DAIKIN

Sales and Engineering Data Sheet

ED 15118-2

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Daikin Magnitude® Chiller Unit Controller Protocol Information

Modbus® Protocol

Model WME Frictionless Centrifugal Chiller, Single-Compressor and Dual-Compressor

This document contains the necessary information to incorporate a Magnitude Chiller Unit Controller from Daikin Applied into your Building Automation System (BAS). It includes all necessary Modbus variables and corresponding Magnitude Chiller Unit Controller data points. Modbus terms and principles are not defined. Refer to the appropriate specifications for definitions and details.

Limited Warranty

Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Notice

Revision History

ED 15118	April 2010	Preliminary release.
ED 15118-1	December 2011	1. Added scaling to Capacity Limit Setpoint – Network. 2. Changed Units of Measure in Table 2 to be Writable. It was incorrectly marked read only.
ED 15118-2	February 2016	Added compressor #2 data and modified the description for Compressor Percent RLA to show the value read via Modbus should be divided by 10.

Software Revision

This edition documents all versions of the standard Magnitude Chiller Unit Controller software and all subsequent revisions until otherwise indicated. You can determine the revision of the application software from the unit controller keypad/display. The version is located on the Service screen. BACnet can also read the software revision by reading the Application_ Software_Version property of the Device Object.

Reference Documents

Company	Number	Title	Source
Daikin Applied	IM 993	Magnitude Chiller Unit Controller, Modbus Communication Module Installation Manual	www.DaikinApplied.com
Daikin Applied	OM 1034	Magnitude Frictionless Centrifugal Chiller Operation and Maintenance Manual	www.DaikinApplied.com
Daikin Applied	IOM 1209	Magnitude Frictionless Centrifugal Chiller Installation, Operation and Maintenance Manual 1000–1500 Tons	www.DaikinApplied.com
Gould, Inc.		Modbus® Application Protocol	www.Modbus.org
Gould, Inc.		Modbus Over Serial Line	www.Modbus.org

Controller Data Points

The Magnitude Chiller Unit Controller contains data points or unit variables that are accessible from two different user interfaces: the unit controller OITS (Operator Interface Touch Screen) panel or a Modbus serial network. Not all points are accessible from both interfaces. This manual lists all important data points and the corresponding network path for each applicable interface. Refer to OM 1034 and IOM 1209 (available on www.DaikinApplied.com) for unit controller operation details.

Compatibility

The Magnitude Chiller Unit Controller can be configured in an interoperable Modbus network. The unit controller must have the corresponding Modbus Communication Module installed. The Magnitude Chiller Unit Controller is designed to meet the Modbus Standards published at www.Modbus.org (see the Reference Documents section).

Protocol Definitions

The Modbus protocol is a standardized Application Level (OSI Level 7) protocol used in interoperable Industrial Control networks. Modbus provides the communication infrastructure necessary to integrate products manufactured by different vendors and to integrate control services that are now independent.

It specifies how requests from the client are sent to a server and how servers reply. The client constructs a PDU (Protocol Data Unit) and sends it to a specific server or broadcasts it to all servers. The PDU contains a function code that defines the action the client is requesting from the server(s). The PDU also includes a data field that further defines the action to the server, for example, the location of the data to be read.

A normal reply from a server includes the same function code and a response data field. In the case of a read operation, the response data field contains the requested data. In the case of a write operation, the response data field contains an echo of the write data of the request command. If the server detects an error in the transmission, the reply to the client includes and exception function code and the response data field contains an exception code.

Controllers can communicate on standard Modbus networks using one of two transmission modes: ASCII or RTU. Users select the serial port communication parameters (baud rate, parity mode, etc), during configuration of the controller. The mode and serial parameters must be the same for all devices on a Modbus network. Transmission mode determines how information is packed into the message fields and decoded. In RTU mode, each byte contains two hexadecimal characters, and in ASCII mode, each byte contains one ASCII character. The Magnitude Chiller Unit Controller uses the RTU mode only.

The Modbus Communication Module uses the following data structure: 8 data bits, 1 stop bit, and no parity bit. It uses the following data transmission rates: 2400, 4800, 9600 and 19200 (default) bps. The baud rate can be configured through the unit controller OITS panel.

Valid Function Codes

The Magnitude Chiller Unit Controller supports four public function codes as defined:

Function Code	Description	Definition
03 (0×03)	Read Holding Registers	This function code reads the contents of a contiguous block of holding registers in a remote device.
06 (0×06)	Write Single Register	This function code writes a single holding register in a remote device.
16 (0×10)	Write Multiple Registers	This function code writes a block of contiguous registers (1 to approx. 120 registers) in a remote device.
43 / 14 (0×2B / 0×0E)	Read Device Identification	Used to read the identification of a remote device.

Read Device Identification

This function code allows reading the identification and additional information relative to the physical and functional description of a remote device, only. The Read Device Identification interface is modeled as an address space composed of a set of addressable data elements. The data elements are called objects and an object ID identifies them. The Magnitude Chiller Unit Controller supports the three Object IDs shown:

Object ID	Object Name / Description	Type
0×00	VendorName	ASCII String
0×01	ProductCode	ASCII String
0×02	MajorMinorRevision	ASCII String

Valid Error Codes

The Magnitude Chiller Unit Controller supports three error or exception codes as shown:

Error Codes	Description	Definition
01	Illegal Function	The function code received in the query is not an allowable action for the server (or slave).
02	Illegal Data Address	The data address received in the query is not an allowable address for the server (or slave).
03	Illegal Data Value	A value contained in the query data field is not an allowable value for server (or slave).

Modbus Data Point

Each data point accessible from a Modbus network is described with a table that gives the data type and index. If the data point represents an enumerated variable, the enumerations are also listed.

Example Data Point: Chiller ON-OFF

This read only output network variable indicates the running mode of the chiller.

Holding Register	Measurement	Units	Valid Range
31	Switch	NA	0 = OFF, 1 = ON

Holding Register

All of the Modbus registers defined in the Magnitude Chiller Unit Controller are 16-bit Holding Registers. Some are read-only and some are read-write.

