Force Unload-Motor Current 52 = Force Unload-Low Suction Regulation 1 53 = Force Unload-Low Suction Regulation 2 54 = Force Unload-Low Suction Regulation 3 55 = Force Unload-Low Suction Regulation 4 56 = Force Unload-Regulation Mode 1 57 = Force Unload-Regulation Mode 2 58 = Force Unload-Regulation Mode 3 59 = Force Unload-Regulation Mode 4 60 = Force Unload-High Discharge Temperature 61 = Force Unload-High Discharge Pressure Mode 1 62 = Force Unload-High Discharge Pressure Mode 2 63 = Force Unload-High Suction Pressure 64 = Force Unload-Low Oil Flow 65 = Force Unload-Separator Velocity 66 = Force Unload-Low RPMs 67 = Force Unload-High Manifold Pressure 68 = Force Unload-Stopping 69 = Force Unload-Vyper Converter Heatsink Temp. 70 = Force Unload-Vyper Ambient Temp. 71 = Force Unload-Harmonic Filter Baseplate Temp. 72 = Force Unload-Vyper Baseplate Temp. 73 = Force Unload-Vyper Phase A Baseplate Temp. 74 = Force Unload-Vyper Phase B Baseplate Temp. 75 = Force Unload-Vyper Phase C Baseplate Temp. 76 = Unload - Low Proc. Leaving Temp. 77 = Force Unload – Maximum Capacity Position 78 – Force Unload – Minimum Capacity Position

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4027	N40:27	44028	R	Condenser Enabled	0 = Disabled 1 = Running 2 = Always
4070	N40:70	44071	R	Compressor Start Status	0 = Ready 1 = Start Inhibit In Shutdown 2 = Start Inhibit In Recycle Delay 3 = Start Inhibit High Discharge Temperature 4 = Start Inhibit High Oil Temperature 5 = Start Inhibit Low Separator Temperature 6 = Start Inhibit Slide Valve Too High 7 = Start Inhibit Still In Prelube 8 = Start Inhibit High Suction Pressure 9 = Start Inhibit High Suction/Discharge Differential 10 = Start Inhibit Permissive Start 11 = Start Inhibit Digital Auxiliaries 12 = Power Fail Restart 13 = Start Inhibit Low Oil Pressure 14 = Running 15 = Start Inhibit In Discharge Pressure Blowdown
4071	N40:71	44072	R	Capacity Status	0 = Idle 1 = Load 2 = Unload
4072	N40:72	44073	R	Volume Status	0 = Idle 1 = Increase 2 = Decrease
4073	N40:73	44074	R	Language (Local Display Only)	0 = English 1 = French 2 = Chinese 3 = Portuguese 4 = Polish 5 = Chinese 6 = Spanish 7 = Russian 8 = Italian
4074	N40:74	44075	R	Temperature Units (Local Display Only)	0 = Celsius 1 = Fahrenheit
4075	N40:75	44076	R	Pressure Units (Local Display Only)	0 = Kpaa 1 = Bar 2 = BarA 3 = PSIA 4 = PSIG/hg 5 = kpaG
4077	N40:77	44078	R	Regulation Mode 1	0 = Disabled 1 = Enabled
4078	N40:78	44079	R	Regulation Mode 2	
4079	N40:79	44080	R	Regulation Mode 3	
4080	N40:80	44081	R	Regulation Mode 4	
4081	N40:81	44082	R	Sequencing Control Enable	
4199	N41:99	44200	R	Manual Capacity Load/Unload	0 = Idle 1 = Load 2 = Unload
4200	N42:00	44201	R	Alarm Silence	0 = Off 1 = On

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code		
4201	N42:01	44202	R	Manual Compressor Action	-1 = Idle 0 = Stop 1 = Run		
4234	N42:34	44235	R	Refrigerant	1 = R11 2 = R113 3 = R114 4 = R1150 5 = R12 6 = R1270 7 = R13 8 = R134a 9 = R13b1 10 = R14 11 = R142b 12 = R170 13 = R218	14 = R22 15 = R23 16 = R290 17 = R401a 18 = R402a 19 = R404a 20 = R410a 21 = R50 22 = R500 23 = R502 24 = R503 25 = R507 26 = R508	27 = R508b 28 = R600 29 = R600a 30 = R717 31 = R718 32 = R728 33 = R729 34 = R744 35 = R771 50 = User Defined
4237	N42:37	44238	R	Oil Pump Status	0 = Off 1 = Running		
4239	N42:39	44240	R	PID 1 Control	0 = Disabled 1 = Running 2 = Always		
4242	N42:42	44243	R	PID 2 Control	0 = Disabled 1 = Running 2 = Always		
4245	N42:45	44246	R	PID 3 Control	0 = Disabled 1 = Running 2 = Always		
4248	N42:48	44249	R	PID 4 Control	0 = Disabled 1 = Running 2 = Always		
4251	N42:51	44252	R	PID 5 Control	0 = Disabled 1 = Running 2 = Always		
4254	N42:54	44255	R	PID 6 Control	0 = Disabled 1 = Running 2 = Always		
4257	N42:57	44258	R	PID 7 Control	0 = Disabled 1 = Running 2 = Always		
4260	N42:60	44261	R	PID 8 Control	0 = Disabled 1 = Running 2 = Always		

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4383	N43:83	44384	R	Sequencing – Sys. 1 Comp 1 Comp Mode	0 = Manual 1 = Automatic 2 = Remote -- Communications 3 = Remote -- IO 5 = Remote -- Sequencing
4384	N43:84	44385	R	Sequencing – Sys. 1 Comp 2 Comp Mode	
4385	N43:85	44386	R	Sequencing – Sys. 1 Comp 3 Comp Mode	
4386	N43:86	44387	R	Sequencing – Sys. 1 Comp 4 Comp Mode	
4387	N43:87	44388	R	Sequencing – Sys. 1 Comp 5 Comp Mode	
4388	N43:88	44389	R	Sequencing – Sys. 1 Comp 6 Comp Mode	
4389	N43:89	44390	R	Sequencing – Sys. 1 Comp 7 Comp Mode	
4390	N43:90	44391	R	Sequencing – Sys. 1 Comp 8 Comp Mode	
4391	N43:91	44392	R	Sequencing – Sys. 1 Comp 1 Capacity Mode	0 = Manual 1 = Automatic 2 = Remote -- Communications 3 = Remote -- IO 4 = Remote -- 4-20 Input 5 = Remote -- Sequencing
4392	N43:92	44393	R	Sequencing – Sys. 1 Comp 2 Capacity Mode	
4393	N43:93	44394	R	Sequencing – Sys. 1 Comp 3 Capacity Mode	
4394	N43:94	44395	R	Sequencing – Sys. 1 Comp 4 Capacity Mode	
4395	N43:95	44396	R	Sequencing – Sys. 1 Comp 5 Capacity Mode	
4396	N43:96	44397	R	Sequencing – Sys. 1 Comp 6 Capacity Mode	
4397	N43:97	44398	R	Sequencing – Sys. 1 Comp 7 Capacity Mode	
4398	N43:98	44399	R	Sequencing – Sys. 1 Comp 8 Capacity Mode	
4407	N44:07	44408	R	Sequencing Enable - System 1	0 = Disabled 1 = Enabled
4417	N44:17	44418	R	Sequencing - Sys 1 Comp 1 Comp Status	0 = Off 1 = Running 20 = Starting 30 = Stopping 31 = Stopping - High Capacity 32 = Stopping - Pumpdown
4418	N44:18	44419	R	Sequencing - Sys 1 Comp 2 Comp Status	
4419	N44:19	44420	R	Sequencing - Sys 1 Comp 3 Comp Status	
4420	N44:20	44421	R	Sequencing - Sys 1 Comp 4 Comp Status	
4421	N44:21	44422	R	Sequencing - Sys 1 Comp 5 Comp Status	
4422	N44:22	44423	R	Sequencing - Sys 1 Comp 6 Comp Status	
4423	N44:23	44424	R	Sequencing - Sys 1 Comp 7 Comp Status	
4424	N44:24	44425	R	Sequencing - Sys 1 Comp 8 Comp Status	
4433	N44:33	44434	R	Sequencing – Sys. 2 Comp 1 Comp Mode	0 = Manual 1 = Automatic 2 = Remote -- Communications 3 = Remote -- IO 5 = Remote -- Sequencing
4434	N44:34	44435	R	Sequencing – Sys. 2 Comp 2 Comp Mode	
4435	N44:35	44436	R	Sequencing – Sys. 2 Comp 3 Comp Mode	
4436	N44:36	44437	R	Sequencing – Sys. 2 Comp 4 Comp Mode	
4437	N44:37	44438	R	Sequencing – Sys. 2 Comp 5 Comp Mode	
4438	N44:38	44439	R	Sequencing – Sys. 2 Comp 6 Comp Mode	
4439	N44:39	44440	R	Sequencing – Sys. 2 Comp 7 Comp Mode	
4440	N44:40	44441	R	Sequencing – Sys. 2 Comp 8 Comp Mode	
4441	N44:41	44442	R	Sequencing – Sys. 2 Comp 1 Capacity Mode	0 = Manual 1 = Automatic 2 = Remote - Communications 3 = Remote - IO 4 = Remote - 4-20 Input 5 = Remote – Sequencing
4442	N44:42	44443	R	Sequencing – Sys. 2 Comp 2 Capacity Mode	
4443	N44:43	44444	R	Sequencing – Sys. 2 Comp 3 Capacity Mode	
4444	N44:44	44445	R	Sequencing – Sys. 2 Comp 4 Capacity Mode	
4445	N44:45	44446	R	Sequencing – Sys. 2 Comp 5 Capacity Mode	
4446	N44:46	44447	R	Sequencing – Sys. 2 Comp 6 Capacity Mode	
4447	N44:47	44448	R	Sequencing – Sys. 2 Comp 7 Capacity Mode	
4448	N44:48	44449	R	Sequencing – Sys. 2 Comp 8 Capacity Mode	

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4457	N44:57	44458	R	Sequencing Enable - System 2	0 = Disabled 1 = Enabled
4467	N44:67	44468	R	Sequencing – Sys. 2 Comp 1 Comp Status	0 = Off 1 = Running 20 = Starting 30 = Stopping 31 = Stopping - High Capacity 32 = Stopping - Pumpdown
4468	N44:68	44469	R	Sequencing – Sys. 2 Comp 2 Comp Status	
4469	N44:69	44470	R	Sequencing – Sys. 2 Comp 3 Comp Status	
4470	N44:70	44471	R	Sequencing – Sys. 2 Comp 4 Comp Status	
4471	N44:71	44472	R	Sequencing – Sys. 2 Comp 5 Comp Status	
4472	N44:72	44473	R	Sequencing – Sys. 2 Comp 6 Comp Status	
4473	N44:73	44474	R	Sequencing – Sys. 2 Comp 7 Comp Status	
4474	N44:74	44475	R	Sequencing - Sys 2 Comp 8 Comp Status	
4483	N44:83	44484	R	Sequencing – Sys. 3 Comp 1 Comp Mode	0 = Manual 1 = Automatic 2 = Remote - Communications 3 = Remote - IO 5 = Remote – Sequencing
4484	N44:84	44485	R	Sequencing – Sys. 3 Comp 2 Comp Mode	
4485	N44:85	44486	R	Sequencing – Sys. 3 Comp 3 Comp Mode	
4486	N44:86	44487	R	Sequencing – Sys. 3 Comp 4 Comp Mode	
4487	N44:87	44488	R	Sequencing – Sys. 3 Comp 5 Comp Mode	
4488	N44:88	44489	R	Sequencing – Sys. 3 Comp 6 Comp Mode	
4489	N44:89	44490	R	Sequencing – Sys. 3 Comp 7 Comp Mode	
4490	N44:90	44491	R	Sequencing – Sys. 3 Comp 8 Comp Mode	
4491	N44:91	44492	R	Sequencing – Sys. 3 Comp 1 Capacity Mode	0 = Manual 1 = Automatic 2 = Remote - Communications 3 = Remote - IO 4 = Remote - 4-20 Input 5 = Remote – Sequencing
4492	N44:92	44493	R	Sequencing – Sys. 3 Comp 2 Capacity Mode	
4493	N44:93	44494	R	Sequencing – Sys. 3 Comp 3 Capacity Mode	
4494	N44:94	44495	R	Sequencing – Sys. 3 Comp 4 Capacity Mode	
4495	N44:95	44496	R	Sequencing – Sys. 3 Comp 5 Capacity Mode	
4496	N44:96	44497	R	Sequencing – Sys. 3 Comp 6 Capacity Mode	
4497	N44:97	44498	R	Sequencing – Sys. 3 Comp 7 Capacity Mode	
4498	N44:98	44499	R	Sequencing – Sys. 3 Comp 8 Capacity Mode	
4507	N45:07	44508	R	Sequencing Enable - System 3	0 = Disabled 1 = Enabled
4517	N45:17	44518	R	Sequencing – Sys. 3 Comp 1 Comp Status	0 = Off 1 = Running 20 = Starting 30 = Stopping 31 = Stopping - High Capacity 32 = Stopping - Pumpdown
4518	N45:18	44519	R	Sequencing – Sys. 3 Comp 2 Comp Status	
4519	N45:19	44520	R	Sequencing – Sys. 3 Comp 3 Comp Status	
4520	N45:20	44521	R	Sequencing – Sys. 3 Comp 4 Comp Status	
4521	N45:21	44522	R	Sequencing – Sys. 3 Comp 5 Comp Status	
4522	N45:22	44523	R	Sequencing – Sys. 3 Comp 6 Comp Status	
4523	N45:23	44524	R	Sequencing – Sys. 3 Comp 7 Comp Status	
4524	N45:24	44525	R	Sequencing – Sys. 3 Comp 8 Comp Status	
4533	N45:33	44534	R	Oil Pump Mode	0 = Manual 1 = Automatic

Table 12: Mode Values *(continued)*

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Code
4534	N45:34	44535	R	Screen Saver	0 = Disabled 1 = Enabled
4539	N45:39	44540	R	Starter Alarms	
4540	N45:40	44541	R	Starter Trips	
4547	N45:47	44548	R	Input Module Capacity Mode Selection	0 = Disabled 1 = Enabled
4548	N45:48	44549	R	Permissive Start Enable	0 = Disabled 1 = Starting 2 = Always
4549	N45:49	44550	R	PLC Interlock Enable	0 = Disabled 1 = Enabled
4550	N45:50	44551	R	Remote Enable Output	0 = Disabled 1 = Compressor Mode: Remote I/O 2 = Compressor Mode: Remote I/O and Capacity Mode: Remote I/O 3 = Compressor Mode: Remote I/O and Capacity Mode: Remote 4-20
4551	N45:51	44552	R	Oil Log Mode	0 = Disabled 1 = Enabled
4566	N45:66	44567	R	Communications Unit Flag	0 = Celsius / PSIA 1 = Panel Units
4690	N46:90	44691	R	Discharge Butterfly Valve Control	0 = Disabled 1 = Enabled
4691	N46:91	44692	R	Discharge Butterfly Valve Lock Open Flag	0 = No 1 = Yes
4692	N46:92	44693	R	Low Discharge Pressure Shutdown Enable	0 = Disabled 1 = Enabled
4693	N46:93	44694	R	EZ Cool LIOC Control	0 = Disabled 1 = Running 2 = Always
4694	N46:94	44695	R	Liquid Injection Closed Warning Flag	0 = False 1 = True
4696	N46:96	44697	R	Separator Condensing Safeties Enable	0 = Disabled 1 = Enabled
4697	N46:97	44698	R	Wet Bulb Control	0 = Disabled 1 = Enabled
4698	N46:98	44699	R	Wet Bulb Refrigerant	0 = R22 6 = R134A 12 = R717 14 = R744

Table 13: Timer Values (Read Only)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data
6000	N60:00	46001	R	Pre-Lube Timer
6001	N60:01	46002	R	Post-lube Timer
6002	N60:02	46003	R	Stopping Unload Timer
6003	N60:03	46004	R	Volume Control Timer
6004	N60:04	46005	R	Capacity Control Timer
6006	N60:06	46007	R	Capacity Load Time
6007	N60:07	46008	R	Capacity Unload Time
6008	N60:08	46009	R	General 10 Second Timer
6009	N60:09	46010	R	Step Load Inhibit Time
6010	N60:10	46011	R	Step Unload Delay Time
6011	N60:11	46012	R	Drive Output Timer
6012	N60:12	46013	R	Autocycle Start Timer
6013	N60:13	46014	R	Autocycle Stop Timer
6014	N60:14	46015	R	Condenser Step Timer
6015	N60:15	46016	R	Balance Piston Ignore
6016	N60:16	46017	R	Stopping Pumpdown Timer
6017	N60:17	46018	R	Liquid Injection Timer
6018	N60:18	46019	R	Liquid Level Timer
6019	N60:19	46020	R	Oil Injection Timer
6020	N60:20	46021	R	Starting Load Inhibit Timer
6021	N60:21	46022	R	Capacity Pulldown Timer
6022	N60:22	46023	R	General 60 Second Timer
6023	N60:23	46024	R	Recycle Delay Timer
6024	N60:24	46025	R	Oil Charging Timer
6025	N60:25	46026	R	Differential Pressure OK Timer
6026	N60:26	46027	R	Slide to Zero Timer
6027	N60:27	46028	R	General 1 Second Timer
6028	N60:28	46029	R	Capacity/Volume Calibration Timer
6029	N60:29	46030	R	Dual Pump Transition Timer
6030	N60:30	46031	R	Power Assist Timer
6031	N60:31	46032	R	Power Fail Restart Timer
6032	N60:32	46033	R	PLC Interlock Timer
6036	N60:36	46037	R	Motor Amps Ignore
6037	N60:37	46038	R	Remote I/O Start Stop
6038	N60:38	46039	R	Vyper Standby Timer
6039	N60:39	46040	R	Drive Force Unload Timer
6040	N60:40	46041	R	Vyper Clear Standby Timer
6041	N60:41	46042	R	Min Slide Valve Timer
6042	N60:42	46043	R	Force Unload Step Timer
6043	N60:43	46044	R	Safety Unload Delay Timer
6044	N60:44	46045	R	Step Volume Timer
6045	N60:45	46046	R	Sequencing Disable Timer
6046	N60:46	46047	R	Shutdown Unload Timer

Table 14: Setpoint Values

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7060	N100:60	47061	R/W	Screen Saver Delay Setpoint	Minutes
7061	N100:61	47062	R/W	Atmospheric Pressure	Pressure (Magnitude)
7100	N101:00	47101	R/W	K Factor	Real
7102	N101:02	47103	R/W	Unload Delay When Stopping	Seconds
7103	N101:03	47104	R/W	Hot Gas On When Below	Percent (%)
7104	N101:04	47105	R/W	False Running Compressor Input Delay	Seconds
7120	N101:20	47121	R/W	Power Assist	Seconds
7121	N101:21	47122	R/W	Power Failure Restart Delay	Minutes
7123	N101:23	47124	R/W	Panel Heater On Value	Temperature
7124	N101:24	47125	R/W	Panel Heater Off Value	
7125	N101:25	47126	R/W	Permissive Start Shutdown Delay	Seconds
7126	N101:26	47127	R/W	PLC Interlock Delay	
7150	N101:50	47151	R/W	Regulation Mode 1 Setpoint	Pressure
7152	N101:52	47153	R/W	Regulation Mode 1 High Dead Band	Pressure (Magnitude)
7153	N101:53	47154	R/W	Regulation Mode 1 Low Dead Band	
7154	N101:54	47155	R/W	Regulation Mode 1 High Proportional Band	
7155	N101:55	47156	R/W	Regulation Mode 1 Low Proportional Band	
7156	N101:56	47157	R/W	Regulation Mode 1 High Cycle Time	Seconds
7157	N101:57	47158	R/W	Regulation Mode 1 Low Cycle Time	
7158	N101:58	47159	R/W	Regulation Mode 1 Auto Cycle Start	Pressure
7159	N101:59	47160	R/W	Regulation Mode 1 Auto Cycle Start Delay	Minutes
7160	N101:60	47161	R/W	Regulation Mode 1 Auto Cycle Stop	Pressure
7161	N101:61	47162	R/W	Regulation Mode 1 Auto Cycle Stop Delay	Minutes
7162	N101:62	47163	R/W	Regulation Mode 1 Load Inhibit	Pressure
7163	N101:63	47164	R/W	Regulation Mode 1 Force Unload	
7164	N101:64	47165	R/W	Regulation Mode 1 Shutdown	
7165	N101:65	47166	R/W	Regulation Mode 1 Warning	
7166	N101:66	47167	R/W	Regulation Mode 1 Shutdown Delay	Seconds
7167	N101:67	47168	R/W	Regulation Mode 1 Warning Delay	
7168	N101:68	47169	R/W	Low Suction Pressure Shutdown Mode 1	Pressure
7169	N101:69	47170	R/W	Low Suction Pressure Shutdown Mode 1 Delay	Seconds
7170	N101:70	47171	R/W	Low Suction Pressure Warning Mode 1	Pressure
7171	N101:71	47172	R/W	Low Suction Pressure Warning Mode 1 Delay	Seconds
7172	N101:72	47173	R/W	Low Suction Pressure Mode 1 Load Inhibit	Pressure
7173	N101:73	47174	R/W	Low Suction Pressure Mode 1 Force Unload	
7176	N101:76	47177	R/W	Mode 1 Prop Band	Pressure
7177	N101:77	47178	R/W	Mode 1 Integration Time	Seconds
7200	N102:00	47201	R/W	Regulation Mode 2 Setpoint	Temperature
7202	N102:02	47203	R/W	Regulation Mode 2 High Dead Band	Temperature (Magnitude)
7203	N102:03	47204	R/W	Regulation Mode 2 Low Dead Band	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7204	N102:04	47205	R/W	Regulation Mode 2 High Proportional Band	Temperature (Magnitude)
7205	N102:05	47206	R/W	Regulation Mode 2 Low Proportional Band	Temperature (Magnitude)
7206	N102:06	47207	R/W	Regulation Mode 2 High Cycle Time	Seconds
7207	N102:07	47208	R/W	Regulation Mode 2 Low Cycle Time	Seconds
7208	N102:08	47209	R/W	Regulation Mode 2 Auto Cycle Start	Temperature
7209	N102:09	47210	R/W	Regulation Mode 2 Auto Cycle Start Delay	Minutes
7210	N102:10	47211	R/W	Regulation Mode 2 Auto Cycle Stop	Temperature
7211	N102:11	47212	R/W	Regulation Mode 2 Auto Cycle Stop Delay	Minutes
7212	N102:12	47213	R/W	Regulation Mode 2 Load Inhibit	Temperature
7213	N102:13	47214	R/W	Regulation Mode 2 Force Unload	Temperature
7214	N102:14	47215	R/W	Regulation Mode 2 Shutdown	Temperature
7215	N102:15	47216	R/W	Regulation Mode 2 Warning	Temperature
7216	N102:16	47217	R/W	Regulation Mode 2 Shutdown Delay	Seconds
7217	N102:17	47218	R/W	Regulation Mode 2 Warning Delay	Seconds
7218	N102:18	47219	R/W	Low Suction Pressure Shutdown Mode 2	Pressure
7219	N102:19	47220	R/W	Low Suction Pressure Shutdown Mode 2 Delay	Seconds
7220	N102:20	47221	R/W	Low Suction Pressure Warning Mode 2	Pressure
7221	N102:21	47222	R/W	Low Suction Pressure Warning Mode 2 Delay	Seconds
7222	N102:22	47223	R/W	Low Suction Pressure Mode 2 Load Inhibit	Pressure
7223	N102:23	47224	R/W	Low Suction Pressure Mode 2 Force Unload	Pressure
7226	N102:26	47227	R/W	Mode 2 Prop Band	Pressure
7227	N102:27	47228	R/W	Mode 2 Integration Time	Seconds
7250	N102:50	47251	R/W	Regulation Mode 3 Setpoint	Pressure
7252	N102:52	47253	R/W	Regulation Mode 3 High Dead Band	Pressure (Magnitude)
7253	N102:53	47254	R/W	Regulation Mode 3 Low Dead Band	Pressure (Magnitude)
7254	N102:54	47255	R/W	Regulation Mode 3 High Proportional Band	Pressure (Magnitude)
7255	N102:55	47256	R/W	Regulation Mode 3 Low Proportional Band	Pressure (Magnitude)
7256	N102:56	47257	R/W	Regulation Mode 3 High Cycle Time	Seconds
7257	N102:57	47258	R/W	Regulation Mode 3 Low Cycle Time	Seconds
7258	N102:58	47259	R/W	Regulation Mode 3 Auto Cycle Start	Pressure
7259	N102:59	47260	R/W	Regulation Mode 3 Auto Cycle Start Delay	Minutes
7260	N102:60	47261	R/W	Regulation Mode 3 Auto Cycle Stop	Pressure
7261	N102:61	47262	R/W	Regulation Mode 3 Auto Cycle Stop Delay	Minutes
7262	N102:62	47263	R/W	Regulation Mode 3 Load Inhibit	Pressure
7263	N102:63	47264	R/W	Regulation Mode 3 Force Unload	Pressure
7264	N102:64	47265	R/W	Regulation Mode 3 Shutdown	Pressure
7265	N102:65	47266	R/W	Regulation Mode 3 Warning	Pressure
7266	N102:66	47267	R/W	Regulation Mode 3 Shutdown Delay	Seconds
7267	N102:67	47268	R/W	Regulation Mode 3 Warning Delay	Seconds
7268	N102:68	47269	R/W	Low Suction Pressure Shutdown Mode 3	Pressure
7269	N102:69	47270	R/W	Low Suction Pressure Shutdown Mode 3 Delay	Seconds
7270	N102:70	47271	R/W	Low Suction Pressure Warning Mode 3	Pressure
7271	N102:71	47272	R/W	Low Suction Pressure Warning Mode 3 Delay	Seconds
7272	N102:72	47273	R/W	Low Suction Pressure Mode 3 Load Inhibit	Pressure

