

Quincy Compressor

Quincy Modbus Gateway

Quincy Power\$ync[®] Communications to
Foreign Non-Quincy Devices

Table Of Contents

Introduction 1

Installation2

Modbus Communication Settings3

Modbus Address Map.....4

Compressor Parameter State Descriptions6

Compressor Write Commands.....9

Appendix A – Interconnection Wiring Diagram..... 10

Introduction

The Quincy Modbus Gateway (Gateway) is an intelligent device that allows foreign (non-Quincy) devices to communicate with Quincy Power\$ync Compressors. Quincy Compressors communicate with each other using a proprietary language developed by Quincy. This language is kept proprietary in order to preserve the safeguards Quincy has implemented to protect each compressor. However, because sometimes it is necessary to communicate with foreign (non-Quincy) devices, Quincy has developed this Gateway to provide for this type of communication.

The Gateway is designed to communicate as a Modbus Slave. Modbus is an industry standard communications protocol for many Programmable Logic Controllers (PLCs) and Distributed Control Systems (DCSs). Modbus is capable of communicating in two modes: ASCII mode and RTU mode.

The Gateway is capable of communicating Modbus in either ASCII mode or RTU mode using RS232 or RS485 communications. The factory default mode is RTU and RS232. If either ASCII mode or RS485 is necessary, they **MUST** be specified upon order.

The Quincy communications link is serial RS232. Since RS232 communications is limited to a distance of 50 feet, the Gateway must be located within 50 feet of the Power\$ync Compressor. If more than 50 feet is necessary, a modem (short haul, fiber-optic, etc.) may be used to extend this distance. Contact Quincy for details.

Installation

1. Mount the Quincy Modbus Gateway within 50 feet of Power\$ync Compressor.
2. Run serial cable (through separate conduit) from the Quincy Power\$ync Compressor to the Quincy Modbus Gateway and terminate as per Figure 1 located in Appendix A.
3. Run serial (or RS485) cable (through separate conduit) from the Modbus Foreign Device to the Quincy Modbus Gateway and terminate as per shown in Appendix A.
4. Run power cable (120 VAC through separate conduit) and terminate on the Power Terminal Block located at the bottom of the Quincy Modbus Gateway. Refer to Appendix A.

Modbus Communication Settings

Set the Modbus Foreign Device Master to the following settings:

RTU Mode

9600 Baud

8 Data Bits

Even Parity

1 Stop Bit

The Modbus Slave Address of the Quincy Modbus Gateway is 1.

Modbus Address Map

The data for each Quincy Compressor is mapped to Modbus address space according to the layout shown in Table 4.1. In other words, Compressor A's data is located in addresses 40101 through 40155, Compressor B's data is located in addresses 40201 through 40255, and so on. For those compressors that are not connected, the value of -1, or "negative one", will be written to the register.

Within the data ranges shown above, each Compressor's data is arranged as shown in Table 4.2. Using both Table 4.1 and 4.2, the address of a specific compressor's parameter may be obtained. Refer to the following examples.

EXAMPLE 1 – Compressor A's Load Pressure

Refer to Table 4.1 to find the range of values for Compressor A. Table 4.1 shows that Compressor A's data is located between 40101 and 40175. Referring also to Table 4.2, Load Pressure is shown to be located in 4xx15. Combining this information, Compressor A's Load Pressure is located in address 40115.

EXAMPLE 2 – Compressor E's Loaded Time

Refer to Table 4.1 to find the range of values for Compressor E. Table 4.1 shows that Compressor E's data is located between 40501 and 40575. Referring also to Table 4.2, Loaded Time is shown to be located in 4xx47 (Hours) and 4xx48 (Minutes). Combining this information, Compressor E's Loaded Hours and Minutes are located in addresses 40547 and 40548.

Modbus Registers	Power\$ync Data
40001-40050	Compressor Write commands
40101-40175	Compressor A Data (Read Only)
40201-40275	Compressor B Data (Read Only)
40301-40375	Compressor C Data (Read Only)
40401-40475	Compressor D Data (Read Only)
40501-40575	Compressor E Data (Read Only)
40601-40675	Compressor F Data (Read Only)
40701-40775	Compressor G Data (Read Only)
40801-40875	Compressor H Data (Read Only)

Table 4.1: Address Map Range for Quincy Compressors

Modbus Registers	Power\$ync Data
40901-40975	Compressor I Data (Read Only)
41001-41075	Compressor J Data (Read Only)
41101-41175	Compressor K Data (Read Only)
41201-41275	Compressor L Data (Read Only)
41301-41375	Compressor I Data (Read Only)
41401-41475	Compressor J Data (Read Only)
41501-41575	Compressor K Data (Read Only)
41601-41675	Compressor L Data (Read Only)

Section

4

QUINCY COMPRESSOR
MODBUS GATEWAY

Modbus Address Map (cont.)