There can be as many as 65,536 elements of each data type in a Modbus device. Data elements are numbered from 1 to 65,536 in each type. Data elements are addressed with an index in the range from 0 to 65,535. The index is not the address of the data element in the unit controller memory. The index is used in Modbus PDUs to specify the location the data in the unit controller. This means, for example, that data element number 1 (i.e., holding register 40001) is addressed using index 0 in the PDU.

In addition, the function code field portion of the message already specifies a ‘holding register’ operation. Therefore the ‘4xxxx’ reference is implicit. This document follows this assumption and has published the holding registers without the implicit 4xxxx. For example, Holding Register 8 is actually Holding Register 40008.

Valid Range

Some properties are standard data types and some are enumerated sets. If the property value represents a range of values, e.g., temperature or pressure, a range of values is given. If the property value is an enumerated set, all enumerated values and corresponding meaning are given.

Configuring the Unit Controller

The Magnitude Chiller Unit Controller and the Modbus Communication Module together are designed to be accessible via a Modbus network. Default values may be changed with the unit controller OITS panel or via the Modbus network (i.e. Building Automation System or BAS). Parameters must be adjusted to accommodate your particular network. See OM 1034 and IOM 1209 for default values and unit controller operating instructions. Also refer to the Modbus Communication Module Installation Manual, IM 933 (all documents available on www.DaikinApplied.com).

The following section describes how to set up the Magnitude Chiller Unit Controller, with an attached Modbus Communication Module, for network integration.

Set up the Unit Controller for Network Integration

From the Magnitude Chiller Unit Controller OITS panel:

1. Set the Control Source on the SET/UNIT screen to USER.
2. Change the BAS Network Protocol default to the appropriate BAS Protocol on the SET/BAS screen.
3. Verify with the chiller/control company technician that the chiller is operational on the BAS.
4. Set the Control Source on the SET/UNIT screen to BAS.

Display Important Data Points

Typical BAS workstation display of Magnitude Unit Controller attributes include the following significant data points (page number of detailed description in parenthesis). Each data point is identified with a number that also identifies it in the corresponding Comprehensive Data Point Tables.

Table 1: Significant Data Points

No.	Configuration
1	Chiller Status (11)
2	Chiller Mode Setpoint - Network (11)
3	Actual Capacity (10)
4	Chiller Enable Setpoint - Network (11)
	Temperatures
5	Condenser Entering Water Temperature (15)
6	Condenser Leaving Water Temperature (15)
7	Evaporator Entering Water Temperature (16)
8	Evaporator Leaving Water Temperature (17)
	Setpoints
9	Cool Setpoint – Network (16)
10	Capacity Limit Setpoint - Network (10)
	Alarms
11	Alarm Digital Output (10)
12	Clear Alarm - Network (12)
13	Active Alarms (20)

You can display any number of additional data points based on job requirements or individual preference. See Modbus Data Points for all available Modbus Variables. For a detailed description of each data point, see the Detailed Data Point Information section.

Modbus Register Mapping

The Modbus Communication Module supports zero-based addressing. For example, holding register 40002 is addressed as 0001 in a Modbus message. The following tables assume 4xxxx addressing. For example, 1 is holding register 40001.

Table 2: General Data Points

Data Point Name	Page	R=Read W=Write	Holding Register (4xxxx)	Description
Chiller Local/Remote	9	R	1	0=Remote, 1=Local
(4) Chiller Enable Setpoint – Network	9	R/W	2	0=Disable (Default), 1=Enable
Chiller Enable Output	9	R	3	0=Disabled, 1=Enabled
Run Enabled	14	R	4	0=OFF, 1=Run Allowed
(2) Chiller Mode Setpoint - Network	10	R/W	5	1=Ice, 2=Cool (Default), 3=Heat
Chiller Mode Output	9	R	6	1=Ice, 2=Cool, 3=Heat
(9) Cool Setpoint - Network	12	R/W	7	35 to 80°F (Default = 44°F) 1.7°C to 26.7°C
Ice Setpoint - Network	13	R/W	8	15 to 35°F (Default = 25°F) -9.5 to 1. 7°C
Heat Setpoint - Network	13	R/W	9	100 to 150°F (Default = 135°F) 37.8 to 65.6°C
Active Setpoint	9	R	10	15 to 150°F (-9.4 to 65.5°C)
(3) Actual Capacity	9	R	11	0% to 100%
(10) Capacity Limit Setpoint – Network	9	R/W	12	0% to 100% (Default = 100%)
Active Capacity Limit Output	9	R	13	0% to 100%
Chiller Capacity Limited	9	R	14	0=Not Limited, 1=Limited
(1) Chiller Status	10	R	15	1=OFF, 2=Start, 3=Run, 4=Preshutdown, 5=Service
(12) Clear Alarm – Network	10	R/W	16	0=Normal (Default), 1=Clear Alarm
(11) Alarm Digital Output	9	R	17	0=No Alarm, 1=Alarm
(7) Evaporator Entering Water Temp	12	R	18	-40 to 257°F (-40 to 125°C)
(8) Evaporator Leaving Water Temp	13	R	19	-40 to 257°F (-40 to 125°C)
Evaporator Water Flow Rate	13	R	20	0 to 10,000 GPM (0 to 631 L/s)
Evaporator Flow Switch Status	12	R	21	0=No Flow, 1=Flow
(5) Condenser Entering Water Temp	12	R	22	-40 to 257°F (-40 to 125°C)
(6) Condenser Leaving Water Temp	12	R	23	-40 to 257°F (-40 to 125°C)
Condenser Water Flow Rate	12	R	24	0 to 10,000 GPM (0 to 631 L/s)
Condenser Flow Switch Status	12	R	25	0=No Flow, 1=Flow
Heat Recovery Entering Water Temp	13	R	26	-40 to 257°F (-40 to 125°C)
Heat Recovery Leaving Water Temp	13	R	27	-40 to 257°F (-40 to 125°C)
Outdoor Air Temp	13	R	28	-40°F to 212°F (-40°C to 100°C)
Liquid Line Refrigerant Temp	13	R	29	-40 to 257°F (-40 to 125°C)
Chiller ON-OFF	10	R	31	0=OFF, 1=ON
Sequence Status	14	R	32	bit8 = Chiller at Full Load 0=Not at full load, 1=Full load bit9 = Circuit/Comp 1 Availability 0=Not Available, 1=Available All other bits are unused at this time.
Condenser Refrigerant Pressure	12	R	53	0 to 410 PSI (0 to 2827 kPA)
Condenser Saturated Refrigerant Temp	12	R	54	-15 to 185°F (-26.2 to 85°C)
Units of Measure	14	W	321	0=English (Default), 1=Metric
Active Alarms	15	R	See Table 5	

