



Installation Operation Maintenance/ Programming

Protocol interface controller (PIC)

Modbus solution for Trane chillers and rooftops



September 2020

BAS-SVX08E-GB

TRANE
TECHNOLOGIES



Introduction

Foreword

These Installation Operation and Maintenance instructions are given as a guide to good practice in the installation, start-up, operation and periodic maintenance by the user of the Protocol Interface Controller (PIC). They do not contain the full service procedures necessary for the continued successful operation of this equipment. The services of a qualified service technician should be employed, through the medium of a maintenance contract with a reputable service company.

Warranty

Warranty is based on the general terms and conditions of the constructor. The warranty is void if the equipment is modified or repaired without the written approval of the constructor, if the operating limits are exceeded, or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance, or failure to comply with the manufacturer's instructions, is not covered by the warranty obligation. If the user does not conform to the instructions given in this document, it may entail cancellation of warranty and liabilities by the constructor.

Reception

On arrival, inspect the unit before signing the delivery note. Specify any damage on the delivery note, and send a registered letter of protest to the last carrier of the goods within 72 hours of delivery. Notify the local Trane sales office at the same time. The unit should be totally inspected within 7 days of delivery. If any concealed damage is discovered, send a registered letter of protest to the carrier within 7 days of delivery and notify the local Trane sales office.

Important notice: No shipping claims will be accepted by Trane if the above mentioned procedure is not respected.

Note: More stringent national rules may apply in some countries. For more information, refer to the general sales conditions of your local Trane sales office.

General Information

Cautions appear at appropriate places in this instruction manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel.

Contents

| | |
|--|----------|
| Introduction | 2 |
| Product description | 5 |
| General presentation Supported equipment | |
| Parts list | |
| Installation | 7 |
| Mounting and wiring Connectors layout | |
| Wiring PIC with Trane equipment | |
| Wiring PIC with RTAC/ CGAN / CXAN / CGCL / CCUH / CCUN / CGWH / CGWN / RAUL / RTHD / CVGF / CGAM / CXAM / RTWD / RTUD chillers (CH530 controller) | |
| Wiring PIC with CGAN/CXAN chillers (CH532 controller) | |
| Wiring PIC with RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/ RTUB chillers (UCM CLD controller with LCI-C interface) | |
| Wiring PIC with CGAH/CXAH/CGCL/CCUH/CGWH/RAUL chillers (SMM controller) | |
| Wiring PIC with RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB chillers (UCM CLD controller with CSR interface) | |
| Wiring PIC with CVGE/CVAE/RTHC chillers (UCP2 controller) | |
| Wiring PIC with WSD/WSH/WKD/WKH/TSD/TSH/TKD/TKH/YSD/YSH/ YKD/YKH rooftop (Reliabel™ controller) | |
| Wiring PIC with WSD/WSH/WKD/WKH/TCD/TCH/TED/TEH/TSD/TSH/TKD/ TKH/YCD/YCH/YSD/YSH/YKD/YKH rooftop (UCP controller) | |
| Wiring PIC with Modbus Building Management System | |
| Wiring PIC with RS-232 Modbus BMS | |
| Wiring PIC with RS-485 Modbus BMS | |
| Diagnostic tool installation | |
| Software installation | |
| Diagnostic cable | |



Contents

Operation

20

Trane equipment data point list

- Data point list for CVGF / CVHE (Tracer CH530)
- Data point list for RTAC (Tracer CH530)
- Data point list for RTHD (Tracer CH530)
- Data point list for RTWD / RTUD (Tracer CH530)
- Data point list for CGAN / CXAN / CGCL / CCUH / CCUN / CGWH / CGWN / RAUL / CGAM / CXAM (Tracer CH530)
- Data point list for CGAN/CXAN (Tracer CH532 V1.2)
- Data point list for CGAN/CXAN (Tracer CH532 V2.0)
- Data point list for RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB (UCM CLD + LCI-C interface)
- Data point list for CGAH/CXAH/CGCL/CCUH/CGWH/RAUL (SMM) Data point list for RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB (UCM CLD + CSR)
- Data point list for CVGE/CVAE/RTHC chillers (UCP2 controller) Data point list for Rooftops (UCPII / UCPIII and Reliatel controllers)

Modbus functions

- Modbus configuration
- Modbus parameters - SW3
- Modbus slave address - SW4

Variable format

PIC and Trane equipment configuration

- Configure the PIC connected to a LON Trane equipment
- Configure the PIC connected to a Comm3 Trane equipment

Configuration change

Maintenance

60

Diagnostic tool operation

- PIC status
- Trane equipment communication status
- Modbus communication status
- Modbus data point tables
- Modbus traffic

Appendix

67

Product description

General presentation

The PIC is the gateway to allow communication between a TRANE equipment and a BMS (Building Management Systems) vendor through the Modbus protocol over a RS232 or a RS-485 link.

The PIC handles Modbus RTU according to Reference Guide: Modicon PI-MBUS-300 Rev. D

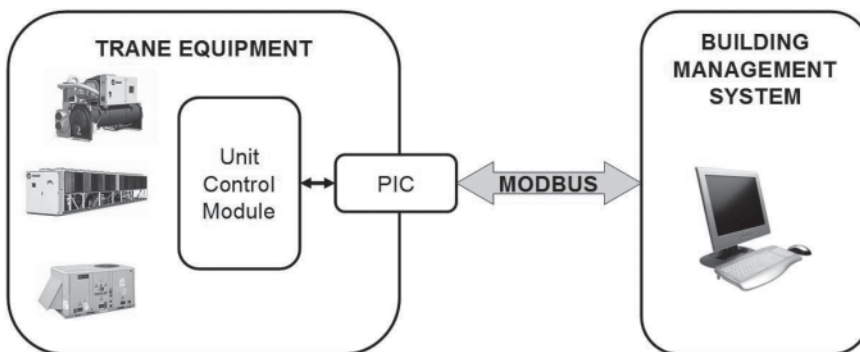
Modicon® is a trademark of Modicon, Inc.

Jbus® is a trademark of April.

Modbus/Jbus Considerations:

Jbus is an extension of Modbus. Jbus supports more functions than Modbus.

- Functions supported by both Modbus and Jbus:
1, 2, 3, 4, 5, 6, 15 and 16
- Functions supported by Jbus but not supported by Modbus:
7, 8, 11, 12 and 13





Product description

Supported equipment

Outdoor Chillers

| | |
|---------------------------|--|
| Helical rotary compressor | RTAA / RTAB / RTAC / RTAD / RTXA |
| Scroll compressor | CGAN / CXAN / CGAH / CXAH / RAUL / CGAM / CXAM |
| Centrifugal compressor | CVAE |

Indoor Chillers

| | |
|---------------------------|--|
| Helical rotary compressor | RTWB / RTUB / RTRA / RTHC / RTHD / RTWD / RTUD |
| Scroll compressor | CGWH / CGWN / CGCL / CCUH / CCUN |
| Centrifugal compressor | CVGE / CVGF |
| Absorption | ABSC / ABSD / ABTF |

Rooftops

| | |
|--------------|---|
| Reversible | WSD / WSH / WKD / WKH |
| Cooling-only | TCD / TCH / TED / TEH / TSD / TSH / TKD / TKH |
| Gas-fired | YCD / YCH / YSD / YSH / YKD / YKH |

Parts list

Table 1 - Parts list

| Communication Boards | Controller Type | Equipment | Drawing # | Part Number |
|----------------------|--|---------------------------------------|----------------|-------------|
| CH530 LCI-C | Tracer CH530 | RTAC Public Extension | | MOD 0160E |
| | | RTAC Chiller Profile | | MOD 0164E |
| | | RTHD | | MOD 0161E |
| | | SCROLL | | MOD 0162E |
| | | Centrifugal | | MOD 0163E |
| | | RTWD, RTUD | | MOD 0186E |
| | | RTAC, RTHD, CGAN.. (hardware only) | X13650845-002 | MOD 01216 |
| CH532 LCI-C V1.2 | Tracer CH532 V1.2 | CGAN/CXAN | X 13740189-001 | BRD0079E |
| CH532 LCI-C V2.0 | Tracer CH532 V2.0, V2.3 and greater | CGAN/CXAN | X 13740189-002 | BRD0084E |
| UCM CLD LCI-C | UCM CLD | RTAA, RTAD, RTWB | X 13651074-001 | KIT 12182 |
| UCM CLD CSR | UCM CLD | RTAA, RTAD, RTWB | X 13650364-004 | MOD01422 |
| TCI4-Comm3 | UCP2 | RTHC | X13650618-002 | MOD00720 |
| TCI4-Comm3 | UCP2 | CVGE | X13650460-011 | MOD01396 |
| TCI Comm3-Comm4 | Reliatel | Rooftop | X01650524-001 | BRD03029 |
| TCI Comm3-Comm4 | UCP II / III | Rooftop | X13650464-004 | BRD00917 |

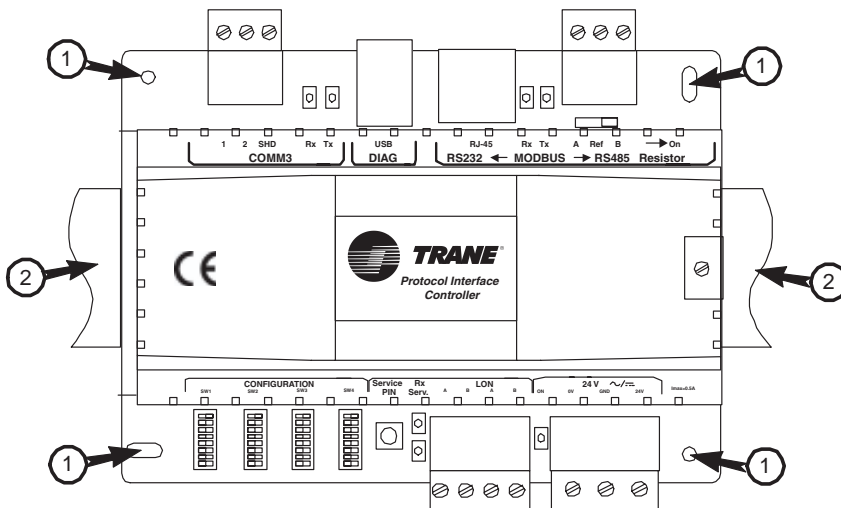
Installation

Mounting and wiring

PIC mounting recommendations

To mount the PIC device:

- Select a location near the controlled equipment to reduce wiring costs and EMC disturbance risks.
- Verify that the location conforms to the specifications below.
- Secure the controller to a 35 mm DIN rail (Use only 10/10 mm thickness sheet) or directly mount the PIC using four M3 screws (not supplied).



1 = Screw holes
2 = DIN rail

Table 2 - PIC specifications

| | |
|------------------------------|--|
| Board dimensions | 95 mm height x 132 mm width x 60 mm depth |
| Minimum clearances | Front 100 mm Each side 25 mm Top and bottom 100 mm |
| Operating environment | Temperature: from -40° to 70°C Relative Humidity: from 5% to 95% non-condensing Dust protection: pollution level 1 |
| Storage environment | Temperature: from -50° to 85°C Relative Humidity: from 5% to 95% non-condensing |



Installation

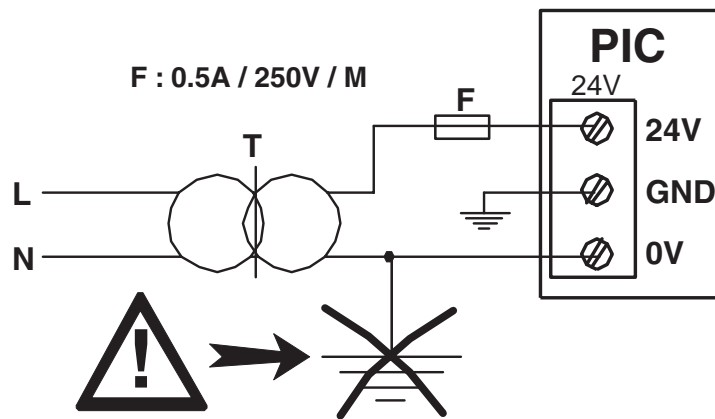
PIC Power Supply recommendations

The PIC device is powered by 24 VAC/VDC +6V/-12V power supply. A 3-wire quickconnect terminal (TB3) is provided for power supply connection to the board.

To ensure the controller will operate properly, verify that the power supply circuit is in compliance with the following circuit requirements:

To keep the PIC in accordance with the Separated Extra Low Voltage (SELV) circuit, the transformer 'T' shall be in accordance with EN / IEC 61558-2-6.

Table 3 - Power supply recommendations



CAUTION! PIC power supply circuit **MUST NOT** be connected to the ground as shown in the above illustration. The non-respect of this requirement will damage the PIC.

CAUTION! If local electrical regulations do not allow the recommended power supply wiring, contact your local Trane Sales Office for an adequate solution to comply with local electrical regulations.

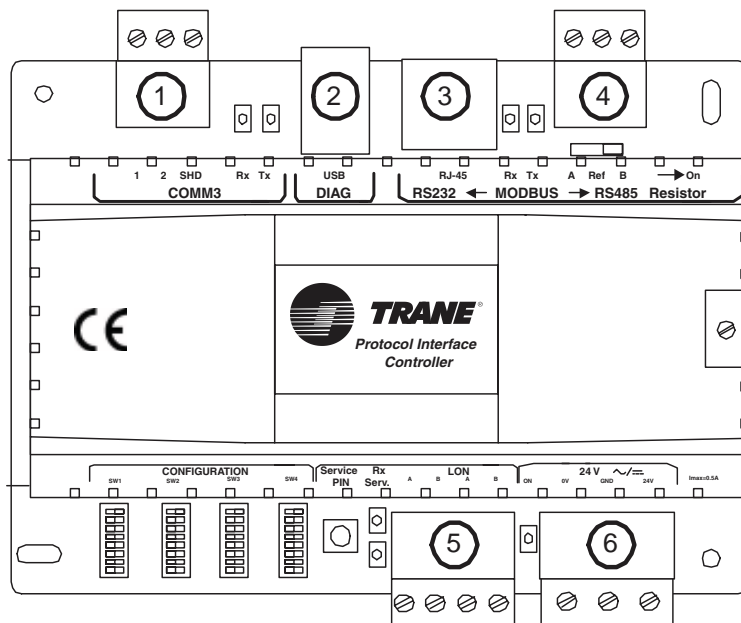
Note: This wiring is in accordance with IEC 60364-4-41 and national standards which incorporate the same requirements.

Installation

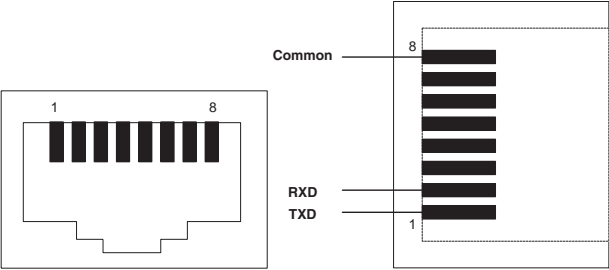
Power supply recommendations

| | |
|---------------------------|---|
| Power requirements | 24 VAC/VDC +6V / -12V 50 or 60 Hz 0.5 A maximum |
| Protection | The PIC device must receive power from a dedicated circuit which is connected to a dedicated isolation screened transformer. The circuit must be protected by a 0.5 A / 250V / Medium time lag circuit breaker/fuse located next to it. |
| Recommended wire | The AC/DC-power wiring requires three-wire cable. The recommended wire is 1.5mm ² (16 AWG) copper wire. |
| Standards | The AC/DC-power wiring complies with IEC or EN 60364-4-41 and 2006/95/EEC for electrical safety. For compliance with 2006/108/EEC and 89/336/EEC European directive for electromagnetic compatibility: - EN 55022 level B - EN 61000-3-2 - EN 61000-4-2 - EN 61000-4-4 |
| Ground Connection | The ground connection of the PIC (GND connector) MUST BE connected to the building earth to prevent electromagnetic compatibility risks. |

Connectors layout



Installation

| | |
|-------------|---|
| Connector 1 | <p>Comm3 connection to Trane equipment 3-pole removable screw 5.08 mm connector Pins '1' & '2': Transmit and receive signals (no polarity) Pin 'SHD': Cable Shield</p> |
| Connector 2 | <p>USB connection to diagnostic PC USB type B female connector</p> |
| Connector 3 | <p>Modbus RS232 connection to Building Management System RJ45 female connector Pin '1': Transmitted Data Pin '2': Received Data Pin '8': Signal Common</p>  |
| Connector 4 | <p>Modbus RS485 connection to Building Management System 3-pole removable screw 5.08 mm connector Pins 'A' & 'B': Signal Pin 'Ref': Reference</p> |
| Connector 5 | <p>LonTalk® connection to Trane equipment 4-pole removable screw 5.08 mm connector Pins 'A' & 'B': Transmit and receive signals (no polarity)</p> |
| Connector 6 | <p>Power supply connection 3-pole removable screw 7.62 mm connector Pin '0V': 0V Pin '24V': 24V AC/DC +6V/-12V Pin 'GND': Ground</p> |

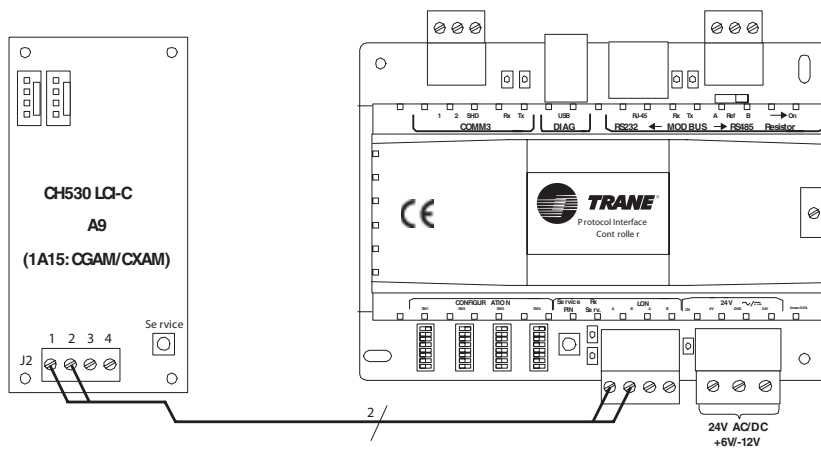


Installation

Wiring PIC with Trane equipment

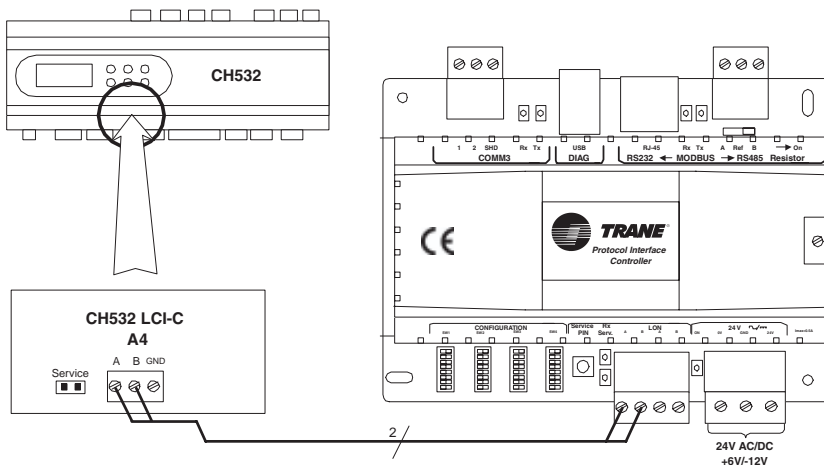
Wiring PIC with RTAC / CGAN / CXAN / CGCL / CCUH / CCUN / CGWH / CGWN / RAUL / RTHD / CVGF / CGAM / CXAM / RTWD / RTUD chillers

The following wiring diagram applies for units equipped with Tracer CH530 controller.



Wiring PIC with CGAN/CXAN chillers (CH532 controller)

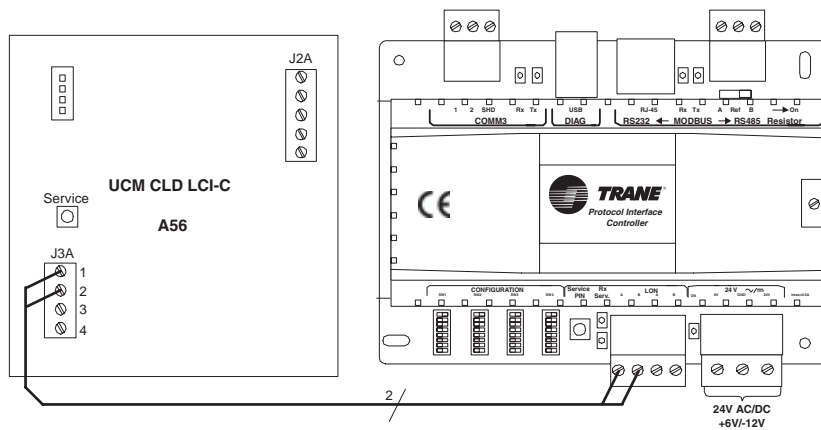
The following wiring diagram applies for units equipped with Tracer CH532 controller.



