Installation Instructions

Tracer® UC600 Programmable Controller

Order Number: BMUC600AAA0100011, BMUC600USA0100011,BMUC600CCA0100011 (Part number: X13651548)

X39641178-01

⚠ 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.

⚠ AVERTISSEMENT DE SÉCURITÉ

Seul le personnel qualifié doit installer et procéder à l'entretien des équipements. L'installation, le démarrage et la réparation des équipements de chauffage, de ventilation et de climatisation peuvent être dangereux et nécessitent une formation et des connaissances spécifiques. Un équipement mal installé, réglé ou modifié par un individu non qualifié peut entrainer des blessures graves, voire mortelles. Lors de toute intervention sur l'équipement, respectez toutes les précautions figurant dans la documentation et sur les étiquettes et autocollants fixés à l'équipement.

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Warnings, Cautions, and Notices

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

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

The Tracer UC600 controller is a multi-purpose, programmable, wireless-compatible device. This field-installed device is designed to control the following types of equipment:

- Air-handling units (AHUs)
- Central heating and cooling plants
- Generic input/output (I/O) control

Required Tools for Mounting and Wiring

A 1/8 in. (3 mm), flat-bladed screwdriver is required to perform functions such as setting rotary addressing switches, tightening or loosening screw terminals, and removing or repositioning the controller on DIN rail.

Packaged Contents

- One (1) Tracer UC600 programmable controller
- One (1) package of terminal connectors
- One (1) ground wire
- One (1) ground screw

Important: *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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Storage and Operating Environment Specifications

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Relative humidity:	5% to 95% (noncondensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	Between 5% to 95% (noncondensing)
Power:	20.4–27.6 Vac (24 Vac, ±15% nominal) 50 or 60 Hz, 26 VA (26 VA plus a maximum of 12 VA for each binary output) 24 Vdc, ±10%, device max load 600 mA
Mounting weight of controller:	Mounting surface must support 1.3 lb. (0.6 kg)
Environmental rating (enclosure):	NEMA 1
Installation:	UL 840:Category 3
Pollution:	UL 840:Degree 2

Agency Compliance

- UL916 PAZX, Open Energy Management Equipment
- UL94-5V, Flammability
- CE Marked
- FCC Part 15, Subpart B, Class B Limit

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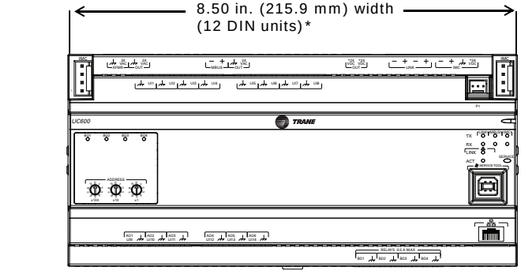
Dimensions



* DIN Standard 43 880 Built-in Equipment for Electrical Installations, Overall Dimensions and Related Mounting Dimensions.
One DIN unit = 18 mm.

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Mounting and Removing the UC600 Controller

The Tracer UC600 controller should be properly mounted on a DIN rail. Control cabinets that include DIN rails are available from Trane.

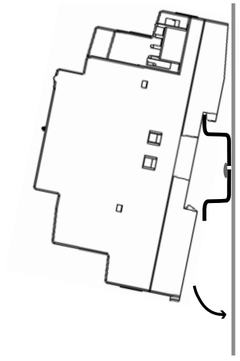
If using a DIN rail from another manufacturer, follow the recommended installation procedures that accompany it.

Important: *When mounting the controller in a control cabinet, provide adequate spacing between modules to allow for ventilation and heat dissipation.*

NOTICE:

Avoid Equipment Damage!
Do not use excessive force to install device on to the DIN rail. Excessive force could result in damage to the plastic enclosure.