Table 3: Pump Data Points

Data Point Name	Page	R=Read W=Write	Holding Register (4xxxx)	Description
Condenser Pump #1 Run Hours	12	R	41 – 42	0 to 999,999 Hours.
Condenser Pump #1 Status	12	R	43	0=Pump OFF Request, 1=Pump ON Request
Condenser Pump #2 Run Hours	12	R	44 – 45	0 to 999,999 Hours.
Condenser Pump #2 Status	12	R	46	0=Pump OFF Request, 1=Pump ON Request
Evaporator Pump #1 Run Hours	13	R	47 – 48	0 to 999,999 Hours.
Evaporator Pump #1 Status	13	R	49	0=Pump OFF Request, 1=Pump ON Request
Evaporator Pump #2 Run Hours	13	R	50 – 51	0 to 999,999 Hours.
Evaporator Pump #2 Status	13	R	52	0=Pump OFF Request, 1=Pump ON Request

Table 4: Compressor Data Points

Data Point Name	Page	R=Read W=Write	Holding Register (4xxxx)	Description
Compressor #1				
Compressor Suction Saturated Refrigerant Temperature	11	R	102	-15 to 104°F (-26.2 to 40°C)
Compressor Suction Refrigerant Pressure	11	R	101	0 to 132 PSI (0 to 910.1kPa)
Compressor Suction Refrigerant Temperature	11	R	103	-40°F to 257°F (-40°C to 125°C)
Compressor Discharge Refrigerant Pressure	10	R	104	0 to 410 PSI 0 to 2827 kPA
Compressor Discharge Saturated Refrigerant Temperature	11	R	105	-15 to 185°F (-26.2 to 85°C)
Compressor Discharge Refrigerant Temperature	10	R	106	-40°F to 257°F (-40°C to 125°C)
Compressor Starts	11	R	107	0 to 65,535 Starts
Compressor Run Hours	11	R	108–109	0 to 999,999 Hours
Compressor Percent RLA	11	R	110	0% to 150% RLA
Compressor Average Current	10	R	111	0 to 2000 amps (less on some models)
Compressor Average Voltage	10	R	112	0 to 10,000 volts
Compressor Power	11	R	113	0 to 600 kW
Compressor #2				
Compressor Suction Saturated Refrigerant Temperature	11	R	152	-15 to 104°F (-26.2 to 40°C)
Compressor Suction Refrigerant Pressure	11	R	151	0 to 132 PSI (0 to 910.1kPa)
Compressor Suction Refrigerant Temperature	11	R	153	-40°F to 257°F (-40°C to 125°C)
Compressor Discharge Refrigerant Pressure	10	R	154	0 to 410 PSI 0 to 2827 kPA
Compressor Discharge Saturated Refrigerant Temperature	11	R	155	-15 to 185°F (-26.2 to 85°C)
Compressor Discharge Refrigerant Temperature	10	R	156	-40°F to 257°F (-40°C to 125°C)
Compressor Starts	11	R	157	0 to 65,535 Starts
Compressor Run Hours	11	R	158–159	0 to 999,999 Hours
Compressor Percent RLA	11	R	160	0% to 150% RLA
Compressor Average Current	10	R	161	0 to 2000 amps (less on some models)
Compressor Average Voltage	10	R	162	0 to 10,000 volts
Compressor Power	11	R	163	0 to 600 kW

This section describes the information (i.e. data) that is available to the BAS via Modbus.

Active Capacity Limit Output

This read only variable is a measure of the ratio of operating capacity limit to full capacity expressed in percent. This value is the lowest of all limits specified by the operator, analog Demand Limit input, or Network Capacity Limit Setpoint.

Holding Register	Measurement	Units	Valid Range
13	Percent of Chiller Capacity	%	0% to 100%

Active Setpoint

This read only variable indicates the current setpoint used to control the chiller. The setpoint that is used is based on the operating mode (Ice, Cool or Heat) of the chiller and any "LWT (Low Water Temperature) reset" functions that are in effect. See "Chiller Mode Output" and "Chiller Mode Setpoint – Network". The default mode is Cool. There are three possible setpoints. See "Cool Setpoint – Network", "Heat Setpoint – Network" and "Ice Setpoint – Network".

Holding Register	Measurement	Units	Valid Range
10	Temperature	°F or °C	15 to 150°F / -9.4 to 65.5°C

Actual Capacity

This read only variable indicates the percent of maximum capacity the chiller is producing under the present operating conditions. At 100%, the chiller may be producing more or less than its nominal rating due to variations in operating conditions.

Holding Register	Measurement	Units	Valid Range
11	Percent of Chiller Capacity	%	0% to 100%

Alarm Digital Output

This read only variable indicates whether an alarm condition has occurred. This variable must be polled for alarm notification.

Holding Register	Measurement	Units	Valid Range
17	Switch	NA	0 = No Alarm, 1 = Alarm

Capacity Limit Setpoint – Network

This read/write variable sets the maximum capacity level of the chiller. This level may be adjusted via the BAS or other network device, but cannot be adjusted above a factory-specified limit. The default is 100%. Values read should be divided by 10. For example, a value of 1000 should be interpreted as 100.0%. Likewise, to write a value of 100%, a value of 1000 should be written.

Holding Register	Measurement	Units	Valid Range
12	Percent of Chiller Capacity × 10	%	0% to 100%

Chiller Capacity Limited

This read only output network variable indicates whether conditions may exist that prevent the chiller from reaching full capacity.

Holding Register	Measurement	Units	Valid Range
14	Switch	NA	0 = Not Limited, 1 = Limited

Chiller Enable Output

This read only variable indicates if operation of the chiller is disabled or enabled. If the chiller is disabled, it can not run. If it is enabled, the chiller is allowed to run.