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7273	N102:73	47274	R/W	Low Suction Pressure Mode 3 Force Unload	
7276	N102:76	47277	R/W	Mode 3 Prop Band	Pressure
7277	N102:77	47278	R/W	Mode 3 Integration Time	Seconds
7300	N103:00	47301	R/W	Regulation Mode 4 Setpoint	Pressure
7302	N103:02	47303	R/W	Regulation Mode 4 High Dead Band	Pressure (Magnitude)
7303	N103:03	47304	R/W	Regulation Mode 4 Low Dead Band	
7304	N103:04	47305	R/W	Regulation Mode 4 High Proportional Band	
7305	N103:05	47306	R/W	Regulation Mode 4 Low Proportional Band	
7306	N103:06	47307	R/W	Regulation Mode 4 High Cycle Time	Seconds
7307	N103:07	47308	R/W	Regulation Mode 4 Low Cycle Time	
7308	N103:08	47309	R/W	Regulation Mode 4 Auto Cycle Start	Pressure
7309	N103:09	47310	R/W	Regulation Mode 4 Auto Cycle Start Delay	Minutes
7310	N103:10	47311	R/W	Regulation Mode 4 Auto Cycle Stop	Pressure
7311	N103:11	47312	R/W	Regulation Mode 4 Auto Cycle Stop Delay	Minutes
7312	N103:12	47313	R/W	Regulation Mode 4 Load Inhibit	Pressure
7313	N103:13	47314	R/W	Regulation Mode 4 Force Unload	
7314	N103:14	47315	R/W	Regulation Mode 4 Shutdown	
7315	N103:15	47316	R/W	Regulation Mode 4 Warning	
7316	N103:16	47317	R/W	Regulation Mode 4 Shutdown Delay	Seconds
7317	N103:17	47318	R/W	Regulation Mode 4 Warning Delay	
7318	N103:18	47319	R/W	Low Suction Pressure Shutdown Mode 4	Pressure
7319	N103:19	47320	R/W	Low Suction Pressure Shutdown Mode 4 Delay	Seconds
7320	N103:20	47321	R/W	Low Suction Pressure Warning Mode 4	Pressure
7321	N103:21	47322	R/W	Low Suction Pressure Warning Mode 4 Delay	Seconds
7322	N103:22	47323	R/W	Low Suction Pressure Mode 4 Load Inhibit	Pressure
7323	N103:23	47324	R/W	Low Suction Pressure Mode 4 Force Unload	
7326	N103:26	47327	R/W	Mode 4 Prop Band	Pressure
7327	N103:27	47328	R/W	Mode 4 Integration Time	Seconds
7350	N103:50	47351	R/W	High Motor Current Load Inhibit	Amps
7351	N103:51	47352	R/W	High Motor Current Force Unload	
7352	N103:52	47353	R/W	High Motor Current Shutdown	
7353	N103:53	47354	R/W	High Motor Current Warning	
7354	N103:54	47355	R/W	High Motor Current Shutdown Delay	Seconds
7355	N103:55	47356	R/W	High Motor Current Warning Delay	
7356	N103:56	47357	R/W	Low Motor Current Shutdown	Amps
7357	N103:57	47358	R/W	Low Motor Current Shutdown Delay	Seconds
7358	N103:58	47359	R/W	Motor Current Confirmed Running	Amps
7359	N103:59	47360	R/W	False Running Motor Amps Delay	Seconds
7360	N103:60	47361	R/W	Starting Motor Amps Ignore Period	
7361	N103:61	47362	R/W	Name Plate Motor Amps	Amps
7362	N103:62	47363	R/W	Volts	Integer
7363	N103:63	47364	R/W	Service Factor	Real

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data		Units
7364	N103:64	47365	R/W	Horsepower		Integer
7365	N103:65	47366	R/W	Recycle Delay		Minutes
7366	N103:66	47367	R/W	CT Factor		None
7373	N103:73	47374	R/W	Drive Increase Cycle Time		Seconds
7374	N103:74	47375	R/W	Drive Increase Rate Of Change		Percent (%)
7375	N103:75	47376	R/W	Drive Idle		
7376	N103:76	47377	R/W	Drive Minimum		
7377	N103:77	47378	R/W	Drive Maximum		
7378	N103:78	47379	R/W	Drive Decrease Cycle Time		Seconds
7379	N103:79	47380	R/W	Drive Decrease Rate Of Change		Percent (%)
7380	N103:80	47381	R/W	Proportional Drive Speed Maximum		
7381	N103:81	47382	R/W	Proportional Slide Valve Maximum		
7382	N103:82	47383	R/W	Low RPMs Shutdown	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
7383	N103:83	47384	R/W	Low RPMs Warning		
7384	N103:84	47385	R/W	Low RPMs Load Inhibit		
7385	N103:85	47386	R/W	Low RPMs Force Unload		
7386	N103:86	47387	R/W	Low RPMs Shutdown Delay		Seconds
7387	N103:87	47388	R/W	Low RPMs Warning Delay		
7388	N103:88	47389	R/W	High RPMs Shutdown	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
7389	N103:89	47390	R/W	High RPMs Warning		
7390	N103:90	47391	R/W	High RPMs Shutdown Delay		
7391	N103:91	47392	R/W	High RPMs Warning Delay		Seconds
7392	N103:92	47393	R/W	High Manifold Pressure Load Inhibit		Pressure
7393	N103:93	47394	R/W	High Manifold Pressure Force Unload		
7394	N103:94	47395	R/W	High Manifold Pressure Shutdown		
7395	N103:95	47396	R/W	High Manifold Pressure Warning		
7396	N103:96	47397	R/W	High Manifold Pressure Shutdown Delay		Seconds
7397	N103:97	47398	R/W	High Manifold Pressure Warning Delay		
7398	N103:98	47399	R/W	RPM Confirmed Running Shutdown Delay		Minutes
7399	N103:99	47400	R/W	RPM Confirmed Running	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
7400	N104:00	47401	R/W	Highest Capacity Position For Starting		Percent (%)
7401	N104:01	47402	R/W	Capacity Slide Stroke		Real
7402	N104:02	47403	R/W	Capacity Decrease Assist Rate		Percent (%)
7403	N104:03	47404	R/W	Remote Capacity 4_20 Deadband		
7404	N104:04	47405	R/W	Automatic Capacity Mode Minimum Slide Valve Position		
7405	N104:05	47406	R/W	Minimum Capacity Pulse Time		Seconds
7406	N104:06	47407	R/W	Step Force Unload Load Inhibit Period		
7407	N104:07	47408	R/W	Starting Load Inhibit Period		
7408	N104:08	47409	R/W	Capacity Position For Volume Increase Force Unload		Percent (%)
7409	N104:09	47410	R/W	Recip Step Count		Integer
7410	N104:10	47411	R/W	Capacity Top End (Calibration)		
7411	N104:11	47312	R/W	Capacity Bottom End (Calibration)		
7413	N104:13	47414	R/W	Volume Top End		Real
7414	N104:14	47415	R/W	Volume Bottom End		

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7415	N104:15	47416	R/W	Volume Middle	Real
7416	N104:16	47417	R/W	Volume Deadband	
7417	N104:17	47418	R/W	Volume Pulse Time	
7418	N104:18	47419	R/W	Volume Top End (Calibration)	Integer
7419	N104:19	47420	R/W	Volume Bottom End (Calibration)	
7423	N104:23	47424	R/W	Drive Proportional Band	
7424	N104:24	47425	R/W	Drive Integration Time	Seconds
7425	N104:25	47426	R/W	Time Schedule Sunday 1st Mode Hour 1	Integer
7426	N104:26	47427	R/W	Time Schedule Sunday 1st Mode Minute 1	
7427	N104:27	47428	R/W	Time Schedule Sunday 2nd Mode Hour 2	
7428	N104:28	47429	R/W	Time Schedule Sunday 2nd Mode Minute 2	
7429	N104:29	47430	R/W	Time Schedule Sunday 3rd Mode Hour 1	
7430	N104:30	47431	R/W	Time Schedule Sunday 3rd Mode Minute 1	
7431	N104:31	47432	R/W	Time Schedule Sunday 4th Mode Hour 2	
7432	N104:32	47433	R/W	Time Schedule Sunday 4th Mode Minute 2	
7433	N104:33	47434	R/W	Time Schedule Monday 1st Mode Hour 1	
7434	N104:34	47435	R/W	Time Schedule Monday 1st Mode Minute 1	
7435	N104:35	47436	R/W	Time Schedule Monday 2nd Mode Hour 2	
7436	N104:36	47437	R/W	Time Schedule Monday 2nd Mode Minute 2	
7437	N104:37	47438	R/W	Time Schedule Monday 3rd Mode Hour 1	
7438	N104:38	47439	R/W	Time Schedule Monday 3rd Mode Minute 1	
7439	N104:39	47440	R/W	Time Schedule Monday 4th Mode Hour 2	
7440	N104:40	47441	R/W	Time Schedule Monday 4th Mode Minute 2	
7441	N104:41	47442	R/W	Time Schedule Tuesday 1st Mode Hour 1	
7442	N104:42	47443	R/W	Time Schedule Tuesday 1st Mode Minute 1	
7443	N104:43	47444	R/W	Time Schedule Tuesday 2nd Mode Hour 2	
7444	N104:44	47445	R/W	Time Schedule Tuesday 2nd Mode Minute 2	
7445	N104:45	47446	R/W	Time Schedule Tuesday 3rd Mode Hour 1	
7446	N104:46	47447	R/W	Time Schedule Tuesday 3rd Mode Minute 1	
7447	N104:47	47448	R/W	Time Schedule Tuesday 4th Mode Hour 2	
7448	N104:48	47449	R/W	Time Schedule Tuesday 4th Mode Minute 2	
7449	N104:49	47450	R/W	Time Schedule Wednesday 1st Mode Hour 1	
7450	N104:50	47451	R/W	Time Schedule Wednesday 1st Mode Minute 1	
7451	N104:51	47452	R/W	Time Schedule Wednesday 2nd Mode Hour 2	
7452	N104:52	47453	R/W	Time Schedule Wednesday 2nd Mode Minute 2	
7453	N104:53	47454	R/W	Time Schedule Wednesday 3rd Mode Hour 1	
7454	N104:54	47455	R/W	Time Schedule Wednesday 3rd Mode Minute 1	
7455	N104:55	47456	R/W	Time Schedule Wednesday 4th Mode Hour 2	
7456	N104:56	47457	R/W	Time Schedule Wednesday 4th Mode Minute 2	
7457	N104:57	47458	R/W	Time Schedule Thursday 1st Mode Hour 1	
7458	N104:58	47459	R/W	Time Schedule Thursday 1st Mode Minute 1	
7459	N104:59	47460	R/W	Time Schedule Thursday 2nd Mode Hour 2	
7460	N104:60	47461	R/W	Time Schedule Thursday 2nd Mode Minute 2	
7461	N104:61	47462	R/W	Time Schedule Thursday 3rd Mode Hour 1	
7462	N104:62	47463	R/W	Time Schedule Thursday 3rd Mode Minute 1	
7463	N104:63	47464	R/W	Time Schedule Thursday 4th Mode Hour 2	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7464	N104:64	47465	R/W	Time Schedule Thursday 4th Mode Minute 2	Integer
7465	N104:65	47466	R/W	Time Schedule Friday 1st Mode Hour 1	
7466	N104:66	47467	R/W	Time Schedule Friday 1st Mode Minute 1	
7467	N104:67	47468	R/W	Time Schedule Friday 2nd Mode Hour 2	
7468	N104:68	47469	R/W	Time Schedule Friday 2nd Mode Minute 2	
7469	N104:69	47470	R/W	Time Schedule Friday 3rd Mode Hour 1	
7470	N104:70	47471	R/W	Time Schedule Friday 3rd Mode Minute 1	
7471	N104:71	47472	R/W	Time Schedule Friday 4th Mode Hour 2	
7472	N104:72	47473	R/W	Time Schedule Friday 4th Mode Minute 2	
7473	N104:73	47474	R/W	Time Schedule Saturday 1st Mode Hour 1	
7474	N104:74	47475	R/W	Time Schedule Saturday 1st Mode Minute 1	
7475	N104:75	47476	R/W	Time Schedule Saturday 2nd Mode Hour 2	
7476	N104:76	47477	R/W	Time Schedule Saturday 2nd Mode Minute 2	
7477	N104:77	47478	R/W	Time Schedule Saturday 3rd Mode Hour 1	
7478	N104:78	47479	R/W	Time Schedule Saturday 3rd Mode Minute 1	
7479	N104:79	47480	R/W	Time Schedule Saturday 4th Mode Hour 2	
7480	N104:80	47481	R/W	Time Schedule Saturday 4th Mode Minute 2	
7486	N104:86	47487	R/W	Skip Frequency 1 Bottom	Percent (%)
7487	N104:87	47488	R/W	Skip Frequency 1 Top	
7488	N104:88	47489	R/W	Skip Frequency 2 Bottom	
7489	N104:89	47490	R/W	Skip Frequency 2 Top	
7490	N104:90	47491	R/W	Skip Frequency 3 Bottom	
7491	N104:91	47492	R/W	Skip Frequency 3 Top	
7492	N104:92	47493	R/W	Skip Frequency 4 Bottom	
7493	N104:93	47494	R/W	Skip Frequency 4 Top	
7494	N104:94	47495	R/W	Skip Frequency 5 Bottom	
7495	N104:95	47496	R/W	Skip Frequency 5 Top	
7500	N105:00	47501	R/W	Demand/Cycling On	Pressure (Magnitude)
7501	N105:01	47502	R/W	Demand/Cycling Off	
7502	N105:02	47503	R/W	Lube Time When Starting	Seconds
7503	N105:03	47504	R/W	Post Lube When Stopping	Minutes
7510	N105:10	47511	R/W	High Suction Pressure Load Inhibit	Pressure
7511	N105:11	47512	R/W	High Suction Pressure Force Unload	
7512	N105:12	47513	R/W	High Suction Pressure Shutdown	
7513	N105:13	47514	R/W	High Suction Pressure Warning	
7514	N105:14	47515	R/W	High Suction Pressure Shutdown Delay	Seconds
7515	N105:15	47516	R/W	High Suction Pressure Warning Delay	
7520	N105:20	47521	R/W	High Discharge Temperature Shutdown	Temperature
7521	N105:21	47522	R/W	High Discharge Temperature Warning	
7522	N105:22	47523	R/W	High Discharge Temperature Shutdown Delay	Seconds
7523	N105:23	47524	R/W	High Discharge Temperature Warning Delay	
7524	N105:24	47525	R/W	High Discharge Temperature Load Inhibit	Temperature
7525	N105:25	47526	R/W	High Discharge Temperature Force Unload	
7526	N105:26	47527	R/W	High Discharge Pressure Inhibit Load Mode 1	Pressure (Positive)
7527	N105:27	47528	R/W	High Discharge Pressure Force Unload Mode 1	
7528	N105:28	47529	R/W	High Discharge Pressure Warning Mode 1	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7529	N105:29	47530	R/W	High Discharge Pressure Shutdown Mode 1	Pressure (Positive)
7530	N105:30	47531	R/W	High Discharge Pressure Warning Mode 1 Delay	Seconds
7531	N105:31	47532	R/W	High Discharge Pressure Shutdown Mode 1 Delay	
7532	N105:32	47533	R/W	High Discharge Pressure Inhibit Load Mode 2	Pressure (Positive)
7533	N105:33	47534	R/W	High Discharge Pressure Force Unload Mode 2	
7534	N105:34	47535	R/W	High Discharge Pressure Warning Mode 2	
7535	N105:35	47536	R/W	High Discharge Pressure Shutdown Mode 2	
7536	N105:36	47537	R/W	High Discharge Pressure Warning Mode 2 Delay	Seconds
7537	N105:37	47538	R/W	High Discharge Pressure Shutdown Mode 2 Delay	
7538	N105:38	47539	R/W	Starting Differential Pressure	Pressure (Magnitude)
7550	N105:50	47551	R/W	Oil Heater Off When Above	Temperature
7551	N105:51	47552	R/W	Oil Injection On When Above	
7552	N105:52	47553	R/W	Oil Injection On Delay	Seconds
7553	N105:53	47554	R/W	Missing Oil Pressure Warning Offset	Pressure (Magnitude)
7554	N105:54	47555	R/W	Missing Oil Pressure Warning Delay	Seconds
7555	N105:55	47556	R/W	Missing Oil Pressure Shutdown Offset	Pressure (Magnitude)
7556	N105:56	47557	R/W	Missing Oil Pressure Shutdown Delay A	Seconds
7557	N105:57	47558	R/W	Missing Oil Pressure Shutdown Delay B	
7558	N105:58	47559	R/W	Insufficient Oil Pressure Safety Offset	Pressure (Magnitude)
7559	N105:59	47560	R/W	Insufficient Oil Pressure Shutdown Capacity Value	Percent (%)
7560	N105:60	47561	R/W	Insufficient Oil Pressure Shutdown Delay	Seconds
7561	N105:61	47562	R/W	Insufficient Oil Pressure Load Inhibit Capacity Value	Percent (%)
7562	N105:62	47563	R/W	Insufficient Oil Pressure Force Unload Capacity Value	
7563	N105:63	47564	R/W	High Oil Temperature Shutdown	Temperature
7564	N105:64	47565	R/W	High Oil Temperature Warning	
7565	N105:65	47566	R/W	High Oil Temperature Shutdown Delay	Seconds
7566	N105:66	47567	R/W	High Oil Temperature Warning Delay	
7567	N105:67	47568	R/W	Low Oil Temperature Shutdown	Temperature
7568	N105:68	47569	R/W	Low Oil Temperature Warning	
7569	N105:69	47570	R/W	Low Oil Temperature Shutdown Delay	Seconds
7570	N105:70	47571	R/W	Low Oil Temperature Warning Delay	
7571	N105:71	47572	R/W	Low Oil Injection Pressure Shutdown	Pressure (Magnitude)
7572	N105:72	47573	R/W	Low Oil Injection Pressure Shutdown Delay	Seconds
7573	N105:73	47574	R/W	Low Oil Level Shutdown Delay	
7574	N105:74	47575	R/W	Low Oil Pressure Shutdown	Pressure (Magnitude)
7575	N105:75	47576	R/W	Low Oil Pressure Warning	
7576	N105:76	47577	R/W	Low Oil Pressure Shutdown Delay	Seconds
7577	N105:77	47578	R/W	Low Oil Pressure Warning Delay	
7578	N105:78	47579	R/W	Low Oil Pressure Shutdown 2	Pressure (Magnitude)
7579	N105:79	47580	R/W	Low Oil Pressure Shutdown Delay 2	Seconds
7580	N105:80	47581	R/W	Low Separator Temperature Shutdown	Temperature
7581	N105:81	47582	R/W	Low Separator Temperature Warning	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7582	N105:82	47583	R/W	Low Separator Temperature Shutdown Delay	Seconds
7583	N105:83	47584	R/W	Low Separator Temperature Warning Delay	
7584	N105:84	47585	R/W	Dual Pump Transition Time	
7585	N105:85	47586	R/W	Oil Log Shutdown Delay	
7586	N105:86	47587	R/W	Dual Pump Transition Time Due To Low Oil Pressure	
7587	N105:87	47588	R/W	Separator Velocity Reference	Real
7588	N105:88	47589	R/W	Separator Velocity Ratio	
7600	N106:00	47601	R/W	High Filter Shutdown	Pressure (Magnitude)
7601	N106:01	47602	R/W	High Filter Shutdown Delay	Minutes
7602	N106:02	47603	R/W	High Filter Warning	Pressure (Magnitude)
7603	N106:03	47604	R/W	High Filter Warning Delay	Minutes
7604	N106:04	47605	R/W	Condenser High Pressure Override	Pressure
7605	N106:05	47606	R/W	Condenser High Pressure Override Delay	Seconds
7606	N106:06	47607	R/W	Condenser Proportional Band	Pressure (Magnitude)
7607	N106:07	47608	R/W	Condenser Integration Time	Seconds
7608	N106:08	47609	R/W	Condenser High Limit	Percent (%)
7609	N106:09	47610	R/W	Condenser Low Limit	
7610	N106:10	47611	R/W	Condenser Control Setpoint	Pressure
7611	N106:11	47612	R/W	Condenser High Dead Band	Pressure (Magnitude)
7612	N106:12	47613	R/W	Condenser Low Dead Band	
7613	N106:13	47614	R/W	Condenser High Step Delay	Seconds
7614	N106:14	47615	R/W	Condenser Low Step Delay	
7615	N106:15	47616	R/W	Condenser Order Step 1	Integer
7616	N106:16	47617	R/W	Condenser Order Step 2	
7617	N106:17	47618	R/W	Condenser Order Step 3	
7618	N106:18	47619	R/W	Condenser Order Step 4	
7620	N106:20	47621	R/W	Balance Piston On	Percent (%)
7621	N106:21	47622	R/W	Balance Piston Off	
7622	N106:22	47623	R/W	Balance Piston Ignore Period	Minutes
7623	N106:23	47624	R/W	Balance Piston Safety Delay	
7635	N106:35	47636	R/W	Liquid Slug Warning Setpoint	Temp. (Magnitude)
7636	N106:36	47637	R/W	Liquid Slug Shutdown Setpoint	
7640	N106:40	47641	R/W	Liquid Level Setpoint	None
7641	N106:41	47642	R/W	Liquid Level Deadband	
7642	N106:42	47643	R/W	Liquid Level Proportional Band	
7643	N106:43	47644	R/W	High Liquid Level Delay	Seconds
7650	N106:50	47651	R/W	Liquid Injection On When Above	Temperature
7651	N106:51	47652	R/W	Liquid Injection On Delay	Seconds
7660	N106:60	47661	R/W	Dx Circuit 1 OnWhenAbove	Percent (%)

