



TRANE UNIVERSITY™

# Course Catalog

*Authorized Training for  
Trane Systems and Solutions*

*Building Systems and Controls*

*Technical Service*

**2016/2017**



TRANE UNIVERSITY™

# *General Information*

A photograph of two men walking down a brightly lit hallway. The man on the left is wearing a yellow polo shirt and khaki pants, carrying a black folder. The man on the right is wearing a tan button-down shirt and dark pants. The hallway has a purple wall on the right side, which is covered with numerous circuit boards and electronic components. The floor is highly reflective, showing the men's reflections. The ceiling has square light fixtures.

Engage. Learn. Achieve.

## Comprehensive training, direct from Trane

Our industry-leading training empowers customers to develop a high level of proficiency operating and optimizing their equipment, controls and building systems.

## An effective way to learn

Trane University™ integrates innovative teaching technologies for instructor-led, distance learning and online courses and webinars. Interactive and hands-on experience uses Trane-developed tools for load, system, energy and economic analysis.

## Your access to an extensive knowledge base

Experienced professional trainers have strong controls and HVAC service backgrounds and are familiar with Trane equipment. They draw on the expertise of Trane applications engineers, product engineers, technical support engineers and product development teams.

## Targeted learning tracks

Trane University professional education is offered through two tracks.

1. Building Systems and Controls Training, focusing on system design and optimization, is valuable for
  - Facility owners and management
  - Engineers
2. Technical Service Training, focusing on operation, maintenance and troubleshooting, was developed for:
  - HVAC service and maintenance technicians
  - Maintenance supervisors
  - Mechanical contractors

## Accredited programs

Continuing education for HVAC professionals is accredited by International Association for Continuing Education (IACET) and American National Standards Institute (ANSI). Trane University awards Continuing Education Units (CEUs) and/or Professional Development Units (PDUs).

## Convenient, easy to register

Browse current course schedules anytime at [Trane.com/traneuniversity](https://Trane.com/traneuniversity). Register for classes online at the Trane Education Center at [Trane.com/tec](https://Trane.com/tec).

## Course locations

Technical Service Training Courses:  
Trane Technical Training Center, La Crosse, Wisconsin\*

Building Systems and Controls Courses:  
Trane, St. Paul, Minnesota\*

Regional classes:

Local Trane Sales offices

Some Technical Service Training courses can be customized at your request and conducted at a Trane sales office or at your site. Call 855-803-3563 to discuss your training needs.

\*Except where noted in course description

## Continuous product improvement

Trane may change course design and/or content without notice. Trane reserves the right to reject any training course enrollment.



### **Enroll early and save**

Any class registrations received a minimum of 60 days before the class begins will receive a 10 percent “early-bird” tuition reduction.

### **How to enroll**

To register for training, please set up an individual account on [Trane.com/tec](https://trane.com/tec).

### **How to pay**

Payment may be made by:

- Major credit card (for fastest confirmation)
- Purchase order (If a Trane Commercial Account has been established, PO number must be entered when enrolling online)
- Check or money order (paid to “The Trane Company”)

### **Federal Government**

Orders for training courses by Federal Government employees should be made out to our Federal Government reseller, IMMIX/EC America, Inc. and

paid for by credit card. Purchase orders will only be accepted for amounts greater than \$5,000. Credit card statements for training will list IMMIX as the payee. Training provided by Trane University™ is listed in the GSA Federal Supply Schedule.

### **Email confirmation**

Trane Education Center will email a confirmation letter to the email address you provide in your online profile. It provides information on hotel accommodations. If you don’t get an enrollment confirmation, make sure Trane Education Center is recognized as a valid sender by your email client. Call us at 855-803-3563 if you have questions.

Please do not make travel arrangements until you receive confirmation of your registration.

### **Cancellation policy**

You may cancel a registration up to 14 days before the course start date without penalty. Any cancellation made after that is subject to full tuition cost (student substitutions are allowed).



Trane reserves the right to cancel any class. We will notify you of class cancellation on or before 14 days prior to the class start date. We are not responsible for any transportation costs related to a class cancellation.

### Hotel information

For St. Paul and La Crosse class locations, hotel arrangements are exclusively made through BCD Travel. Students must register through BCD Travel to receive the special rate for preferred hotels. A link to register for the hotel is included in the confirmation email.

For classes in other locations, hotel recommendations are given but students are responsible for making their own hotel arrangements.

### Building security

Attendees are issued a temporary identification badge upon arrival and are required to display the badge on their person throughout the duration of the course.

### Proper clothing

Normal work or business casual attire is required. Shorts, sandals and flip-flops are not appropriate. Long pants and long-sleeve shirts of 100 percent cotton must be worn for Service Training which involves lab equipment with live electrical circuits. Closed-toe leather shoes and long pants are required for plant tours.

### Personal protective equipment (PPE)

*Applies to Technical Service Training classes only.* Instructor-provided PPE is required to be worn while performing lab exercises. If you prefer, please bring personal PPE to class (i.e. prescription safety glasses with side shields, steel-toed boots, etc.) If you are attending CenTraVac Mechanical Overhaul or your course includes a plant tour - Steel-Toed shoe covers are provided, but personal steel-toed boots will be more comfortable.

### Tobacco policy

Our facilities are tobacco-free. Designated tobacco areas are provided outside of the building.

### Photo policy

*Applies to Technical Service Training only.*

Photography inside the Technology Center requires special authorization. Check photography equipment with our security department when entering the building.

### Save with training packages

Through this program, you can prepay training credits to be applied to future training, reducing the cost by as much as 40 percent. Each credit is equivalent to one dollar.

#### PLATINUM Training Package

- Includes 47,500 credits
- Cost \$28,500
- Platinum credits are valid for two years

#### GOLD Training Package

- Includes 7,600 credits
- Package cost \$5,700
- Gold credits are valid for one year

Credits may be used by multiple individuals within your organization. Login to the Trane Education Center to purchase a training package.

We will contact you within 24 hours to activate the program. Your credits can be applied immediately. We track the credits your company has used and send periodic reports showing your available credits.

**Register online ([Trane.com/tec](https://Trane.com/tec)) for individual courses or build proficiency following a course progression.**

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## Questions?

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Call 855-803-3563

[Log on to Trane Education Center](#)

[Building Systems and Controls Training](#)

Email [traneuniversity@trane.com](mailto:traneuniversity@trane.com)

[Technical Service Training](#)

Email [traneuniversity@trane.com](mailto:traneuniversity@trane.com)

Trane University™ builds knowledge systematically with a proven curriculum, expert instructors and structured learning paths.


# Building Systems and Controls Training

## COURSE PROGRESSION

Tracer Summit®

### Legend

 = Instructor Led Training

 = eLearning Material

### Base

Tracer Summit  
System  
Operation

### Level 1

Introduction to  
Computer  
Networking

LonTalk  
Fundamentals

### Level 2

Tracer  
Summit 101

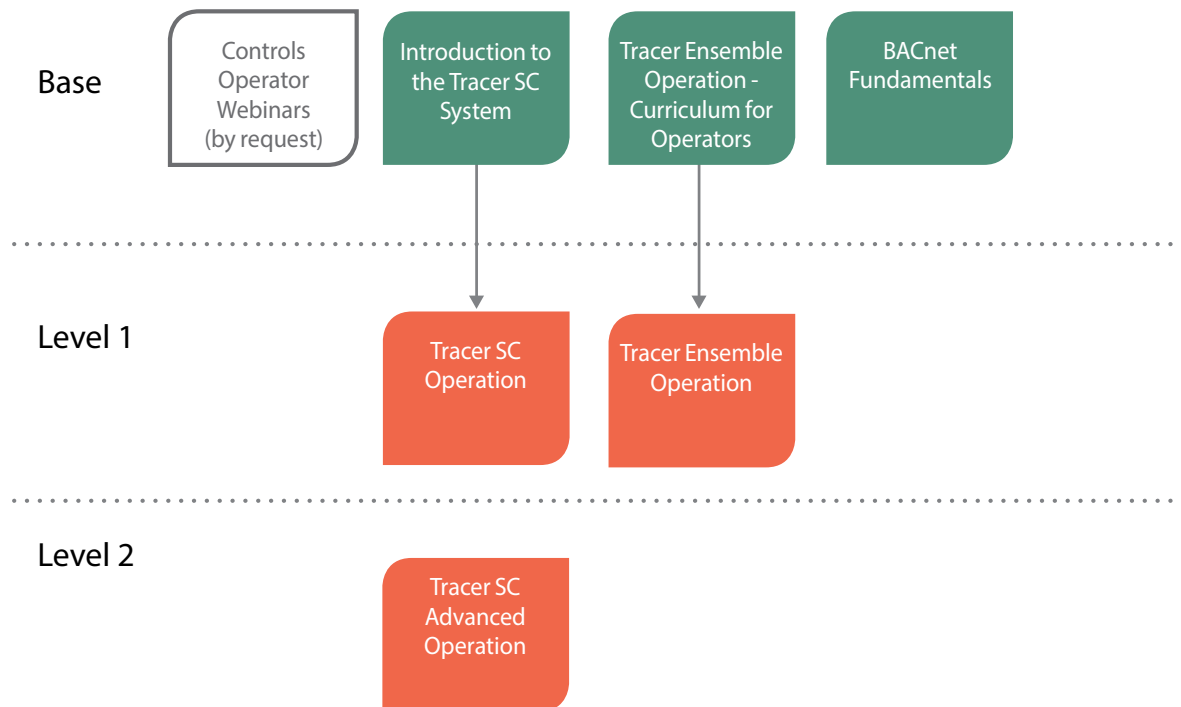


## COURSE PROGRESSION

### Tracer<sup>®</sup> SC, Tracer<sup>®</sup> UC and Tracer<sup>®</sup> Ensemble

#### Legend

 = Instructor Led Training

 = eLearning Material


# Building Systems and Controls Training



Trane University™ currently offers six instructor-led courses for building owners, operators and building system engineers.

## Class location

Our instructor-led courses are delivered at the Trane Technical Training Center in White Bear Lake (St. Paul), Minnesota, and are also offered regionally in local Trane offices.

## Choosing your classes

View the step-by-step class progression flow charts, which outline learning components for each Trane system: Tracer Summit®, Tracer® SC/UC or Tracer® Ensemble.

## Register online at the Trane Education Center

All course enrollments must be completed online via the Trane Education Center. Each person that wants to attend a course needs to have their own profile.