Holding Register	Measurement	Units	Valid Range
3	Switch	NA	0 = Disabled, 1 = Enabled

Chiller Enable Setpoint – Network

This read/write variable is used to disable or enable chiller operation over the network. The default is Disable.

Holding Register	Measurement	Units	Valid Range
2	Switch	NA	0 = Disable, 1 = Enable

Chiller Local/Remote

This read only variable indicates whether the chiller is in local control or allowed to be controlled remotely via the Modbus network. The value can only be changed locally. The values from the following variables are ignored in the chiller application if this variable is set to Local (1):

- Chiller Enable Setpoint
- Chiller Mode Setpoint – Network
- Cool Setpoint Network
- Ice Setpoint Network
- Heat Setpoint Network
- Capacity Limit Setpoint

Holding Register	Measurement	Units	Valid Range
1	Switch	NA	0 = Remote, 1 = Local

Chiller Mode Output

This read only variable indicates the current operating mode of the chiller.

Holding Register	Measurement	Units	Valid Range
6	Enumeration	NA	1 = Ice 2 = Cool 3 = Heat

Chiller Mode Setpoint - Network

This read/write variable is used to change the operating mode of the chiller. The default is Cool.

Holding Register	Measurement	Units	Valid Range
5	Enumeration	NA	1 = Ice 2 = Cool 3 = Heat

Chiller ON-OFF

This read only variable indicates the running mode of the chiller.

Holding Register	Measurement	Units	Valid Range
31	Switch	NA	0 = OFF, 1 = ON

Chiller Status

This read only variable indicates the unit status of the chiller.

Holding Register	Measurement	Units	Valid Range
15	Enumeration	NA	1 = OFF 2 = Start 3 = Run 4 = Pre-shutdown 5 =Service

Clear Alarm – Network

This read/write network variable clears all active alarms. The following alarms cannot be cleared via the Modbus network. They can only be cleared at the chiller unit controller:

- Low Evaporator Pressure
- High Condenser Pressure
- Evaporator Freeze Protect
- Condenser Freeze Protect
- High Motor Temperature
- High Motor Gap Temperature
- Mechanical High Pressure

Holding Register	Measurement	Units	Valid Range
16	Switch	NA	0 = Normal, 1 = Clear Alarm

Compressor Average Current

This read only variable indicates the average input line current of the compressor VFD. Values read should be divided by 10. For example, a value of 2000 should be interpreted as 200.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
111	Electric Current × 10	Amperes	0 to 2,000 Amps
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
161	Electric Current × 10	Amperes	0 to 2,000 Amps

Compressor Average Voltage

This read only variable indicates the average input line voltage of the compressor VFD. Values read should be divided by 10. For example, a value of 5000 should be interpreted as 500.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
112	Electric Voltage × 10	Volts	0 to 10,000 Volts
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
162	Electric Voltage × 10	Volts	0 to 10,000 Volts

Compressor Discharge Refrigerant Pressure

This read only variable indicates the current refrigerant pressure discharged from the compressor. Values read should be divided by 10. For example, a value of 1330 should be interpreted as 133.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
104	Pressure (gauge) × 10	PSI (kilopaskal)	0 to 410 PSI (0 to 2827 kPA)
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
154	Pressure (gauge) × 10	PSI (kilopaskal)	0 to 410 PSI (0 to 2827 kPA)

Compressor Discharge Refrigerant Temperature

This read only variable indicates the current refrigerant temperature discharged from the compressor. Values read should be divided by 10. For example, a value of 1037 should be interpreted as 103.7.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
106	Temperature × 10	°F or °C	-40°F to 257°F (-40°C to 125°C)
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
156	Temperature × 10	°F or °C	-40°F to 257°F (-40°C to 125°C)

Compressor Discharge Saturated Refrigerant Temperature

This read only variable indicates the current saturated refrigerant temperature discharged from the compressor. Values read should be divided by 10. For example, a value of 1037 should be interpreted as 103.7.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
105	Temperature × 10	°F or °C	-15 to 185°F -26.2 to 85°C
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
155	Temperature × 10	°F or °C	-15 to 185°F -26.2 to 85°C

Compressor Percent RLA

This read only variable indicates the current percent RLA for the compressor motor of the compressor. Values read should be divided by 10. For example, a value of 810 should be interpreted as 81.0%.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
110	Percent RLA × 10	% RLA	0% to 150% RLA
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
160	Percent RLA × 10	% RLA	0% to 150% RLA

Compressor Power

This read only variable indicates the current power of the compressor motor. Values read should be divided by 10. For example, a value of 1000 should be interpreted as 100.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
113	Electric Power × 10	Kilowatts	0 to 600 kW
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
163	Electric Power × 10	Kilowatts	0 to 600 kW

Compressor Run Hours

This read only variable indicates the number of hours that the compressor motor has been turned on.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
108 - 109	Elapsed Time	Hours	0 to 999,999 Hours
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
158 - 159	Elapsed Time	Hours	0 to 999,999 Hours

Compressor Starts

This read only variable indicates the number of times the compressor motor has been started.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
107	Count	Starts	0 to 65,535 Starts
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
157	Count	Starts	0 to 65,535 Starts

Compressor Suction Refrigerant Pressure

This read only variable indicates the current refrigerant pressure entering the compressor. Values read should be divided by 10. For example, a value of 400 should be interpreted as 40.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
101	Pressure (gauge) × 10	PSI or kPa	0 to 132 PSI (0 to 910.1kPa)
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
151	Pressure (gauge) × 10	PSI or kPa	0 to 132 PSI (0 to 910.1kPa)

Compressor Suction Refrigerant Temperature

This read only variable indicates the current refrigerant temperature entering the compressor. Values read should be divided by 10. For example, a value of 850 should be interpreted as 85.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
103	Temperature × 10	°F or °C	-40°F to 257°F (-40°C to 125°C)
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
153	Temperature × 10	°F or °C	-40°F to 257°F (-40°C to 125°C)

Compressor Suction Saturated Refrigerant Temperature

This read only variable indicates the current saturated refrigerant temperature discharged from the compressor. Values read should be divided by 10. For example, a value of 850 should be interpreted as 85.0.

