Installation Instructions

Symbio™ 500 Pre-programmed for RTU or Heat Pumps

Order Number: BMSY500ABA0100011

The Symbio™ 500 controller is a pre-programmed field-installed device that provides direct digital zone temperature control. It can operate as a stand-alone device or as part of a building automation system (BAS) and control:

- 0/1/2-heat plus 0/1/2-cool rooftop unit.
- heat pump; 0/1/2 compressor plus auxiliary heat (optional).

Visually inspect contents for obvious defects or damage. All components have been thoroughly inspected before leaving the factory. Any claims for damage incurred during shipment should be filed immediately with the carrier.

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⚠ SAFETY WARNING

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

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Warnings, Cautions, and Notices

Read this manual thoroughly before operating or servicing this unit. Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING — Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

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

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

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

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⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

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⚠ WARNING

Follow EHS Policies!

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

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

Storage/Operating Specifications

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Relative Humidity:	Between 5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	Between 5% to 95% (non-condensing)
Power:	20.4 to 27.6 Vac (24 Vac, ±15% nominal) 50 to 60 Hz, 24 VA For specifics on transformer sizing, see BAS-SVX090*-EN.
Mounting Weight of Controller:	Mounting surface must support 0.80lb. (0.364 kg)
Environmental Rating (Enclosure):	NEMA 1
Plenum Rating	Not plenum rated

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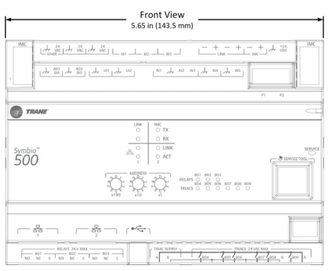
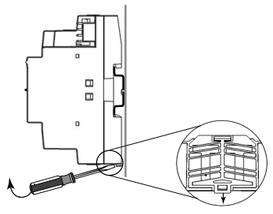
Dimensions/Mounting/Removing Symbio 500



To mount device:

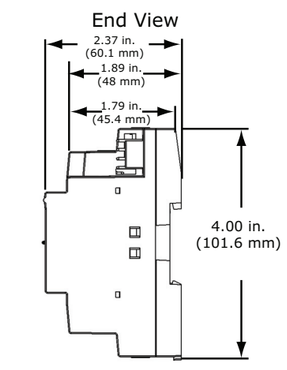
1. Hook device over top of DIN rail.
2. Gently push on lower half of device in the direction of arrow until the release clip clicks into place.



To remove/reposition device:

1. Disconnect all connectors before removing or repositioning.
2. Insert screwdriver into slotted release clip and gently pry upward with the screwdriver to disengage the clip.
3. While holding tension on the clip, lift device upward to remove or reposition.
4. If repositioned, push on the device until the release clip clicks back into place to secure the device on the DIN rail.

Slotted release clip shown from back side



NOTICE

Enclosure Damage!

Failure to follow instructions below could result in damage to the plastic enclosure. Do not use excessive force to install the controller on the DIN rail. If using another manufacturer's DIN rail, follow their recommended installation.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

⚠ WARNING

Proper Ground Connection Required!

Failure to follow instructions below could result in death or serious injury.
After installation, ensure that the 24 Vac transformer is grounded through the controller. Measure the voltage between chassis ground and any ground terminal on the controller. Expected result: Vac <4.0 volt.

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Communication Link Wiring

The Symbio™ 500 controller communicates with the building automation system (BAS) and with other controller over a BACnet® MS/TP, BACnet/IP, or Air-Fi Wireless communication link.

Important: *BACnet MS/TP link wiring must be field-supplied and installed in compliance with NEC and local codes.*

For instructions on BACnet MS/TP communication wiring, refer to the Unit Controller Wiring For the Tracer® SC+ System Controller Wiring Guide (BAS-SVN03*-EN).

A/C Power Wiring

Prior to connecting AC power to the controller:

- All wiring must comply with National Electrical Code™ (NEC) and local codes.
- The recommended wire for AC power is 16 AWG copper wire, minimum.
- Refer to "Transformer Recommendations".

