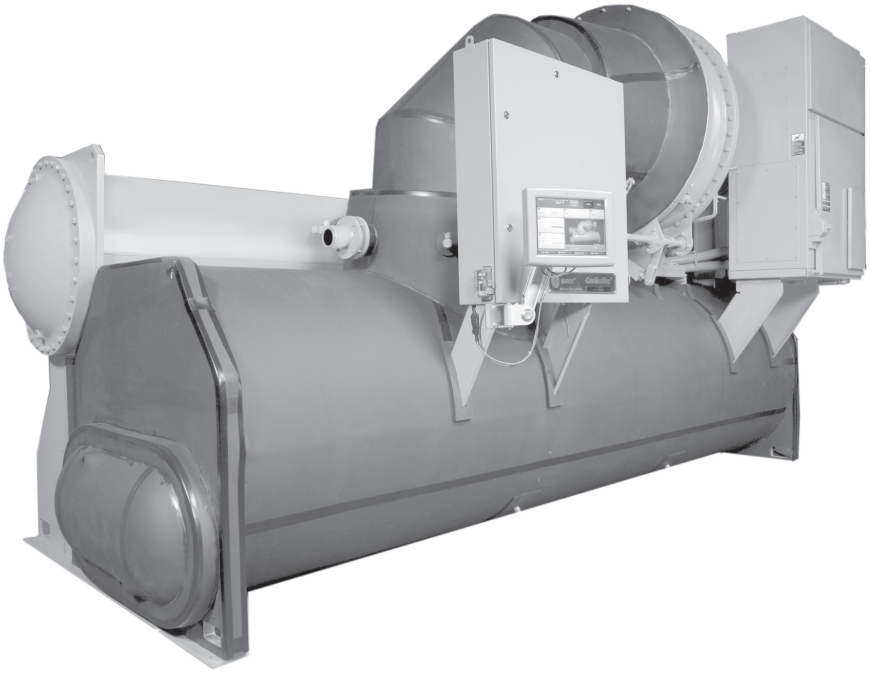
Integration Guide

BACnet™ and Modbus RTU Communication Interfaces

for Trane™ Chillers with Tracer AdaptiView™ Control



X39641078-01A

February 2008

BAS-SVP01A-EN

Copyright

Trademarks

Contents

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
- BACnet/Modbus RTU addressing
- BACnet/Modbus RTU data points and configuration property definitions
- Additional resources
- A 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," p. 37**.*

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.

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 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," p. 37.
- Comm 4 using TCI (from the IPC3 bus)

Rotary Switches

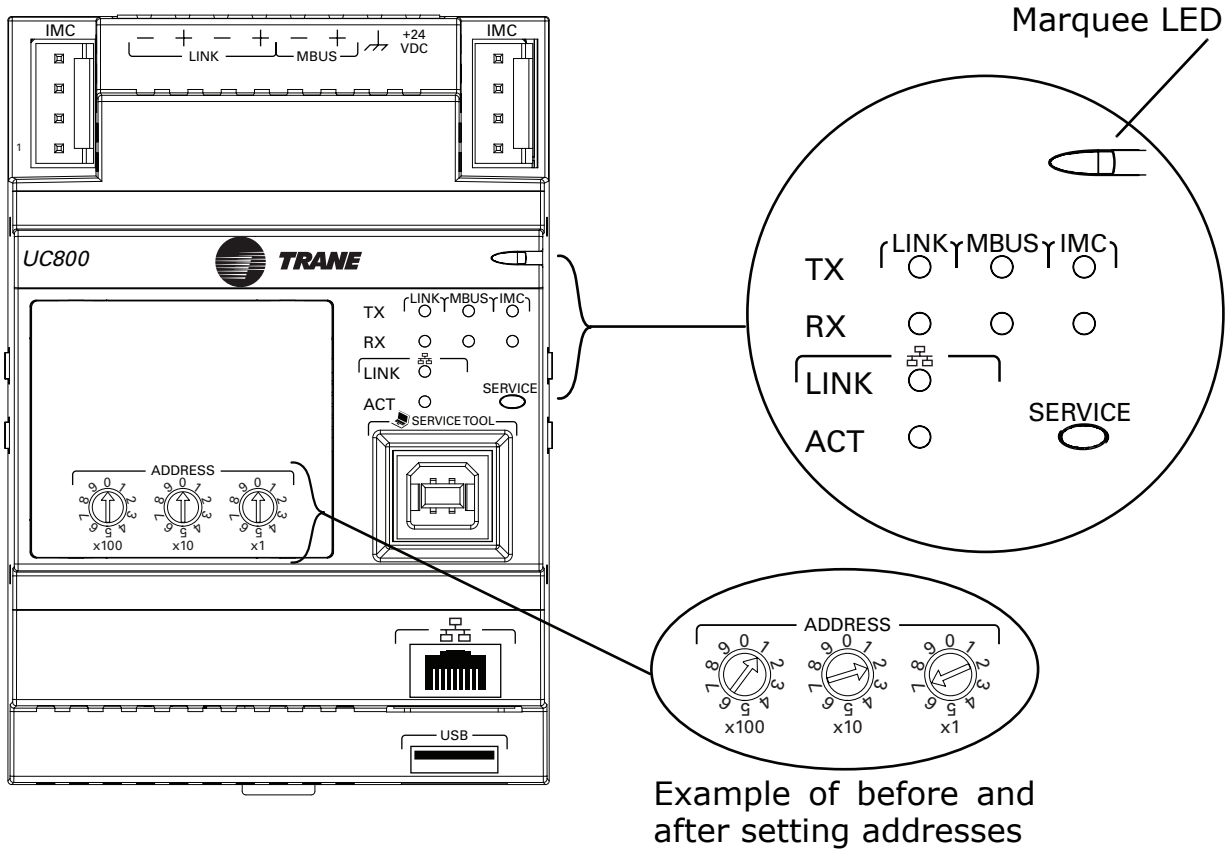
There are three rotary switches on the front of the UC800 (see Figure 1, p. 7). Use these switches to define a three-digit address when the UC800 is installed in a BACnet or Modbus RTU system (for example, 107, 127, and so on).

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," p. 14.

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 no problems exist.
- 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 CVHE, CVHF, and CVHG Water-cooled CenTraVac Chillers with Tracer AdaptiView Control listed in the section,* "Additional Resources," p. 37.)

Equivalent Data Points Reference List: BACnet, Modbus RTU

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

Table 1. Data point object names

Data Point Object Names	BACnet Object[a]	Modbus RTU Register
Active Base Loading Setpoint	AI3	30006
Active Base Loading Setpoint Source	MI7	300032
Active Chilled Water Setpoint Source	MI4	30029
Active Cool/Heat Setpoint Temperature	AI7	30010
Active Current Limit Setpoint	AI2	30005
Active Current Limit Setpoint Source	MI5	30030
Active Hot Water Setpoint Source	MI6	30031
AFD Transistor Temp	AI70	30110
Alarm Present	BI10	30047
Approx Cond Water Flow	AI14	30021
Approx Evap Water Flow	AI12	30017
Approx Unit Heating Power	NA	30009
Average Line Current	AI1	30004
Average Starter Phase Current	AI57	30097
Average Starter Phase Current	NA	30101
BAS Base Loading Enable	BV1	40007
BAS Base Loading Setpoint	AV4	40006
BAS Chilled Water Setpoint	AV1	40003
BAS Chiller Auto Stop Command	MV1	40001
BAS Chiller Mode Command	MV2	40002
BAS Current Limit Setpoint	AV2	40004
BAS Diagnostic Reset	BV2	40008
BAS Hot Water Setpoint	AV4	40005
Base Loading	BI9	30046
Calculated Chiller Capacity	AI5	30008
Carbon Tank Temp	AI39	30071
Chiller Control Mode	MI2	30027
Chiller In Auto	BI11	30048
Chiller Running	BI1	30003
Chiller Running Status	MI1	30026
Compressor Refrigerant Discharge Temperature	AI36	30065
Compressor Running	MI11	30055
Compressor Running Time	AI49	30088, 30089
Compressor Starts	AI48	30086, 30087
Cond Differential Wtr Press	AI15	30022
Cond Entering Water Temp	AI10	30013
Cond Leaving Water Temp	AI11	30014
Cond Sat Rfgt Temp	AI35	30064
Condenser Pump Control	BI4	30019
Condenser Rfgt Pressure	AI28	30057
Condenser Water Flow	BI5	30020
Daily Pumpout-24 Hours	AI45	30080, 30081