Installation

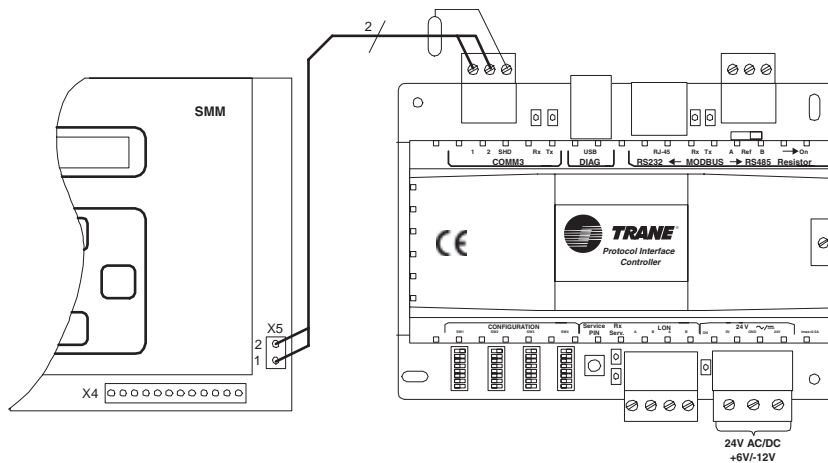
Wiring PIC with RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB chillers (UCM CLD controller with LCI-C interface)

The following wiring diagram applies for units equipped with Tracer UCM CLD controller with the LCI-C (A56) communication interface.



Wiring PIC with CGAH/CXAH/CGCL/CCUH/CGWH/RAUL chillers (SMM controller)

The following wiring diagram applies for units equipped with SMM controller.

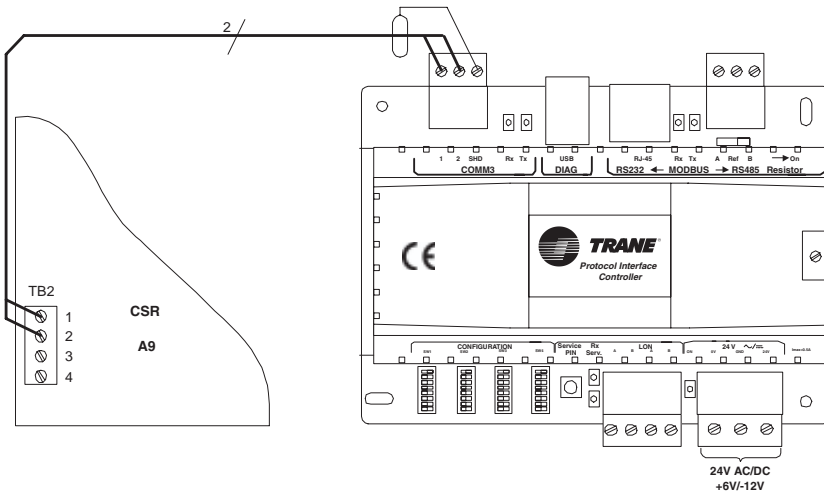




Installation

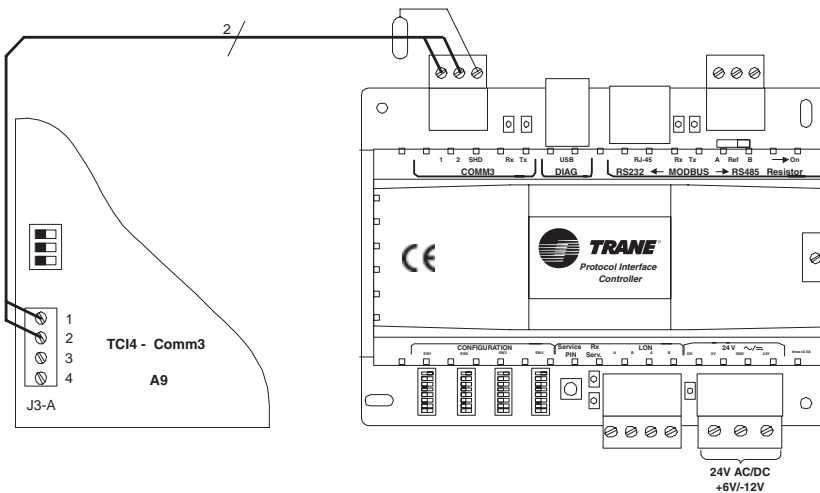
Wiring PIC with RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB chillers (UCM CLD controller with CSR interface)

The following wiring diagram applies for units equipped with UCM CLD controller with the CSR (A9) communication interface.



Wiring PIC with CVGE/CVAE/RTHC chillers (UCP2 controller)

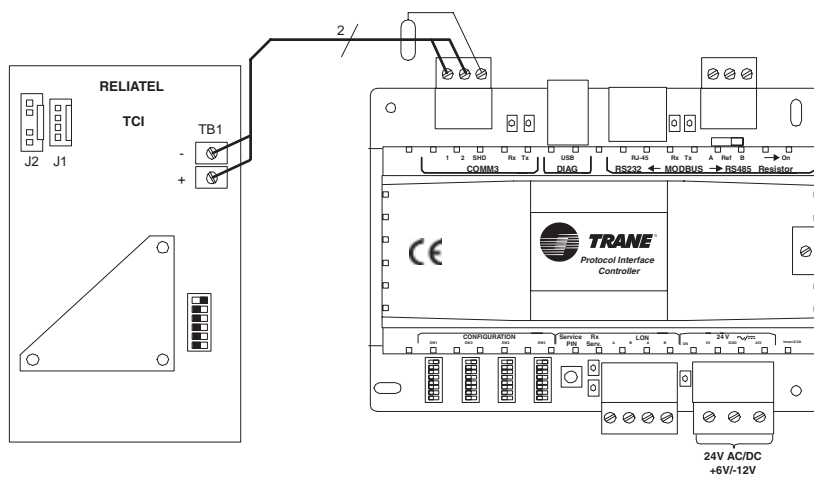
The following wiring diagram applies for units equipped with UCP2 controller with the TCI4-Comm3 (A9) communication interface.



Installation

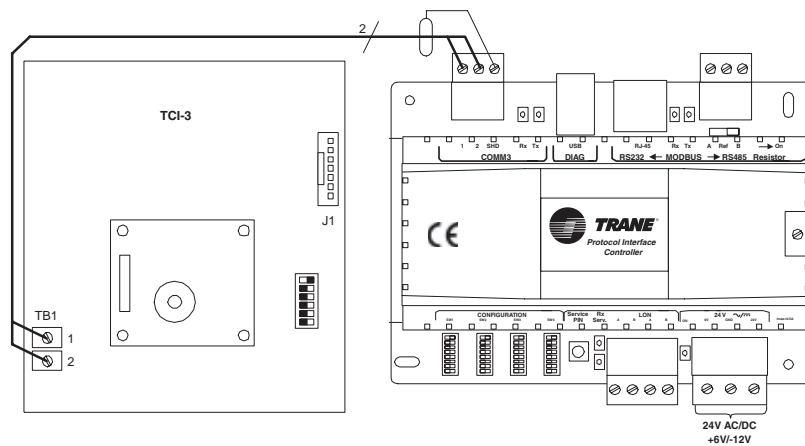
Wiring PIC with WSD/WSH/WKD/WKH/TSD/TSH/TKD/TKH/YSD/YSH/YKD/YKH rooftop (Reliatel controller)

The following wiring diagram applies for units equipped with Reliatel controller with the TCI communication interface.



Wiring PIC with WSD/WSH/WKD/WKH/TCD/TCH/TED/TEH/TSD/TSH/TKD/TKH/YCD/YCH/YSD/YSH/YKD/YKH rooftop (UCP controller)

The following wiring diagram applies for units equipped with UCP II/III controller with the TCI-3 communication interface.

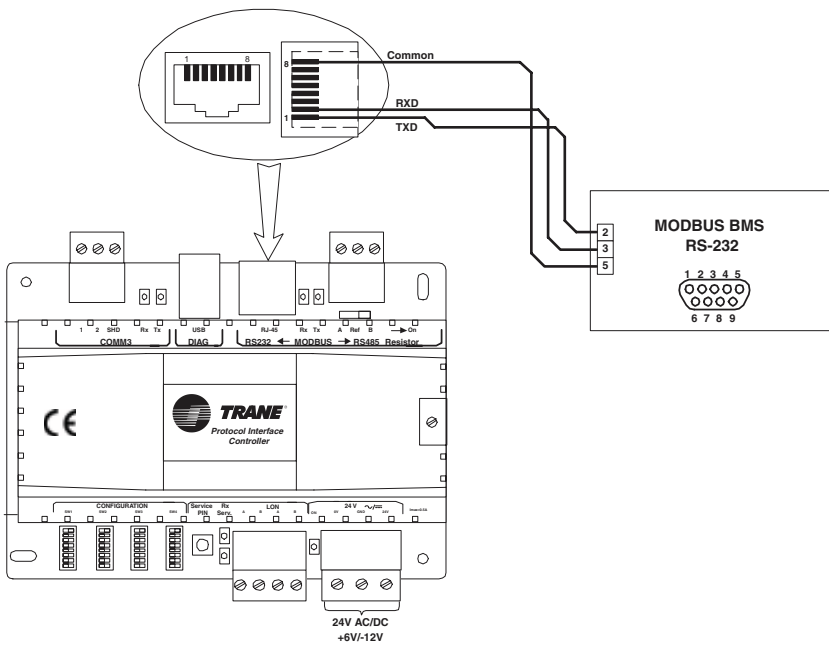




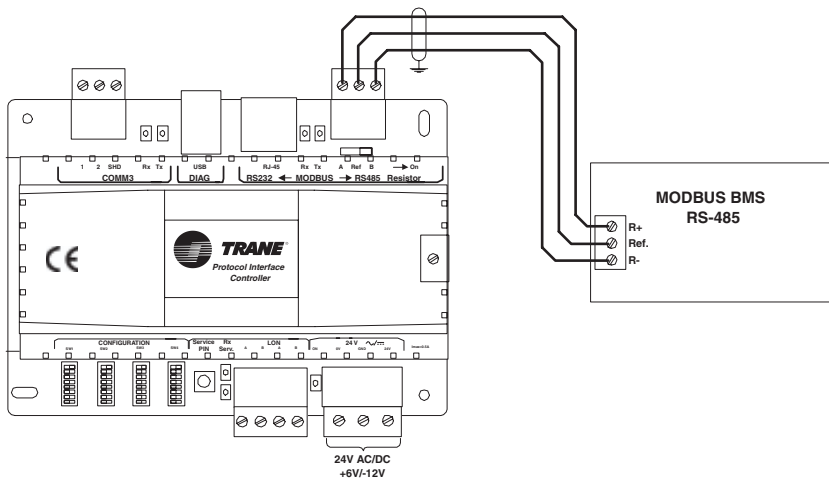
Installation

Wiring PIC with Modbus Building Management System

Wiring PIC with RS-232 Modbus BMS

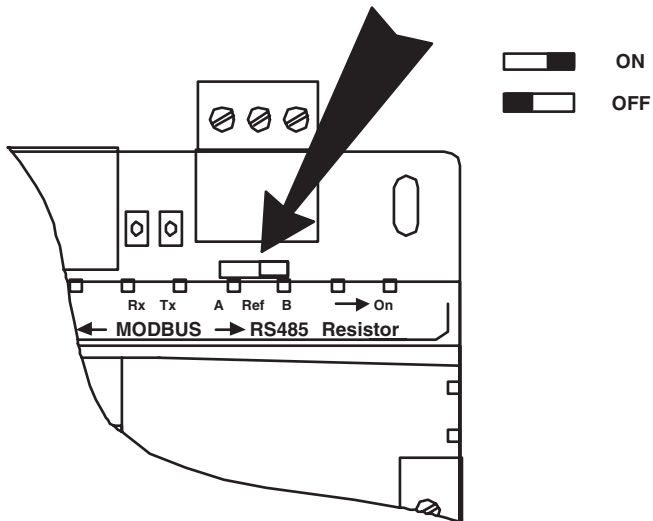


Wiring PIC with RS-485 Modbus BMS



Installation

If the RS485 wire length is less than 100 meters, it is recommended to use the termination resistor option. Set the 'Resistor' switch to the 'On' position. See following figure.





Installation

Diagnostic tool installation

Software Installation

The PIC controller is associated with a PC-based diagnostic tool. This diagnostic runs on Windows 2000 and Windows XP SP2.

The PIC is connected to the PC via a PC USB port.

The diagnostic tool installation software is available upon request to the IT group in your local Trane Sales Office.

CAUTION! Before starting software installation, DO NOT CONNECT the PIC to the PC. Software drivers must be installed prior to the first PIC connection.

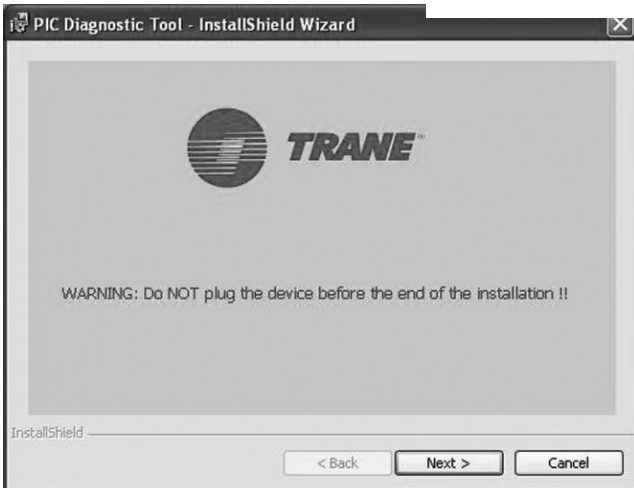
Step 0: Check if the diagnostic tool is already installed.

From the 'Start' menu, 'All programs', check if the 'PIC DiagTool' icon is located in the 'PIC Diag' program group. If the icon is present, the diagnostic tool is already installed.

Step 1: Run the diagnostic tool installation wizard (setup.exe)

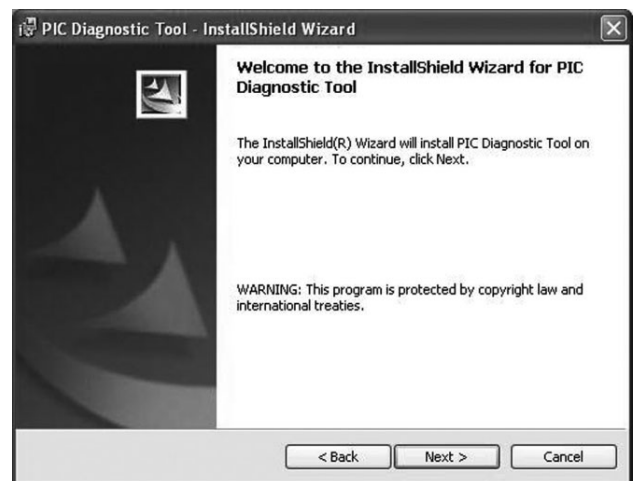


Step 2: Ensure the PIC is not connect



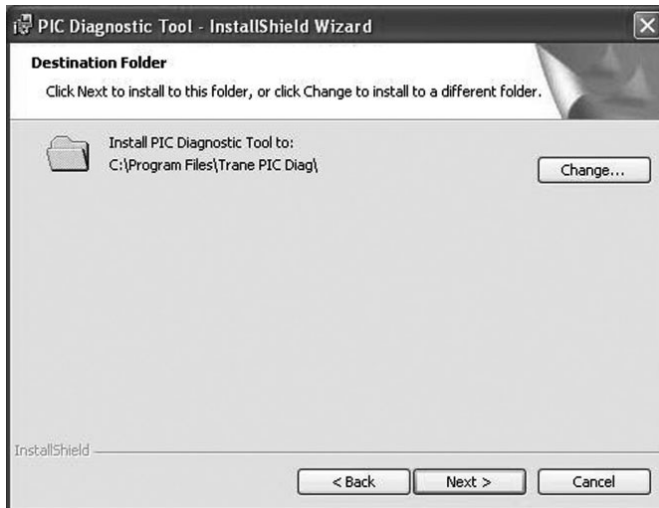
Click on 'Next'

Step 3: Confirm diagnostic tool installation



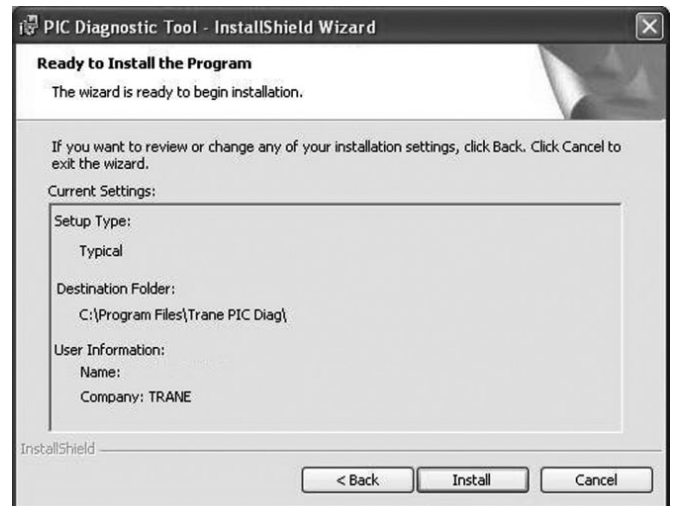
Installation

Step 4: Select installation folder



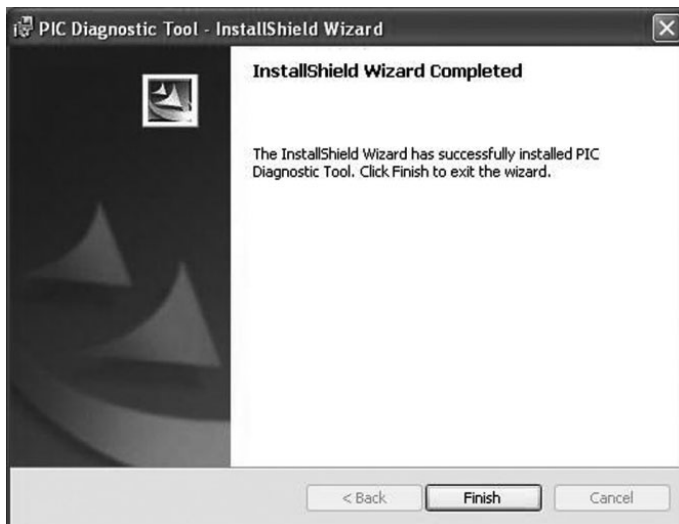
Once configured, click on 'Next'.

Step 5: Confirm installation parameters



Once checked, click on 'Install'. The installation process starts copying files.

Step 6: Finish the installation



Click on 'Finish'. The software installation is done.

Installation

Step 7: Connect the PIC

Connect the PIC to the PC using the specified USB cable (see 'Diagnostic cable specifications section'). Both PC and PIC must be powered On.

As soon as the connection is done, an information window will appear on the right side of the status bar. This window shows the installation process is running. Once the installation is completed, the window will show that the new equipment is ready to be used.

The diagnostic tool is ready to be used.

Step 8: Launch the diagnostic tool

The PIC must be connected to the PC prior to launch the diagnostic tool.

From the 'Start Menu', 'All programs', 'PIC Diag' select the PIC application 'PIC Diag Tool'.



