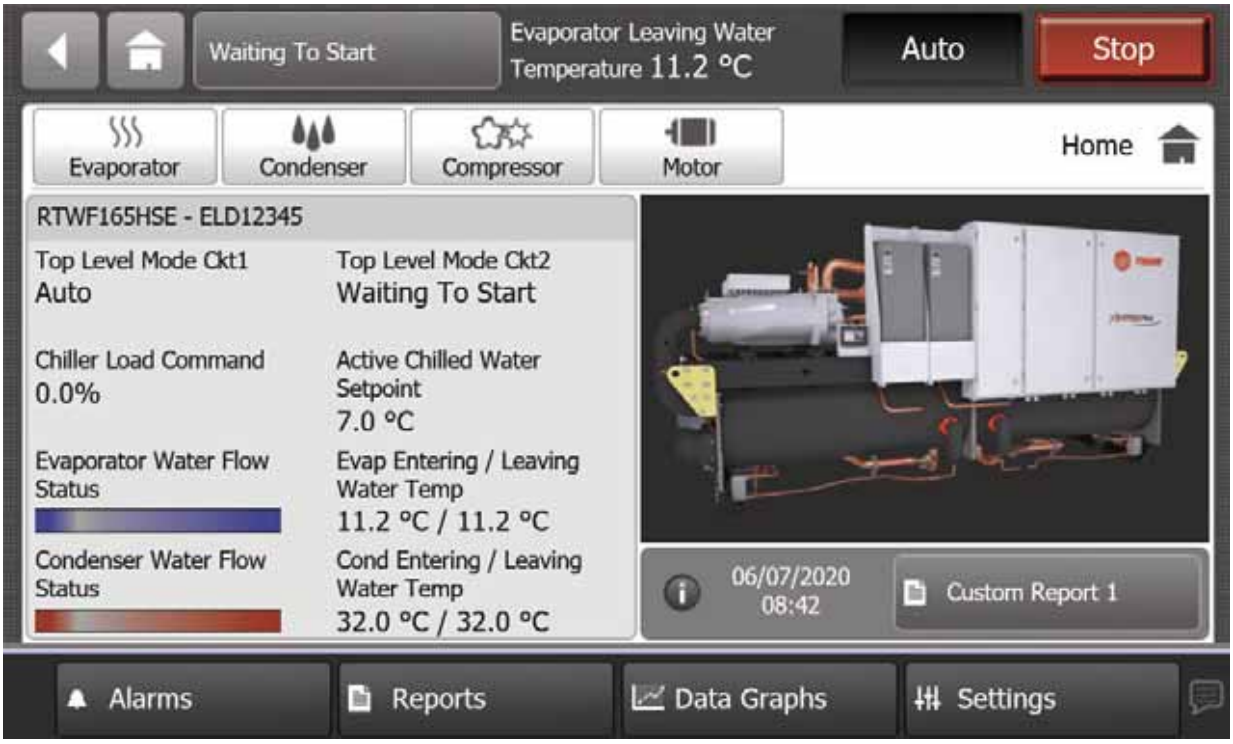
Tracer™ TD7 with Symbio™ 800



September 2020 **CNT-SVU006A-GB**

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General Recommendations

As you review this manual, keep in mind that:

- All field-installed wiring must conform to European guidelines and any applicable local codes. Be sure to satisfy proper equipment grounding requirements per European guidelines.
- Compressor motor and unit electrical data (including motor kW, voltage utilization range, rated load amps) is listed on the chiller nameplate.
- All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

Note:

Always refer to wiring diagrams shipped with unit submittal for specific electrical schematic and connection information.

WARNING:

Proper field wiring and grounding required!

All field wiring MUST be performed by qualified personnel.

Improperly installed or improperly grounded machines can cause FIRE and ELECTROCUTION hazards

To avoid these hazards, you MUST follow requirements in local electrical codes.

Failure to follow cade could result in death or serious injury.

WARNING:

Hazardous voltage w/capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency™ Drive) capacitors before servicing.

Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

- For variable frequency drives or others energy storing component provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged.
- DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After disconnecting input power, wait five (5) minutes for units which are equipped with EC fans and wait twenty (20) minutes for units which are equipped with variable frequency drive (0V DC) before touching any internal components

Failure to follow these instructions could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see *"Adaptive Frequency™ Drive (AFD3) Capacitor Discharge,"* and BAS-SVX19*.

General Recommendations

WARNING!

Hazardous Voltage - Pressurized Burning Fluid:

Before removing compressor terminal box cover for servicing, or servicing power side of control panel, CLOSE COMPRESSOR DISCHARGE SERVICE VALVE and disconnect all electric power including remote disconnects. Discharge all motor start/run capacitors. Follow lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

Do not operate compressor without terminal box cover in place. Failure to follow all electrical safety precautions could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see *"Adaptive Frequency™ Drive (AFD3) Capacitor Discharge,"* and BAS-SVX19*.

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

Important:

To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

WARNING!