Modbus Address	Address Description
4xx01	Machine ID
4xx02	Compressor State
4xx03	Operating State
4xx04	Shutdown State
4xx05	Compressor Mode
4xx06	Network Communications State
4xx07	Network State of This Machine
4xx08	Active
4xx09	Sequence Position
4xx10	Starter Type
4xx11	Fluid Filter Delta-P Switch
4xx12	Intake Filter Delta-P Switch
4xx13	Motor Overload
4xx14	Main Motor Auxiliary Contact
4xx15	Bypassing Enabled
4xx16	Modulation Enabled
4xx17	Machine Type (1=Lift Valve)
4xx18	Number of Bypass Valves Open
4xx19	Load Pressure
4xx21	Unload Pressure
4xx23	Line Pressure
4xx25	Sump Pressure
4xx27	Discharge Temperature
4xx29	Sump Temperature
4xx31	Compressor Model
4xx33	Compressor Capacity in CFM
4xx35	Compressor Horsepower
4xx37	Air Filter Time (Hours)
4xx38	Air Filter Time (Minutes)
4xx39	Fluid Filter Time (Hours)
4xx40	Fluid Filter Time (Minutes)

Modbus Address	Address Description
4xx41	Separator Element Time (Hours)
4xx42	Separator Element Time (Minutes)
4xx43	Fluid Time (Hours)
4xx44	Fluid Time (Minutes)
4xx45	Loaded Time (Hours)
4xx46	Loaded Time (Minutes)
4xx47	Unloaded Time (Hours)
4xx48	Unloaded Time (Minutes)
4xx49	Time Remaining Until Shutdown (Hours)
4xx50	Time Remaining Until Shutdown (Minutes)
4xx51	Rotation Time In Hours until Change
4xx53	Compressor Time (Hour)
4xx54	Compressor Time (Minute)
4xx55	Auto Dual Timer
4xx56	Firmware Major Version Number
4xx57	Firmware Minor Version Number
4xx60	Value 1 of Serial Number
4xx61	Value 2 of Serial Number
4xx62	Value 3 of Serial Number
4xx63	Value 4 of Serial Number
4xx64	Value 5 of Serial Number
4xx65	Value 6 of Serial Number
4xx66	Value 7 of Serial Number
4xx67	Value 8 of Serial Number
4xx68	Value 9 of Serial Number
4xx69	Value 10 of Serial Number
4xx70	Value 11 of Serial Number
4xx71	Value 12 of Serial Number
4xx72	Value 13 of Serial Number
4xx73	Value 14 of Serial Number
4xx74	Value 15 of Serial Number
4xx75	Value 16 of Serial Number

Table 4.2: Modbus Address Map for PowerSync Values

Compressor Parameter State Descriptions

Several parameters listed in Table 4.2 indicate one of several possible states. For example, possible states for the parameter “Compressor State” are: Stopped, Starting, Loaded, Unloaded, etc. Each state corresponds to a specific value for that parameter. Refer to Tables 5.1 through 5.5 for the following examples.

EXAMPLE 1 - Compressor Running

This state is indicated when the “Operating State” parameter, 4xx03, contains the value 1. Refer to Table 5.2.

EXAMPLE 2 - High Sump Air Pressure

This state is indicated when the “Compressor State” parameter, 4xx02, contains the value 5 AND “Shutdown State” parameter, 4xx04, contains the value 4. Refer to Tables 5.1 and 5.2.

EXAMPLE 3 - Continuous Run Mode

This state is indicated when the “Compressor Mode” parameter, 4xx05, contains the value 0. Refer to Table 5.3.

Register Value	Value Description
0	Compressor Stopped
1	Compressor Starting
2	Compressor Loaded
3	Compressor Unloaded
4	Compressor Stopped, Waiting for Restart
5	Fault Shutdown (refer to Shutdown State for more info.)