Diagnostic cable

The PIC requires a standard USB cable:
On PC side: USB type A male connector
On PIC side: USB type B male connector



Operation

Trane Equipment Data point List

Table 4 - Data Point List for CVGF / CVHE / CVHF / CVHG chillers, Tracer CH530 controller Version 2.0 and greater

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|-----------------------|----------|----------------------|--------|---|-------------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command | bit | | |
| | | 00002 | 1 | Chiller Mode | bit | | |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield | | |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature | | |
| | | 40003 | 2 | Current Limit Setpoint | Percentage | | |
| | | 40004 | 3 | Heating Setpoint | Temperature | | |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit | | |
| | | 30001 | 0 | Copy of function 2 binary points | bitfield | | |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature | | |
| | | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage | | |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage | | |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature | | |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature | | |
| | | 30007 | 6 | Condenser Entering Water Temperature | Temperature | | |
| | | 30008 | 7 | Condenser Leaving Water Temperature | Temperature | | |
| | | 30009 | 8 | Chiller Status (See Appendix) | bitfield | | |
| | | 30010 | 9 | Compressor Running Outputs (See Appendix) | bitfield | | |
| | | Analog Inputs | 4 | 30011 | 10 | Evaporator Refrigerant Pressure Circuit 1 | Pressure |
| | | | | 30012 | 11 | Evaporator Refrigerant Pressure Circuit 2 | Pressure |
| | | | | 30013 | 12 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | | | 30014 | 13 | Evaporator Refrigerant Temperature Circuit 2 | Temperature |
| | | | | 30015 | 14 | Condenser Refrigerant Pressure 1 | Pressure |
| | | | | 30016 | 15 | Condenser Refrigerant Pressure 2 | Pressure |
| | | | | 30017 | 16 | Condenser Refrigerant Temperature 1 | Temperature |
| 30018 | 17 | | | Condenser Refrigerant Temperature 2 | Temperature | | |
| | | 30019-30020 | 18-19 | Starts - Compressor A | None | | |
| | | 30021-30022 | 20-21 | Run Time - Compressor A | Hours | | |
| | | 30023-30024 | 22-23 | Starts - Compressor D | None | | |
| | | 30025-30026 | 24-25 | Run Time - Compressor D | Hours | | |



Operation

Table 5 - Data Point List for RTAC chillers (Chiller Profile), Tracer CH530 controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|--------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Current Limit Setpoint | Percentage |
| | | 40004 | 3 | Heating Setpoint | Temperature |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit |
| | | 30001 | 0 | Copy of function 2 binary points | bitfield |
| Analog Inputs | 4 | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| | | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature |
| | | 30007 | 6 | Condenser Entering Water Temperature | Temperature |
| | | 30008 | 7 | Condenser Leaving Water Temperature | Temperature |
| | | 30009 | 8 | Chiller Status (See Appendix) | bitfield |



Operation

Table 6 - Data Point List for RTAC chillers (Public Extension), Tracer CH530 controller.

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|-----------------------|----------|----------------------|--------|---|-------------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command | bit | | |
| | | 00002 | 1 | Chiller Mode | bit | | |
| | | 40001 | 0 | Copy of function 5/15 binary points | bitfield | | |
| Analog Outputs | 6/16 | 40002 | 1 | Chilled Water Setpoint | Temperature | | |
| | | 40003 | 2 | Current Limit Setpoint | Percentage | | |
| | | 10002 | 1 | Chiller Running Status | bit | | |
| Binary Inputs | 2 | 30001 | 0 | Copy of function 2 binary points | bitfield | | |
| | | 30002 | 1 | Active Chilled Water Setpoint | Temperature | | |
| | | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage | | |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage | | |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature | | |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature | | |
| | | 30009 | 8 | Chiller Status (See Appendix) | bitfield | | |
| | | 30010 | 9 | Compressor Running Outputs (See Appendix) | bitfield | | |
| | | 30011 | 10 | Air Flow Circuit 1 (LSB) Circuit 2 (MSB) | Percentage | | |
| | | 30012 | 11 | Outdoor Air Temperature | Temperature | | |
| | | 30013 | 12 | Evaporator Refrigerant Pressure Circuit 1 | Pressure | | |
| | | 30014 | 13 | Evaporator Refrigerant Pressure Circuit 2 | Pressure | | |
| | | Analog Inputs | 4 | 30015 | 14 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | | | 30016 | 15 | Evaporator Refrigerant Temperature Circuit 2 | Temperature |
| | | | | 30017 | 16 | Condenser Refrigerant Pressure 1 | Pressure |
| | | | | 30018 | 17 | Condenser Refrigerant Pressure 2 | Pressure |
| | | | | 30019 | 18 | Condenser Refrigerant Temperature 1 | Temperature |
| | | | | 30020 | 19 | Condenser Refrigerant Temperature 2 | Temperature |
| | | | | 30021-30022 | 20-21 | Starts - Compressor A | None |
| | | | | 30023-30024 | 22-23 | Run Time - Compressor A | Hours |
| | | | | 30025-30026 | 24-25 | Starts - Compressor B | None |
| 30027-30028 | 26-27 | | | Run Time - Compressor B | Hours | | |
| 30029-30030 | 28-29 | | | Starts - Compressor C | None | | |
| 30031-30032 | 30-31 | | | Run Time - Compressor C | Hours | | |
| 30033-30034 | 32-33 | | | Starts - Compressor D | None | | |
| 30035-30036 | 34-35 | | | Run Time - Compressor D | Hours | | |



Operation

Table 7 - Data Point List for RTHD chillers, Tracer CH530 controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|-------------------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Current Limit Setpoint | Percentage |
| | | 40004 | 3 | Heating Setpoint | Temperature |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit |
| Analog Inputs | 4 | 30001 | 0 | Copy of function 2 binary points | bitfield |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| | | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature |
| | | 30007 | 6 | Condenser Entering Water Temperature | Temperature |
| | | 30008 | 7 | Condenser Leaving Water Temperature | Temperature |
| | | 30009 | 8 | Chiller Status (See Appendix) | bitfield |
| | | 30010 | 9 | Compressor Running Outputs (See Appendix) | bitfield |
| | | 30011 | 10 | Evaporator Refrigerant Pressure Circuit 1 | Pressure |
| | | 30012 | 11 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | 30013 | 12 | Condenser Refrigerant Pressure 1 | Pressure |
| | | 30014 | 13 | Condenser Refrigerant Temperature 1 | Temperature |
| | | 30015-30016 | 14 | Starts - Compressor A | None |
| 30017-30018 | 15 | Run Time - Compressor A | Hours | | |



Operation

Table 8 - Data Point List for RTWD - RTUD chillers, Tracer CH530 controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|--------------------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command | bit |
| | | 00002 | 1 | Chiller Mode | bit |
| | | 00003 | 2 | Noise Reduction Command (RTUD only) | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Current Limit Setpoint | Percentage |
| | | 40004 | 3 | Heating Setpoint | Temperature |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit |
| | | 10003 | 2 | Noise Reduction Active (RTUD only) | bit |
| Analog Inputs | 4 | 30001 | 0 | Copy of function 2 binary points | bitfield |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| | | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature |
| | | 30007 | 6 | Condenser Entering Water Temperature | Temperature |
| | | 30008 | 7 | Condenser Leaving Water Temperature | Temperature |
| | | 30009 | 8 | Chiller Status | bitfield |
| | | 30010 | 9 | Compressor Running Outputs | bitfield |
| | | 30011 | 10 | Air Flow Circuit 1 (LSB) ; Circuit 2 (MSB) (RTUD only) | Percentage |
| | | 30012 | 11 | Outdoor Air Temperature | Temperature |
| | | 30013 | 12 | Evaporator Refrigerant Pressure Circuit 1 | Pressure |
| | | 30014 | 13 | Evaporator Refrigerant Pressure Circuit 2 | Pressure |
| | | 30015 | 14 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | 30016 | 15 | Evaporator Refrigerant Temperature Circuit 2 | Temperature |
| | | 30017 | 16 | Condenser Refrigerant Pressure 1 | Pressure |
| | | 30018 | 17 | Condenser Refrigerant Pressure 2 | Pressure |
| | | 30019 | 18 | Condenser Refrigerant Temperature 1 | Temperature |
| | | 30020 | 19 | Condenser Refrigerant Temperature 2 | Temperature |
| 30021-30022 | 20-21 | Starts - Compressor 1A | None | | |
| 30023-30024 | 22-23 | Run Time - Compressor 1A | Hours | | |
| 30029-30030 | 28-29 | Starts - Compressor 2A | None | | |
| 30031-30032 | 30-31 | Run Time - Compressor 2A | Hours | | |
| 30037-30038 | 36-37 | Unit Power | W | | |



Operation

Table 9 - Data Point List for CGAN/CXAN/CGAM/CXAM/CGC/CCUH/CCUN/CGWH/CGWN/RAUL chillers, Tracer CH530 controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|-------------------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| | | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| Analog Outputs | 6/16 | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Current Limit Setpoint | Percentage |
| | | 40004 | 3 | Heating Setpoint | Temperature |
| | | 10002 | 1 | Chiller Running Status | bit |
| Binary Inputs | 2 | 30001 | 0 | Copy of function 2 binary points | bitfield |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| Analog Inputs | 4 | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature |
| | | 30007 | 6 | Condenser Entering Water Temperature | Temperature |
| | | 30008 | 7 | Condenser Leaving Water Temperature | Temperature |
| | | 30009 | 8 | Chiller Status (See Appendix) | bitfield |
| | | 30010 | 9 | Compressor Running Outputs (See Appendix) | bitfield |
| | | 30011 | 10 | Condenser Fan Running Outputs (See Appendix) | bitfield |
| | | 30012 | 11 | Outdoor Air Temperature | Temperature |
| | | 30013 | 12 | Evaporator Refrigerant Pressure Circuit 1 | Pressure |
| | | 30014 | 13 | Evaporator Refrigerant Pressure Circuit 2 | Pressure |
| | | 30015 | 14 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | 30016 | 15 | Evaporator Refrigerant Temperature Circuit 2 | Temperature |
| | | 30017 | 16 | Condenser Refrigerant Pressure 1 | Pressure |
| | | 30018 | 17 | Condenser Refrigerant Pressure 2 | Pressure |
| | | 30019 | 18 | Condenser Refrigerant Temperature 1 | Temperature |
| | | 30020 | 19 | Condenser Refrigerant Temperature 2 | Temperature |
| | | 30021-30022 | 20-21 | Starts - Compressor A | None |
| | | 30023-30024 | 22-23 | Run Time - Compressor A | Hours |
| 30025-30026 | 24-25 | Starts - Compressor B | None | | |
| 30027-30028 | 26-27 | Run Time - Compressor B | Hours | | |
| 30029-30030 | 28-29 | Starts - Compressor C | None | | |
| 30031-30032 | 30-31 | Run Time - Compressor C | Hours | | |
| 30033-30034 | 32-33 | Starts - Compressor D | None | | |
| 30035-30036 | 34-35 | Run Time - Compressor D | Hours | | |
| 30037-30038 | 36-37 | Starts - Compressor E | None | | |
| 30039-30040 | 38-39 | Run Time - Compressor E | Hours | | |
| 30041-30042 | 40-41 | Starts - Compressor F | None | | |
| 30043-30044 | 42-43 | Run Time - Compressor F | Hours | | |



Operation

Table 10 - Data Point List for CGAN/CXAN chillers, Tracer CH532 controller Version 1.2

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|--------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| | | 00003 | 2 | Circuit 1 lockout | bit |
| | | 00004 | 3 | Circuit 2 lockout | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Heating Setpoint | Temperature |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit |
| | | 10003 | 2 | Circuit 1 Fan 1 output | bit |
| | | 10004 | 3 | Circuit 1 Fan 2 output | bit |
| | | 10008 | 7 | Compressor A1 output | bit |
| | | 10009 | 8 | Compressor B1C1 output | bit |
| | | 10010 | 9 | Compressor A2 output | bit |
| | | 10011 | 10 | Compressor B2C2 output | bit |
| Analog Inputs | 4 | 30001 | 0 | Copy of function 2 binary points | bitfield |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| | | 30003 | 2 | Evaporator Leaving Water Temperature | Temperature |
| | | 30004 | 3 | Evaporator Entering Water Temperature | Temperature |
| | | 30005 | 4 | Condenser Entering Water Temperature | Temperature |
| | | 30006 | 5 | Chiller Status (See Appendix) | bitfield |



Operation

Table 11 - Data Point List for CGAN/CXAN chillers, Tracer CH532 controller Version 2.0 and greater

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|----------------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| | | 00003 | 2 | Circuit 1 Enable/Disable | bit |
| | | 00004 | 3 | Circuit 2 Enable/Disable | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| | | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Heating Setpoint | Temperature |
| Binary Inputs | 2 | 10002 | 1 | Chiller Running Status | bit |
| | | 10003 | 2 | Circuit 1 Fan 1 output | bit |
| | | 10004 | 3 | Circuit 1 Fan 2 output | bit |
| | | 10005 | 4 | Circuit 1 Fan 3 output | bit |
| | | 10006 | 5 | Circuit 2 Fan 1 output | bit |
| | | 10007 | 6 | Circuit 2 Fan 2 output | bit |
| | | 10008 | 7 | Circuit 2 Fan 3 output | bit |
| | | 10009 | 8 | Compressor A1 output | bit |
| | | 10010 | 9 | Compressor B1C1 output | bit |
| | | 10011 | 10 | Compressor A2 output | bit |
| | | 10012 | 11 | Compressor B2C2 output | bit |
| | | Analog Inputs | 4 | 30001 | 0 |
| 30002 | 1 | | | Active Chilled/Hot Water Setpoint | Temperature |
| 30003 | 2 | | | Evaporator Leaving Water Temperature | Temperature |
| 30004 | 3 | | | Evaporator Entering Water Temperature | Temperature |
| 30005 | 4 | | | Condenser Entering Water Temperature | Temperature |
| 30006 | 5 | | | Chiller Status (See Appendix) | bitfield |
| 30007 | 6 | | | Circuit 1 saturated suction temperature | Temperature |
| 30008 | 7 | | | Circuit 2 saturated suction temperature | Temperature |
| 30009 | 8 | | | Circuit 1 saturated discharge temperature | Temperature |
| 30010 | 9 | | | Circuit 2 saturated discharge temperature | Temperature |
| 30011-30012 | 10-11 | | | Compressor A1 running hours | Hours |
| 30013-30014 | 12-13 | | | Compressor B1C1 running hours | Hours |
| 30015-30016 | 14-15 | | | Compressor A2 output running hours | Hours |
| 30017-30018 | 16-17 | | | Compressor B2C2 running hours | Hours |
| 30019-30020 | 18-19 | | | Compressor A1 starts | None |
| 30021-30022 | 20-21 | | | Compressor B1C1 starts | None |
| 30023-30024 | 22-23 | | | Compressor A2 starts | None |
| 30025-30026 | 24-25 | | | Compressor B2C2 starts | None |



Operation

Table 12 - Data Point List for RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB chillers, UCM CLD controller with LCI-C interface

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-----------------------|----------|-------------------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Chiller Enable/Disable Command (0=Disable) | bit |
| | | 00002 | 1 | Chiller Mode (0=Cool) | bit |
| | | 40001 | 0 | Copy of function 5/15 binary points | bitfield |
| Analog Outputs | 6/16 | 40002 | 1 | Chilled Water Setpoint | Temperature |
| | | 40003 | 2 | Current Limit Setpoint | Percentage |
| | | 40004 | 3 | Heating Setpoint | Temperature |
| | | 10002 | 1 | Chiller Running Status | bit |
| Binary Inputs | 2 | 30001 | 0 | Copy of function 2 binary points | bitfield |
| | | 30002 | 1 | Active Chilled/Hot Water Setpoint | Temperature |
| Analog Inputs | 4 | 30003 | 2 | Actual Capacity (Percent Run Load Amps) | Percentage |
| | | 30004 | 3 | Active Current Limit Setpoint | Percentage |
| | | 30005 | 4 | Evaporator Leaving Water Temperature | Temperature |
| | | 30006 | 5 | Evaporator Entering Water Temperature | Temperature |
| | | 30007 | 6 | Chiller Status (See Appendix) | bitfield |
| | | 30008 | 7 | Compressor Running Outputs (See Appendix) | bitfield |
| | | 30009 | 8 | Condenser Fan Running Outputs (See Appendix) | bitfield |
| | | 30010 | 9 | Outdoor Air Temperature | Temperature |
| | | 30011 | 10 | Evaporator Refrigerant Pressure Circuit 1 | Pressure |
| | | 30012 | 11 | Evaporator Refrigerant Pressure Circuit 2 | Pressure |
| | | 30013 | 12 | Evaporator Refrigerant Temperature Circuit 1 | Temperature |
| | | 30014 | 13 | Evaporator Refrigerant Temperature Circuit 2 | Temperature |
| | | 30015 | 14 | Condenser Refrigerant Pressure 1 | Pressure |
| | | 30016 | 15 | Condenser Refrigerant Pressure 2 | Pressure |
| | | 30017 | 16 | Condenser Refrigerant Temperature 1 | Temperature |
| | | 30018 | 17 | Condenser Refrigerant Temperature 2 | Temperature |
| | | 30019-30020 | 18-19 | Starts - Compressor A | None |
| | | 30021-30022 | 20-21 | Run Time - Compressor A | Hours |
| | | 30023-30024 | 22-23 | Starts - Compressor B | None |
| | | 30025-30026 | 24-25 | Run Time - Compressor B | Hours |
| 30027-30028 | 26-27 | Starts - Compressor C | None | | |
| 30029-30030 | 28-29 | Run Time - Compressor C | Hours | | |
| 30031-30032 | 30-31 | Starts - Compressor D | None | | |
| 30033-30034 | 32-33 | Run Time - Compressor D | Hours | | |

Operation

Table 13 - Data Point List for CGAH/CXAH/CGCL/CCUH/CGWH/RAUL chillers, SMM controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|--------------|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | 1 = stop the circuit 1 | bit |
| | | 00002 | 1 | 1 = stop the circuit 2 | bit |
| | | 00003 | 2 | 1 = validation of the EVP leaving water setpoint | bit |
| | | 00004 | 3 | 1 = unit runs in heating mode | bit |
| | | 00005 | 4 | 1 = validation of the running mode | bit |
| | | 00006 | 5 | 1 = validation of remote controls | bit |
| | | 00007 | 6 | 1 = low noise is validated | bit |
| | | 00008 | 7 | 1 = validation of the low noise mode | bit |
| Analog Outputs | 6/16 | 40001 | 0 | EVP water setpoint | Temperature |
| | | 40002 | 1 | Bit 7 = validation of remote control Bit 4 = validation of the running mode Bit 3 = running mode (0=cool;1=heat) Bit 2 = validation of the EVP leaving water setpoint Bit 1 = stop the circuit 2 Bit 0 = stop the circuit 1 | bitfield |
| | | 40003 | 2 | Bit 3 = validation of EVP water pump control Bit 2 = EVP water pump command (0=stop;1=start) Bit 1 = Validation of the low noise mode Bit 0 = Low noise is validated | bitfield |
| | | 10001 | 0 | 1 = module I/O1 communication fault | bit |
| Binary Inputs | 2 | 10002 | 1 | 1 = module I/O2 communication fault | bit |
| | | 10003 | 2 | 1 = module I/O3 communication fault | bit |
| | | 10004 | 3 | 1 = module I/O4 communication fault | bit |
| | | 10005 | 4 | 1 = active remote water setpoint | bit |
| | | 10006 | 5 | 1 = unit in heating mode | bit |
| | | 10007 | 6 | 1 = compressor A1 runs | bit |
| | | 10008 | 7 | 1 = compressor B1 runs | bit |
| | | 10009 | 8 | 1 = liquid valve of circuit 1 open | bit |
| | | 10010 | 9 | 1 = EVP water pump runs | bit |
| | | 10011 | 10 | 1 = EVP resistor is stopped | bit |
| | | 10012 | 11 | 1 = default relay of circuit 1 is ON | bit |
| | | 10013 | 12 | 1 = compressor A2 runs | bit |
| | | 10014 | 13 | 1 = compressor B2 runs | bit |
| | | 10015 | 14 | 1 = liquid valve of circuit 2 opened | bit |
| | | 10016 | 15 | 1 = bypass/reverse cycle of circuit 2 runs | bit |
| | | 10017 | 16 | 1 = default relay of circuit 2 is ON | bit |
| | | 10018 | 17 | 1 = line fan 1 runs | bit |
| | | 10019 | 18 | 1 = Y fan 1 runs | bit |
| | | 10020 | 19 | 1 = delta fan 1 runs | bit |
| | | 10021 | 20 | 1 = fan 2 runs | bit |
| | | 10022 | 21 | 1 = fans 3 and 4 run | bit |
| | | 10023 | 22 | 1 = warning exits | bit |
| | | 10024 | 23 | 1 = unit or circuit 1 manual reset fault | bit |
| | | 10025 | 24 | 1 = unit or circuit 2 manual reset fault | bit |