Table 1. Data point object names

Data Point Object Names	BACnet Object[a]	Modbus RTU Register
Differential Refrigerant Pressure	AI29	30058
Emergency Stop	BI597	30044
Evap Entering Water Temp	AI9	30012
Evap Leaving Water Temp	AI8	30011
Evap Rfgt Pressure	AI27	30056
Evap Sat Rfgt Temp	AI34	30063
Evaporator Pump Control	BI2	30015
Evaporator Water Flow	BI3	30016
Ext Base Loading Setpt	AI25	30043
Ext Chilled Wtr Setpt	AI23	30041
Ext Current Limit Setpt	AI24	30042
External Auto Stop	MI10	30040
Frequency	AI69	30109
Front Panel Auto/Stop	MI8	30033
Front Panel Base Loading Command	BI6	30039
Front Panel Base Loading Setpt	AI22	30038
Front Panel Chilled Water Setpt	AI19	30035
Front Panel Chiller Control Mode	MI9	30034
Front Panel Current Limit Setpoint	AI20	30036
Front Panel Hot Water Setpt	AI21	30037
Head Relief Request Relay	BI15	30052
Hot Gas Bypass	BI16	30053
IGV1 Position	AI37	30066
IGV2 Position	AI38	30067
Inboard Bearing Temp	AI64	30104
Last Diagnostic Code	BI501-BI722	30025
Limit Mode Relay Status	BI14	30051
Local Setpoint Control	BI12	30049
Manual Override Exists	BI8	30045
Maximum Capacity Relay	BI13	30050
Motor Winding Temp #1	AI66	30106
Motor Winding Temp #2	AI67	30107
Motor Winding Temp #3	AI68	30108
Oil Differential Pressure	AI32	30061
Oil Pump Discharge Pressure	AI31	30060
Oil Tank Pressure	AI30	30059
Oil Tank Temperature	AI33	30062
Outboard Bearing Temp	AI65	30105
Power	AI62	30102
Pumpout Chiller Off-7 Days	AI44	30078, 30079
Pumpout Chiller On-7 Days	AI43	30076, 30077
Pumpout Relay	BI18	30069
Pumpout-Life	AI46	30082, 30083
Purge Compressor Relay	BI17	30068
Purge Liquid Temp	AI40	30072
Purge Regen Valve Solenoid	BI19	30070
Purge Rfgt Cprs Suction Temp	AI41	30073
Refrigerant Monitor	AI26	30054
Refrigeration-Life	AI47	30084, 30085

Table 1. Data point object names

Data Point Object Names	BACnet Object[a]	Modbus RTU Register
Second Condenser Ent Wtr Temp	AI16	30023
Second Condenser Lvg Wtr Temp	AI17	30024
Setpoint Source	MI3	30028
Software Revision	Device Object	30002
Software Type	Device Object	30001
Starter Average Phase Voltage	AI53	30093
Starter Current L1	AI54	30094
Starter Current L1	NA	30098
Starter Current L2	AI55	30095
Starter Current L2	NA	30099
Starter Current L3	AI56	30096
Starter Current L3	NA	30100
Starter Load Power Factor	AI63	30103
Starter Power Consumption	AI4	30007
Starter Voltage Phase AB	AI50	30090
Starter Voltage Phase BC	AI51	30091
Starter Voltage Phase CA	AI52	30092
Time Until Next Purge Run	AI42	30074, 30075
Unfiltered Evap Differential Wtr Press	AI13	30018

(a) AI=Analog Input, BI=Binary Input, MI=Multistate Input, MV=Multistate Value, NA=Not Applicable

BACnet 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 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 (refer to Table 2, p. 12)
- Baud rate, Device ID, and character set
- Object data points and configurations

BACnet Protocol Implementation Conformance Statement (PICS)

Standardized Device Profile

BACnet application specific controller (B-ASC)

Interoperability Building Blocks

Data Sharing

- Data Sharing-ReadProperty-B (DS-RP-B)
- Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)
- Data Sharing-WriteProperty-B (DS-WP-B)
- Data Sharing-WritePropertyMultiple-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-TimeSynchronization-B (DM-TS-B)
- Device Management-UTCTimeSynchronization-B (DM-UTC-B)

Object Types

Table 2. Descriptions and configurations

Object Type	Required Properties Read	Properties Written	Optional Properties Read	Ability to Create	Ability to Delete
Analog Input	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Units	• Object_Name • Out_Of_Service	Reliability	None	None
Analog Output	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Units • Priority_Array • Relinquish_Default	• Object_Name • Present_Value • Out_Of_Service • Relinquish_Default	Reliability	None	None
Analog Value	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Units	• Object_Name • Present_Value • Out_Of_Service • Relinquish_Default	• Priority_Array • Relinquish_Default • Reliability	None	None
Binary Input	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Polarity	• Object_Name • Out_Of_Service • Inactive_Text • Active_Text	• Inactive_Text • Active_Text • Time_Delay • Notification_Class • Alarm_Value • Event_Enable • Acked_Transitions • Notify_Type • Event_Time_Stamps • Reliability	None	None
Binary Output	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Polarity • Priority_Array • Relinquish_Default	• Object_Name • Present_Value • Out_Of_Service • Relinquish_Default • Inactive_Text • Active_Text	• Inactive_Text • Active_Text • Reliability	None	None
Binary Value	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service	• Object_Name • Present_Value • Out_Of_Service • Inactive_Text • Active_Text • Relinquish_Default	• Inactive_Text • Active_Text • Priority_Array • Relinquish_Default • Reliability	None	None

Table 2. Descriptions and configurations

Object Type	Required Properties Read	Properties Written	Optional Properties Read	Ability to Create	Ability to Delete
Device	• Object_Identifier • Object_Name • Object_Type • System_Status • Vendor_Name • Vendor_Identifier • Model_Name • Firmware_Revision • Application_Software_Version • Protocol_Version • Protocol_Revision • Protocol_Services_Supported • Protocol_Object_Types_Supported • Object_List • Max_APDU_Length_Accepted • Segmentation_Supported • APDU_Timeout • Number_Of_APDU_Retries • Device_Address_Binding • Database_Revision	Object_Name	• Max_Segments_Accepted • APDU_Segment_Timeout • Max_Master • Max_Info_Frames • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status	None	None
Multistate Input	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Number_Of_States	• Object_Name • State_Text	• State_Text • Reliability	None	None
Multistate Output	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Number_Of_States • Priority_Array • Relinquish_Default	• Object_Name • Present_Value • Relinquish_Default • State_Text	• State_Text • Reliability	None	None
Multistate Value	• Object_Identifier • Object_Name • Object_Type • Present_Value • Status_Flags • Event_State • Out_Of_Service • Number_Of_States	• Object_Name • Present_Value • State_Text • Relinquish_Default	• State_Text • Priority_Array • Relinquish_Default • Reliability	None	None
Notification Class	• Object_Identifier • Object_Name • Object_Type • Notification_Class • Priority • Ack_Required • Recipient_List	• Object_Name • Recipient_List	None	None	None

Protocol: Baud Rate, Device ID, and Supported Character Sets

Baud Rate

MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, and 76800.

