



Integration Guide

BACnet and Modbus RTU Communication Interfaces for Trane™ Chillers with Tracer UC800 Control

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

BAS-SVP022A-GB
Original instructions



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Warnings, Cautions and Notices

Warning, cautions and notices are provided in appropriate places throughout this document:

Warning!

Indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution!

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE!

Indicates a situation that could result in equipment or property - damage - only accidents.

Overview

Interoperability provides the capability for building control systems or devices from multiple vendors to communicate with each other through open, standard protocols. Trane has adopted open, standard interoperable protocols to give customers the flexibility to choose the best possible vendor for their building subsystems and easily incorporate Trane products into legacy systems in existing buildings. This guide will provide:

- A brief overview of two of these protocols supported by Trane — BACnet™ and Modbus™ Remote Terminal Unit (RTU)
- An equivalent listing of data points for both protocols for RTHD Evo and RTAF chillers
- BACnet / Modbus RTU addressing
- BACnet / Modbus RTU data points and configuration property definitions
- Additional resources
- Glossary of terms

Note: Users of this guide should have basic knowledge of BACnet/Modbus protocols. For more detailed information about these protocols, visit these company's web sites listed under "Additional Resources."

BACnet Protocol

The Building Automation and Control Network (BACnet and ANSI/ASHRAE Standard 135-2004) protocol is a standard that allows building automation systems or components from different manufacturers to share information and control functions. BACnet provides building owners the capability to connect various types of building control systems or subsystems together for a variety of reasons. In addition, multiple vendors can use this protocol to share information for monitoring and supervisory control between systems and devices in a multi-vendor interconnected system. The BACnet protocol identifies standard objects (data points) called BACnet objects. Each object has a defined list of properties that provide information about that object. BACnet also defines a number of standard application services that are used to access data and manipulate these objects and provides a client/server communication between devices.

BACnet Testing Laboratory (BTL) Certification

All Tracer™ UC800 controllers are designed to support BACnet communication protocol. In addition, some particular revisions of the UC800 firmware have been tested and have achieved BTL certification by an official BACnet testing laboratory. For more details, refer to the BTL website at: www.bacnetassociation.org.

Modbus RTU Protocol

Modicon Communication Bus (Modbus) is an application layer-messaging protocol that, like BACnet, provides client/server communication between devices over a variety of networks. During communications on a Modbus RTU network, the protocol determines how each controller will know its device address, recognize a message addressed to its device, determine what action to take, and extract any data or other information contained in the message. Controllers communicate using a master/slave technique, whereby, only one device (master) can initiate transactions (queries). Other devices (slaves) respond by supplying the requested data to the master or by taking the action requested in the query.

The master can address individual slaves or it can initiate a broadcast message to all slaves. In turn, the slaves respond to queries that are addressed to them individually or broadcasted. The Modbus RTU protocol establishes the format for the master's query by placing into it the device address, a function code defining the requested action, any data to be sent, and an error-checking field.



Tracer UC800 Controller Rotary Switches

This section provides information about the Tracer™ UC800 controller rotary switches and LED displays.

Communication Interfaces

The UC800 supports the communication interfaces listed below. There is one set of terminations (link) for BACnet and Modbus. LonTalk™ and Comm 4 communication interfaces connect to the IPC3 bus which is the MBUS connection.

- BACnet MS /TP
- Modbus Slave
- LonTalk using LCI-C (from the IPC3 bus) Note: Refer to "Additional Resources"
- Comm4 using TCI (from the IPC3 bus)

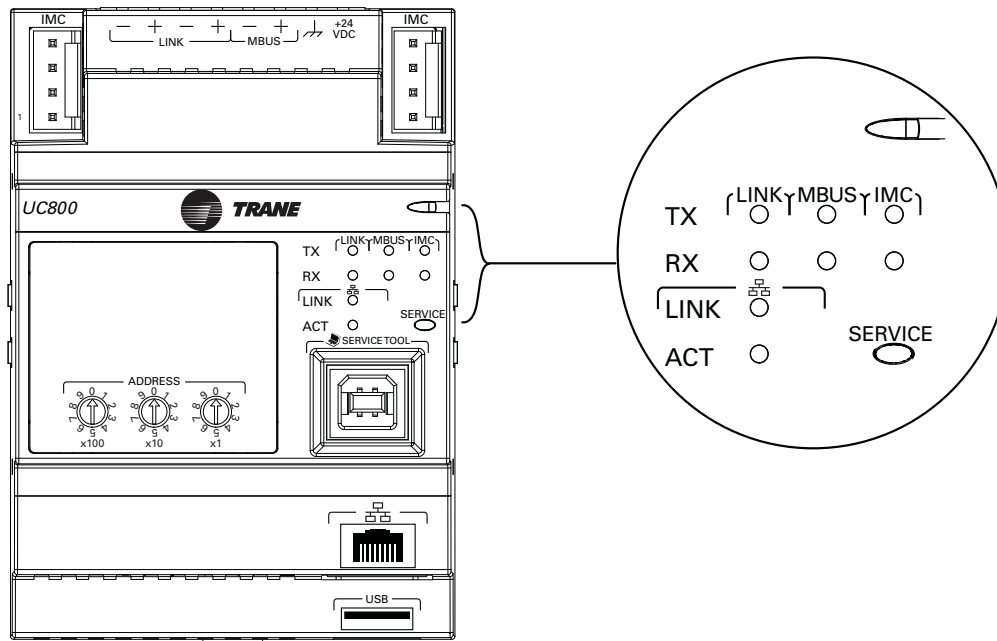
Rotary Switches

There are three rotary switches on the front of the UC800. See Figure 1. Use these switches to define a three-digit address when the UC800 is installed in a BACnet or Modbus RTU system (for example, 107, 127, and so on). Note: Valid MAC addresses are 001 to 127 for BACnet and 001 to 247 for Modbus RTU. For additional information about setting higher addresses, refer to "Device ID"