Operation

Table 13 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|---------------|----------|---|--------|---|-------------|--|----------|
| Binary Inputs | 2 | 10026 | 25 | 1 = unit or circuit 1 automatic reset fault | bit | | |
| | | 10027 | 26 | 1 = unit or circuit 2 automatic reset fault | bit | | |
| | | 10028 | 27 | 1 = circuit 1 is limited or not ready | bit | | |
| | | 10029 | 28 | 1 = circuit 2 is limited or not ready | bit | | |
| | | 10030 | 29 | 1 = unit information alarm | bit | | |
| | | 10031 | 30 | 1 = unit default LED in ON | bit | | |
| | | 10032 | 31 | 1 = menu B 07 on Remote position | bit | | |
| | | 10033 | 32 | 1 = unit stopped by external input | bit | | |
| | | 10034 | 33 | 1 = unit stopped by serial link | bit | | |
| | | 10035 | 34 | 1 = unit stopped by operator | bit | | |
| | | 10036 | 35 | 1 = unit stopped by keypad | bit | | |
| | | 10037 | 36 | 1 = no EVP water flow while the unit is running | bit | | |
| | | 10038 | 37 | 1 = unit stopped by low ambient | bit | | |
| | | 10039 | 38 | 1 = no EVP water flow while the unit is stopped | bit | | |
| Analog Inputs | 4 | 30001 | 0 | EVP circuit 1 leaving water temperature | Temperature | | |
| | | 30002 | 1 | saturated EVP 1 refrigerant temperature | Temperature | | |
| | | 30003 | 2 | saturated CDS 1 refrigerant temperature | Temperature | | |
| | | 30004 | 3 | EVP circuit 2 leaving water temperature | Temperature | | |
| | | 30005 | 4 | saturated EVP 2 refrigerant temperature | Temperature | | |
| | | 30006 | 5 | saturated CDS 2 refrigerant temperature | Temperature | | |
| | | 30007 | 6 | air temperature | Temperature | | |
| | | 30008 | 7 | CDS leaving water temperature | Temperature | | |
| | | 30009 | 8 | EVP entering water temperature | Temperature | | |
| | | 30010 | 9 | CDS entering water temperature | Temperature | | |
| | | 30011 | 10 | saturated EVP 1 refrigerant pressure | Pressure | | |
| | | 30012 | 11 | saturated CDS 1 refrigerant pressure | Pressure | | |
| | | 30013 | 12 | saturated EVP 2 refrigerant pressure | Pressure | | |
| | | 30014 | 13 | saturated CDS 2 refrigerant pressure | Pressure | | |
| | | 30015 | 14 | regulation temperature | Temperature | | |
| | | 30016 | 15 | active EVP water temperature setpoint | Temperature | | |
| | | 30017 | 16 | diagnostic code | None | | |
| | | 30018-30019 | 17-18 | start counter of the compressor A1 | None | | |
| | | 30020-30021 | 19-20 | start counter of the compressor A2 | None | | |
| | | 30022-30023 | 21-22 | start counter of the compressor B1 | None | | |
| | | 30024-30025 | 23-24 | start counter of the compressor B2 | None | | |
| | | 30026-30027 | 25-26 | operating hours of the compressor A1 | Hours | | |
| | | 30028-30029 | 27-28 | operating hours of the compressor A2 | Hours | | |
| | | 30030-30031 | 29-30 | operating hours of the compressor B1 | Hours | | |
| | | 30032-30033 | 31-32 | operating hours of the compressor B2 | Hours | | |
| | | 30034 | 33 | Bit 7 1 = unit in heating mode | | | bitfield |
| | | | | Bit 6 1 = active remote water setpoint | | | |
| | | | | Bit 5 1 = module I/O4 communication fault | | | |
| | | | | Bit 4 1 = module I/O3 communication fault | | | |
| | | | | Bit 3 1 = module I/O2 communication fault | | | |
| | | Bit 2 1 = module I/O1 communication fault | | | | | |

Operation

Table 13 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|--|----------|---|----------|---|----------|
| Analog Inputs | 4 | 30035 | 34 | Bit 7 1 = compressor B2 runs | bitfield |
| | | | | Bit 6 1 = compressor A2 runs | |
| | | | | Bit 5 1 = default relay of circuit 1 is ON | |
| | | | | Bit 4 1 = EVP resistor is stopped | |
| | | | | Bit 3 1 = EVP water pump runs | |
| | | | | Bit 2 1 = liquid valve of circuit 1 open | |
| | | | | Bit 1 1 = compressor B1 runs | |
| | | | | Bit 0 1 = compressor A1 runs | |
| | | 30036 | 35 | Bit 7 1 = fans 3 and 4 run | bitfield |
| | | | | Bit 6 1 = fan 2 runs | |
| | | | | Bit 5 1 = delta fan 1 runs | |
| | | | | Bit 4 1 = Y fan 1 runs | |
| | | | | Bit 3 1 = line fan 1 runs | |
| | | | | Bit 2 1 = default relay of circuit 2 is ON | |
| | | | | Bit 1 1 = bypass/reverse cycle of circuit 2 runs | |
| | | | | Bit 0 1 = liquid valve of circuit 2 opened" | |
| | | 30037 | 36 | Bit 1 1 = warning exits | bitfield |
| | | 30038 | 37 | Bit 7 1 = unit default LED in ON | bitfield |
| | | | | Bit 6 1 = unit information alarm | |
| | | | | Bit 5 1 = circuit 2 is limited or not ready | |
| | | | | Bit 4 1 = circuit 1 is limited or not ready | |
| | | | | Bit 3 1 = unit or circuit 2 automatic reset fault | |
| | | | | Bit 2 1 = unit or circuit 1 automatic reset fault | |
| | | | | Bit 1 1 = unit or circuit 2 manual reset fault | |
| Bit 0 1 = unit or circuit 1 manual reset fault | | | | | |
| 30039 | 38 | Bit 2 1 = Reversible chiller or Heat Pump | bitfield | | |
| Bit 1 1 = menu B 07 in Extern position | | | | | |
| 30040 | 39 | Bit 0 1 = Menu B 07 in Remote position" | bitfield | | |
| | | Bit 7 1 = unit stopped by low ambient | | | |
| | | Bit 6 1 = no EVP water flow while the unit is running | | | |
| | | Bit 4 1 = unit stopped by keypad | | | |
| | | Bit 3 1 = unit stopped by operator | | | |
| 30041 | 40 | Bit 2 1 = unit stopped by serial link | bitfield | | |
| | | Bit 1 1 = unit stopped by external input" | | | |
| | | Bit 4 1 = no EVP water flow while the unit is stopped | | | |
| | | Bit 3 1 = Unit stopped by communication failure with I/O module 3 | | | |
| | | Bit 2 1 = Unit stopped by communication failure with I/O module 2 | | | |
| 30042 | 41 | Bit 1 1 = Unit stopped by sensor 31 failed | bitfield | | |
| | | Bit 0 1 = Unit stopped by sensor 21 failed | | | |
| | | Bit 7 1 = Compressor subtract request by control algorithm | | | |
| | | Bit 6 1 = Compressor add request by control algorithm | | | |
| 30043 | 42 | Bit 5 1 = Fan speed inverter failure | bitfield | | |
| | | Bit 0 1 = EVP water flow established | | | |
| | | Running power (%) | | Percentage | |



Operation

Table 14 - Data Point List for RTAA/RTAB/RTXA/RTAD/RTWB/RTRA/RTUB chillers, UCM CLD controller with CSR

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|--|--------|--|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | Enable remote setpoints | bit |
| | | 00002 | 1 | Remote chiller auto/stop (0 = auto, 1 = stop) | bit |
| | | 00003 | 2 | Enable Hot water setpoint | bit |
| | | 00004 | 3 | Ice mode (1 = yes, 0 = no) | bit |
| | | 00005 | 4 | Not used | bit |
| | | 00006 | 5 | Lock out circuit 1 (1 = yes, 0 = no) | bit |
| | | 00007 | 6 | Lock out circuit 2 (1 = yes, 0 = no) | bit |
| | | 00012 | 11 | External hot water setpoint (1 = enable) | bit |
| | | 00013 | 12 | RTXA unit type (1 = RTXA, 0 = other) | bit |
| | | 00014 | 13 | RTUA unit type (1 = RTUA, 0 = other) | bit |
| Analog Outputs | 6/16 | 40001 | 0 | Remote chilled water setpoint | Temperature |
| | | 40002 | 1 | Remote current limit setpoint | Percentage |
| | | 40003 | 2 | Copy of function 5/15 binary points | bitfield |
| | | 40004 | 3 | Front panel hot water setpoint | Temperature |
| | | 40005 | 4 | Front panel heating design delta temp | Temperature |
| Binary Inputs | 2 | 10001 | 0 | Compressor running bit (1 = any compressor running) | bit |
| | | 10004 | 3 | Machine manual reset required (1 = active) | bit |
| | | 10005 | 4 | Machine auto reset (1 = active) | bit |
| | | 10007 | 6 | Compressor contactor 1 (1 = ON, 0 = OFF) | bit |
| | | 10008 | 7 | Compressor contactor 1 (1 = ON, 0 = OFF) | bit |
| | | 10009 | 8 | Compressor contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10010 | 9 | Compressor contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10011 | 10 | Unit heat/cool mode (1 = heat, 0 = cool) | bit |
| | | 10018 | 17 | Remote setpoints valid (1 = Yes, 0 = No) | bit |
| | | 10019 | 18 | UCM communication established (1 = Yes, 0 = No) | bit |
| | | 10020 | 19 | Fan control (1 = enabled, 0 = disabled) | bit |
| | | 10021 | 20 | SI display units (1 = enabled, 0 = disabled) | bit |
| | | 10022 | 21 | Under/over voltage detection (1 = enabled, 0 = disabled) | bit |
| | | 10023 | 22 | Phase unbalance protection (1 = enabled, 0 = disabled) | bit |
| | | 10024 | 23 | Phase reversal protection (1 = enabled, 0 = disabled) | bit |
| | | 10025 | 24 | Night noise setback (1 = enabled, 0 = disabled) | bit |
| | | 10026 | 25 | Reduced intrush starting (1 = enabled, 0 = disabled) | bit |
| | | 10027 | 26 | Lead/lag (1 = enabled, 0 = disabled) | bit |
| | | 10028 | 27 | Reset relay 1 (1 = ON, 0 = OFF) | bit |
| | | 10029 | 28 | Condenser fan contactor 4 (1 = ON, 0 = OFF) | bit |
| | | 10030 | 29 | Condenser fan contactor 3 (1 = ON, 0 = OFF) | bit |
| | | 10031 | 30 | Condenser fan contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10032 | 31 | Condenser fan contactor 1 (1 = ON, 0 = OFF) | bit |
| | | 10033 | 32 | Oil line solenoid valve 1, female slide valve step load solenoid for 70-125 Ton (1 = ON, 0 = OFF) | bit |
| | | 10034 | 33 | Transition contactor 1 (1 = ON, 0 = OFF) | bit |
| | | 10035 | 34 | Reset relay 1 (1 = ON, 0 = OFF) | bit |
| | | 10036 | 35 | Condenser fan contactor 4 (1 = ON, 0 = OFF) | bit |
| | | 10037 | 36 | Condenser fan contactor 3 (1 = ON, 0 = OFF) | bit |
| | | 10038 | 37 | Condenser fan contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10039 | 38 | Condenser fan contactor 1 (1 = ON, 0 = OFF) | bit |
| 10040 | 39 | Oil line solenoid valve 1, female slide valve step load solenoid for 70-125 Ton (1 = ON, 0 = OFF) | bit | | |

Operation

Table 14 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|---------------|----------|--|----------|---|-------------|
| Binary Inputs | 2 | 10041 | 40 | Transition contactor 1 (1 = ON, 0 = OFF) | bit |
| | | 10042 | 41 | Reset relay 2 (1 = ON, 0 = OFF) | bit |
| | | 10047 | 46 | Oil line solenoid valve 2, female slide valve step load solenoid for 70-125 Ton (1 = ON, 0 = OFF) | bit |
| | | 10048 | 47 | Transition contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10049 | 48 | Reset relay 2 (1 = ON, 0 = OFF) | bit |
| | | 10054 | 53 | Oil line solenoid valve 2, female slide valve step load solenoid for 70-125 Ton (1 = ON, 0 = OFF) | bit |
| | | 10055 | 54 | Transition contactor 2 (1 = ON, 0 = OFF) | bit |
| | | 10059 | 58 | Unit type RTXA (1 = true) | bit |
| | | 10060 | 59 | Circuit 2 oil bypass (1 = on) | bit |
| | | 10061 | 60 | Circuit 1 oil bypass (1 = on) | bit |
| | | 10062 | 61 | Circuit 2 reversed (1 = yes (heating), 0 = no) | bit |
| | | 10063 | 62 | Circuit 1 reversed (1 = yes (heating), 0 = no) | bit |
| | | 10065 | 64 | Informational warning (1 = active) | bit |
| | | 10066 | 65 | Circuit 2 auto reset (1 = active) | bit |
| | | 10067 | 66 | Circuit 1 auto reset (1 = active) | bit |
| | | 10068 | 67 | Circuit 2 manual reset required (1 = active) | bit |
| | | 10069 | 68 | Circuit 1 manual reset required (1 = active) | bit |
| | | Analog Inputs | 4 | 30001 | 0 |
| 30002 | 1 | | | Evaporator entering water temperature | Temperature |
| 30003 | 2 | | | Condenser leaving water temperature | Temperature |
| 30004 | 3 | | | Condenser entering water temperature | Temperature |
| 30005 | 4 | | | Average % current for chiller | Percentage |
| 30006 | 5 | | | Operating code | None |
| 30007 | 6 | | | Last diagnostic code | None |
| 30008 | 7 | | | Active chiller water/ice term setpoint | Temperature |
| 30009 | 8 | | | Copy of function 2 binary points | bitfield |
| 30010 | 9 | | | 00h = 130-400 Ton RTAA (Intermediate screw), 01h = 70-125 Ton (General purpose screw) | None |
| 30011 | 10 | | | 00h = 130-400 Ton RTAA, 06h = 70-125 Ton | None |
| 30012 | 11 | | | 00h = 130-400 Ton RTAA (Required by the Remote Display) | None |
| 30013 | 12 | | | CPM module software revision level | None |
| 30014 | 13 | | | CSR module software revision level | None |
| 30015 | 14 | | | Master EXV module software revision level | None |
| 30016 | 15 | | | MSCP module # 1 software revision level | None |
| 30017 | 16 | | | MSCP module # 2 software revision level | None |
| 30018 | 17 | | | MSCP module # 3 software revision level | None |
| 30019 | 18 | | | MSCP module # 4 software revision level | None |
| 30020 | 19 | | | Bit 2-0 = Number of compressors on unit Bit 4-3 = Number of circuits on unit Bit 6-5 = Manifolded pair identification 00h = AB/CD (4 CPRSR UNIT), AB/C (3 CPRSR UNIT), A/B (2 CPRSR UNIT) 01h, 10h, 11h = UNDEFINED Bit 7 = Water cooled unit (1 = Yes, 0 = No)" | bitfield |
| 30021 | 20 | Bit 1-0 = 00h (Stop/reset), 01h (Auto/remote), 10h = Auto/Local Bit 2 = Evaporator pump status (1 = ON, 0 = OFF) Bit 3 = Night noise setback bit (1 = ON, 0 = OFF) Bit 4 = Compressor running bit (1 = any compressor running) Bit 5 = Alarm bit (1 = alarm) Bit 6 = Actively ice making bit (1 = making ice) Bit 7 = Max capacity bit (1 = max capacity)" | bitfield | | |



Operation

Table 14 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|---------------|----------|-----------------------|-------------|--|-------------|
| Analog Inputs | 4 | 30022 | 21 | Circuit 1 % airflow | Percentage |
| | | 30023 | 22 | Circuit 2 % airflow | Percentage |
| | | 30024 | 23 | % line voltage chiller | Percentage |
| | | 30025 | 24 | Zone temperature | Temperature |
| | | 30026 | 25 | Outdoor air temperature | Temperature |
| | | 30027 | 26 | Compressor A phase A % RLA | Percentage |
| | | 30028 | 27 | Compressor A phase B % RLA | Percentage |
| | | 30029 | 28 | Compressor A phase C % RLA | Percentage |
| | | 30030 | 29 | Compressor B phase A % RLA | Percentage |
| | | 30031 | 30 | Compressor B phase B % RLA | Percentage |
| | | 30032 | 31 | Compressor B phase C % RLA | Percentage |
| | | 30033 | 32 | Compressor C phase A % RLA | Percentage |
| | | 30034 | 33 | Compressor C phase B % RLA | Percentage |
| | | 30035 | 34 | Compressor C phase C % RLA | Percentage |
| | | 30036 | 35 | Compressor D phase A % RLA | Percentage |
| | | 30037 | 36 | Compressor D phase B % RLA | Percentage |
| | | 30038 | 37 | Compressor D phase C % RLA | Percentage |
| | | 30039 | 38 | Active current limit setpoint | Percentage |
| | | 30040 | 39 | External chilled water setpoint | Temperature |
| | | 30041 | 40 | External current limit setpoint | Percentage |
| | | 30042-30043 | 41-42 | Compressor A running hours | Hours |
| | | 30044-30045 | 43-44 | Compressor B running hours | Hours |
| | | 30046-30047 | 45-46 | Compressor C running hours | Hours |
| | | 30048-30049 | 47-48 | Compressor D running hours | Hours |
| | | 30050-30051 | 49-50 | Compressor A starts counter | None |
| | | 30052-30053 | 51-52 | Compressor B starts counter | None |
| | | 30054-30055 | 53-54 | Compressor C starts counter | None |
| | | 30056-30057 | 55-56 | Compressor D starts counter | None |
| | | 30058 | 57 | Circuit 1 compressor suction refrigerant temperature | Temperature |
| | | 30059 | 58 | Circuit 1 sat evap refrigerant temperature | Temperature |
| | | 30060 | 59 | Circuit 1 sat cond refrigerant temperature | Temperature |
| | | 30061 | 60 | Circuit 2 compressor suction refrigerant temperature | Temperature |
| | | 30062 | 61 | Circuit 2 sat evap refrigerant temperature | Temperature |
| | | 30063 | 62 | Circuit 2 sat cond refrigerant temperature | Temperature |
| | | 30064 | 63 | Circuit 1 subcooled liquid refrigerant temperature | Temperature |
| | | 30065 | 64 | Circuit 2 subcooled liquid refrigerant temperature | Temperature |
| | | 30066 | 65 | Compressor A entering oil temperature | Temperature |
| | | 30067 | 66 | Compressor B entering oil temperature | Temperature |
| 30068 | 67 | Auxiliary temperature | Temperature | | |
| 30069 | 68 | Unit tonnage | tons | | |

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|---------------|----------|--|----------|--|----------|
| Analog Inputs | 4 | 30070 | 69 | Compressor A operating mode | None |
| | | 30071 | 70 | Compressor B operating mode | None |
| | | 30072 | 71 | Compressor C operating mode | None |
| | | 30073 | 72 | Compressor D operating mode | None |
| | | 30074 | 73 | Slave EXV software revision level | None |
| | | 30075 | 74 | COMM3 framing errors | None |
| | | 30076 | 75 | COMM3 UART buffer overrun errors | None |
| | | 30077 | 76 | COMM3 bad zero byte errors | None |
| | | 30078 | 77 | COMM3 bad serial function code errors | None |
| | | 30079 | 78 | COMM3 write outside of write buffer errors | None |
| | | 30080 | 79 | COMM3 CRC errors | None |
| | | 30081 | 80 | COMM3 message time-out errors | None |
| | | 30082 | 81 | IPC bad CSR token errors | None |
| | | 30083 | 82 | IPC UART buffer overrun/framing errors | None |
| | | 30084 | 83 | IPC CRC errors | None |
| | | 30085 | 84 | IPC message time-out errors | None |
| | | 30086 | 85 | IPC communication state at time of last time-out error | None |
| | | 30087 | 86 | Circuit 1 saturated evap refrigerant press | Pressure |
| | | 30088 | 87 | Circuit 2 saturated evap refrigerant press | Pressure |
| | | 30089 | 88 | Circuit 1 saturated cond refrigerant press | Pressure |
| 30090 | 89 | Circuit 2 saturated cond refrigerant press | Pressure | | |