NOTICE

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Wiring Requirements

To ensure proper operation of the Symbio™ 500, install the power supply circuit in accordance with the following guidelines:

- The Symbio 500 must receive AC power from a dedicated power circuit; failure to comply may cause the controller to malfunction.
- A dedicated power circuit disconnect switch must be near the controller, easily accessible by the operator, and marked as the disconnecting device for the controller.
- **DO NOT** run AC power wires in the same wire bundle with input/output wires; failure to comply may cause the controller to malfunction due to electrical noise.

18 AWG copper wire is recommended for the circuit between the transformer and the Symbio 500.

Transformer Recommendations

The Symbio™ 500 can be powered with 24 Vac. Use of a 24 Vac power supply is recommended in order to use the spare 24 Vac outputs for powering relays and TRIACs.

- AC transformer requirements: UL listed, Class 2 power transformer, 24 Vac ±15%, device max load 24 VA, BCI application 6 VA. The transformer must be sized to provide adequate power to the Symbio 500 controller (12 VA) and outputs (maximum 12 VA per binary output).
- CE-compliant installations: The transformer must be CE marked and SELV compliant per IEC standards.

NOTICE

Equipment Damage!

Sharing 24 Vac power between controllers could result in equipment damage.

A separate transformer is recommended for each Symbio 500. The line input to the transformer must be equipped with a circuit breaker sized to handle the maximum transformer line current. If a single transformer is shared by multiple Symbio 500s:

- The transformer must have sufficient capacity.
- Polarity must be maintained for every Symbio 500 powered by the transformer.

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Important: *If a technician inadvertently reverses polarity between controllers powered by the same transformer, a difference of 24 Vac will occur between the grounds of each controller. The following symptoms could result:*

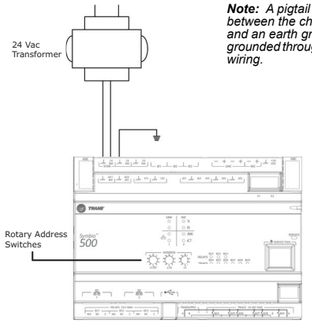
- *Partial or full loss of communication on the entire BACnet® MS/TP link.*
- *Improper function of* Symbio 500 *outputs.*
- *Damage to the transformer or a blown transformer fuse.*

Wiring AC Power

1. Connect both secondary wires from the 24 Vac transformer to the XFMR terminals on the device.
2. Ensure the device is properly grounded.

Important: *This device must be grounded for proper operation! The factory-supplied ground wire must be connected from any chassis ground connection on the device to an appropriate earth ground (⏚). The chassis ground connection used may be the 24 Vac transformer input at the device, or any other chassis ground connection on the device.*

Note: *The device is not grounded through the DIN rail connection.*



Note: *A pigtail connection should be used between the chassis ground on the device and an earth ground, if the device is not grounded through one leg of the transformer wiring.*

Start-up and Power Check

1. Verify that the 24 Vac connector and the chassis ground are properly wired.
2. Each device must have a unique and valid address. The address is set either by using the rotary address switches or, for Tracer® SC applications, by using the Software Set Device ID function in the Tracer® TU service tool. Valid addresses are **001** through **127** for Tracer® SC applications.

Important: *A duplicate address or a **000** address will cause communication problems in a BACnet® link: The Tracer® SC will not discover all devices on the link and the installation process will fail after discovery.*

3. Remove the lockout/tagout from the line voltage power to the electrical cabinet.
4. Apply power to the Symbio 500 and observe the power check sequence that follows: The power LED lights red for 1 second. Then it changes to green, indicating that the unit is properly booted and ready for application code. Flashing red indicates that a fault conditions exists.

Input/Output Wiring

NOTICE

Equipment Damage!

Failure to follow instructions below could result in damage to the controller, power transformer, or input/output devices due to inadvertent connections to power circuits. Remove power to the Symbio™ 500 controller before making input/output connections.

Pre-power checks of input/output devices should be performed according to the Symbio 500 IOM (BAS-SVX090*-EN). Maximum wire lengths are as follows:

Maximum Wire Lengths

Pre-power checks of input/output devices should be performed according to the Symbio 500 IOM (BAS-SVX090*-EN). Maximum wire lengths below.