Table 5.1: “Compressor State” (4xx02) State Descriptions

Register Value	Value Description
0	Compressor Not Running
1	Compressor Running

Table 5.2: “Operating State” (4xx03) State Descriptions

Compressor Parameter State Descriptions (cont.)

Register Value	Value Description
0	Communication with the Relay Board has been lost.
1	Contactor will not disengage
2	Stop Button or HAT backup tripped
3	High Discharge Air Temperature
4	High Sump Air Pressure
5	Motor Overload (either main or fan)
6	RTD disconnected, cannot monitor Discharge Temperature
7	RTD disconnected, cannot monitor Sump Temperature
8	Pressure transducer disconnected, cannot monitor Line Pressure
9	Pressure transducer disconnected, cannot monitor Sump Pressure
10	State Machine Error
11	Contactor will not engage
12	Not Used
13	Possible Reverse Rotation
14	Write Error in EEPROM

Table 5.3: “Shutdown State” (4xx04) State Descriptions (valid only when Compressor State = 5)

Register Value	Value Description
0	Continuous Run Mode
1	Auto Dual Mode
2	Network Mode

Table 5.4: “Compressor Mode” (4xx05) State Descriptions

Compressor Parameter State Descriptions (cont.)

Register Value	Value Description
0	No Communications
1	Bad Communications
2	Bad to Poor Communications
3	Poor Communications
4	Acceptable Communications
5	Good Communications

Table 5.5: “Network Communications State” (4xx06) State Descriptions

Register Value	Value Description
0	Pointer passed left, inlet closed, lift valves 1,2,3,4 open
1	Pointer passed left, inlet open, lift valves 1,2,3,4 open
2	Pointer passing left, inlet open, lift valves 1,2,3,4 open
3	Pointer at machine, inlet open, lift valves 1,2,3,4 open
4	Pointer at machine, inlet open, lift valves 1,2,3 open
5	Pointer at machine, inlet open, lift valves 1,2 open
6	Pointer at machine, inlet open, lift valve 1 open
7	Pointer at machine, inlet open, no lift valves open
8	Pointer passing right, inlet open, no lift valves open
9	Pointer passed right, inlet open, no lift valves open

Table 5.6: “Network State of Compressor” (4xx07) State Descriptions

Register Value	Value Description
0	Bad – Maybe a Bad Switch
1	Good
2	Replace Filter

Table 5.7: “Fluid Filter” (4xx11) & “Intake Filter” (4xx12) State Descriptions

Compressor Write Commands

The Write Command for each Quincy Compressor is mapped to Modbus address space according to the layout shown in Table 6.1. The value written into the Write Command Register initiates the desired function as shown in Table 6.2. Note that any command you send has to be immediately followed by a zero.

EXAMPLE 1 – Compressor A's Write Command Register

Refer to Table 6.2 to find the value that initiates the desired function. Then refer to Table 6.1 to find the Write Command Register for the Compressor that you want to control. Write the command value into the Write Command Register and then immediately write a zero into that same register. In other words, to send the "Start" Command to Compressor A's Write Command Register, write the number "4" into register 40002 and then write the number "0" into register 40002.

Modbus Register	Address Description
40001	Not Used
40002	Compressor A Write Command Register
40003	Not Used
40004	Compressor B Write Command Register
40005	Not Used
40006	Compressor C Write Command Register
40007	Not Used
40008	Compressor D Write Command Register
40009	Not Used
40010	Compressor E Write Command Register
40011	Not Used
40012	Compressor F Write Command Register
40013	Not Used
40014	Compressor G Write Command Register
40015	Not Used
40016	Compressor H Write Command Register

Modbus Register	Address Description
40017	Not Used
40018	Compressor I Write Command Register
40019	Not Used
40020	Compressor J Write Command Register
40021	Not Used
40022	Compressor K Write Command Register
40023	Not Used
40024	Compressor L Write Command Register
40025	Not Used
40026	Compressor M Write Command Register
40027	Not Used
40028	Compressor N Write Command Register
40029	Not Used
40030	Compressor O Write Command Register
40031	Not Used
40032	Compressor P Write Command Register

Table 6.1: Compressor Write Command Registers

Register Value	Value Description
0	Enable Next Command
1	Not Used
2	Load Compressor
3	Unload Compressor
4	Start Compressor
5	Stop Compressor

Table 6.2: Compressor Write Command Value Descriptions

Interconnection Wiring Diagram