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7661	N106:61	47662	R/W	Dx Circuit 1Off When Below	Percent (%)
7662	N106:62	47663	R/W	Dx Circuit 2 On When Above	
7663	N106:63	47664	R/W	Dx Circuit 2 Off When Below	
7664	N106:64	47665	R	Dewpoint Temperature of Discharge	Temperature
7670	N106:70	47671	R/W	Economizer On When Above	Percent (%)
7671	N106:71	47672	R/W	Economizer Off When Below	
7672	N106:72	47673	R/W	Economizer Over Ride	Pressure (Magnitude)
7673	N106:73	47674	R/W	Economizer Port Value	Real
7674	N106:74	47675	R/W	Economizer Fixed Pressure	Pressure (Positive)
7675	N106:75	47676	R/W	Separator Condensing Start Inhibit Offset	Temperature (Magnitude)
7676	N106:76	47677	R/W	Separator Condensing Warning Offset	Temperature (Magnitude)
7677	N106:77	47678	R/W	Separator Condensing Shutdown Offset	Temperature (Magnitude)
7678	N106:78	47679	R/W	Separator Condensing Warning Delay	Seconds
7679	N106:79	47680	R/W	Separator Condensing Shutdown Delay	Seconds
7680	N106:80	47681	R/W	Pump Down Setpoint	Pressure
7681	N106:81	47682	R/W	Pump Down Time When Stopping	Minutes
7683	N106:83	47684	R/W	Low Demand Pump Pressure Warning Offset	Pressure (Magnitude)
7684	N106:84	47685	R/W	Low Demand Pump Pressure Warning Delay	Seconds
7685	N106:85	47686	R/W	Low Demand Pump Pressure Shutdown Offset	Pressure (Magnitude)
7686	N106:86	47687	R/W	Low Demand Pump Pressure Shutdown Delay	Seconds
7690	N106:90	47691	R/W	Capacity Pulldown Step	Percent (%)
7691	N106:91	47692	R/W	Capacity Pulldown Step Time	Seconds
7693	N106:93	47694	R/W	Minimum Condensing Pressure (Wet Bulb Control)	Pressure
7694	N106:94	47695	R/W	Condensing Temperature Approach (Wet Bulb Control)	Seconds
7700	N107:00	47701	R/W	Auxiliary Input 1 Delay	Seconds
7701	N107:01	47702	R/W	Auxiliary Input 2 Delay	
7702	N107:02	47703	R/W	Auxiliary Input 3 Delay	
7703	N107:03	47704	R/W	Auxiliary Input 4 Delay	
7704	N107:04	47705	R/W	Auxiliary Input 5 Delay	
7705	N107:05	47706	R/W	Auxiliary Input 6 Delay	
7706	N107:06	47707	R/W	Auxiliary Input 7 Delay	
7707	N107:07	47708	R/W	Auxiliary Input 8 Delay	
7708	N107:08	47709	R/W	Auxiliary Input 9 Delay	
7709	N107:09	47710	R/W	Auxiliary Input 10 Delay	
7710	N107:10	47711	R/W	Auxiliary Input 11 Delay	
7711	N107:11	47712	R/W	Auxiliary Input 12 Delay	
7712	N107:12	47713	R/W	Auxiliary Input 13 Delay	
7713	N107:13	47714	R/W	Auxiliary Input 14 Delay	
7714	N107:14	47715	R/W	Auxiliary Input 15 Delay	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7715	N107:15	47716	R/W	Auxiliary Input 16 Delay	Seconds
7716	N107:16	47717	R/W	Auxiliary Input 17 Delay	
7717	N107:17	47718	R/W	Auxiliary Input 18 Delay	
7718	N107:18	47719	R/W	Auxiliary Input 19 Delay	
7719	N107:19	47720	R/W	Auxiliary Input 20 Delay	
7730	N107:30	47731	R/W	Auxiliary Analog 1 High Shutdown	Pressure
7731	N107:31	47732	R/W	Auxiliary Analog 1 High Shutdown Delay	Seconds
7732	N107:32	47733	R/W	Auxiliary Analog 1 High Warning	Pressure
7733	N107:33	47734	R/W	Auxiliary Analog 1 High Warning Delay	Seconds
7734	N107:34	47735	R/W	Auxiliary Analog 1 Low Shutdown	Pressure
7735	N107:35	47736	R/W	Auxiliary Analog 1 Low Shutdown Delay	Seconds
7736	N107:36	47737	R/W	Auxiliary Analog 1 Low Warning	Pressure
7737	N107:37	47738	R/W	Auxiliary Analog 1 Low Warning Delay	Seconds
7740	N107:40	47741	R/W	Auxiliary Analog 2 High Shutdown	Pressure
7741	N107:41	47742	R/W	Auxiliary Analog 2 High Shutdown Delay	Seconds
7742	N107:42	47743	R/W	Auxiliary Analog 2 High Warning	Pressure
7743	N107:43	47744	R/W	Auxiliary Analog 2 High Warning Delay	Seconds
7744	N107:44	47745	R/W	Auxiliary Analog 2 Low Shutdown	Pressure
7745	N107:45	47746	R/W	Auxiliary Analog 2 Low Shutdown Delay	Seconds
7746	N107:46	47747	R/W	Auxiliary Analog 2 Low Warning	Pressure
7747	N107:47	47748	R/W	Auxiliary Analog 2 Low Warning Delay	Seconds
7750	N107:50	47751	R/W	Auxiliary Analog 3 High Shutdown	Pressure
7751	N107:51	47752	R/W	Auxiliary Analog 3 High Shutdown Delay	Seconds
7752	N107:52	47753	R/W	Auxiliary Analog 3 High Warning	Pressure
7753	N107:53	47754	R/W	Auxiliary Analog 3 High Warning Delay	Seconds
7754	N107:54	47755	R/W	Auxiliary Analog 3 Low Shutdown	Pressure
7755	N107:55	47756	R/W	Auxiliary Analog 3 Low Shutdown Delay	Seconds
7756	N107:56	47757	R/W	Auxiliary Analog 3 Low Warning	Pressure
7757	N107:57	47758	R/W	Auxiliary Analog 3 Low Warning Delay	Seconds
7760	N107:60	47761	R/W	Auxiliary Analog 4 High Shutdown	Pressure
7761	N107:61	47762	R/W	Auxiliary Analog 4 High Shutdown Delay	Seconds
7762	N107:62	47763	R/W	Auxiliary Analog 4 High Warning	Pressure
7763	N107:63	47764	R/W	Auxiliary Analog 4 High Warning Delay	Seconds
7764	N107:64	47765	R/W	Auxiliary Analog 4 Low Shutdown	Pressure
7765	N107:65	47766	R/W	Auxiliary Analog 4 Low Shutdown Delay	Seconds
7766	N107:66	47767	R/W	Auxiliary Analog 4 Low Warning	Pressure
7767	N107:67	47768	R/W	Auxiliary Analog 4 Low Warning Delay	Seconds
7770	N107:70	47771	R/W	Auxiliary Analog 5 High Shutdown	Pressure
7771	N107:71	47772	R/W	Auxiliary Analog 5 High Shutdown Delay	Seconds

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7772	N107:72	47773	R/W	Auxiliary Analog 5 High Warning	Pressure
7773	N107:73	47774	R/W	Auxiliary Analog 5 High Warning Delay	Seconds
7774	N107:74	47775	R/W	Auxiliary Analog 5 Low Shutdown	Pressure
7775	N107:75	47776	R/W	Auxiliary Analog 5 Low Shutdown Delay	Seconds
7776	N107:76	47777	R/W	Auxiliary Analog 5 Low Warning	Pressure
7777	N107:77	47778	R/W	Auxiliary Analog 5 Low Warning Delay	Seconds
7780	N107:80	47781	R/W	Auxiliary Analog 6 High Shutdown	Pressure
7781	N107:81	47782	R/W	Auxiliary Analog 6 High Shutdown Delay	Seconds
7782	N107:82	47783	R/W	Auxiliary Analog 6 High Warning	Pressure
7783	N107:83	47784	R/W	Auxiliary Analog 6 High Warning Delay	Seconds
7784	N107:84	47785	R/W	Auxiliary Analog 6 Low Shutdown	Pressure
7785	N107:85	47776	R/W	Auxiliary Analog 6 Low Shutdown Delay	Seconds
7786	N107:86	47787	R/W	Auxiliary Analog 6 Low Warning	Pressure
7787	N107:87	47788	R/W	Auxiliary Analog 6 Low Warning Delay	Seconds
7790	N107:90	47791	R/W	Auxiliary Analog 7 High Shutdown	Pressure
7791	N107:91	47792	R/W	Auxiliary Analog 7 High Shutdown Delay	Seconds
7792	N107:92	47793	R/W	Auxiliary Analog 7 High Warning	Pressure
7793	N107:93	47794	R/W	Auxiliary Analog 7 High Warning Delay	Seconds
7794	N107:94	47795	R/W	Auxiliary Analog 7 Low Shutdown	Pressure
7795	N107:95	47796	R/W	Auxiliary Analog 7 Low Shutdown Delay	Seconds
7796	N107:96	47797	R/W	Auxiliary Analog 7 Low Warning	Pressure
7797	N107:97	47798	R/W	Auxiliary Analog 7 Low Warning Delay	Seconds
7800	N108:00	47801	R/W	Auxiliary Analog 8 High Shutdown	Pressure
7801	N108:01	47802	R/W	Auxiliary Analog 8 High Shutdown Delay	Seconds
7802	N108:02	47803	R/W	Auxiliary Analog 8 High Warning	Pressure
7803	N108:03	47804	R/W	Auxiliary Analog 8 High Warning Delay	Seconds
7804	N108:04	47805	R/W	Auxiliary Analog 8 Low Shutdown	Pressure
7805	N108:05	47806	R/W	Auxiliary Analog 8 Low Shutdown Delay	Seconds
7806	N108:06	47807	R/W	Auxiliary Analog 8 Low Warning	Pressure
7807	N108:07	47808	R/W	Auxiliary Analog 8 Low Warning Delay	Seconds
7810	N108:10	47811	R/W	Auxiliary Analog 9 High Shutdown	Pressure
7811	N108:11	47812	R/W	Auxiliary Analog 9 High Shutdown Delay	Seconds
7812	N108:12	47813	R/W	Auxiliary Analog 9 High Warning	Pressure
7813	N108:13	47814	R/W	Auxiliary Analog 9 High Warning Delay	Seconds
7814	N108:14	47815	R/W	Auxiliary Analog 9 Low Shutdown	Pressure
7815	N108:15	47816	R/W	Auxiliary Analog 9 Low Shutdown Delay	Seconds
7816	N108:16	47817	R/W	Auxiliary Analog 9 Low Warning	Pressure
7817	N108:17	47818	R/W	Auxiliary Analog 9 Low Warning Delay	Seconds
7820	N108:20	47821	R/W	Auxiliary Analog 10 High Shutdown	Pressure

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7822	N108:22	47823	R/W	Auxiliary Analog 10 High Warning	Pressure
7823	N108:23	47824	R/W	Auxiliary Analog 10 High Warning Delay	Seconds
7824	N108:24	47825	R/W	Auxiliary Analog 10 Low Shutdown	Pressure
7825	N108:25	47826	R/W	Auxiliary Analog 10 Low Shutdown Delay	Seconds
7826	N108:26	47827	R/W	Auxiliary Analog 10 Low Warning	Pressure
7827	N108:27	47828	R/W	Auxiliary Analog 10 Low Warning Delay	Seconds
7830	N108:30	47831	R/W	Auxiliary Analog 11 High Shutdown	Pressure
7831	N108:31	47832	R/W	Auxiliary Analog 11 High Shutdown Delay	Seconds
7832	N108:32	47833	R/W	Auxiliary Analog 11 High Warning	Pressure
7833	N108:33	47834	R/W	Auxiliary Analog 11 High Warning Delay	Seconds
7834	N108:34	47835	R/W	Auxiliary Analog 11 Low Shutdown	Pressure
7835	N108:35	47836	R/W	Auxiliary Analog 11 Low Shutdown Delay	Seconds
7836	N108:36	47837	R/W	Auxiliary Analog 11 Low Warning	Pressure
7837	N108:37	47838	R/W	Auxiliary Analog 11 Low Warning Delay	Seconds
7840	N108:40	47841	R/W	Auxiliary Analog 12 High Shutdown	Pressure
7841	N108:41	47842	R/W	Auxiliary Analog 12 High Shutdown Delay	Seconds
7842	N108:42	47843	R/W	Auxiliary Analog 12 High Warning	Pressure
7843	N108:43	47844	R/W	Auxiliary Analog 12 High Warning Delay	Seconds
7844	N108:44	47845	R/W	Auxiliary Analog 12 Low Shutdown	Pressure
7845	N108:45	47846	R/W	Auxiliary Analog 12 Low Shutdown Delay	Seconds
7846	N108:46	47847	R/W	Auxiliary Analog 12 Low Warning	Pressure
7847	N108:47	47848	R/W	Auxiliary Analog 12 Low Warning Delay	Seconds
7850	N108:50	47851	R/W	Auxiliary Analog 13 High Shutdown	Pressure
7851	N108:51	47852	R/W	Auxiliary Analog 13 High Shutdown Delay	Seconds
7852	N108:52	47853	R/W	Auxiliary Analog 13 High Warning	Pressure
7853	N108:53	47854	R/W	Auxiliary Analog 13 High Warning Delay	Seconds
7854	N108:54	47855	R/W	Auxiliary Analog 13 Low Shutdown	Pressure
7855	N108:55	47856	R/W	Auxiliary Analog 13 Low Shutdown Delay	Seconds
7856	N108:56	47857	R/W	Auxiliary Analog 13 Low Warning	Pressure
7857	N108:57	47858	R/W	Auxiliary Analog 13 Low Warning Delay	Seconds
7860	N108:60	47861	R/W	Auxiliary Analog 14 High Shutdown	Pressure
7861	N108:61	47862	R/W	Auxiliary Analog 14 High Shutdown Delay	Seconds
7862	N108:62	47863	R/W	Auxiliary Analog 14 High Warning	Pressure
7863	N108:63	47864	R/W	Auxiliary Analog 14 High Warning Delay	Seconds
7864	N108:64	47865	R/W	Auxiliary Analog 14 Low Shutdown	Pressure
7865	N108:65	47866	R/W	Auxiliary Analog 14 Low Shutdown Delay	Seconds
7866	N108:66	47867	R/W	Auxiliary Analog 14 Low Warning	Pressure
7867	N108:67	47868	R/W	Auxiliary Analog 14 Low Warning Delay	Seconds
7870	N108:70	47871	R/W	Auxiliary Analog 15 High Shutdown	Pressure
7871	N108:71	47872	R/W	Auxiliary Analog 15 High Shutdown Delay	Seconds

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7873	N108:73	47874	R/W	Auxiliary Analog 15 High Warning Delay	Seconds
7874	N108:74	47875	R/W	Auxiliary Analog 15 Low Shutdown	Pressure
7875	N108:75	47876	R/W	Auxiliary Analog 15 Low Shutdown Delay	Seconds
7876	N108:76	47877	R/W	Auxiliary Analog 15 Low Warning	Pressure
7877	N108:77	47878	R/W	Auxiliary Analog 15 Low Warning Delay	Seconds
7880	N108:80	47881	R/W	Auxiliary Analog 16 High Shutdown	Pressure
7881	N108:81	47882	R/W	Auxiliary Analog 16 High Shutdown Delay	Seconds
7882	N108:82	47883	R/W	Auxiliary Analog 16 High Warning	Pressure
7883	N108:83	47884	R/W	Auxiliary Analog 16 High Warning Delay	Seconds
7884	N108:84	47885	R/W	Auxiliary Analog 16 Low Shutdown	Pressure
7885	N108:85	47886	R/W	Auxiliary Analog 16 Low Shutdown Delay	Seconds
7886	N108:86	47887	R/W	Auxiliary Analog 16 Low Warning	Pressure
7887	N108:87	47888	R/W	Auxiliary Analog 16 Low Warning Delay	Seconds
7890	N108:90	47891	R/W	Auxiliary Analog 17 High Shutdown	Pressure
7891	N108:91	47892	R/W	Auxiliary Analog 17 High Shutdown Delay	Seconds
7892	N108:92	47893	R/W	Auxiliary Analog 17 High Warning	Pressure
7893	N108:93	47894	R/W	Auxiliary Analog 17 High Warning Delay	Seconds
7894	N108:94	47895	R/W	Auxiliary Analog 17 Low Shutdown	Pressure
7895	N108:95	47896	R/W	Auxiliary Analog 17 Low Shutdown Delay	Seconds
7896	N108:96	47897	R/W	Auxiliary Analog 17 Low Warning	Pressure
7897	N108:97	47898	R/W	Auxiliary Analog 17 Low Warning Delay	Seconds
7900	N109:00	47901	R/W	Auxiliary Analog 18 High Shutdown	Pressure
7901	N109:01	47902	R/W	Auxiliary Analog 18 High Shutdown Delay	Seconds
7902	N109:02	47903	R/W	Auxiliary Analog 18 High Warning	Pressure
7903	N109:03	47904	R/W	Auxiliary Analog 18 High Warning Delay	Seconds
7904	N109:04	47905	R/W	Auxiliary Analog 18 Low Shutdown	Pressure
7905	N109:05	47906	R/W	Auxiliary Analog 18 Low Shutdown Delay	Seconds
7906	N109:06	47907	R/W	Auxiliary Analog 18 Low Warning	Pressure
7907	N109:07	47908	R/W	Auxiliary Analog 18 Low Warning Delay	Seconds
7910	N109:10	47911	R/W	Auxiliary Analog 19 High Shutdown	Pressure
7911	N109:11	47912	R/W	Auxiliary Analog 19 High Shutdown Delay	Seconds
7912	N109:12	47913	R/W	Auxiliary Analog 19 High Warning	Pressure
7913	N109:13	47914	R/W	Auxiliary Analog 19 High Warning Delay	Seconds
7914	N109:14	47915	R/W	Auxiliary Analog 19 Low Shutdown	Pressure
7915	N109:15	47916	R/W	Auxiliary Analog 19 Low Shutdown Delay	Seconds
7916	N109:16	47917	R/W	Auxiliary Analog 19 Low Warning	Pressure
7917	N109:17	47918	R/W	Auxiliary Analog 19 Low Warning Delay	Seconds
7920	N109:20	47921	R/W	Auxiliary Analog 20 High Shutdown	Pressure

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
7921	N109:21	47922	R/W	Auxiliary Analog 20 High Shutdown Delay	Seconds
7922	N109:22	47923	R/W	Auxiliary Analog 20 High Warning	Pressure
7923	N109:23	47924	R/W	Auxiliary Analog 20 High Warning Delay	Seconds
7924	N109:24	47925	R/W	Auxiliary Analog 20 Low Shutdown	Pressure
7925	N109:25	47926	R/W	Auxiliary Analog 20 Low Shutdown Delay	Seconds
7926	N109:26	47927	R/W	Auxiliary Analog 20 Low Warning	Pressure
7927	N109:27	47928	R/W	Auxiliary Analog 20 Low Warning Delay	Seconds
7930	N109:30	47931	R/W	High Entering Process Temperature Shutdown	Temperature
7931	N109:31	47932	R/W	High Entering Process Temperature Warning	
7932	N109:32	47933	R/W	High Entering Process Temperature Shutdown Delay	Seconds
7933	N109:33	47934	R/W	High Entering Process Temperature Warning Delay	
7934	N109:34	47935	R/W	Low Entering Process Temperature Shutdown	Temperature
7935	N109:35	47936	R/W	Low Entering Process Temperature Warning	
7936	N109:36	47937	R/W	Low Entering Process Temperature Shutdown Delay	Seconds
7937	N109:37	47938	R/W	Low Entering Process Temperature Warning Delay	
8000	N110:00	48001	R/W	PID 1 Setpoint	Temperature
8001	N110:01	48002	R/W	PID 1 Deadband	None
8002	N110:02	48003	R/W	PID 1 Proportional Band	Temp. (Magnitude)
8003	N110:03	48004	R/W	PID 1 Integral Gain	Real
8004	N110:04	48005	R/W	PID 1 Derivative Gain	
8005	N110:05	48006	R/W	PID 1 High Limit	Percent (%)
8006	N110:06	48007	R/W	PID 1 Low Limit	
8007	N110:07	48008	R/W	PID 1 When Running Off Value	
8008	N110:08	48009	R/W	PID 2 Setpoint	None
8009	N110:09	48010	R/W	PID 2 Deadband	
8010	N110:10	48011	R/W	PID 2 Proportional Band	
8011	N110:11	48012	R/W	PID 2 Integral Gain	Real
8012	N110:12	48013	R/W	PID 2 Derivative Gain	
8013	N110:13	48014	R/W	PID 2 High Limit	Percent (%)
8014	N110:14	48015	R/W	PID 2 Low Limit	
8015	N110:15	48016	R/W	PID 2 When Running Off Value	
8016	N110:16	48017	R/W	PID 3 Setpoint	None
8017	N110:17	48018	R/W	PID 3 Deadband	
8018	N110:18	48019	R/W	PID 3 Proportional Band	
8019	N110:19	48020	R/W	PID 3 Integral Gain	Real
8020	N110:20	48021	R/W	PID 3 Derivative Gain	
8021	N110:21	48022	R/W	PID 3 High Limit	Percent (%)
8022	N110:22	48023	R/W	PID 3 Low Limit	
8023	N110:23	48024	R/W	PID 3 When Running Off Value	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8024	N110:24	48025	R/W	PID 4 Setpoint	None
8025	N110:25	48026	R/W	PID 4 Deadband	
8026	N110:26	48027	R/W	PID 4 Proportional Band	
8027	N110:27	48028	R/W	PID 4 Integral Gain	Real
8028	N110:28	48029	R/W	PID 4 Derivative Gain	
8029	N110:29	48030	R/W	PID 4 High Limit	Percent (%)
8030	N110:30	48031	R/W	PID 4 Low Limit	
8031	N110:31	48032	R/W	PID 4 When Running Off Value	
8032	N110:32	48033	R/W	PID 5 Setpoint	None
8033	N110:33	48034	R/W	PID 5 Deadband	
8034	N110:34	48035	R/W	PID 5 Proportional Band	
8035	N110:35	48036	R/W	PID 5 Integral Gain	Real
8036	N110:36	48037	R/W	PID 5 Derivative Gain	
8037	N110:37	48038	R/W	PID 5 High Limit	Percent (%)
8038	N110:38	48039	R/W	PID 5 Low Limit	Percent (%)
8039	N110:39	48040	R/W	PID 5 When Running Off Value	
8040	N110:40	48041	R/W	PID 6 Setpoint	None
8041	N110:41	48042	R/W	PID 6 Deadband	
8042	N110:42	48043	R/W	PID 6 Proportional Band	
8043	N110:43	48044	R/W	PID 6 Integral Gain	Real
8044	N110:44	48045	R/W	PID 6 Derivative Gain	
8045	N110:45	48046	R/W	PID 6 High Limit	Percent (%)
8046	N110:46	48047	R/W	PID 6 Low Limit	
8047	N110:47	48048	R/W	PID 6 When Running Off Value	
8048	N110:48	48049	R/W	PID 7 Setpoint	None
8049	N110:49	48050	R/W	PID 7 Deadband	
8050	N110:50	48051	R/W	PID 7 Proportional Band	
8051	N110:51	48052	R/W	PID 7 Integral Gain	Real
8052	N110:52	48053	R/W	PID 7 Derivative Gain	
8053	N110:53	48054	R/W	PID 7 High Limit	Percent (%)
8054	N110:54	48055	R/W	PID 7 Low Limit	
8055	N110:55	48056	R/W	PID 7 When Running Off Value	
8056	N110:56	48057	R/W	PID 8 Setpoint	None
8057	N110:57	48058	R/W	PID 8 Deadband	
8058	N110:58	48059	R/W	PID 8 Proportional Band	
8059	N110:59	48060	R/W	PID 8 Integral Gain	Real
8060	N110:60	48061	R/W	PID 8 Derivative Gain	
8061	N110:61	48062	R/W	PID 8 High Limit	Percent (%)
8062	N110:62	48063	R/W	PID 8 Low Limit	
8063	N110:63	48064	R/W	PID 8 When Running Off Value	
8070	N110:70	48071	R/W	High Compressor Vibration Warning - Suction	Vibration (Fg)
8071	N110:71	48072	R/W	High Compressor Vibration Warning Delay - Suction	Seconds