Device ID

The Device ID is used 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 operates as a device and requires its own Device ID which defaults to the rotary dial settings.

- Current Device ID— The default Device ID is set to the Tracer™ UC800 MAC address set on the rotary dials. The device ID can also be soft set using the Trane™ service tool.
- Soft Set Device ID—If the BACnet protocol is being used, you can enter a soft set device ID using the Tracer TU software.

  Note: This may be required for integration with third-party equipment.

Character Sets

- ANSI X3.4
- ISO 10646 (UCS2)
- ISO 8859-1

Object Data Points and Configurations

Device Object

Object Name	Instance	Property Values
UC800 (Dev Instance)	Configurable	NA

Notification Class Objects

Object Name	Instance	Property Values
Warning	1	NA
Normal Shutdown	2	NA
Immediate ShutDown	3	NA

Read/Write Values (Sorted by Object Type and Instance)

Object Name	Object Type	Instance	Property Values	Relinquish Default	Valid Range	Description
BAS Chilled Water Setpoint	AV	1	Real	6.7°C/44°F	-17.78° to 23.9°C (depending on installed options)	
BAS Current Limit Setpoint	AV	2	Real	100% RLA	0-100%	
BAS Hot Water Setpoint	AV	3	Real	48.9°C/120°F	26.7°C to 60°C	
BAS Base Loading Setpoint	AV	4	Real	50%	0-100%	
BAS Base Loading Enable	BV	1	0=disable 1=enable	NA	0 or 1	Inactive Active
BAS Diagnostic Reset	BV	2	0=false (no reset) 1=true (can reset)	NA	0 or 1	Inactive Active
BAS Chiller Auto Stop Command	MV	1	1=stop 2=auto	2=auto	1 or 2	
BAS Chiller Mode Command	MV	2	1=cool 2=heat 3=ice 4=free cool	1=cool	1 to 4	

Read-only Values (Sorted by Object Type and Instance)

Inputs

Object Name	Object Type	Instance	Property Values
Average Line Current	AI	1	Real
Active Current Limit Setpoint	AI	2	Real
Active Base Loading Setpt	AI	3	Real
Starter Power Consumption	AI	4	Real
Calculated Chiller Capacity	AI	5	Real
Active Cool/Heat Setpoint Temperature	AI	7	Real

Object Name	Object Type	Instance	Property Values
Evap Leaving Water Temp	AI	8	Real
Evap Entering Water Temp	AI	9	Real
Cond Entering Water Temp	AI	10	Real
Cond Leaving Water Temp	AI	11	Real
Approx Evap Water Flow	AI	12	Real
Unfiltered Evap Differential Wtr Press	AI	13	Real
Approx Cond Water Flow	AI	14	Real
Cond Differential Wtr Press	AI	15	Real
Second Condenser Ent Wtr Temp	AI	16	Real
Second Condenser Lvg Wtr Temp	AI	17	Real
Front Panel Chilled Water Setpt	AI	19	Real
Front Panel Current Limit Setpoint	AI	20	Real
Front Panel Hot Water Setpt	AI	21	Real
Front Panel Base Loading Setpt	AI	22	Real
Ext Chilled Wtr Setpt	AI	23	Real
Ext Current Limit Setpt	AI	24	Real
Ext Base Loading Setpt	AI	25	Real
Refrigerant Monitor	AI	26	Real
Evap Rfgt Pressure	AI	27	Real
Cond Rfgt Pressure	AI	28	Real
Differential Refrigerant Pressure	AI	29	Real
Oil Tank Pressure	AI	30	Real
Oil Pump Discharge Pressure	AI	31	Real
Oil Differential Pressure	AI	32	Real
Oil Tank Temperature	AI	33	Real
Evap Sat Rfgt Temp	AI	34	Real
Cond Sat Rfgt Temp	AI	35	Real
Compressor Refrigerant Discharge Temperature	AI	36	Real
IGV1 Position	AI	37	Real
IGV2 Position	AI	38	Real
Carbon Tank Temp	AI	39	Real
Purge Liquid Temp	AI	40	Real
Purge Rfgt Cprsr Suction Temp	AI	41	Real
Time Until Next Purge Run	AI	42	Real
Pumpout Chiller On-7 Days	AI	43	Real
Pumpout Chiller Off-7 Days	AI	44	Real
Daily Pumpout-24 Hours	AI	45	Real
Pumpout-Life	AI	46	Real
Refrigerant-Life	AI	47	Real
Compressor Starts	AI	48	Real
Compressor Running Time	AI	49	Real
Starter Voltage Phase AB	AI	50	Real
Starter Voltage Phase BC	AI	51	Real
Starter Voltage Phase CA	AI	52	Real
Starter Average Phase Voltage	AI	53	Real

Object Name	Object Type	Instance	Property Values
Starter Current L1	AI	54	Real
Starter Current L2	AI	55	Real
Starter Current L3	AI	56	Real
Power	AI	62	Real
Starter Load Power Factor	AI	63	Real
Inboard Bearing Temp	AI	64	Real
Outboard Bearing Temp	AI	65	Real
Motor Winding Temp #1	AI	66	Real
Motor Winding Temp #2	AI	67	Real
Motor Winding Temp #3	AI	68	Real
Frequency	AI	69	Real
AFD Transistor Temp	AI	70	Real
Chiller Running	BI	1	0=no (not running) 1=yes (running) Inactive Active
Evaporator Pump Control	BI	2	0=off (pump off) 1=on (pump on) Inactive Active
Evaporator Water Flow	BI	3	0=no flow 1=flow Inactive Active
Condenser Pump Control	BI	4	0=off (pump off) 1=on (pump on) Inactive Active
Condenser Water Flow	BI	5	0=no flow 1=flow Inactive Active
Front Panel Base Loading Command	BI	6	0=auto 1=on
Manual Override Exists	BI	8	0=false 1=true
Base Loading	BI	9	0=inactive 1=active
Alarm Present	BI	10	0=no 1=yes
Chiller In Auto	BI	11	0=no 1=yes
Local Setpoint Control	BI	12	0=no 1=yes
Maximum Capacity Relay	BI	13	0=off 1=on
Limit Mode Relay Status	BI	14	0=inactive 1=active
Head Relief Request Relay	BI	15	0=off 1=on
Hot Gas Bypass	BI	16	0=inactive 1=active

Object Name	Object Type	Instance	Property Values
Purge Compressor Relay	BI	17	0=off 1=on
Pumpout Relay	BI	18	0=off 1=on
Purge Regen Valve Solenoid	BI	19	0=off 1=on
Chiller Running Status	MI	1	1=not running 2=starting 3=running 4=stopping
Chiller Control Mode	MI	2	1=cool 2=heat 3=ice 4=free cooling
Setpoint Source	MI	3	1=BAS/Ext/FP 2=Ext/FP 3=front panel
Active Chilled Water Setpoint Source	MI	4	1=front panel 2=external 3=ice machine 4=BAS
Active Current Limit Setpoint Source	MI	5	1=front panel 2=external 3=ice machine 4=BAS
Active Hot Water Setpoint Source	MI	6	1=front panel 2=external 3=ice machine 4=BAS
Active Base Loading Setpoint Source	MI	7	1=front panel 2=external 3=ice machine 4=BAS
Front Panel Auto/Stop	MI	8	1=stop 2=auto
Front Panel Chiller Control Mode	MI	9	1=cool 2=heat 3=ice 4=free cooling
External Auto Stop	MI	10	1=off 2=auto 3=on
Compressor Running	MI	11	1=stopped 2=running 3=alarm