Figure 1. Mounting the controller



To mount the controller:

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

To remove or reposition the controller:

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 (figure 2).
3. While holding tension on the clip, lift device upward to remove or to reposition.
4. If repositioned, push on the device until the release clip clicks back into place to secure the device to DIN rail

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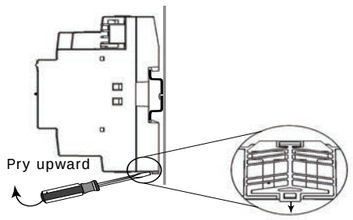
Figure 2. Removing the controller



Slotted release clip shown from back side

Powering the Controller

All wiring must comply with the National Electrical Code (NEC)™ and local electrical codes.

⚠ WARNING

Hazardous voltage!
Disconnect all electric power, including remote disconnects, before servicing. Follow proper lockout and/or tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in serious injury or death.

⚠ AVERTISSEMENT

Risque d'électrocution!
Avant toute intervention, couper toutes les alimentations électriques, y compris des sectionneurs déportés. Respecter les procédures de verrouillage et/ou d'étiquetage appropriées pour éviter tout risque de remise sous tension accidentelle. Le non-respect de cette recommandation peut entraîner des blessures graves voire la mort.

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⚠ CAUTION

Personal Injury and Equipment Damage!
After installation, make sure to check that the 24 Vac transformer is grounded through the module as illustrated in Figure 3 panel 8. Failure to check could result in personal injury and/or damage to equipment. Measure the voltage between chassis ground and any ground terminal on the module. Expected result: Vac ≤ 4.0 V.

⚠ ATTENTION

Dommages corporels et matériels!
Après l'installation, vérifier que le transformateur 24 V C.A. est mis à la terre via le module comme illustré par la figure 3 du panneau 8. Le non- respect de cette recommandation peut entraîner des blessures corporelles graves et/ou des dommages matériels. Mesurer la tension entre la masse du châssis et toute borne de masse sur le module. Résultat escompté: V C.A. ≤ 4,0 V.

Wiring Requirements

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

- The controller should 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 controller.

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Transformer Requirements

- AC transformer requirements: UL listed, Class 2 power transformer, 24 Vac ±10%, device max load 26 VA. The transformer must be sized to provide adequate power to the UC600 controller (26 VA) and outputs (maximum 12 VA per binary output).
- UC600 requires 26VA: 26VA is for UC600+ IO + two expansion modules (XM30 or XM32).
- DC power supply requirements: UL listed, Class 2 power transformer, 24 Vdc ±10%,device max load 600 mA.
- CE-compliant installations: The transformer must be CE marked and SELV compliant per IEC standards.

NOTICE:

Avoid Equipment Damage!
Sharing 24 Vac power between controllers could cause equipment damage.

A separate transformer is recommended for each controller. The line input to the transformer must be equipped with a circuit breaker sized to manage the maximum transformer line current.

If a single transformer is shared by multiple UC600 controllers:

- The transformer must have sufficient capacity.
- Polarity must be maintained for every UC600 controller powered by the transformer.

Important: *If polarity is inadvertently reversed between controllers that are 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 UC600 controller outputs*
- *Damage to the transformer or a blown transformer fuse*

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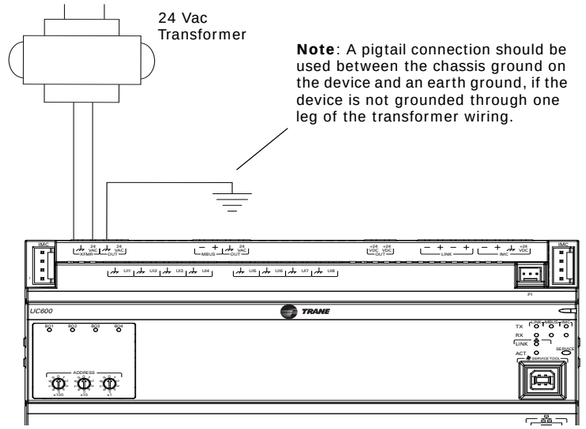
Wiring AC Power to the UC600

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.*

Figure 3. Wiring AC power to the transformer



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Controller Startup and Power Check

1. Verify that the 24 Vac connector and the chassis ground are properly wired.
2. Set a unique and valid address for each device.
3. The BACnet Device ID is set by combining the Tracer SC rotary switch address, link number and UC600 rotary switch address, or soft-set through Tracer TU. A unique MAC address is required and set by the rotary address switches of the UC600. Valid rotary switch settings are "001" through "127".

