Product Catalog

Tracer™ SC System Controller

For Tracer Building Automated Systems

January 2011

BAS-PRC031-EN

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Product Introduction

The Tracer™ SC system controller acts as the central coordinator for all individual equipment devices on a Tracer building automation system (see p. 14). The Web-based interface of the Tracer SC system controller provides an easy and convenient way for building operators to access their building automation system. Access is available from any personal computer that meets system requirements, even from remote locations.

The following list highlights the features and benefits of the Tracer SC system controller:

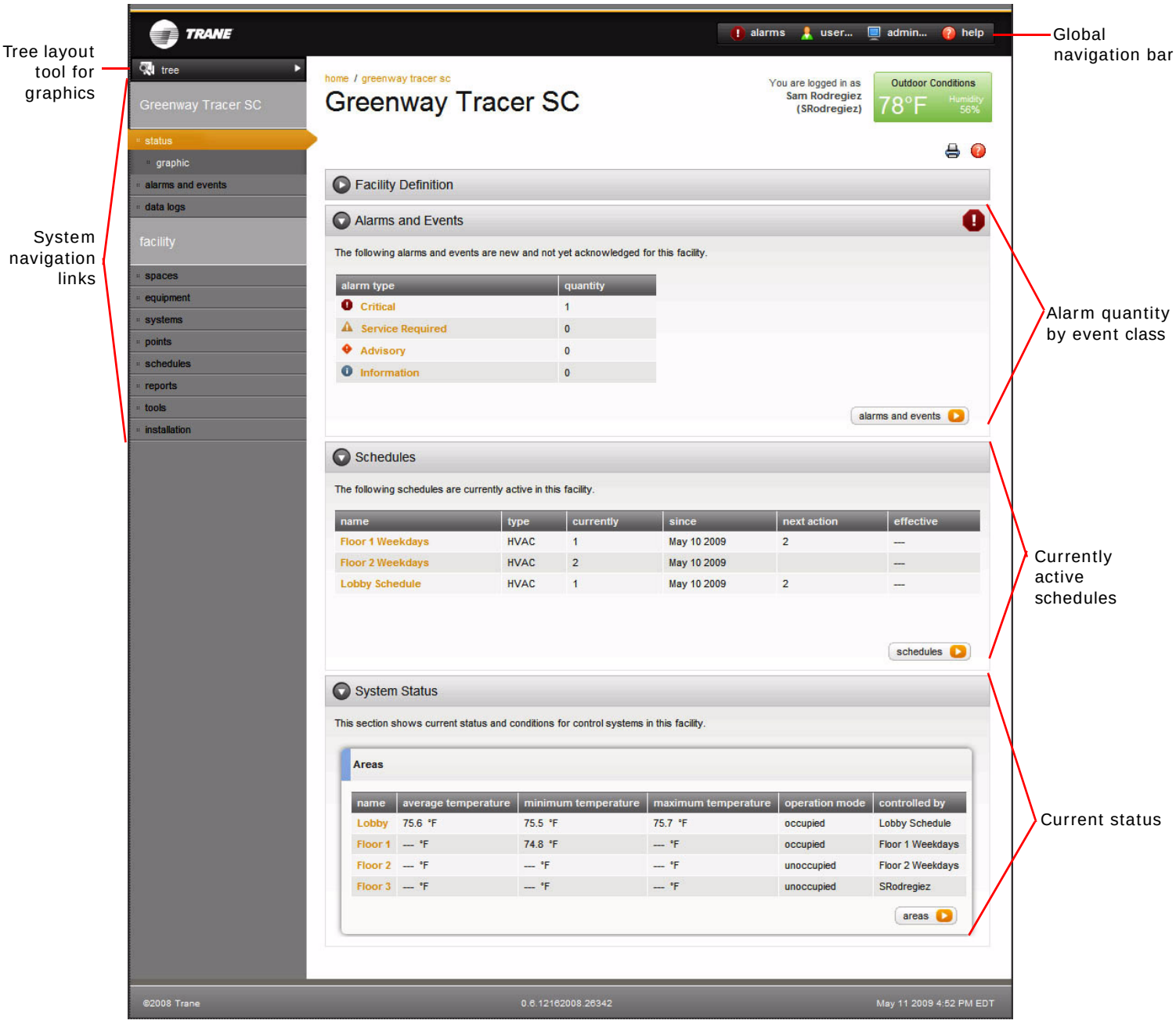
Features	Benefits
User interface: • Web-enabled • Simpler to navigate to status and setting screens • View the most frequently needed facility status information from one page • Automatic data collection on key unit and system parameters • Enhanced data logging capabilities • Easier to create complex graphics to better represent your HVAC system	Provides access to system data from any PC in any location. More users can access the HVAC system. Increased usability and improved performance.
Open, scalable, flexible controls: • Scalable system size to accommodate customers' specific needs (small steps can be taken to building up system size) • Protocol-independent communications (BACnet™, LonTalk™) • BACnet, LonTalk, or any combination on the same system	Accommodates future changes through flexible technology.
Achieve points toward Leadership in Energy and Environmental Design (LEED) certification through: • Site commissioning report • Energy data collection measurement • Optimizing energy performance • Maintaining indoor air quality	Lower operating costs through less energy use. Minimize impact on environment and infrastructure. Increase worker productivity through better air quality and reduced absenteeism.
Energy-saving programs: • Fan pressure optimization—Controls pressure in ductwork based on demand • Ventilation reset—Conditions only the required amount of outdoor air • Chiller Plant Control (CPC)—Manages chiller adds and subtracts to meet cooling loads	Make buildings run more efficiently.
Pre-programmed system applications: • Alarm and event log • Variable Air Systems (VAS) • Area • Chiller Plant Control • Scheduling • Overrides • Reporting • Data logging • Security	Provide consistent comfort and improved indoor air quality. Reduce/eliminate hot/cold complaints.
Faster installation and commissioning: • Device discovery • Preformatted object types • Preconfiguration of controller data	Gets your building up and running faster.

User Interface

The Tracer SC user interface provides an easy way for building operators to set up, operate, and modify a building automation system. The home page (Figure 1) contains system status information and links to navigate to all areas of the system.

The main features of the user interface are described in this section.