Diagnostics: Inputs with Alarming Capabilities (Sorted by Instance)

Object Name[a]	Object Type	Instance	Property Values
Started Did Not Transition	BI	501	0=off 1=on
Starter Did Not Fully Accelerate	BI	502	0=off 1=on
Phase Reversal	BI	503	0=off 1=on
Start Dry Run Test	BI	504	0=off 1=on
Phase Loss	BI	505	0=off 1=on
Power Loss	BI	506	0=off 1=on
Momentary Power Loss	BI	507	0=off 1=on
Severe Current Unbalance	BI	508	0=off 1=on
Starter Fault Type 1	BI	509	0=off 1=on
Starter Fault Type 2	BI	510	0=off 1=on
Starter Fault Type 3	BI	511	0=off 1=on
Transition Complete Input Shorted	BI	512	0=off 1=on
At Speed Input Shorted	BI	513	0=off 1=on
Transition Complete Input Opened	BI	514	0=off 1=on
At Speed Input Opened	BI	515	0=off 1=on
Motor Current Overload	BI	516	0=off 1=on
Compressor Did Not Accelerate: Shutdown	BI	517	0=off 1=on
Cprsr Did Not Accelerate: Transition	BI	518	0=off 1=on
Starter Contactor Interrupt Failure	BI	519	0=off 1=on
Starter Module Memory Error Type 1	BI	520	0=off 1=on
Starter Module Memory Error Type 2	BI	521	0=off 1=on
Starter Comm Loss: Main Processor	BI	522	0=off 1=on
L1 Current Transformer Polarity Reversed	BI	523	0=off 1=on
L2 Current Transformer Polarity Reversed	BI	524	0=off 1=on
L3 Current Transformer Polarity Reversed	BI	525	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
VAB Potential Transformer Polarity Reversed	BI	526	0=off 1=on
VBC Potential Transformer Polarity Reversed	BI	527	0=off 1=on
VCA Potential Transformer Polarity Reversed	BI	528	0=off 1=on
Voltage Phase Reversal	BI	529	0=off 1=on
L1 Current Loss	BI	530	0=off 1=on
L2 Current Loss	BI	531	0=off 1=on
L3 Current Loss	BI	532	0=off 1=on
Voltage VAB Loss	BI	533	0=off 1=on
Voltage VBC Loss	BI	534	0=off 1=on
Voltage VCA Loss	BI	535	0=off 1=on
AFD Power Loss	BI	536	0=off 1=on
AFD Start Inhibited	BI	537	0=off 1=on
AFD Motor Current Overload	BI	538	0=off 1=on
AFD Motor Short	BI	539	0=off 1=on
AFD Instantaneous Current Overload	BI	540	0=off 1=on
AFD High Temperature	BI	541	0=off 1=on
AFD Output Phase Loss	BI	542	0=off 1=on
AFD Ground Fault	BI	543	0=off 1=on
HPC/High AFD Heat Sink Water Pressure	BI	544	0=off 1=on
AFD Communication Loss: Main Processor	BI	545	0=off 1=on
AFD High Bus Voltage	BI	546	0=off 1=on
AFD Control Board Memory Error Type 2	BI	547	0=off 1=on
AFD General Failure	BI	548	0=off 1=on
AFD Fatal Software Error	BI	549	0=off 1=on
AFD I/O Board Failure	BI	550	0=off 1=on
AFD Power Intfc Controller Board Failure	BI	551	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
AFD Power Structure Board Failure	BI	552	0=off 1=on
AFD DPI Communication Failure	BI	553	0=off 1=on
AFD RS485 Board Memory Error Type 2	BI	554	0=off 1=on
External Chilled/Hot Water Setpoint	BI	555	0=off 1=on
External Current Limit Setpoint	BI	556	0=off 1=on
Evaporator Entering Water Temp Sensor	BI	557	0=off 1=on
Evaporator Leaving Water Temp Sensor	BI	558	0=off 1=on
Condenser Entering Water Temp Sensor	BI	559	0=off 1=on
Condenser Leaving Water Temp Sensor	BI	560	0=off 1=on
Evaporator Diff Water Pressure Xdcr[b]	BI	561	0=off 1=on
Condenser Diff Water Pressure Xdcr[b]	BI	562	0=off 1=on
Second Cond Entering Water Temp Sensor	BI	563	0=off 1=on
Second Cond Leaving Water Temp Sensor	BI	564	0=off 1=on
Evap Saturated Refrigerant Temp Sensor	BI	565	0=off 1=on
Cond Saturated Refrigerant Temp Sensor	BI	566	0=off 1=on
Purge Liquid Temperature Sensor	BI	567	0=off 1=on
Condenser Refrigerant Pressure Xdcr[b]	BI	568	0=off 1=on
Oil Tank Temperature Sensor	BI	569	0=off 1=on
Oil Pump Discharge Pressure Xdcr[b]	BI	570	0=off 1=on
Oil Tank Pressure Transducer	BI	571	0=off 1=on
Motor Winding Temperature 1 Sensor	BI	572	0=off 1=on
Motor Winding Temperature 2 Sensor	BI	573	0=off 1=on
Motor Winding Temperature 3 Sensor	BI	574	0=off 1=on
Inboard Bearing Temp Sensor	BI	575	0=off 1=on
Outboard Bearing Temp Sensor	BI	576	0=off 1=on
Cprsr Discharge Refrigerant Temp Sensor	BI	577	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
Outdoor Air Temp Sensor	BI	578	0=off 1=on
Purge Cprsr Suction Rfgt Temp Sensor	BI	579	0=off 1=on
Purge Carbon Tank Temperature Sensor	BI	580	0=off 1=on
External Base Loading Setpoint	BI	581	0=off 1=on
Purge Liquid Level Too High Warning	BI	583	0=off 1=on
Purge Liquid Level Too High Continuously	BI	584	0=off 1=on
Purge Carbon Regen Temp Not Satisfied	BI	585	0=off 1=on
Purge Carbon Regen Temp Limit Exceeded	BI	586	0=off 1=on
Purge Daily Pumpout Limit Exceeded	BI	587	0=off 1=on
Purge Carbon Regen Temperature Too Low	BI	588	0=off 1=on
Low Evaporator Refrigerant Temperature	BI	589	0=off 1=on
High Oil Temperature	BI	590	0=off 1=on
Low Evap Leaving Water Temp: Unit Off	BI	591	0=off 1=on
Low Evap Leaving Water Temp: Unit On	BI	592	0=off 1=on
Evaporator Water Flow Overdue	BI	593	0=off 1=on
Evaporator Water Flow Lost	BI	594	0=off 1=on
High Evaporator Water Temperature	BI	595	0=off 1=on
Condenser High Pressure Cutout	BI	596	0=off 1=on
Emergency Stop	BI	597	0=off 1=on
Invalid Configuration	BI	598	0=off 1=on
Non-Volatile Memory Reformat	BI	599	0=off 1=on
Check Clock	BI	600	0=off 1=on
MP: Could Not Store Starts and Hours	BI	601	0=off 1=on
MP: Non-Volatile Block Test Error	BI	602	0=off 1=on
MP: Reset Has Occurred	BI	603	0=off 1=on
Extended Compressor Surge	BI	604	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
Over Voltage	BI	605	0=off 1=on
Under Voltage	BI	606	0=off 1=on
Low Evaporator Water Flow	BI	607	0=off 1=on