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

   Note: *The default baud rate is 76.8 kbs.*
4. Remove the lockout/tagout from the line voltage power to the electrical cabinet.
5. Apply power to the UC600.

When communication between devices occurs, the transmitting (TX) and receiving (RX) LEDs blink. The following table describes the UC600 LED activity and indicators.

Power LED	**Indicates...**
Solid Green	Normal operation.
Blinking Red	Alarm or fault is present.
Solid Red	Low voltage or malfunction.
Sequence on Powerup: Illuminates red, then flashes green, then solid green.	
Service LED	**Indicates...**
Solid Green	LED has been pressed and remains on until powered down.
Not illuminated	Normal operation.

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Input and Output Wiring

NOTICE:

Avoid Equipment Damage!
Remove power to the UC600 before making input or output connections. Failure to do so may cause damage to the controller, power transformer, or input/output devices due to inadvertent connections to the power circuits.

Maximum wire lengths are as follows:

Maximum Wire Lengths		
Type	**Inputs**	**Outputs**
Binary	1,000 ft (300 m)	1,000 ft (300 m)
0–20 mA	1,000 ft (300 m)	1,000 ft (300 m)
0–10 Vdc	300 ft (100 m)	300 ft (100 m)
Thermistor/Resistive	300 ft (100 m)	Not Applicable

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

Tug Test for Terminal Connectors

If using terminal connectors for wiring the controller, strip the wires to expose 1/4 in. (7 mm) of bare wire. Insert each wire into a terminal connector and tighten the terminal screw. A tug test is recommended after tightening terminal screws to ensure that all wires are secure.

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BACnet MS/TP Link Wiring

BACnet MS/TP link wiring must be field-supplied and installed in compliance with the NEC and local codes. In addition, the wire must be of the following type: low capacitance, 18 gauge, stranded, tinned copper, shielded, twisted pair. For more details on this topic, refer to the *BACnet MS/TP Wiring Best Practices Guide* (BAS-SVX051).

Important: *Polarity must be maintained between all devices on the link.*

BACnet/IP Wiring

Tracer UC600 firmware V5.0 and higher supports BACnet/IP on an Ethernet network. The device requires a Category 5E Ethernet cable with an R-45 plug connector.

⚠ CAUTION

Electrical Shock Hazard!
To observe safety precautions, do not mix Class 1 and Class 2 voltages in an enclosure or on a controller without an approved barrier between the wiring.

⚠ ATTENTION

Risque d'électrocution!
Ne pas mélanger les câblages de tension de classe 1 et de classe 2 dans un boîtier ou sur un régulateur sans une séparation homologuée entre les câblages.

Expansion Modules

If additional input or output points are needed, the XM30 and XM32 expansion modules are available. The UC600 controller will support up to 120 combined I/O points. See the *Tracer XM30 Installation Instructions* (X39641148) and the *Tracer XM32 Installation Instructions* (X39641174) for application and installation information.

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Input and Output Specifications and Wiring Examples

The following table provides specifications for input and output configuration.