Figure 1. Tracer SC user interface: Home page



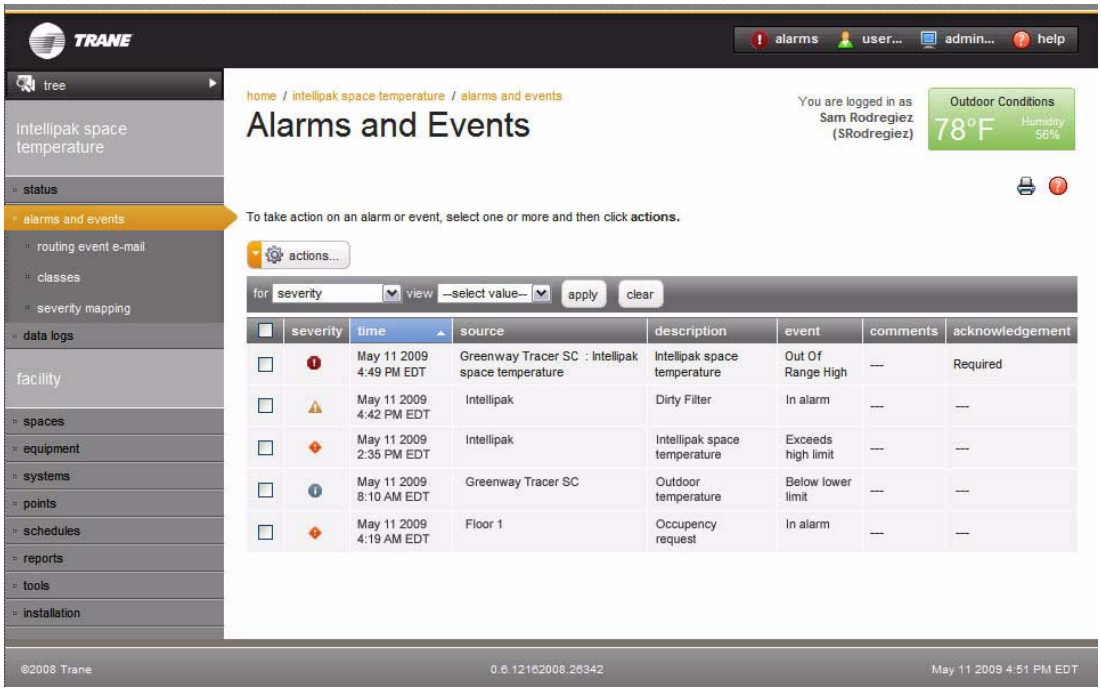
Alarms and Events

Events are occurrences that are detected by a Tracer building automation system. They can include diagnostics, critical operating conditions, as well as routine procedures.

An event that is triggered by the detection of an abnormal or critical operating condition is generally considering to be an alarm. If an alarm exists, an alarm icon flashes in the global navigation bar, which remains visible in the right corner of every page of the user interface (see Figure 2, for example).

When the system detects an event, data about the event appears in a log on the Alarms and Events page (Figure 2). The data displayed in the log includes when and where the event occurred and whether the operator is required to acknowledge it. An operator can also use the log to add comments about events. Column headings can be used to sort and filter events. They can also be removed or exported from the log.

Figure 2. Alarms and Events log



The Alarms and Events log has seven categories that can be used to sort and filter them. Sorting can be based, for example, on severity level. Filtering can be used to view only the alarms from a specific piece of equipment, for example, or those received at a specific time or from a specific alarm category.

Events can also be routed by e-mail to selected system operators. Event routing rules can be configured so that events respond to specific conditions when they occur.

Data Logs

Data logs, also referred to as trends, allow the user to produce a variety of data samples at defined intervals to show the historical and current status of the facility. Data logs record, in real-time, the value of a data point in the system and the time at which the value was recorded.

Data logs can be viewed in real-time, or at a later time in either graphical or tabular format. They can also be printed and saved. With the proper security access, system users can configure (create, delete, and update) and manage (clear, enable, and disable) data logs in the system. (See Figure 3 for an example of a data log.)

Figure 3. Data log example

Schedules

Scheduling is one of a facility's most important energy-saving strategies. Its use ensures that equipment runs only when needed. Schedules can be used to:

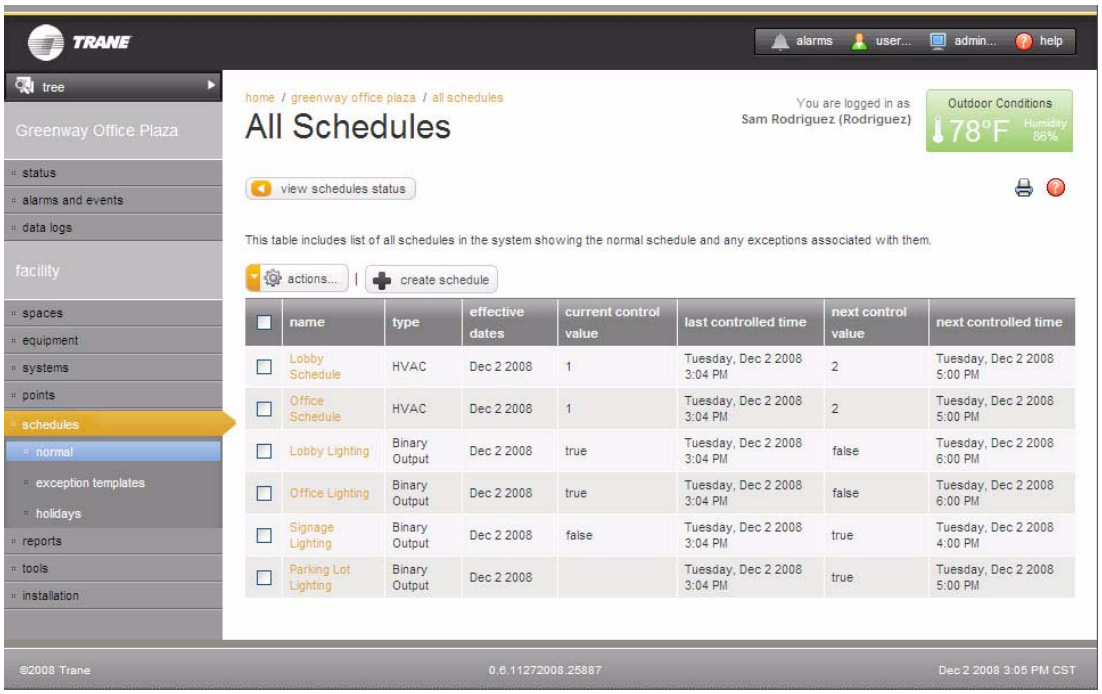
- Keep equipment running at minimal energy-use levels on weekends and holidays
- Create exceptions to the standard schedule
- Perform optimal start and stop of equipment to optimize energy use while maintaining comfort requirements
- Change setpoints at specific times of day

From the home page, you can select:

- All schedules, which shows all schedules in the system
- Active schedules, which shows just the active schedules in the system

Figure 4 shows an example of an All Schedules page.