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8072	N110:72	48073	R/W	High Compressor Vibration Warning - Discharge	Vibration (Fg)
8073	N110:73	48074	R/W	High Compressor Vibration Warning Delay - Discharge	Seconds
8074	N110:74	48075	R/W	High Compressor Vibration Shutdown - Suction	Vibration (Fg)
8075	N110:75	48076	R/W	High Compressor Vibration Shutdown Delay - Suction	Seconds
8076	N110:76	48077	R/W	High Compressor Vibration Shutdown - Discharge	Vibration (Fg)
8077	N110:77	48078	R/W	High Compressor Vibration Shutdown Delay - Discharge	Seconds
8078	N110:78	48079	R/W	High Motor Vibration Warning - Shaft Side	Vibration (Fg)
8079	N110:79	48080	R/W	High Motor Vibration Warning Delay - Shaft Side	Seconds
8080	N110:80	48081	R/W	High Motor Vibration Warning - Opposite Shaft Side	Vibration (Fg)
8081	N110:81	48082	R/W	High Motor Vib. Warning Delay - Opposite Shaft Side	Seconds
8082	N110:82	48083	R/W	High Motor Vibration Shutdown - Shaft Side	Vibration (Fg)
8083	N110:83	48084	R/W	High Motor Vibration Shutdown Delay - Shaft Side	Seconds
8084	N110:84	48085	R/W	High Motor Vibration Shutdown - Opposite Shaft Side	Vibration (Fg)
8085	N110:85	48086	R/W	High Motor Vib. Shutdown Delay - Opposite Shaft Side	Seconds
8086	N110:86	48087	R/W	High Motor Temp. Warning - Shaft Side	Temperature
8087	N110:87	48088	R/W	High Motor Temp. Warning Delay - Shaft Side	Seconds
8088	N110:88	48089	R/W	High Motor Temp. Warning - Opposite Shaft Side	Temperature
8089	N110:89	48090	R/W	High Motor Temp. Warning Delay - Opposite Shaft Side	Seconds
8090	N110:90	48091	R/W	High Motor Temp. Shutdown - Shaft Side	Temperature
8091	N110:91	48092	R/W	High Motor Temp. Shutdown Delay - Shaft Side	Seconds
8092	N110:92	48093	R/W	High Motor Temp. Shutdown – Opposite Shaft Side	Temperature
8093	N110:93	48094	R/W	High Motor Temp. Shutdown Delay – Opposite Shaft Side	Seconds
8140	N111:40	48141	R/W	High Motor Stator #1 Temperature Warning	Temperature
8134	N111:34	48135	R/W	Discharge Butterfly Valve Pressure Differential Setpoint	Pressure (Magnitude)
8135	N111:35	48136	R/W	Discharge Butterfly Valve Control Dead Band	Pressure (Magnitude)
8136	N111:36	48137	R/W	Discharge Butterfly Valve Control Proportional Band	Pressure (Magnitude)
8141	N111:41	48142	R/W	High Motor Stator #1 Temperature Warning Delay	Seconds
8142	N111:42	48143	R/W	High Motor Stator #1 Temperature Shutdown	Temperature
8143	N111:43	48144	R/W	High Motor Stator #1 Temperature Shutdown Delay	Seconds
8144	N111:44	48145	R/W	High Motor Stator #2 Temperature Warning	Temperature
8145	N111:45	48146	R/W	High Motor Stator #2 Temperature Warning Delay	Seconds
8146	N111:46	48147	R/W	High Motor Stator #2 Temperature Shutdown	Temperature
8147	N111:47	48148	R/W	High Motor Stator #2 Temperature Shutdown Delay	Seconds
8148	N111:48	48149	R/W	High Motor Stator #3 Temperature Warning	Temperature
8149	N111:49	48150	R/W	High Motor Stator #3 Temperature Warning Delay	Seconds
8150	N111:50	48151	R/W	High Motor Stator #3 Temperature Shutdown	Temperature
8151	N111:51	48152	R/W	High Motor Stator #3 Temperature Shutdown Delay	Seconds
8201	N112:01	48202	R/W	Oil Analysis Service Interval	Hours
8202	N112:02	48203	R/W	Change Filters Service Interval	
8203	N112:03	48204	R/W	Clean Oil Strainers Service Interval	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8204	N112:04	48205	R/W	Clean Liquid Strainers Service Interval	Hours
8205	N112:05	48206	R/W	Clean Coalescers Service Interval	
8206	N112:06	48207	R/W	Clean Suction Screen Service Interval	
8207	N112:07	48208	R/W	Vibration Analysis Service Interval	
8208	N112:08	48209	R/W	Check Coupling Service Interval	
8209	N112:09	48210	R/W	Grease Motor Service Interval	
8210	N112:10	48211	R/W	User Defined #1 Service Interval	
8211	N112:11	48212	R/W	User Defined #2 Service Interval	
8212	N112:12	48213	R/W	User Defined #3 Service Interval	
8213	N112:13	48214	R/W	User Defined #4 Service Interval	
8214	N112:14	48215	R/W	User Defined #5 Service Interval	
8215	N112:15	48216	R/W	User Defined #6 Service Interval	
8216	N112:16	48217	R/W	User Defined #7 Service Interval	
8217	N112:17	48218	R/W	User Defined #8 Service Interval	
8218	N112:18	48219	R/W	Oil Analysis - Next Service	
8219	N112:19	48220	R/W	Change Filters - Next Service	
8220	N112:20	48221	R/W	Clean Oil Stainers - Next Service	
8221	N112:21	48222	R/W	Clean Liquid Strainers - Next Service	
8222	N112:22	48223	R/W	Clean Coalescers - Next Service	
8223	N112:23	48224	R/W	Clean Suction Screen - Next Service	
8224	N112:24	48225	R/W	Vibration Analysis - Next Service	
8225	N112:25	48226	R/W	Check Coupling - Next Service	
8226	N112:26	48227	R/W	Grease Motor - Next Service	
8227	N112:27	48228	R/W	User Defined #1 - Next Service	
8228	N112:28	48229	R/W	User Defined #2 - Next Service	
8229	N112:29	48230	R/W	User Defined #3 - Next Service	
8230	N112:30	48231	R/W	User Defined #4 - Next Service	
8231	N112:31	48232	R/W	User Defined #5 - Next Service	
8232	N112:32	48233	R/W	User Defined #6 - Next Service	
8233	N112:33	48234	R/W	User Defined #7 - Next Service	
8234	N112:34	48235	R/W	User Defined #8 - Next Service	
8300	N113:00	48301	R/W	Sequencing - System 1 Compressor 1 ID	None
8301	N113:01	48302	R/W	Sequencing - System 1 Compressor 2 ID	
8302	N113:02	48303	R/W	Sequencing - System 1 Compressor 3 ID	
8303	N113:03	48304	R/W	Sequencing - System 1 Compressor 4 ID	
8304	N113:04	48305	R/W	Sequencing - System 1 Compressor 5 ID	
8305	N113:05	48306	R/W	Sequencing - System 1 Compressor 6 ID	
8306	N113:06	48307	R/W	Sequencing - System 1 Compressor 7 ID	
8307	N113:07	48308	R/W	Sequencing - System 1 Compressor 8 ID	
8308	N113:08	48309	R/W	Sequencing - System 1 Compressor 1 Start #	
8309	N113:09	48310	R/W	Sequencing - System 1 Compressor 2 Start #	
8310	N113:10	48311	R/W	Sequencing - System 1 Compressor 3 Start #	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8311	N113:11	48312	R/W	Sequencing - System 1 Compressor 4 Start #	None
8312	N113:12	48313	R/W	Sequencing - System 1 Compressor 5 Start #	
8313	N113:13	48314	R/W	Sequencing - System 1 Compressor 6 Start #	
8314	N113:14	48315	R/W	Sequencing - System 1 Compressor 7 Start #	
8315	N113:15	48316	R/W	Sequencing - System 1 Compressor 8 Start #	
8316	N113:16	48317	R/W	Sequencing - System 1 Capacity Control Setpoint	Temperature
8317	N113:17	48318	R/W	Sequencing - System 1 Control Point	
8318	N113:18	48319	R/W	Sequencing - System 1 Minimum Run Time	Minutes
8319	N113:19	48320	R/W	Sequencing - System 1 Compressor 1 Capacity	Real
8320	N113:20	48321	R/W	Sequencing - System 1 Compressor 2 Capacity	
8321	N113:21	48322	R/W	Sequencing - System 1 Compressor 3 Capacity	
8322	N113:22	48323	R/W	Sequencing - System 1 Compressor 4 Capacity	
8323	N113:23	48324	R/W	Sequencing - System 1 Compressor 5 Capacity	
8324	N113:24	48325	R/W	Sequencing - System 1 Compressor 6 Capacity	Real
8325	N113:25	48326	R/W	Sequencing - System 1 Compressor 7 Capacity	
8326	N113:26	48327	R/W	Sequencing - System 1 Compressor 8 Capacity	
8327	N113:27	48328	R/W	Sequencing - System 1 Compressor 1 Run Time	Integer
8328	N113:28	48329	R/W	Sequencing - System 1 Compressor 2 Run Time	
8329	N113:29	48330	R/W	Sequencing - System 1 Compressor 3 Run Time	
8330	N113:30	48331	R/W	Sequencing - System 1 Compressor 4 Run Time	
8331	N113:31	48332	R/W	Sequencing - System 1 Compressor 5 Run Time	
8332	N113:32	48333	R/W	Sequencing - System 1 Compressor 6 Run Time	
8333	N113:33	48334	R/W	Sequencing - System 1 Compressor 7 Run Time	
8334	N113:34	48335	R/W	Sequencing - System 1 Compressor 8 Run Time	
8335	N113:35	48336	R/W	Sequencing - System 1 Compressor 1 Minimum Capacity	Percent (%)
8336	N113:36	48337	R/W	Sequencing - System 1 Compressor 2 Minimum Capacity	
8337	N113:37	48338	R/W	Sequencing - System 1 Compressor 3 Minimum Capacity	
8338	N113:38	48339	R/W	Sequencing - System 1 Compressor 4 Minimum Capacity	
8339	N113:39	48340	R/W	Sequencing - System 1 Compressor 5 Minimum Capacity	
8340	N113:40	48341	R/W	Sequencing - System 1 Compressor 6 Minimum Capacity	
8341	N113:41	48342	R/W	Sequencing - System 1 Compressor 7 Minimum Capacity	
8342	N113:42	48343	R/W	Sequencing - System 1 Compressor 8 Minimum Capacity	
8343	N113:43	48344	R/W	Sequencing - System 1 Compressor 1 Slave Command	None
8344	N113:44	48345	R/W	Sequencing - System 1 Compressor 2 Slave Command	
8345	N113:45	48346	R/W	Sequencing - System 1 Compressor 3 Slave Command	
8346	N113:46	48347	R/W	Sequencing - System 1 Compressor 4 Slave Command	
8347	N113:47	48348	R/W	Sequencing - System 1 Compressor 5 Slave Command	
8348	N113:48	48349	R/W	Sequencing - System 1 Compressor 6 Slave Command	
8349	N113:49	48350	R/W	Sequencing - System 1 Compressor 7 Slave Command	
8350	N113:50	48351	R/W	Sequencing - System 1 Compressor 8 Slave Command	
8351	N113:51	48352	R/W	Sequencing - System 1 Compressor 1 Start Inhibits	
8352	N113:52	48353	R/W	Sequencing - System 1 Compressor 2 Start Inhibits	
8353	N113:53	48354	R/W	Sequencing - System 1 Compressor 3 Start Inhibits	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8354	N113:54	48355	R/W	Sequencing - System 1 Compressor 4 Start Inhibits	None
8355	N113:55	48356	R/W	Sequencing - System 1 Compressor 5 Start Inhibits	
8356	N113:56	48357	R/W	Sequencing - System 1 Compressor 6 Start Inhibits	
8357	N113:57	48358	R/W	Sequencing - System 1 Compressor 7 Start Inhibits	
8358	N113:58	48359	R/W	Sequencing - System 1 Compressor 8 Start Inhibits	
8400	N114:00	48401	R/W	Sequencing – System 2 Compressor 1 ID	None
8401	N114:01	48402	R/W	Sequencing – System 2 Compressor 2 ID	
8402	N114:02	48403	R/W	Sequencing – System 2 Compressor 3 ID	
8403	N114:03	48404	R/W	Sequencing – System 2 Compressor 4 ID	
8404	N114:04	48405	R/W	Sequencing – System 2 Compressor 5 ID	
8405	N114:05	48406	R/W	Sequencing – System 2 Compressor 6 ID	
8406	N114:06	48407	R/W	Sequencing – System 2 Compressor 7 ID	
8407	N114:07	48408	R/W	Sequencing - System 2 Compressor 8 ID	None
8408	N114:08	48409	R/W	Sequencing - System 2 Compressor 1 Start #	
8409	N114:09	48410	R/W	Sequencing - System 2 Compressor 2 Start #	
8410	N114:10	48411	R/W	Sequencing - System 2 Compressor 3 Start #	
8411	N114:11	48412	R/W	Sequencing - System 2 Compressor 4 Start #	
8412	N114:12	48413	R/W	Sequencing - System 2 Compressor 5 Start #	
8413	N114:13	48414	R/W	Sequencing - System 2 Compressor 6 Start #	
8414	N114:14	48415	R/W	Sequencing - System 2 Compressor 7 Start #	
8415	N114:15	48416	R/W	Sequencing - System 2 Compressor 8 Start #	
8416	N114:16	48417	R/W	Sequencing - System 2 Capacity Control Setpoint	Temperature
8417	N114:17	48418	R/W	Sequencing - System 2 Control Point	
8418	N114:18	48419	R/W	Sequencing - System 2 Minimum Run Time	Minutes
8419	N114:19	48420	R/W	Sequencing - System 2 Compressor 1 Capacity	Real
8420	N114:20	48421	R/W	Sequencing - System 2 Compressor 2 Capacity	
8421	N114:21	48422	R/W	Sequencing - System 2 Compressor 3 Capacity	
8422	N114:22	48423	R/W	Sequencing - System 2 Compressor 4 Capacity	
8423	N114:23	48424	R/W	Sequencing - System 2 Compressor 5 Capacity	
8424	N114:24	48425	R/W	Sequencing - System 2 Compressor 6 Capacity	
8425	N114:25	48426	R/W	Sequencing - System 2 Compressor 7 Capacity	
8426	N114:26	48427	R/W	Sequencing - System 2 Compressor 8 Capacity	
8427	N114:27	48428	R/W	Sequencing - System 2 Compressor 1 Run Time	Integer
8428	N114:28	48429	R/W	Sequencing - System 2 Compressor 2 Run Time	
8429	N114:29	48430	R/W	Sequencing - System 2 Compressor 3 Run Time	
8430	N114:30	48431	R/W	Sequencing - System 2 Compressor 4 Run Time	
8431	N114:31	48432	R/W	Sequencing - System 2 Compressor 5 Run Time	
8432	N114:32	48433	R/W	Sequencing - System 2 Compressor 6 Run Time	
8433	N114:33	48434	R/W	Sequencing - System 2 Compressor 7 Run Time	
8434	N114:34	48435	R/W	Sequencing - System 2 Compressor 8 Run Time	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8435	N114:35	48436	R/W	Sequencing - System 2 Compressor 1 Minimum Capacity	Percent (%)
8436	N114:36	48437	R/W	Sequencing - System 2 Compressor 2 Minimum Capacity	
8437	N114:37	48438	R/W	Sequencing - System 2 Compressor 3 Minimum Capacity	
8438	N114:38	48439	R/W	Sequencing - System 2 Compressor 4 Minimum Capacity	
8439	N114:39	48440	R/W	Sequencing - System 2 Compressor 5 Minimum Capacity	
8440	N114:40	48441	R/W	Sequencing - System 2 Compressor 6 Minimum Capacity	
8441	N114:41	48442	R/W	Sequencing - System 2 Compressor 7 Minimum Capacity	
8442	N114:42	48443	R/W	Sequencing - System 2 Compressor 8 Minimum Capacity	
8443	N114:43	48444	R/W	Sequencing - System 2 Compressor 1 Slave Command	None
8444	N114:44	48445	R/W	Sequencing - System 2 Compressor 2 Slave Command	
8445	N114:45	48446	R/W	Sequencing - System 2 Compressor 3 Slave Command	
8446	N114:46	48447	R/W	Sequencing - System 2 Compressor 4 Slave Command	
8447	N114:47	48448	R/W	Sequencing - System 2 Compressor 5 Slave Command	
8448	N114:48	48449	R/W	Sequencing - System 2 Compressor 6 Slave Command	
8449	N114:49	48450	R/W	Sequencing - System 2 Compressor 7 Slave Command	
8450	N114:50	48451	R/W	Sequencing - System 2 Compressor 8 Slave Command	None
8451	N114:51	48452	R/W	Sequencing - System 2 Compressor 1 Start Inhibits	
8452	N114:52	48453	R/W	Sequencing - System 2 Compressor 2 Start Inhibits	
8453	N114:53	48454	R/W	Sequencing - System 2 Compressor 3 Start Inhibits	
8454	N114:54	48455	R/W	Sequencing - System 2 Compressor 4 Start Inhibits	
8455	N114:55	48456	R/W	Sequencing - System 2 Compressor 5 Start Inhibits	
8456	N114:56	48457	R/W	Sequencing - System 2 Compressor 6 Start Inhibits	
8457	N114:57	48458	R/W	Sequencing - System 2 Compressor 7 Start Inhibits	
8458	N114:58	48459	R/W	Sequencing - System 2 Compressor 8 Start Inhibits	
8500	N115:00	48501	R/W	Sequencing - System 3 Compressor 1 ID	None
8501	N115:01	48502	R/W	Sequencing - System 3 Compressor 2 ID	
8502	N115:02	48503	R/W	Sequencing - System 3 Compressor 3 ID	
8503	N115:03	48504	R/W	Sequencing - System 3 Compressor 4 ID	
8504	N115:04	48505	R/W	Sequencing - System 3 Compressor 5 ID	
8505	N115:05	48506	R/W	Sequencing - System 3 Compressor 6 ID	
8506	N115:06	48507	R/W	Sequencing - System 3 Compressor 7 ID	
8507	N115:07	48508	R/W	Sequencing - System 3 Compressor 8 ID	
8508	N115:08	48509	R/W	Sequencing - System 3 Compressor 1 Start #	
8509	N115:09	48510	R/W	Sequencing - System 3 Compressor 2 Start #	
8510	N115:10	48511	R/W	Sequencing - System 3 Compressor 3 Start #	None
8511	N115:11	48512	R/W	Sequencing - System 3 Compressor 4 Start #	
8512	N115:12	48513	R/W	Sequencing - System 3 Compressor 5 Start #	
8513	N115:13	48514	R/W	Sequencing - System 3 Compressor 6 Start #	
8514	N115:14	48515	R/W	Sequencing - System 3 Compressor 7 Start #	
8515	N115:15	48516	R/W	Sequencing - System 3 Compressor 8 Start #	
8516	N115:16	48517	R/W	Sequencing - System 3 Capacity Control Setpoint	Temperature
8517	N115:17	48518	R/W	Sequencing - System 3 Control Point	

Table 14: Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8518	N115:18	48519	R/W	Sequencing - System 3 Minimum Run Time	Minutes
8519	N115:19	48520	R/W	Sequencing - System 3 Compressor 1 Capacity	Real
8520	N115:20	48521	R/W	Sequencing - System 3 Compressor 2 Capacity	
8521	N115:21	48522	R/W	Sequencing - System 3 Compressor 3 Capacity	
8522	N115:22	48523	R/W	Sequencing - System 3 Compressor 4 Capacity	
8523	N115:23	48524	R/W	Sequencing - System 3 Compressor 5 Capacity	
8524	N115:24	48525	R/W	Sequencing - System 3 Compressor 6 Capacity	
8525	N115:25	48526	R/W	Sequencing - System 3 Compressor 7 Capacity	
8526	N115:26	48527	R/W	Sequencing - System 3 Compressor 8 Capacity	
8527	N115:27	48528	R/W	Sequencing - System 3 Compressor 1 Run Time	Integer
8528	N115:28	48529	R/W	Sequencing – System 3 Compressor 2 Run Time	
8529	N115:29	48530	R/W	Sequencing – System 3 Compressor 3 Run Time	
8530	N115:30	48531	R/W	Sequencing – System 3 Compressor 4 Run Time	
8531	N115:31	48532	R/W	Sequencing – System 3 Compressor 5 Run Time	
8532	N115:32	48533	R/W	Sequencing – System 3 Compressor 6 Run Time	
8533	N115:33	48534	R/W	Sequencing – System 3 Compressor 7 Run Time	Integer
8534	N115:34	48535	R/W	Sequencing – System 3 Compressor 8 Run Time	
8535	N115:35	48536	R/W	Sequencing - System 3 Compressor 1 Minimum Capacity	Percent (%)
8536	N115:36	48537	R/W	Sequencing - System 3 Compressor 2 Minimum Capacity	
8537	N115:37	48538	R/W	Sequencing - System 3 Compressor 3 Minimum Capacity	
8538	N115:38	48539	R/W	Sequencing - System 3 Compressor 4 Minimum Capacity	
8539	N115:39	48540	R/W	Sequencing - System 3 Compressor 5 Minimum Capacity	
8540	N115:40	48541	R/W	Sequencing - System 3 Compressor 6 Minimum Capacity	
8541	N115:41	48542	R/W	Sequencing - System 3 Compressor 7 Minimum Capacity	
8542	N115:42	48543	R/W	Sequencing - System 3 Compressor 8 Minimum Capacity	
8543	N115:43	48544	R/W	Sequencing - System 3 Compressor 1 Slave Command	None
8544	N115:44	48545	R/W	Sequencing - System 3 Compressor 2 Slave Command	
8545	N115:45	48546	R/W	Sequencing - System 3 Compressor 3 Slave Command	
8546	N115:46	48547	R/W	Sequencing - System 3 Compressor 4 Slave Command	
8547	N115:47	48548	R/W	Sequencing - System 3 Compressor 5 Slave Command	
8548	N115:48	48549	R/W	Sequencing - System 3 Compressor 6 Slave Command	
8549	N115:49	48550	R/W	Sequencing - System 3 Compressor 7 Slave Command	
8550	N115:50	48551	R/W	Sequencing - System 3 Compressor 8 Slave Command	
8551	N115:51	48552	R/W	Sequencing - System 3 Compressor 1 Start Inhibits	
8552	N115:52	48553	R/W	Sequencing - System 3 Compressor 2 Start Inhibits	
8553	N115:53	48554	R/W	Sequencing - System 3 Compressor 3 Start Inhibits	None
8554	N115:54	48555	R/W	Sequencing - System 3 Compressor 4 Start Inhibits	
8555	N115:55	48556	R/W	Sequencing - System 3 Compressor 5 Start Inhibits	
8556	N115:56	48557	R/W	Sequencing - System 3 Compressor 6 Start Inhibits	
8557	N115:57	48558	R/W	Sequencing - System 3 Compressor 7 Start Inhibits	
8558	N115:58	48559	R/W	Sequencing - System 3 Compressor 8 Start Inhibits	
8809	N118:09	48810	R/W	Operating RPM high	RPM
8810	N118:10	48811	R/W	Comp. Bearing 1 x Rotational Speed Warning	In/Sec
8811	N118:11	48812	R/W	Comp. Bearing 1 x Rotational Speed Warning Delay	Sec
8812	N118:12	48813	R/W	Comp. Bearing 1 x Rotational Speed Shutdown	In/Sec
8813	N118:13	48814	R/W	Comp. Bearing 1 x Rotational Speed Shutdown Delay	Sec
8814	N118:14	48815	R/W	Motor Bearing 1 x Rotational Speed Warning	In/Sec
8815	N118:15	48816	R/W	Motor Bearing 1 x Rotational Speed Warning Delay	Sec
8816	N118:16	48817	R/W	Motor Bearing 1 x Rotational Speed Shutdown	In/Sec
8817	N118:17	48818	R/W	Motor Bearing 1 x Rotational Speed Shutdown Delay	Sec

Table 15: Commands

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Value Codes	
8910	N119:10	48911	W	Remote – Start	1 = Start	**See Note 1**
8911	N119:11	48912	W	Remote – Stop	1 = Stop	
8912	N119:12	48913	W	Remote - Load Slide Valve	0 = Turn off 1 – 15 = Load x seconds	
8913	N119:13	48914	W	Remote - Unload Slide Valve	0 = Turn off 1 – 15 = Unload x seconds	
8914	N119:14	48915	W	Remote - RDB Capacity	25, 50, 75, 100 (represents capacity %)	
8915	N119:15	48916	W	Remote - Compressor Mode	0 = Manual 1 = Auto 2 = Remote -- Communications 3 = Remote -- I/O 5 = Remote -- Sequencing 6 = Manual -- Browser	
8916	N119:16	48917	W	Remote - Capacity Mode	1 = Auto 2 = Remote -- Communications 3 = Remote -- I/O 4 = Remote -- 4-20ma 5 = Remote – Sequencing 6 = Manual -- Browser	
8917	N119:17	48918	W	Remote - Clear Alarms	1 = Clear Alarms	
8918	N119:18	48919	W	Remote - Clear Recycle Delay	1 = Clear Recycle Delay	
8919	N119:19	48920	W	Remote - Sequencing Mode	0 = Disable 1 = Enable	
8920	N119:20	48921	W	Remote - Communication Units	0 = C ° / PSIA 1 = Panel Units	**See Note 2**
8921	N119:21	48922	W	Remote - Regulation Mode	0 = Regulation Mode 1 1 = Regulation Mode 2 2 = Regulation Mode 3 3 = Regulation Mode 4	**See Note 3**
8922	N119:22	48923	W	Remote – Set Slide Valve Position	0 – 100%	**See Note 4**
8923	N119:23	48924	W	Remote – Set Drive Speed	0 – 100%	**See Note 5**
8924	N119:24	48925	W	Remote – Set Total Capacity	0 - 200	**See Note 6**

GENERAL NOTES: Command Values need tenths field added. For example, to start the compressor, the table above states that 1 = Start. However, being that one decimal place is assumed, a value of 10 actually needs to be sent.

SPECIFIC NOTES:

Note 1: The compressor must be in remote communications to accept the start and stop commands that are sent through serial communications, and the Capacity Mode must be in remote communications to accept load and unload commands that are sent.

Note 2: To read the proper Temperature/Pressure units, use FRICK address 4566. To change (write to) the Temperature/Pressure units, use FRICK address 8920.

Note 3: Mode must already be enabled.

Note 4: The value passed with this command is the position (percentage) to which the control will attempt to set the Slide Valve. The control will automatically load and/or unload the Slide Valve until it is within a deadband (+/- 0.5%) of the target.

Conditions:
- the compressor must be running
- the Capacity Mode must be Remote Comms
- if the compressor is Variable Speed, the Slide Valve will not go below the Variable Speed Minimum Slide Valve setpoint

This command is reset by a Remote Load or Remote Unload command. Writing to this value too often causes the Slide Valve to load and unload excessively. Only write to this value when the Slide Valve needs to move from its current position. Typically, this is not more than once every 30 seconds.

Note 5: The value passed with this command is the speed (percentage) to which the control will attempt to set the Drive.

Conditions:
- the compressor must be Variable Speed
- the compressor must be running
- the Capacity Mode must be Remote Comms
- the Drive will not go below the Drive Speed Minimum setpoint

This command is reset by a Remote Load or Remote Unload command

Note 6: This command is actually a combination the previous two (Remote – Set Slide Valve Position and Remote – Set Drive Speed), and is for the convenience of the PLC programmer. A value of X from 0 to 100 will set the Slide Valve Position to X% and the Drive Speed to 0% (or the allowable minimum). A value of X from 100 to 200 will set the Slide Valve to 100% and the Drive Speed to (X – 100)%. See notes 4 and 5 for additional requirements.