Discharge Time:

Frequency converters contain DC-link capacitors that can remain charged even when the frequency converter is not powered. To avoid electrical hazards, disconnect AC mains, any permanent magnet type motors, and any remote DC link power supplies, including battery backups, UPS and DC-link connections to other frequency converters. Wait for the capacitors to fully discharge before performing any service or repair work. The amount of wait time is listed in the Discharge Time table. Failure to wait the specified time after power has been removed before doing service or repair could result in death or serious injury.

Table 1 – Capacitor Discharge Times

Voltage	Power	Minimum waiting time [min]
380 – 500 V	90 – 250 kW	20
	315 – 800 kW	40

Installer-Supplied Components / Interconnecting Wiring

Installer-Supplied Components

Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

- Power supply wiring (in conduit) for all field-wired connections.
- All control (interconnecting) wiring (in conduit) for field supplied devices.
- Fused-disconnect switches or circuit breakers.

Interconnecting Wiring

Chilled/Hot Water Pump Control NOTICE:

Equipment Damage!

If the microprocessor calls for a pump to start and water does not flow, the evaporator may be damaged catastrophically. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will always be running when called upon by the chiller controls.

An evaporator water pump output relay closes when the chiller is given a signal to go into the Auto mode of operation from any source. The contact is opened to turn off the pump in the event of most machine level diagnostics to prevent pump overheat.

The relay output is required to operate the Evaporator

Water Pump contactor, Heat recovery and Condenser Water Pump. Contacts should be compatible with 115/240 VAC control circuit. Normally, the water pump run command relays follows the AUTO mode of the chiller. Whenever the unit has no diagnostics and is in the AUTO mode, regardless of where the auto command is coming from, the normally open relay is energized.

When the unit exits the AUTO mode, the relay is timed to open in an adjustable (using TU or TD7) 0 to 30 minutes.

The non-AUTO modes, in which the pumps are stopped, includes Reset, Stop, External Stop, Remote Display Stop, Stopped by Tracer, Start Inhibited by Low Ambient Temp, and Ice Making complete (if applicable).

Pump relay operation

Chiller Mode	Relay Operation
Auto	Instant Close
Ice Making	Instant Close
Tracer Override	Close
Stop	Timed Close
Ice Complete	Instant Close
Freeze protection	Instant Close
Diagnostics	Instant Close

When going from Stop to Auto, the Evaporator Water Pump relay is energized. Water flow switch is activating, and flow status information back after 15 seconds.

Pump relay Operation for multi-pipe unit

Priority mode	Evaporator Pump command	Heat Recovery Pump command
Cooling Only	Active	OFF
Heating Only	OFF	Active
Cooling Priority	Active	Active
Heating Priority	Active	Active
Heat Recovery Priority	Active	Active
Max Capacity Priority	Active	Active

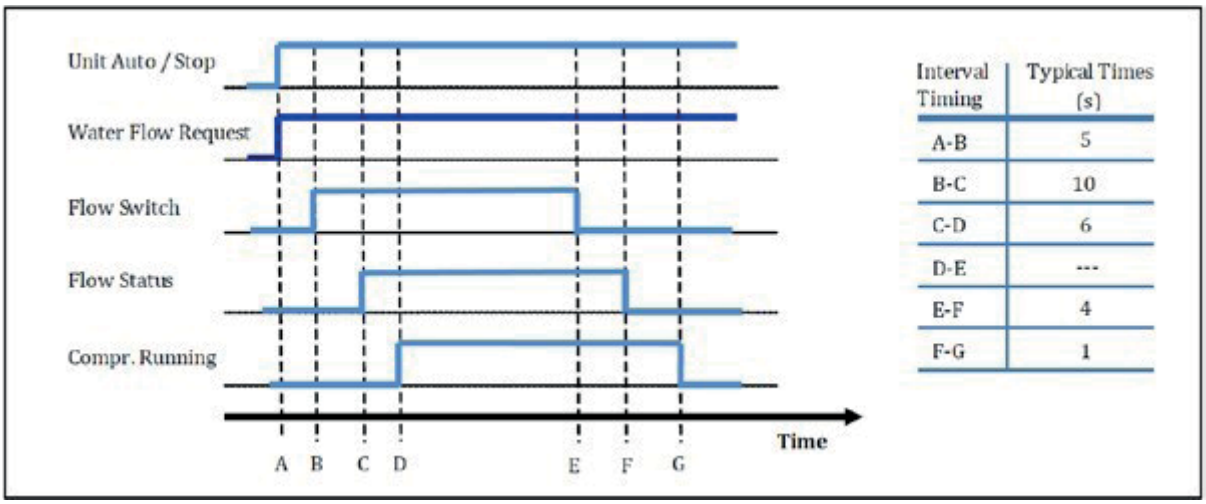
Freeze Avoidance relay

A freeze avoidance relay need to be interconnected to a device that prevent water temperature from freezing (water pump contactor, water valve actuator). Freeze avoidance relay will close when freezing risk is detected.

Installer-Supplied Components / Interconnecting Wiring

Water flow proving

When unit controller water flow proving is configured for a Paddle water Flow switch, it will require a high voltage binary input (110V-220V). When configured for a Thermal dispersion water flow switch, it requires a binary low voltage input (12-24V).