Figure 4. The All Schedules page



Area

The Area application coordinates HVAC equipment for a specific area of the building. You can use the application to assign unit controllers, binary outputs, and binary values to be members of a common area. You can then efficiently perform a single operation (such as changing a setpoint, creating a schedule, performing an override) and apply it to all members of the area. In addition, the area application can use one of six algorithms, along with area temperatures and humidity inputs, to make an economizing decision. The application also supports optimal start/stop, humidity pulldown, night purge, unoccupied heating/cooling, unoccupied humidify, unoccupied dehumidify, and timed override functions.

Variable Air Systems

The Variable Air Systems (VAS) application coordinates air-handling units, variable-air-volume (VAV) boxes, and ventilation within a building. VAV units are assigned to the air-handling unit that supplies air to them. The VAS application coordinates the start-up and shut-down of the system to ensure proper static pressure control. Energy-saving applications, including static pressure optimization and ventilation optimization, are available as standard VAS application features.

Chilled Plant Control

The Chiller Plant Control application coordinates chillers and provides system chilled water control. It controls the leaving-water temperature by adding chillers as the building cooling load increases, calculates the chilled water setpoint for each chiller, and recovers from failures by starting the next chiller in the sequence immediately after a chiller is marked as failed.

CPC optimizes energy use by subtracting chillers when the requirements of the cooling load decreases. In addition, CPC matches chillers to the building load and equalizes runtime and wear on each chiller by using different rotation schemes.

Overrides

Overrides can be performed on equipment, areas, and points for either a designated amount of time or until the user decides to put the point back into automatic control.

Reports

Standard reports for Trane equipment are available from Tracer SC. These reports provide a valuable source of data that can be used for record-keeping and troubleshooting.

Report types include:

- Site reports
- VAS commissioning reports
- Points reports
- Chiller reports

Report features include:

- Scheduling reports to run during specific date periods and run frequencies
- Specifying file storage options for scheduled reports
- Exporting reports to save to your PC as csv, text, or pdf files
- Editing scheduled reports

Tracer Graphical Programming (TGP2)

Tracer Graphical Programming (TGP2) is a powerful graphical program that allows you to customize Tracer system applications. TGP2 routines are typically used for sequencing equipment, calculating setpoints and values, and performing shutdown sequences.

Note: *TGP2 is available through the Tracer™ TU service tool.*

Graphics and the Tracer Graphics Editor

The Tracer Graphics Editor, available through the Tracer TU service tool, is used to create, edit, and publish graphics for use on Tracer SC. Graphics on the Tracer SC are used to monitor and control building equipment and applications. They can display data related to climate, lighting, and other controllable operations. They can be used to change setpoints and to override equipment operation.

The Tracer Graphics Editor can be used to align graphical elements, determine which elements appear on top, and perform cut, copy, and paste functions.

You can include in graphics:

- Any data that is available in the system as a numerical or text value
- Analog values that can change colors if they deviate from a desired value
- Multiple graphic images in JPEG, GIF, and animated GIF formats
- Visual elements from the building, such as floor plans or exterior views from CAD drawings
- Digital photography in JPG and GIF formats
- Animated images to represent binary and analog values
- Target buttons that provide links to related sources
- User controls including push buttons, check boxes, drop-down list boxes, and entry fields

Graphics can be grouped in a logical way to make navigation through the building automation system simulate walking through the building. See Figure 5, Figure 6, and Figure 7 as examples.

Figure 5. Home page showing graphic of building exterior (Example 1)

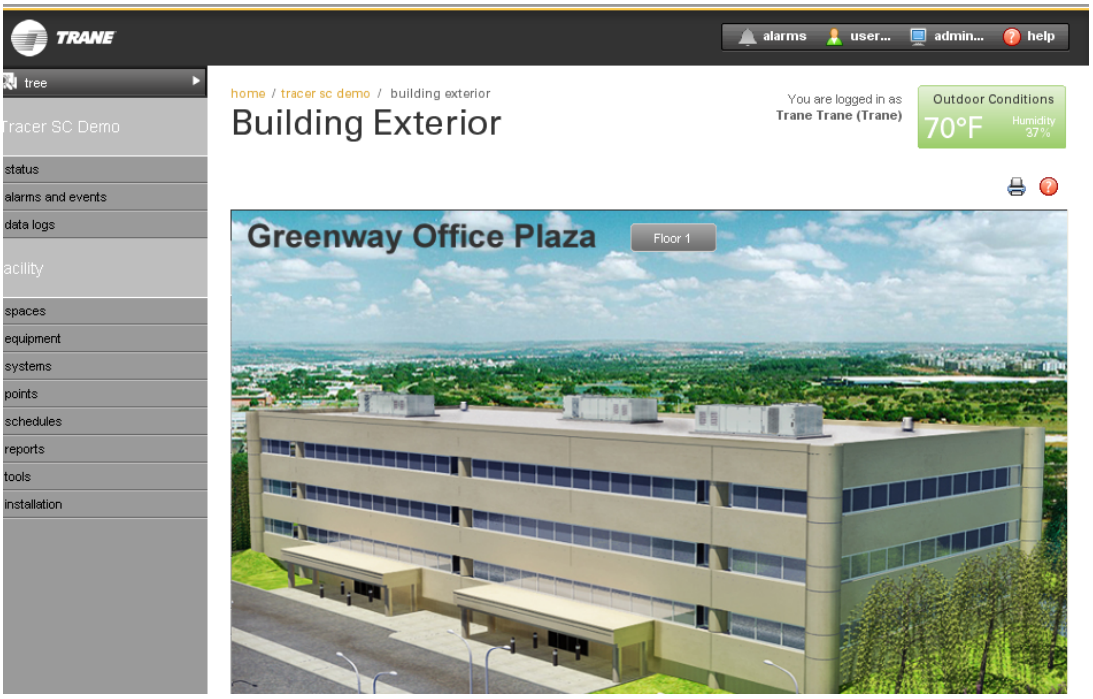


Figure 6. Home page with floor plan graphic (Example 2)