Course title	Regular tuition	Early-bird rate*
Tracer Summit System Operation	\$1,550	\$1,395
Tracer Summit 101	\$1,980	\$1,782
Tracer Summit 102	\$1,980	\$1,782
Tracer SC Operation	\$1,100	\$990
Tracer Ensemble Operation	\$1,100	\$990
Tracer SC Advanced Operation	\$1,320	\$1,188

\*Early-bird rate: Any class registrations received a minimum of 60 days before the class begins will receive a 10 percent tuition reduction.

## Tracer Summit® System Operation

**Length:**  
3.5 days

**Day and time:**  
Day 1-3: 8 a.m.–4:30 p.m.;  
Day 4: 8–11:30 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
System Operation

### Course description

In this course, students will learn to perform common and advanced operations with their installed Tracer Summit building management system. This highly interactive basic course includes presentations and hands-on workshops where students practice using the common applications of a Tracer Summit building management system and learn how to monitor and control building mechanical systems.

Note: This is a good course to take if you're planning to take Tracer Summit 101.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Create and modify schedules/holiday and exceptions
- Create, modify and plot graphs of trends
- Respond, route and print alarms
- Create and modify users and passwords
- Create and modify basic graphics
- Monitor chiller plant control
- Learn how time-of-day, area and variable air systems work together through applications

### Who should attend

Tracer Summit System Operations is intended for Trane service technicians and Tracer Summit system owners, building engineers and operators.

### Prerequisites

None

### Pre-work

None



# Tracer Summit® 101

**Length:**  
4.5 days

**Day and time:**  
Day 1-4: 8 a.m.–5 p.m.;  
Day 5: 8–11:30 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Summit 101

## Course description

The Tracer Summit installation course is intended for BAS personnel and Applied Systems Contractors who will be responsible for engineering, installing and commissioning Tracer Summit Projects. The skills taught in the installation workshops are intended for those who will install Tracer Summit hardware and configure applications.

## Specific course objectives

Upon completion of this course, participants should be able to:

- Size a Building Control Unit (BCU)
- Install BCU hardware
- Understand Ethernet LAN installations
- Configure a BCU with an IP address

- Configure a site
- Install LonTalk® devices on a BCU including Generic LonTalk Devices (GLDs)
- Install Trane® unit controllers
- Configure Area and VAS applications
- Create schedules
- Configure alarm and message routing
- Create and configure points
- Create custom graphics
- Back up and restore a site

## Prerequisites

While not a required prerequisite, Tracer Summit System Operation is highly recommended prior to taking Tracer Summit 101.

## Pre-work

All pre-work must be completed prior to coming to class. Students will be tested on this material the first day.

Required pre-work includes:

- LonTalk Fundamentals e-learning



## Tracer Summit® 102

**Length:**  
4.5 days

**Day and time:**  
Day 1-4: 8 a.m.–5 p.m.;  
Day 5: 8–11:30 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Summit 102

### Course description

Students are introduced to the standard Tracer applications included with the Tracer Summit software through lecture and extensive hands-on workshops. In addition to the standard Tracer applications, the course also covers the custom programming language (CPL) used in Tracer Summit.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Set up and operate area control
- Set up and operate Variable Air Systems (VAS) [Comm4 and LonTalk]
- Set up and operate Chiller Plant Control (CPC)
- How to write programs using CPL

### Who should attend

Tracer Summit 102 is intended for Trane technicians and contractors who have successfully completed Tracer Summit 101 and have a solid working knowledge of those subjects.

### Prerequisites

- Tracer Summit 101

### Pre-work

All pre-work must be completed prior to coming to class. Students will be tested on this material the first day.

Required pre-work includes:

- Online document attached to course details in your Trane Education Center account



## Tracer® SC Operation

**Length:**  
2.5 days

**Day and time:**  
Day 1–2: 8 a.m.–4:30 p.m.;  
Day 3: 8–11:30 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
SC Operation

### Course description

In this course, building operators and Trane technicians will learn to operate and modify their Tracer SC system. This course is highly interactive and includes presentations and hands-on workshops where students practice using the common applications of a Tracer SC building automation system while learning how to monitor and control building mechanical systems.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Monitor and control the building's mechanical systems
- Respond to alarms and events

- Add and modify schedules
- Create, view and edit data logs
- Perform area overrides
- Add and delete users
- Backup a site

### Who should attend

Tracer SC Operations is intended for Trane service technicians and Tracer SC system owners, building engineers and operators.

### Prerequisites

Introduction to the Tracer SC System e-learning module is recommended but not required.

### Pre-work

None



## Tracer® SC Advanced Operation

**Length:**

3 days

**Day and time:**

Day 1–3: 8 a.m.–4:30 p.m.;

**Register here:**

[Trane Education Center](#)

**Recommended search:**

Advanced Operation

### Course description

The Tracer SC Advanced Operation course builds on the knowledge and skills learned in the Tracer SC Operation course. Tracer SC Advanced Operation will enable learners to expand their skillset to complete a variety of advanced operation, control strategies and energy saving methods to get the most out of their Tracer SC building control system.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Define and apply coordinated control methods using spaces, area, VAV Air Systems and schedules
- Create HVAC, analog and binary schedules
- Configure alarming for binary and analog points
- Create alarm categories and notification classes
- Route notification classes to users
- Set up and modify data logs
- Work with Tracer Graphical Editor (TGE) to modify graphics

### Who should attend

Tracer SC Advanced Operation is intended for Tracer SC system owners, operators and building engineers who have previously completed the Tracer SC Operation course and want to go deeper.

### Prerequisites

Tracer SC Advanced Operation is an advanced operations course. Students must be proficient at using a personal computer and familiar with using a web browser. Previous completion of the Tracer SC Operation course is required prior to attendance.

### Pre-work

None

### Continuing Education Units

Upon successful completion of this course, students receive a certificate of achievement and earn two continuing education units according to the criteria set by the International Association for Continuing Education and Training (Washington, DC). To successfully complete this course, students must attend all class sessions, complete all workshops and quizzes and complete a course evaluation form.

## Tracer® Ensemble Operation

**Length:**  
2.5 days

**Day and time:**  
Day 1: 8 a.m.–4:30 p.m.;  
Day 2: 8 a.m. –4:30 p.m.;  
Day 3: 8:00 –11:30 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Ensemble Operation

### Course description

Tracer Ensemble Operation is specifically designed for building operators and administrators to become more efficient with their Tracer Ensemble software which is a Web-enabled service and monitoring tool for multiple building facilities. Tracer Ensemble allows building operators and administrators access to Tracer Ensemble from the local network or the Internet to monitor and control their building system. Students will have the opportunity to work with the Tracer Ensemble software to become more familiar with common tasks.

### Specific course objectives

Objectives of this course include:

- User management
- Status and overrides
- Working with schedules
- Alarm processing
- Data logging
- Reports
- Tenant Services
- Critical Control

### Who should attend

Tracer Ensemble Operation is intended for building operators and owners with Tracer Ensemble.

### Prerequisites

This is an operations-level class. Students must have an operating-level understanding of personal computers and the Windows operating system. Students must possess knowledge of Tracer Summit or Tracer SC depending upon which system is installed in their facility.

### Pre-work

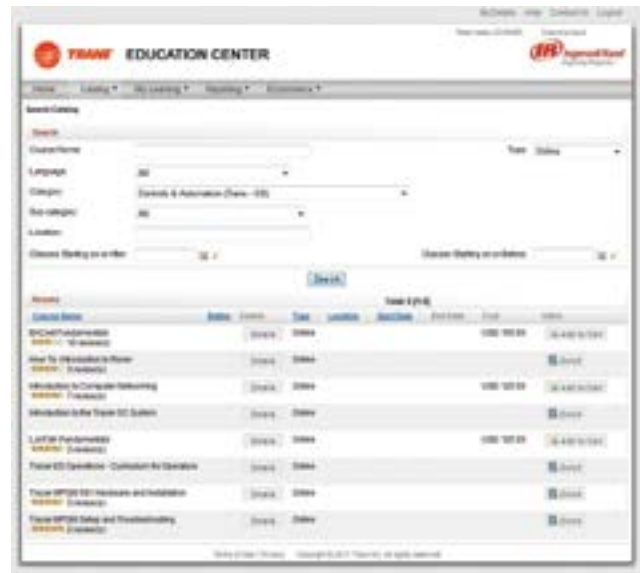
None

# Introduction: Online Classes

All online e-learning must be accessed via the [Trane Education Center](#).

Online courses can be taken at your own pace. Students must set up their own individual account in the Trane Education Center to register.

Many of the online e-learning modules are pre-work for the instructor-led classes but can be taken on their own. A detailed description of each module appears on the following pages.



## Online Classes

### Tracer® ES Operations—Curriculum for Operators

**Length:**

5–15 minutes per module

**Register here:**

[Trane Education Center](#)

**Recommended search:**

ES Operation

#### Course description

This curriculum will walk the student through common tasks they would perform while using their Tracer ES building management system.

#### Specific course objectives

Modules in this curriculum include:

- Navigation
- User preferences
- Managing alarms
- Viewing status
- Viewing data logs
- Creating data logs
- Viewing schedules
- Overrides

#### Who should attend

This course is intended for Tracer ES users and operators.





## Online Classes

### Introduction to the Tracer® SC System

**Length:**  
45 minutes

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Tracer SC

#### Course description

This course introduces you to the Tracer SC interface and common tasks performed using it.

#### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the Tracer SC role in a building automation system
- Navigate through the user interface
- View equipment and spaces status and data logs
- Override occupancy or set-points
- Determine what set-point will be used by the system
- Access, view and maintain alarms and events
- Change a schedule and add an exception

#### Who should attend

This course is intended for Tracer SC users and operators.