Interval Timing	Typical Times (s)
A-B	5
B-C	10
C-D	6
D-E	---
E-F	4
F-G	1

If water flow is not established in 20 minutes (for normal transition), the unit controller de-energizes the Pump relay and generates a non-latching diagnostic. If flow returns (e.g. someone else is controlling the pump), the diagnostic is cleared, the Pump is re-energized, and normal control resumed.

If evaporator water flow is lost once it had been established, the water pump relay remains energized and a non-latching diagnostic is generated. If flow returns, the diagnostic is cleared and the unit returns to normal operation. In general, when there is either a non-latching or latching diagnostic, the Pump relay is turned off as though there was a zero time delay. Exceptions whereby the relay continues to be energized occur with:

- Low Water Temp. diagnostic (non-latching) (Unless also accompanied by a Leaving Water Temperature Sensor Diagnostic)

  OR

- Loss of Water Flow diagnostic (non-latching) and the unit is in the AUTO mode, after initially having proven water flow.

Lead Lag Dual Pump

The running pump is changed each time the unit is switched on.

Programmable Relays

4 programmable relays are provided for enunciation of certain events or states of the chiller, selected from a list of likely needs, while only using four physical output relays, as shown in the field wiring diagram.

The relays contacts are isolated Form C (SPDT), suitable for use with 120 VAC circuits drawing up to 2.8 amps inductive, 7.2 amps resistive, or 1/3 HP and for 240 VAC circuits drawing up to 0.5 amp resistive.

The list of events/states that can be assigned to the programmable relays can be found in Table (…) Chiller events/ Status description. The relay will be energized when the event/state occurs.

Depending of the unit type and option, the list of function behind programmable can vary.

Tracer™ TU Service Tool is used to install the Programmable Relay Option package and assign any of the above lists of events or status to each of the four relays provided with the option. (See "Tracer™ TU," for more information on the Tracer TU service tool)

If any of the Alarm/Status relays are used, provide electrical power, 115 VAC with fused-disconnect to the panel and wire through the appropriate relays (terminals on 1A10). Provide wiring (switched hot, neutral, and ground connections) to the remote annunciation devices. Do not use power from the chiller's control panel transformer to power these remote devices. Refer to the field diagrams which are shipped with the unit.

Table 2 – Programmable relay event/status descriptions

Relay function	Description
Alarm	This output is true whenever there is any active latching or non-latching shutdown diagnostic that targets the chiller, circuit, or any of the compressors on a circuit.
Alarm - Latching	This output is true whenever there is an active latching shutdown diagnostic that targets the chiller, circuit, or any of the compressors on a circuit.
Alarm - NonLatching	This output is true whenever there is an active non-latching shutdown diagnostic that targets the chiller, circuit, or any of the compressors on a circuit.
Alarm Ckt X	This output is true whenever there is any active latching or non-latching shutdown diagnostic that targets Circuit X, or any of the Compressors on Circuit X. The CMAF design have 2 circuits.
Alarm – General Latching Ckt X	This output is true whenever is latching alarm(s) that targets circuit X or all the compressors on circuit X so that the circuit X is unable to produce any capacity. It mean it activates when there is latching alarm on circuit, or latching alarms on every compressor of circuit.
Alarm – General Latching Unit	This output is true whenever is latching alarm(s) that targets chiller or all circuits or all the compressors on a circuit so that the unit is unable to produce any capacity. It means it activates when there is latching alarm on Chiller, or 'General Latching Circuit X' on every circuit.
Alarm – General Non Latching Ckt X	This output is true whenever is non latching alarm(s) that targets circuit X or the compressors on circuit X so that the circuit X is unable to produce any capacity.
Alarm – General Non Latching Unit	This output is true whenever is at least a non latching alarm(s) that targets chiller or circuits or compressors on a circuit and there are latching or/and non latching diagnostics that targets chiller, circuits or compressors so that the unit is unable to produce any capacity.
Unit Limit Mode	This output is true whenever a circuit on the unit has been running in one of the limit modes continuously for the Limit Relay debounce time. A given limit or overlapping of different limits must be in effect continuously for the debounce time prior to the output becoming true. It will become false if no limits are present for the debounce time.
Circuit X Running	The output is true whenever any compressor of Circuit X is running. The CMAF design have 2 circuits.
Compressor Running	The output is true if any compressor on the unit is running.
Cooling	The output is true if capacity control is in Chilled Water Control mode (the water temperature is being controlled to the Active Chilled Water Setpoint). This output is active when running in Cooling only or Heat Recovery.
Heating	The output is true if capacity control is in Hot Water Control mode (the water temperature is being controlled to the Active Hot Water Setpoint). It includes Air source heat pump operation of heat recovery operation. The output is false in any other capacity control mode (Cooling Air Cooled, etc.). This output is true if it is running in Heat Recovery or Air-Source Heat Pump (Heating).
Evaporator Water Freeze Avoidance Request	This relay output is energized any time either the Low Evaporator Water Temperature – Unit Off or the Low Evaporator Temperature Ckt x – Unit Off diagnostics are active. This relay is intended for use as an external interlock for a field engineered and provided solution to mitigate the freeze danger implied by these diagnostics. Generally, this would be used in cases where operation of the evaporator water pump is unacceptable due to the system constraints, (i.e. such as mixing unconditioned warm water with controlled supply water as provided by other parallel chillers). The relay's output can provide the method to close bypass valves so the circulation becomes local to the evap and excludes the load, or can be used to defeat the evap pump override entirely while initiating an independent source of heat / flow to the evap.
Heat Recovery / Condenser Water Freeze Avoidance Request	The relay output is energized any time either the Low Condenser Water Temperature – Unit Off or the Low Condenser Temperature Ckt X – Unit Off diagnostics are active. The intent is to notify the customer during conditions of freeze risk for the condenser when the unit is off.