Condenser Water Flow Overdue	BI	608	0=off 1=on
Condenser Water Flow Lost	BI	609	0=off 1=on
Free Cooling Actuators Not Open	BI	610	0=off 1=on
Free Cooling Actrs not Open During FC	BI	611	0=off 1=on
Free Cooling Actuators Not Closed	BI	612	0=off 1=on
Free Cooling Actuators Unexpectedly Open	BI	613	0=off 1=on
Unexpected Starter Shutdown	BI	614	0=off 1=on
Starter Failed to Alrm/Start	BI	615	0=off 1=on
Low Differential Oil Pressure	BI	617	0=off 1=on
Check Oil Filter	BI	618	0=off 1=on
Oil Pressure Sensor Calibration	BI	619	0=off 1=on
High Vacuum Lockout	BI	620	0=off 1=on
Low Oil Temperature	BI	621	0=off 1=on
High Inboard Bearing Temperature	BI	622	0=off 1=on
High Outboard Bearing Temperature	BI	623	0=off 1=on
High Cprsr Rfgt Discharge Temperature	BI	624	0=off 1=on
High Motor Winding Temperature 1	BI	625	0=off 1=on
High Motor Winding Temperature 2	BI	626	0=off 1=on
High Motor Winding Temperature 3	BI	627	0=off 1=on
Refrigerant Monitor Input	BI	628	0=off 1=on
Unexpected Differential oil Pressure	BI	629	0=off 1=on
Differential Oil Pressure Overdue	BI	630	0=off 1=on
BAS Failed to Establish	BI	631	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
BAS Communication Lost	BI	632	0=off 1=on
Hot Gas Bypass Valve Closure Overdue	BI	633	0=off 1=on
Hot Gas Bypass Valve Unexpectedly Open	BI	634	0=off 1=on
Hot Gas Bypass Valve Opening Overdue	BI	635	0=off 1=on
Generator Fault Relay Open	BI	636	0=off 1=on
Generator Ready Overdue	BI	637	0=off 1=on
LCI-C Software Mismatch: Use BAS Tool	BI	645	0=off 1=on
Excessive Loss of Communication	BI	646	0=off 1=on
Comm Loss: External Auto/Stop	BI	647	0=off 1=on
Comm Loss: Emergency Stop	BI	648	0=off 1=on
Comm Loss: External Ice Building Command	BI	649	0=off 1=on
Comm Loss: Outdoor Air Temperature	BI	650	0=off 1=on
Comm Loss: Evap Leaving Water Temp	BI	651	0=off 1=on
Comm Loss: Evap Entering Water Temp	BI	652	0=off 1=on
Comm Loss: Condenser Leaving Water Temp	BI	653	0=off 1=on
Comm Loss: Condenser Entering Water Temp	BI	654	0=off 1=on
Comm Loss: Sec Cond Leaving Water Temp	BI	655	0=off 1=on
Comm Loss: Sec Cond Entering Water Temp	BI	656	0=off 1=on
Comm Loss: Oil Tank Temperature	BI	657	0=off 1=on
Comm Loss: Ext Chilled/Hot Wtr Setpoint	BI	658	0=off 1=on
Comm Loss: Ext Current Limit Setpoint	BI	659	0=off 1=on
Comm Loss: Cond High Pressure Cutout	BI	660	0=off 1=on
Comm Loss: Evaporator Water Flow Switch	BI	661	0=off 1=on
Comm Loss: Condenser Water Flow Switch	BI	662	0=off 1=on
Comm Loss: Evap Saturated Rfgt Temp	BI	663	0=off 1=on
Comm Loss: Cond Saturated Rfgt Temp	BI	664	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
Comm Loss: Purge Liquid Temperature	BI	665	0=off 1=on
Comm Loss: Cond Refrigerant Pressure	BI	666	0=off 1=on
Comm Loss: Oil Tank Pressure	BI	667	0=off 1=on
Comm Loss: Oil Pump Discharge Pressure	BI	668	0=off 1=on
Comm Loss: Evaporator Water Pump Relay	BI	669	0=off 1=on
Comm Loss: Condenser Water Pump Relay	BI	670	0=off 1=on
Comm Loss: Ice Building Relay	BI	671	0=off 1=on
Comm Loss: Starter	BI	672	0=off 1=on
Comm Loss: Adaptive Frequency Drive	BI	673	0=off 1=on
Comm Loss: Local BAS Interface	BI	674	0=off 1=on
Comm Loss: Compressor Running Relay	BI	675	0=off 1=on
Comm Loss: Non-Wrn Latching Alarm Relay	BI	676	0=off 1=on
Comm Loss: Non-Wrn NonLatching Alm Relay	BI	677	0=off 1=on
Comm Loss: Unit Purge Alarm Relay	BI	678	0=off 1=on
Comm Loss: Limit Warning Relay	BI	679	0=off 1=on
Comm Loss: Maximum Capacity Relay	BI	680	0=off 1=on
Comm Loss: Head Relief Request Relay	BI	681	0=off 1=on
Comm Loss: Evap Diff Water Pressure	BI	682	0=off 1=on
Comm Loss: Cond Diff Water Pressure	BI	683	0=off 1=on
Comm Loss: Compressor Motor %RLA Output	BI	684	0=off 1=on
Comm Loss: External Free Cooling Command	BI	685	0=off 1=on
Comm Loss: Refrigerant Monitor Input	BI	686	0=off 1=on
Comm Loss: External Free Cooling Command	BI	687	0=off 1=on
Comm Loss: Free Cool Actrs Closed Input	BI	688	0=off 1=on
Comm Loss: Free Cool Liq Line Actrs Relay	BI	689	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
Comm Loss: Free Cool Gas Line Actr Relay	BI	690	0=off 1=on
Comm Loss: Free Cooling Auxiliary Relay	BI	691	0=off 1=on
Comm Loss: Purge Cprsr Suction Rfgt Temp	BI	692	0=off 1=on
Comm Loss: Purge Carbon Tank Temperature	BI	693	0=off 1=on
Comm Loss: Purge Liquid Level Switch	BI	694	0=off 1=on
Comm Loss: Purge Pumpout Relay	BI	696	0=off 1=on
Comm Loss: Purge Carbon Tank Heater Rly	BI	697	0=off 1=on
Comm Loss: Purge Regen Solenoid Relay	BI	698	0=off 1=on
Comm Loss: Purge Alarm Relay	BI	699	0=off 1=on
Comm Loss: Purge Pumpout Solenoid Output	BI	700	0=off 1=on
Comm Loss: Purge Exhaust Solenoid Output	BI	701	0=off 1=on
Comm Loss: Purge Condensing Unit Relay	BI	702	0=off 1=on
Comm Loss: Solid State Starter Fault	BI	703	0=off 1=on
Comm Loss: PFCC Relay	BI	704	0=off 1=on
Comm Loss: Oil/Refrigerant Pump Relay	BI	705	0=off 1=on
Comm Loss: Oil Tank Heater Relay	BI	706	0=off 1=on
Comm Loss: Motor Winding Temperature 1	BI	709	0=off 1=on
Comm Loss: Motor Winding Temperature 2	BI	710	0=off 1=on
Comm Loss: Motor Winding Temperature 3	BI	711	0=off 1=on
Comm Loss: Inboard Bearing Temperature	BI	712	0=off 1=on
Comm Loss: Outboard Bearing Temperature	BI	713	0=off 1=on
Comm Loss: Cprsr Discharge Rfgt Temp	BI	714	0=off 1=on
Comm Loss: IGV First Stage Actuator	BI	715	0=off 1=on
Comm Loss: IGV Second Stage Actuator	BI	716	0=off 1=on