LED Description and Operation

There are 10 LEDs on the front of the UC800. Figure 1 shows the locations of each LED and a description of its behavior in specific instances.

Figure 1 - LED locations



Marquee LED

- Shows solid green when the UC800 is powered and operating normally.
- Shows solid red when the UC800 is powered, but represents low power or a malfunction.
- Blinks red when an alarm exists.

LINK, MBUS, IMC

- The TX LED blinks green at the data transfer rate when the UC800 transfers data to other devices on the link.
- The RX LED blinks yellow at the data transfer rate when the UC800 receives data from other devices on the link.

Ethernet Link

- The LINK LED shows solid green if the Ethernet link is connected and communicating.
- The ACT LED blinks yellow at the data transfer rate when data flow is active on the link.

SERVICE

- Shows solid green when pressed. (For more details, refer to the document, Installation, Operation, and Maintenance Guide for Chillers (RTHD Evo – RTAF) with Tracer UC800 Control listed in the section, "Additional Resources".)

Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

The following table provides a quick reference to equivalent data point objects names for RTWD and RTAF chillers when using either BACnet or Modbus RTU communications. This table is sorted alphabetically by data point names.

Note: The information contained in the following table is for versions 2.06 and higher. For version 1.11, refer to BACnet and Modbus RTU Communications Interfaces for Trane Chillers with Tracer UC800 Control Integration Guide.

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
Active Chilled Water Setpoint	AI 1	30003	X	X
Front Panel Chilled Water Setpoint	AI 2	30004	X	X
Evaporator Entering Water Temperature	AI 3	30005	X	X
Evaporator Leaving Water Temperature	AI 4	30006	X	X
Active Current Limit Setpoint	AI 5	30007	X	X
Front Panel Current Limit Setpoint	AI 6	30008	X	X
Unit Power Consumption	AI 7	30009	X	X
Outdoor Air Temperature	AI 8	30010	X	X
External Chilled Water Setpoint	AI 9	30011	X	X
External Current Limit Setpoint	AI 10	30012	X	X
Evaporator Refrigerant Pressure Ckt1	AI 11	30013	X	X
Condenser Refrigerant Pressure Ckt1	AI 12	30014	X	X
Differential Refrigerant Pressure Ckt1	AI 13	30015	X	X
Evaporator Saturated Rfgt Temp Ckt1	AI 14	30016	X	X
Condenser Saturated Rfgt Temp Ckt1	AI 15	30017	X	X
Evaporator Refrigerant Pressure Ckt2	AI 16	30018		X
Condenser Refrigerant Pressure Ckt2	AI 17	30019		X
Differential Refrigerant Pressure Ckt2	AI 18	30020		X
Evaporator Saturated Rfgt Temp Ckt2	AI 19	30021		X
Condenser Saturated Rfgt Temp Ckt2	AI 20	30022		X
Discharge Temperature Cprsr1A	AI 21	30023	X	X
Oil Pressure Cprsr1A	AI 22	30024	X	X
Oil Temperature Cprsr1A	AI 23	30025	X	X
Discharge Temperature Cprsr2A	AI 24	30026		X
Oil Pressure Cprsr2A	AI 25	30027		X
Oil Temperature Cprsr2A	AI 26	30028		X
Air Flow Ckt1	AI 30	30032		
Air Flow Ckt2	AI 31	30033		
Starts Cprsr1A	AI 35	30035/36	X	X
Run Time Cprsr1A	AI 36	30037/38	X	X
Motor Voltage Phase AB Cprsr1A	AI 37	30039	X	X
Motor Voltage Phase BC Cprsr1A	AI 38	30040	X	X
Motor Voltage Phase CA Cprsr1A	AI 39	30041	X	X
Motor Current A Cprsr1A	AI 40	30042	X	X
Motor Current B Cprsr1A	AI 41	30043	X	X
Motor Current C Cprsr1A	AI 42	30044	X	X
Motor % RLA A Cprsr1A	AI 43	30045	X	X
Motor % RLA B Cprsr1A	AI 44	30046	X	X



Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
Motor % RLA C Cprsr1A	AI 45	30047	X	X
Average Motor Current % RLA AFD 1A	AI 46	30048		X
Starts Cprsr2A	AI 51	30051/52		X
Run Time Cprsr2A	AI 52	30053/54		X
Motor Voltage Phase AB Cprsr2A	AI 53	30055		X
Motor Voltage Phase BC Cprsr2A	AI 54	30056		X
Motor Voltage Phase CA Cprsr2A	AI 55	30057		X
Motor Current A Cprsr2A	AI 56	30058		X
Motor Current B Cprsr2A	AI 57	30059		X
Motor Current C Cprsr2A	AI 58	30060		X
Motor % RLA A Cprsr2A	AI 59	30061		X
Motor % RLA B Cprsr2A	AI 60	30062		X
Motor % RLA C Cprsr2A	AI 61	30063		X
Average Motor Current % RLA AFD 2A	AI 62	30064		X
Run Enable	BI 1	30094	X	X
Local Setpoint Control	BI 2	30095	X	X
Limit Mode Relay Status	BI 3	30096	X	X
Chiller Running State	BI 4	30097	X	X
Maximum Capacity Relay	BI 5	30098	X	X
Alarm Present	BI 10	30099	X	X
Chiller Running Status	MI 1	30100	X	X
Operating Mode	MI 2	30101	X	X
Front Panel Chiller Mode	MI 3	30102	X	X
Front Panel Auto/Stop	MI 8	30103	X	X
Active Chilled Water Setpoint Source	MI 5	30104	X	X
Setpoint Source	MI 4	30105	X	X
Active Current Limit Setpoint Source	MI 6	30106	X	X
Manual Override Exists	BI 8	30107	X	X
Running Status Cprsr1A	BI 11	30108	X	X
Running Status Cprsr2A	BI 12	30109		X
External Auto Stop	MI 7	30110	X	X
Emergency Stop	BI 9	30111	X	X
Evaporator Water Pump Command	BI 6	30112	X	X
Evaporator Water Flow Status	BI 7	30113	X	X
BAS Chiller Auto Stop Command	MV 1	40001	X	X
BAS Chiller Mode Command	MV 2	40002	X	X
Chilled Water Setpoint	AV 1	40003	X	X
Current Limit Setpoint	AV 3	40004	X	X
BAS Noise Reduction Command	BV 3	40005		X
Last Diagnostic Code	Not Available	30114	X	X
Reset Diagnostic	BV 2	40008	X	X

Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
AFD Fault 1A	BI 500		X	X
AFD Fault 2A	BI 501			X
At Speed Input Opened	BI 502		X	X
At Speed Input Opened	BI 503		X	X
At Speed Input Shorted	BI 504		X	X
At Speed Input Shorted	BI 505		X	X
BAS Communication Lost	BI 506		X	X
BAS Failed to Establish Communication	BI 507		X	X
Chiller Service Recommended	BI 508		X	X
Comm Loss: AFD Fault Input 1A	BI 509		X	X
Comm Loss: AFD Fault Input 2A	BI 510			X
Comm Loss: AFD Run Command	BI 511		X	X
Comm Loss: AFD Run Command	BI 512		X	X
Comm Loss: Auxiliary Setpoint Command	BI 513		X	X
Comm Loss: Oil Temperature	BI 514		X	X
Comm Loss: Oil Temperature	BI 515			X
Comm Loss: Energy Meter Pulse Input	BI 516			X
Comm Loss: Evap Iso Valve Close Switch	BI 517			X
Comm Loss: Evap Iso Valve Close Switch	BI 518			X
Comm Loss: Evap Iso Valve Open Switch	BI 519			X
Comm Loss: Evap Iso Valve Open Switch	BI 520			X
Comm Loss: Evap Isolation Valve Relay	BI 521			X
Comm Loss: Evap Isolation Valve Relay	BI 522			X
Comm Loss: Evaporator Pump 2 Fault Input	BI 523		X	X
Comm Loss: Evaporator Pump 1 Fault Input	BI 524		X	X
Comm Loss: Fan Relay 1 - Circuit 1	BI 525			X
Comm Loss: Fan Relay 1 - Circuit 2	BI 526			X
Comm Loss: Fan Relay 2 - Circuit 1	BI 527			X
Comm Loss: Fan Relay 2 - Circuit 2	BI 528			X
Comm Loss: Fan Relay 3 - Circuit 1	BI 529			X
Comm Loss: Fan Relay 3 - Circuit 2	BI 530			X
Comm Loss: Fan Relay 4 - Circuit 1	BI 531			X
Comm Loss: Fan Relay 4 - Circuit 2	BI 532			X
Comm Loss: High Pressure Cutout Switch	BI 533		X	X
Comm Loss: High Pressure Cutout Switch	BI 534			X



Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
Comm Loss: Local BAS Interface	BI 535		X	X
Comm Loss: Motor 1A RLA Input	BI 536		X	X
Comm Loss: Motor 2A RLA Input	BI 537			X
Comm Loss: Motor Winding Tstat Cprsr2A	BI 538			X
Comm Loss: Motor Winding Tstat Cprsr1A	BI 539		X	X
Comm Loss: Programmable Relay Board 2	BI 540		X	X
Comm Loss: Slide Valve Load	BI 541		X	X
Comm Loss: Slide Valve Load	BI 542			X
Comm Loss: Slide Valve Unload	BI 543		X	X
Comm Loss: Slide Valve Unload	BI 544			X
Comm Loss: Speed Command 1A	BI 545		X	X
Comm Loss: Speed Command 2A	BI 546			X
Comm Loss: Starter	BI 547		X	X
Comm Loss: Step Load	BI 548			X
Comm Loss: Step Load	BI 549			X
Comm Loss: Sub-Cooling Liq Press, Ckt 2	BI 550		X	X
Comm Loss: Sub-Cooling Liq Press, Ckt 1	BI 551		X	X
Compressor Did Not Accel: Transition	BI 552		X	X
Compressor Did Not Accel: Transition	BI 553		X	X
Compressor Did Not Accelerate: Shutdown	BI 554		X	X
Compressor Did Not Accelerate: Shutdown	BI 555			X
Oil Temperature Sensor	BI 556		X	X
Oil Temperature Sensor	BI 557			X
Comm Loss: Starter	BI 558		X	X
Comm Loss: Fan Control Relays	BI 559			X
Comm Loss: Fan Control Relays	BI 560			X
Evaporator Pump 1 Fault	BI 561			X
Evap Pump 1 Starts Run time Written	BI 562			X
Evaporator Pump 2 Fault	BI 563			X
Comm Loss: Evaporator Water Pump 2 Relay	BI 564			X
Evap Pump 2 Starts Run time Written	BI 565			X
Comm Loss: Evap Pump Inv1 Fault Input	BI 566			X
Comm Loss: Evap Pump Inv1 Freq Feedback	BI 567			X
Comm Loss: Evap Pump Inv1 Run Command	BI 568			X
Evap Water Pump 1 Svc Recommended	BI 569			X
Evap Water Pump 2 Svc Recommended	BI 570			X



Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
Evap Iso Valve Closed Switch Failure	BI 571			X
Evap Iso Valve Closed Switch Failure	BI 572			X
Evap Isolation Valve Failed To Close	BI 573			X
Evap Isolation Valve Failed To Close	BI 574			X
Evap Isolation Valve Failed To Open	BI 575			X
Evap Isolation Valve Failed To Open	BI 576			X
Evap Iso Valve Illegal Switch State	BI 577			X
Evap Iso Valve Illegal Switch State	BI 578			X
Evap Iso Valve Open Switch Failure	BI 579			X
Evap Iso Valve Open Switch Failure	BI 580			X
Evaporator Water Flow Lost - Pump1	BI 581			X
Evaporator Water Flow Lost - Pump2	BI 582			X
Evaporator Water Flow Overdue - Pump1	BI 583			X
High Motor Winding Temperature	BI 584			X
High Motor Winding Temperature	BI 585			
High Oil Temperature	BI 586		X	X
High Oil Temperature	BI 587			X
LCI-C Software Mismatch: Use BAS Tool	BI 588			
Mfr Maintenance Recommended Cprsr1A	BI 589		X	X
Mfr Maintenance Recommended Cprsr1B	BI 590			X
Mfr Maintenance Recommended Cprsr2A	BI 591			X
Mfr Maintenance Recommended Cprsr2B	BI 592			X
Momentary Power Loss	BI 593		X	X
Momentary Power Loss	BI 594			X
Motor 1A RLA Input	BI 595		X	X
Motor 2A RLA Input	BI 596			X
Motor Current Overload	BI 597		X	X
Motor Current Overload	BI 598			X
Phase Loss	BI 599		X	X
Phase Loss	BI 600			X
Phase Reversal	BI 601		X	X
Phase Reversal	BI 602			X
Power Loss	BI 603			X
Power Loss	BI 604			X
Severe Current Imbalance	BI 605		X	X
Severe Current Imbalance	BI 606			X
Starter Comm Loss: Main Processor	BI 607		X	X
Starter Comm Loss: Main Processor	BI 608			X
Starter Contactor Interrupt Failure CKT1	BI 609		X	X
Starter Contactor Interrupt Failure CKT2	BI 610			X
Starter Did Not Fully Accelerate	BI 611		X	X



Equivalent Data Points Reference List for RTHD Evo and RTAF Chillers: BACnet, Modbus RTU

Data Point Object Name	BACnet Object	Modbus RTU Register	RTHD	RTAF
Starter Did Not Fully Accelerate	BI 612			X
Starter Did Not Transition	BI 613		X	X
Starter Did Not Transition	BI 614			X
Starter Dry Run Test	BI 615		X	X
Starter Dry Run Test	BI 616			X
Starter Fault Type I	BI 617		X	X
Starter Fault Type I	BI 618			X
Starter Fault Type II	BI 619		X	X
Starter Fault Type II	BI 620			X
Starter Fault Type III	BI 621		X	X
Starter Fault Type III	BI 622			X
Starter Module Memory Error Type 1	BI 623		X	X
Starter Module Memory Error Type 2	BI 624			X
Starter Module Memory Error Type 2	BI 625			X
Sub-Cooling Pressure Sensor, Circuit 2	BI 626			X
Liquid Line Pressure Sensor - Ckt1	BI 627		X	X
Transition Complete Input Opened	BI 628		X	X
Transition Complete Input Opened	BI 629			X
Transition Complete Input Shorted	BI 630		X	X
Transition Complete Input Shorted	BI 631			X