Programmable Relays

Maximum Capacity	The output is true whenever the chiller has reached maximum capacity continuously for the Max Capacity Relay debounce time for either cooling or heating. The output is false when the chiller does not have all its available compressors running continuously for the debounce time.
Service request (for Chiller, Compressor(s) or water pump):	This relay will be energized when at least one Maintenance alert condition (refer to Service required message specification) occurs, as long as at least one of associated informational diagnostic(s) will be active.
Warning	This output is true whenever there is an active latching or non-latching informational diagnostic that targets the chiller, circuit, or any of the compressors on a circuit.
Heat Recovery Active Circuit X	The output is true whenever Circuit X is running and Heat recovery is active on that circuit.
Ice Building	This output is true when Ice Building status is active.
Free Cooling Status	The output is true (closed) whenever Free Cooling is active and the capacity is > 0%. The output is false (open) whenever Free Cooling is inactive or capacity = 0%.
Free Cooling Maximum Capacity	The output is true (closed) whenever Free Cooling capacity = 100%. The output is false (open) whenever Free Cooling is <100% capacity.
None	This selection is desirable to provide an easy way for a customer to defeat the effect of the relay, if it has already been wired. For instance, if the relay was normally programmed as an “alarm” relay, and was wired to a claxon, it may be desirable to temporarily defeat the feature without changing wiring.

Low Voltage Wiring

The remote devices described below require low voltage wiring. All wiring to and from these remote input devices to the Control Panel must be made with shielded, twisted pair conductors. Be sure to ground the shielding only at the panel.

Important:

To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

Immediate Shutdown input

Symbio800 provides auxiliary control for a customer specified/installed latching trip out. When customer furnished remote contact 6S2, the chiller will run normally when the contact is closed. When the contact opens, the unit will stop and a manually resettable diagnostic is generated. This condition requires manual reset at the chiller switch on the front of the control panel.

This customer-furnished contact must be compatible with 24 VDC, 12 mA resistive load.

External Auto/Stop input

If the unit requires external Auto/Stop function, the installer must provide remote contact 6S1.

The chiller will run normally when the contact is closed. When contact opens, the compressor(s), if operating, will go to the RUN: UNLOAD operating mode and cycle off. Unit operation will be inhibited. Closure of the contact will permit the unit to return to normal operation.

Field-supplied contacts for all low voltage connections must be compatible with dry circuit 24 VDC for a 12mA resistive load. Refer to the field diagrams that are shipped with the unit.

Ice Making command input (Optional)

Ice Making Command is possible as an option through a binary low voltage input. When the ice building mode is activated, the unit will run at full cooling capacity and will continue to operate until the ice making command terminates or the entering water temperature reaches the Ice making Termination Setpoint. If terminated on Ice making Termination Setpoint, the Controller will not allow the unit to restart until the ice building command is removed.

External chilled / Hot water setpoint input (Optional)

External water setpoint allow to change the unit chilled/hot water temperature setpoint via an analog input. The input signal is configurable between 2-10 VDC and 4 - 20mA. The unit controller configuration defines the setpoint assigned to minimum signal and maximum signal assuming a linear evolution within that range.

Input Signal (2 VDC - 10 VDC)	External water setpoint
<1 VDC	Invalid
[1 VDC , 2 VDC]	Min
[2 VDC , 10 VDC]	min + (max – min) * (Signal – 2) / 8
[10 VDC , 11 VDC]	Max
>11 VDC	Invalid

Input Signal (4 mA - 20 mA)	External water setpoint
<2 mA	Invalid
[2 mA , 4 mA]	Min
[4 mA , 20 mA]	min + (max – min) * (Signal – 4) / 16
[20 mA , 22 mA]	Max
>22 mA	Invalid

Invalid Signal will generate an informational diagnostic and the unit controller will automatically use lower priority level setpoint : Front Panel (TD7) Water Setpoint.

A constant voltage output +10VDC is available on the dual analog I/O board to allow operation with a variable resistive input signal.

Low Voltage Wiring

External demand limit setpoint input (Optional)

External demand limit setpoint allow to change the unit demand limit setpoint via an analog input. The input signal is configurable.