Table 16: DBS Setpoint Values

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8950	N119:50	48951	R	Average Current	Amps
8951	N119:51	48952	R	Elapsed Run Time Hours	Hours
8952	N119:52	48953	R	Elapsed Run Time Minutes	Minutes
8953	N119:53	48954	R	Current Phase A	Amps
8954	N119:54	48955	R	Current Phase B	
8955	N119:55	48956	R	Current Phase C	
8956	N119:56	48957	R	Heatsink Temperature	Temperature
8957	N119:57	48958	R	RTD Temperature	
8958	N119:58	48959	R	Thermal Capacity Used	Percent (%)
8959	N119:59	48960	R	Time until Start	Minutes
8960	N119:60	48961	R	Full Load Amps	Amps
8961	N119:61	48962	R	Locked Rotor Current	Percent (%)
8962	N119:62	48963	R	Stall Time	Seconds
8963	N119:63	48964	R	Jam Current Level	Percent (%)
8964	N119:64	48965	R	Jam Run Delay	Seconds
8965	N119:65	48966	R	DBS Service Factor	Percent (%)
8966	N119:66	48967	R	Current Unbalance Alarm Level	
8967	N119:67	48968	R	Current Unbalance Alarm Run Delay	Seconds
8968	N119:68	48969	R	RTD Temperature Alarm Level	Temperature
8969	N119:69	48970	R	RTD Temperature Trip Level	
8970	N119:70	48971	R	Bypass Time	Seconds
8971	N119:71	48972	R	Constant Current Level	Percent (%)
8972	N119:72	48973	R	Ramp Time	Seconds
8973	N119:73	48974	R	DBS Version	Real
8974	N119:74	48975	R	Last Trip Current	Amps
8975	N119:75	48976	R	Last Trip Heatsink Temp	Temperature
8976	N119:76	48977	R	Last Trip RTD Temp	
8977	N119:77	48978	R	Last Trip Thermal Capacity	Percent (%)
8978	N119:78	48979	R	Last Trip FLA	Amps
8979	N119:79	48980	R	Last Trip Current Step	Percent (%)
8980	N119:80	48981	R	Last Trip Ramp Time	Seconds
8981	N119:81	48982	R	Last Trip Bypass Time	
8982	N119:82	48983	R	Last Run Time Hours	Hours
8983	N119:83	48984	R	Last Run Time Minutes	Minutes
8984	N119:84	48985	R	Total Accumulated Run Time Hours	Hours
8985	N119:85	48986	R	Total Accumulated Run Time Minutes	Minutes
8986	N119:86	48987	R	Total Number of Starts	None
8987	N119:87	48988	R	Total Short Circuit Trips	
8988	N119:88	48989	R	Total Jam Trips	
8989	N119:89	48990	R	Total Phase Loss Trips	
8990	N119:90	48991	R	Total Phase Reversal Trips	
8991	N119:91	48992	R	Total Current Unbalance Trips	
8992	N119:92	48993	R	Total Heatsink Overtemp Trips	
8993	N119:93	48994	R	Total RTD Overtemp Trips	
8994	N119:94	48995	R	Total Thermal Overload Trips	
8995	N119:95	48996	R	Maximum RTD Temperature	Temperature
8997	N119:97	48998	R	Locked Rotor Current Setpoint	Percent (%)

Table 16: DBS Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
8998	N119:98	48999	R	Stall Time Setpoint	Seconds
8999	N119:99	49000	R	Jam Current Level Setpoint	Percent (%)
9000	N120:00	49001	R	Jam Run Delay Setpoint	Seconds
9001	N120:01	49002	R	DBS Service Factor Setpoint	Percent (%)
9002	N120:02	49003	R	Current Unbalance Alarm Level Setpoint	
9003	N120:03	49004	R	Current Unbalance Alarm Run Delay Setpoint	Seconds
9004	N120:04	49005	R	RTD Temperature Alarm Level Setpoint	Temperature
9005	N120:05	49006	R	RTD Temperature Trip Level Setpoint	
9007	N120:07	49008	R	DBS Command Flags	None

Table 17: General Setpoint Values

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
9100	N121:00	49101	R/W	Real Time Trending Recording Interval	Seconds
9101	N121:01	49102	R/W	History Trending Recording Interval	Minutes

Table 18: VSD (Vyper) Setpoint Values

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data		Units
9200	N122:00	49201	R/W	Vyper Drive Standby Time		Minutes
9210	N122:10	49211	R	Vyper Drive Auto Speed Command	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
9211	N122:11	49212	R	Vyper Drive Run Command		None
9215	N122:15	49216	R	Vyper Drive Current Fault		None
9216	N122:16	49217	R	Vyper Drive Current Warning		
9218	N122:18	49219	R	Vyper Drive Speed Command	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
9219	N122:19	49220	R	Vyper Drive Percent of Full Load Amps	Percent (%)	
9220	N122:20	49221	R	Vyper Drive Actual Speed	(NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
9223	N122:23	49224	R	Vyper Drive Operating Mode		None
9224	N122:24	49225	R	Vyper Drive Water Pump		
9225	N122:25	49226	R	Vyper Drive Precharge Relay		
9226	N122:26	49227	R	Vyper Drive Trigger SCRs		
9228	N122:28	49229	R	Vyper Drive Output Frequency		Real
9229	N122:29	49230	R	Vyper Drive Output Voltage		Integer
9230	N122:30	49231	R	Vyper Drive DC Bus Voltage		

Table 18: VSD (Vyper) Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
9231	N122:31	49232	R	Vyper Drive Job FLA	
9232	N122:32	49233	R	Vyper Drive DC Inverter Link Current	
9233	N122:33	49234	R	Vyper Drive Phase A Current	Amps
9234	N122:34	49235	R	Vyper Drive Phase B Current	
9235	N122:35	49236	R	Vyper Drive Phase C Current	
9236	N122:36	49237	R	Vyper Drive Ambient Temperature	
9237	N122:37	49238	R	Vyper Drive Baseplate Temperature	Temperature
9238	N122:38	49239	R	Vyper Drive Converter Heatsink Temperature	
9239	N122:39	49240	R	Vyper Drive Motor Temperature	
9240	N122:40	49241	R	Vyper Drive Input Power	kW
9242	N122:42	49243	R	Vyper Drive Total Kilowatts per hour	Integer
9243	N122:43	49244	R	Vyper Drive Model	
9244	N122:44	49245	R	Harmonic Filter Present	
9245	N122:45	49246	R	Harmonic Filter Operating Mode	
9246	N122:46	49247	R	Harmonic Filter Supply Contactor Energized	None
9247	N122:47	49248	R	Harmonic Filter Precharge Contactor Energized	
9248	N122:48	4249	R	Harmonic Filter Phase Rotation Direction	
9249	N122:49	49250	R	Harmonic Filter DC Bus Voltage	
9250	N122:50	49251	R	Harmonic Filter L1-N Voltage	
9251	N122:51	49252	R	Harmonic Filter L2-N Voltage	
9252	N122:52	49253	R	Harmonic Filter L3-N Voltage	Integer
9253	N122:53	49254	R	Harmonic Filter L1-L2 Voltage	
9254	N122:54	49255	R	Harmonic Filter L2-L3 Voltage	
9255	N122:55	49256	R	Harmonic Filter L3-L1 Voltage	
9256	N122:56	49257	R	Harmonic Filter L1 Total Harmonic Distortion	
9257	N122:57	49258	R	Harmonic Filter L2 Total Harmonic Distortion	Percent (%)
9258	N122:58	49259	R	Harmonic Filter L3 Total Harmonic Distortion	
9259	N122:59	49260	R	Harmonic Filter L1 Filter Current	
9260	N122:60	49261	R	Harmonic Filter L2 Filter Current	
9261	N122:61	49262	R	Harmonic Filter L3 Filter Current	Amps
9262	N122:62	49263	R	Harmonic Filter L1 Supply Current	
9263	N122:63	49264	R	Harmonic Filter L2 Supply Current	
9264	N122:64	49265	R	Harmonic Filter L3 Supply Current	
9265	N122:65	49266	R	Harmonic Filter L1 Total Demand Distortion	
9266	N122:66	49267	R	Harmonic Filter L2 Total Demand Distortion	Percent (%)
9267	N122:67	49268	R	Harmonic Filter L3 Total Demand Distortion	
9268	N122:68	49269	R	Harmonic Filter Total Supply KVA	Integer
9269	N122:69	49270	R	Harmonic Filter Total Power Factor	Real
9270	N122:70	49271	R	Harmonic Filter Baseplate Temperature	Temperature
9271	N122:71	49272	R	Vyper Drive Auto/Manual Switch Status	None
9272	N122:72	49273	R	Vyper Drive Manual Mode Speed Switch Status (NOTE: RPM values are NOT multiplied by 10 in Allen-Bradley and MODBUS protocols)	RPM
9273	N122:73	49274	R	Vyper Drive Line Frequency Jumper Status	
9274	N122:74	49275	R	Vyper Drive Run Command Signal Status	None
9275	N122:75	49276	R	Vyper Drive No Faults Present Signal Status	

Table 18: VSD (Vyper) Setpoint Values (continued)

Frick® Address	AB Address	Modbus Address	Read/ Write	Description of Data	Units
9276	N122:76	49277	R	Vyper Drive Run Acknowledge Relay Status	None
9277	N122:77	49278	R	Vyper Drive Run Command Relay Status	
9278	N122:78	49279	R	Vyper Drive Interface Board Software Version	
9279	N122:79	49280	R	Vyper Drive Software Version	
9280	N122:80	49281	R	Vyper Drive Modbus Node ID	
9281	N122:81	49282	R	Vyper Drive IB Transmit Errors	
9282	N122:82	49283	R	Vyper Drive CP to IB Time Out Errors	
9283	N122:83	49284	R	Vyper Drive VD to IB Time Out Errors	
9284	N122:84	49285	R	Vyper Drive IB to VD Receive Errors	
9285	N122:85	49286	R	Vyper Drive VD to IB Checksum Errors	
9286	N122:86	49287	R	Vyper Drive HF to IB Time Out Errors	
9287	N122:87	49288	R	Vyper Drive VD to HF Receive Errors	
9288	N122:88	49289	R	Vyper Drive HF to IB Checksum Errors	
9289	N122:89	49290	R	Vyper Drive Software Reboots	
9290	N122:90	49291	R	Vyper Drive Phase B Baseplate Temperature	Temperature
9291	N122:91	49292	R	Vyper Drive Phase C Baseplate Temperature	
9295	N122:95	49296	R	Vyper Drive Fault #1	
9296	N122:96	49297	R	Vyper Drive Warning #1	
9297	N122:97	49298	R	Vyper Drive Fault #2	
9298	N122:98	49299	R	Vyper Drive Warning #2	
9299	N122:99	49300	R	Vyper Drive Fault #3	
9300	N123:00	49301	R	Vyper Drive Warning #3	
9301	N123:01	49302	R	Vyper Drive Fault #4	
9302	N123:02	49303	R	Vyper Drive Warning #4	
9303	N123:03	49304	R	Vyper Drive Fault #5	
9304	N123:04	49305	R	Vyper Drive Warning #5	
9305	N123:05	49306	R	Vyper Drive Fault #6	
9306	N123:06	49307	R	Vyper Drive Warning #6	
9307	N123:07	49308	R	Vyper Drive Fault #7	
9308	N123:08	49309	R	Vyper Drive Warning #7	
9309	N123:09	49310	R	Vyper Drive Fault #8	
9310	N123:10	49311	R	Vyper Drive Warning #8	
9311	N123:11	49312	R	Vyper Drive Fault #9	
9312	N123:12	49313	R	Vyper Drive Warning #9	
9313	N123:13	49314	R	Vyper Drive Fault #10	
9314	N123:14	49315	R	Vyper Drive Warning #10	

NOTES:

SECTION 7
WARNING/SHUTDOWN MESSAGE CODES

The following list represents all of the current warning/shutdown messages that are potentially displayable (at the time of this writing). The numeric value to the left of each message corresponds to the value that is read from the Safety Message addresses (FRICK address 3070 – 3079). As an example, if FRICK address 3070 were being read, and it returned a value of 51, then referring to the chart on the following pages, it would be found that the code of 51 represents Oil Level Shutdown.

3	Balance Piston 1 Shutdown
4	Balance Piston 2 Shutdown
5	Balance Piston 3 Shutdown
6	Liquid Slugging Warning
7	Liquid Slugging Shutdown
8	High Oil Filter Pressure Warning
9	High Oil Filter Pressure Shutdown
10	Missing Comp. Oil Pressure Warning
11	Missing Comp. Oil Pressure Shutdown A
12	Missing Comp. Oil Pressure Shutdown B
13	Insufficient Main Oil Pressure Shutdown
14	High Motor Current Shutdown
15	High Motor Current Warning
16	Low Motor Current Shutdown
17	High Discharge Temperature Sensor Fault
18	High Discharge Temperature Shutdown
19	High Discharge Temperature Warning
20	High Suction Pressure Shutdown
21	High Suction Pressure Warning
22	Low Separator Temperature Shutdown
23	Low Separator Temperature Warning
24	High Comp. Oil Temperature Shutdown
25	High Comp. Oil Temperature Warning
26	Low Comp. Oil Temperature Shutdown
27	Low Comp. Oil Temperature Warning
28	Low Suction Shutdown - Regulation Mode 1
29	Low Suction Warning - Regulation Mode 1
30	Low Suction Shutdown - Regulation Mode 2
31	Low Suction Warning - Regulation Mode 2
32	Low Suction Shutdown - Regulation Mode 3
33	Low Suction Warning - Regulation Mode 3
34	Low Suction Shutdown - Regulation Mode 4
35	Low Suction Warning - Regulation Mode 4
36	Regulation Mode 1 Shutdown
37	Regulation Mode 1 Warning
38	Regulation Mode 2 Shutdown
39	Regulation Mode 2 Warning
40	Regulation Mode 3 Shutdown
41	Regulation Mode 3 Warning
42	Regulation Mode 4 Shutdown
43	Regulation Mode 4 Warning
44	Low RPM Shutdown
45	Low RPM Warning
46	High RPM Shutdown
47	High RPM Warning
48	High Manifold Pressure Shutdown
49	High Manifold Pressure Warning
50	Low Main Oil Injection Pressure Shutdown
51	Oil Level Shutdown
52	Compressor Capacity Unload Alarm
53	False Running Fail -- Motor Amps
54	False Running Fail -- Confirmed Running Inp
55	High Limit Disch Pres Shutdown
56	High Limit Disch Temp Shutdown
57	High Disch Pres Shutdown -- Mode 1
58	High Disch Pres Warning -- Mode 1
59	High Disch Pres Shutdown -- Mode 2
60	High Disch Pres Warning -- Mode 2
61	Start Failure Shutdown For Eng And Turb
62	High Liquid Level Shutdown
63	Auxiliary Input 1 Shutdown
64	Auxiliary Input 1 Warning
65	Auxiliary Input 2 Shutdown
66	Auxiliary Input 2 Warning
67	Auxiliary Input 3 Shutdown
68	Auxiliary Input 3 Warning
69	Auxiliary Input 4 Shutdown
70	Auxiliary Input 4 Warning
71	Auxiliary Input 5 Shutdown
72	Auxiliary Input 5 Warning
73	Auxiliary Input 6 Shutdown
74	Auxiliary Input 6 Warning
75	Auxiliary Input 7 Shutdown
76	Auxiliary Input 7 Warning
77	Auxiliary Input 8 Shutdown
78	Auxiliary Input 8 Warning
79	Auxiliary Input 9 Shutdown
80	Auxiliary Input 9 Warning
81	Auxiliary Input 10 Shutdown
82	Auxiliary Input 10 Warning
83	High Auxiliary Analog 1 Shutdown
84	High Auxiliary Analog 1 Warning
85	Low Auxiliary Analog 1 Shutdown
86	Low Auxiliary Analog 1 Warning
87	High Auxiliary Analog 2 Shutdown
88	High Auxiliary Analog 2 Warning
89	Low Auxiliary Analog 2 Shutdown
90	Low Auxiliary Analog 2 Warning
91	High Auxiliary Analog 3 Shutdown
92	High Auxiliary Analog 3 Warning
93	Low Auxiliary Analog 3 Shutdown
94	Low Auxiliary Analog 3 Warning

95	High Auxiliary Analog 4 Shutdown
96	High Auxiliary Analog 4 Warning
97	Low Auxiliary Analog 4 Shutdown
98	Low Auxiliary Analog 4 Warning
99	High Auxiliary Analog 5 Shutdown
100	High Auxiliary Analog 5 Warning
101	Low Auxiliary Analog 5 Shutdown
102	Low Auxiliary Analog 5 Warning
103	High Auxiliary Analog 6 Shutdown
104	High Auxiliary Analog 6 Warning
105	Low Auxiliary Analog 6 Shutdown
106	Low Auxiliary Analog 6 Warning
107	High Auxiliary Analog 7 Shutdown
108	High Auxiliary Analog 7 Warning
109	Low Auxiliary Analog 7 Shutdown
110	Low Auxiliary Analog 7 Warning
111	High Auxiliary Analog 8 Shutdown
112	High Auxiliary Analog 8 Warning
113	Low Auxiliary Analog 8 Shutdown
114	Low Auxiliary Analog 8 Warning
115	High Auxiliary Analog 9 Shutdown
116	High Auxiliary Analog 9 Warning
117	Low Auxiliary Analog 9 Shutdown
118	Low Auxiliary Analog 9 Warning
119	High Auxiliary Analog 10 Shutdown
120	High Auxiliary Analog 10 Warning
121	Low Auxiliary Analog 10 Shutdown
122	Low Auxiliary Analog 10 Warning
123	Low Suction Pressure Sensor Fault
124	Low Discharge Pressure Sensor Fault
125	High Discharge Pressure Sensor Fault
126	Low Comp. Oil Pressure Sensor Fault
127	High Comp. Oil Pressure Sensor Fault
128	Low Discharge Temperature Sensor Fault
129	Low Comp. Oil Temperature Sensor Fault
130	Low Separator Temperature Sensor Fault
131	Auxiliary Input 11 Shutdown
132	Auxiliary Input 11 Warning
133	Auxiliary Input 12 Shutdown
134	Auxiliary Input 12 Warning
134	Auxiliary Input 13 Shutdown
136	Auxiliary Input 13 Warning
137	Auxiliary Input 14 Shutdown
138	Auxiliary Input 14 Warning
139	Auxiliary Input 15 Shutdown
140	Auxiliary Input 15 Warning
141	Auxiliary Input 16 Shutdown
142	Auxiliary Input 16 Warning
143	Auxiliary Input 17 Shutdown
144	Auxiliary Input 17 Warning
145	Auxiliary Input 18 Shutdown
146	Auxiliary Input 18 Warning
147	Auxiliary Input 19 Shutdown
148	Auxiliary Input 19 Warning
149	Auxiliary Input 20 Shutdown
150	Auxiliary Input 20 Warning
151	High Auxiliary Analog 11 Shutdown
152	High Auxiliary Analog 11 Warning
153	Low Auxiliary Analog 11 Shutdown
154	Low Auxiliary Analog 11 Warning
155	High Auxiliary Analog 12 Shutdown
156	High Auxiliary Analog 12 Warning
157	Low Auxiliary Analog 12 Shutdown
158	Low Auxiliary Analog 12 Warning
159	High Auxiliary Analog 13 Shutdown
160	High Auxiliary Analog 13 Warning
161	Low Auxiliary Analog 13 Shutdown
162	Low Auxiliary Analog 13 Warning
163	High Auxiliary Analog 14 Shutdown
164	High Auxiliary Analog 14 Warning
165	Low Auxiliary Analog 14 Shutdown
166	Low Auxiliary Analog 14 Warning
167	High Auxiliary Analog 15 Shutdown
168	High Auxiliary Analog 15 Warning
169	Low Auxiliary Analog 15 Shutdown
170	Low Auxiliary Analog 15 Warning
171	High Auxiliary Analog 16 Shutdown
172	High Auxiliary Analog 16 Warning
173	Low Auxiliary Analog 16 Shutdown
174	Low Auxiliary Analog 16 Warning
175	High Auxiliary Analog 17 Shutdown
176	High Auxiliary Analog 17 Warning
177	Low Auxiliary Analog 17 Shutdown
178	Low Auxiliary Analog 17 Warning
179	High Auxiliary Analog 18 Shutdown
180	High Auxiliary Analog 18 Warning
181	Low Auxiliary Analog 18 Shutdown
182	Low Auxiliary Analog 18 Warning
183	High Auxiliary Analog 19 Shutdown
184	High Auxiliary Analog 19 Warning
185	Low Auxiliary Analog 19 Shutdown
186	Low Auxiliary Analog 19 Warning
187	High Auxiliary Analog 20 Shutdown
188	High Auxiliary Analog 20 Warning
189	Low Auxiliary Analog 20 Shutdown
190	Low Auxiliary Analog 20 Warning
191	Analog Board 1 Communications Shutdown
192	Analog Board 2 Communications Shutdown
193	Digital Board 1 Communications Shutdown
194	Digital Board 2 Communications Shutdown
195	DBS Communication Failure Shutdown
196	Digital Board 1 Reset
197	Digital Board 2 Reset
198	Starting Failure - No Compressor Auxiliary
199	Starting Failure - Low Motor Amps
200	VSD Communication Failure Warning
201	Starting Low Comp. Oil Pressure Shutdown
202	Oil Pump Auxiliary Failure
203	Oil Pump 1 Auxiliary Warning
204	Oil Pump 1 Auxiliary Shutdown
205	Oil Pump 2 Auxiliary Warning
206	Oil Pump 2 Auxiliary Shutdown
207	Low Comp. Oil Pressure Warning
208	Low Comp. Oil Pressure Shutdown

209 Missing Oil Pressure Shutdown C
210 High Compressor Vib Warning - Suction
211 High Compressor Vib Warning - Discharge
212 High Compressor Vib Shutdown - Suction
213 High Compressor Vib Shutdown - Discharge
214 High Motor Vib Warning - Shaft Side
215 High Motor Vib Warning - Opp Shaft Side
216 High Motor Vib Shutdown - Shaft Side
217 High Motor Vib Shutdown – Opp Shaft Side
218 Compressor Auxiliary Shutdown
220 Oil Log Shutdown
221 DBS - Current Unbalance
222 DBS - RTD Temperature
223 DBS - Short Circuit
224 DBS - Thermal Overload
225 DBS - Shorted SCR
226 DBS - Phase Loss
227 DBS - Phase Reversal
228 DBS - Jam
229 DBS - HEATSINK Overtemperature
230 DBS - RTD Overtemperature
231 VSD Interface Board Power Supply Fault
233 VSD Board Motor Current > 15%
234 VSD Board Run Signal Fault
235 VSD Interface Board to Panel Comms Loss
237 VSD Initialization Fault
238 VSD Stop Contacts Fault
239 Harmonic Filter Logic Board Or Comms Fault
240 Harmonic Filter High Total Demand Distortion
241 VSD High Phase B Inverter Baseplate Temp
242 VSD High Phase C Inverter Baseplate Temp
243 VSD Low Phase B Inverter Baseplate Temp
244 VSD Low Phase C Inverter Baseplate Temp
247 VSD High Phase A Instantaneous Current
248 VSD High Phase B Instantaneous Current
249 VSD High Phase C Instantaneous Current
251 VSD Phase A Gate Driver Fault
252 VSD Phase B Gate Driver Fault
253 VSD Phase C Gate Driver Fault
254 VSD Single Phase Input Power Fault
257 VSD 105% Motor Current Overload Fault
258 VSD High DC Bus Voltage Fault
259 VSD Logic Board Power Supply Fault
263 VSD Low DC Bus Voltage Fault
264 VSD DC Bus Voltage Imbalance Fault
265 VSD High Internal Ambient Temp Fault
266 VSD High Inverter Baseplate Temp Fault
267 VSD Logic Board Processor Fault
268 VSD Run Signal Fault
269 VSD High Converter Heatsink Temp Fault
270 VSD Invalid Current Scale Selection
271 VSD Low Inverter Baseplate Temp Fault
272 VSD Serial Communication Fault
273 VSD Precharge Lockout Fault
274 VSD Low Converter Heatsink Temp Fault
275 VSD Current Imbalance Fault
276 VSD Precharge - DC Bus Voltage Imbalance
277 VSD Precharge - Low DC Bus Voltage 2
278 VSD Precharge - Low DC Bus Voltage 1
280 Harmonic Filter High DC Bus Voltage Fault
281 Harmonic Filter High Phase C Current Fault
282 Harmonic Filter High Phase B Current Fault
283 Harmonic Filter High Phase A Current Fault
284 Harmonic Filter Phase Locked Loop Fault
286 Harmonic Filter Logic Board Power Supply
295 Harmonic Filter Precharge - High DC Bus Volt
296 Harmonic Filter Precharge - Low DC Bus Volt
297 Harmonic Filter DC Current Transformer 1
298 Harmonic Filter DC Current Transformer 2
299 Harmonic Filter High Baseplate Temp Fault
301 Harmonic Filter Low DC Bus Voltage
305 Harmonic Filter DC Bus Voltage Imbalance
306 Harmonic Filter 110% Input Current Overload
307 Harmonic Filter Run Signal Fault
311 VSD Interface Board NovRAM Failure
313 Harmonic Filter Serial Communication
314 Harmonic Filter Input Frequency Out of Range
331 VSD High Phase A Inverter Baseplate Temp
332 VSD Low Phase A Inverter Baseplate Temp
333 High Discharge Pressure Shutdown
334 High Discharge Pressure Warning
335 Process Stopped – See Event Log
336 High Process Entering Temp Shutdown
337 High Process Entering Temp Warning
338 Low Process Entering Temp Shutdown
339 Low Process Entering Temp Warning
340 High Motor Temp Warning - Shaft Side
341 High Motor Temp Warning - Opp Shaft Side
342 High Motor Temp Shutdown - Shaft Side
343 High Motor Temp Shutdown - Opp Shaft Side
344 High Motor Stator #1 Temp Warning
345 High Motor Stator #1 Temp Shutdown
346 High Motor Stator #2 Temp Warning
347 High Motor Stator #2 Temp Shutdown
348 High Motor Stator #3 Temp Warning
349 High Motor Stator #3 Temp Shutdown
350 Sequencing Slide Valve Failure Shutdown
351 DBS Communication Failure Warning
352 Low Oil Differential 1 (Kobe)
353 Low Oil Differential 2 (Kobe)
354 High Oil Pressure (Kobe)
355 High Comp. Oil Pressure Shutdown
356 Coalescer Filter Differential Warning
357 Low Discharge Pressure Shutdown
358 High Oil Temperature Sensor Fault
359 High Separator Temperature Sensor Fault
360 Low Main Oil Inj Pressure Sensor Warning
361 High Main Oil Inj Pressure Sensor Warning
362 Low Economizer Pressure Sensor Warning
363 High Economizer Pressure Sensor Warning
364 Low Filter Pressure Sensor Warning
365 High Filter Pressure Sensor Warning
366 Liquid Injection Closed Warning
367 Low Discharge Pressure Shutdown (RCSI)