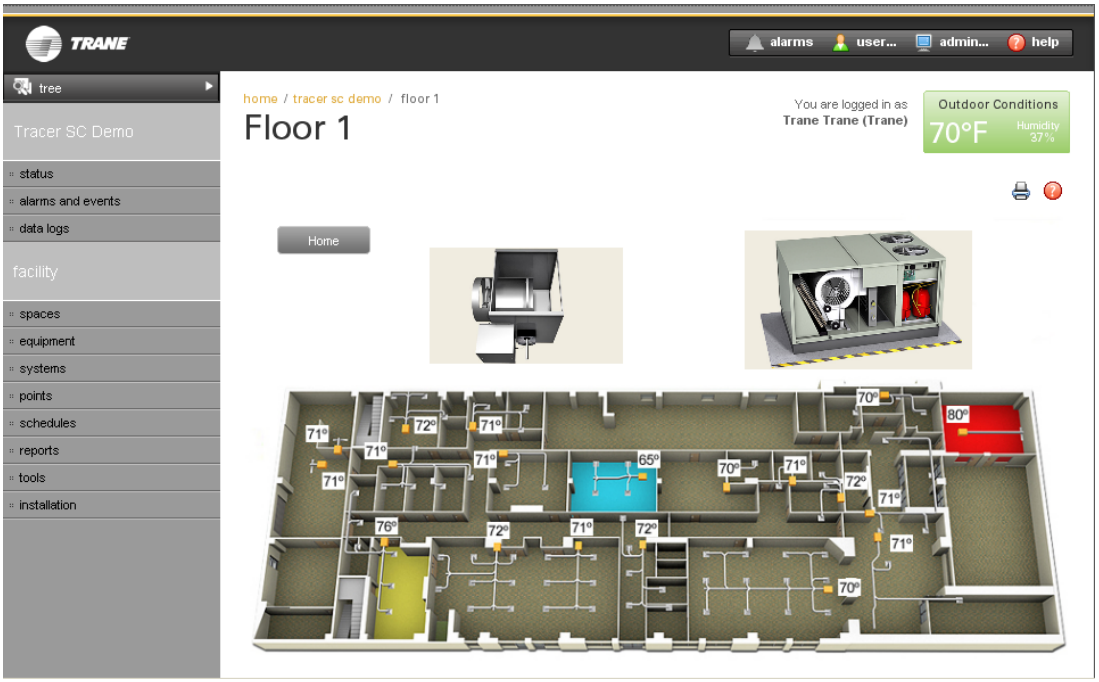
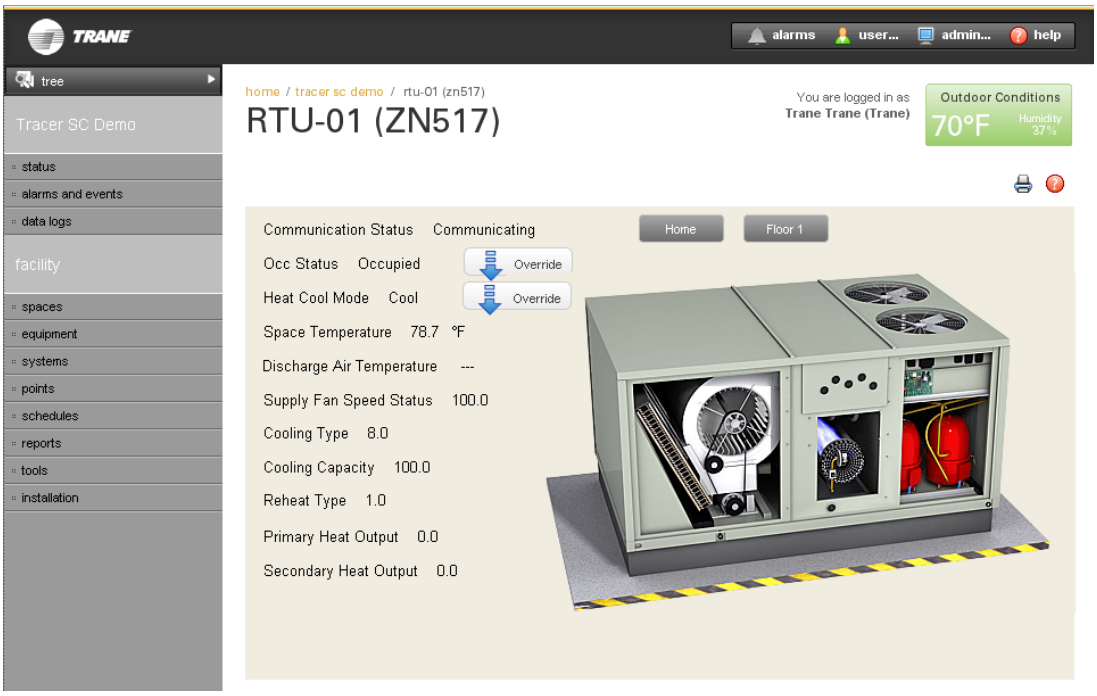


Figure 7. Equipment status graphic (Example 3)