Object Name[a]	Object Type	Instance	Property Values
Comm Loss: Ext Base Loading Setpoint	BI	717	0=off 1=on
Comm Loss: Ext Base Loading Command	BI	718	0=off 1=on
Comm Loss: External Hot Water Command	BI	719	0=off 1=on
Comm Loss: Hot Gas Bypass Load Relay	BI	720	0=off 1=on
Comm Loss: Hot Gas Bypass Unload Relay	BI	721	0=off 1=on
Comm Loss: Hot Gas Bypass Actr Closed In	BI	722	0=off 1=on
Comm Loss: Generator Start/Stop Relay	BI	723	0=off 1=on
Comm Loss: Generator Speed Signal Output	BI	724	0=off 1=on
Comm Loss: Generator Up To Speed Input	BI	725	0=off 1=on
Comm Loss: Generator Fault Input	BI	726	0=off 1=on

(a) Many data points and diagnostics require certain options to be installed. The objects will not appear if the option is not installed. For more details, refer to the Water-cooled CenTraVac Chiller with Tracer AdaptiView Control Diagnostics Manual and Component Summary listed under "Additional Resources," p. 37.

(b) Xdcr refers to transducer

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 other Modbus systems and devices using Modbus RTU protocol. This section includes information about:

- Baud rate, parity, and supported character sets
- Data points descriptions and configurations

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

Stop bits are defined by the parity settings. If the parity is *Even*, then the stop bit is1 (**default**). If the parity is *None*, then the stop bit is 2.

Data Points Descriptions and Configurations

Holding Registers- Read/Write (Sorted by Register)

This function code is used to read the contents of a contiguous block of holding registers in a remote device.

Register Object Name	Register	Register Type	Register Value	Valid Range
BAS Chiller Auto Stop Command	40001	Binary		0,1
BAS Chiller Mode Command	40002	Enumeration	0=cool 1=heat 2=ice 3=free cool	
BAS Chilled Water Setpoint	40003	Temperature		-17.78°C to 23.9°C (depending on installed options)
BAS Current Limit Setpoint	40004	Percent		0–100
BAS Hot Water Setpoint	40005	Temperature		26.7°C to 60°C
BAS Base Loading Setpoint	40006	Percent		0–100
BAS Base Loading Enable	40007	Binary		0,1
BAS Diagnostic Reset	40008	Binary		0,1

Input Registers-Read Only (Sorted by Register)

This function code is used to read from 1 to 125 contiguous input registers in a remote device.

Register Object Name	Register	Register Type[a]	Register Value
Software Type	30001	NA	448=CTV
Software Revision	30002	NA	
Chiller Running	30003	Binary	
Average Line Current	30004	Percent	
Active Current Limit Setpoint	30005	Percent	
Active Base Loading Setpoint	30006	Percent	
Starter Power Consumption	30007	Power	
Calculated Chiller Capacity	30008	Power	
Approx Unit Heating Power	30009	Power	
Active Cool/Heat Setpoint Temperature	30010	Temperature	
Evap Leaving Water Temp	30011	Temperature	
Evap Entering Water Temp	30012	Temperature	
Cond Entering Water Temp	30013	Temperature	
Cond Leaving Water Temp	30014	Temperature	
Evaporator Pump Control	30015	Binary	
Evaporator Water Flow	30016	Binary	
Approx Evap Water Flow	30017	Flow, Water	
Unfiltered Evap Differential Wtr Press	30018	Pressure	
Condenser Pump Control	30019	Binary	

Register Object Name	Register	Register Type[a]	Register Value
Condenser Water Flow	30020	Binary	
Approx Cond Water Flow	30021	Flow, Water	
Cond Differential Wtr Press	30022	Pressure	
Second Condenser Ent Wtr Temp	30023	Temperature	
Second Condenser Lvg Wtr Temp	30024	Temperature	
Last Diagnostic Code	30025	Enumeration	[b]
Chiller Running Status	30026	Enumeration	0=off/idle (auto) 1=starting 2=running 3=stopping 4=needs service (stop or diagnostic lockout)
Chiller Control Mode	30027	Enumeration	0=cool 1=heat 2=ice 3=free cool
Setpoint Source	30028	Enumeration	0=BAS+external+local 1=external+local 2=local
Active Chilled Water Setpoint Source	30029	Enumeration	0=front panel 3=external 5=BAS
Active Current Limit Setpoint Source	30030	Enumeration	0=front panel 3=external 5=BAS 6=ice making
Active Hot Water Setpoint Source	30031	Enumeration	0=front panel 3=external 5=BAS
Active Base Loading Setpoint Source	30032	Enumeration	0=front panel 3=external 5=BAS
Front Panel Auto/Stop	30033	Binary	
Front Panel Chiller Control Mode	30034	Enumeration	0=cool 1=heat 2=ice 3=free cool
Front Panel Chilled Water Setpt	30035	Temperature	
Front Panel Current Limit Setpoint	30036	Percent	
Front Panel Hot Water Setpt	30037	Temperature	
Front Panel Base Loading Setpt	30038	Percent	
Front Panel Base Loading Command	30039	Binary	
External Auto Stop	30040	Binary	
Ext Chilled Wtr Setpt	30041	Temperature	
Ext Current Limit Setpt	30042	Percent	
Ext Base Loading Setpt	30043	Percent	
Emergency Stop	30044	Binary	
Manual Override Exists	30045	Binary	
Base Loading	30046	Binary	
Alarm Present	30047	Binary	
Chiller In Auto	30048	Binary	
Local Setpoint Control	30049	Binary	

Register Object Name	Register	Register Type[a]	Register Value
Maximum Capacity Relay	30050	Binary	
Limit Mode Relay Status	30051	Binary	
Head Relief Request Relay	30052	Binary	
Hot Gas Bypass	30053	Binary	
Refrigerant Monitor	30054	Concentration	
Compressor Running	30055	Binary	
Evap Rfgt Pressure	30056	Pressure	
Condenser Rfgt Pressure	30057	Pressure	
Differential Refrigerant Pressure	30058	Pressure	
Oil Tank Pressure	30059	Pressure	
Oil Pump Discharge Pressure	30060	Pressure	
Oil Differential Pressure	30061	Pressure	
Oil Tank Pressure	30062	Temperature	
Evap Sat Rfgt Temp	30063	Temperature	
Cond Sat Rfgt Temp	30064	Temperature	
Compressor Refrigerant Discharge Temperature	30065	Temperature	
IGV1 Position	30066	Percent	
IGV2 Position	30067	Percent	
Purge Compressor Relay	30068	Binary	
Pumpout Relay	30069	Binary	
Purge Regen Valve Solenoid	30070	Binary	
Carbon Tank Temp	30071	Temperature	
Purge Liquid Temp	30072	Temperature	
Purge Rfgt Cprs Suction Temp	30073	Temperature	
Time Until Next Purge Run	30074	Time Interval	
	30075	(cont.)	
Pumpout Chiller On-7 Days	30076	Time Interval	
	30077	(cont.)	
Pumpout Chiller Off-7 Days	30078	Time Interval	
	30079	(cont.)	
Daily Pumpout-24 Hours	30080	Time Interval	
	30081	(cont.)	
Pumpout-Life	30082	Time Interval	
	30083	(cont.)	
Refrigeration-Life	30084	Time Interval	
	30085	(cont.)	
Compressor Starts	30086	Count	
	30087	(cont.)	
Compressor Running Time	30088	Time Interval	
	30089	(cont.)	
Starter Voltage Phase AB	30090	Voltage	
Starter Voltage Phase BC	30091	Voltage	
Starter Voltage Phase CA	30092	Voltage	
Starter Average Phase Voltage	30093	Voltage	
Starter Current L1	30094	Current	

Register Object Name	Register	Register Type[a]	Register Value
Starter Current L2	30095	Current	
Starter Current L3	30096	Current	
Average Starter Phase Current	30097	Current	
Starter Current L1	30098	Percent	
Starter Current L2	30099	Percent	
Starter Current L3	30100	Percent	
Average Starter Phase Current	30101	Percent	
Power	30102	Power	
Starter Load Power Factor	30103	Power Factor	
Inboard Bearing Temp	30104	Temperature	
Outboard Bearing Temp	30105	Temperature	
Motor Winding Temp #1	30106	Temperature	
Motor Winding Temp #2	30107	Temperature	
Motor Winding Temp #3	30108	Temperature	
Frequency	30109	Frequency	
AFD Transistor Temp	30110	Temperature	

(a) Refer to the Determining Input Register Type table below.