# Technical Service Training

## COURSE PROGRESSION

### All Courses

#### Legend

 = Instructor Led Training

 = eLearning Material

#### e-Learning



#### Recommended years of experience

3 months–1.5 years



1.5–3 years



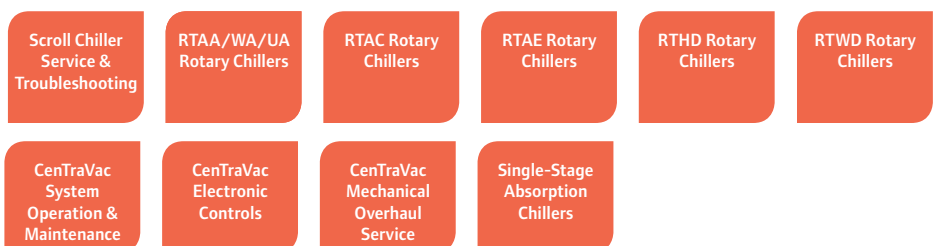
3–5 years



3–7 years



5+ years



## COURSE PROGRESSION

### Unitary Path

#### Legend

 = Instructor Led Training

 = eLearning Material

#### eLearning



#### Recommended years of experience

3 months–1.5 years



1.5–3 years



3–5 years



3–7 years



COURSE PROGRESSION

Applied Path

Legend

 = Instructor Led Training

 = eLearning Material

Recommended years of experience

3 months–1.5 years	Air Conditioning Service	HVAC Electrical Troubleshooting				
1.5–3 years	Commercial Service 1					
3–5 years	Airside System Service	Chilled Water Systems Service				
5+ years	Scroll Chiller Service & Troubleshooting	RTAA/WA/UA Rotary Chillers	RTAC Rotary Chillers	RTAE Rotary Chillers	RTHD Rotary Chillers	RTWD Rotary Chillers
	CenTraVac System Operation & Maintenance	CenTraVac Electronic Controls	CenTraVac Mechanical Overhaul Service			

## Course Schedule

Available courses, intended audience, dates and tuition are shown below. Read the course description provided in this catalog before enrolling. All courses are held in Trane's La Crosse, Wisconsin, Technical Training Center unless noted otherwise. If you can't find the training you need, contact Trane University at 855-803-3563.

Course title	Audience	2016	2017	Tuition
Air Conditioning Service	Service & Maintenance Techs	Sept 12-16 Nov 14-18	Mar 6-10 May 8-12	\$1,700
Commercial Service 1	Service & Maintenance Techs	Oct 10-14	Apr 3-7	\$1,700
Airside System Service	Service & Maintenance Techs	Nov 7-11	Apr 17-21	\$1,700
HVAC Electrical Troubleshooting	Service & Maintenance Techs	Sept 19-23 Nov 14-18	Mar 13-17 May 15-19	\$1,700
Chilled Water Systems Service	Service & Maintenance Techs	Dec 6-9	June 13-16	\$1,700
CenTraVac System Operation and Maintenance	Owner/Operator/ Maintenance Supervisors and HVAC Techs	Sept 13-16 Nov 29 - Dec 2	Mar 7-10 May 9-12	\$1,900
CenTraVac Electronic Controls	Service Techs	Sept 20-23 Dec 6-9	Mar 14-17 May 16-19	\$1,900
CenTraVac Mechanical Overhaul Service	Service Techs	Sep 26-30 Dec 12-16	Mar 20-24 May 22-26	\$3,500
Single-Stage Absorption Chillers	Service Techs		Apr 3-7	\$1,900
RTAA/WA/UA Rotary Chillers	Service & Maintenance Techs		May 1-4	\$1,900
RTAC Rotary Chillers	Service & Maintenance Techs	Oct 4-6 Dec 13-5	Mar 28-31 June 6-9	\$1,900
RTAE Rotary Chillers	Service & Maintenance Techs	Oct 25-27	Apr 25-27	\$1,900
RTAF Rotary Chillers	Service & Maintenance Techs		June 27-29	\$1,900
RTHD Rotary Chillers	Service & Maintenance Techs	Nov 8-10	Mar 21-23	\$1,900
RTWD Rotary Chillers	Service & Maintenance Techs	Oct 18-20		\$1,900
Precedent Voyager Rooftop	Service Techs	Oct 11-14	Apr 4-7 Jun 6-9	\$1,900
IntelliPak I & II Rooftop Units	Service Techs	Sept 26-30 Nov 28-Dec 2	Mar 13-17 May 15-19	\$1,900
Commercial Rooftop Burner Service	Service Techs	Oct 18-20		\$1,900
Scroll Chiller Service & Troubleshooting	Service & Maintenance Techs	Nov 1-4	May 9-12	\$1,900

### Early-bird rate

All class registrations received a minimum of 60 days before the class begins will receive a 10 percent tuition reduction.



## Air Conditioning Service

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Air Conditioning Service

### Course description

This is a comprehensive, entry-level air conditioning service course. It concentrates on essential refrigeration knowledge that all HVAC technicians must eventually possess in order to perform competent HVAC service work. After attending, technicians should have acquired knowledge in tool usage, basic system theory, metering devices, system problem identification, superheat, sub-cooling, piping, evacuation and recharging techniques. This course is 45–50 percent lab intensive. Packaged rooftop units, 2 to 5 tons, are used in the lab sessions. A separate course is available to help develop electrical troubleshooting skills.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand basic system theory
- Identify the four basic parts of the refrigeration system and how they work
- Learn to use refrigeration instruments
- Perform system logging
- Perform system evacuation and charging
- Diagnose and correct start up and service problems related to refrigeration systems
- Measure and adjust superheat and sub-cooling using classroom methods

- Demonstrate refrigerant recovery procedures
- Understand and follow lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is well suited for entry-level air conditioning and/or HVAC maintenance mechanics or perhaps an electrician with new responsibilities in air conditioning maintenance and service. Some previous experience working with HVAC equipment is preferred, but not required.

### Prerequisites

This course is open to entry level service technicians and industrial or facility maintenance technicians. The student should have some basic mechanical and electrical background in addition to an aptitude and interest for work with HVAC equipment.

### Course outline

- Introduction
  - Welcome
  - Course Content and Objectives
  - Training Facility Orientation
  - Daily Review of Study Guide
- Safety
  - HVAC and Lab safety Considerations
- Product Familiarization

- Nomenclature Identification
- Identify Lab Units
- Refrigeration System Components
  - Air Conditioning Cycle Components
  - Compressor
  - Condenser
  - Metering Devices
  - Evaporator
  - AC Terms and Definitions
- Refrigeration Cycle Trainer
  - System Operation
  - Components in the System
  - Use of Pressure-Temperature Charts
  - Diagnosis of Refrigeration Cycle Problems
- Tool Identification and Use
  - Refrigeration Hand Tools
  - Refrigeration Diagnostic Tools
- Superheat and Sub-cooling
  - Calculation Method
  - Parameters
  - Guidelines for System Analysis
  - Lab Practice for Measuring
  - Refrigeration Cycle Familiarization Lab
  - Manifold Gauge Connections
  - Temperature Analyzer Connections
  - System Logging
    - Model, Serial Numbers
    - Superheat and Sub-cooling
    - Evaporator, Condenser Delta-Ts
    - Interpretation of Pressures
    - Pressure/Temperature Conversions
- Refrigeration Diagnosis Worksheets and Problems
  - Discussion of Symptoms to Causes
  - Troubleshooting Chart Analysis
- Refrigeration Troubleshooting Lab
  - Diagnosing Refrigeration Circuit Problems
    - Component Failures: TXV, Distributor, etc.
    - Low Refrigerant Charge
    - Excess Refrigerant Charge
  - Evaluate Operating Units
- Compressors
  - The Function of the Compressor
  - Compressor Failure Modes
    - Refrigerant or Oil Slugging
    - Refrigerant Flow Restrictions
    - Oil Loss and Starvation
    - Motor Overheating & Electrical Failures
  - Changing Compressor after Mechanical Failure
  - Changing Compressor after a Burnout
    - Mild and Severe Burnout Cleanup Procedures
    - Filter-Drier Selection& Installation
- Refrigeration Piping
  - Main Concerns
  - Proper Installation Precautions
  - Brazing Basics
- Refrigerant Recovery
  - Recovery Equipment
  - Recovery of Lab Units
- Evacuation Methods
  - Deep Vacuum Pump Requirements
  - Triple Evacuation Requirements
  - Tools & Instruments Required
  - Evacuation of Lab Units
  - Refrigerant Charging Methods
  - Weighing Refrigerant Charge
  - Partial Charging Suggestions and Techniques
  - Charging of Lab Units

## Commercial Service 1

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Commercial Service 1

### Course description

This course exposes the student to light commercial unit operation, set-up and troubleshooting, dual compressor units, refrigerant troubleshooting, heating fundamentals, combustion analysis and unit airflow set-up and checkout. Hands-on training, using Trane light commercial 5- to 25-ton lab equipment, enhances the existing knowledge of technicians who already have appropriate fundamental A/C service skills. The course emphasizes a systematic approach to HVAC service troubleshooting.

Important: Be certain that your prospective student meets the educational and/or experience requirements to attend this course. Read the “Prerequisites” section carefully.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Interpret temperature/pressure readings on an operating system
- Discuss start-up and service problems within refrigeration system
- Measure airflow using appropriate airflow instruments and determine basic airside problems
- Determine heating efficiency
- Check gas systems using proper test procedures
- Use ANSI/Trane wiring diagrams to properly test single- and three-phase electrical systems and components

- Understand the basics of psychrometrics

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is ideal for dealer, contractor or owner maintenance technicians progressing from residential to light commercial service who have experience in HVAC. We recommend completion of HVAC Electrical Troubleshooting and Air Conditioning Service before attending this course.

### Prerequisites

Students attending must have completed a vocational or technical program in air conditioning/refrigeration, our Trane Air Conditioning Service course, or have equivalent practical experience. Students must also have a working knowledge of the basic theory needed to diagnose the refrigeration cycle and an understanding of the following tools and subjects:

- Refrigeration Manifold Gauge Set
- Volt/Ohmmeter
- Electronic Temperature Meter
- Clamp-on ammeter
- Temperature/Pressure Relationships
- Metering Devices

## Course outline

- Introduction
  - Welcome
  - Course Content and Objectives
  - Training Facility Orientation
  - Safety
- Refrigeration Diagnosis
  - System Component Operation
  - Refrigerant Diagnosis Lab
- Compressor Diagnosis
  - System Requirements for Compressor Life
  - Compression Ratio
  - Failure Modes
- Piping
  - Main Concerns
  - Problem Applications
  - Scroll Piping Philosophy
  - Pipe Sizing Exercise: Single-Riser Systems
- Heating
  - Combustion Analysis
  - Light Commercial Heating System
    - Components
    - Operation
- Introduction to Air Systems
  - Terms and Definitions
  - Measurement/Instruments
- Air Conditioning Fans
  - Fan Types
  - Mechanical Failures
  - Fan Performance
- Air Lab
  - Duct Traversing
  - Measurement of Duct Pressures
- CFM Calculations
- Fan RPM Measurements
- Measuring Devices Familiarization
- Psychrometrics
  - Wet Bulb
  - Dry Bulb
  - Relative Humidity
  - Dew Point/Humidity Ratio
- Wiring Diagrams
  - Voltage and Current Unbalance
  - Read and Interpret ANSI/Trane Diagrams
  - Logical Electrical Troubleshooting

## Airside System Service

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Airside System

### Course description

This course covers the operation and setup of a commercial VAV system from the standpoint of the service technician. Shutoff VAV, Bypass VAV and Single Zone VAV will be discussed in the class, although Shutoff VAV (traditional VAV) will be the primary focus. The concepts discussed will apply to new system startup as well as existing buildings. The course also discusses the different fan types used in commercial HVAC units.