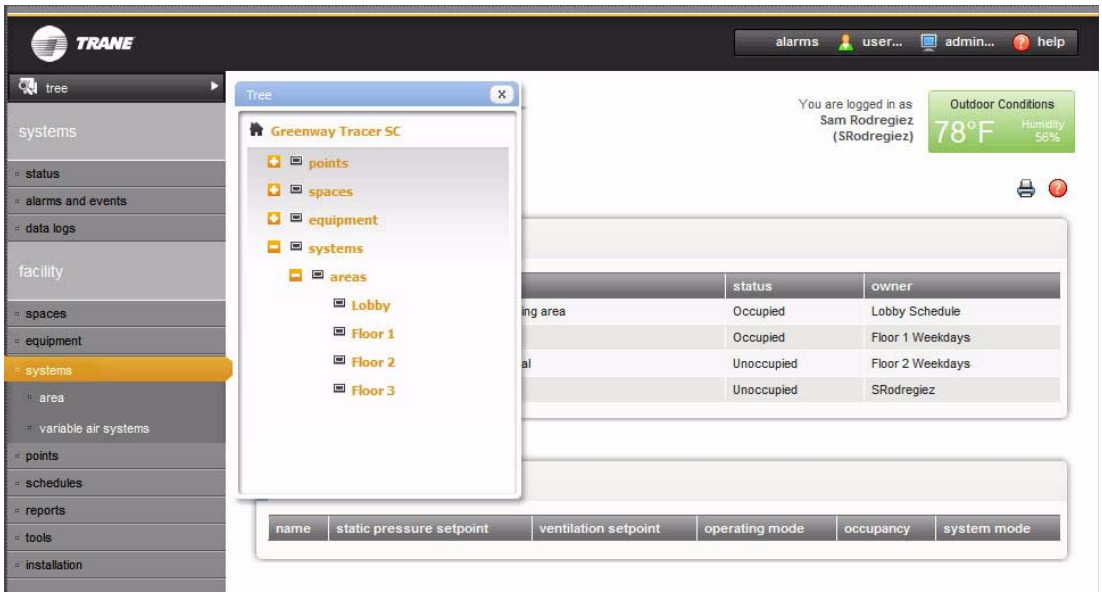


Tree Layout

The Tree Layout tool allows you to build a navigation tree in the user interface. A navigation tree provides an alternate way to navigate through the user interface. A navigation tree appears as a separate window on top of the page currently in view (see Figure 8).

The navigation tree consists of nodes, display text, and icons. You build the tree by choosing display text for nodes, arranging the nodes, and assigning associated graphics to them. The graphics represent equipment and areas of the facility.

Figure 8. Example of a navigation tree



Backup and Restore

Database changes made by other users are automatically reflected in the Tracer SC without the need for a central server. The system database can be archived or backed up for local or off-site storage of data if it is ever needed for restoring the system, in the event of a problem.

Troubleshooting

Tracer SC constantly evaluates all of the system parameters and reports abnormal conditions to the operator. Problems ranging from a communication failure caused by a broken wire to the failure of a sensor are automatically detected and reported to the Alarms and Events log (see p. 6).

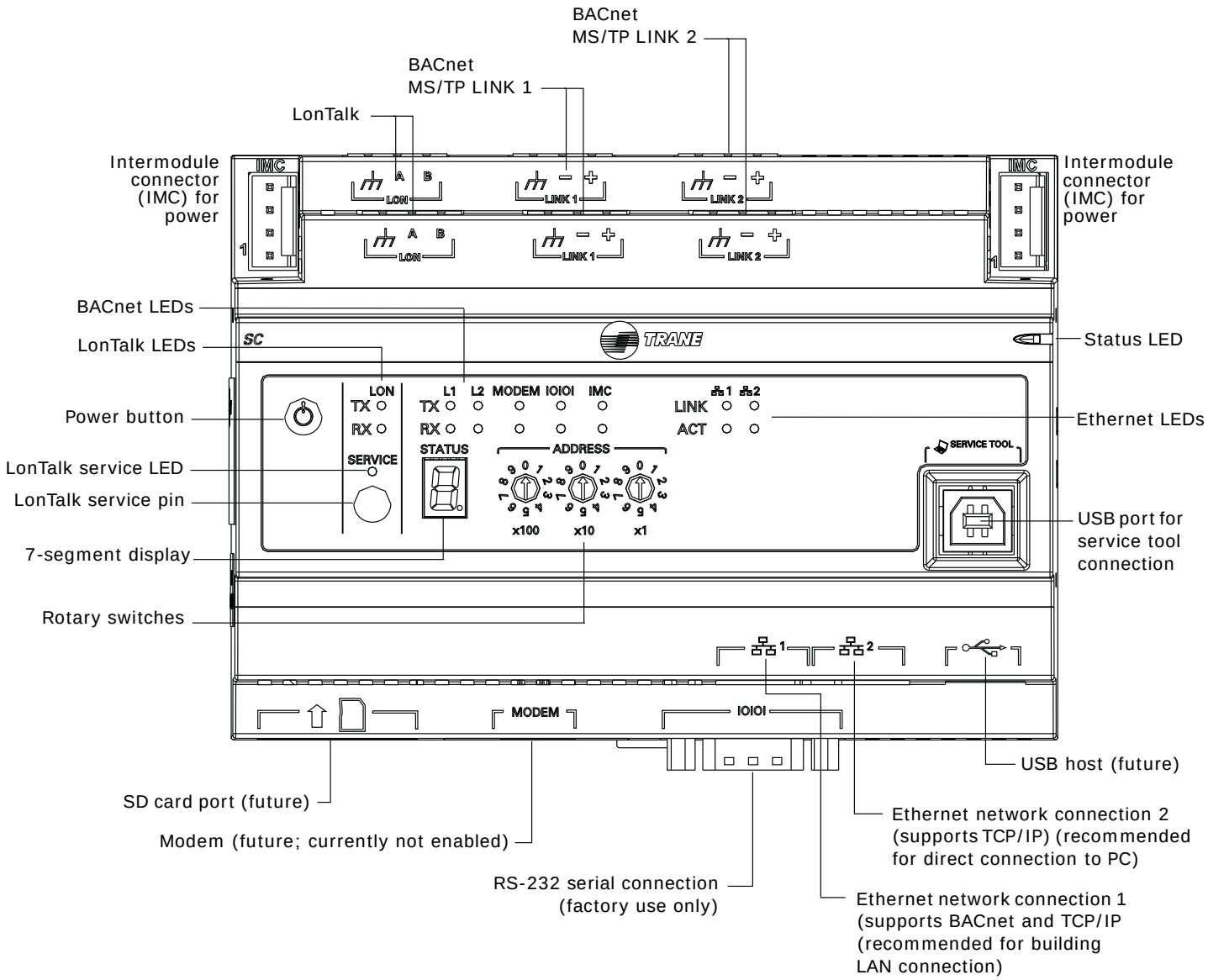
Security

A sophisticated password system protects a Tracer system from unauthorized access. Each operator is assigned a role. Roles are defined by access rights. Several pre-defined roles can be selected from the Tracer SC interface. Operators have access only to those features which define their roles. Roles can also be customized. An operator with administrative-level security can access all information on the system and has the ability to alter passwords.