BACnet Data Points and Configuration Property Definitions

The Tracer UC800 controller is an equipment unit controller that provides the equipment system sequences and performs closed-loop control. In addition, the UC800 integrates with other BACnet systems and devices using BACnet MS/TP. This section includes information about:

- BACnet protocol implementation conformance statement (PICS)
- Object types: descriptions and configuration
- Baud rate, Device ID, and character set

BACnet Protocol Implementation Conformance Statement (PICS)

Standardized Device Profile

BACnet application specific controller (B-ASC)

Interoperability Building Blocks

Data Sharing

- Data Sharing-Read Property-B(DS-RP-B)
- Data Sharing-Read Property Multiple-B(DS-RPM-B)
- DataSharing-WriteProperty-B(DS-WP-B)
- Data Sharing-Write Property Multiple-B(DS-WPM-B)

Alarm and Event Management

- Alarm and Event-Notification Internal-B(AE-N-I-B)
- Alarm and Event-Information-B(AE-INFO-B)

Device Management

- Device Management-Dynamic Device Binding-A (DM-DDB-A)
- Device Management-Dynamic Device Binding-B (DM-DDB-B)
- Device Management-Dynamic Object Binding-B (DM-DOB-B)
- Device Management-Device Communication Control-B(DM-DCC-B)
- Device Management-Time Synchronization-B (DM-TS-B)
- Device Management-UTCTime Synchronization-B (DM-UTC-B)



BACnet Data Points and Configuration Property Definitions

Binary Outputs

Object_Identification	Object_Name	Type	Inst.	Relinquish Default	Inactive Text	Active Text
0x0100000FFFFFFFFFA (Binary Output, -6)	Chiller Auto Stop Command	BO	1	True	Stop	Auto
0x0100000FFFFFFFFFB (Binary Output, -5)	Remote Diagnostic Reset Command	BO	2	False	No Reset Request	Reset Request
0x0100000FFFFFFFFFC (Binary Output, -4)	Base Loading Auto/On Request	BO	3	False	Auto	On

Binary Inputs

Object_Identification	Object_Name	Type	Inst.
0x00C00001 (Binary Input, 1)	Run Enabled	BI	1
0x00C00002 (Binary Input, 2)	Local Setpoint Control	BI	2
0x00C00003 (Binary Input, 3)	Capacity Limited	BI	3
0x00C00004 (Binary Input, 4)	Chiller Running State	BI	4
0x00C00005 (Binary Input, 5)	Condenser Water Flow Status	BI	5
0x00C00006 (Binary Input, 6)	Head Relief Request	BI	7
0x00C00007 (Binary Input, 7)	Base Loading Active	BI	8
0x00C00008 (Binary Input, 8)	Compressor 1A Running	BI	9
0x00C00009 (Binary Input, 9)	Evaporator Water Pump Request	BI	17
0x00C0000A (Binary Input, 10)	Condenser Water Pump Request	BI	19
0x00C0000B (Binary Input, 11)	Evaporator Water Flow Status	BI	22
0x00C0000C (Binary Input, 12)	Alarm Present	BI	23
0x00C0000D (Binary Input, 13)	Shutdown Alarm Present	BI	24
0x00C0000E (Binary Input, 14)	Last Diagnostic	BI	25

Analog Outputs

Object_Identification	Object_Name	Type	Inst.	Relinquish Default	Units	Min Value	Max Value
0x040000014 (Analog Output, 20)	Chilled Water Setpoint	AO	1	44F	Degrees celcius	0F	75F
0x040000015 (Analog Output, 21)	Current Limit Setpoint	AO	2	100%	Percent	0%	120%
0x040000016 (Analog Output, 22)	Hot Water Setpoint	AO	4	120F	Degrees Celcius	80F	140F
0x040000017 (Analog Output, 23)	Base Loading Setpoint	AO	5	50%	Percent	0%	100%