Input Signal (2 VDC - 10 VDC)	External demand limit setpoint
<1 VDC	Invalid
[1 VDC , 2 VDC]	Min
[2 VDC , 10 VDC]	min + (max – min) * (Signal – 2) / 8
[10 VDC , 11 VDC]	Max
>11 VDC	Invalid

Input Signal (4 mA - 20 mA)	External demand limit setpoint
<2 mA	Invalid
[2 mA , 4 mA]	Min
[4 mA , 20 mA]	min + (max – min) * (Signal – 4) / 16
[20 mA , 22 mA]	Max
>22 mA	Invalid

Minimum value for demand limit setpoint is depending of unit type : 0% to 60%. Refer to minimum available value for the front panel demand limit setpoint in the TD7.

Maximum value for demand limit setpoint is depending of unit type from 100% to 120%. Refer to maximum available value for the front panel demand limit setpoint in the TD7.

A constant voltage output +10VDC is available on the dual analog I/O board to allow operation with a remote potentiometer.

External unit mode selection input (Optional)

Heat Pump (Reversible Air cooled or Water cooled chillers)

One binary low voltage input allows to toggle unit mode from Cooling (Chilled water control) to Heating (Hot water control) for heat pump application.

Binary Input state (J2-1/2)	Unit user mode
Open/ Not Energized	Cooling mode (Chilled water control)
Closed / Energized	Heating mode (Hot water control)

Multi Pipe unit

Two binary low voltage input allows to toggle multi pipe unit priority mode as described in the following scheme.

Binary Input #1 state (J2-1/2)	Binary Input #2 state (J2-3/4)	Unit user mode
Open/ Not Energized	Open/ Not Energized	Max capacity priority (Chilled and Hot water control is active. If there is decision to make between satisfying cooling or heating demand, the capacity demand arbitration logic will decide to fulfill the highest demanding side between Chilled and Hot water)
Closed / Energized	Open/ Not Energized	Cooling Only (Chilled water control, Hot water side is inactive)
Open/ Not Energized	Closed / Energized	Heating Only (Hot water control, Chilled water side is inactive)
Closed / Energized	Closed / Energized	Heat Recovery Priority (Chilled and Hot water control is active. If there is decision to make between satisfying cooling or heating demand, the capacity demand arbitration logic will decide to maximize heat recovery mode)

External unit capacity output (Optional)

Heat Pump (Reversible Air cooled or Water cooled chillers)

One analog output reflects the actual capacity of the unit between 0 to 100% : 2 VDC output = 0% , 10 VDC output = 100% (max capacity).

Multi Pipe unit

Two analog outputs reflects the respective cooling and Heating capacity of the unit between 0 to 100% : 2 VDC output = 0% , 10 VDC output = 100% (max capacity).

Active control setpoint arbitrations

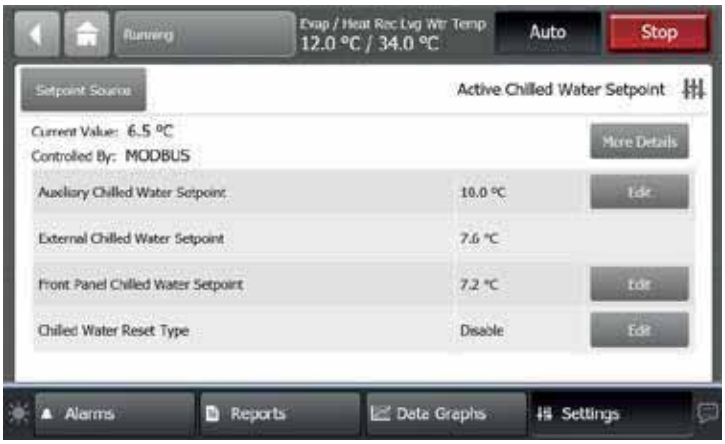
The unit controller will select the active setpoint based on the following priority rules from Highest to Lowest priority:

- BAS communication Bacnet, Lonworks or Modbus (BAS)
- External inputs (Ext)
  - Front Panel TD7 (FP)

A TD7 setting will restrict the available setpoint sources to consider in the arbitration

The arbitrated active setpoint is shown on Front Panel TD7 Setpoint settings Screens.

In this example, the active chilled water setpoint source is given by the Modbus BAS communication and is equal to 6.5°C.



Low Voltage Wiring

Chilled / Hot water setpoint reset

The Automatic chilled/ hot setpoint reset function applies to the arbitrated water setpoint.
Three type of Chilled water reset functions are possible in the TD7 setting.