Type	Inputs	Outputs
Binary	1,000 ft (300 m)	1,000 ft (300 m)
0 to 20 mA	1,000 ft (300 m)	1,000 ft (300 m)
0 to 10 Vdc	300 ft (100 m)	300 ft (100 m)
Thermistor/Resistive	300 ft (100 m)	Not Applicable

Notes:

1. All wiring must be in accordance with the NEC and local codes.
2. Use only 18 to 22 AWG (1.02 mm to 0.65 mm diameter), stranded, tinned-copper, shielded, twisted-pair wire.
3. Analog and 24 Vdc output wiring distances are dependent on the receiving unit specifications.
4. **DO NOT** run input/output wires or communication wires in the same wire bundle with AC power wires.

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Tug Test for Terminal Connectors

If using terminal connectors for wiring the Symbio™ 500, strip the wires to expose 0.28 in (7 mm) of bare wire. Insert each wire into a terminal connector and tighten the terminal screws. A tug test is recommended after tightening terminal screws to ensure that all wires are secure.

Setting Up the Controller

Use any of the tools below to properly configure the controller for the specific application. Choose either the hardwired USB connection or a temporary Wi-Fi connection via the Trane Wi-Fi Module.

Tool	Type	Tool or Browser Address
Tracer® TU	USB Cable	Tracer® TU
Symbio User Interface (UI)	USB Cable	http://198.80.18.1
	Wi-Fi	http://198.80.18.65
	Log In > Points > Binary Points	
Symbio TD7 Graphics	USB Cable	http://198.80.18.1/UI_Medium/index.html
	Wi-Fi	http://198.80.18.65/UI_Medium/index.html
	Reports > Unit Configuration	

Wi-Fi Network Name: **Symbio WiFi BB222150654** (number will vary)

Wi-Fi Password: **tracerwifi**

Confirm the unit configuration. Refer to the following settings:

Table 1. Unit configuration

Label	Functions	Selections (Default in Bold)
BV306	Configuration: Heat Pump Selection	**Non-Heat Pump,** Heat Pump
BV307	Configuration: SCC/DAC Selection	**Space Comfort (Room) Control,** Discharge Air Control
BV308	Configuration: SCC Supply Fan Mode	**Constant Speed,** Variable Speed
BV309	Configuration: Supply Fan Status	**Not Installed**, Installed
BV310	Configuration: Heat Cool Disable Input	**Not Installed**, Installed

Input/Output Information

Table 2. Analog inputs

Label	Functions	Detail
AI1	Space Temperature Local	10 kΩ @ 77°F (25°C) Thermistor
AI3	Return Air Temperature Local	
AI4	Discharge Air Temperature	
AI5	Outdoor Air Temperature Local	
AI2	Space Temperature Setpoint Local	1 kΩ potentiometer

Table 3. Universal inputs

Label	Functions	Detail
UI1	Outdoor Air Damper Position Feedback	2 to 10 Vdc
UI2	Space CO_2 Concentration Local	4 to 20 mA

Table 4. Binary inputs

Label	Functions	Detail
BI1	Mechanical Heat/Cool Disable Input	Open = Disable, Closed = Normal
BI2	Occupancy Input	Open = Occupied, Closed = Unoccupied
BI3	Supply Fan Status	Open = Off, Closed = On

Table 5. Analog outputs

Label	Functions	Detail
A01	Supply Fan Speed Command	0-10 VDC
A02	Outdoor Air Damper Command	2-10 VDC

Table 6. Binary outputs

Label	Functions	T-stat	Detail
BO1	Supply Fan Start Stop Command	G	Binary output ratings BO1 to BO3 Relay: 0.5A @ 24Vac pilot duty BO4 to BO9 Triac: 0.5A @ 24Vac resistive and pilot duty
BO2	Not Used	--	
BO3	Ventilation Relay	--	
BO4	Compressor 1 Command	Y1	
BO5	Compressor 2 Command	Y2	
BO6	Heat Stage W1 Command	W1	
BO7	Heat Stage W2 Command	W2	
BO8	Reversing Valve Command	O	Off = Heating, On = Cooling
BO9	Auxiliary Heat Command	X	

Refer to Application Guide (BAS-APG050*-EN) and IOM (BAS-SVX090*-EN) for additional information.