BACnet Data Points and Configuration Property Definitions

Analog Inputs

Object_Identification	Object_Name	Type	Inst.	Units
0x0000001E (Analog Input, 30)	Active Cool/Heat Setpoint Temperature	AI	1	Degrees_Celcius
0x0000001F (Analog Input, 31)	Active Current Limit Setpoint	AI	2	Percent
0x00000020 (Analog Input, 32)	Active Base Loading Setpoint	AI	4	Percent
0x00000021 (Analog Input, 33)	Actual Running Capacity	AI	5	Percent
0x00000022 (Analog Input, 34)	Evaporator Refrigerant Pressure - Ckt 1	AI	6	kPa
0x00000023 (Analog Input, 35)	Evaporator Refrigerant Pressure - Ckt 2	AI	9	kPa
0x00000024 (Analog Input, 36)	Evaporator Saturated Refrigerant Temperature - Ckt 1	AI	12	Degrees_Celcius
0x00000025 (Analog Input, 37)	Condenser Refrigerant Pressure - Ckt 1	AI	16	kPa
0x00000026 (Analog Input, 38)	Condenser Refrigerant Pressure - Ckt 2	AI	18	kPa
0x00000027 (Analog Input, 39)	Condenser Saturated Refrigerant Temperature - Ckt 1	AI	20	Degrees_Celcius
0x00000028 (Analog Input, 40)	Condenser Saturated Refrigerant Temperature - Ckt 2	AI	22	Degrees_Celcius
0x00000029 (Analog Input, 41)	Local Atmospheric Pressure	AI	25	kPa
0x0000002A (Analog Input, 42)	Starts - Compressor 1A	AI	26	None
0x0000002B (Analog Input, 43)	Run Time - Compressor 1A	AI	34	Hours
0x0000002C (Analog Input, 44)	Evaporator Entering Water Temp	AI	44	Degrees_Celcius
0x0000002D (Analog Input, 45)	Evaporator Leaving Water Temp	AI	45	Degrees_Celcius
0x0000002E (Analog Input, 46)	Condenser Entering Water Temp	AI	46	Degrees_Celcius
0x0000002F (Analog Input, 47)	Condenser Leaving Water Temp	AI	47	Degrees_Celcius
0x00000030 (Analog Input, 48)	High Side Oil Pressure - Compressor 1A	AI	48	kPa
0x00000031 (Analog Input, 49)	Refrigerant Disch Temp - Ckt 1	AI	56	Degree_Celcius
0x00000032 (Analog Input, 50)	Condenser Control Output	AI	58	Percent
0x00000033 (Analog Input, 51)	Phase AB Voltage - Compressor 1A	AI	59	Volts
0x00000034 (Analog Input, 52)	Phase BC Voltage - Compressor 1A	AI	60	Volts
0x00000035 (Analog Input, 53)	Phase CA Voltage - Compressor 1A	AI	61	Volts
0x00000036 (Analog Input, 54)	Line 1 Current (in Amps) - Compressor 1A	AI	71	Amps
0x00000037 (Analog Input, 55)	Line 2 Current (in Amps) - Compressor 1A	AI	72	Amps
0x00000038 (Analog Input, 56)	Line 3 Current (in Amps) - Compressor 1A	AI	73	Amps
0x00000039 (Analog Input, 57)	Line 1 Current (%RLA) - Compressor 1A	AI	83	Percent
0x0000003A (Analog Input, 58)	Line 2 Current (%RLA) - Compressor 1A	AI	84	Percent
0x0000003B (Analog Input, 59)	Line 3 Current (%RLA) - Compressor 1A	AI	85	Percent
0x0000003C (Analog Input, 60)	Number of Circuits	AI	95	None
0x0000003D (Analog Input, 61)	Number of Compressors - Ckt 1	AI	96	None
0x0000003E (Analog Input, 62)	Number of Compressors - Ckt 2	AI	97	None
0x0000003F (Analog Input, 63)	Chiller Design Capacity	AI	98	kW



BACnet Data Points and Configuration Property Definitions

Multi State Outputs

Object_Identification	Object_Name	Type	Inst.	IPC3 States	Number of States	State Text	Relinquish Default
0x038000045 (Multi-State Output, 69)	Chiller Mode Command	MO	1	[3] HVAC_COOL [1] HVAC_HEAT [11] HVAC_ICE [10] HVAC_FREE_COOL	4	[0] 4 [1] Cool [2] Heat [3] Ice Making [4] NOT_USED	[1] [Cool]

MultiState Inputs

Object_Identifier	Object_Name	Type	Inst.	Number of States	State Text
0x0340004B (Multi_State Input, 75)	Running Mode	MI	1	5	[0] 5 [1] Chiller Off [2] Chiller in Start Mode [3] Chiller in Run Mode [4] Chiller in Pre-Shutdown Mode [5] Chiller in Service Mode
0x0340004C (Multi_State Input, 76)	Operating Mode	MI	2	4	[0] 4 [1] HVAC_COOL [2] HVAC_HEAT [3] HVAC_ICE [4] NOT_USED
0x0340004D (Multi_State Input, 77)	MP Communication Status	MI	3	4	[0] 4 [1] Communication [2] Communication Lost [3] Failed To Establish [4] Waiting To Establish
0x0340004E (Multi_State Input, 78)	Refrigerant Type	MI	4	12	[0] 12 [1] R-11 [2] R-12 [3] R-22 [4] R-123 [5] R-134A [6] R-407C [7] R-410A [8] R-113 [9] R-114 [10] R-500 [11] R-502 [12] R-404A
0x0340004F (Multi_State Input, 79)	Model Information	MI	5	16	[0] 16 [1] RTA [2] CVH [3] CVG [4] CVR [5] CDH [6] RTH [7] CGW [8] CGA [9] CCA [10] RTW [11] RTX [12] RTU [13] CCU [14] CXA [15] CGC [16] RAU

BACnet Data Points and Configuration Property Definitions

Object_Identifier	Object_Name	Type	Inst.	Number of States	State Text
0x03400050 (Multi_State Input, 80)	Cooling Type	MI	6	2	[0] 2 [1] Water Cooled [2] Air Cooled
0x03400051 (Multi_State Input, 81)	Manufacturing Location	MI	7	18	[0] 18 [1] Field Applied [2] La Crosse [3] Pueblo [4] Charmes [5] Rushville [6] Macon [7] Waco [8] Lexington [9] Forsyth [10] Clarksville [11] Ft. Smith [12] Penang [13] Colchester [14] Curitiba [15] Taicang [16] Taiwan [17] Epinal [18] Golbey