Operation

Table 15 - Data Point List for CVGE/CVAE/RTHC chillers, UCP2 controller

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|--------------|--------|---|-------------|
| Binary Outputs | 5/15 | 00002 | 1 | Tracer Chiller Auto/Stop (1 = auto, 0 = stop) | bit |
| | | 40001 | 0 | Tracer Chilled Water Setpoint | Temperature |
| | | 40002 | 1 | CTV/RTH: Tracer Current Limit Setpoint | Percentage |
| | | 40003 | 2 | Copy of function 5/15 binary points | bitfield |
| Analog Outputs | 6/16 | | | Bit 0 CTV: Hot Gas Bypass (1 = On, 0 = Off) | |
| | | | | Bit 1 CTV: Free Cooling Mode Request (1 = On, 0 = Off) | |
| | | | | Bit 2 CTV: Water Temp Control Mode Request (1 = Heat, 0 = Cool) | |
| | | | | Bit 3 UNUSED | |
| | | | | Bit 4 CTV/RTH/ABS: Base Load Mode Request (1 = yes, 0 = no) | |
| | | | | Bit 5 CTV/RTH: Ice Making Mode Request (1 = yes, 0 = no) | |
| | | | | Bit 6 RESERVED | |
| | | | | Bit 7 Tracer Chiller Auto/Stop (1 = auto, 0 = stop)* | bitfield |
| | | 40005 | 4 | CTV: Tracer Hot Water Setpoint | Temperature |
| | | 40006 | 5 | CTV/RTH: Tracer Ice Termination Setpoint | Temperature |
| Binary Inputs | 2 | 10001 | 0 | Compr/Unit Running (1 = Yes, 0 = No) | bit |
| | | 10002 | 1 | Chilled Water Flow (1 = On, 0 = Off) | bit |
| | | 10003 | 2 | Condenser Water Flow (1 = On, 0 = Off) | bit |
| | | 10004 | 3 | MMR exits | bit |
| | | 10005 | 4 | MAR exits | bit |
| | | 10006 | 5 | Equipment communication | bit |
| | | 10007 | 6 | Compr/Unit Running (1 = Yes, 0 = No) | bit |
| | | 10012 | 11 | Remote Setpoints Valid(1 = Yes, 0 = No) | bit |
| | | 10013 | 12 | UCM Power Loss has occurred (1 = Yes, 0 = No) | bit |
| | | 10014 | 13 | No_TCI4_UCM_Com (1=no com) | bit |
| | | 10015 | 14 | Alarm (1 = On, 0 = Off) | bit |
| | | 10016 | 15 | Condenser Water Pump (1 = On, 0 = Off) | bit |
| | | 10017 | 16 | Chilled Water Pump (1 = On, 0 = Off) | bit |
| | | 10018 | 17 | Limit Warning (1=Warning) | bit |
| | | 10019 | 18 | CTV/ABS: Max Capacity (1 = Yes, 0 = No) | bit |
| | | 10020 | 19 | Reset Relay (1 = On, 0 = Off) | bit |
| | | 10021 | 20 | CTV/RTH: Actively Ice Making (1 = Yes, 0 = No) | bit |
| | | 10022 | 21 | IFW exists | bit |
| | | 10023 | 22 | ABS: Rfgt Flow (1 = No Flow) | bit |
| | | 10024 | 23 | ABS: PCL Switch Status | bit |
| | | 10025 | 24 | CTV/RTH: Ice Machine Control | bit |
| | | 10026 | 25 | CTV: Hot gas bypass status | bit |
| | | 10027 | 26 | CTV: Heat pump status | bit |
| | | 10028 | 27 | CTV: Free cooling status | bit |
| | | 10029 | 28 | CTV/RTH/ABS: Base loading status | bit |
| | | 10030 | 29 | Chiller mode | bit |
| | | 10031 | 30 | CTV: Condensor fan 1 | bit |
| | | 10032 | 31 | CTV: Condensor fan 2 | bit |
| | | 10033 | 32 | CTV: Condensor fan 3 | bit |
| | | 10034 | 33 | CTV: retired for Tracer (Cond. fan 4) | bit |
| | | 10035 | 34 | CTV: Oil pump relay | bit |

Operation

Table 15 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|---------------|----------|--|-------------|---|-------------|--|----------|
| Binary Inputs | 2 | 10036 | 35 | external auto/stop | bit | | |
| | | 10037 | 36 | emergency stop | bit | | |
| | | 10038 | 37 | CTV: external free cooling | bit | | |
| | | 10039 | 38 | CTV/RTH: external ice making | bit | | |
| | | 10040 | 39 | CTV: external heat pump | bit | | |
| | | 10041 | 40 | Manual Chilled Water Pump (1= ON; 0 = AUTO) | bit | | |
| | | 10042 | 41 | External Input Type (0 = 4-20mA; 1 = 2 - 10V) | bit | | |
| | | 10043 | 42 | CTV: Manual Oil Pump (1= ON, 0 = AUTO) | bit | | |
| Analog Inputs | 4 | 30001 | 0 | Leaving Chilled Water Temperature | Temperature | | |
| | | 30002 | 1 | Entering Chilled Water Temperature | Temperature | | |
| | | 30003 | 2 | Condenser Leaving Water Temperature | Temperature | | |
| | | 30004 | 3 | Condenser Entering Water Temperature | Temperature | | |
| | | 30005 | 4 | Average % Current Draw | Percentage | | |
| | | 30006 | 5 | Operating Code | None | | |
| | | 30007 | 6 | Last Active Diagnostic Code | None | | |
| | | 30008 | 7 | Active Chilled Water Setpoint | Temperature | | |
| | | 30009 | 8 | copy of function 2 binary points 10001 to 10011 | bitfield | | |
| | | 30010 | 9 | Last Operating Mode at Time of Last Diag | None | | |
| | | 30011 | 10 | Bit 0 UNUSED | | | |
| | | | | Bit 1 UNUSED | | | |
| | | | | Bit 2 UNUSED | | | |
| | | | | Bit 3 Limit Warning (1=Warning) | | | |
| | | | | Bit 4 Chilled Water Pump (1 = On, 0 = Off) | | | |
| | | | | Bit 5 Condenser Water Pump (1 = On, 0 = Off) | | | |
| | | | | Bit 6 Compr/Unit Running (1 = Yes, 0 = No) | | | |
| | | | | Bit 7 Alarm (1 = On, 0 = Off) | | | bitfield |
| 30012 | 11 | Bit 0 UNUSED | | | | | |
| | | Bit 1 UNUSED | | | | | |
| | | Bit 2 UNUSED | | | | | |
| | | Bit 3 UNUSED | | | | | |
| | | Bit 4 UNUSED | | | | | |
| | | Bit 5 CTV/RTH: Actively Ice Making (1 = Yes, 0 = No) | | | | | |
| | | Bit 6 Reset Relay (1 = On, 0 = Off) | | | | | |
| | | Bit 7 CTV/ABS: Max Capacity (1 = Yes, 0 = No)* | | | bitfield | | |
| 30013 | 12 | Bit 0 Chilled Water Flow (1 = On, 0 = Off) | | | | | |
| | | Bit 1 Condenser Water Flow (1 = On, 0 = Off) | | | | | |
| | | Bit 2 MMR exists | | | | | |
| | | Bit 3 MAR exists | | | | | |
| | | Bit 4 IFW exists | | | | | |
| | | Bit 5 RESERVED | | | | | |
| | | Bit 6 RESERVED | | | | | |
| | | Bit 7 RESERVED | | | bitfield | | |
| 30014 | 13 | Active Outdoor Air Temperature | Temperature | | | | |
| 30016 | 15 | Bit 0 RESERVED | | | | | |
| | | Bit 1 RESERVED | | | | | |
| | | Bit 2 Tracer | | | | | |
| | | Bit 3 External Direct Capacity Control | | | | | |
| | | Bit 4 future 2 | | | | | |
| | | Bit 5 future 1 | | | | | |
| | | Bit 6 External Input | | | | | |
| | | Bit 7 Front Panel" | | | bitfield | | |
| 30016 | 15 | CTV/RTH: Active Ice Termination Setpoint | Temperature | | | | |



Operation

Table 15 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|-------------------------------------|------------|-------------------------------------|-------------|--|-------------|
| Analog Inputs | 4 | 30017 | 16 | Bit 0 RESERVED | |
| | | | | Bit 1 RESERVED | |
| | | | | Bit 2 Tracer | |
| | | | | Bit 3 External Direct Capacity Control | |
| | | | | Bit 4 future 2 | |
| | | | | Bit 5 future 1 | |
| | | | | Bit 6 RESERVED | |
| | | | | Bit 7 Front Panel | bitfield |
| | | 30018 | 17 | CTV/RTH: Active Current Limit Setpoint | Percentage |
| | | 30019 | 18 | Bit 1 Ice Building | |
| | | | | Bit 2 Tracer | |
| | | | | Bit 3 RESERVED | |
| | | | | Bit 4 future 2 | |
| | | | | Bit 5 future 1 | |
| | | | | Bit 6 External Input | |
| | | 30020 | 19 | CTV: Active Hot Water Setpoint | Temperature |
| | | 30021 | 20 | Bit 0 RESERVED | |
| | | | | Bit 1 RESERVED | |
| | | | | Bit 2 Tracer | |
| | | | | Bit 3 External Direct Capacity Control | |
| | | | | Bit 4 future 2 | |
| | | | | Bit 5 future 1 | |
| | | | | Bit 6 External Input | |
| | | | | Bit 7 Front Panel | bitfield |
| | | 30022-30023 | 21-22 | CTV/RTH: Compressor Running Seconds | Seconds |
| | | 30024 | 23 | CTV/RTH: Compressor Starts | None |
| | | 30025 | 24 | RTH: Compressor Discharge Refrigerant | Temperature |
| | | 30026 | 25 | Saturated Evap Refrigerant Temp | Temperature |
| | | 30027 | 26 | Saturated Cond Refrigerant Temp | Temperature |
| | | 30028 | 27 | CTVARTH: Saturated Evap Refrigerant Press | Pressure |
| | | 30029 | 28 | CTVARTH: Saturated Cond Refrigerant Press | Pressure |
| | | 30030 | 29 | CTVARTH: Compressor Winding 1 Temp | Temperature |
| | | 30031 | 30 | CTVARTH: Compressor Winding 2 Temp | Temperature |
| | | 30032 | 31 | CTVARTH: Compressor Winding 3 Temp | Temperature |
| | | 30033 | 32 | CTV: Oil Sump Temp | Temperature |
| | | 30034 | 33 | CTV: Condenser Rfgr Pressure | Pressure |
| | | 30035 | 34 | CTV/RTH: Rfgr Type 5 = WATER 4 = R22 3 = R134A 2 = R12 1 = R11 0 = R123 | None |
| | | 30036 | 35 | Restart Inhibit Timer | None |
| | | 30037 | 36 | CTVARTH: Cmpr Phase A Current Draw | |
| | | | | ABS: Soln Pump Phase A Current Draw | Percentage |
| | | 30038 | 37 | CTVARTH: Cmpr Phase B Current Draw | |
| ABS: Soln Pump Phase B Current Draw | Percentage | | | | |
| 30039 | 38 | CTVARTH: Cmpr Phase C Current Draw | | | |
| | | ABS: Soln Pump Phase C Current Draw | Percentage | | |
| 30040 | 39 | CTV/ABS: Power | None | | |
| 30041 | 40 | CTV: Inboard Bearing Temp | | | |
| | | ABS: Dilute Soln Temp Lvg Absorber | Temperature | | |

Operation

Table 15 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|---------------|----------|--------------|--------|--|-------------|
| Analog Inputs | 4 | 30042 | 41 | CTV: Outboard Bearing Temp ABS: Strong Soln Temp Lvg LTHX | Temperature |
| | | 30043 | 42 | CTV/RTH: Discharge Temp ABS: Intermd Soln Temp at Absorber Spray | Temperature |
| | | 30044 | 43 | ABS: LiBr Concentration | Percentage |
| | | 30045 | 44 | ABS: LiBr Cryst Temp | Temperature |
| | | 30046 | 45 | ABS: Absorber Entering Water Temp | Temperature |
| | | 30047 | 46 | CTV: IGV Stepper Motor Position ABS: Energy Valve Stepper Motor Position RTH: EXV Stepper Motor Position* | Percentage |
| | | 30048 | 47 | ABS: Dilute Solution Temp Lvg HTHX | Temperature |
| | | 30049 | 48 | ABS: Dilute Solution Temp Ent HTG | Temperature |
| | | 30050 | 49 | Bit 0 RESERVED Bit 1 CTV/RTH: Ice Machine Control Bit 2 UNUSED Bit 3 UNUSED Bit 4 UNUSED Bit 5 UNUSED Bit 6 ABS: Purge Status Bit 7 ABS: PCL Switch Status | bitfield |
| | | 30051 | 50 | Bit 0 UNUSED Bit 1 UNUSED Bit 2 Chiller mode Bit 3 CTV/RTH/ABS: Base loading status Bit 4 CTV: Free cooling status Bit 5 CTV: Heat pump status Bit 6 CTV: UNUSED Bit 7 CTV: Hot gas bypass status | bitfield |
| | | 30052 | 51 | Bit 0 CTV: purge pumpout running Bit 1 CTV: purge mode 1 = auto 0 = stop Bit 2 Head relief request Bit 3 CTV: Oil pump relay Bit 4 CTV: retired for Tracer (Cond. fan 4) Bit 5 CTV: Condensor fan 3 Bit 6 CTV: Condensor fan 2 Bit 7 CTV: Condensor fan 1 | bitfield |
| | | 30053 | 52 | Bit 0 CTV: purge service pumout Bit 1 CTV: purge liquid level Bit 2 CTV: external heat pump Bit 3 CTV/RTH: external ice making Bit 4 CTV: external free cooling Bit 5 emergency stop Bit 6 external auto/stop Bit 7 CTV: purge compr running | bitfield |



Operation

Table 15 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|---------------|----------|--------------|--------|--|-------------|---|------|
| Analog Inputs | 4 | 30054 | 53 | HVAC Unit Type ID 0 = CVHE/G 1 = CVHF 2 = CVHB 3 = CVGE 4 = CVAE 5 = RTHA 6 = RTHB 7 = two stage absorption 8 = one stage absorption 9 = direct fired absorption | None | | |
| | | | | 30055 | 54 | Chiller Module Software Revision Level | None |
| | | | | 30056 | 55 | Circuit Module Software Revision Level | None |
| | | | | 30057 | 56 | Stepper Module 1 Software Revision Level | None |
| | | | | 30058 | 57 | ABS: Stepper Module 2 Software Revision Level | None |
| | | | | 30059 | 58 | Starter Module Software Revision Level | None |
| | | | | 30060 | 59 | CTV: Purge Module Software Revision Level | None |
| | | | | 30061 | 60 | Options Module Software Revision Level | None |
| | | | | 30062 | 61 | Comm Module (TCI IV) Software Revision Level | None |
| | | | | 30063 | 62 | Local Human Interface Software Revision Level | None |
| | | 30064 | 63 | Remote Human Interface Software Revision Level | None | | |
| | | 30065 | 64 | Front Panel Chilled Water Setpoint | Temperature | | |
| | | 30066 | 65 | CTV/RTH: Front Panel Current Limit Setpoint | Percentage | | |
| | | 30067 | 66 | CTV: Front Panel Hot Water Setpoint | Temperature | | |
| | | 30068 | 67 | CTV/RTH: Front Panel Ice Termination Setpoint | Temperature | | |
| | | 30069 | 68 | Design Delta Temperature | Temperature | | |
| | | 30070 | 69 | Differential To Start Setpoint | Temperature | | |
| | | 30071 | 70 | Differential To Stop Setpoint | Temperature | | |
| | | 30072 | 71 | CTV/RTH: Condenser Pressure Limit Setpoint | Pressure | | |
| | | 30073 | 72 | Chiller Power UP/Start Delay Setpoint | Temperature | | |
| | | 30074 | 73 | Rated Load Amps | Percentage | | |
| | | 30075 | 74 | Low Rfght Temp Cutout | Temperature | | |
| | | 30076 | 75 | Leaving Water Temp Cutout | Temperature | | |
| | | 30077 | 76 | Setpoint Source Override | None | | |
| | | 30078 | 77 | CTV: Control Type: 0 = Chilled Water ; 1 = Hot Water ; 2 = Control Externally | None | | |



Operation

Table 16 - Data Point List for Rooftops, UCP2/UCP3 and Reliatel controllers

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|----------------|--------|---|-------------|
| Binary Outputs | 5/15 | 00001 | 0 | ICS Diagnostic Reset (1 = Yes 0 = No) | bit |
| | | 00002 | 1 | Factory Test (***) Factory Use Only (***) (1 = Yes 0 = No) | bit |
| | | 00003 | 2 | ICS Slave Mode Requested (1 = Yes 0 = No) | bit |
| | | 00004 | 3 | Unit Control Source (1 = ICS 0 = Local) | bit |
| | | 00005 | 4 | Supply Fan Mode (1 = On (Continuous) 0 = Auto) | bit |
| | | 00006 | 5 | Econ Drive Open (1 = Drive Open 0 = Auto) | bit |
| | | 00007 | 6 | Econ Drive Closed (1 = Drive Closed 0 = Auto) | bit |
| | | 00008 | 7 | Econ Drive to Min Pos (1 = Drive to Min Position 0 = Auto) | bit |
| | | 00009-00010 | 8-9 | Economizer Control (bits 00009 00010) 0 0 Economizer Disabled 0 1 Economizer Disabled 1 0 Use Local Economizer Enthalpy Request (AUTO) 1 1 Override Local Economizer Enthalpy Request (ENABLED) | bit |
| | | 00011 | 10 | ICS Manual Heat/Cool Override (1 = Manual 0 = Auto) | bit |
| | | 00012 | 11 | ICS Manual Override Selection (1 = Cool 0 = Heat) | bit |
| | | 00013 | 12 | ICS Unit Stop Request (1 = Off 0 = Auto) | bit |
| | | 00014 | 13 | Supply Air Tempering Request (1 = Enable 0 = Disable) | bit |
| | | 00015 | 14 | Emergency Heat Mode Req (Heat Pump Only) (1 = Em Heat 0 = Auto) | bit |
| | | 00016 | 15 | Emergency Stop Request (1 = Yes 0 = No) | bit |
| | | 00017 | 16 | Auxiliary Heat Lockout (1 = Not Locked Out 0 = Lock Out) | bit |
| | | 00018 | 17 | Compressor Lockout (Lockout Both) (1 = Not Locked Out 0 = Lock Out) | bit |
| | | Analog Outputs | 6/16 | 40001 | 0 |
| 40002 | 1 | | | Economizer Damper Minimum Position (0 to 50 %) | Percentage |
| 40003 | 2 | | | ICS Zone Cooling Setpoint | Temperature |
| 40004 | 3 | | | ICS Zone Heating Setpoint | Temperature |
| 40005 | 4 | | | Number of Cooling Stages to be Enabled (0 to 3) | None |
| 40006 | 5 | | | Number of Heating Stages to be Enabled (0 to 3) | None |
| 40007 | 6 | | | Bit 0 Econ Drive to Min Pos (1 = Drive to Min Position 0 = Auto) Bit 1 Econ Drive Closed (1 = Drive Closed 0 = Auto) Bit 2 Econ Drive Open (1 = Drive Open 0 = Auto) Bit 3 Supply Fan Mode (1 = On (Continuous) 0 = Auto) Bit 4 Unit Control Source (1 = ICS 0 = Local) Bit 5 ICS Slave Mode Requested (1 = Yes 0 = No) Bit 6 Factory Test (***) Factory Use Only (***) (1 = Yes 0 = No) Bit 7 ICS Diagnostic Reset (1 = Yes 0 = No) | bitfield |
| 40008 | 7 | | | Bit 0 Emergency Stop Request (1 = Yes 0 = No) Bit 1 Emergency Heat Mode Req (Heat Pump Only) (1 = Em Heat 0 = Auto) Bit 2 Supply Air Tempering Request (1 = Enable 0 = Disable) Bit 3 ICS Unit Stop Request (1 = Off 0 = Auto) Bit 4 ICS Manual Override Selection (1 = Cool 0 = Heat) Bit 5 ICS Manual Heat/Cool Override (1 = Manual 0 = Auto) Bit 6, 7 Economizer Control (bits 7 6) 0 0 Economizer Disabled 0 1 Economizer Disabled 1 0 Use Local Economizer Enthalpy Request (AUTO) 1 1 Override Local Economizer Enthalpy Request (ENABLED) | bitfield |