Compressor #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
102	Temperature × 10	°F or °C	-15 to 104°F -26.2 to 40°C
Compressor #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
152	Temperature × 10	°F or °C	-15 to 104°F -26.2 to 40°C

Condenser Entering Water Temperature

This read only variable indicates the current temperature of the water entering the condenser. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
22	Temperature × 10	°F or °C	-40 to 257°F -40 to 125°C

Condenser Flow Switch Status

This read only variable indicates the status of the water flowing through the condenser.

Holding Register	Measurement	Units	Valid Range
25	Switch	NA	0 = No Flow, 1 = Flow

Condenser Leaving Water Temperature

This read only variable indicates the current temperature of the water leaving the condenser. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
23	Temperature × 10	°F or °C	-40 to 257°F -40 to 125°C

Condenser Pump Run Hours

This read only variable indicates the number of hours that the pump motor has been turned ON.

Pump #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
41 - 42	Elapsed Time	Hours	0 to 999,999 Hours
Pump #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
44 - 45	Elapsed Time	Hours	0 to 999,999 Hours

Condenser Pump Status

This read only variable indicates if the pump has been commanded ON or OFF.

Condenser #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
43	Switch	NA	0 = Pump OFF Request 1 = Pump ON Request
Condenser #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
46	Switch	NA	0 = Pump OFF Request 1 = Pump ON Request

Condenser Refrigerant Pressure

This read only variable indicates refrigerant pressure of the condenser. Values read should be divided by 10. For example, a value of 1330 should be interpreted as 133.0.

Holding Register	Measurement	Units	Valid Range
53	Pressure (gauge) × 10	PSI (kPa)	0 to 410 PSI (0 to 2827 kPA)

Condenser Saturated Refrigerant Temperature

This read only variable indicates the saturated refrigerant temperature of the condenser. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
54	Temperature × 10	°F or °C	-15 to 185°F -26.2 to 85°C

Condenser Water Flow Rate

This read only variable indicates the rate of water flow through the condenser.

Holding Register	Measurement	Units	Valid Range
24	Flow Volume	GPM (liters/second)	0 to 10,000 GPM (0 to 631 L/s)

Cool Setpoint - Network

This read/write variable is used to change the Cooling setpoint from the network. It sets the temperature of the Leaving Chilled Water when the chiller is operating in the Cooling Mode. It cannot be set below the local Cool Setpoint. The default is 44°F. Values read should be divided by 10. For example, a value of 410 should be interpreted as 41.0.

Holding Register	Measurement	Units	Valid Range
7	Temperature × 10	°F or °C	35 to 80°F 1.7°C to 26.7°C

Evaporator Entering Water Temperature

This read only variable indicates the temperature of the water entering the evaporator. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
18	Temperature × 10	°F or °C	-40 to 257°F (-40 to 125°C)

Evaporator Flow Switch Status

This read only indicates the status of the water flowing through the evaporator.

Holding Register	Measurement	Units	Valid Range
21	Switch	NA	0 = No Flow, 1 = Flow

Evaporator Leaving Water Temperature

This read only variable indicates the current temperature of the water leaving the evaporator. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
19	Temperature × 10	°F or °C	-40 to 257°F (-40 to 125°C)

Evaporator Pump Run Hours

This read only variable indicates the number of hours that the pump motor has been turned ON.

Pump #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
47 - 48	Elapsed Time	Hours	0 to 999,999 Hours
Pump #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
50 - 51	Elapsed Time	Hours	0 to 999,999 Hours

Evaporator Pump Status

This read only variable indicates if the pump has been commanded ON or OFF.

Pump #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
49	Switch	NA	0 = Pump OFF Request 1 = Pump ON Request
Pump #2			
Holding Register	**Measurement**	**Units**	**Valid Range**
52	Switch	NA	0 = Pump OFF Request 1 = Pump ON Request

Evaporator Water Flow Rate

This read only variable indicates the rate of water flow through the evaporator.

Holding Register	Measurement	Units	Valid Range
20	Flow Volume	GPM (liters/ second)	0 to 10,000 GPM (0 to 631 L/s)

Heat Recovery Entering Water Temperature

This read only variable indicates the temperature of the water entering the heat recovery section of the condenser. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
26	Temperature × 10	°F or °C	-40 to 257°F (-40 to 125°C)

Heat Recovery Leaving Water Temperature

This read only variable indicates the current temperature of the water leaving the heat recovery section of the condenser. Values read should be divided by 10. For example, a value of 688 should be interpreted as 68.8.

Holding Register	Measurement	Units	Valid Range
27	Temperature × 10	°F or °C	-40 to 257°F (-40 to 125°C)

Heat Setpoint – Network

This read/write variable is used to change the Heating setpoint from the network. It sets the temperature of the Leaving Condenser Water when the chiller is operating in the Heating Mode. The default is 135°F. Values read should be divided by 10. For example, a value of 1350 should be interpreted as 135.0.

Holding Register	Measurement	Units	Valid Range
9	Temperature × 10	°F or °C	100 to 150°F (Default = 135°F) 37.8 to 65.6°C

Ice Setpoint – Network

This read/write variable is used to change the Ice setpoint from the network. It sets the temperature of the Leaving Chilled Water when the chiller is operating in the Ice Mode. The default is 25°F. Values read should be divided by 10. For example, a value of 250 should be interpreted as 25.0.

Holding Register	Measurement	Units	Valid Range
8	Temperature × 10	°F or °C	15 to 35°F (Default = 25°F) -9.5 to 1. 7°C

Liquid Line Refrigerant Temperature

This read only variable indicates the current, liquid line, refrigerant temperature.

Circuit #1			
Holding Register	**Measurement**	**Units**	**Valid Range**
29	Temperature	°F or °C	-40 to 257°F (-40 to 125°C)

Outdoor Air Temperature

This read only variable indicates the current outdoor air temperature. Values read should be divided by 10. For example, a value of 720 should be interpreted as 72.0.

Holding Register	Measurement	Units	Valid Range
28	Temperature × 10	°F or °C	-40°F to 212°F (-40°C to 100°F)

Run Enabled

This read only variable indicates the running mode of the chiller. The Run Enabled variable indicates that the chiller can start if operating conditions are met.