Modbus RTU Data Points and Configuration

Property Definitions

The Tracer UC800 controller is an equipment unit controller which provides the equipment system sequences and performs closed-loop control. In addition, the UC800 integrates with Modbus systems and devices using Modbus RTU protocol. This section includes information about baud rate, parity, and supported character sets

Protocol: Baud Rate, Parity, and Supported Character Sets

Baud Rate: 300, 1200, 2400, 4800, 9600, 19200 (**default**), 38400, 57600 or 115200

Parity: Even (**default**) or None

Stop Bits: One (**default**) or two

Modbus Data Points Descriptions and Configurations

Binary Outputs

Register Object Name	Register	Register Type	Register Value	
BAS Chiller Auto stop Command	40001	Binary	0=OFF; 1=ON	Holding Register-Read/Write
BAS Base Loading Command	40007	Binary	0=OFF; 1=ON	Holding Register-Read/Write
BAS Diagnostic Reset	40008	Binary	0=OFF; 1=ON	Holding Register-Read/Write

Binary Inputs

Register Object Name	Register	Register Type	Register Value	
Chiller Running	30003	Binary	0=OFF; 1=ON	Input Register-Read only
Evaporator Water Pump Command	30012	Binary	0=OFF; 1=ON	Input Register-Read only
Evaporator Water Flow Status	30013	Binary	0=No Flow; 1=Flow	Input Register-Read only
Condenser Water Pump Command	30014	Binary	0=OFF; 1=ON	Input Register-Read only
Condenser Water Flow Status	30015	Binary	0=No Flow; 1=Flow	Input Register-Read only
Alarm Present	30019	Binary	0=No ; 1=Yes	Input Register-Read only
Shutdown Alarm Present	30020	Binary	0=No ; 1=Yes	Input Register-Read only
Run Enable	30021	Binary	0=Stop; 1=Auto	Input Register-Read only
Local Setpoint Control	30022	Binary	0=No; 1=Yes	Input Register-Read only
Limit Mode Relay Status	30023	Binary	0=Inactive; 1=Active	Input Register-Read only
Head Relief Request Relay	30024	Binary	0=OFF; 1=ON	Input Register-Read only
Active Base Loading Command	30026	Binary	0=Inactive; 1=Active	Input Register-Read only
Compressor Running status	30027	Binary	0=OFF; 1=Running	Input Register-Read only

Modbus RTU Data Points and Configuration Property Definitions

Analogic Outputs

Register Object Name	Register	Register Type	Register Value	
BAS Chilled Water Setpoint	40003	Temperature	0~75F	Holding Register-Read/Write
BAS Current Limit Setpoint	40004	Percent	0~100%	Holding Register-Read/Write
BAS Hot Water Setpoint	40005	Temperature	80~140F	Holding Register-Read/Write
BAS Base Loading Setpoint	40006	Percent	0~100%	Holding Register-Read/Write

Analogic Inputs

Register Object Name	Register	Register Type	Register Value	
Active Current Limit Setpoint	30004	Percent		Input Register-Read only
Active Base Loading Setpoint	30005	Percent		Input Register-Read only
Actual Running Capacity	30006	Percent		Input Register-Read only
Active Cool/Heat Setpoint Temperature	30007	Temperature		Input Register-Read only
Evaporator Entering Water Temperature	30008	Temperature		Input Register-Read only
Evaporator Leaving Water Temperature	30009	Temperature		Input Register-Read only
Condenser Entering Water Temperature	30010	Temperature		Input Register-Read only
Condenser Leaving Water Temperature	30011	Temperature		Input Register-Read only
Head Pressure Control Command	30025	Voltage		Input Register-Read only
Local Atmospheric Pressure	30028	Pressure		Input Register-Read only
Evaporator Refrigerant Pressure	30029	Pressure		Input Register-Read only
Condenser Refrigerant Pressure	30030	Pressure		Input Register-Read only
Evaporator Saturated Rfgt Temp	30031	Temperature		Input Register-Read only
Condenser Saturated Rfgt Temp	30032	Temperature		Input Register-Read only
Compressor Oil Pressure	30035	Pressure		Input Register-Read only
Discharge Temperature	30036	Temperature		Input Register-Read only
Starter Input Voltage AB	30037	Voltage		Input Register-Read only
Starter Input Voltage BC	30038	Voltage		Input Register-Read only
Starter Input Voltage CA	30039	Voltage		Input Register-Read only
Starter Motor Current L1	30040	Current		Input Register-Read only
Starter Motor Current L2	30041	Current		Input Register-Read only
Starter Motor Current L3	30042	Current		Input Register-Read only
Starter Motor Current L1 % RLA	30043	Percent		Input Register-Read only
Starter Motor Current L2 % RLA	30044	Percent		Input Register-Read only
Starter Motor Current L3 % RLA	30045	Percent		Input Register-Read only
Frequency Command	30046	Frequency		Input Register-Read only
AFD Output Power	30047	Power		Input Register-Read only