(b) Refer to the Diagnostic Codes and Descriptions listing below.

Determining Input Register Type

Register Type	Data Format	Units
Binary	u16	0 = false/off/no/disabled, 1 = true/on/yes/enabled
Concentration	u16	PPM
Current	U16	Amps
Enumeration	u16	NA
Flow, Air	u16	Liters/Second
Flow, Water	u16	Liters/Minute
Frequency	u16	0.1 Hz (600 = 60 Hz)
Percent	s16	0.005% (20000 = 100%)
Power	u16	kW (3517 = 1000 Tons)
Power Factor	s16	0.005 (200 = 1)
Pressure	u16	0.1 kPa absolute
Temperature	s16	0.01 °C (Register value =100 = 1 °C)
Time Interval	u32	Seconds
Voltage	u16	Volts
None	u16	NA

Diagnostic Codes and Descriptions Listing

Hexadecimal Value	Decimal Value	Diagnostic Name
F0	240	Starter Did Not Transition
1F5	501	Starter Did Not Fully Accelerate
E5	229	Phase Reversal
188	392	Starter Dry Run Test
E4	228	Phase Loss
D9	217	Power Loss
E2	226	Momentary Power Loss
1B2	434	Severe Current Unbalance
1E9	489	Starter Fault Type I
1ED	493	Starter Fault Type II
1F1	497	Starter Fault Type III
3D5	981	Transition Complete Input Shorted
3D6	982	At Speed Input Shorted
3D7	983	Transition Complete Input Opened
3D8	984	At Speed Input Opened
EC	236	Motor Current Overload
EE	238	Compressor Did Not Accelerate: Shutdown
1FA	506	Cprsr Did Not Accelerate: Transition
CA	202	Starter Contactor Interrupt Failure
6B5	1717	Starter Module Memory Error Type 1
6B5	1717	Starter Module Memory Error Type 2
2D0	720	Starter Comm Loss: Main Processor
6B5	1717	L1 Current Transformer Polarity Reversed
6B5	1717	L2 Current Transformer Polarity Reversed
6B5	1717	L3 Current Transformer Polarity Reversed
6B5	1717	VAB Potential Transformer Polarity Reversed
6B5	1717	VBC Potential Transformer Polarity Reversed
6B5	1717	VCA Potential Transformer Polarity Reversed
6B5	1717	Voltage Phase Reversal
E4	228	Current L1 Loss
E4	228	Current L2 Loss
E4	228	Current L3 Loss
6B5	1717	Voltage VAB Loss
6B5	1717	Voltage VBC Loss
6B5	1717	Voltage VCA Loss
6B5	1717	AFD Power Loss
6B5	1717	AFD Start Inhibited
EC	236	AFD Motor Current Overload
6B5	1717	AFD Motor Short
6B5	1717	AFD Instantaneous Current Overload
6B5	1717	AFD High Temperature
E4	228	AFD Output Phase Loss
6B5	1717	AFD Ground Fault
6B5	1717	HPC/High AFD Heat Sink Water Pressure
2D0	720	AFD Communication Loss: Main Processor
6B5	1717	AFD High Bus Voltage
6B5	1717	AFD Control Board Memory Error Type 2
6B5	1717	AFD General Failure
6B5	1717	AFD Fatal Software Error
6B5	1717	AFD I/O Board Failure
6B5	1717	AFD Power Intfc Controller Board Failure
6B5	1717	AFD Power Structure Board Failure
6B5	1717	AFD DPI Communication Failure
6B5	1717	AFD RS485 Board Memory Error Type 2
87	135	External Chilled/Hot Water Setpoint

Note: Many of the codes in this listing are the same. Refer to the local display for more detail.

Hexadecimal Value	Decimal Value	Diagnostic Name
89	137	External Current Limit Setpoint
8E	142	Evaporator Entering Water Temp Sensor
AB	171	Evaporator Leaving Water Temp Sensor
9A	154	Condenser Entering Water Temp Sensor
9B	155	Condenser Leaving Water Temp Sensor
2EB	747	Evaporator Diff Water Pressure Xdcr
2EC	748	Condenser Diff Water Pressure Xdcr
2E9	745	Second Cond Entering Water Temp Sensor
2EA	746	Second Cond Leaving Water Temp Sensor
AD	173	Evap Saturated Refrigerant Temp Sensor
8F	143	Cond Saturated Refrigerant Temp Sensor
2A4	676	Purge Liquid Temperature Sensor
AC	172	Condenser Refrigerant Pressure Xdcr
A9	169	Oil Tank Temperature Sensor
2F1	753	Oil Pump Discharge Pressure Transducer
2F3	755	Oil Tank Pressure Transducer
A4	164	Motor Winding Temperature 1 Sensor
A7	167	Motor Winding Temperature 2 Sensor
A8	168	Motor Winding Temperature 3 Sensor
AF	175	Inboard Bearing Temperature Sensor
B0	176	Outboard Bearing Temperature Sensor
284	644	Compressor Discharge Refrigerant Temperature Sensor
A1	161	Outdoor Air Temperature Sensor
2A3	675	Purge Cprsr Suction Rfgt Temp Sensor
6B4	1716	Purge Carbon Tank Temperature Sensor
4C4	1220	External Base Loading Setpoint
2A5	677	Purge Liquid Level Too High Warning
2A5	677	Purge Liquid Level Too High Continuously
6B4	1716	Purge Carbon Regen Temp Not Satisfied
6B4	1716	Purge Carbon Regen Temp Limit Exceeded
2AA	682	Purge Daily Pumpout Limit Exceeded
6B4	1716	Carbon Regeneration Temperature Too Low
FB	251	Low Evaporator Refrigerant Temperature
F4	244	High Oil Temperature
C5	197	Low Evap Leaving Water Temp: Unit Off
C6	198	Low Evap Leaving Water Temp: Unit On
384	900	Evaporator Water Flow Overdue
ED	237	Evaporator Water Flow Lost
6B6	1718	High Evaporator Water Temperature
F5	245	Condenser High Pressure Cutout
FD	253	Emergency Stop
399	921	MP: Invalid Configuration
1AD	429	MP: Non-Volatile Memory Reformat
2E6	742	Check Clock
1D1	465	MP: Could not Store Starts and Hours
1D2	466	MP: Non-Volatile Block Test Error
D9	217	MP: Reset Has Occurred
DA	218	Extended Compressor Surge
D7	215	Over Voltage
D8	216	Under Voltage
2F4	756	Low Evaporator Water Flow
DC	220	Condenser Water Flow Overdue
F7	247	Condenser Water Flow Lost
F9	249	Free Cooling Actuators Not Open
F9	249	Free Cooling Actuators Not Open During FC