368 Low Bal Piston Pressure Sensor Warning
369 High Bal Piston Pressure Sensor Warning
370 Low System Disch Pressure Sensor Warning
371 High System Disch Pressure Sensor Warning
372 Low Suction Temp Sensor Warning
373 High Suction Temp Sensor Warning
374 Low Disch Temp Sensor Warning
375 High Disch Temp Sensor Warning
376 Low Oil Temp Compressor Sensor Warning
377 High Oil Temp Compressor Sensor Warning
378 Low Oil Separator Temp Sensor Warning
379 High Oil Separator Temp Sensor Warning
380 Low Vyper Coolant Temp. Sensor Warning
381 High Vyper Coolant Temp. Sensor Warning
382 Low Process Leaving Temp Sensor Warning
383 High Process Leaving Temp Sensor Warning
384 Low Process Entering Temp Sensor Warning
385 High Process Entering Temp Sensor Warning
386 Blank
387 Low Slide Valve Sensor Warning
388 Low Slide Stop Sensor Warning
389 Blank
390 High Vyper Coolant Temperature Shutdown
391 High Vyper Coolant Temperature Warning
392 Low Vyper Coolant Temperature Shutdown
393 Low Vyper Coolant Temperature Warning
394 Low Demand Pump Pressure Warning
395 Low Demand Pump Pressure Shutdown
396 Separator Condensing Warning
397 Separator Condensing Shutdown
398 Restart Lockout Shutdown
399 Blank
400 Blank
401 Blank
402 Low Ext Setpt/Ext Inp Sig Sensor Warning
403 High Ext Setpt/Ext Inp Sig Sensor Warning
404 Low Motor Current Sensor Warning
405 High Motor Current Sensor Warning
406 Low RPM Sensor Warning
407 High RPM Sensor Warning
408 Low Kw Monitoring Sensor Warning
409 High Kw Monitoring Sensor Warning
410 Low EZ Cool LIOC Feedback Sensor Warning
411 High EZ Cool LIOC Feedback Sensor Warning
412 Low Auxiliary Analog Input #1 Sensor Warning
413 High Auxiliary Analog Input #1 Sensor Warning
414 Low Auxiliary Analog Input #2 Sensor Warning
415 High Auxiliary Analog Input #2 Sensor Warning
416 Low Auxiliary Analog Input #3 Sensor Warning
417 High Auxiliary Analog Input #3 Sensor Warning
418 Low Auxiliary Analog Input #4 Sensor Warning
419 High Auxiliary Analog Input #4 Sensor Warning
420 Low Auxiliary Analog Input #5 Sensor Warning
421 High Auxiliary Analog Input #5 Sensor Warning
422 Low Auxiliary Analog Input #6 Sensor Warning
423 High Auxiliary Analog Input #6 Sensor Warning
424 Low Auxiliary Analog Input #7 Sensor Warning
425 High Auxiliary Analog Input #7 Sensor Warning
426 Low Auxiliary Analog Input #8 Sensor Warning
427 High Auxiliary Analog Input #8 Sensor Warning
428 Low Auxiliary Analog Input #9 Sensor Warning
429 High Auxiliary Analog Input #9 Sensor Warning
430 Low Auxiliary Analog Input #10 Sensor Warning
431 High Auxiliary Analog Input #10 Sensor Warning
432 Low Auxiliary Analog Input #11 Sensor Warning
433 High Auxiliary Analog Input #11 Sensor Warning
434 Low Auxiliary Analog Input #12 Sensor Warning
435 High Auxiliary Analog Input #12 Sensor Warning
436 Low Auxiliary Analog Input #13 Sensor Warning
437 High Auxiliary Analog Input #13 Sensor Warning
438 Low Auxiliary Analog Input #14 Sensor Warning
439 High Auxiliary Analog Input #14 Sensor Warning
440 Low Auxiliary Analog Input #15 Sensor Warning
441 High Auxiliary Analog Input #15 Sensor Warning
442 Low Auxiliary Analog Input #16 Sensor Warning
443 High Auxiliary Analog Input #16 Sensor Warning
444 Low Auxiliary Analog Input #17 Sensor Warning
445 High Auxiliary Analog Input #17 Sensor Warning
446 Low Auxiliary Analog Input #18 Sensor Warning
447 High Auxiliary Analog Input #18 Sensor Warning
448 Low Auxiliary Analog Input #19 Sensor Warning
449 High Auxiliary Analog Input #19 Sensor Warning
450 Low Auxiliary Analog Input #20 Sensor Warning
451 High Auxiliary Analog Input #20 Sensor Warning
452 Low Manifold Pressure Sensor Warning
453 High Manifold Pressure Sensor Warning
454 Low Rem Capacity Position Sensor Warning
455 High Rem Capacity Position Sensor Warning
456 Low Liquid Level Sensor Warning
457 High Liquid Level Sensor Warning
458 High Process Leaving Temp Shutdown
459 High Process Leaving Temp Warning
460 Low Process Leaving Temp Shutdown
461 Low Process Leaving Temp Warning
462 Coalescer Filter Differential Warning
463 Condensing Water In Separator Warning (Off)
464 Condensing Water In Separator Warning (Running)
465 Blank
466 Manual Stop Shutdown (RSCI only)
467 Remote Stop Shutdown (RCIS only)
468 Vyper Fault Limit Reached Shutdown
469 Control Oil Pump Auxiliary Failure Shutdown
470 Control Oil Pump 1 Auxiliary Warning
471 Control Oil Pump 1 Auxiliary Shutdown
472 Control Oil Pump 2 Auxiliary Warning
473 Control Oil Pump 2 Auxiliary Shutdown
474 Vilter MonoScrew Running Oil Pressure Shutdown
475 Vilter MonoScrew Running Oil Pressure Warning
476 Vilter MonoScrew Changeover Oil Pres. Shutdown
477 Vilter MonoScrew Low Pre-Lube Oil Pres. Shutdown

SECTION 8
Q6 PROCESSOR BOARD

Q6 Processor Board

INTRODUCTION

FRICK Controls has released the latest version of the Quantum HD Unity Control System. The redesigned microprocessor, referred to as the Q6 Processor Board, is the brains of the system. The Q6 processor board combines the functions of the Q5 processor board and the interface board into a single board.

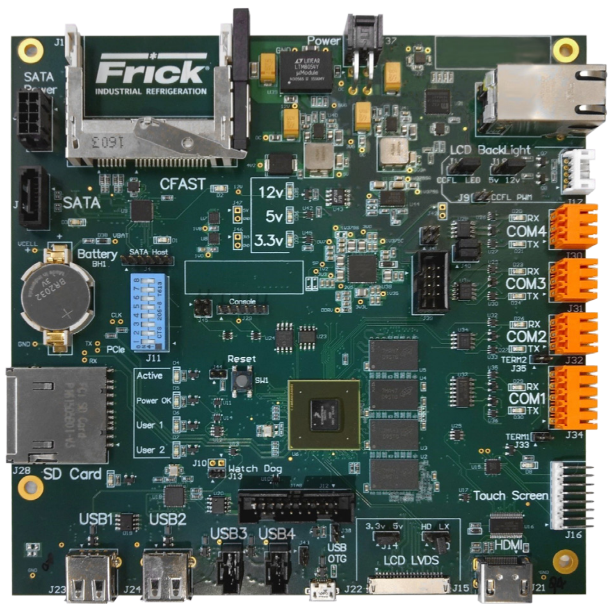


Figure 17: Q6 Processor Board

FEATURES

The Q6 processor board includes the following features:

- 4 USB ports.
- 10/100/1000 Mbps Ethernet port.
- 1 RS-422 port.
- 2 dedicated, 1 available RS-485 ports.
- External HDMI video monitor port.
- LED indicators to verify proper operation of onboard systems such as power, serial communication, or Ethernet.
- 4 GB of RAM memory.
- Battery to maintain date and time/
- External serial communications.

POWER UP SEQUENCE

The power-up sequence is the first thing that needs to be checked when troubleshooting the Q6 Processor Board. The following sequence of events are indicative of a functioning Q6 processor board:

1. All LEDs light up solid, excluding the CFast, SATA, and SATA Host LEDs.
2. Active, User 1, User 2, and SD Card LEDs turn off.
3. Rx and Tx LEDs for Com-1-Com-4 turn off.
4. CFast and SATA Host LEDs blink rapidly to indicate activity.
5. The display shows a black screen with a graphic.
6. The display changes to a white screen with the text Open Embedded and a loading bar.
7. The display changes to a blue screen with the text Quantum HD Loading.
8. The Active LED (blue) begins to blink slowly.
9. Ethernet port LEDs turn on to indicate network link speed (if used).
10. The display shows the Operating Status (Home) screen.

After the board has powered up, the following sequence of events is indicative of proper communication to the analog and digital boards:

1. Rx and Tx LEDs for Com-4 on the Q6 Processor Board will blink rapidly to indicate activity.
2. Analog and Digital I/O board's Rx and Tx lights will blink rapidly to indicate activity.
3. The Power LED on each I/O board will be on, and the Active LED will blink slowly.

TROUBLESHOOTING

If the Operating Status screen is not shown, check the following items:

1. If no LEDs are lit, check the AC and DC power. Refer to the *Power Supply* section in *090.070-M*.
2. Check if the lighting of the LEDs is occurring as described in the *What Occurs When Applying Power* section.
   - If the power-up sequence continues to repeat without displaying the Operating Status (Home) screen, then there is a booting problem.
3. Check all plugged connectors for proper seating.
4. Check for any error messages displayed while booting.
   - Write down any error messages exactly as they appear (taking a picture with a mobile device is also useful.)
5. Check that the software is OK:
   - Is the correct software product and version installed?
   - Was new software just installed?
6. Check the display. If the Q6 processor board appears to be booting properly and the display is not illuminated, you may have an issue with the display:
   - If only a portion of the display is dark, one of the backlights has failed.
   - If the entire display is dark, use a beam-type light source such as a flashlight to look for a ghost image (something is displayed on the screen but it is very dark). If a ghost image is present, the display backlight cable is not seated, the display backlight has failed, or the Q6 processor board has failed.
   - Verify that the LVDS display cable and the backlight cable are firmly seated. It may be necessary to remove the LVDS display cable from the back of the display and reseat it to ensure it is connected properly.

⚠ WARNING

This is a small connector. Observe caution when unplugging and re-plugging this cable to avoid any damage due to excessive force.

BATTERY FUNCTION

The Q6 processor board uses a battery to maintain correct date and time for the purpose of time stamping warnings and shutdowns if they occur. If the date and time are not being maintained properly, this could indicated the battery is not functioning. If so, replace the battery. Order through Baltimore Parts or purchase at most electronic shops.

Manufacturer's numbers:

BR2032 · Up to 80°C Operating Temperature or
CR2032 · Up to 60°C Operating Temperature.

BATTERY REPLACEMENT

The battery is fully accessible, but is surrounded by sensitive electronic components, so take care when replacing the battery.

Replace the battery using the following procedure:

1. Power off the panel.
2. Don an antistatic wristband and connect it to the ground wire in the lower left corner of the processor board.
3. Locate the battery socket (see Figure 18).
4. Place your fingernail under the edge of the battery and gently lift up. The battery releases easily.
5. Place the new battery into the socket with the same orientation as the old battery. Face the side with writing out.
6. Power up the panel and wait until the Quantum HD application has loaded.
7. Navigate to the Panel settings page to set the correct date and time.

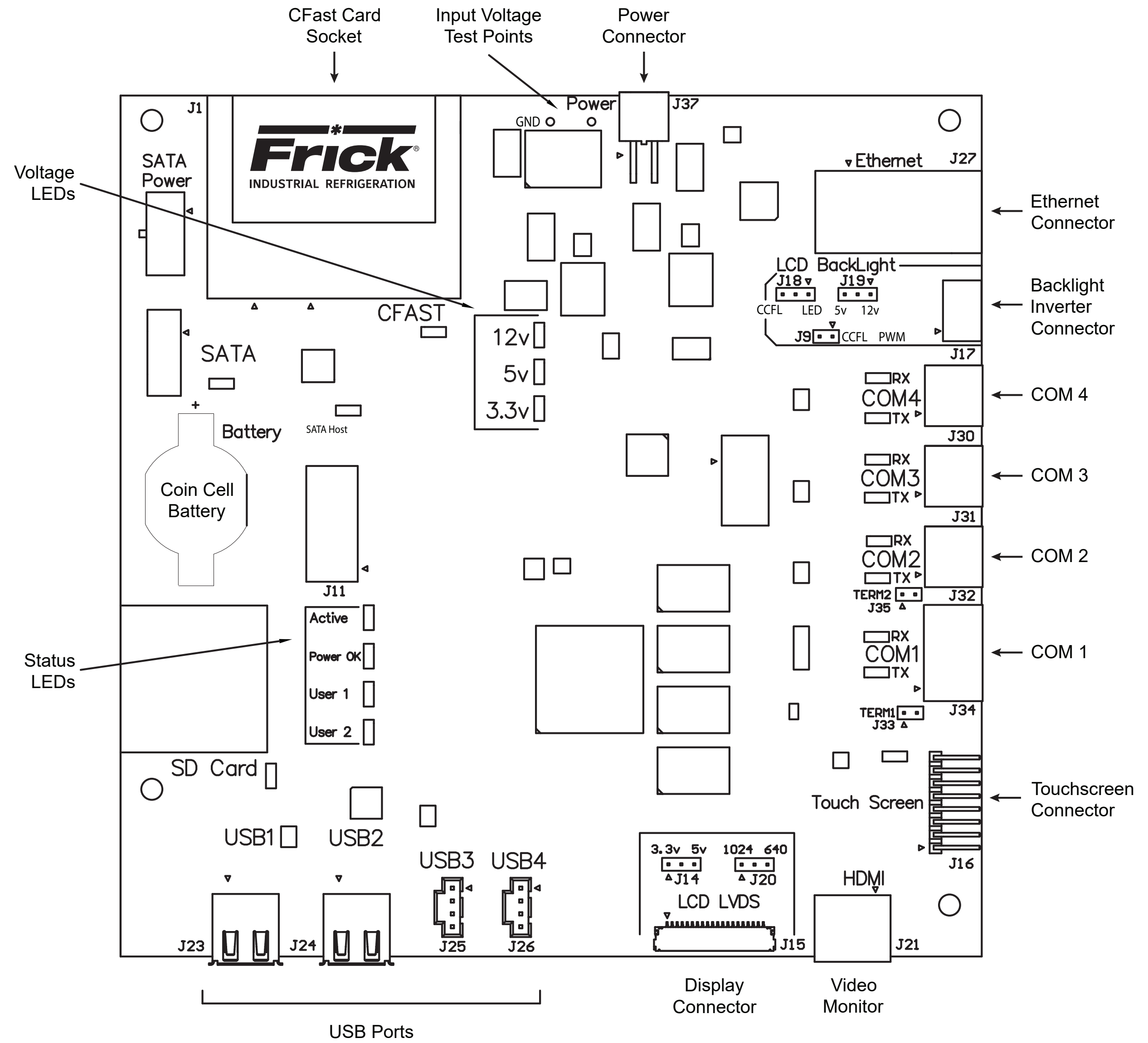


Figure 18: Q6 Processor Board Diagram

Note: The triangle symbol (▷) denotes Pin 1 on connectors. Refer to the chart on the following page for jumper settings.

Do not change jumpers J13 (not shown), J38 (not shown), J40 (not shown), and J43* (pins 1&2 and 1&2). Changing these jumpers to any configuration other than this will prevent the processor from booting.

*double jumper.

Table 19: Q6 Board Jumper Settings

JUMPER TITLE	FUNCTION	JUMPER SETTING	
LCD Backlight			
J19 (Backlight Type)	LED (default)	1 2 3	1 - 2 Closed
	CCFL	1 2 3	2 - 3 Closed
J18 (Backlight Voltage)	12v (default)	1 2 3	1 - 2 Closed
	5v	1 2 3	2 - 3 Closed
J9 (CCFL PWM)	Disabled (default)	1 2	1 Pin Only
	Enabled	1 2	1 - 2 Closed
LCD LVDS			
J14 (LCD Voltage)	3.3v (default)	1 2 3	1 - 2 Closed
	5v	1 2 3	2 - 3 Closed
J20 (LCD Resolution)	HD (default)	1 2 3	1 - 2 Closed
	LX	1 2 3	2 - 3 Closed
COM2 & COM1			
J35 (COM2 Resistors)	Disabled (default)	1 2	1 Pin Only
	Enabled	1 2	1 - 2 Closed
J33 (COM1 Resistors)	Disabled (default)	1 2	1 Pin Only
	Enabled	1 2	1 - 2 Closed

NOTE: The triangle symbol (▷) denotes Pin 1

Do not change jumpers J13 (removed), J38 (removed), J40 (removed) and J43* (pins 1&2 and 1&2). The default configuration for these pins is there are no jumpers. Changing these jumpers to any configuration other than this prevents the processor from booting.

Table 20: Q6 LED Definitions

LABEL	COLOR	FUNCTION
Power LEDs		
D35	Green	12V Power OK
D36	Green	5V Power OK
D37	Green	3.3V Power OK
Status LEDs		
D4	Blue	Quantum Software OK
D5	Green	Processor Power OK
D6	Amber	(Future Use)
D7	Amber	(Future Use)
Serial Communication Activity LEDs		
D20	Green	COM4 Rx Activity
D21	Green	COM4 Tx Activity
D23	Green	COM3 Rx Activity
D24	Green	COM3 Tx Activity
D26	Green	COM2 Rx Activity
D27	Green	COM2 Tx Activity
D29	Green	COM1 Rx Activity
D30	Green	COM1 Tx Activity
Touchscreen Activity LED		
D8	Green	Touch Detected
SATA Activity LEDs		
D1	Green	SATA Bus Activity
D2	Green	CFast Card Activity
D3	Green	Auxiliary SATA Activity
SD Card Activity LED		
D19	Green	SD Card Activity

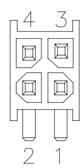
Table 21: DIP Switch (J11) Definitions

POSITION	ENABLE STATE	FUNCTION
1	On	Restore Default Setpoints
2	On	Reset Default IP Address
3	On	(Future Use)
4	On	(Future Use)
5	On	(Future Use)
6	On	(Future Use)
7	On	(Future Use)
8	On	(Future Use)

Table 22: Ethernet Connector (J27) Definitions

LINK SPEED	AMBER LED	GREEN LED	LINK STATE
Standby	Off		No Link Established
1000 Mbps (Gigabit)	On	Off	No Activity
	Blinking		Activity
100 Mbps	Off	On	No Activity
		Blinking	Activity
10 Mbps	On		No Activity
	Blinking		Activity

Table 23: Power Connector Pinout (J37)

Pin	Function	
1	Ground (GND)	
2	Ground (GND)	
3	9-28v (VCC)	
4	9-28v (VCC)	

RESETTING IP ADDRESS TO DEFAULT

If necessary, reset a panel IP address to a known default by using the following procedure:

1. Power off the panel
2. Set DIP switch (J11) number 2 to the **ON** position
3. Power up the panel and wait until the panel restarts
4. Set DIP switch (J11) number 2 to the **OFF** position

The IP address is reset to the default address for the corresponding Unity product:

Compressor:	192.168.0.170
Condenser/Vessel:	192.168.0.171
Evaporator:	192.168.0.172
Engine Room:	192.168.0.173

Figure 19 shows the location of the Q6 Processor Board and how it mounts to the back of the display plate:

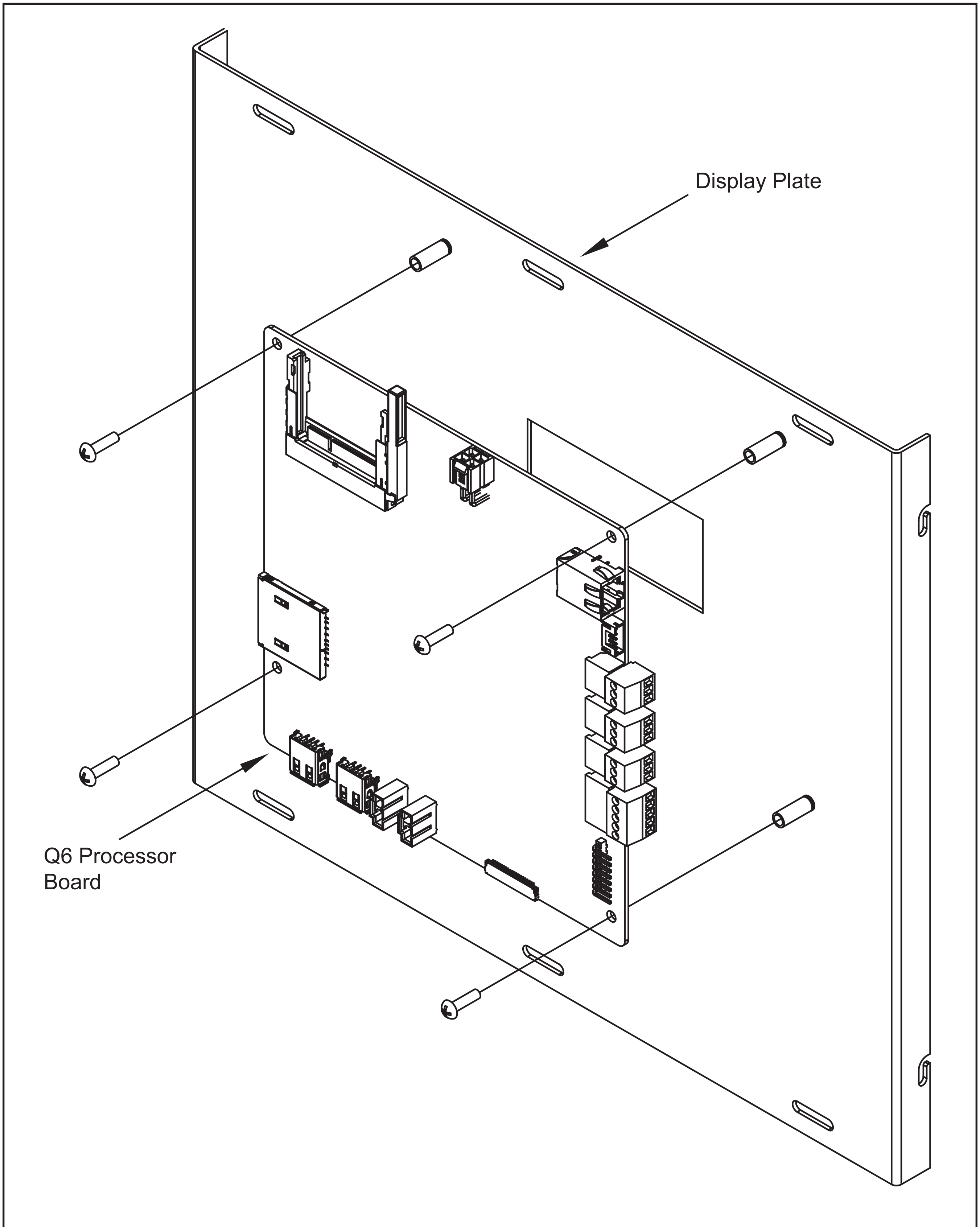


Figure 19: Q6 Processor Board Mounting

SECTION 9
Q5 PROCESSOR BOARD AND INTERFACE

Q5 Processor Board

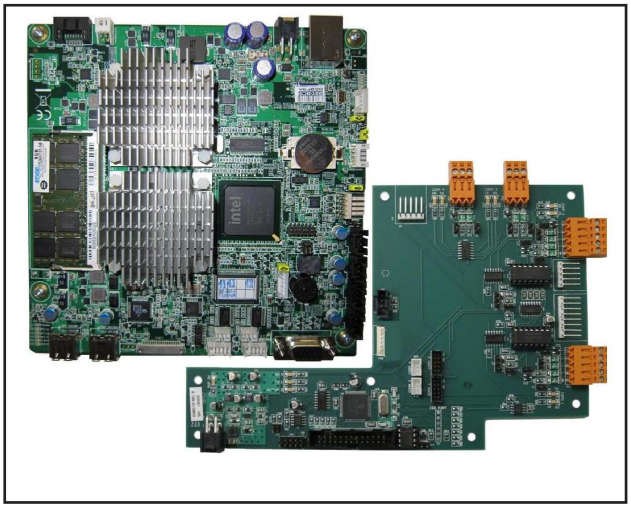


Figure 20: Q5 Processor Board

MAIN BOARD HISTORY AND IDENTIFICATION

The processor board, as shown in Figure 20, is known as the Q5 board, which is based on the Pentium microprocessor platform. The operating software that this board runs is known as Quantum™ HD Unity software. This software displays graphic information and data on the LCD screen in a format that is similar to the way a Windows® desktop computer screen displays a Web browser (the Internet).