Hardware Components

The Tracer SC system controller is housed in a protective enclosure that makes it easy to access. Figure 9, p. 13, illustrates the parts and function of the device.

Figure 9. Tracer SC system controller components



Tracer Building Automation System

A Tracer™ building automation system provides centralized building control through a single, integrated system. Climate, lighting, scheduling, energy consumption, air quality monitoring, and other controllable features of a facility can be programmed and managed by a Tracer building automation system for simple, consistent, and reliable operations.

In addition to controlling any type of HVAC equipment, a Tracer building automation system can be connected to other building systems such as security systems and lab hood controls. These applications work together to maximize the comfort and security of people in the building, while minimizing energy use.

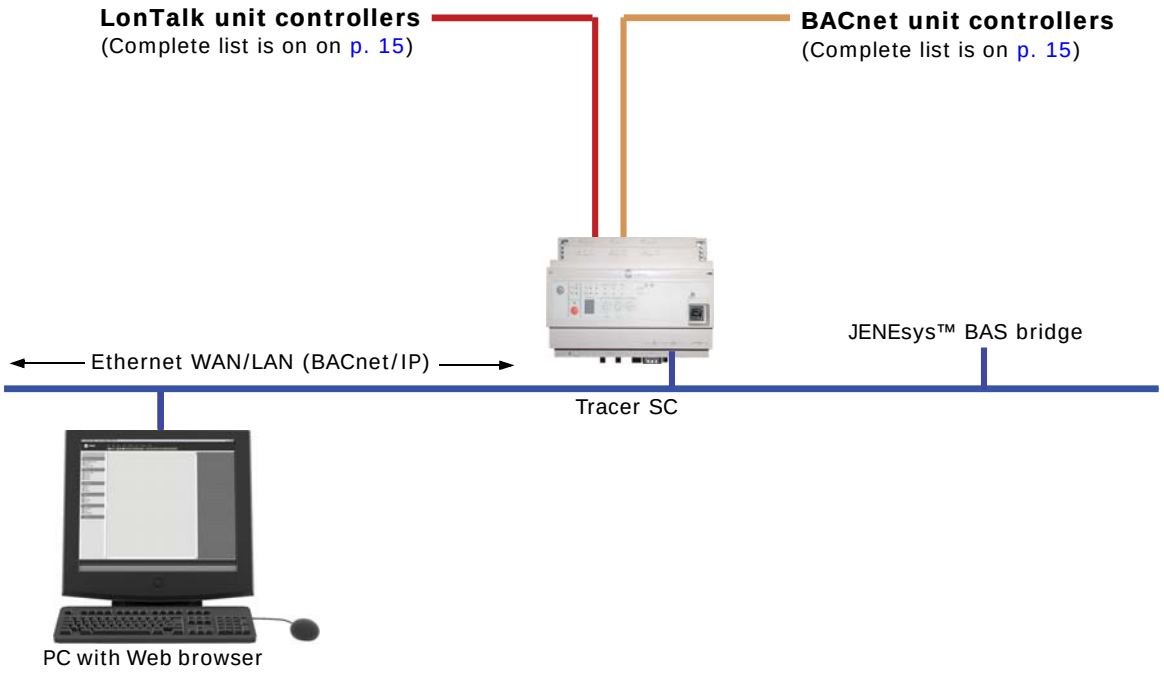
Tracer System Architecture

The control elements are distributed throughout the Tracer building automation system. system controller is at the highest level of control. Unitary equipment has unit controllers, which compose subsystems. All controllers on the system are integrated into a network for communication and monitoring.

In a Tracer building automation system, control is distributed to the following three levels to ensure integrity, as shown in Figure 10, p. 14:

- User interface control
- System control
- Unit control

Figure 10. Tracer building automation system architecture



User Interface Control

The Tracer SC user interface is viewed and operated from a Web-enabled PC. The user interface provides the ability for a building operator to configure, monitor, and modify system operations at the highest level of control (see "User Interface," p. 5, for details.)

Commands communicated from this control level can override automatic system-level control functions and some unit-level control functions.

System Control

The Tracer SC system controller communicates with all unit controllers, acting as the central coordinator for all individual equipment devices. It gathers data from unit controllers, schedules and coordinates equipment operations, monitors for abnormal situations, and performs other miscellaneous building management and system-level functions.

The Tracer SC system controller is designed to function automatically, without intervention of commands from the operator interface control level.

The Tracer SC supports the JENEsys™ BAS bridge, which enhances system integration by providing a communication bridge between competitive proprietary protocols or other protocols such as Modbus.

Unit Control

Unit controllers provide all necessary unit control functions. They operate associated unitary equipment, while ensuring that all built-in safety features are enabled and that diagnostics are issued.

Each controller is designed to operate in stand-alone mode. Therefore, if system control fails, unit operation can continue.

Each Tracer SC can support a maximum quantity of 120 unit controllers. Unit controllers installed on a Tracer SC can be a combination of the following BACnet and LonTalk unit controllers.

Notes:

- *Three types of product licenses are available for the Tracer SC. They are based on the maximum number of unit controllers that each Tracer SC supports: 30, 60, or 120.*
- *BACnet controllers cannot exceed 60 controllers per link or 120 total controllers per Tracer SC.*
- *Of the total number of unit controllers on the LonTalk link, the number of MP580/581s cannot exceed 20.*

BACnet (MS/TP) unit controllers supported by Tracer SC

Tracer SC systems support the following BACnet (MS/TP) unit controllers:

- Tracer UC400 unit controller for variable-air-volume (VAV) equipment
- Tracer UC400 unit controller for programmable equipment
- Tracer UC800/AdaptiView unit controller for CenTraVac chillers
- BCI-I: BACnet communications interface for IntelliPak system
- BCI-C: BACnet communications interface for chillers
- BCI-R: BACnet communications interface for ReliaTel
- Non-Trane BACnet (MS/TP) devices

LonTalk unit controllers supported by Tracer SC

Tracer SC systems support the following Trane unit controllers:

- Tracer AH540/541 air-handler controller

- Tracer MP501 multi-purpose controller
- Tracer MP503 input/output module
- Tracer MP580/581 programmable controller
- Tracer VV550/551 VAV controller
- Tracer ZN510/511 zone controller
- Tracer ZN517 unit controller
- Tracer ZN520/521 zone controller
- Tracer ZN523 zone controller
- Tracer ZN524 water-source heat pump unit controller
- Tracer ZN525 zone controller
- Tracer CH530 chiller controller
- Tracer CH532 chiller controller
- LCI-C: LonTalk communications interface for chillers
- LCI-I: LonTalk communications interface for IntelliPak systems
- LCI-R: LonTalk communications interface for ReliaTel systems
- Non-Trane LonTalk devices using SCC, DAC, and chiller profiles; and devices supporting LonTalk standard network generic variables

Service Tools

Two service tools are available for the support of unit controllers and for additional functions on systems using Tracer SC:

The Tracer™ TU Service Tool

Use the Tracer TU service tool:

- For configuring BACnet unit controllers
- For downloading Tracer SC software updates
- For obtaining data file from Tracer SC for use in creating TGP2 programs, and for accessing the TGP2 editor
- For accessing the Tracer Graphics Editor (TGE), which is used to copy graphics files to the Tracer SC and to edit them.
- As an additional way to backup and restore data to Tracer SC

The Rover™ Service Tool

Use the Rover Version 7 service tool:

- For configuring LonTalk unit controllers
- For setting the Tracer SC LonTalk network address
- To discover unit controller and the Tracer SC

Resources

The following resources are available for managing Tracer building automation systems:

Tracer SC Installation, setup, and operation

- *Tracer SC System Controller Installation and Setup Guide* (BAS-SVX31)
- Tracer SC online help
- *Tracer SC Installation Instructions* (X39641100)
- *Unit Controller Wiring Guide for the Tracer SC System Controller* (BAS-SVN03)

Programming

- Tracer Graphical Programming (TGP2) Editor
- *Tracer Graphical Programming (TGP2) Application Guide* (BAS-APG008) and online help

HVAC applications

- Tracer SC Air Systems Application Guide (BAS-APG007)
- Tracer SC Chiller Plant Control Application Guide (BAS-APG012)

Service tools

- Tracer TU—*Tracer TU Service Tool Getting Started Guide* (TTU-SVN01) and online help
- *Rover Version 7 Operation and Setup Guide* (EMTX-SVX01) and online help

Graphics support

- Centralized Services
- Tracer Graphics Editor (TGE): launches from within the Tracer TU service tool (with online help)
- *Tracer TU Service Tool Getting Started Guide* (TTU-SVN01)

Software updates

- *Tracer TU Service Tool Getting Started Guide* (TTU-SVN01)

Web sites

- MyTraneControls.com: A free online Web site designed to assist Tracer building automation system owners and operators.

Tracer BAS training courses

- The Trane College of Building Automation offers a comprehensive portfolio of technical courses on the operation, installation, and programming of Tracer building automation systems. Refer to http://trane.com/Commercial/DNA/View.aspx?i=586.

Service, maintenance, troubleshooting

In addition to the resources listed above:

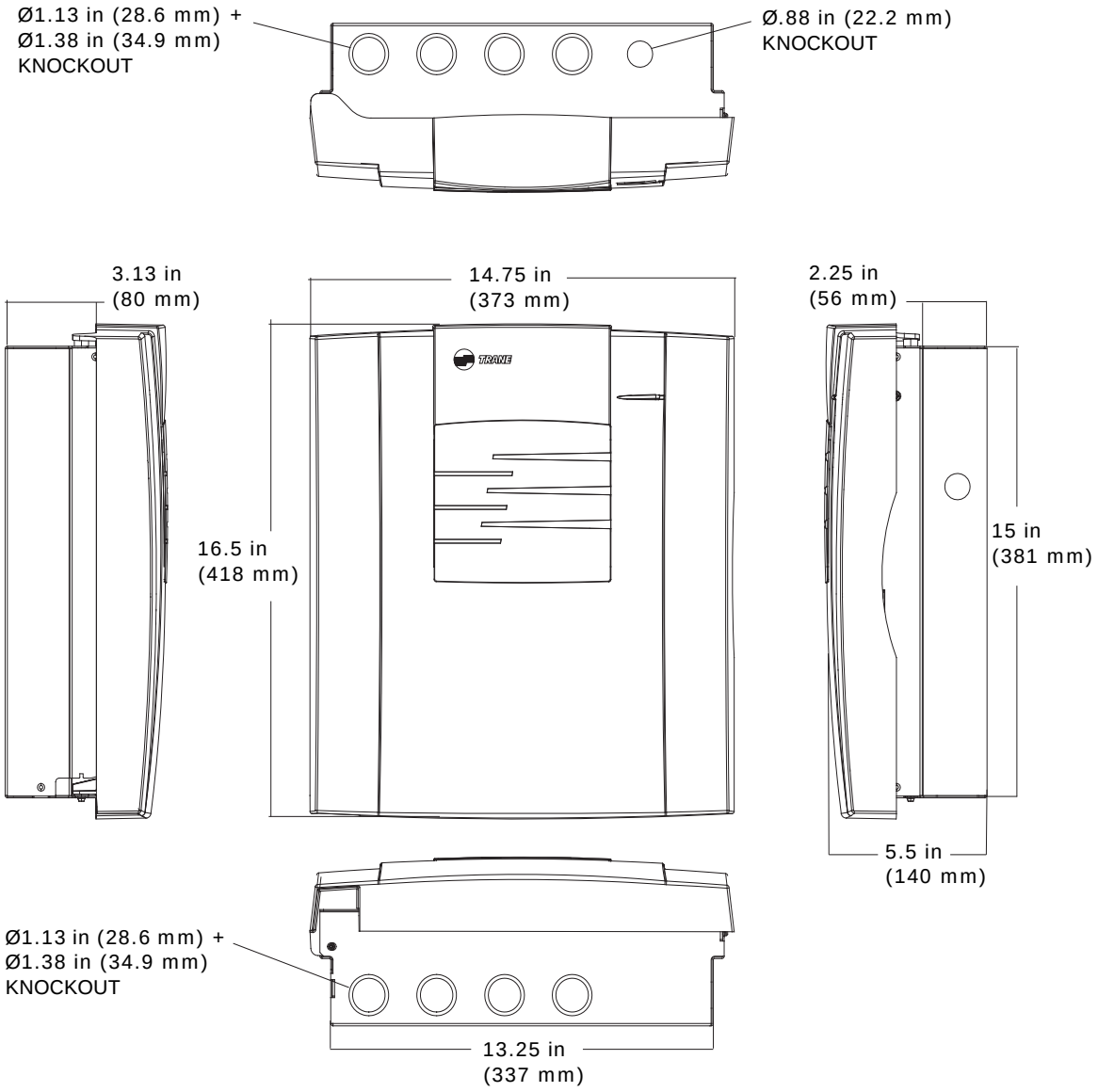
- Trane Product Support
- Warranty information