Operation

Table 16 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|----------------|----------|--|--------|---|----------|
| Analog Outputs | 6/16 | 40009 | 8 | Bit 0 Compressor Lockout (Lockout Both) (1 = Not Locked Out 0 = Lock Out) | |
| | | | | Bit 1 Auxiliary Heat Lockout (1 = Not Locked Out 0 = Lock Out) | |
| | | | | Bit 2 Lead/Lag Enable/Disable (1 = Enabled 0 = Disabled) | |
| | | | | Bit 3 Zone Temperature Source (1 = Echelon 0 = Local) | |
| | | | | Bit 4 Economizer Min Position Setpoint Source (1 = ICS 0 = Local) | |
| | | | | Bit 5 Power Exhaust Setpoint Source (1 = ICS 0 = Local) | |
| | | | | Bit 6 Reset Select Input Source (VAV Only) (1 = ICS 0 = Local) | |
| | | | | Bit 7 Tracer Has Not Written (1 = Yes 0 = No) | bitfield |
| | | 40010 | 9 | Reserved for BAS 1 | None |
| | | 40011 | 10 | Reserved for BAS 2 | None |
| Binary Inputs | 2 | 10004 | 3 | Gemini Unit (1 = Yes 0 = No) | bit |
| | | 10005 | 4 | Economizer Installed (1 = Installed 0 = Not Installed) | bit |
| | | 10006 | 5 | Gas or Electric (1 = Gas Heat 0 = Electric Heat) | bit |
| | | 10007 | 6 | Heat Pump (Voyager I & II Only) (1 = Yes 0 = No) | bit |
| | | 10008 | 7 | Compressor 1 Exists (1 = Yes 0 = No) | bit |
| | | 10009 | 8 | Compressor 1 Cycling Input (1 = Normal 0 = Disabled) | bit |
| | | 10010 | 9 | HPC for Compressor 1 (1 = High Press 0 = Normal) | bit |
| | | 10011 | 10 | Compressor 1 Locked Out (1 = Yes 0 = No) | bit |
| | | 10012 | 11 | Compressor On or Off (1 = On 0 = Off) | bit |
| | | 10013 | 12 | Compressor 2 Exists (1 = Yes 0 = No) | bit |
| | | 10014 | 13 | Compressor 2 Cycling Input (1 = Normal 0 = Disabled) | bit |
| | | 10015 | 14 | HPC for Compressor 2 (1 = High Press 0 = Normal) | bit |
| | | 10016 | 15 | Compressor 2 Locked Out (1 = Yes 0 = No) | bit |
| | | 10017 | 16 | Compressor On or Off (1 = On 0 = Off) | bit |
| | | 10019 | 18 | Return Humidity Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10020 | 19 | Return Air Temperature Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10021 | 20 | Outdoor Humidity Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10022 | 21 | Supply Air Temperature Sensor Failed (Mixed) (1 = Yes 0 = No) | bit |
| | | 10023 | 22 | Outdoor Air Temperature Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10024 | 23 | Zone Temperature Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10025 | 24 | Economizer Fault (1 = Yes 0 = No) | bit |
| | | 10026 | 25 | Coil Temperature Sensor Failed (1 = Yes 0 = No) | bit |
| | | 10027 | 26 | Local Zone Cooling Setpoint Failed (1 = Yes 0 = No) | bit |
| | | 10028 | 27 | Local Zone Heating Setpoint Failed (1 = Yes 0 = No) | bit |
| | | 10030 | 29 | Filter Clogged Failure (1 = Yes 0 = No) | bit |
| | | 10031 | 30 | Heat Failure (1 = Yes 0 = No) | bit |
| | | 10032 | 31 | High Temperature Input is Hot / Smoke Detector (1 = Yes 0 = No) | bit |
| | | 10033 | 32 | Heat Stage 3 Exists (1 = Yes 0 = No) | bit |
| | | 10034 | 33 | Heat Stage 2 Exists (1 = Yes 0 = No) | bit |
| | | 10035 | 34 | Not Used - Reserved for UCP (1 = Yes 0 = No) | bit |
| | | 10036 | 35 | Emergency Heat Mode (Heat Pump Only) (1 = Yes 0 = No) | bit |
| | | 10037 | 36 | Supply Fan Mode (1 = On 0 = Auto) | bit |
| | | 10038 | 37 | Manual/Auto Mode (1 = Manual 0 = Auto) | bit |
| | | 10039 | 38 | Heat/Cool Mode (1 = Cool 0 = Heat) | bit |
| | | 10040 | 39 | Off Mode (1 = Off 0 = Auto) | bit |
| | | 10041 | 40 | Timed Override Request (1 = Yes 0 = No) | bit |
| | | 10042 | 41 | Test Mode in Progress (1 = Yes 0 = No) | bit |
| 10043 | 42 | Decision to Economize (1 = Enabled 0 = Disabled) | bit | | |
| 10045 | 44 | Power Up Failure has Occurred (1 = Yes 0 = No) | bit | | |
| 10046 | 45 | Heat Pump Defrost is Active (1 = Yes 0 = No) | bit | | |
| 10047 | 46 | Evaporator Defrost is Active (1 = Yes 0 = No) | bit | | |



Operation

Table 16 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit | | |
|--|----------|--|----------|--|-------------|--|--|
| Binary Inputs | 2 | 10048 | 47 | Supply Air Tempering is Active (1 = Yes 0 = No) | bit | | |
| | | 10049 | 48 | Exhaust Fan is Energized (1 = Yes 0 = No) | bit | | |
| | | 10050 | 49 | Condenser Fan A is Energized (1 = Yes 0 = No) | bit | | |
| | | 10051 | 50 | Condenser Fan B is Energized (1 = Yes 0 = No) | bit | | |
| | | 10052 | 51 | Heat Output 1 is Energized (1 = Yes 0 = No) | bit | | |
| | | 10053 | 52 | Heat Output 2 is Energized (1 = Yes 0 = No) | bit | | |
| | | 10054 | 53 | Reverse Valve is Energized (1 = Yes 0 = No) | bit | | |
| | | 10055 | 54 | Supply Fan is Energized (1 = Yes 0 = No) | bit | | |
| | | 10059 | 58 | Clogged Filter Local Input (1 = Yes 0 = No) | bit | | |
| | | 10060 | 59 | Compressor 2 Cycling Input (1 = OK 0 = Bad) | bit | | |
| | | 10061 | 60 | Compressor 1 Cycling Input (1 = OK 0 = Bad) | bit | | |
| | | 10065 | 64 | Default Defrost Flag | bit | | |
| | | 10066 | 65 | Demand Defrost Fault C Flag | bit | | |
| | | 10067 | 66 | Demand Defrost Fault B Flag | bit | | |
| | | 10068 | 67 | Demand Defrost Fault A Flag | bit | | |
| | | 10069 | 68 | Fan Failure (1 = Failed 0 = Ok) | bit | | |
| | | 10070 | 69 | Heat Failure (1 = Open 0 = Closed) | bit | | |
| | | 10071 | 70 | HPC for Compressor 2 (1 = High Press 0 = Normal) | bit | | |
| 10072 | 71 | HPC for Compressor 1 (1 = High Press 0 = Normal) | bit | | | | |
| Analog Inputs | 4 | 30001 | 0 | Outdoor Air Temperature Sensor Value | Temperature | | |
| | | 30002 | 1 | Zone Temperature Sensor Value | Temperature | | |
| | | 30003 | 2 | Mixed Air Temperature Sensor Value | Temperature | | |
| | | 30004 | 3 | Return Air Temperature Sensor Value | Temperature | | |
| | | 30005 | 4 | Local Zone Cooling Setpoint Input | Temperature | | |
| | | 30006 | 5 | Local Zone Heating Setpoint Input | Temperature | | |
| | | 30007 | 6 | Actual Zone Cooling Setpoint | Temperature | | |
| | | 30008 | 7 | Actual Zone Heating Setpoint | Temperature | | |
| | | 30009 | 8 | Outdoor Air Relative Humidity Sensor Value (10.0 to 90.0 %) | Percentage | | |
| | | 30010 | 9 | Return Air Relative Humidity Sensor Value (10.0 to 90.0 %) | Percentage | | |
| | | 30011 | 10 | Local Economizer minimum position Range (0.0 to 50.0 %) | Percentage | | |
| | | 30012 | 11 | Actual Economizer Damper Position Range (0.0 to 100.0 %) | Percentage | | |
| | | 30013 | 12 | Number of Cooling Stages Active (0 to 3) | None | | |
| | | 30014 | 13 | Number of Heating Stages Active (0 to 3) | None | | |
| | | 30016 | 15 | Reference Enthalpy Switch Settings (22, 23, 25 or 27 BTU/LBM) | None | | |
| | | 30018 | 17 | Bit 0 Gas or Electric (1 = Gas Heat 0 = Electric Heat) | | | |
| | | | | Bit 1 Heat Pump (Voyager I & II Only) (1 = Yes 0 = No) | | | |
| | | | | Bit 2 Voyager III Unit (1 = Yes 0 = No) | | | |
| | | | | Bit 3 Economizer Installed (1 = Installed 0 = Not Installed) | | | |
| | | | | Bit 4 Gemini Unit (1 = Yes 0 = No) | | | |
| Bit 5 Not Used - Reserved for UCP | | | | | | | |
| Bit 6 Not Used - Reserved for UCP | | | | | | | |
| Bit 7 Not Used - Reserved for UCP | | | | bitfield | | | |
| Bit 0 Compressor On or Off (1 = On 0 = Off) | | | | | | | |
| Bit 1 Compressor 1 Locked Out (1 = Yes 0 = No) | | | | | | | |
| Bit 2 HPC for Compressor 1 (1 = High Press 0 = Normal) | | | | | | | |
| Bit 3 Compressor 1 Cycling Input (1 = Normal 0 = Disabled) | | | | | | | |
| Bit 4 Compressor 1 Exists (1 = Yes 0 = No) | | | | | | | |
| Bit 5 Compressor 1 is Lead (1 = Yes 0 = No) | | | | | | | |
| Bit 6 Not Used - Reserved for UCP | | | | | | | |
| Bit 7 Not Used - Reserved for UCP | | | bitfield | | | | |
| 30019 | 18 | Bit 0 Compressor On or Off (1 = On 0 = Off) | | | | | |
| | | Bit 1 Compressor 1 Locked Out (1 = Yes 0 = No) | | | | | |
| | | Bit 2 HPC for Compressor 1 (1 = High Press 0 = Normal) | | | | | |
| | | Bit 3 Compressor 1 Cycling Input (1 = Normal 0 = Disabled) | | | | | |
| | | Bit 4 Compressor 1 Exists (1 = Yes 0 = No) | | | | | |
| | | Bit 5 Compressor 1 is Lead (1 = Yes 0 = No) | | | | | |
| | | Bit 6 Not Used - Reserved for UCP | | | | | |
| | | Bit 7 Not Used - Reserved for UCP | | | bitfield | | |



Operation

Table 16 - Continued

| Data Type | Function | Modbus Index | Offset | Point Description | Unit |
|---|----------|--------------|--------|---|----------|
| Analog Inputs | 4 | 30020 | 19 | Bit 0 Compressor On or Off (1 = On 0 = Off) | |
| | | | | Bit 1 Compressor 2 Locked Out (1 = Yes 0 = No) | |
| | | | | Bit 2 HPC for Compressor 2 (1 = High Press 0 = Normal) | |
| | | | | Bit 3 Compressor 2 Cycling Input (1 = Normal 0 = Disabled) | |
| | | | | Bit 4 Compressor 2 Exists (1 = Yes 0 = No) | |
| | | | | Bit 5 Compressor 2 is Lead (1 = Yes 0 = No) | |
| | | | | Bit 6 Not Used - Reserved for UCP | |
| | | | | Bit 7 Not Used - Reserved for UCP | bitfield |
| | | 30021 | 20 | Bit 0 Zone Temperature Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 1 Outdoor Air Temperature Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 2 Supply Air Temperature Sensor Failed (Mixed) (1 = Yes 0 = No) | |
| | | | | Bit 3 Outdoor Humidity Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 4 Return Air Temperature Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 5 Return Humidity Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 6 Not Used - Reserved for UCP | |
| | | | | Bit 7 External Auto Stop (1 = Yes 0 = No) | bitfield |
| | | 30022 | 21 | Bit 0 High Temperature Input is Hot / Smoke Detector (1 = Yes 0 = No) | |
| | | | | Bit 1 Heat Failure (1 = Yes 0 = No) | |
| | | | | Bit 2 Filter Clogged Failure (1 = Yes 0 = No) | |
| | | | | Bit 3 Not Used - Reserved for UCP | |
| | | | | Bit 4 Local Zone Heating Setpoint Failed (1 = Yes 0 = No) | |
| | | | | Bit 5 Local Zone Cooling Setpoint Failed (1 = Yes 0 = No) | |
| | | | | Bit 6 Coil Temperature Sensor Failed (1 = Yes 0 = No) | |
| | | | | Bit 7 Economizer Fault (1 = Yes 0 = No) | bitfield |
| | | 30023 | 22 | Bit 0 Spare | |
| | | | | Bit 1 Supply Fan is Energized (1 = Yes 0 = No) | |
| | | | | Bit 2 Reverse Valve is Energized (1 = Yes 0 = No) | |
| | | | | Bit 3 Heat Output 2 is Energized (1 = Yes 0 = No) | |
| Bit 4 Heat Output 1 is Energized (1 = Yes 0 = No) | | | | | |
| Bit 5 Condenser Fan B is Energized (1 = Yes 0 = No) | | | | | |
| Bit 6 Condenser Fan A is Energized (1 = Yes 0 = No) | | | | | |
| Bit 7 Exhaust Fan is Energized (1 = Yes 0 = No) | bitfield | | | | |

Operation

Modbus Functions

Function 2: Read n bits

Inputs are addressed starting at zero: input 10001 is addressed as 0.

Function 4: Read n analog values

Registers are addressed starting at zero: register 30001 is addressed as 0.

Function 5: Write a bit

Function 15: Write n bits

Coils are addressed starting at zero: coil 00001 is addressed as 0.

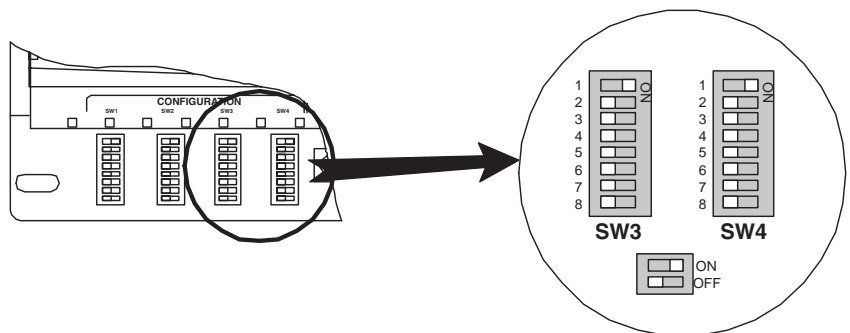
Function 6: Write a remote setpoint

Function 16: Write n remote setpoints

Registers are addressed starting at zero: register 40001 is addressed as 0.

Modbus Configuration

There are 2 blocks of dip switches dedicated to Modbus configuration.



Dip switch block SW3: Serial Type, Parity, Baudrate

Dip switch block SW4: Modbus slave address

Modbus parameters - SW3

Table 17 - SW3 - Modbus configuration

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------|--------------|-----|-----|-----|-----|-----|-----|---|----------|
| Serial Type | RS232 | ON | | | | | | | |
| | RS485 | OFF | | | | | | | |
| Parity Check | None | | OFF | OFF | | | | | |
| | Odd | | ON | ON | | | | | |
| | Even | | OFF | ON | | | | | |
| Baudrate | 1200 | | | | OFF | OFF | OFF | | |
| | 2400 | | | | ON | OFF | OFF | | |
| | 4800 | | | | OFF | ON | OFF | | |
| | 9600 | | | | ON | ON | OFF | | |
| | 14400 | | | | OFF | OFF | ON | | |
| | 38400 | | | | OFF | ON | ON | | |
| | 57600 | | | | ON | ON | ON | | |
| | | | | | | | | | Reserved |



Operation

Modbus slave address - SW4

To configure the PIC slave address (from 1 to 247), the dip switches SW4 should be configured according to the following table.

Table 18 - SW4 - Modbus slave address

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 2 | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| 3 | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| 4 | OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| 5 | ON | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| 6 | OFF | ON | ON | OFF | OFF | OFF | OFF | OFF |
| 7 | ON | ON | ON | OFF | OFF | OFF | OFF | OFF |
| 8 | OFF | OFF | OFF | ON | OFF | OFF | OFF | OFF |
| 9 | ON | OFF | OFF | ON | OFF | OFF | OFF | OFF |
| 10 | OFF | ON | OFF | ON | OFF | OFF | OFF | OFF |
| 11 | ON | ON | OFF | ON | OFF | OFF | OFF | OFF |
| 12 | OFF | OFF | ON | ON | OFF | OFF | OFF | OFF |
| 13 | ON | OFF | ON | ON | OFF | OFF | OFF | OFF |
| 14 | OFF | ON | ON | ON | OFF | OFF | OFF | OFF |
| 15 | ON | ON | ON | ON | OFF | OFF | OFF | OFF |
| 16 | OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF |
| 17 | ON | OFF | OFF | OFF | ON | OFF | OFF | OFF |
| 18 | OFF | ON | OFF | OFF | ON | OFF | OFF | OFF |
| 19 | ON | ON | OFF | OFF | ON | OFF | OFF | OFF |
| 20 | OFF | OFF | ON | OFF | ON | OFF | OFF | OFF |
| 21 | ON | OFF | ON | OFF | ON | OFF | OFF | OFF |
| 22 | OFF | ON | ON | OFF | ON | OFF | OFF | OFF |
| 23 | ON | ON | ON | OFF | ON | OFF | OFF | OFF |
| 24 | OFF | OFF | OFF | ON | ON | OFF | OFF | OFF |
| 25 | ON | OFF | OFF | ON | ON | OFF | OFF | OFF |
| 26 | OFF | ON | OFF | ON | ON | OFF | OFF | OFF |
| 27 | ON | ON | OFF | ON | ON | OFF | OFF | OFF |
| 28 | OFF | OFF | ON | ON | ON | OFF | OFF | OFF |
| 29 | ON | OFF | ON | ON | ON | OFF | OFF | OFF |
| 30 | OFF | ON | ON | ON | ON | OFF | OFF | OFF |



Operation

Table 18 - Continued

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|----|-----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 65 | ON | OFF | OFF | OFF | OFF | OFF | ON | OFF |
| 66 | OFF | ON | OFF | OFF | OFF | OFF | ON | OFF |
| 67 | ON | ON | OFF | OFF | OFF | OFF | ON | OFF |
| 68 | OFF | OFF | ON | OFF | OFF | OFF | ON | OFF |
| 69 | ON | OFF | ON | OFF | OFF | OFF | ON | OFF |
| 70 | OFF | ON | ON | OFF | OFF | OFF | ON | OFF |
| 71 | ON | ON | ON | OFF | OFF | OFF | ON | OFF |
| 72 | OFF | OFF | OFF | ON | OFF | OFF | ON | OFF |
| 73 | ON | OFF | OFF | ON | OFF | OFF | ON | OFF |
| 74 | OFF | ON | OFF | ON | OFF | OFF | ON | OFF |
| 75 | ON | ON | OFF | ON | OFF | OFF | ON | OFF |
| 76 | OFF | OFF | ON | ON | OFF | OFF | ON | OFF |
| 77 | ON | OFF | ON | ON | OFF | OFF | ON | OFF |
| 78 | OFF | ON | ON | ON | OFF | OFF | ON | OFF |
| 79 | ON | ON | ON | ON | OFF | OFF | ON | OFF |
| 80 | OFF | OFF | OFF | OFF | ON | OFF | ON | OFF |
| 81 | ON | OFF | OFF | OFF | ON | OFF | ON | OFF |
| 82 | OFF | ON | OFF | OFF | ON | OFF | ON | OFF |
| 83 | ON | ON | OFF | OFF | ON | OFF | ON | OFF |
| 84 | OFF | OFF | ON | OFF | ON | OFF | ON | OFF |
| 85 | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| 86 | OFF | ON | ON | OFF | ON | OFF | ON | OFF |
| 87 | ON | ON | ON | OFF | ON | OFF | ON | OFF |
| 88 | OFF | OFF | OFF | ON | ON | OFF | ON | OFF |
| 89 | ON | OFF | OFF | ON | ON | OFF | ON | OFF |
| 90 | OFF | ON | OFF | ON | ON | OFF | ON | OFF |
| 91 | ON | ON | OFF | ON | ON | OFF | ON | OFF |
| 92 | OFF | OFF | ON | ON | ON | OFF | ON | OFF |
| 93 | ON | OFF | ON | ON | ON | OFF | ON | OFF |
| 94 | OFF | ON | ON | ON | ON | OFF | ON | OFF |
| 95 | ON | ON | ON | ON | ON | OFF | ON | OFF |
| 96 | OFF | OFF | OFF | OFF | OFF | ON | ON | OFF |