The lab exercises are designed around several working VAV systems in our La Crosse, Wisconsin, training lab. This includes IntelliPak® Commercial Self-Contained (CSC) and rooftop units (RTU) with various types of VariTrane VAV boxes. During the lab exercises, students will use the various tools needed to setup and commission (or re-commission) a VAV system. Also, the Rover™ service tool will be used for VAV box setup and for the purpose of verifying proper system operation from a service perspective. Attendees will learn to recognize important parameters within building plans in order to commission the building as the design engineer intended. The plans used will include the equipment schedule, sequence of operation, airflow requirements and ventilation.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Verify system airflow using multiple methods
- Approach a commercial VAV system and know whether it is working as intended
- Understand the sequence of operation utilizing building plans

- Understand forward curve fans, airfoil fans and direct drive plenum fans
- Know how to set up and verify proper system air flow with each fan type
- Know the capabilities and the limitations of the building control system from a service technician standpoint
- Use Rover service tool to analyze the air delivery system
- Know the differences between Single Zone, Bypass and Shutoff VAV systems and where each is applied

### Lab safety

Student participation in any hands-on portion of this course will include ladder safety and use of proper fall protection. It is expected the student will adhere to all other safety requirements as they arise.

### Who should attend

This course is ideal for Trane service technicians, controls technicians, service contractors, maintenance technicians, Existing Building Systems (EBS) personnel and others involved with system commissioning or with ensuring that an HVAC system is operating correctly and efficiently. Though geared for service technicians, anyone involved with ensuring that a system is set up to work as efficiently as possible will benefit from the class. The course includes systems used in all geographic regions. The curriculum is designed for “seasoned” or advanced technicians whose responsibility is to interpret and commission new buildings with engineered energy conservation as the top priority.

## Prerequisites

Participants attending this course must have strong HVAC skills or an understanding of engineered building systems and understand the importance of compliance with today's energy efficiency requirements. Attendees should have an interest in promoting energy conservation with the customer as well as within their organization with regard to proper (or improper) system setup and operation.

## Course outline

- Introduction
  - Welcome
  - Course Content and Objectives
  - Training Facility Orientation
  - Lab safety
- Building Plans
  - Layout of an Energy Efficient Building
    - Load Calculations
    - ASHRAE
  - Submittal
    - Sequence of Operation
    - Unit Options
  - Equipment Schedule
  - Hands-on Lab: Identify System Components
- Introduction to Rover
  - Terms and Definitions
  - Uses for Service Technicians
- VAV System Types
  - Bypass VAV
    - Typical Applications
    - Limitations
  - Shutoff VAV
    - Typical Applications
    - Limitations
- VAV Boxes
  - Introduction: VAV Box Types
  - Operation
  - Application
  - Zone Sensors
  - Hands-on Lab: VAV Box Setup Stand Alone and using Rover Service Rool
    - UCM 4.2 (COMM4)
    - VV 550 LonTalk®
    - UC400 BACnet
- HVAC Unit Operation
  - Constant Volume
    - Constant Volume Control Types
    - Bypass VAV Control Types
    - Demand Control Ventilation (DCV) with CO2 Sensor
  - Single Zone VAV
  - Variable Air Volume
    - Supply Fan Control
    - Discharge Temperature Control
    - Supply Air Tempering
    - Supply Air Reset
    - Constant Volume Modes
    - Demand Control Ventilation (DCV) with CO2 Sensor
  - Hands-on Lab: Unit Setup of Each Type
- VAV System Setup
  - Hands-on Lab
  - Setup Multiple VAV Systems Including Setting Airflow

# HVAC Electrical Troubleshooting

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Electrical Troubleshooting

## Course description

This course is intended to improve a technician’s ability and confidence when electrically troubleshooting commercial HVAC equipment. The course will broaden the technician’s capabilities to troubleshoot controls and other electrical circuits by teaching an understanding of practical electrical theory as applied to the products and components found in HVAC. The information and skills learned should greatly decrease service diagnosis time and take the guesswork out of isolating problems found in single and three-phase air conditioning and heating products. This course makes extensive use of lab hands-on methods.

## Specific course objectives

Upon completion of this course, participants should be able to:

- Define and use fundamental electrical terms, laws and formulas for understanding what electricity is and what it does
- Understand the basic logic of series, parallel and series-parallel circuits
- Identify the proper usage of meters required to troubleshoot electricity
- Increase confidence and ability in reading complex wiring diagrams
- Understand control logic and sequence of unit operation
- Understand safeties and component operation in Trane equipment

- Become familiar with the characteristics of single- and three-phase motors and their associated control components
- Understand the principal maintenance requirements for longer operating life of electrical components
- Learn a systematic, efficient method for electrical troubleshooting which can be applied to all major HVAC products

## Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

## Who should attend

This course is ideal for HVAC installers, maintenance mechanics, industrial electrical technicians and apprentice level service technicians who have HVAC servicing responsibility and need a thorough understanding of electrical troubleshooting skills.

## Prerequisites

This course is open to anyone that is motivated to become proficient with the electrical side of HVAC equipment. An understanding of the refrigeration cycle and its components will be helpful.

## Course outline

- Introduction
  - Course Content
  - Training Facility Orientation
  - Study Guide
  - Safety - General
- Troubleshooting Fundamentals
  - Electrical Flow, Conductors and Insulators
  - Magnetism
  - Voltage, Current, and Resistance; Ohm's Law
  - Power, Safety, Volt-Ohm Meters
- Current and Basic Control
  - Series Flow Logic
  - Parallel Flow Logic
  - Combination Series-Parallel Logic
- Circuits Exercise
  - Wiring Series, Parallel & Series-Parallel Circuits
  - Applying Ohm's Law
  - Alternating Current
    - Production
    - Single phase
  - Three-phase Wye and Delta Styles
  - Transformation
  - Rating Transformers
  - Effects On Circuits
    - Capacitance & Inductance
  - Resistive, Inductive and Capacitive Circuits
    - Power
    - Power Factor
    - Horsepower
- Hands-On Lab
  - Wiring Series, Parallel & Series-Parallel A.C. Circuits
  - Applying Electrical Laws
  - Troubleshooting A.C. Circuits
- Motors
  - Single-Phase Motors
  - Starting Methods
  - Three-Phase Motors and Starters
  - Identifying Failure Modes: Insulation Failures, Ground Faults, Shorts, Opens, Internal Overload, Single-Phasing, Voltage, Current Unbalance
  - Proper Phasing (3 phase)
  - Failure Modes
  - Calculating Voltage and Current Unbalance
  - Identifying Single-Phase Compressor Motor Terminals
- Wiring Diagrams
  - Understanding Trane Standardized Diagrams
  - Flow logic
  - Constructing Your Own Field Diagrams
  - Troubleshooting from Diagrams
- Controls & Safeties—Operation, Checkout & Troubleshooting of HVAC Electrical Components
  - How they Operate
  - How to Adjust
  - How to Troubleshoot
- Controls Lab
  - Wiring Control Circuits With Field-Drawn Diagrams
  - Troubleshooting Controls and Safeties as Applied in Trane Light Commercial or Commercial Rooftops



## Chilled Water Systems Service

**Length:**  
3.5 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Chilled Water

### Course description

This course is intended to provide attendees with a "systems" approach to maintaining and diagnosing problems involving chilled water piping systems from a service perspective. It will show technicians and supervisors how Trane utilizes water flows to obtain efficient chiller operation. The course will also discuss water system conditions that can be detrimental to efficient operation and possibly damaging to system components. Students will take flow measurements in a laboratory setting, using recommended tools and techniques to determine chilled water system performance. Chilled water system types such as decoupled loop, variable-primary flow and others will be discussed.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the behavior of fluids contained in building chilled water systems
- Identify and understand the application of chilled water system components and auxiliary system components
- Recognize and understand various chilled water system piping configurations.
- Identify cooling tower types and optimize their operation
- Gain fundamental understanding of chilled water optimization
- Learn how chiller water systems are designed and

applied based on chiller type and single vs. multiple chiller installations

- Recognize waterside problems that reduce efficiency and damage equipment
- Become aware of the importance of proper system water treatment
- Learn how airside design and loads can affect chilled water system

### Lab safety

Student participation in any hands-on "live-circuit exercise" portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course will benefit personnel who operate and/or maintain commercial HVAC distribution systems or who plan and/or conduct maintenance or service procedures for these systems. This course is intended for plant engineers, maintenance supervisors, operating engineers and HVAC service and maintenance technicians who need an improved understanding of air and chilled water system control and maintenance requirements and techniques.

## Prerequisites

This course addresses the needs of persons from widely varied backgrounds and does not require in-depth HVAC knowledge. Students should be ready, however, to assimilate HVAC "systems" thinking.