Specifications

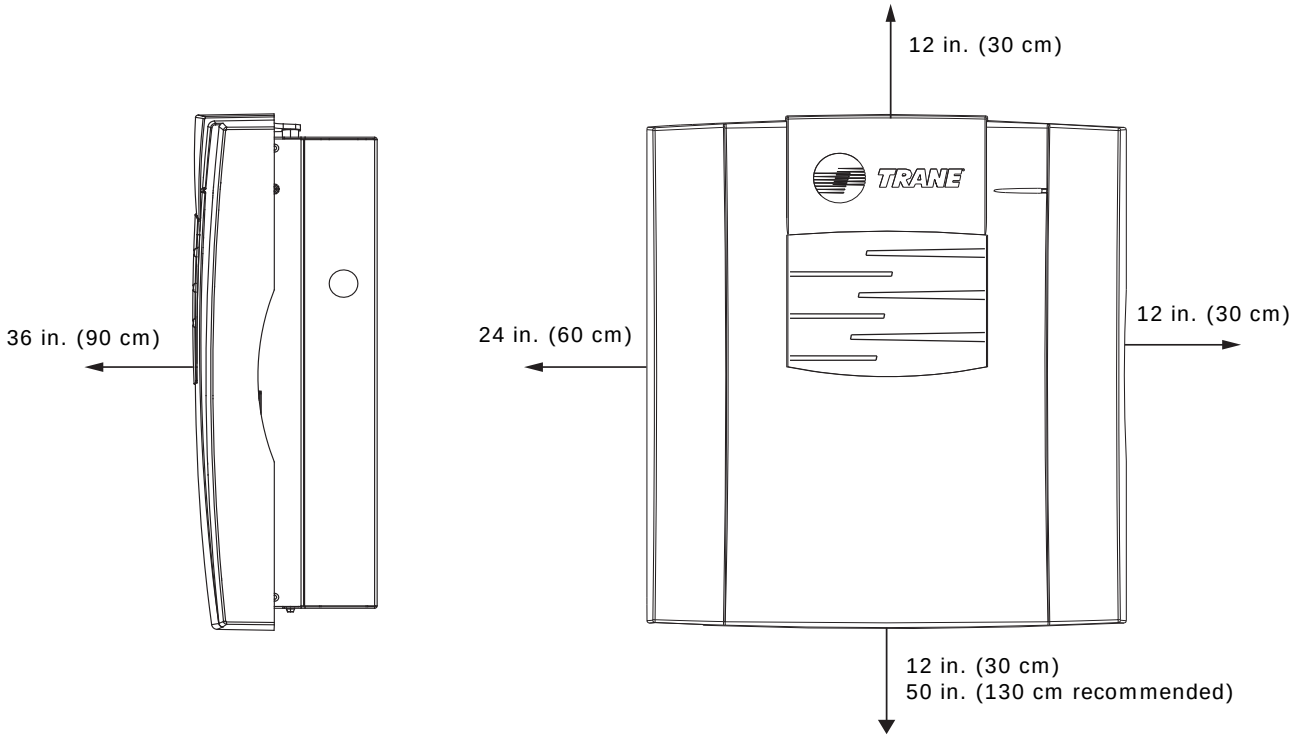
This section contains specifications for Tracer SC system controllers and for Tracer building automation systems.

Computer	Browser requirements	• Internet Explorer™ Version 7.0 or higher, or Mozilla Firefox™ Version 3.0 or higher
	Software requirements	• Java™ SE Runtime Environment (JRE) Version 5.0 (preferred: Version 6 Update 10 or higher) • Adobe Flash™ player • Internet Explorer™ Version 7.0 or higher or Mozilla Firefox Version 3.0 or higher • USB driver—For service tool connection and for direct access to Tracer SC Web pages
Tracer SC system controller	Power requirements	• Nominal rating: 120/230 Vac; 50 or 60 Hz; 1 pH • Maximum current: 6.0 A at 120 Vac dedicated circuit breaker
	Operating environment	• Temperature: From –40°F to 122°F (–40°C to 50°C) • Relative humidity: From 10% to 90%, non-condensing
	Storage environment	• Temperature: From –40°F to 158°F (–40°C to 70°C) • Relative humidity: From 5% to 95%, non-condensing
	Enclosure (optional)	• NEMA-1
	Weight	• 14 lb (6.5 kg)
	Mounting	• Wall-mounted with #10 (5 mm) screws and #10 wall anchors • Mounting surface must be able to support 60 lb (28 kg)
	UL listing	• UL-916-PAZX—energy management • CUL-C22.2—signal devices—Canada
	FCC	• FCC part 15, Class A
	CE	• Emissions EN61326:1998 Class B • Immunity EN61326:1998 Commercial • Safety EN61010-1:2001
	Processor	PowerPC405 Core
	Memory	• FLASH 500 MB • SDRAM 256 MB
	Battery	• No battery required. The clock is maintained for a minimum of three days by the super capacitor. All other programs are backed up by nonvolatile memory.
System Communication	BACnet	Tracer building automation systems communicates with BACnet devices that support: • Communications based on the BACnet ASHRAE/ANSI 135 standard • ENV-1805-1/ENV-13321-1 • 10BASE-T/100BASE-TX dedicated Ethernet (ISO/IEC 8802-3) or Transmission Control Protocol/Internet Protocol (TCP/IP) compatible network **Note:** Non-Trane BACnet devices will be supported in a 2010 product release.
	LonTalk	Tracer building automation systems communicates with LonTalk devices that support: • Communications based on the EIA-709.1 (LonTalk) standard • LonTalk standard network variable types (SNVTs) • FTT-10A or FT-X1 transceivers • Twisted-pair physical media (Level 4 wiring) **Note:** Limited support for non-Trane LonTalk devices will be implemented in the July 2009 product release.

Dimensions for the Tracer SC Enclosure (optional)



Minimum Clearances for the Tracer SC Enclosure (optional)



Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.Trane.com.

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

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