Operation

Table 18 - Continued

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 129 | ON | OFF | OFF | OFF | OFF | OFF | OFF | ON |
| 130 | OFF | ON | OFF | OFF | OFF | OFF | OFF | ON |
| 131 | ON | ON | OFF | OFF | OFF | OFF | OFF | ON |
| 132 | OFF | OFF | ON | OFF | OFF | OFF | OFF | ON |
| 133 | ON | OFF | ON | OFF | OFF | OFF | OFF | ON |
| 134 | OFF | ON | ON | OFF | OFF | OFF | OFF | ON |
| 135 | ON | ON | ON | OFF | OFF | OFF | OFF | ON |
| 136 | OFF | OFF | OFF | ON | OFF | OFF | OFF | ON |
| 137 | ON | OFF | OFF | ON | OFF | OFF | OFF | ON |
| 138 | OFF | ON | OFF | ON | OFF | OFF | OFF | ON |
| 139 | ON | ON | OFF | ON | OFF | OFF | OFF | ON |
| 140 | OFF | OFF | ON | ON | OFF | OFF | OFF | ON |
| 141 | ON | OFF | ON | ON | OFF | OFF | OFF | ON |
| 142 | OFF | ON | ON | ON | OFF | OFF | OFF | ON |
| 143 | ON | ON | ON | ON | OFF | OFF | OFF | ON |
| 144 | OFF | OFF | OFF | OFF | ON | OFF | OFF | ON |
| 145 | ON | OFF | OFF | OFF | ON | OFF | OFF | ON |
| 146 | OFF | ON | OFF | OFF | ON | OFF | OFF | ON |
| 147 | ON | ON | OFF | OFF | ON | OFF | OFF | ON |
| 148 | OFF | OFF | ON | OFF | ON | OFF | OFF | ON |
| 149 | ON | OFF | ON | OFF | ON | OFF | OFF | ON |
| 150 | OFF | ON | ON | OFF | ON | OFF | OFF | ON |
| 151 | ON | ON | ON | OFF | ON | OFF | OFF | ON |
| 152 | OFF | OFF | OFF | ON | ON | OFF | OFF | ON |
| 153 | ON | OFF | OFF | ON | ON | OFF | OFF | ON |
| 154 | OFF | ON | OFF | ON | ON | OFF | OFF | ON |
| 155 | ON | ON | OFF | ON | ON | OFF | OFF | ON |
| 156 | OFF | OFF | ON | ON | ON | OFF | OFF | ON |
| 157 | ON | OFF | ON | ON | ON | OFF | OFF | ON |
| 158 | OFF | ON | ON | ON | ON | OFF | OFF | ON |

Operation

Table 18 - Continued

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 159 | ON | ON | ON | ON | ON | OFF | OFF | ON |
| 160 | OFF | OFF | OFF | OFF | OFF | ON | OFF | ON |
| 161 | ON | OFF | OFF | OFF | OFF | ON | OFF | ON |
| 162 | OFF | ON | OFF | OFF | OFF | ON | OFF | ON |
| 163 | ON | ON | OFF | OFF | OFF | ON | OFF | ON |
| 164 | OFF | OFF | ON | OFF | OFF | ON | OFF | ON |
| 165 | ON | OFF | ON | OFF | OFF | ON | OFF | ON |
| 166 | OFF | ON | ON | OFF | OFF | ON | OFF | ON |
| 167 | ON | ON | ON | OFF | OFF | ON | OFF | ON |
| 168 | OFF | OFF | OFF | ON | OFF | ON | OFF | ON |
| 169 | ON | OFF | OFF | ON | OFF | ON | OFF | ON |
| 170 | OFF | ON | OFF | ON | OFF | ON | OFF | ON |
| 171 | ON | ON | OFF | ON | OFF | ON | OFF | ON |
| 172 | OFF | OFF | ON | ON | OFF | ON | OFF | ON |
| 173 | ON | OFF | ON | ON | OFF | ON | OFF | ON |
| 174 | OFF | ON | ON | ON | OFF | ON | OFF | ON |
| 175 | ON | ON | ON | ON | OFF | ON | OFF | ON |
| 176 | OFF | OFF | OFF | OFF | ON | ON | OFF | ON |
| 177 | ON | OFF | OFF | OFF | ON | ON | OFF | ON |
| 178 | OFF | ON | OFF | OFF | ON | ON | OFF | ON |
| 179 | ON | ON | OFF | OFF | ON | ON | OFF | ON |
| 180 | OFF | OFF | ON | OFF | ON | ON | OFF | ON |
| 181 | ON | OFF | ON | OFF | ON | ON | OFF | ON |
| 182 | OFF | ON | ON | OFF | ON | ON | OFF | ON |
| 183 | ON | ON | ON | OFF | ON | ON | OFF | ON |
| 184 | OFF | OFF | OFF | ON | ON | ON | OFF | ON |
| 185 | ON | OFF | OFF | ON | ON | ON | OFF | ON |
| 186 | OFF | ON | OFF | ON | ON | ON | OFF | ON |
| 187 | ON | ON | OFF | ON | ON | ON | OFF | ON |
| 188 | OFF | OFF | ON | ON | ON | ON | OFF | ON |



Operation

Table 18 - Continued

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 189 | ON | OFF | ON | ON | ON | ON | OFF | ON |
| 190 | OFF | ON | ON | ON | ON | ON | OFF | ON |
| 191 | ON | ON | ON | ON | ON | ON | OFF | ON |
| 192 | OFF | OFF | OFF | OFF | OFF | OFF | ON | ON |
| 193 | ON | OFF | OFF | OFF | OFF | OFF | ON | ON |
| 194 | OFF | ON | OFF | OFF | OFF | OFF | ON | ON |
| 195 | ON | ON | OFF | OFF | OFF | OFF | ON | ON |
| 196 | OFF | OFF | ON | OFF | OFF | OFF | ON | ON |
| 197 | ON | OFF | ON | OFF | OFF | OFF | ON | ON |
| 198 | OFF | ON | ON | OFF | OFF | OFF | ON | ON |
| 199 | ON | ON | ON | OFF | OFF | OFF | ON | ON |
| 200 | OFF | OFF | OFF | ON | OFF | OFF | ON | ON |
| 201 | ON | OFF | OFF | ON | OFF | OFF | ON | ON |
| 202 | OFF | ON | OFF | ON | OFF | OFF | ON | ON |
| 203 | ON | ON | OFF | ON | OFF | OFF | ON | ON |
| 204 | OFF | OFF | ON | ON | OFF | OFF | ON | ON |
| 205 | ON | OFF | ON | ON | OFF | OFF | ON | ON |
| 206 | OFF | ON | ON | ON | OFF | OFF | ON | ON |
| 207 | ON | ON | ON | ON | OFF | OFF | ON | ON |
| 208 | OFF | OFF | OFF | OFF | ON | OFF | ON | ON |
| 209 | ON | OFF | OFF | OFF | ON | OFF | ON | ON |
| 210 | OFF | ON | OFF | OFF | ON | OFF | ON | ON |
| 211 | ON | ON | OFF | OFF | ON | OFF | ON | ON |
| 212 | OFF | OFF | ON | OFF | ON | OFF | ON | ON |
| 213 | ON | OFF | ON | OFF | ON | OFF | ON | ON |
| 214 | OFF | ON | ON | OFF | ON | OFF | ON | ON |
| 215 | ON | ON | ON | OFF | ON | OFF | ON | ON |
| 216 | OFF | OFF | OFF | ON | ON | OFF | ON | ON |
| 217 | ON | OFF | OFF | ON | ON | OFF | ON | ON |
| 218 | OFF | ON | OFF | ON | ON | OFF | ON | ON |

Operation

Table 18 - Continued

| SW4 - Modbus Slave Address | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|----|----|
| Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 219 | ON | ON | OFF | ON | ON | OFF | ON | ON |
| 220 | OFF | OFF | ON | ON | ON | OFF | ON | ON |
| 221 | ON | OFF | ON | ON | ON | OFF | ON | ON |
| 222 | OFF | ON | ON | ON | ON | OFF | ON | ON |
| 223 | ON | ON | ON | ON | ON | OFF | ON | ON |
| 224 | OFF | OFF | OFF | OFF | OFF | ON | ON | ON |
| 225 | ON | OFF | OFF | OFF | OFF | ON | ON | ON |
| 226 | OFF | ON | OFF | OFF | OFF | ON | ON | ON |
| 227 | ON | ON | OFF | OFF | OFF | ON | ON | ON |
| 228 | OFF | OFF | ON | OFF | OFF | ON | ON | ON |
| 229 | ON | OFF | ON | OFF | OFF | ON | ON | ON |
| 230 | OFF | ON | ON | OFF | OFF | ON | ON | ON |
| 231 | ON | ON | ON | OFF | OFF | ON | ON | ON |
| 232 | OFF | OFF | OFF | ON | OFF | ON | ON | ON |
| 233 | ON | OFF | OFF | ON | OFF | ON | ON | ON |
| 234 | OFF | ON | OFF | ON | OFF | ON | ON | ON |
| 235 | ON | ON | OFF | ON | OFF | ON | ON | ON |
| 236 | OFF | OFF | ON | ON | OFF | ON | ON | ON |
| 237 | ON | OFF | ON | ON | OFF | ON | ON | ON |
| 238 | OFF | ON | ON | ON | OFF | ON | ON | ON |
| 239 | ON | ON | ON | ON | OFF | ON | ON | ON |
| 240 | OFF | OFF | OFF | OFF | ON | ON | ON | ON |
| 241 | ON | OFF | OFF | OFF | ON | ON | ON | ON |
| 242 | OFF | ON | OFF | OFF | ON | ON | ON | ON |
| 243 | ON | ON | OFF | OFF | ON | ON | ON | ON |
| 244 | OFF | OFF | ON | OFF | ON | ON | ON | ON |
| 245 | ON | OFF | ON | OFF | ON | ON | ON | ON |
| 246 | OFF | ON | ON | OFF | ON | ON | ON | ON |
| 247 | ON | ON | ON | OFF | ON | ON | ON | ON |



Operation

Variable format

Temperature:

Offset: -45 °C

Scaling: 10

Conversion:

When the BMS receives a data, the following equation has to be applied

$$\text{Temperature} = (\text{data received} / 10) - 45$$

When the BMS sends a data, the following equation has to be applied

$$\text{Data to send} = (\text{Temperature} + 45) * 10$$

Percentage:

Offset = 0

Scaling = 1

Without unit:

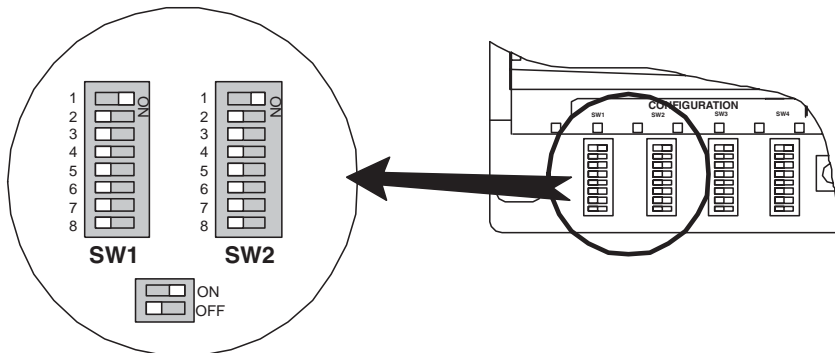
Offset = 0

Scaling = 1

PIC and Trane Equipment configuration

Configure the PIC connected to a LON Trane Equipment

Step 1: Configure PIC dip switches SW1 and SW2 according to the Trane Equipment





Operation

Table 19

| SW1 - Trane Equipment Configuration | | | | | | | | | |
|--|------------|-----|-----|-----|-----|----------|---|---|-----|
| Trane Equipment | Controller | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| RTAC (Chiller Profile) | CH530 | OFF | OFF | OFF | OFF | Reserved | | | OFF |
| CVGF | CH530 | OFF | OFF | OFF | OFF | | | | OFF |
| RTHD | CH530 | OFF | OFF | OFF | OFF | | | | OFF |
| CGAN / CXAN / CGCL / CCUH / CCUN / CGWH / CGWN / RAUL / CGAM / CXAM | CH530 | OFF | OFF | OFF | OFF | | | | OFF |
| CGAN / CXAN | CH532 V1.2 | OFF | OFF | OFF | OFF | | | | OFF |
| CGAN / CXAN | CH532 V2.0 | OFF | OFF | OFF | OFF | | | | OFF |
| RTAA / RTAB / RTXA / RTAD / RTWB / RTRA / RTUB | UCM CLD | OFF | OFF | OFF | OFF | | | | OFF |
| RTAC (Public Extension) | CH530 | OFF | OFF | OFF | OFF | | | | OFF |
| RTWD / RTUD | CH530 | OFF | OFF | OFF | OFF | | | | OFF |

Table 20

| SW2 - Trane Equipment Configuration | | | | | | | | | |
|--|------------|-----|-----|-----|-----|-----|-----|----------|---|
| Trane Equipment | Controller | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| RTAC (Chiller Profile) | CH530 | OFF | OFF | OFF | OFF | OFF | OFF | Reserved | |
| CVGF | CH530 | ON | OFF | OFF | OFF | OFF | OFF | | |
| RTHD | CH530 | OFF | ON | OFF | OFF | OFF | OFF | | |
| CGAN / CXAN / CGCL / CCUH / CCUN / CGWH / CGWN / RAUL / CGAM / CXAM | CH530 | ON | ON | OFF | OFF | OFF | OFF | | |
| CGAN / CXAN | CH532 V1.2 | OFF | OFF | ON | OFF | OFF | OFF | | |
| CGAN / CXAN | CH532 V2.0 | ON | OFF | ON | OFF | OFF | OFF | | |
| RTAA / RTAB / RTXA / RTAD / RTWB / RTRA / RTUB | UCM CLD | OFF | ON | ON | OFF | OFF | OFF | | |
| RTAC (Public Extension) | CH530 | ON | ON | ON | OFF | OFF | OFF | | |
| RTWD / RTUD | CH530 | OFF | OFF | OFF | ON | OFF | OFF | | |

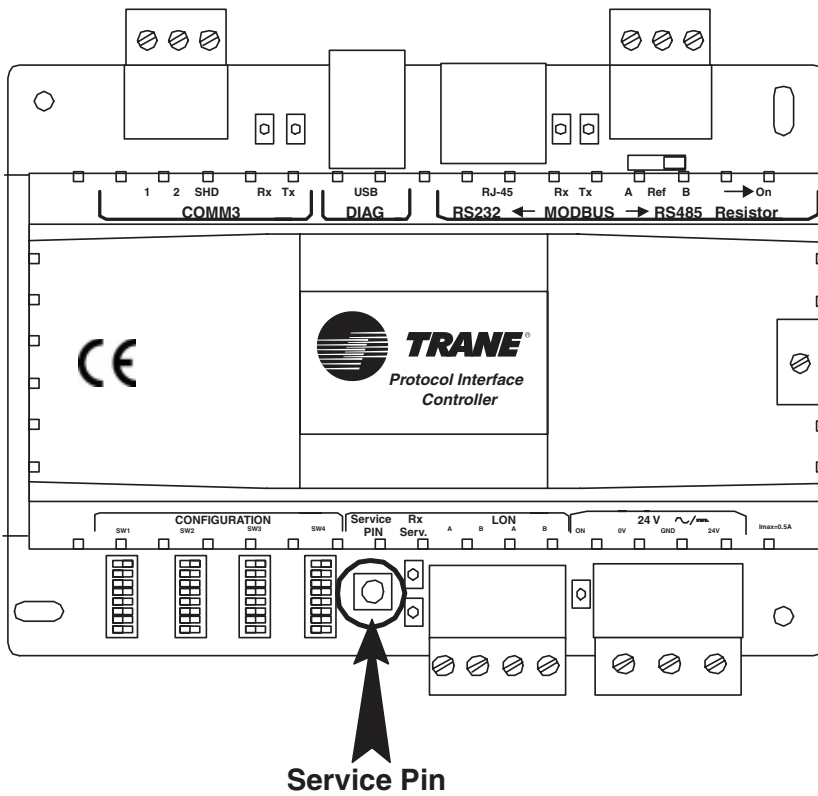


Operation

Step 2: Validate the PIC configuration

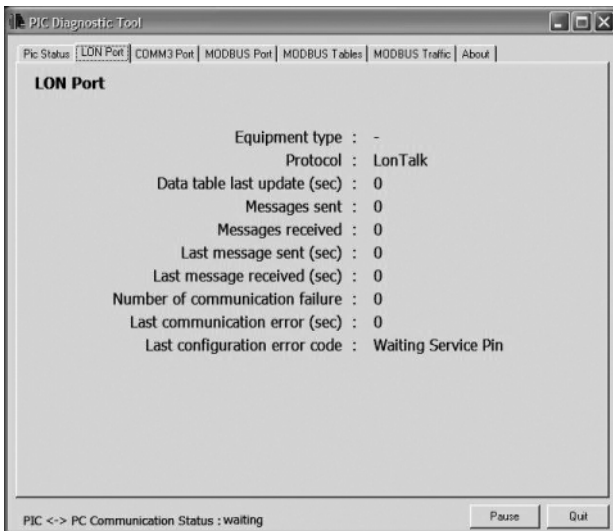
Once the PIC is configured and wired to Trane equipment, the configuration has to be validated.

The PIC service pin has to be pressed for at least 15 seconds. That will save the configuration and reset the PIC.



Operation

The PIC is now in a stand-by sequence, waiting for a Trane equipment to be identified.



Step 3: Initiate communication between the PIC and Trane Equipment

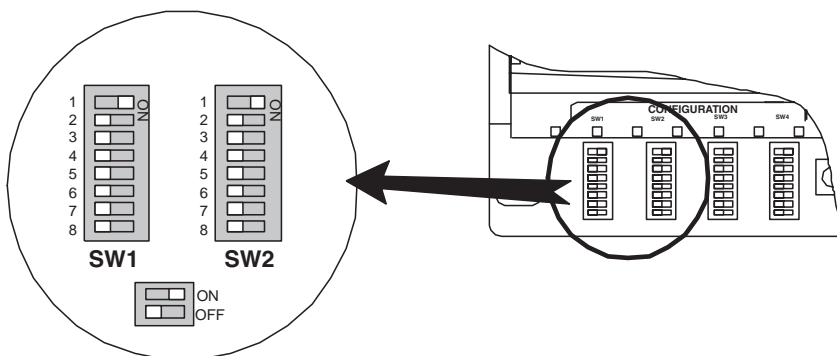
Once the PIC is in 'waiting' status, the existing Trane Equipment has to identify itself to the PIC by pressing once the Trane equipment service pin (See the Installation section for a more detailed view of the equipment service pin).

The PIC can see this 'call' and can initiate the communication with the device. The communication is completely established when the 'Last configuration error code' line from the 'Lon Port' tab of the diagnostic tool shows 'Configuration Pass' or when the BMS starts to receive answers to its queries.

Note: if the diagnostic tool was connected to PIC during the configuration change process, the diagnostic tool must be closed and then opened again to retrieve communication with the PIC.

Configure the PIC connected to a Comm3 Trane Equipment

Step 1: Configure PIC dip switches SW1 and SW2 according to the existing Trane Equipment

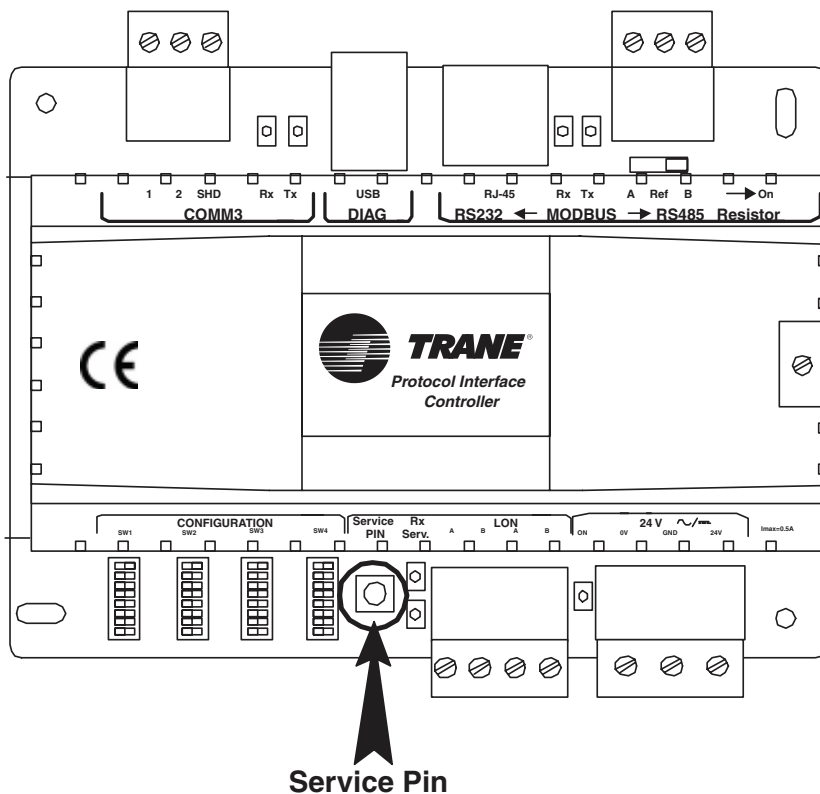


Operation

Step 2: Validate the PIC configuration

Once the PIC is configured and wired to Trane equipment, the configuration has to be validated.