The Q5 board can be identified by the presence of a large aluminum heat sink located on the board. Adjacent to the processor board, is an interface board which allows the user to attach local communications connections by using the four orange connectors (RS-422 and RS-485 ports).

There are also a number of jumpers present on both the Q5 and the interface board. It may be necessary for qualified personnel to modifiy these jumpers to configure the Quantum™ 5 for specific applications.

The Q5 uses flash card technology. There is a flash card socket located on the under side of this main board. The Q5 board has the HD Unity Operating System pre-loaded at the factory, and the card must be present for the HD Unity to operate.

The information that follows will primarily describe the jumper configuration for communications settings, as well as wiring diagrams for the different types of communications that are possible with the Q5.

Q5 COMMUNICATIONS CONNECTOR LOCATIONS

Figure 21 shows the customer connection points for both serial communications and the Ethernet connection. Note that Com-4 is reserved for communications to the installed I/O boards, and cannot be used for customer applications.

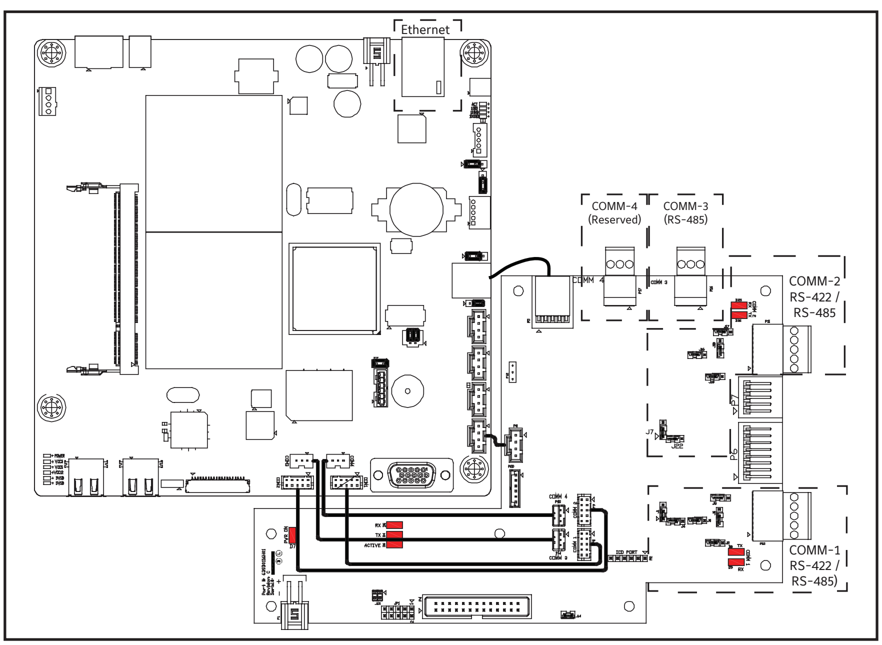


Figure 21: Q5 Processor Board Pictorial

Serial Communications Hardware

Q5 GENERAL DESCRIPTION

User connections for serial communications to and from the Q5 are located on the interface board, and can use RS-422 and/or RS-485 hardware protocol. These hardware protocols can connect by using Com-3 for RS-485, and Com-1 and Com-2 for RS-422/RS-485.

As mentioned in the previous paragraph, the user connections for the serial communications portion of the Q5 controller consists of an interface board, mounted below and to the right of the main controller. In addition to external forms of serial communication (to be discussed shortly), the keypad also connects here:

COM-1 AND COM-2 DESCRIPTION

The board, as shown in Figure 22, has two RS-422/485 serial communications ports, labeled P10 (Com-1) and P11 (Com-2). They can be used for external communications to the outside world.

COM-3 DESCRIPTION

Com-3 is labeled as P16 and is used for RS-485 hardware protocol, and can be used in addition to any of the other communications ports that may be being used.

COM-4 DESCRIPTION

Com-4 (RS-485) is labeled as P17 and is dedicated to providing communications to the DIgital and Analog boards.

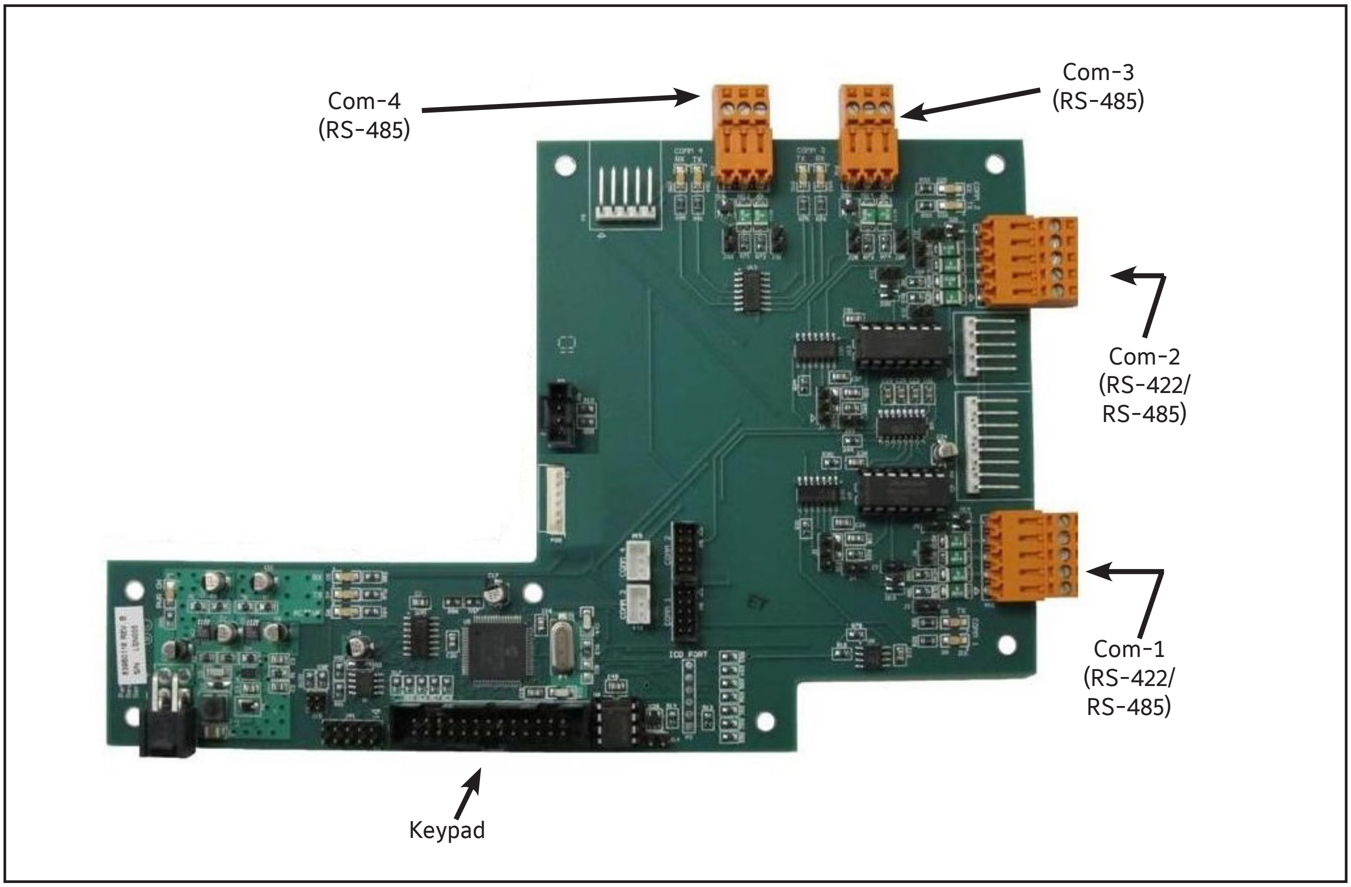


Figure 22: Communications Ports on the Q5 interface board

Serial Communications Port Wiring

GENERAL NOTE

The information that is presented here and on the following pages, refers to the interface board and not the Q5 board. The interface board was developed to make customer connections to the processor easier, as the Q5 use connections that are too small and delicate to easily use in the field.

RS-232 WIRING AND JUMPERS

With the introduction of the Q5/interface board, customer connections to RS-232 have been eliminated. If RS-232 communications IS required, these signals may be converted to RS-422/485, and the appropriate available port(s) used.

RS-422/485 WIRING AND JUMPERS

All four interface board serial communications ports are capable of RS-485, and Com-1 (P10) and Com-2 (P11) can additionally be configured as either RS-422 or RS-485.

Table 24 describes the interface board RS-422 connector pinouts and their associated communications signals:

Table 24: RS-422 Signal Wiring

Connector Pin #	Signal	
	COMM-1 (P10)	COMM-2 (P11)
5	GND	GND
4	TX+	TX+
3	TX-	TX-
2	RX+	RX+
1	RX-	RX-

Table 25: RS-485 Signal Wiring

Connector Pin #	Signal			
	COMM 1 (P10)	COMM 2 (P11)	COMM 3 (P17)	COMM 4 (P16)
5	GND		-	
4	N/C		-	
3	N/C		GND	
2	+TX/+RX		+TX/+RX	
1	-TX/-RX		-TX/-RX	

Figure 23 shows a cutaway view of the interface board, as well as the jumpers, LEDs and signal pinouts to allow the end user to communicate to Com-1 (P10) and Com-2 (P11) using RS-422/485 protocol, and to use Com-3 (P16) to communicate by using RS-485.

NOTICE

Com-3 and Com-4 do not have any associated jumpers, and Com-4 (P17) is reserved for I/O board communications. Refer to the tables in this section for the specifics on the jumper settings RS-422/485:

RS-422/485 Connectors, Jumpers and LED Location

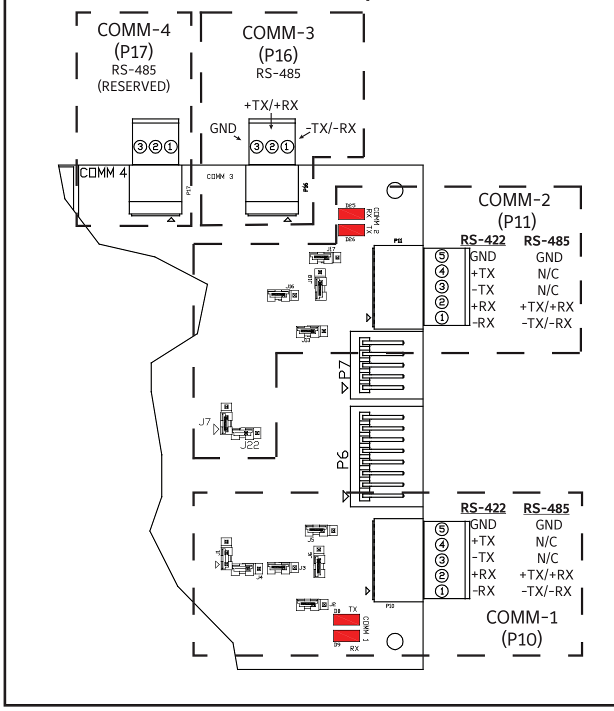


Figure 23: Pinouts and Jumper Locations

Table 26: Comms 1 & 2 Jumper Settings

Comm 1	Comm 2	Function	Jumper Setting
J1	J7	RS-422 (4-Wire) **Default**	1 - 2 Closed
		RS-485 (2-Wire)	2 - 3 Closed
J2	J13	Pull Down **Default**	1 Pin Only
J3	J16	Pull Up **Default**	1 Pin Only
J5	J17	RS-422 **Default**	1 Pin Only
		RS-485	1 - 2 Closed
J6	J18	RS-422 **Default**	1 Pin Only
		RS-485	1 - 2 Closed
J4	J22	High Speed Target **Default**	1 - 2 Closed

NOTE: The triangle symbol (◁) denotes Pin 1 on connectors.

Q5 Interconnections

Figure 24 depicts the Q5 Processor Board, and the necessary interconnects between it and the interface board. Each of the interconnecting harnesses must be installed as shown for proper operation.

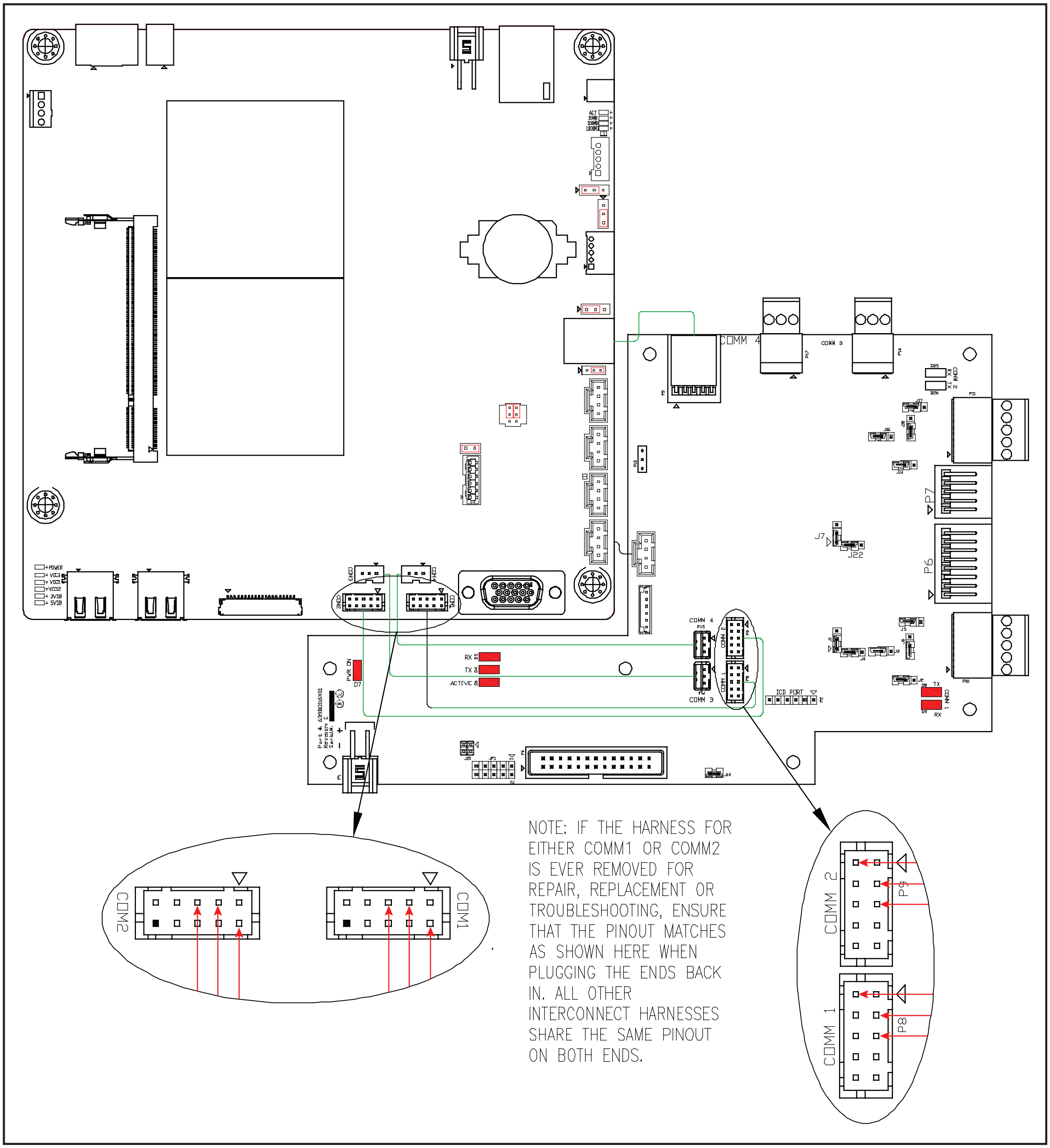


Figure 24: Q5 Processor Board Interconnections

Serial Communications Troubleshooting

WIRING NOTE: See the chapter entitled S*erial Communications Port Wiring*, for the figure and tables referred to in the following paragraphs. Always ensure that the wiring matches these figures before proceeding.

JUMPER NOTE: It may be necessary to modify some of the jumpers in Tables 22 and 23 for RS-422/485, to ensure optimum communications performance. Typically, the termination jumper is only installed in the last Quantum™ in the communications daisy chain.

TROUBLESHOOTING RS-422

COM-1 (P10)

Com-1 may be used for either RS-422 or RS-485, depending on the setting of jumper J1. If pins 1-2 are shorted (closed) on J1, then RS-422 is selected.

Notice in Figure 23, there are six jumpers associated with Com-1. Refer to Table 26 for the function of each of the jumpers associated with Com-1. Notice also the two LED indicators that are pointed out. D8 LED will flash each time that the Quantum™ transmits (TX) data. D9 LED will flash each time that data is received (RX).

If communications cannot be established using Com-1, then note the status of these two LEDs (D8 and D9). If D8 is constantly lit, it may indicate an external wiring issue (TX and RX possibly swapped). Also verify the position of J1, and ensure that it is set for pins 1-2 closed.

Also verify that the proper Panel ID, Baud rate, data bits, and protocol has been setup at the Quantum™, and matches that of the initiating device (see the section entitled **COMMUNICATIONS SETUP** for further details).

COM-2 (P11)

Com-2 may be used for either RS-422 or RS-485, depending on the setting of jumper J7. If pins 1-2 are shorted (closed) on J7, then RS-422 is selected.

Notice in Figure 23, there are six jumpers associated with Com-2. Refer to Table 26 for the function of each of the jumpers associated with Com-2. Notice also the two LED indicators that are pointed out. D26 LED will flash each time that the Quantum™ transmits (TX) data. D25 LED will flash each time that data is received (RX).

If communications cannot be established using Com-2, then note the status of these two LEDs (D25 and D26). If D25 is constantly lit, it may indicate an external wiring issue (TX and RX possibly swapped). Also verify the position of J7, and ensure that it is set for pins 1-2 closed.

Also verify that the proper Panel ID, Baud rate, data bits, and protocol has been setup at the Quantum™, and matches that of the initiating device. See the section entitled *Communications Setup* for further details.

TROUBLESHOOTING RS-485

COM-1 (P10)

Com-1 may be used for either RS-422 or RS-485, depending on the setting of jumper J1. If pins 2-3 are shorted (closed) on J1, then RS-485 is selected.

Notice in Figure 23, there are six jumpers associated with Com-1. Refer to Table 26 for the function of each of the jumpers associated with Com-1. Notice also the two LED indicators that are pointed out. D8 LED will flash each time that the Quantum™ transmits (TX) data. D9 LED will flash each time that data is received (RX).

If communications cannot be established using Com-1, then note the status of these two LEDs (D8 and D9). If D8 is constantly lit, it may indicate an external wiring issue (TX and RX possibly swapped). Also verify the position of J1, and ensure that it is set for pins 2-3 closed.

Also verify that the proper Panel ID, Baud rate, data bits, and protocol has been setup at the Quantum™, and matches that of the initiating device (see the section entitled **COMMUNICATIONS SETUP** for further details).

COM-2 (P11)

Com-2 may be used for either RS-422 or RS-485, depending on the setting of jumper J7. If pins 2-3 are shorted (closed) on J7, then RS-485 is selected.

Notice in Figure 23, there are six jumpers associated with Com-2. Refer to Table 26 for the function of each of the jumpers associated with Com-2. Notice also the two LED indicators that are pointed out. D26 LED will flash each time that the Quantum™ transmits (TX) data. D25 LED will flash each time that data is received (RX).

If communications cannot be established using Com-2, then note the status of these two LEDs (D25 and D26). If D26 is constantly lit, it may indicate an external wiring issue (TX and RX possibly swapped). Also verify the position of J7, and ensure that it is set for pins 2-3 closed.

Also verify that the proper Panel ID, Baud rate, data bits, and protocol has been setup at the Quantum™, and matches that of the initiating device (see the section entitled *Communications Setup* for further details).

COM-3 (P16)

Com-3 may only be used for RS-485. There are no jumpers or LEDs assoiciated with this port.

One of the primary functions of this port would be for dedicated communications to a Vyper drive or a solid state DBS motor starter.

Verify that the proper Panel ID, Baud rate, data bits, and protocol has been setup at the Quantum™, and matches that of the initiating device (see the section entitled *Communications Setup* for further details).

NOTES:

SECTION 10
APPENDICES

Appendix A

FRICK SERIAL COMMUNICATIONS CONVERTER MODULE

(PART NUMBER 639B0086H01)

DESCRIPTION

FRICK Controls has developed a DIN-rail mountable communications module for the purpose of converting typical RS-232 serial protocol to either RS-422 or RS-485 serial protocols. The module will also work converting RS-422 or RS-485 to RS-232 (bi-directional). Due to the tight mounting restrictions in many existing control panels, this module provides the ultimate solution for field communications upgrades or modifications. No drilling is required, and minimal space is lost. The only requirement is an external source of 24 VDC power.

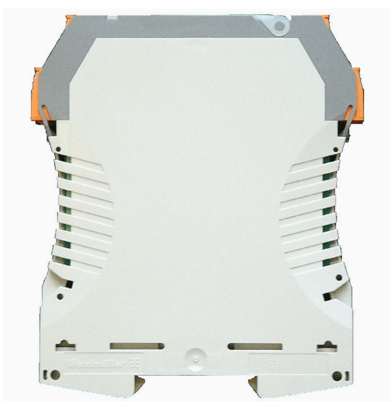


Figure 25: FRICK Communications Converter Module

SETTING THE DIPSWITCH

Inside the module is a circuit board which contains a DIP switch. Set this switch according to the necessary protocol parameters that you are trying to achieve. It is recommended to set or verify the settings of this DIP switch before mounting and wiring the module. The circuit board must be removed from its housing in order to access this DIP switch. Each end of the housing has a small tab, located just below the bottom most terminal block of each end. Hold the module as shown in Figure 26:

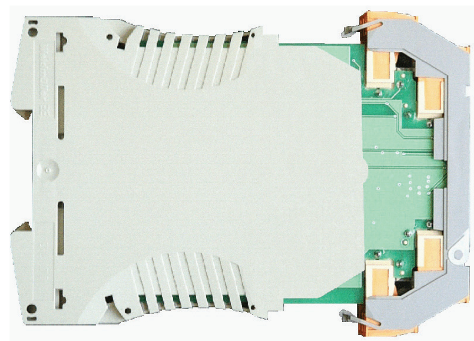


Figure 26: Disassembling the Module

Press the tabs using the thumb and finger, and with your other hand carefully slide the circuit board out of the housing. Ensure that proper anti-static guidelines are followed while handling the circuit board. See Figure 27 for Circuit board diagram.

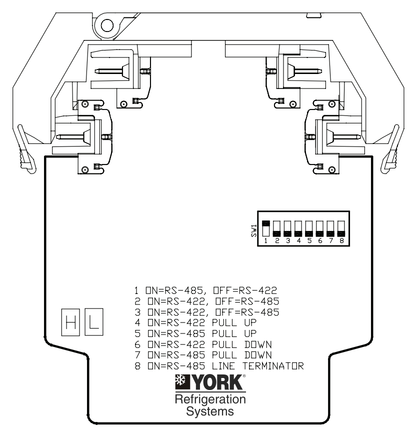


Figure 27: Module circuit board

For easy reference, the DIP switch position functions are provided on the board. For the purpose of clarity however, refer to Table 27:

Table 27 Module Dip Switch Settings

Switch Position	ON Function	OFF Function
1	RS-485	RS-422
2	RS-422	RS-485
3	RS-422	RS-485
4	RS-422 Pull up	No pull up
5	RS-485 Pull up	No pull up
6	RS-422 Pull down	No pull down
7	RS-485 Pull down	No pull down
8	RS-485 termination	No termination

MOUNTING THE MODULE

This module can be mounted on the standard din rail that is available in most control panels.