## Course outline

- Introduction
  - Welcome
  - Course Content/Objectives
- Safety
  - Potential Hazards
  - Lockout/Tagging
  - Chemical Safety
  - Lab safety
- Auxiliary System Components
  - Valves (Types, 2-Way, 3-Way)
  - Pumps
    - Definitions
    - Types
    - Construction
    - Performance
    - Pump Curves
  - Terminal Units
  - Accessories
    - Strainers
    - Gauges
    - Meters
    - Thermometers
    - Relief Valves
    - Drains
- Pump Performance Lab
  - Horsepower Calculation
  - Determining GPM With Pump Curve
  - Variable Frequency Drive
    - New GPM Calculation
    - New HP Calculation
    - New Ft. of Head Calculation
- Chilled Water Plant Basics
  - Chiller Types (Air-Cooled, Water- Cooled)
  - Heat Exchangers
    - Types
    - Construction
    - Flow Calculations/ Measurement
    - Temperature Limits/ Guidelines
    - Pass Divider Leaks
  - Formulas
  - Make-Up Water
  - Expansion Tank/Air Removal
  - Chilled Water Reset
  - AHRI Conditions
  - Ice Storage/Building
- Freeze Protection Types
  - Propylene Glycol
  - Ethylene Glycol
  - Calcium Chloride
  - Methanol
- Piping Configuration Comparison
  - Two-Pipe
  - Four-Pipe
  - System Variation (Primary/ Secondary, Variable Flow, Low Flow)
- Cooling Towers
  - Function in the System
  - Water Treatment Requirements
  - Chilled Water Systems Lab
  - Determine GPM
    - Flow Meters
    - Circuit Setters
    - Heat Exchanger Delta P/ Delta T
  - Calculate Chiller Tons
  - System Troubleshooting
- Chilled Water Systems Lab
  - Determine GPM
    - Flow Meters
    - Circuit Setters
    - Heat Exchanger Delta P/ Delta T
  - Calculate Chiller Tons
  - System Troubleshooting
- Airside System Basics
  - Terms and Definitions
  - Measurement
  - Instruments
  - Fan Performance Tables and Curves
- Airside Lab
  - Duct Traversing
  - Duct Pressure Measurement
  - Calculating CFM
  - Measuring Fan RPM
  - Measuring Device Familiarization

# CenTraVac® System Operation and Maintenance

**Length:**  
3.5 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
System Fundamentals

## Course description

This course will familiarize owner maintenance supervisors and technicians with Trane CenTraVac CVHE/F/G and the new CVHS oil-less centrifugal chiller operation and maintenance requirements. It will also help them understand chilled water systems and load-based chiller dynamics. The course will help technicians troubleshoot and will help chiller owners decide if work can be done in-house or not. Technicians can particularly benefit from coverage on diagnosing and maintaining machine design performance, and learn what can occur if operating outside of these parameters. Students will have the opportunity to observe the manufacturing and the assembly of key components in a factory tour. This course relies primarily on classroom lecture.

## Specific course objectives

Upon completion of this course, participants should be able to:

- Understand Trane® centrifugal chiller operation and chilled water system theory
- Observe chiller construction process
- Use operating logs to recognize normal operation and how abnormal influences affect chiller operation and performance
- Recognize problems that reduce efficiency and damage equipment
- Learn basics of system components
- Understand chilled water piping designs

## Who should attend

Our target is individuals responsible for the operation and preventative maintenance of Trane CenTraVac chillers (CVHE/F/G and the new CVHS). This course will benefit technicians, supervisors or engineers who make planning decisions to support centrifugal chiller maintenance. This class does not include hands-on maintenance training.

## Prerequisites

Students will benefit from this course in direct relation to their background knowledge of refrigeration, electrical, mechanical and basic heat transfer systems. This course addresses the needs of individuals from widely varied backgrounds and does not require in-depth HVAC knowledge.

## Plant tour requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

## Course outline

- Centrifugal Identification
  - CVHE
  - CVHF
  - CVHG
  - CVHS
- Basic Refrigeration Cycle
  - Refrigeration Terms
  - Charting the Cycle
- CTV Equipment
  - Components
  - Compressors
  - CH530 Operator Interface
  - Tracer AdaptiView™ Control Operator Interface
  - TD 12"
- Performance
  - Design Factors in Performance
  - Performance and Operating Conditions
  - Effect and Costs of Inefficient Operation
- Logging and Troubleshooting
  - Components of a Good Log
  - Using Logs to Find Problems
  - Electrical Formulas/calculating tonnage
  - Principle of Heat Balance
  - Log Accuracy
- CenTraVac Plant Tour
  - Condenser Assembly
  - Evaporator Assembly
  - Unit Assembly
  - Run Test Stands
- Purge Operation
  - Trane Purifier Plus™ Purge System
  - Earthwise Purge
- Preventative Maintenance
  - Oil Analysis
  - Tube Analysis
  - Cooling Tower

## CenTraVac® Electronic Controls

**Length:**  
3.5 days

**Day and time:**  
Tue–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Electronic Control

### Course description

This course is intended to update experienced service technicians on Trane CenTraVac chiller control technology. Detailed coverage includes electronic capacity modulation controls found on all Trane® centrifugal chillers manufactured between 2001 and the present. Earlier-model control systems are not discussed in depth. This course covers Tracer® CH530 and Tracer AdaptiView™ control system in use at this time.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Operate all the controls covered by this course, including systems interface
- Understand operating logic for Tracer CH530 and Tracer AdaptiView™ control platforms
- Use control information for routine operational troubleshooting
- Use menu-driven diagnostics
- Functionally diagnose various components of an operating control panel
- Perform detailed trouble analysis on controls and determine necessary field repairs or replacement action
- Determine potential electrical or electronic control faults through recommended isolation checkout procedures

### Who should attend

This course is for technicians who regularly work with Trane CenTraVac CVHE/F/G/S chillers. Coverage does not include mechanical maintenance or service.

### Prerequisites

Technicians must be comfortable with electrical controls, electrical meters such as digital volt-ohmmeters and understand refrigeration and centrifugal chiller control requirements. It is helpful if technicians have experience with other HVAC electronic control systems or have attended HVAC Electrical Troubleshooting. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisite located on page five of the catalog.

### Plant tour requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

## Course outline

- Introduction
  - Course Overview and Objectives
  - Training Logistics
- Tracer CH530 and AdaptiView Control
  - Control Platforms
  - Adaptive Control Logic/Functions
  - Operator Interfaces
    - DynaView/AdaptiView
      - Operation/Capabilities
      - CLD Display/Resistive Touch Screen
      - Menus/Sub-menus
    - Tech-View/Tracer TU
      - Operational Capabilities
      - Laptop/Connection Requirements
      - Machine Views
      - Configuration
      - Binding View
      - Software Download/Updates
  - Diagnostics
  - Programming (Nameplate Configuration)
  - LLID (Low-Level Intelligent Device) Operation/Concept
    - Frame-Mounted LLIDS
    - Panel-Mounted LLIDS
    - LLID Binding
    - LLID Replacement
- Troubleshooting
  - Operator - Service Data
  - Log Data
  - Performance Monitoring
- Motor Controllers
  - Starters & Starting Methods
  - X-Line
  - Wye/Delta
  - Solid-State
  - AFD
- Diagnostics
  - Diagnostic Types
  - Diagnostic Logs
  - Diagnostic Strategies
- System Logging
  - Using "Custom Report" Feature
  - Determining Log Point
- Chiller Operating Sequence
  - Basic Sequence
  - Timing Sequence
  - Sequence Breakdown

## CenTraVac® Mechanical Overhaul Service

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Mechanical Service

### Course description

This course will broaden any technician's level of service and overhaul expertise. It will help them gain confidence and experience in system start-up, maintenance, repair and major overhaul of water-cooled CenTraVac chillers. The course provides learning situations not otherwise available or that may take months or even years of on-the-job exposure to encounter. This course lays a substantial foundation for the technician's continued professional growth and provides familiarity with other centrifugal chiller products. This is a mechanical service course only. Controls course attendance is required for complete CenTraVac chiller service coverage.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Identify various Trane® centrifugal chillers and variations in mechanical components
- Be familiar with documented factory service information available to support Trane centrifugal chillers
- Properly maintain and repair chiller with varying lubrication and cooling system designs
- Properly overhaul a Model CVHE/F/G CenTraVac chiller compressor and motor, using factory-recommended procedures
- Properly inspect compressor and motor components for compliance to factory specifications

### Who should attend

This course is designed for technicians or mechanics who have experience in other HVAC chiller products and are beginning to work with centrifugal products. The class is useful for experienced centrifugal service technicians who have no formal centrifugal overhaul training or experience with Trane CenTraVac chillers.

### Prerequisites

Prerequisites for this course include:

- Previous heavy refrigeration service experience
- Skills with close tolerance measuring instruments
- Experience with shop rigging of components heavier than 150 lbs and have completed a "Technician Agreement" attesting to the above conditions

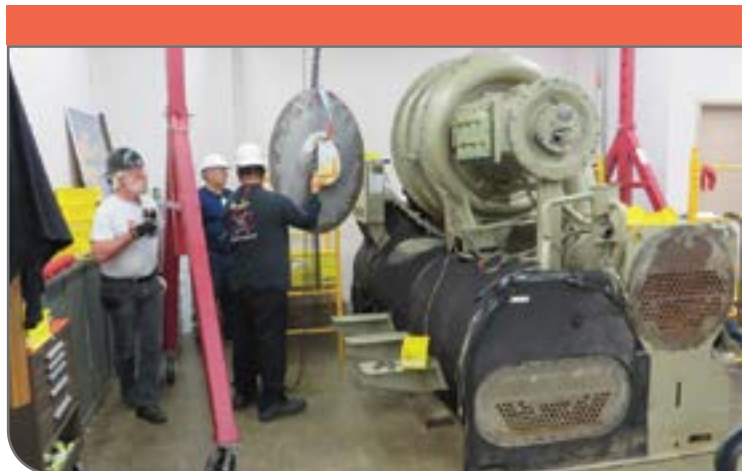
Notice: Students are required to wear steel-tipped footwear to participate in mechanical lab service procedures. Appropriate work clothes should be worn to disassemble a chiller.

### Plant tour requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

## Course outline

- Introduction
  - Orientation to Trane Operations
- Lubrication System
  - CenTraVac Lube System Operation
  - Oil Retention System
  - Lube System Maintenance Procedures
  - Oil Cooler Operation and Maintenance
  - Oil Analysis as a Maintenance Tool
- Machine Components
  - Compressor Construction and Troubleshooting
  - Review Service and Repair of CVHE/F/G Compressors
  - Review Diagnosis of Machine Malfunctions
- Motor
  - Review Motor Construction
  - Review Bearing Configurations and Service Procedures
  - Motor Cooling Systems Including Refrigerant Pump
  - Motor Assembly and Service Procedures
- Troubleshooting
  - Focusing on Specific Problem Causes
- Lab Exercise
  - Students Properly Disassemble, Inspect and Reassemble CVHE Compressor
- Plant Tour (see “Plant tour requirements”)





## Single-Stage Absorption Chillers

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Single

### Course description

This course is the most thorough and comprehensive presentation ever offered by Trane on the foundational understanding of absorption chillers and their refrigeration cycle. Coverage includes a detailed view of absorption chiller components, detailed instruction in the “theory of absorption chiller operation” and in the lithium bromide chemical cycle (includes hands-on), the chemistry of inhibitors, overview of capacity control system operation, crystallization causes and effects, purge system operation, performance and operator logging recommendations.