Hexadecimal Value	Decimal Value	Diagnostic Name
F9	249	Free Cooling Actuators Not Closed
F9	249	Free Cooling Actuators Unexpectedly Open
6B5	1717	Unexpected Starter Shutdown
6B5	1717	Starter Failed to Arm/Start
189	393	Solid State Starter Fault
F2	242	Low Differential Oil Pressure
4C1	1217	Check Oil Filter
2E7	743	Oil Pressure Sensor Calibration
287	647	High Vacuum Lockout
482	1154	Low Oil Temperature
EA	234	High Inboard Bearing Temperature
EB	235	High Outboard Bearing Temperature
1C2	450	High Cprsr Discharge Rfgt Temperature
18B	395	High Motor Winding Temperature 1
18C	396	High Motor Winding Temperature 2
18D	397	High Motor Winding Temperature 3
2F2	754	Refrigerant Monitor Input
E8	232	Unexpected Differential Oil Pressure
1FF	511	Differential Oil Pressure Overdue
390	912	BAS Failed to Establish Communication
398	920	BAS Communication Lost
3B6	950	Hot Gas Bypass Valve Closure Overdue
6B6	1718	Hot Gas Bypass Valve Unexpectedly Open
6B6	1718	Hot Gas Bypass Valve Opening Overdue
4C5	1221	Generator Fault Relay Open
4C6	1222	Generator Ready Overdue
6B6	1718	LCI-C Software Mismatch: Use BAS Tool
6B6	1718	Excessive Loss of Communication
6B6	1718	Comm Loss: External Auto/Stop
6B6	1718	Comm Loss: Emergency Stop
6B6	1718	Comm Loss: External Ice Building Command
6B6	1718	Comm Loss: Outdoor Air Temperature
6B6	1718	Comm Loss: Evap Leaving Water Temp
6B6	1718	Comm Loss: Evap Entering Water Temp
6B6	1718	Comm Loss: Condenser Leaving Water Temp
6B6	1718	Comm Loss: Condenser Entering Water Temp
6B6	1718	Comm Loss: Sec Cond Leaving Water Temp
6B6	1718	Comm Loss: Sec Cond Entering Water Temp
6B7	1719	Comm Loss: Oil Tank Temperature
6B6	1718	Comm Loss: Ext Chilled/Hot Wtr Setpoint
6B6	1718	Comm Loss: Ext Current Limit Setpoint
6B7	1719	Comm Loss: Cond High Pressure Cutout
6B6	1718	Comm Loss: Evaporator Water Flow Switch
6B6	1718	Comm Loss: Condenser Water Flow Switch
6B6	1718	Comm Loss: Evap Saturated Rfgt Temp
6B6	1718	Comm Loss: Cond Saturated Rfgt Temp
6B4	1716	Comm Loss: Purge Liquid Temperature
6B6	1718	Comm Loss: Cond Refrigerant Pressure
6B7	1719	Comm Loss: Oil Tank Pressure
6B7	1719	Comm Loss: Oil Pump Discharge Pressure
6B6	1718	Comm Loss: Evaporator Water Pump Relay
6B6	1718	Comm Loss: Condenser Water Pump Relay
6B6	1718	Comm Loss: Ice Building Relay
2AD	685	Comm Loss: Starter
2AD	685	Comm Loss: Adaptive Frequency Drive

Hexadecimal Value	Decimal Value	Diagnostic Name
389	905	Comm Loss: Local BAS Interface
6B6	1718	Comm Loss: Compressor Running Relay
6B6	1718	Comm Loss: Non-Wrn Latching Alarm Relay
6B6	1718	Comm Loss: Non-Wrn NonLatching Alm Relay
6B6	1718	Comm Loss: Unit Purge Alarm Relay
6B6	1718	Comm Loss: Limit Warning Relay
6B6	1718	Comm Loss: Maximum Capacity Relay
6B6	1718	Comm Loss: Head Relief Request Relay
6B6	1718	Comm Loss: Evap Diff Water Pressure
6B6	1718	Comm Loss: Cond Diff Water Pressure
6B6	1718	Comm Loss: Cond Rfgt Pressure Output
6B6	1718	Comm Loss: Compressor Motor % RLA Output
6B6	1718	Comm Loss: Refrigerant Monitor Input
6B6	1718	Comm Loss: External Free Cooling Command
6B6	1718	Comm Loss: Free Cool Actrs Closed Input
6B6	1718	Comm Loss: Free Cool Liq Line Actuator Relay
6B6	1718	Comm Loss: Free Cool Gas Line Actr Relay
6B6	1718	Comm Loss: Free Cooling Auxiliary Relay
6B4	1716	Comm Loss: Purge Cprsr Suction Rfgt Temp
6B4	1716	Comm Loss: Purge Carbon Tank Temperature
6B4	1716	Comm Loss: Purge Liquid Level Switch
6B4	1716	Comm Loss: Purge Chiller Cprsr Run Input
6B4	1716	Comm Loss: Purge Pumpout Relay
6B4	1716	Comm Loss: Purge Carbon Tank Heater Rly
6B4	1716	Comm Loss: Purge Regen Solenoid Relay
6B4	1716	Comm Loss: Purge Alarm Relay
6B4	1716	Comm Loss: Purge Pumpout Solenoid Output
6B4	1716	Comm Loss: Purge Exhaust Solenoid Output
6B4	1716	Comm Loss: Purge Condensing Unit Relay
6B5	1717	Comm Loss: Solid State Starter Fault
6B5	1717	Comm Loss: PFCC Relay
6B7	1719	Comm Loss: Oil/Refrigerant Pump Relay
6B7	1719	Comm Loss: Oil Tank Heater Relay
6B7	1719	Comm Loss: Motor Winding Temperature 1
6B7	1719	Comm Loss: Motor Winding Temperature 2
6B7	1719	Comm Loss: Motor Winding Temperature 3
6B7	1719	Comm Loss: Inboard Bearing Temperature
6B7	1719	Comm Loss: Outboard Bearing Temperature
6B7	1719	Comm Loss: Cprsr Discharge Rfgt Temp
2B0	688	Comm Loss: IGV First Stage Actuator
2B1	689	Comm Loss: IGV Second Stage Actuator
6B6	1718	Comm Loss: Ext Base Loading Setpoint
6B6	1718	Comm Loss: Ext Base Loading Command
6B6	1718	Comm Loss: External Hot Water Command
3B8	952	Comm Loss: Hot Gas Bypass Load Relay
3B8	952	Comm Loss: Hot Gas Bypass Unload Relay
3B8	952	Comm Loss: Hot Gas Bypass Actr Closed In
6B6	1718	Comm Loss: Generator Start/Stop Relay
6B6	1718	Comm Loss: Generator Speed Signal Output
6B6	1718	Comm Loss: Generator Up To Speed Input
6B6	1718	Comm Loss: Generator Fault Input

Additional Resources

Use the following documents and links as additional resources:

- *Installation, Operation, and Maintenance Guide for CVHE, CVHF, and CVHG Water-cooled CenTraVac Chillers with Tracer AdaptiView™ Control* (CVHE-SVX02A-EN)
- *LonTalk™ Communication Interface for Trane™ Chillers with Tracer AdaptiView Control Hardware and Software Installation Guide* (ACC-SVN100A-EN)
- Product support online:
  - www.bacnet.org
  - www.modbus.org
  - www.ashrae.org
  - Tracer TU Help online
- *Tracer™ TU Service Tool Getting Started Guide* (TTU-SVN02A-EN) (X39641083-01A)
- *Tracer TU Service Tool for Water-cooled CenTraVac Chillers with Tracer AdaptiView Control Programming Guide* (CTV-SVP02A-EN)
- *Water-cooled CenTraVac Chillers with Tracer AdaptiView Control Installation, Operation, and Maintenance Guide* (CVHE-SVX02A-EM)
- *Water-cooled CenTraVac Chiller with Tracer AdaptiView Control Diagnostics Manual and Component Summary* (CTV-SVP03A-EN)

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 500 bps). At higher speeds, multiple bits may be encoded with each electrical change. For example, 4,800 baud may allow 9,600 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 9,600 bps modem may operate at only 2,400 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 is used 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 contents of a 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 Mobus 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.

Literature Order Number	BAS-SVP01A-EN
Date	February 2008
Supersedes	New

www.trane.com

For more information, contact your local Trane office or e-mail us at comfort@trane.com