Input/Output type	Quantity	Types	Range	Notes
Universal input	8	Thermistor	10kΩ – Type II, 10kΩ –Type III, 2252Ω – Type II, 20kΩ – Type IV, 100 kΩ	The UC600 is limited to ten 0-20mA current inputs/outputs when 2 expansion modules are powered using the UC600 supply, or seven 0-20mA inputs/outputs if using 2 expansion modules and a WCI.
		Resistive (setpoint)	100Ω – 1MΩ	
		RTD	Balco™ (Ni-Fe), 1kΩ; 385 (Pt), 1kΩ	
		Current	0–20 mA (linear)	
		Voltage	0–20 Vdc (linear)	
		Binary	Dry contact	
		Pulse Width Accumulator	Minimum 20 ms, opened or closed	Universal inputs require the following to meet the 25Hz requirement:duty cycle between 30% - 70% relay output - no load present when open.
Universal Input/Analog Output	Configure using any combination of analog or binary inputs/analog outputs			
Inputs	6	Thermistor	10kΩ – Type II, 10kΩ –Type III, 2252Ω – Type II, 20kΩ – Type IV, 100 kΩ	The UC600 is limited to ten 0-20mA current inputs/outputs when 2 expansion modules are powered using the UC600 supply, or seven 0-20mA inputs/outputs if using 2 expansion modules and a WCI.
		Resistive (setpoint)	100Ω –1MΩ	
		RTD	Balco™(Ni-Fe), 1kΩ; 385 (Pt), 1kΩ	
		Current	0–20 mA (linear)	
		Voltage	0–20 Vdc (linear)	
		Binary	Dry contact	
		Pulse Width Accumulator	Minimum 20 ms, opened or closed	Universal inputs require the following to meet the 25Hz requirement:duty cycle between 30% - 70% relay output - no load present when open.
Outputs		Current	0–20 mA @16 V	The UC600 is limited to ten 0-20mA current inputs/outputs when 2 expansion modules are powered using the UC600 supply, or seven 0-20mA inputs/outputs if using 2 expansion modules and a WCI.
		Voltage	0–10 Vdc @20 mA	
		Pulse	12.5ms to 1 second (12.5ms resolution), 1 second to 60 seconds (0.5 second resolution)	Limited to 0-10 Vdc by software.
Binary output	4	Relay (form A) wet	24 VAC, 0.5A maximum	Ranges are given per contact.
Pressure input	1	3-wire	0–5 in inwc.	Pressure input supplied with 5 Vdc. Designed for Kavlico™ pressure transducers.

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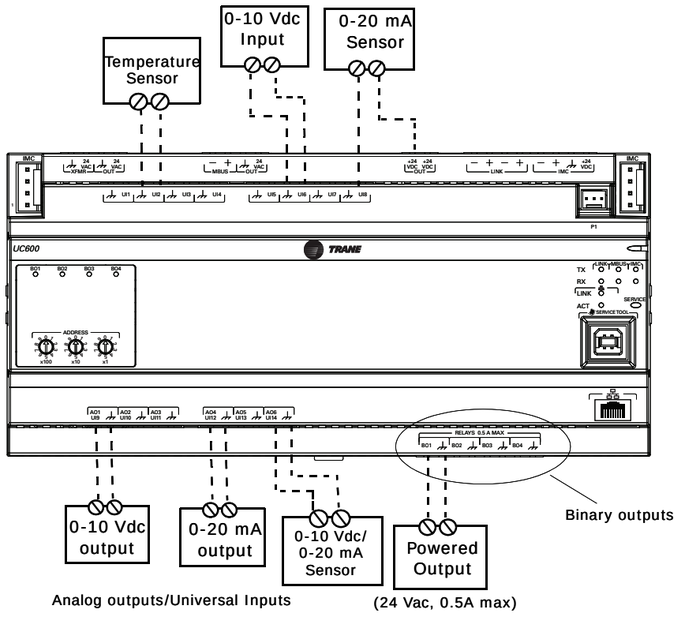
Input and Output Wiring Examples

Figure 4. UC600 input and output wiring examples



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Agency Listings and Compliance

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

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.com 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. We are committed to using environmentally conscious print practices.

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