The PIC service pin has to be pressed for at least 15 seconds. This will save the configuration and reset the PIC.



Service Pin

The PIC can start its communication sequence with Trane Equipment.

Step 3: Configure Trane equipment

In order to operate with the PIC, the Comm3 Trane Equipment must have its address set to '1'. See Installation Operation Maintenance manuals of the existing Trane equipment for details.

Note: if the diagnostic tool was connected to PIC during the configuration change process, the diagnostic tool must be closed and then opened again to retrieve communication with the PIC.

Configuration Change

For any type of change (Modbus settings or Trane Equipment type) made on configuration dip switches (SW1 to SW4), a configuration validation is required.

How to proceed?

Step 1 - Set all dip switches to the desired position (See configuration section)

Step 2 - Press the PIC service pin for at least 15 seconds.

Step 3 - Reassign the Trane Equipment by pressing the equipment service pin (only for LON communicating units)

PIC is now operating with the new configuration.

Note: if the diagnostic tool was connected to PIC during the configuration change process, the diagnostic tool must be closed and then opened again to retrieve communication with the PIC.

Operation

Diagnostic Tool Operations

The PIC can be troubleshoot using a diagnostic tool designed for the PIC. This tool provides information on:

- Communication with Trane Equipment (counters)
- Communication with Modbus device (counters)
- Current configuration
- Data point
- Modbus traffic

Before starting the diagnostic tool, make sure the PIC is powered on and connected to the PC using the right USB cable (see Diagnostic Tool Installation Section of this manual).

To start the diagnostic tool, from the 'Start Menu', 'All programs', 'PIC Diag' select the PIC application 'PIC Diag Tool'.

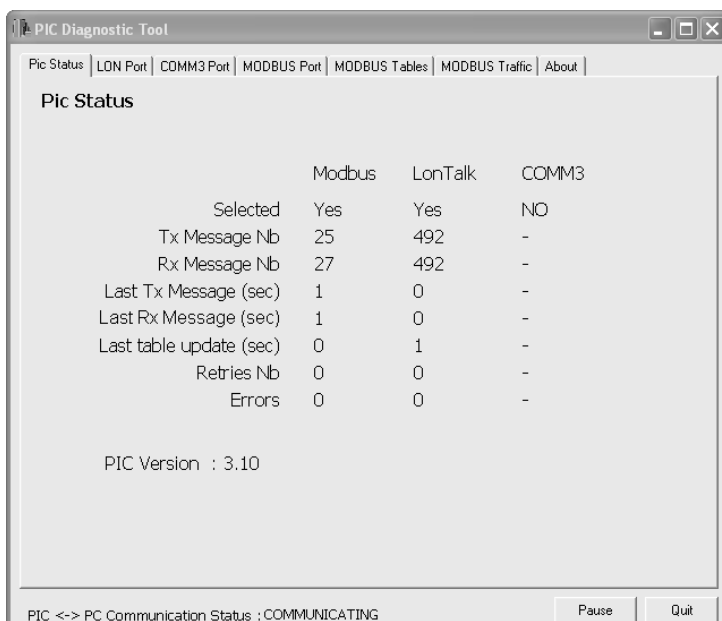


Data displayed on the PIC diagnostic tool are refreshed every 5 seconds (between the PIC and the PC).

CAUTION!: The diagnostic tool is only to view information, the operator will not be able to modify any data displayed on the screen.

CAUTION!: The diagnostic tool only displays rough value of data. For example, a temperature of 6.5°C in register 30001 will be displayed as 515 in decimal $((6.5 + 45) * 10)$.

PIC Status



Maintenance

Fields description

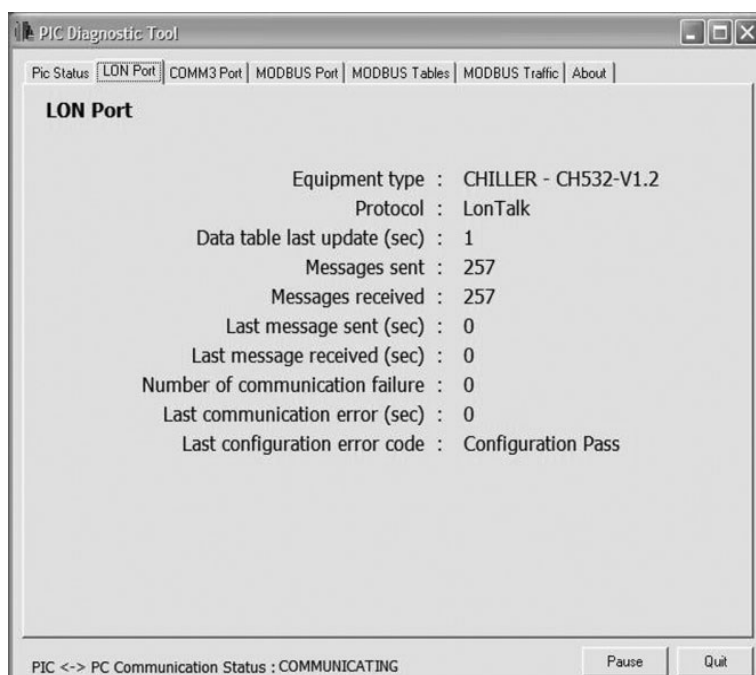
- Selected: Configured communication protocol
- Tx Message Nb: Number of messages the PIC transmitted
- Rx Message Nb: Number of messages the PIC received
- Last Tx Message (sec): Time elapsed since the PIC sent the latest message
- Last Rx Message (sec): Time elapsed since the PIC received the latest message
- Last table update (sec): Time elapsed since the Trane Equipment data point table was refreshed
- Retries Nb: Number of communication retries in case of no answer
- Errors: Number of errors
- PIC Versus: Current software version of the PIC
- PIC <-> PIC Communication Status: Status of the USB link between the PC and the PIC.
 - 'Communicating': PIC is on line and communication with the diagnostic tool
 - 'Not communicating': PIC does not communicate anymore with the PC. The diagnostic tool must be closed and opened again. This is typically what happens during a configuration change after pressing the service pin for 15 seconds.
 - Waiting: PIC is communicating but is waiting for an update.

Command description

- Pause: freezes the screen with current values
- Quit: exits the diagnostic tool

Trane Equipment Communication Status

The diagnostic tool provides the operator with an in-depth view of each communication channel.



Maintenance

Fields description

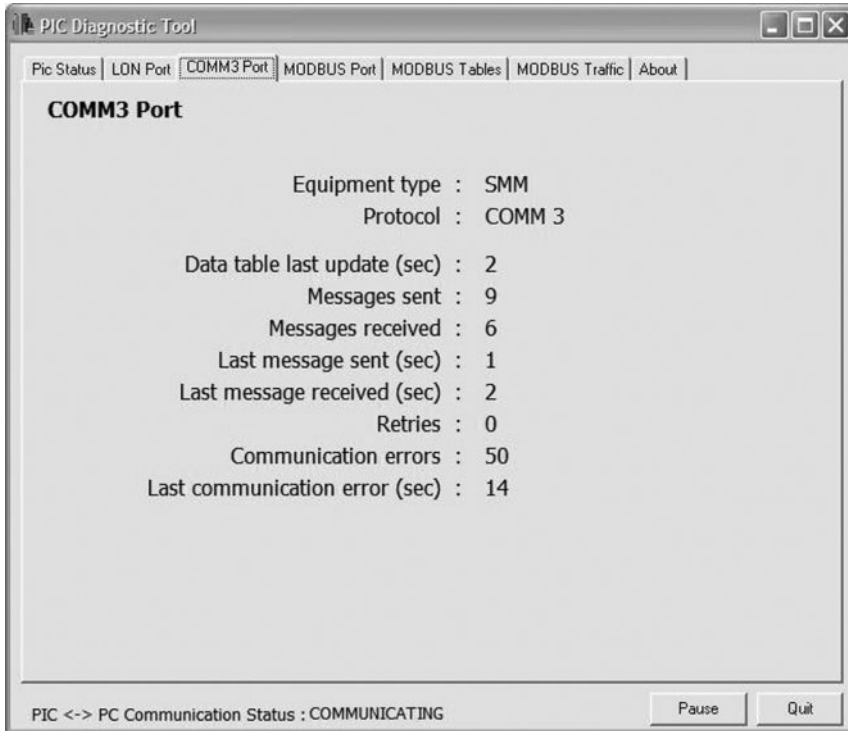
- Equipment type: Description of the controller the PIC is configured with.
- Protocol: Active communication protocol
- Data table last update (sec): Time elapsed since Trane Equipment data point table was refreshed
- Message sent: Number of messages the PIC transmitted
- Message received: Number of messages the PIC received
- Last message sent (sec): Time elapsed since the PIC sent the latest message
- Last Message received (sec): Time elapsed since the PIC received the latest message
- Number of communication failures: self-explanatory
- Last communication error (sec): Time elapsed since the last communication error
- Last configuration error code: Description of Trane equipment installation process
 - Not Started: Configuration not started
 - Waiting Service Pin: PIC device is waiting for service pin press on the distant equipment.
 - Wrong Program ID: The equipment installed does not correspond to the configured equipment on the PIC device.
 - Subnet Node Already In Use: The PIC default subnet and node configuration is already in use by equipment on the LON network.
 - Unconfigured Fail: The PIC tries to force the equipment to go to unconfigured state and does not succeed. Unconfigure manually the CH530 LCI-c by pressing 15 seconds on the service pin of the CH530 LCI-c board. Once done, retry to configure the PIC.
 - Unconfigured Response Fail: The PIC tries to force the equipment to go to unconfigured state and does not succeed. Unconfigure manually the CH530 LCI-c by pressing 15 seconds on the service pin of the CH530 LCI-c board. Once done, retry to configure the PIC.
 - Unconfigured Query Status Fail: The PIC tries to ask to the equipment its configured status and the request fails.
 - Address Unbound Fail: The PIC tries to unbind the equipment and does not succeed.
 - Read Memory Fail: The PIC tries to read the memory of the equipment and does not succeed.
 - Net Var Unbound Fail: The PIC tries to unbind network variables of the equipment and does not succeed.
 - Query Status Fail: The PIC tries to ask to the equipment something and the request fails.
 - Equipment Configured Fail: The equipment indicates to the PIC that the Configuration operation has failed.
 - Subnet Node Query Status Fail: The PIC tries to ask to the equipment its subnet and node configuration and does not succeed.
 - **Configuration Pass: The PIC auto-install process was successful.**

Command description

- Pause: freezes the screen with current values
- Quit: exits the diagnostic tool



Maintenance



Fields description

- Equipment type: Description of the controller the PIC is configured with.
- Protocol: Active communication protocol
- Data table last update (sec): Time elapsed since the Trane Equipment data point table was refreshed
- Message sent: Number of messages the PIC transmitted
- Message received: Number of messages the PIC received
- Last message sent (sec): Time elapsed since the PIC sent the latest message
- Last Message received (sec): Time elapsed since the PIC received the latest message
- Retries: Number of times the PIC re-sent questions to the equipment
- Communication errors: self-explanatory
- Last communication error (sec): Time elapsed since the last communication error

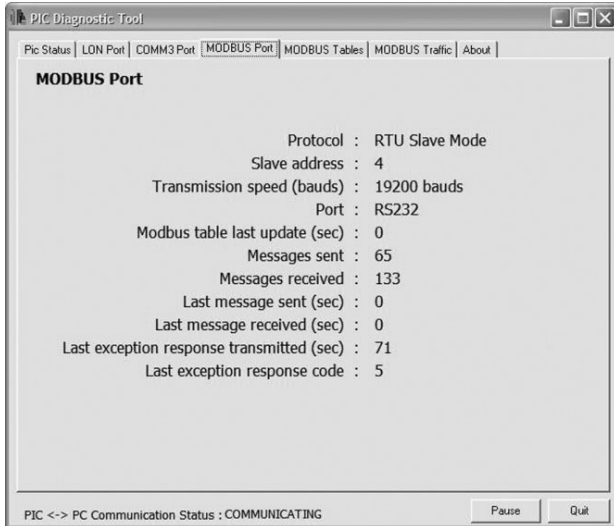
Command description

- Pause: freeze the screen with current values
- Quit: exits the diagnostic tool



Maintenance

Modbus Communication Status



Fields description

- Protocol: PIC is a Modbus slave device. PIC is compatible with Modbus RTU.
- Slave address: Modbus slave address the PIC answers to.
- Transmission speed (bauds): Configured Modbus baudrate
- Port: configured Modbus port (RS232 or RS485)
- Modbus table last update (sec): Time elapsed since the Trane Equipment data point table was refreshed
- Message sent: Number of messages the PIC transmitted over the Modbus link
- Message received: Number of messages the PIC received over the Modbus link
- Last message sent (sec): Time elapsed since the PIC sent the latest message
- Last Message received (sec): Time elapsed since the PIC received the latest message
- Last exception response transmitted (sec): Time elapsed since the last exception response
- Last exception response code: Modbus exception code:
 - Illegal Function (0x01): PIC has received a query for an unsupported Modbus function
 - Illegal Data Address (0x02): PIC has received a query for an unsupported data (not in the data point list)
 - Illegal Data Value (0x03): PIC has received a query with an illegal data value (out of range)
 - Slave Device Failure (0x04): Data table is not anymore updated but it has been updated at least once.
 - Data Table Not Updated (0x05): Data table has never been updated

Command description

- Pause: freezes the screen with current values
- Quit: exits the diagnostic tool

Maintenance

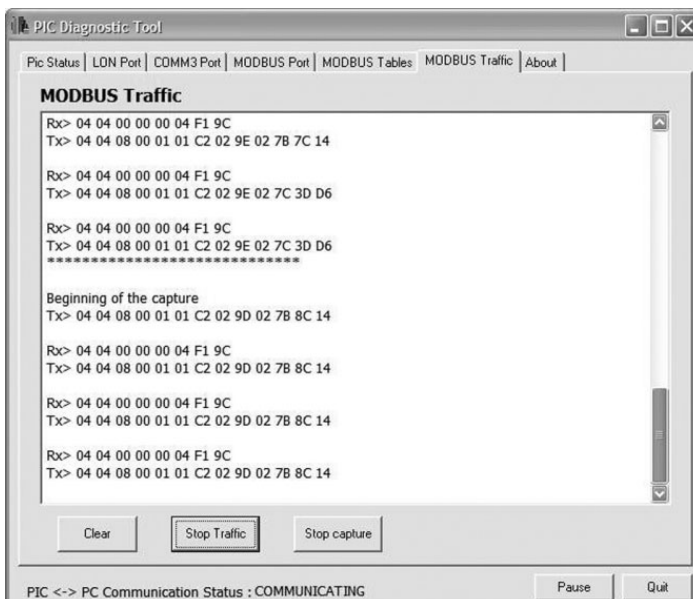
Modbus Traffic

The diagnostic tool offers the possibility to display and save the Modbus traffic between the PIC and the Modbus BMS. PIC displays Modbus frames in hexadecimal.



Command description

- Start Traffic: Displays Modbus frames
- Start capture: Save Modbus frames
- Clear: Clear the Modbus frames buffer in the diagnostic tool memory



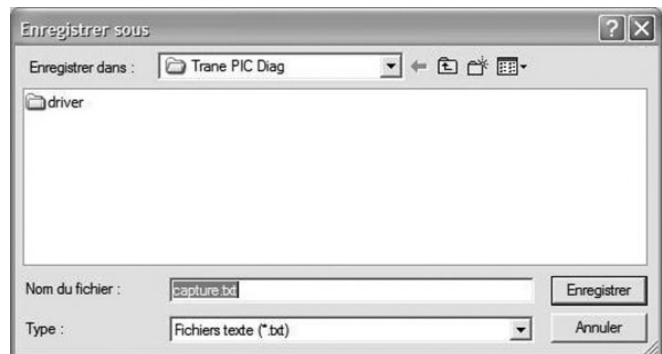
Maintenance

Field description

- Rx>: Valid Modbus frame received by the PIC
- Tx>: Modbus frame sent by the PIC ; Answer to the query of the BMS
- *****: Interruption in the traffic display. The operator switched to a different screen and then switched back to Modbus traffic screen.

Command description

- Stop Traffic: End of Modbus frames display
- Stop capture: End of Modbus frame capture process
- Clear: Clear the Modbus frames buffer in the diagnostic tool memory
- When the operator ends the capture process, the diagnostic tool will display a 'Save As' type screen. The operator will be able to save in a text file Modbus frames that are saved in the buffer.



Data Point Description

Table A - How to read Chiller Status in equipment data point lists

| Chiller Status - bitfield | | |
|-----------------------------|--------------|--|
| Item | Register bit | Description |
| Chiller Run Mode | Bits 0-3 | 0 (0000) = Chiller Off |
| | | 1 (0001) = Chiller in start mode |
| | | 2 (0010) = Chiller in run mode |
| | | 3 (0011) = Chiller in pre-shutdown mode |
| | | 4 (0100) = Chiller in service mode |
| any others = not applicable | | |
| Chiller Operating Mode | Bits 4-7 | 0 (0000) = Cooling mode |
| | | 1 (0001) = Heating mode |
| | | 2 (0010) = Free cooling mode |
| | | 3 (0011) = Ice-making mode |
| any others = not applicable | | |
| Chiller in alarm | Bit 8 | 1=Chiller has an active diagnostic that caused the chiller to be shutdown. (These are shutdown alarms, not warnings.) 0=No shutdown alarms are present. |
| Chiller enabled | Bit 9 | 1=Chiller is available to run or is currently running. 0=Chiller is not permitted to run. |
| Chiller local mode | Bit 10 | 1=Chiller is in local mode. BAS is disabled in the Setpoint Source and the chiller will ignore communications. 0=Chiller is not in local mode and network visible values may be changed remotely. |
| Chiller in limits | Bit 11 | 1=Conditions may exist that prevent the chiller from reaching setpoint. 0=Chiller is not restricted from attempting to reach setpoint. |
| Chilled water flow | Bit 12 | 1=Chilled water flow is detected 0=No chilled water flow is observed. |
| Condenser water flow | Bit 13 | 1=Condenser water flow is detected. 0=No condenser water is observed. |

Appendix

Table B - How to read Compressor Running Outputs in equipment data point lists

| Compressor Running Outputs - bitfield | |
|--|-----------------------------|
| Bit Position | Description |
| Bit 15 | Not used |
| Bit 14 | Not used |
| Bit 13 | Compressor F running (1=On) |
| Bit 12 | Compressor E running (1=On) |
| Bit 11 | Compressor D running (1=On) |
| Bit 10 | Compressor C running (1=On) |
| Bit 9 | Compressor B running (1=On) |
| Bit 8 | Compressor A running (1=On) |
| Bit 7 | Not used |
| Bit 6 | Not used |
| Bit 5 | Compressor F exists (1=Yes) |
| Bit 4 | Compressor E exists (1=Yes) |
| Bit 3 | Compressor D exists (1=Yes) |
| Bit 2 | Compressor C exists (1=Yes) |
| Bit 1 | Compressor B exists (1=Yes) |
| Bit 0 | Compressor A exists (1=Yes) |

Table C - How to read Condenser Fan Running Outputs in equipment data point lists

| Condenser Fan Running Outputs - bitfield | |
|---|-----------------------------------|
| Bit Position | Description |
| Bit 15 | Condenser fan(s) H On (1=On) |
| Bit 14 | Condenser fan(s) G On (1=On) |
| Bit 13 | Condenser fan(s) F On (1=On) |
| Bit 12 | Condenser fan(s) E On (1=On) |
| Bit 11 | Condenser fan(s) D On (1=On) |
| Bit 10 | Condenser fan(s) C On (1=On) |
| Bit 9 | Condenser fan(s) B On (1=On) |
| Bit 8 | Condenser fan(s) A On (1=On) |
| Bit 7 | Condenser fan(s) H exists (1=Yes) |
| Bit 6 | Condenser fan(s) G exists (1=Yes) |
| Bit 5 | Condenser fan(s) F exists (1=Yes) |
| Bit 4 | Condenser fan(s) E exists (1=Yes) |
| Bit 3 | Condenser fan(s) D exists (1=Yes) |
| Bit 2 | Condenser fan(s) C exists (1=Yes) |
| Bit 1 | Condenser fan(s) B exists (1=Yes) |
| Bit 0 | Condenser fan(s) A exists (1=Yes) |



Trane - by Trane Technologies (NYSE: TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.eu or tranetechnologies.com.
Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

BAS-SVX08E-GB_0920
Supersedes BAS-SVX08D-E4_0111

©2020 Trane