Important: Be certain that your prospective student meets the educational and/or experience requirements to attend this course. Read the “Prerequisites” section carefully. Students will be involved in hands-on activities.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Become familiar with absorption chiller construction
- Learn to recognize major absorber components and understand their functions
- Become familiar with lithium bromide (charging, inhibitors, characteristics, etc.)
- Learn how to use a Equilibrium Chart and understand its importance for determining system conditions
- Learn the sequence of control operation (pneumatics and electric)

- Learn how Trane’s UCP2™ Adaptive Control™ technology has been applied to absorption chillers

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is well-suited for technicians who desire a comprehensive understanding of the theory of absorption refrigeration systems.

### Prerequisites

The student should have a working knowledge of pneumatic, electrical, heat transfer, steam and mechanical systems.

Important: This course utilizes a fully operational absorption chiller with UCP2™ micro control. This provides our students a practical, hands-on opportunity to attain the confidence they need to work with these chillers.

## Course outline

- Absorption Chillers—General
  - Introduction
  - Absorption Terminology
  - Absorption vs. Mechanical Refrigeration Cycles
    - Steam Table
    - Pressure Table
  - Chiller Components
    - Generator
    - Condenser
    - Evaporator
    - Absorber
    - Heat Exchanger
    - Solution Pump
    - Economizer
    - Positive Concentration Limiter
    - SOR (Sensing, Detection, Recovery—ABSD)
- Operational Cycle
  - Generator Temperatures
  - Cooling Tower Function
  - Condenser Pressure/Temperatures
  - Chilled Water Circuit
  - Evaporator Pressure/Temperatures
  - Absorber Circuit
  - Heat Exchanger Cycle
  - Pumps and Seals
  - Lubrication Circuit
  - Purge System
- Operational Analysis
  - Calculating Tonnage
  - Using an Equilibrium Chart
    - Performance and Operation
    - Interrelation Between Components
  - Crystallization
    - Causes
    - Anti-Crystallization Devices
- Charging
  - Lithium Bromide
  - Refrigerant
  - Evacuation Procedures
  - Inhibitors
  - Additives
- Internal Components
  - Eliminators
  - Metering Orifices
  - Absorber Spray Trees
  - Condenser and Evaporator Collection Pans
- Machine Maintenance (Hands-on)
  - Pulling Solution Samples
  - Determining Specific Gravity
  - Purge Techniques
  - Determining Hydrogen Production
  - Machine Logging
  - Pump Maintenance
- UCP2™ Overview
- Automatic Purge (ABSD)
- Capacity Control (ABSD)
- AFD (ABSD)

## RTAA/WA/UA Rotary Chillers

**Length:**  
3.5 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
RTAA

### Course description

This course provides training for service and facility maintenance technicians who need an in-depth understanding of the controls, maintenance and troubleshooting of Trane’s RTAA and RTWA helical-rotary chillers. The course provides insights into compressor design, unit operation, unit installation, start-up requirements, unit performance and service diagnosis. Specific service steps are covered for refrigerant handling and component service.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the theory of helical rotary chiller operation
- Understand each chiller’s construction and the interrelation of various components
- Understand the capabilities of particular machine designs
- Understand unit wiring and interconnecting diagrams
- Understand control start sequence and operating logic
- Understand system control methods available for building automation
- Use control information for routine operational troubleshooting

- Understand machine control menu-driven diagnosis
- Know routine maintenance requirements for helical-rotary chillers
- Become aware of limits to field servicing methods inherent with helical compressor designs
- Understand service techniques used with refrigerant handling and component repairs

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane RTAA, air-cooled and RTWA water-cooled chillers. This course is primarily classroom oriented.

### Prerequisites

Technicians must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers and/or Trane’s UCP1 and UCP2™ chiller control system would be helpful, but are not required.

### Plant tour requirement

Leather shoes which give good protection and long trousers are required for plant tours. Students attending the course in Pueblo, Colorado should bring a basic function electronic calculator.

## Course outline

- Introduction
  - Course Overview and Objectives
- Helical-Rotary Chiller Specifics
  - Refrigeration Cycle, Main Components
  - Helicopter Concept
    - Operation
    - Advantages
  - Design and Construction/Operation
  - Compressors
    - Intermediate
    - General Purpose (GP)
  - Bearings
  - Motor/Rotor
    - Starter Options
  - Slide Valve & Step Unloaders
  - Check Valve
  - Oil Distribution System
  - Condensers
    - Air-Cooled (RTAA)
    - Water-Cooled (RTWA)
    - Remote (RTUA)
  - Evaporators
    - Standard
    - Remote (Optional)
    - Remote Evaporator Piping Techniques
  - Metering Devices
  - Options
- Adaptive Control™ Systems
  - UCP1 Modules (70-400 Ton)
    - Sequence of Operation
  - Adaptive Control Logic/Functions
  - Operator Interface
  - Menus
  - Capabilities
  - Diagnostic Codes
  - Programming
  - Inputs/Outputs
  - Module Troubleshooting
- Clear Language Display
  - Menus
  - Diagnostic Overview
  - Programming
  - Remote Panel
    - Functions/Capabilities
- Plant Tour (Pueblo Sessions Only) Question/Answer Session During Tour
- Troubleshooting
  - Mechanical Components
    - Slide Valve/Piston
    - Load/Unload Solenoids
    - Expansion Valve Test
  - Refrigeration Cycle
  - Controls
    - Current Transformers
    - Temperature Sensors
  - Safeties
  - Control Modules
  - Interpreting Diagnostic Codes/Menus
- Maintenance/Repair
  - Logging
  - Performance Monitoring
  - Refrigerant Recovery/Recharging Routine
  - Maintenance
- Sequence of Operation
  - Mapping Functions & Flow Logic Using Wiring Diagrams
- Simulator Lab (La Crosse Sessions)
  - Programming the UCM
  - Perform EXV Test
  - Check Module Inputs/Outputs
  - Verify Control Parameters/Algorithms

## RTAC Rotary Chillers

**Length:**

3 days

**Day and time:**

Tues–Thurs, 8 a.m.–4:30 p.m.

**Register here:**

[Trane Education Center](#)

**Recommended search:**

RTAC

### Course description

This course covers operation, diagnosis and maintenance for Trane® model RTAC rotary chiller CH530 micro electronic control system with additional coverage of refrigeration system components.

Emphasis will be placed on operational characteristics of the GP2 compressor, Falling Film evaporator and E-coil design condenser. Additional coverage provided for chiller operation using unit ANSI Trane wiring diagrams with emphasis on understanding the Adaptive control system logic. Tracer CH530 control architecture and components will also be discussed.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location. The sessions at the factory include a factory tour. Refer to the schedule page for individual class locations.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the operating characteristics of 140- to 500-ton Trane RTAC rotary chiller machines
- Understand RTAC chiller construction and the physical relationship of components
- Describe GP2 compressor construction, operation and checkout
- Understand Falling Film evaporator construction and operation
- Learn the Tracer CH530 control architecture and operating logic

- Understand the field maintenance and limitations of the Trane RTAC rotary chiller

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for owners, contractor and in-plant HVAC service technicians who will work regularly with Trane RTAC rotary chillers. This course is primarily classroom oriented.

### Prerequisites

Technicians must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers and/or the Trane UCP1 and UCP2™ chiller control system would be helpful, but are not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

## Course outline

- RTAC Helical-Rotary Chiller Specifics
  - RTAC Features Overview
  - RTAC Refrigeration Cycle
  - R-134a/Polyester Oil Concerns
  - Main Component Overviews
- Performance/Parameters
  - Operation & Advantages
  - AHRI Conditions
  - Machine Logging
  - Operational/Logging Parameters
- GP2 (CHHN) Compressor
  - Construction
  - R-134A Optimization
  - Bearing Configuration
  - Oil Distribution
    - Oil Charge/Level
    - Oil Flow Protection
  - Starter Options
    - X-Line
    - Y-Delta
  - Compressor Loading/Unloading
    - Female Stepper
      - Construction
      - Operation
    - Male Slide Valve
      - Construction
      - Operation
  - Discharge Check
  - Compressor Heater
- Falling Film Evaporators
  - With Liquid Vapor
- Separator
  - Construction
  - Operation
- Without Liquid Vapor Separator
  - Construction
  - Operation
- Oil Return
- Freeze Avoidance
  - Pump Control
  - Heat Tape
  - Chiller Leveling
- RTAC Oil Circuits
  - Polyester Oil/R-134a
  - Oil Separator
  - Oil Level Check
  - E-Coil Condenser
  - Ambient Options
  - Condenser Fans
  - Condenser Fan Staging
  - Corrosion Protection
  - Maintenance
- Liquid Level Sensor
  - Operation
  - External Intelligence (LLID)
    - Operating Characteristics
  - Internal Intelligence (LLID)
    - Operating Characteristics
- Electronic Expansion Valve
  - Operation
  - Position Indicator
  - LLID Operation
- Tracer CH530 Adaptive Control
  - Control Platform
  - Main Processor
- LLID (Low Level Intelligence Device)
- IPC3 Communication Trunk
- Adaptive Control Logic
- Operator Interfaces
  - Dyna View
    - Operation/Capabilities
    - Resistive Touch Screen
    - Menu/Submenus
  - TechView
  - Operational Capabilities
  - Trane.com
    - Software Download
    - Software Installation
  - Laptop
    - Minimum Requirements
    - Connection
    - Machine Views
    - Binding
    - Configuring
    - Software Download/Updates
  - Diagnostics
    - Active
    - Historic

\*Courses held in Pueblo, Colorado, have a manufacturing plant tour.