Holding Register	Measurement	Units	Valid Range
4	Switch	NA	0 = Off, 1 = Run Allowed

Sequence Status

This read only variable indicates the circuit/compressor availability of the chiller.

Holding Register	Measurement	Units	Valid Range
32	Bit 8 – Chiller Full Load	NA	0 = Not at Full Load 1 = Full Load
	Bit 9 – Circuit/ Compressor 1 Availability	NA	0 = Not Available 1 = Available

Units of Measure

This read/write holding register selects the units of measure that are passed through Modbus.

Holding Register	Measurement	Units	Valid Range
321	Units of Measure	NA	0=English (Default), 1=Metric

Alarm Classes

Modbus alarms in a Magnitude Chiller Unit Controller are divided into three classes: Faults, Problems, and Warnings. Fault alarms have the highest severity level. Problem alarms have medium severity level. Warning alarms have the lowest severity level.

Fault Alarms

Fault alarms require an acknowledgment from the operator. These alarms indicate that the compressor is shut down.

Problem Alarms

Problem alarms do not cause compressor shutdown but limit operation of the chiller in some way.

Warning Alarms

A warning is enunciated whenever an abnormal condition exists which does not effect chiller operation.

Alarm Handling

One Modbus network variable indicates an alarm condition and one network variable clears alarms.

Alarm Digital Output

This read only output network variable indicates whether an alarm condition has occurred. This variable must be polled for alarm notification.

Holding Register	Measurement	Units	Valid Range
17	Switch	NA	0 = No Alarm 1 = Alarm

Clear Alarm – Network

This read/write variable clears all active alarms. The following alarms cannot be cleared via the network. They can only be cleared at the chiller unit controller.

- Low Evaporator Pressure
- High Condenser Pressure
- Evaporator Freeze Protect
- Condenser Freeze Protect
- High Motor Temperature
- High Motor Gap Temperature
- Mechanical High Pressure

Holding Register	Measurement	Units	Valid Range
16	Switch	NA	0 = Normal 1 = Clear Alarm

Active Alarms

The Active Alarms Holding Registers are comprised of several holding registers. There is one holding register for each alarm that indicates the alarm condition, and there are four holding registers for the timestamp for each alarm. You must read the status of these registers to determine the particular alarm condition indicated by the Alarm Digital Output. Table 5 defines the holding registers for each alarm.

Holding Register	Measurement	Units	Valid Range
5700-6819	Alarm Condition & Timestamp	NA	See Table 5

Table 5: Modbus Alarms

	Description	Holding Register				
		Current State 0=Normal 1=Alarm	Timestamp			
			Year	Month (Bits 0-7) Date (Bits 8-15)	Hour (Bits 0-7) Minute (Bits 8-15)	Second (Bits0-7)
Warnings						
1	Cmp1SoftwareProbWarn	5700	5701	5702	5703	5704
2	Cmp2SoftwareProbWarn	5705	5706	5707	5708	5709
5	ChillerEvapEntTempSenWarn	5720	5721	5722	5723	5724
6	ChillerCondEntTempSenWarn	5725	5726	5727	5728	5729
7	ChillerCondLvgTempSenWarn	5730	5731	5732	5733	5734
8	ChillerLiqLn1RefTempSenWarn	5735	5736	5737	5738	5739
9	ChillerLiqLn2RefTempSenWarn	5740	5741	5742	5743	5744
10	ChillerSoftwareProbWarn	5745	5746	5747	5748	5749
Problems						
11	Cmp1LoEvapPressInhibitLoading	5750	5751	5752	5753	5754
12	Cmp1EvapFreezeProtect	5755	5756	5757	5758	5759
13	Cmp1CondFreezeProtect	5760	5761	5762	5763	5764
14	Cmp1HiDischTemp	5765	5766	5767	5768	5769
15	Cmp2LoEvapPressInhibitLoading	5770	5771	5772	5773	5774
16	Cmp2EvapFreezeProtect	5775	5776	5777	5778	5779
17	Cmp2CondFreezeProtect	5780	5781	5782	5783	5784
18	Cmp2HiDischTemp	5785	5786	5787	5788	5789
27	ChillerEvapPmp1Flt	5830	5831	5832	5833	5834
28	ChillerEvapPmp2Flt	5835	5836	5837	5838	5839
29	ChillerCondPmp1Flt	5840	5841	5842	5843	5844
30	ChillerCondPmp2Flt	5845	5846	5847	5848	5849
31	ChillerEvapEntWtrTempSenFlt	5850	5851	5852	5853	5854
Faults						
32	Cmp1LowEvapPress	5855	5856	5857	5858	5859
33	Cmp1HiCondPress	5860	5861	5862	5863	5864
34	Cmp1Tmr Exp No Strt	5865	5866	5867	5868	5869
35	Cmp1LowMotorCurrent	5870	5871	5872	5873	5874
36	Cmp1HiDischTemp	5875	5876	5877	5878	5879
37	Cmp1MechHiPress	5880	5881	5882	5883	5884
38	Cmp1HiMotorTemp	5885	5886	5887	5888	5889
39	Cmp1HiMotorGapTemp	5890	5891	5892	5893	5894
40	Cmp1LoRotorPumpSuperHt	5895	5896	5897	5898	5899
41	Cmp1SurgeTemp	5900	5901	5902	5903	5904
42	Cmp1SurgeSwitch	5905	5906	5907	5908	5909
43	Cmp1MotorStartFailure	5910	5911	5912	5913	5914
44	Cmp1NoCmpStop	5915	5916	5917	5918	5919
45	Cmp1VFDFault	5920	5921	5922	5923	5924
46	Cmp1VFDRefFault	5925	5926	5927	5928	5929
47	Cmp1VFDLossofMotorSync	5930	5931	5932	5933	5934
48	Cmp1VFDMotorStall	5935	5936	5937	5938	5939
49	Cmp1VFDSpdCommandFault	5940	5941	5942	5943	5944
50	Cmp1VFDOverspeed(Hardware)	5945	5946	5947	5948	5949
51	Cmp1VFDOverspeed(Software)	5950	5951	5952	5953	5954
52	Cmp1VFDOverspdMonitorFault	5955	5956	5957	5958	5959
53	Cmp1VFDInputVoltageHigh	5960	5961	5962	5963	5964
54	Cmp1VFDPrechargeFault	5965	5966	5967	5968	5969
55	Cmp1VFDLowDCBusVolt	5970	5971	5972	5973	5974
56	Cmp1VFDHiDCBusVltRunning	5975	5976	5977	5978	5979
57	Cmp1VFDHiDCBusVltRegen	5980	5981	5982	5983	5984
58	Cmp1VFDHiSteeringBrVltPrechrg	5985	5986	5987	5988	5989
59	Cmp1VFDHiSteeringBrVltRunning	5990	5991	5992	5993	5994
60	Cmp1VFDMotorOverload	5995	5996	5997	5998	5999
61	Cmp1VFDHiCurrentBridge1	6000	6001	6002	6003	6004
62	Cmp1VFDHiCurrentBridge2	6005	6006	6007	6008	6009