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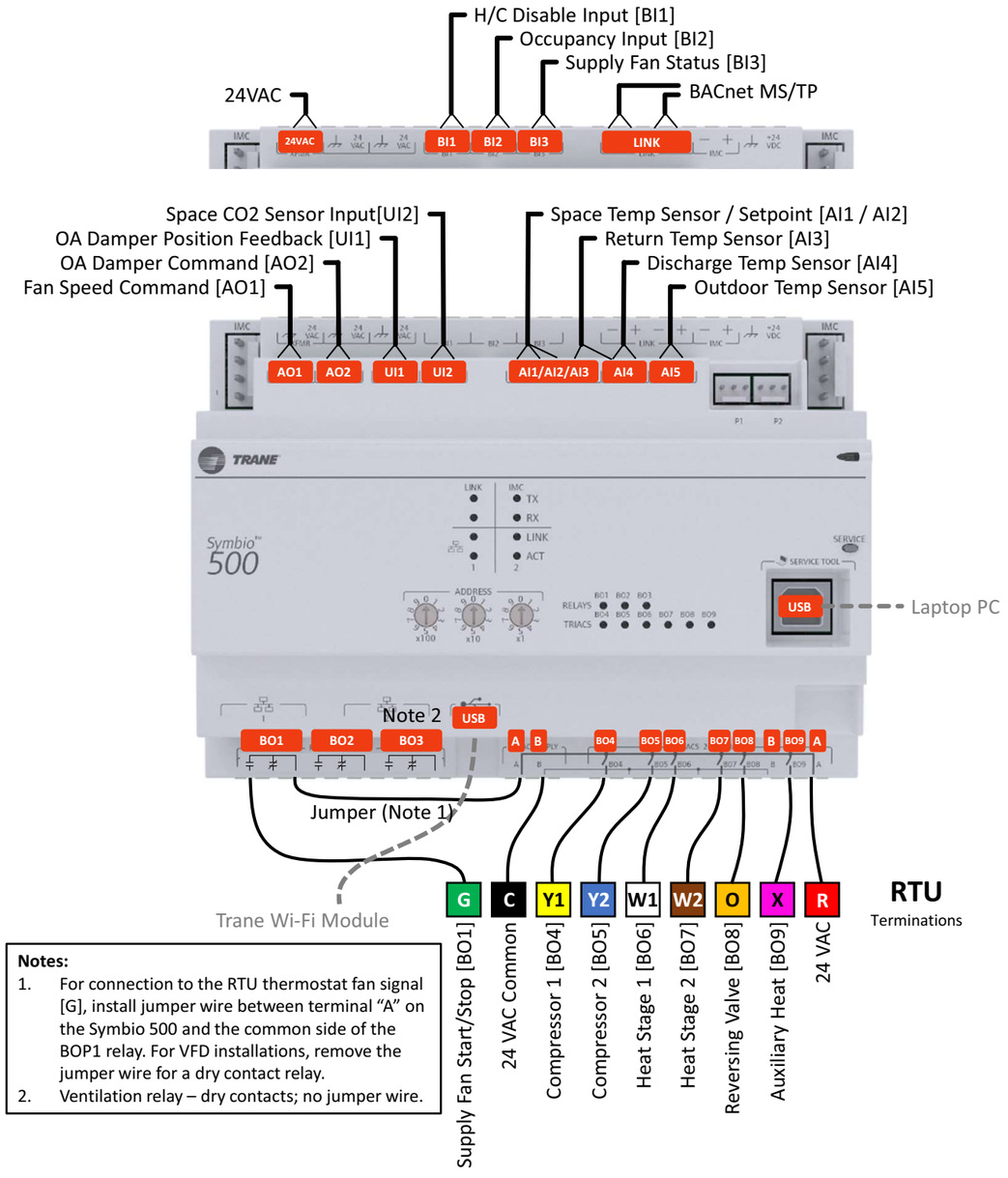

Notes:

1. For connection to the RTU thermostat fan signal [G], install jumper wire between terminal "A" on the Symbio 500 and the common side of the BOP1 relay. For VFD installations, remove the jumper wire for a dry contact relay.
2. Ventilation relay – dry contacts; no jumper wire.

Agency Listings and Compliance

The European Union (EU) Declaration of Conformity is available from your local Trane® office.

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(NEW)