## RTAE Rotary Chillers

**Length:**  
3 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
RTAE

### Course description

This course covers the operation of Trane® model RTAE stealth rotary chillers. Coverage includes chiller refrigeration system components, construction and operation. Emphasis will be placed on the operational characteristics of the GP4 compressor, CHIL evaporator, Transverse condenser and AFD3 cooling circuit. Additional coverage will be provided on the Trane RTAE UC800 control platform with TD7 AdaptiView™ display, chiller logging and maintenance requirements.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location. The sessions at the factory include a factory tour. Refer to the schedule page for individual class locations.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the operating characteristics of Trane model RTAE rotary chiller
- Understand Trane RTAE rotary chiller construction and the physical relationship of components
- Understand GP4 compressor operation
- Understand the RTAE CHIL evaporator construction and operation
- Become familiar with Trane RTAE UC800 control platform and operating logic
- Understand the field service, maintenance, and limitations of Trane RTAE rotary chillers

- Understand the AFD3 Drive as it relates to Trane RTAE rotary chillers

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for owners, contractor and in-plant HVAC service technicians who will work regularly with Trane RTAE rotary chillers. This course is primarily classroom oriented.

### Prerequisites

Technician must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers and/or the Trane CH530 chiller control system would be helpful but are not required.

## Course outline

- RTAE Helical-Rotary Chiller Specifics
    - RTAE Features Overview
    - RTAE Refrigeration Cycle
    - Main Component Overviews
  - Performance/Parameters
    - Operation & Advantages
    - AHRI Conditions
    - Operational/Logging Parameters
  - GP4 (CHHS) Compressor
    - Construction
    - Oil Distribution
    - Trane AFD3 Operation
    - Capacity Control
  - CHIL Evaporator
    - Construction
    - Operation
    - Oil Return
    - Freeze Avoidance
    - Liquid Level Sensor Operation
    - Electronic Expansion Valve Operation
  - RTAE Oil Circuits
    - Polyol-Ester Oil/R-134a
    - Oil Distribution
  - Transverse “V” Condenser
    - Ambient Options
    - Condenser Fan Staging
    - Corrosion Protection
    - Maintenance
  - Tracer UC800 AdaptiView Control
    - Control Platform
    - AdaptiView Control Logic
    - Operator Interfaces
      - TD7 AdaptiView Display
  - Operation/Capabilities
  - Menu Structure
  - Diagnostics
    - Active
    - Historic
- \*Courses held in Pueblo, Colorado, have a manufacturing plant tour



## RTAF Rotary Chillers

**Length:**  
3 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
RTAE

### Course description

This course is designed to assist the Service Technician in becoming proficient in the maintenance of the RTAF Sintesis unit platform. This program will also give the technician the ability to identify specific problems associated with diagnostics. After completing the program the technician should be able to verify proper unit operation and performance.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location. The sessions at the factory include a factory tour. Refer to the schedule page for individual class locations.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the theory of operation of the RTAF.
- Understand how TR200 Drives have been implemented
- Understand the problems associated with oil loss
- Know how the AFD can increase efficiency
- Know how to identify what problems can occur because of AFD
- Understand oil return

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for owners, contractor and in-plant HVAC service technicians who will work regularly with Trane RTAE rotary chillers. This course is primarily classroom oriented.

### Prerequisites

Technician must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers and/or the Trane CH530 chiller control system would be helpful but are not required.

## Course outline

- Helical Rotor Compressor Development
  - Advantages
  - Compression Cycle
  - Capacity Control
  - Oil Management
  - Efficiency
- Trane Series R® Compressor
  - Rotors
  - Bearings
  - Motor
  - Slide Valve
  - Female Step Load
  - Lubrication Circuits
  - Motor Starters
- Chiller Construction
  - Heat Exchangers
  - Refrigeration Circuit
  - Metering Devices
- RTAF TU Control Platform
  - Control Platform
  - Adaptive Control Logic/Functions
  - Operator Interfaces
  - Diagnostics
  - Programming
  - LLID (Low-Level Intelligent Device) Concepts

\*Courses held in Pueblo, Colorado, have a manufacturing plant tour

## RTHD Rotary Chillers

**Length:**  
3 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
RTHD

### Course description

This course covers the operation and maintenance of Trane® model RTHD helical rotary chiller with Tracer™ CH530 and UC800 control platforms. Coverage includes discussion on the CH530 and UC800 micro electronic controls in addition to refrigeration system components and operational logging. Emphasis will be placed on chiller sequence of operation, construction of refrigeration system components and the chiller's Adaptive Control™ system logic.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location. The sessions at the factory include a factory tour. Refer to the schedule page for individual class locations.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the operating characteristics of Trane model RTHD helical rotary chillers
- Understand the differences between Tracer CH530 and UC800 control platforms
- Understand the field service, maintenance and limitations of Trane model RTHD rotary chillers
- Learn Trane model RTHD rotary chiller compressor operation with and without TR200 VFD

### Who should attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane Series R chillers. This course is primarily classroom

oriented but provides important in-depth technical details useful for technicians transitioning to service work on these products.

### Prerequisites

The technician must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers is recommended and/or Trane's UCP1 and UCP2™ is helpful but not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

## Course outline

- Introduction
  - Course Overview and Objectives
  - La Crosse Training Center Logistics
- Helical Rotor Compressor Development
  - Advantages
  - Compression cycle
  - Capacity Control
  - Oil Management
  - Efficiency
- The Trane Series R Compressor
  - Construction
  - Operation
    - Loading/Unloading
    - Oil Distribution
    - Check Out
- Chiller Construction
  - Heat Exchangers
    - Evaporator Construction
    - Condenser Construction
  - Refrigerant Circuit
    - Evaporator Performance
    - Motor Cooling
  - Metering Devices
- RTHD CH530 and TU Control Platform
  - Control Platform
  - Adaptive Control Logic/Functions
  - Dyna-View and TD7 AdaptiView™ Operator Interfaces
    - Operation/Capabilities
    - Resistive Touch Screen
    - Menus/Sub-menus
  - Tech-View and TU Software Interface
    - Operational Capabilities
    - Laptop/Connection
    - Requirements
- Machine Views
  - Configuration
  - Binding View
  - Software Download/Updates
- Diagnostics
  - LLID (Low-Level Intelligent Device) Operation
  - Frame-Mounted LLIDS
  - Panel-Mounted LLIDS
  - LLID Binding/Replacement
- Hands on Control Platform Exercises or Plant Tour
  - Plant tour will only be provided with courses scheduled at the Pueblo, Colorado Trane plant

## RTWD Rotary Chillers

**Length:**  
3 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
RTWD

### Course description

This course provides service technicians an in-depth understanding of the controls, maintenance and troubleshooting of Trane® model RTWD (CH530) helical rotary chiller. The course also provides insight into compressor design, unit operation, unit performance and service diagnosis.

Note: This course may be held at the Training Center in La Crosse, Wisconsin, at the factory or an alternate location. Sessions at the factory include a factory tour. Refer to the schedule page for individual class locations.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand the theory of operation of the Trane RTWD
- Become familiar with the Trane RTWD platform service procedures to include maintenance and troubleshooting
- Understand the CH530 control system
- Know how the GP2 compressor operates
- Understand the gas pump operation
- Understand the problems associated with oil loss
- Understand oil return

### Who should attend

The course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane Series R chillers. This course is primarily classroom-oriented but provides important in-depth technical details useful for technicians transitioning to service work on these products.

### Prerequisites

The technician must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers is recommended and/or Trane's UCP1™ and UCP2™ is helpful but not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

### Course outline

- Introduction
  - Course Overview and Objectives
  - La Crosse Training Center Logistics
- Helical Rotor Compressor Development
  - Advantages
  - Compression cycle
  - Capacity Control
  - Oil Management
  - Efficiency
- The Trane Series R® Compressor
  - Rotors
  - Bearings
  - Motor
  - Slide Valve
    - Load Solenoid
    - Unload Solenoid



- Female Stepper
- Lubrication Circuits
  - Oil Separator(s)
  - Oil Tank
  - Oil Cooler
  - Oil Distribution System
  - Oil Return Systems
- Gas Pump
  - Operation
  - Troubleshooting
- Motor Starters
  - Starter Terminology
  - Types of Starters
  - Starter Components
- Chiller Construction
  - Heat Exchangers
    - Evaporator Construction
    - Condenser Construction
  - Refrigerant Circuit
    - Evaporator Performance
    - Motor Cooling
  - Metering Devices
- RTWD CH530
  - Control Platform
  - Adaptive Control Logic/Functions
  - Operator Interfaces
    - DynaView
      - Operation/Capabilities
      - Resistive Touch Screen
      - Menus/Sub-menus
    - TechView
      - Operational Capabilities
      - Laptop/Connection Requirements
      - Machine Views
      - Configuration
      - Binding View
      - Software Download/Updates
  - Diagnostics
  - Programming

- LLID (Low-Level Intelligent Device) Operation/Concept
  - Frame-Mounted LLIDS
  - Panel-Mounted LLIDS
  - LLID Binding
  - LLID Replacement

- Plant Tour (Pueblo Sessions Only)



## Precedent™ Voyager™ Rooftops (3–25 Ton Units)

**Length:**  
3.5 days

**Day and time:**  
Tues–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Precedent

### Course description

This course is designed to provide commercial service technicians in-depth comprehensive coverage of the Trane Precedent and Voyager rooftops with ReliaTel™ controls. The course focuses specifically on these Trane products. Upon course completion, students will have been exposed in detail to the mechanical, electrical and control systems of these units and will have become knowledgeable in the start-up, maintenance and troubleshooting requirements of these products.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand product airflow properties, dynamics and adjustment procedures
- Demonstrate the ability to read and follow a ReliaTel schematic
- Employ proper mechanical cooling and heating system startup procedures
- Gain understanding of heating components operation and troubleshooting
- Demonstrate the ability to test and troubleshoot Zone Sensor modules
- Apply proper techniques to service, diagnose and troubleshoot Precedent and Voyager rooftops with ReliaTel controls
- Explain the operation of the ReliaTel economizer with CO2 and DCV control

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

Note: Courses may be held at the training center in La Crosse, Wisconsin, at the factory or an alternate location. Refer to the schedule page for individual class locations.

### Who should attend

This course is intended for commercial rooftop service technicians who have a good understanding of both constant volume and variable air volume rooftops and systems and who need extended knowledge of the Trane Precedent and Voyager rooftops.