	Description	Holding Register				
		Current State 0=Normal 1=Alarm	Timestamp			
			Year	Month (Bits 0-7) Date (Bits 8-15)	Hour (Bits 0-7) Minute (Bits 8-15)	Second (Bits0-7)
63	Cmp1VFDHiCurrentChopper1	6010	6011	6012	6013	6014
64	Cmp1VFDHiCurrentChopper2	6015	6016	6017	6018	6019
65	Cmp1VFDInputPhaseLoss	6020	6021	6022	6023	6024
66	Cmp1VFDOutputPhaseLoss	6025	6026	6027	6028	6029
67	Cmp1VFDHiTempSide1	6030	6031	6032	6033	6034
68	Cmp1VFDHiTempSide2	6035	6036	6037	6038	6039
69	Cmp1VFD IGBT FltBridge1	6040	6041	6042	6043	6044
70	Cmp1VFD IGBT FltBridge2	6045	6046	6047	6048	6049
71	Cmp1VFD IGBT FltChopper1	6050	6051	6052	6053	6054
72	Cmp1VFD IGBT FltChopper2	6055	6056	6057	6058	6059
73	Cmp1VFDTherm1Flt	6060	6061	6062	6063	6064
74	Cmp1VFDTherm2Flt	6065	6066	6067	6068	6069
75	Cmp1VFDTherm3Flt	6070	6071	6072	6073	6074
76	Cmp1VFDTherm4Flt	46075	6076	6077	6078	6079
77	Cmp1VFDHiPwrSupTemp	6080	6081	6082	6083	6084
78	Cmp1VFDHiPwrSupVolt	6085	6086	6087	6088	6089
79	Cmp1VFDClgFanFlt	6090	6091	6092	6093	6094
80	Cmp1VFDProcessorFlt	6095	6096	6097	6098	6099
81	Cmp1VFDMaintenanceMode	6100	6101	6102	6103	6104
82	Cmp1SuctPressSenFlt	6105	6106	6107	6108	6109
83	Cmp1DishPressSenFlt	6110	6111	6112	6113	6114
84	Cmp1CondRfrCkt1PressSenFlt	6115	6116	6117	6118	6119
85	Cmp1CondRfrCkt2PressSenFlt	6120	6121	6122	6123	6124
86	Cmp1SuctTempSenFlt	6125	6126	6127	6128	6129
87	Cmp1DischTempSenFlt	6130	6131	6132	6133	6134
88	Cmp1MotorGapTempSenFlt	6135	6136	6137	6138	6139
89	Cmp1RotorPmpTempSenFlt	6140	6141	6142	6143	6144
90	Cmp1BearingOrbitSurgeFlt	6145	6146	6147	6148	6149
91	Cmp1CommunicationsFlt	6150	6151	6152	6153	6154
92	Cmp1EvapLvgWtrTempSenFlt	6155	6156	6157	6158	6159
93	Cmp1CondLvgWtrTempSenFlt	6160	6161	6162	6163	6164
94	Cmp1SoftwareFlt	6165	6166	6167	6168	6169
95	Cmp1EvapWtrFlwLoss	6170	6171	6172	6173	6174
96	Cmp1CondWtrFlwLoss	6175	6176	6177	6178	6179
97	Cmp2LowEvapPress	6180	6181	6182	6183	6184
98	Cmp2HiCondPress	6185	6186	6187	6188	6189
99	Cmp2Tmr Exp No Strt	6190	6191	6192	6193	6194
100	Cmp2LowMotorCurrent	6195	6196	6197	6198	6199
101	Cmp2HiDischTemp	6200	6201	6202	6203	6204
102	Cmp2MechHiPress	6205	6206	6207	6208	6209
103	Cmp2HiMotorTemp	6210	6211	6212	6213	6214
104	Cmp2HiMotorGapTemp	6215	6216	6217	6218	6219
105	Cmp2LoRotorPumpSuperHt	6220	6221	6222	6223	6224
106	Cmp2SurgeTemp	6225	6226	6227	6228	6229
107	Cmp2SurgeSwitch	6230	6231	6232	6233	6234
108	Cmp2MotorStartFailure	6235	6236	6237	6238	6239
109	Cmp2NoCmpStop	6240	6241	6242	6243	6244
110	Cmp2VFDFault	6245	6246	6247	6248	6249
111	Cmp2VFDRefFault	6250	6251	6252	6253	6254
112	Cmp2VFDLossofMotorSync	6255	6256	6257	6258	6259
113	Cmp2VFDMotorStall	6260	6261	6262	6263	6264
114	Cmp2VFDSpdCommandFault	6265	6266	6267	6268	6269
115	Cmp2VFDOverspeed(Hardware)	6270	6271	6272	6273	6274
116	Cmp2VFDOverspeed(Software)	6275	6276	6277	6278	6279
117	Cmp2VFDOverspdMonitorFault	6280	6281	6282	6283	6284
118	Cmp2VFDInputVoltageHigh	6285	6286	6287	6288	6289