CWS' = Active Chilled water setpoint (after reset)
CWS = Original Chilled water setpoint (before reset)
CWR = Amount of reset applied to the chilled water
→CWS' = CWS+CWR

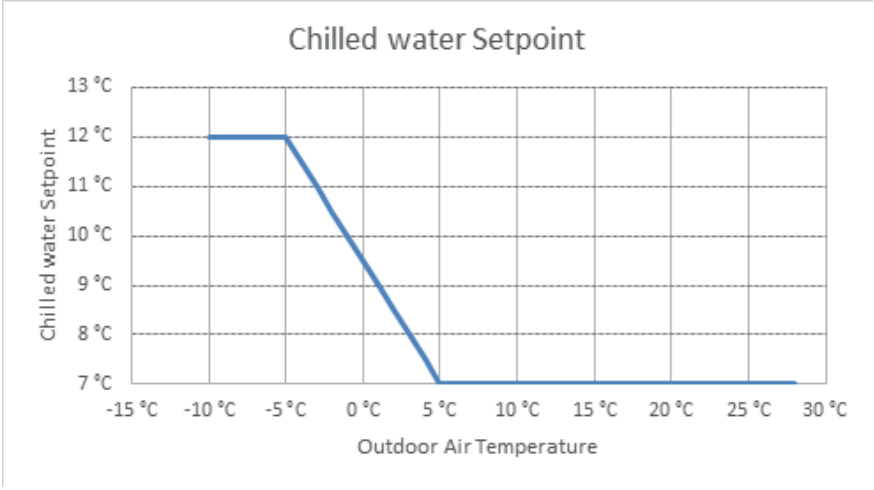
HWS' = Active Chilled water setpoint (after reset)
HWS = Original Chilled water setpoint (before reset)
HWR = Amount of reset applied to the chilled water
→HWS' = HWS-HWR

Outdoor Air Temperature Reset

The Chilled water setpoint reset amount (CWR) is proportional to the measure outdoor air temperature (TOD)
It is defined as CWR = RESET RATIO * (START RESET –TOD)
With limits:

CWR ≥ 0
CWR ≤ Maximum Reset

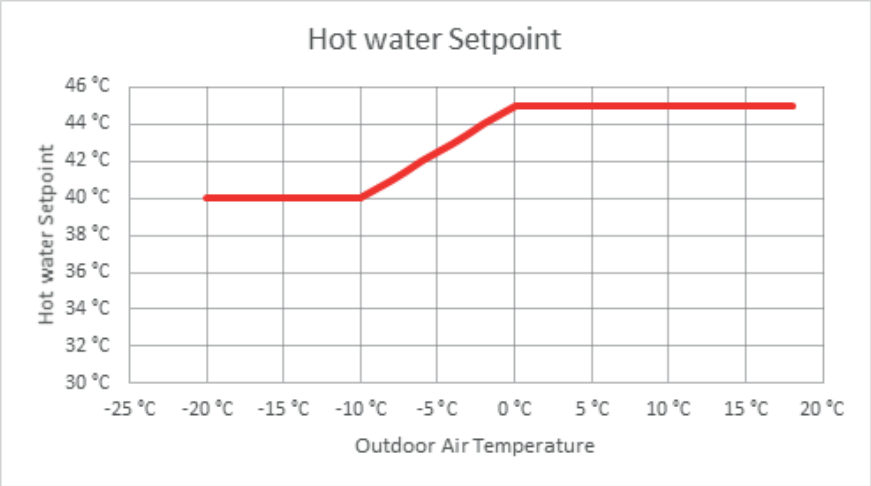
Example of chilled water setpoint reset applied to 7°C chilled water setpoint, with RESET RATIO=50%, Maximum Reset = 5K START RESET = 20°C



The Hot water setpoint reset amount (HWR) is proportional to the measure outdoor air temperature (TOD)
It is defined as HWR = RESET RATIO * (START RESET –TOD)
With limits:

HWR ≥ 0
HWR ≤ Maximum Reset

Example of hot water setpoint reset applied to 45°C hot water setpoint, with RESET RATIO = -50%, Maximum Reset = 5K START RESET = 0°C



Return Water Temperature Reset

The Chilled water setpoint reset amount (CWR) is proportional to the difference between measured return and leaving chilled water temperature (TWE, TWL)

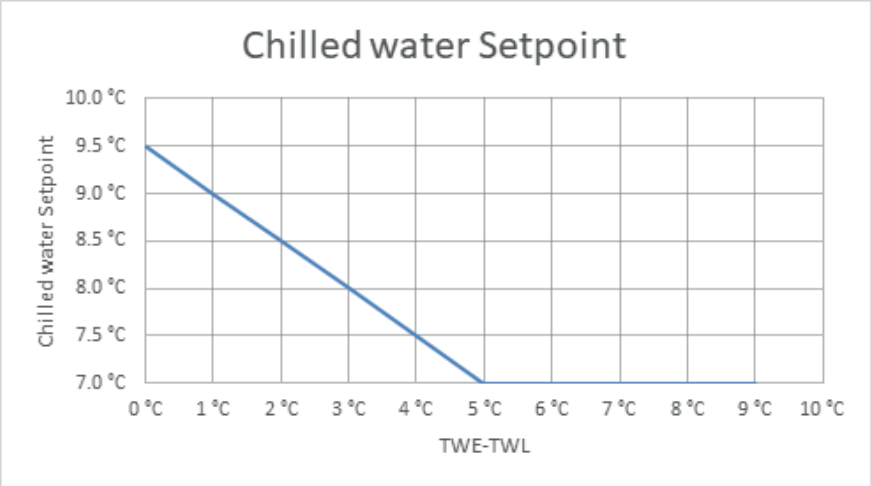
It is defined as CWR = RESET RATIO * (START RESET – (TWE –TWL))