- Find an open area of the din rail (5/8 in. minimum, for the width of the module), and preferably as far away from any inductive loads (for example, relays or contactors) as possible.
- Module orientation is not critical, however, try to mount it so that all wiring connections can be made neatly, and according to any applicable local codes.
- Catch one end of the DIN rail latch (at the bottom of the module, under one edge of the DIN rail, then snap the other latch onto the opposite side of the DIN rail, as shown in Figure 28:

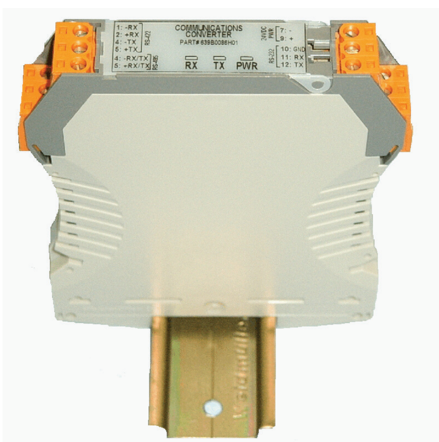


Figure 28: Module mounted to DIN rail

WIRING THE MODULE

There are twelve total wire terminal points on this module. Refer to Table 28 for the pin-out:

Table 28: Wire Terminal Connections

Terminal Position	Module Power	RS-232	RS-422	RS-485
1	-	-	-RX	-
2	-	-	+RX	-
3 (Not used)	-	-	-	-
4	-	-	-TX	-RX/-TX
5	-	-	+TX	+RX/+TX
6 (Not used)	-	-	-	-
7	-24 VDC	-	-	-
8 (Not used)	-	-	-	-
9	+24 VDC	-	-	-
10	-	GND	-	-
11	-	TX	-	-
12	-	RX	-	-

- Locate a suitable source for the +24 VDC power. Using a minimum of 18 AWG stranded wire, connect the MINUS wire to terminal # 7. Connect the PLUS wire to terminal # 8.
- All remaining connections will be based upon the particular protocols that you have decided to use. Simply match the SIGNAL NAME from the source device to match the SIGANAL NAME of the module. All external communications wiring must conform with the FRICK Proper Installation of Electronic Equipment in an Industrial Environment publication.

Refer to Figure 29 for the pin connections showing how to wire the Converter Module for RS-232:

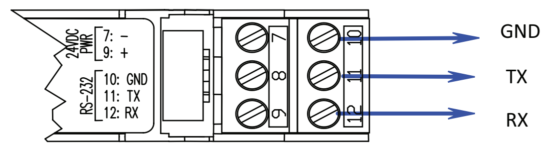


Figure 29: RS-232 Wiring To FRICK Communications Converter Module

RS-422 CONNECTIONS

Refer to Figure 30 for the pin connections showing how to attach a 4-wire RS-422 cable directly to the FRICK Communications Converter Module:

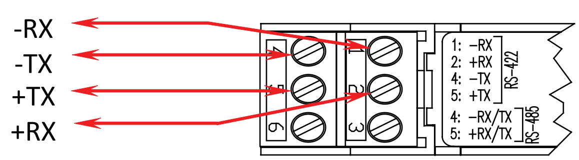


Figure 30: RS-422 Connections

RS-485 CONNECTIONS

Although typical RS-485 communications requires a control signal to change the state of the RX/TX driver lines to establish handshaking, this board incorporates a smart feature that handles this handshaking internally, without the user needing to provide it. It is a true two-wire system. Refer to Figure 31 for the pin connections showing how to attach a 2-wire RS-485 cable directly to the FRICK Communications Converter Module:

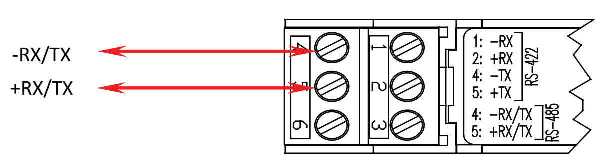


Figure 31: RS-485 Connections

Appendix B

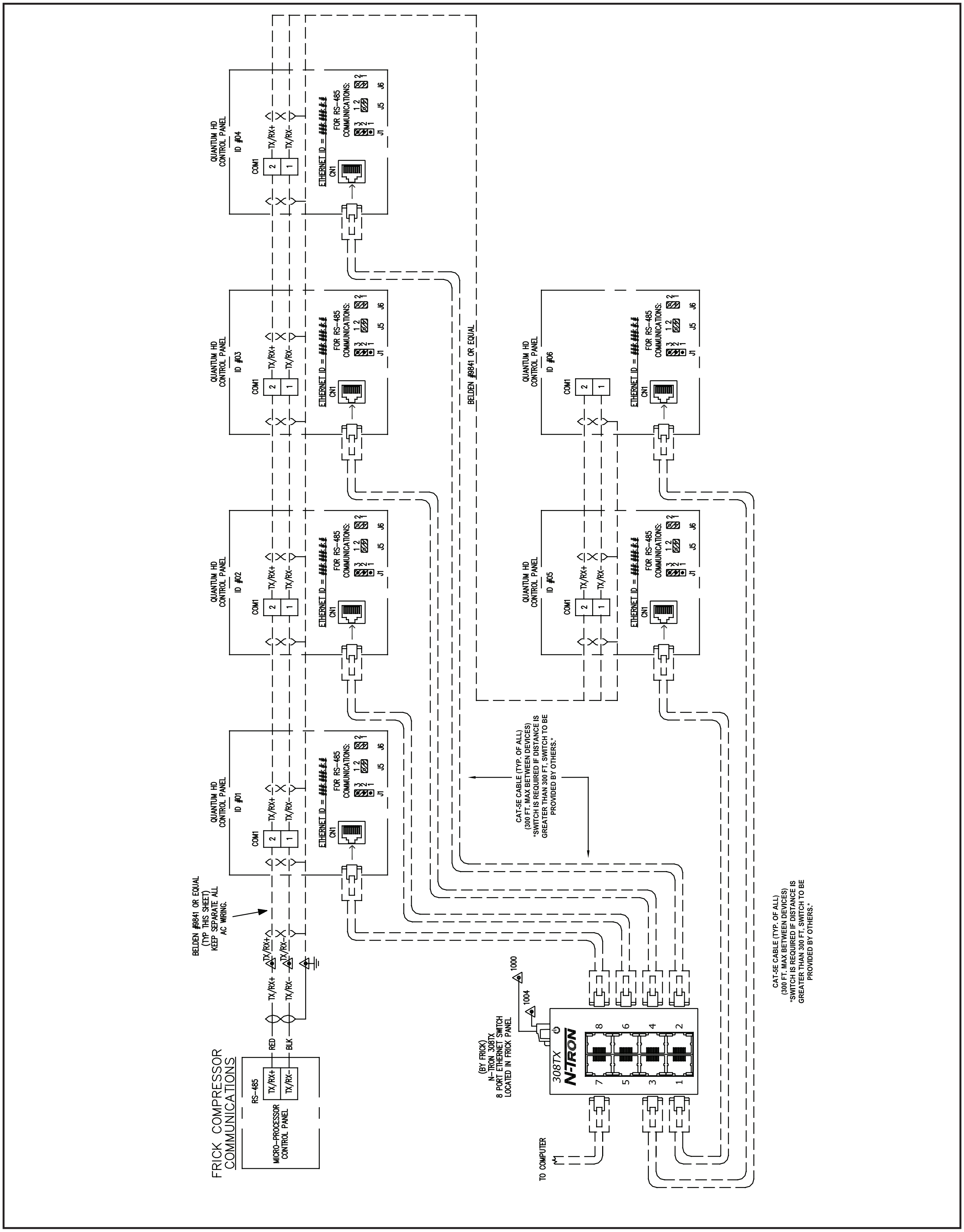


Figure 32: Quantum™ HD Unity Ethernet Communications Wiring

Appendix C

QUANTUM™ HD UNITY LOCAL ETHERNET CONFIGURATIONS

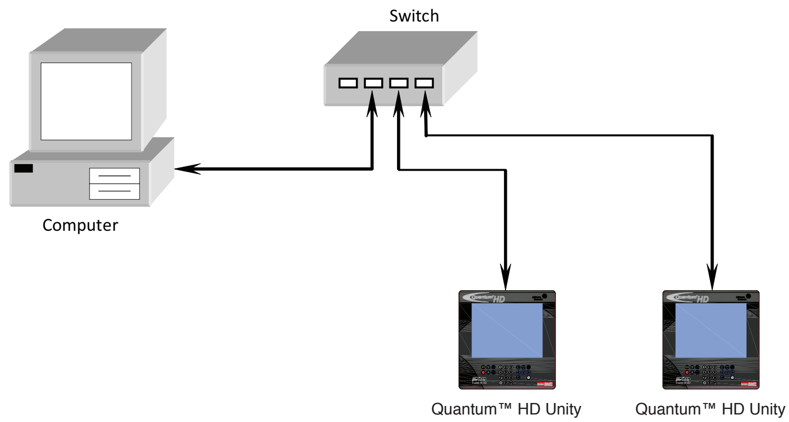


Figure 33: Typical Small Local Quantum™ HD Unity Ethernet Configuration

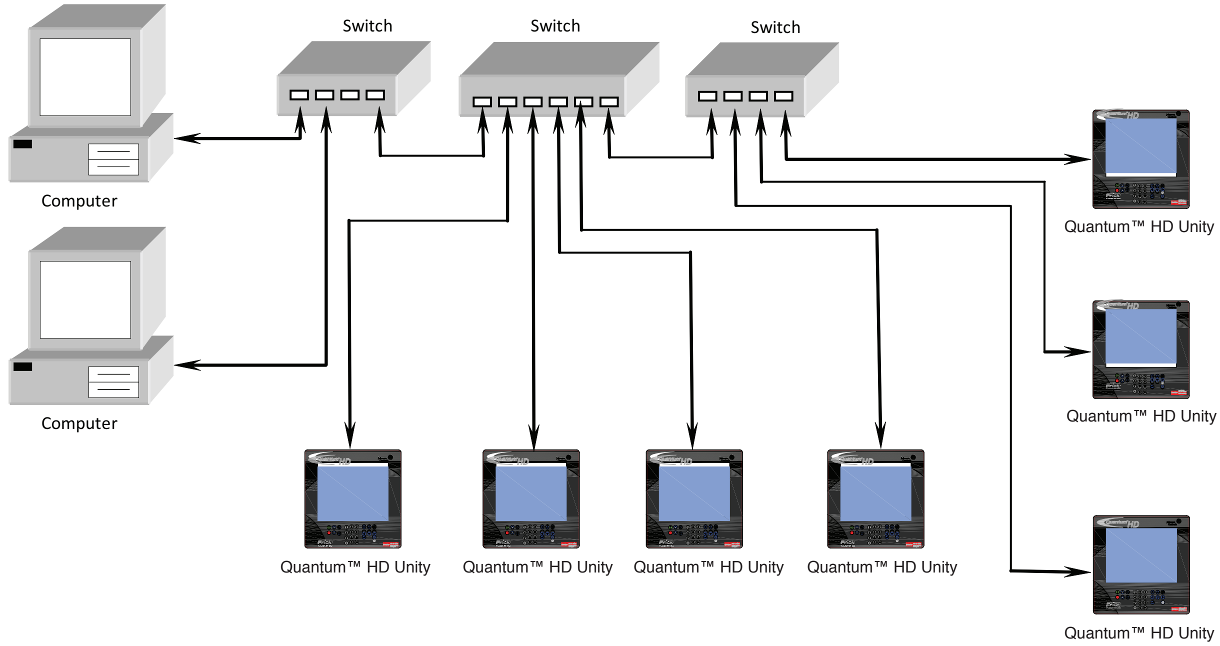


Figure 34: Typical Large Local Quantum™ HD Unity Ethernet Configuration

Appendix D

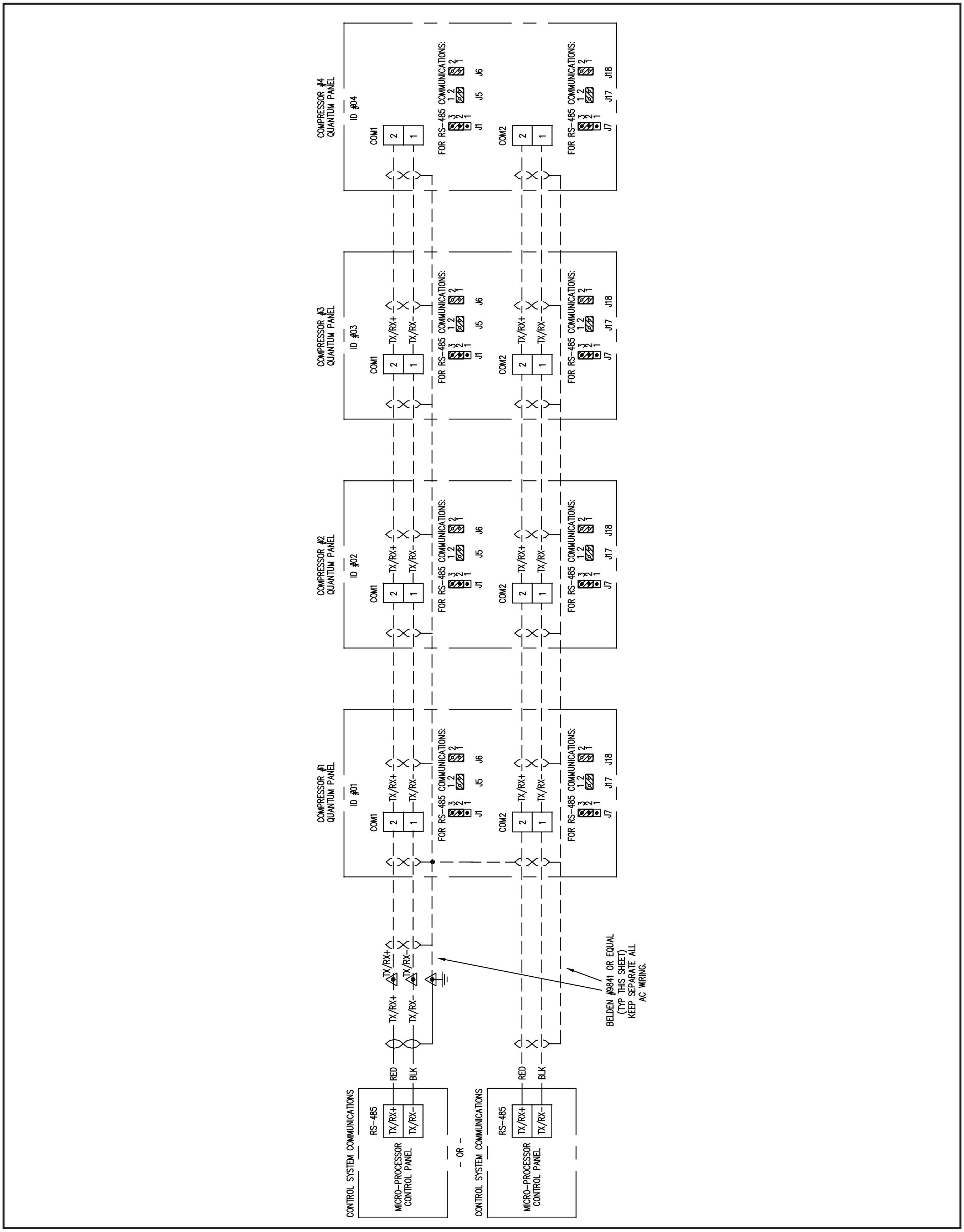


Figure 35: Quantum™ HD Unity Serial Communications Wiring

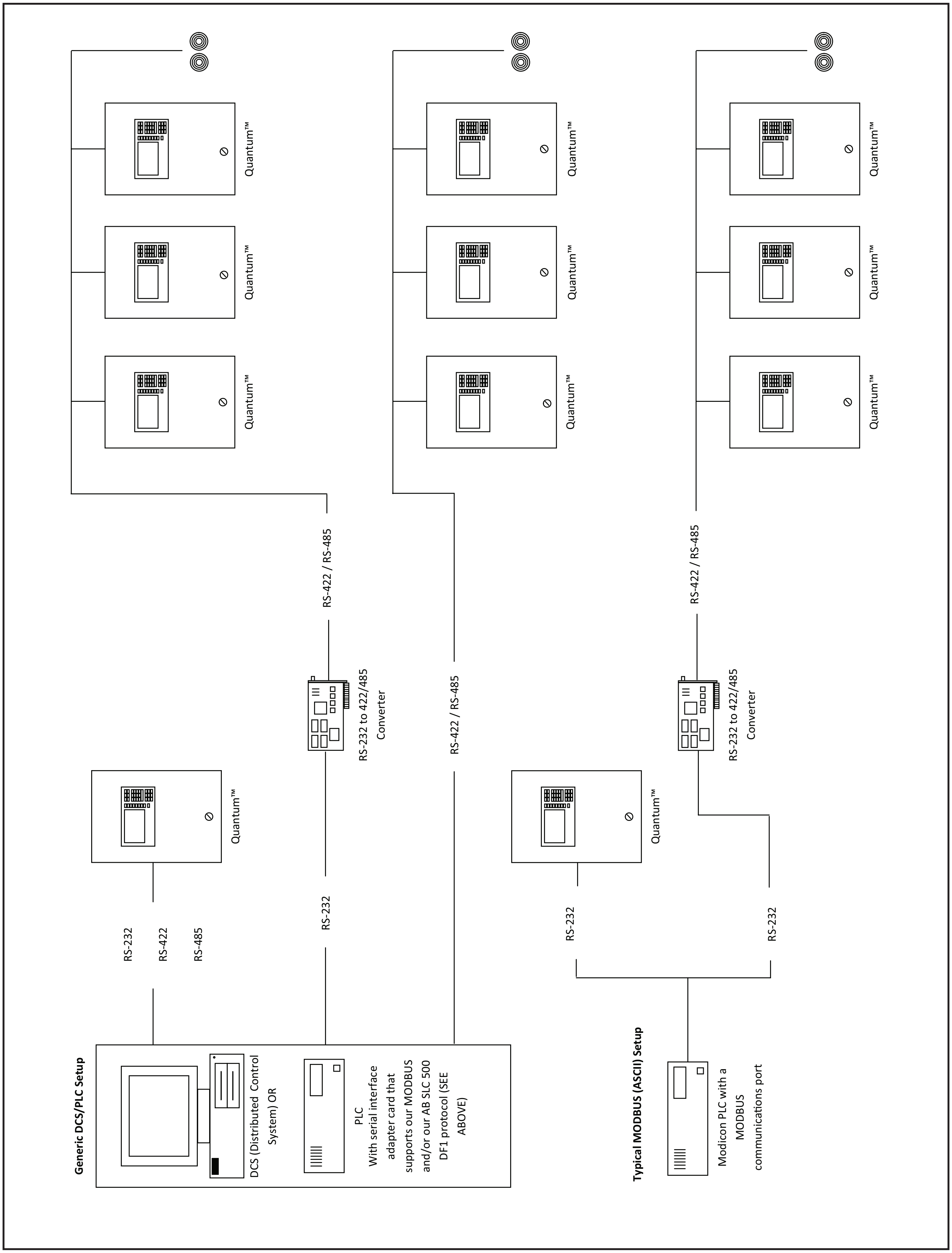


Figure 36: Serial Connections

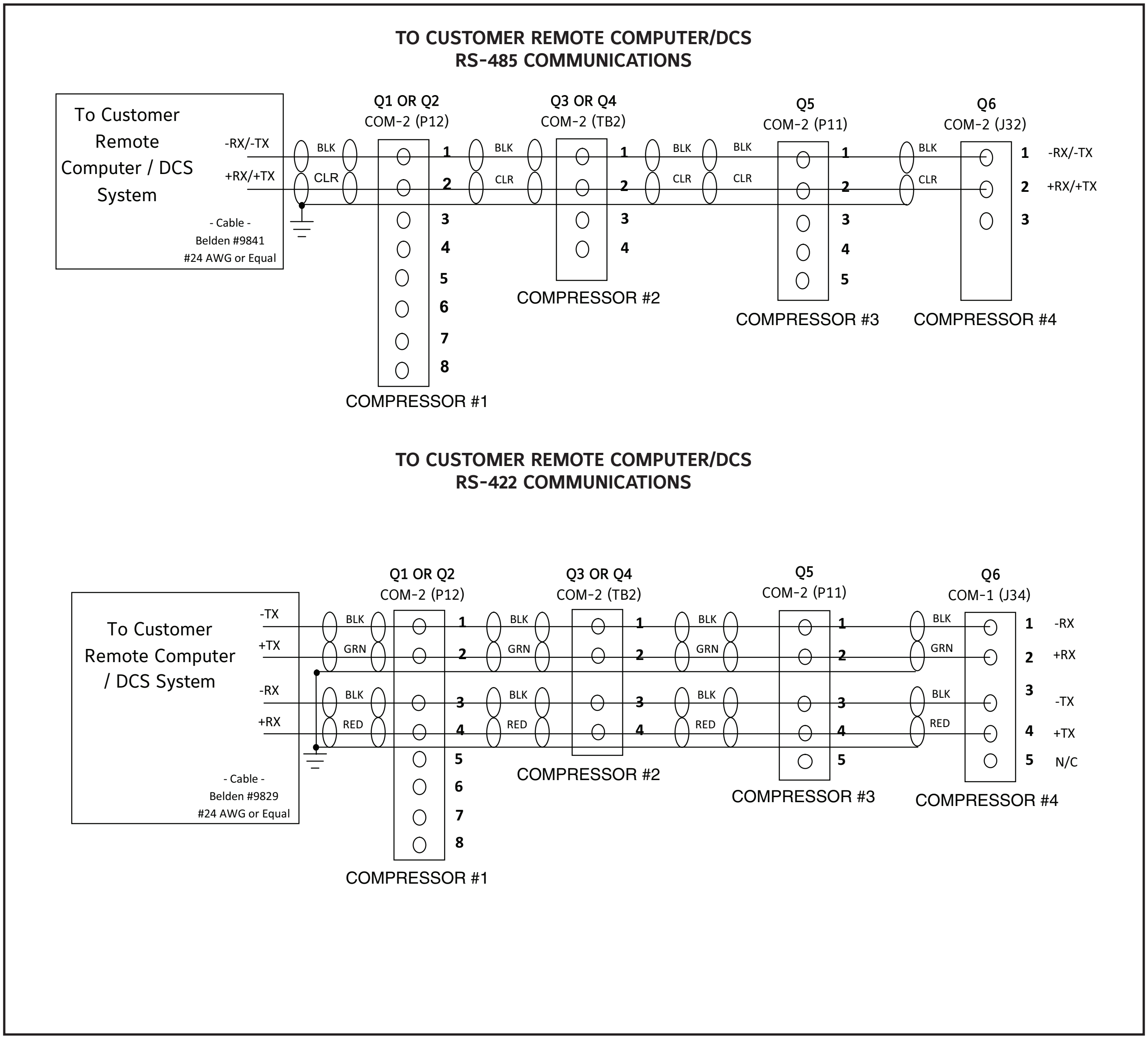


Figure 37: Wiring Diagram - Communications Wiring Diagrams

June 2019 Revisions

Throughout	- Updated to Quantum HD Unity
	- Updated to versions 11.x and 12.x
	- Added Q6 processor reference where applicable
	- Cat 5 replaced with CAT5e
Page 1	- Updated web address
Page 6	- Updated home screen image
Page 8	- Added Figure 3
	- Removed obsolete part numbers from Table 1
Page 11	- Updated Service - Communications information
Page 14	- Updated image
	- Updated Description, [Map file], [Download MapFile.txt to USB Device], and [Upload MapFile.txt from USB Device] sections
Page 15	- Added Figure 12
	- Added info on creating new Map file; added 1st Notice statement
Page 16	- Updated Notices; added SSW motor starter to protocol list
Page 17	- Added SSW motor starter to Table
Page 18	- Updated Quantum HD Unity Communications Protocol list
Page 19	- Updated Return Compressor Status info (row 5 and 7)
Page 20	- Updated Notice
Page 35	- Added info to Message sequence logic section (last paragraph)
Page 41	- Added info to ModBus TCP/IP (Ethernet) section (last paragraph)
Page 42	- Added info to Status - ModBus TCP Log (last paragraph)
	- Updated nomenclature (Modbus ID)
Page 59	- Added Economizer Port Pressure and Economizer Butterfly Valve to table
Page 61	- Added rows (3136 through 3140) to Table 10
Page 90	- Added rows (8809 through 8817) to Table 14
Page 101	- Added entire section on Q6 processor board
Page 119	- Updated Figure 37 with Q6 info

December 2019 Revisions

Page 68	- Updated Table 12 (AB address column, rows 4690 through 4698)

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