	Description	Holding Register				
		Current State 0=Normal 1=Alarm	Timestamp			
			Year	Month (Bits 0-7) Date (Bits 8-15)	Hour (Bits 0-7) Minute (Bits 8-15)	Second (Bits0-7)
119	Cmp2VFDPrechargeFault	6290	6291	6292	6293	6294
120	Cmp2VFDLowDCBusVolt	6295	6296	6297	6298	6299
121	Cmp2VFDHiDCBusVltRunning	6300	6301	6302	6303	6304
122	Cmp2VFDHiDCBusVltRegen	6305	6306	6307	6308	6309
123	Cmp2VFDHiSteeringBrVltPrechrg	6310	6311	6312	6313	6314
124	Cmp2VFDHiSteeringBrVltRunning	6315	6316	6317	6318	6319
125	Cmp2VFDMotorOverload	6320	6321	6322	6323	6324
126	Cmp2VFDHiCurrentBridge1	6325	6326	6327	6328	6329
127	Cmp2VFDHiCurrentBridge2	6330	6331	6332	6333	6334
128	Cmp2VFDHiCurrentChopper1	6335	6336	6337	6338	6339
129	Cmp2VFDHiCurrentChopper2	6340	6341	6342	6343	6344
130	Cmp2VFDInputPhaseLoss	6345	6346	6347	6348	6349
131	Cmp2VFDOutputPhaseLoss	6350	6351	6352	6353	6354
132	Cmp2VFDHiTempSide1	6355	6356	6357	6358	6359
133	Cmp2VFDHiTempSide2	6360	6361	6362	6363	6364
134	Cmp2VFD IGBT FltBridge1	6365	6366	6367	6368	6369
135	Cmp2VFD IGBT FltBridge2	6370	6371	6372	6373	6374
136	Cmp2VFD IGBT FltChopper1	6375	6376	6377	6378	6379
137	Cmp2VFD IGBT FltChopper2	6380	6381	6382	6383	6384
138	Cmp2VFDTherm1Flt	6385	6386	6387	6388	6389
139	Cmp2VFDTherm2Flt	6390	6391	6392	6393	6394
140	Cmp2VFDTherm3Flt	6395	6396	6397	6398	6399
141	Cmp2VFDTherm4Flt	6400	6401	6402	6403	6404
142	Cmp2VFDHiPwrSupTemp	6405	6406	6407	6408	6409
143	Cmp2VFDHiPwrSupVolt	6410	6411	6412	6413	6414
144	Cmp2VFDClgFanFlt	6415	6416	6417	6418	6419
145	Cmp2VFDProcessorFlt	6420	6421	6422	6423	6424
146	Cmp2VFDMaintenanceMode	6425	6426	6427	6428	6429
147	Cmp2SuctPressSenFlt	6430	6431	6432	6433	6434
148	Cmp2DishPressSenFlt	6435	6436	6437	6438	6439
149	Cmp2CondRfrCkt1PressSenFlt	6440	6441	6442	6443	6444
150	Cmp2CondRfrCkt2PressSenFlt	6445	6446	6447	6448	6449
151	Cmp2SuctTempSenFlt	6450	6451	6452	6453	6454
152	Cmp2DischTempSenFlt	6455	6456	6457	6458	6459
153	Cmp2MotorGapTempSenFlt	6460	6461	6462	6463	6464
154	Cmp2RotorPmpTempSenFlt	6465	6466	6467	6468	6469
155	Cmp2BearingOrbitSurgeFlt	6470	6471	6472	6473	6474
156	Cmp2CommunicationsFlt	6475	6476	6477	6478	6479
157	Cmp2EvapLvgWtrTempSenFlt	6480	6481	6482	6483	6484
158	Cmp2CondLvgWtrTempSenFlt	6485	6486	6487	6488	6489
159	Cmp2SoftwareFlt	6490	6491	6492	6493	6494
160	Cmp2EvapWtrFlwLoss	6495	6496	6497	6498	6499
161	Cmp2CondWtrFlwLoss	6590	6591	6592	6593	6594

This table lists the ASCII characters and their decimal and hexadecimal numbers. The characters in Bold are not supported. All non-printing characters, except (space), are not listed in this table and are not supported by the Magnitude Chiller Unit Controller. Characters not supported are translated to a space.

Table 6: ASCII-Supported Characters

Char	Decimal	Hexadecimal	Char	Decimal	Hexadecimal	Char	Decimal	Hexadecimal
(Space)	32	0x20	@	64	0x40	`	96	0x60
!	33	0x21	A	65	0x41	a	97	0x61
“	34	0x22	B	66	0x42	b	98	0x62
#	35	0x23	C	67	0x43	c	99	0x63
$	36	0x24	D	68	0x44	d	100	0x64
%	37	0x25	E	69	0x45	e	101	0x65
&	38	0x26	F	70	0x46	f	102	0x66
‘	39	0x27	G	71	0x47	g	103	0x67
(	40	0x28	H	72	0x48	h	104	0x68
)	41	0x29	I	73	0x49	I	105	0x69
*	42	0x2a	J	74	0x4a	j	106	0x6a
+	43	0x2b	K	75	0x4b	k	107	0x6b
‘	44	0x2c	L	76	0x4c	l	108	0x6c
-	45	0x2d	M	77	0x4d	m	109	0x6d
.	46	0x2e	N	78	0x4e	n	110	0x6e
/	47	0x2f	O	79	0x4f	o	111	0x6f
0	48	0x30	P	80	0x50	p	112	0x70
1	49	0x31	Q	81	0x51	q	113	0x71
2	50	0x32	R	82	0x52	r	114	0x72
3	51	0x33	S	83	0x53	s	115	0x73
4	52	0x34	T	84	0x54	t	116	0x74
5	53	0x35	U	85	0x55	u	117	0x75
6	54	0x36	V	86	0x56	v	118	0x76
7	55	0x37	W	87	0x57	w	119	0x77
8	56	0x38	X	88	0x58	x	120	0x78
9	57	0x39	Y	89	0x59	y	121	0x79
:	58	0x3a	Z	90	0x5a	z	122	0x7a
;	59	0x3b	[	91	0x5b	{	123	0x7b
<	60	0x3c	\	92	0x5c	|	124	0x7c
=	61	0x3d	]	93	0x5d	}	125	0x7d
>	62	0x3e	^	94	0x5e	~	126	0x7e
?	63	0x3f	_	95	0x5f			

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

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