With limits:

CWR ≥ 0

CWR ≤ Maximum Reset

Example of chilled water setpoint reset applied to 7°C chilled water setpoint, with RESET RATIO = 50%, Maximum Reset = 5K START RESET = 5°C



Constant Return Water Temperature Reset

CWR = 100% * (Design Delta Temperature – (TWE –TWL))

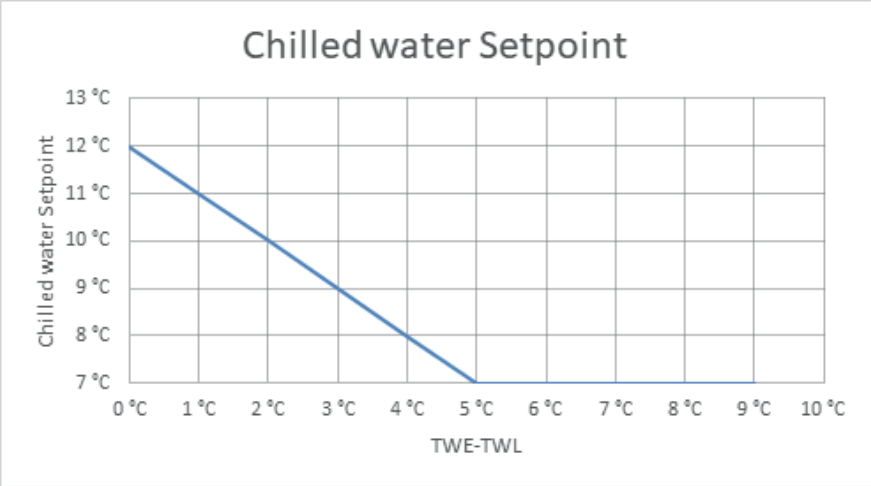
With limits:

CWR ≥ 0

CWR ≤ Design Delta Temperature

Example of chilled water setpoint reset applied to 7°C chilled water setpoint, with Design Delta T = 5K

Low Voltage Wiring



Diagnostic

If any sensor measurement needed to perform the currently selected chilled water reset type is invalid due to loss of communication or sensor failure, the desired CWR will be set to 0. The actual CWR is subject to maximum rate limits described earlier.

Web User Interface and Time / Day scheduling

Web User Interface is accessible either through the USB port of the Symbio800 and a web browser connected to http:// 198.80.18.1.

The Symbio800 Web User Interface is helpful to look at logs, active points and various module configuration (protected by multi level password restricted access).

Time/Day scheduling

Symbio800 includes a time / day scheduling features that is helpful if a unit setpoints or operation need to be adapted with the date and time of the day. It is typically used when unit is not controlled by a Building Automation System.

The function is configured through the Web UI Menu “Schedules” when unit is not controlled by a building management system.

Schedules can modify any Analog, Multistate or Binary values available on the unit data point table.

Up to 3 schedules can be created per unit. Schedules integrate exceptions days and yearly calendar features. Please refer to the only help integrated inside the Web User Interface for more details.

Smart Communication Protocol

LonTalk™ Interface (U60)

Symbio800 provides an optional LonTalk™ Protocol interface between the chiller and a Building Automation System (BAS). An U60 module shall be used to provide Lon functionality between a LonTalk compatible network and the Chiller. The inputs/ outputs include both mandatory and optional network variables as established by the LonMark Functional Chiller Profile 8040. See integration guide for detailed information.

BACnet Interfaces

Symbio800 integrates build-in communication interfaces for Bacnet MS/TP and Bacnet IP.

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

BACnet Testing Laboratory (BTL) Certification

All Symbio800 controllers are designed to support BACnet Smart Com Protocol. In addition, some particular revisions of the Symbio800 firmware have been tested and have achieved BTL certification by an official BACnet testing laboratory.

For more details, refer to the BTL website at www.bacnetassociation.org.

ModBus Interfaces

Symbio800 integrates build-in communication interfaces for Modbus RTU and Modbus TCP.

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

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

The Web UI is a good way to get all active Modbus points linked with the unit configuration. A Modbus registers detailed list is present in the BAS point list document.