Modbus RTU Data Points and Configuration Property Definitions

Multistate Inputs

Register Object Name	Register	Register Type	Register Value	
Software Type	30001	N/A		Input Register-Read only
Software Revision	30002	N/A		Input Register-Read only
Chiller Running Status	30016	Enumeration	[1] Not Running [2] Starting [3] Running [4] Stopping [5] Chiller in Service Mode	Input Register-Read only
Chiller Mode Command	30017	Enumeration	[1] Cool [2] Heat [3] Ice [4] NOT_USED	Input Register-Read only
BAS Communication Status	30018	Enumeration	[1] Established [2] Lost [3] Never Established [4] Starting	Input Register-Read only
Compressor Starts	30033	Count		Input Register-Read only
Compressor Running Time	30034	Time Interval		Input Register-Read only
Number of Circuits	30048	Number	1	Input Register-Read only
Number of Compressors - Ckt 1	30049	Number	1	Input Register-Read only
Number of Compressors - Ckt 2	30050	Number	0	Input Register-Read only
Chiller Design Capacity	30051	Number		Input Register-Read only
Refrigerant Type	30052	Enumeration	[0] R-134A	Input Register-Read only
Model Information	30053	Enumeration	[6] RTHD / RTAF	Input Register-Read only
Cooling Type	30054	Enumeration	[1] Water Cooled / Air Cooled	Input Register-Read only
Manufacturing Location	30055	Enumeration	[3] Pueblo [15] Taicang [17] Epinal [18] Golbey	Input Register-Read only
Last Diagnostic	30056	Enumeration		Input Register-Read only

Multistate Outputs

Register Object Name	Register	Register Type	Register Value	
BAS Chiller Mode Command	40002	Enumeration	1= Cool; 2=Heat; 3=Ice	Holding Register-Read/ Write

Additional Resources

Use the following documents and links as additional resources:

- RTHD Evo, Installation, Operation, and Maintenance Manual (IOM: RLC – SVX018A)
- RTAF, Installation, Operation, and Maintenance Manual (IOM: RLC-SVX019A)
- LonTalk™ Communication Interface for Trane Chillers with Tracer AdpatiView Control Hardware and Software Installation Guide (ACC-SVN100A-EN)
- Tracer TU Service Tool (CTV-SVD03A-EN)
- WWW.bacnet.org
- WWW.bacnetassociation.org
- WWW.modbus.org
- WWW.ashrae.org

Note: For further assistance, contact your local Trane Sales Office.

Glossary

A

ASHRAE

See American Society of Heating, Refrigeration, and Air-conditioning Engineers

American Society of Heating, Refrigeration, and Air-conditioning Engineers

An international organization of 50,000 persons with chapters throughout the world. The Society is organized for the sole purpose of advancing the arts and sciences of heating, ventilation, air conditioning and refrigeration. It benefits the public with its research, standards writing, continuing education, and publications.

B

BACnet™

See Building Automation Control network

BACnet interoperability building blocks

A block of BACnet application services that tells vendors what BACnet services must be implemented to provide specific device functionality. The BIBBs are grouped together into BACnet device profiles.

BACnet object

An abstract representation of the physical point or points where data is input from or output to an I/O device. Each object may have several BACnet properties that describe the status of that object.

Baud rate

The number of signaling elements that occur each second during electronic data transmission. At slow speeds, baud indicates the number of bits per second that are transmitted. For example, 500 baud means that 500 bits are transmitted each second (abbreviated 500bps). At higher speeds, multiple bits may be encoded with each electrical change. For example, 4800 baud may allow 9600 bits to be sent each second. Data transmission rates at high speeds are generally expressed in bits per second (bps) rather than baud. For example, a 9600 bps mode may operate at only 2400 baud.

BIBB

See BACnet interoperability building blocks

Building Automation Control network (BACnet and ANSI/ASHRAE Standard 135-2004)

An interoperable protocol developed specifically for the building controls industry. The American National Standards Institute named it as a standard and Trane advocates BACnet protocol for use in system-level control devices.

C

Configuration (Tracer™ UC800 controller)

Refers to the use of the Tracer TU service tool to select the chiller type, tonnage, and other options, of a Tracer UC800 controller.

D

device

A device is a standard BACnet object as defined by ASHRAE Standard 135-2004. The Tracer UC800 contains the BACnet object.

Device ID

The Device ID issued to uniquely identify each BACnet Device and it can be in the range of 0 to 4194302. There cannot be more than one device using the same Device ID. Each of the sample applications operate as a device and requires its own device id which defaults to zero.

H

Holding register (read/write)

A function code used to read the content from contiguous block of holding registers in a remote device used with the Modbus protocol.

I**Input register (read-only)**

A function code used to read from 1 to 125 contiguous input registers in a remote device used with the Modbus protocol.

Interoperability

The ability to integrate equipment from different vendors into a comprehensive automation and control system. In addition, digital communications between products designed independently, but designed to the same communication standard.

L**LLID**

Low level intelligent device.

M**Modbus**

A communications standard developed by Modicon for industrial control systems. Modbus variations include Modbus RTU, Intel Modbus RTU, Modbus Plus, and Modbus TCP/IP.

P**protocol**

A set of rules (language) that governs the exchange of data over a digital communications system.

R**RLA**

Rated load amps.

T**Tracer UC800 controller**

Name of a family of Trane chiller controllers.



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