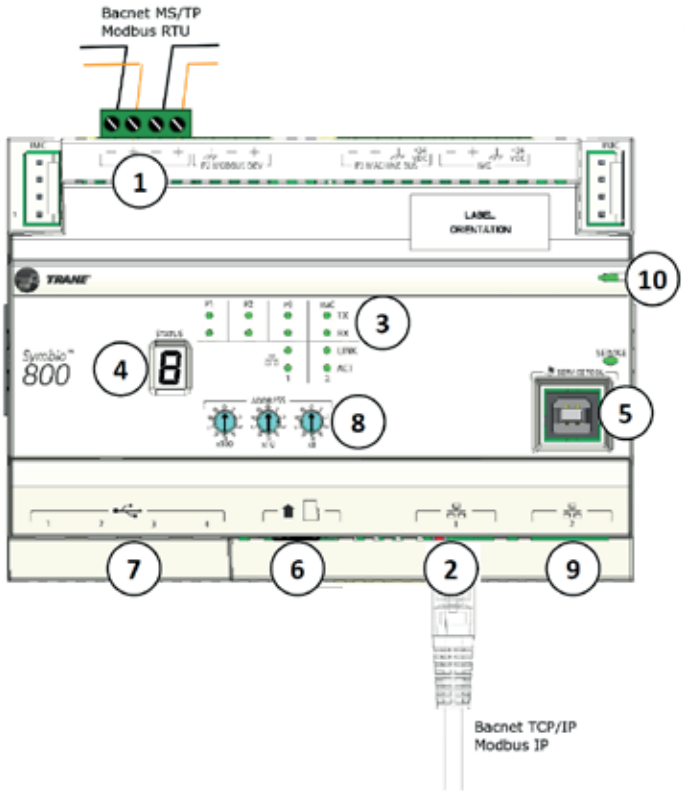
LED, Wiring and Port Descriptions

Figure 1 illustrates the Symbio800 controller ports, LEDs, rotary switches, and wiring terminals.

1. Bacnet MS/TP or Modbus RTU connection is done on terminal P1.
2. Bacnet IP or Modbus TCP connection is done on Ethernet port 1.
3. Link LED indicating Transmission (TX) and Reception (RX) communication signals of different communication ports.
4. Status LED 7 segment display indicating system operation status.
5. USB device type B connection for the service tool (Tracer TU).
6. Micro SD card used for backup purpose and recovery in case of module damage.
7. Four USB ports used for various interface connection (Wifi network, Lon communication interface, Service flash memory stick).
8. Three rotary switches used to define a three-digit address when the Symbio800 is installed in a BACnet or MODBUS system (e.g., 107, 127, etc.). Valid addresses are 001 to 127 for BACnet and 001 to 247 for MODBUS.
9. Ethernet port 2 is dedicated to TD7 Front panel display communication.
10. Main system LED : if green solid, the Symbio800 is powered and no problem exist. If the LED is red solid or red blinking, the Symbio800 is powered, but there are problems present Alarm.

Other terminals (P2, P3, IMC) are used for internal unit communication purpose.

Figure 1 – Wiring locations and connection ports of Symbio800 controller



Status LED message

The seven segment status LED indicate operation of the Symbio800 module.

In normal condition, the status LED is a rolling sequence of the three horizontal segments.

Other message described by status LED are failure codes (Fxxx) and Update code (Uxxx).

In case of failure, please call your local Trane Service representative.

NOTICE:

Electrical Noise!

Maintain at least 15 cm between low-voltage (<30V) and high voltage circuits. Failure to do so could result in electrical noise that could distort the signals carried by the low-voltage wiring, including IPC.

Tracer TD7 Operator Interface

D7 is the unit operator interface for Symbio800 controller. It contains all information and functions needed to operators, service technicians, and owners.

From TD7 main screen, it is possible to navigate to all useful control screens:

1 – Alarms: show active and history log of warning and alarms. It allows alarm local reset to restart chiller after the origin of alarm is solved.

2 – Reports: display status of main section of the chillers; three custom report can be created by user to display a set of specific data for efficient custom data monitoring.

3 – Data Graphs: TD7 store data graph in its memory and a set a predefined graph is done. For specific user purpose, custom graph can be created to monitoring trend of user defined data set. Graphs time scale, style can also be customized.

4 – Settings: include technicians and user settings. A password can be set to protect settings for modification.

5 – Fast changing language: allow you to choose the display text between 26 languages.

6 – Fast changing screen brightness: pressing this button will toggle screen backlight over 3 level of brightness.

7 – Shortcut to main component report: display predefined report for main components of the unit.

8 – Backward button: move display from current to the previous screen.

9 – Home button: move from any screen back to home screen.

10 – Status button: display current unit: circuit mode and submodes.

11 – General data overview: click on each data to enter in attached predefined.

12 – About: display Symbio800 and TD7 software information.

13 – Time/date: allow you to adjust settings of time and date.

14 – Shortcut to Custom Report 1.

Figure 2 – TD7 operator interface report

Warnings and Alarms

TD7 alarms section displays active alarms as well as alarms history.

The ‘Target’ field is indicating the area of action of the related alarm:

- Compressor XY target impact a specific compressor and did not impact the other compressors present on the unit.
- Circuit X target impact the complete circuit and did not impact the other circuit.
- Chiller target impact the complete unit.

The ‘Severity’ field indicate the impact linked to the related alarm:

- Warning is not stopping chiller operation, but indicate a non critical event occurrence. It shall indicate to engage a service operation to the chiller.
- Normal Shutdown will stop unit following the standard shutdown sequence and related minimum run times and shutdown timers.
- Immediate shutdown will stop immediately the unit. It is attached to critical alarms.

The ‘Date and time’ field indicate Symbio800 date/time when the diagnostic has occurred.

Refer to the Product diagnostic document to get the list with detailed description of all alarms possible on the unit.

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CNT-SVU006A-GB September 2020
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