### Prerequisites

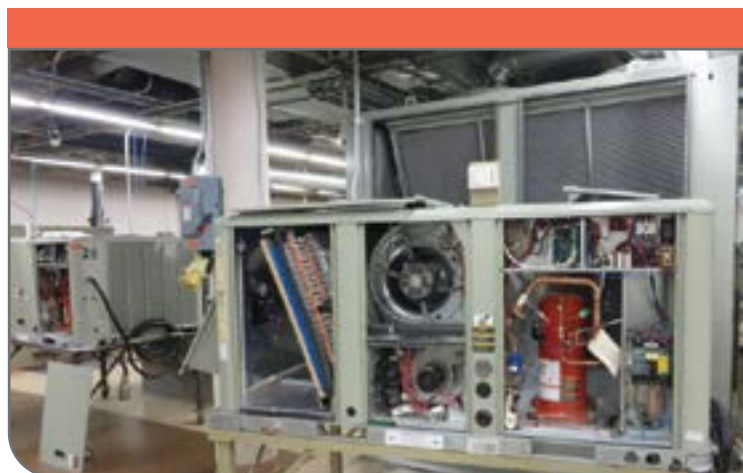
Students should have a good understanding of both the refrigeration and combustion cycles and understand airflow dynamics. Students should be able to follow electrical ladder diagram logic and be familiar with commercial unitary equipment sequence of operation.

## Hands-on lab units

- Precedent Updates
  - Direct Drive Plenum Fan, Single Zone VAV, Multizone VAV, eFlex compressor, TD5 Display, R410A Refrigerant, Hot Gas Reheat (Dehumidification)
- Voyager Updates
  - Multizone VAV, eFlex compressor, TD5 Display, Single Zone VAV, R410A Refrigerant, Hot Gas Reheat (Dehumidification), Modulating Gas Burner, Demand Control Ventilation with CO2

## Course outline

- Introduction
  - Welcome
  - Course Content
  - Safety
- Precedent/Voyager Products
  - Standard Features
  - Options
- Cooling
  - Scroll Compressors
    - Basic Construction
    - Operation/Checkout
    - Failure Modes
    - Change-out Procedures
    - Oil Concerns
  - Condenser Performance
  - Metering Devices
    - Fixed Orifice
    - TXV
  - Evaporator Performance
  - Refrigeration Cycle
    - Logging
    - Diagnosis
    - Troubleshooting
- Heating
  - Gas Heat
    - Components
    - Combustion Cycle
    - Setup
    - Operation
    - Troubleshooting
- Airside
  - Airflow Terminology and Measurement Techniques
  - Constant Volume vs. VAV
  - Fan Maintenance
    - Belts/Drives/Setup
  - Economizers
    - Types
    - Operation
- ReliaTel Controls
  - Control Modules
    - RTRM
    - RTOM
    - TCI/LCI
    - RTAM
    - RTVM
  - Module Inputs/Outputs
    - Analog Inputs/Outputs
    - Binary Inputs/Outputs
  - Field-Installed Sensors
    - Types
    - Operation
  - Wiring Diagrams
    - Sequence of Operation
    - Troubleshooting Logic





## IntelliPak® I & II Rooftop Units

**Length:**  
4.5 days

**Day and time:**  
Mon–Thurs, 8 a.m.–4:30 p.m.;  
Fri, 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
IntelliPak

### Course description

This course is designed to provide coverage of Trane IntelliPak I and IntelliPak II rooftop units. The course focus is on operation, start-up and maintenance of 20- to 130-ton IntelliPak I and 90- to 162-ton IntelliPak II rooftop units. Proper service techniques will be discussed to include correct maintenance procedures and intervals. Factory recommended installation and start-up procedures will also be discussed. Attendees will be able to start-up, operate and program unit control microprocessors. Attendees will also understand control logic and check-out procedures with unit diagnostics. Upon course completion, students will have been exposed to the mechanical, electrical and control systems of these units and will have become knowledgeable in the start-up, service and maintenance requirements of these products.

Note: Courses may be held in two locations – at the training center in La Crosse, Wisconsin, and at the factory. The sessions at the factory DO NOT include live unit hands-on but DO include a factory tour. Refer to the schedule page for individual class locations.

We recommend taking the Commercial Burner Service class for in-depth hands-on training on IntelliPak I and II Burners.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand refrigeration cycle applied to the IntelliPak rooftops

- Employ proper mechanical systems startup service and troubleshooting procedures
- Be able to navigate the human interface
- Overview of heating components operation and checkout
- Apply maintenance/service schedules
- Learn to properly configure and set up IntelliPak control systems
- Practice exceptional lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for rooftop service technicians who have a good understanding of both constant volume and variable air volume rooftops units and systems and need additional knowledge regarding startup and maintenance procedures of Trane IntelliPak rooftop units.

### Prerequisites

Students must have a good understanding of both the refrigeration and combustion cycles and understand airflow dynamics. Students should be able to follow electrical ladder diagram logic and be familiar with commercial unitary equipment sequence of operation.

## Plant tour requirement

Leather shoes which give good protection and long trousers are required for plant tours. This applies to all class locations.

## Hands-On Lab Units

- R410A Refrigerant
- Microchannel Coil
- Return Fan
- Exhaust Fan
- Single Zone VAV
- Rapid Restart
- Traq Fresh Air Measurement
- StatiTrac Building Pressure ControlBurner, Demand Control Ventilation with CO2

## Course outline

- Introduction
  - Welcome
  - Course Content
  - Training Facility Orientation
- IntelliPak Controls
  - Terminology
  - System Control Types
  - IntelliPak Modules
  - Zone Sensors
  - Analog/Binary Inputs
  - Pressure Transducers
  - IntelliPak Schematic Overview
  - Human Interface Programming
  - Service Mode and Diagnostics
- Basic Sequences of Operation
  - Occupied Unoccupied
  - Constant Volume and Variable Air Volume
  - CV Heating Sequences
  - VAV Heating Sequences
  - Fresh Air Control
  - Economizer
  - Demand Control Ventilation with CO2
  - Traq Fresh Air Measurement
  - Head Pressure Control
  - Loss of Charge Protection
  - StatiTrac Building Pressure Control
- Mechanical
  - Unit Logging
  - Superheat and Sub-cool Measurement
  - Refrigeration Components
  - R22, R410A
  - Microchannel Coil
  - Scroll Compressors
  - Modulating Dehumidification
  - Hot Gas Bypass
  - Compressor Replacement
- Heating
  - Gas Heating Overview
  - Electric Heat
  - Hot Water
  - Steam Heat
- Airside
  - Airflow Terminology
  - Forward Curved Fans
  - Airfoil Fans
  - Direct Drive Plenum Fans
  - Variable Frequency Drives
- Supply Fan
- Exhaust Fan
- Return Fan
- Exhaust Damper Control
- Fresh Air Damper Control
- Course Wrap-up
  - Materials Review
  - Questions and Answers
  - Completion Certificates and Dismissal

## Commercial Rooftop Burner Service

**Length:**  
3 days

**Day and time:**  
Tues–Thurs, 8–4:30 p.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Rooftop Burner

### Course description

This course covers the operation and setup of the gas burners used in the following Trane Commercial Rooftop Units (RTU): Precedent™ 3 to 10 tons, Voyager™ 12.5 to 50 tons, IntelliPak® I 20 to 130 tons, and IntelliPak II 90 to 162 tons. Centering on lab exercises the service technician will be introduced to the various burners currently used in Trane units from a setup and service perspective. Classroom lecture and exercises will support the hands-on labs. This course applies to new system startup as well as existing buildings.

The lab exercises are designed around several working natural gas burners in our La Crosse, Wisconsin, training lab including the multi-stage and modulating burners used on commercial rooftop units of 3 to 162 tons. During the lab exercises, students will use the various tools needed to set up and service each burner type. Each student has the opportunity to go through the hands-on exercises as well as to observe other students.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand and practice gas burner safety
- Gain a working understanding of the fundamentals of gas combustion
- Have a theoretical as well as a practical understanding of the flame sensing circuit used in this equipment
- Know how to set up and use a flue analyzer to properly test and adjust the burner

- Apply maintenance/service schedules
- Have hands-on practice setting up each of the several burner types
- Perform proper startup on two-stage Precedent burner
- Perform proper startup on two-stage and modulating Voyager burner
- Perform proper startup on IntelliPak I two-stage and modulating burners
- Perform proper startup on IntelliPak II Power Flame modulating burner

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog. It is expected the student will adhere to all other safety requirements as they arise.

### Who should attend

This course is recommended for Trane service technicians and others involved with system commissioning or with ensuring that an HVAC system is operating correctly and efficiently. Though geared for service technicians, anyone involved with ensuring that a system is set up to work as efficiently as possible will benefit.

## Prerequisites

Participants attending this course must have strong HVAC skills or an understanding of gas combustion principles and a desire to understand the importance of proper burner setup to ensure a safe and reliable installation. Participants must be able to read and interpret wiring diagrams and understand the proper use of tools used in setting up a burner.

## Course outline

- Introduction
  - Welcome
  - Course Content and Objectives
  - Training Facility Orientation
  - Lab safety
- Combustion Basics
  - Combustion Process
  - Products of Combustion
  - Gas Heat Values
  - Flue Gas Testing Basics
  - Flame Sensing Theory and Practical
  - Hands-on Lab: Combustion Analyzer Familiarization
- Precedent 1 and 2 Stage Burner
  - Components
  - Theory of Operation
  - Hands-on Lab: Burner Setup and Troubleshooting
- Voyager 2 Stage and Modulating Burner
  - Components
  - Theory of Operation
  - Hands-on Lab; Burner Setup and Troubleshooting
- IntelliPak I 2-Stage and Modulating Burner
  - Components
  - Theory of Operation
- Hands-on Lab: Burner Setup and Troubleshooting
- IntelliPak II 2-Stage and Modulating Burner
  - Components
  - Theory of Operation
  - Hands-on Lab: Burner Setup and Troubleshooting
- Course Wrap-up
  - Materials Review
  - Questions and Answers
  - Knowledge Check
  - Completion Certificates and Dismissals

## Scroll Chiller Service & Troubleshooting

**Length:**  
3.5 days

**Day and time:**  
Tues–Thurs: 8 a.m.–4:30 p.m.;  
Fri: 8–11 a.m.

**Register here:**  
[Trane Education Center](#)

**Recommended search:**  
Scroll Chiller

### Course description

This service level course covers the operation, diagnosis and troubleshooting for Trane® model CGAM liquid chiller 20 to 130 tons and CGWF scroll chiller 20 to 60 tons with additional detailed coverage of R-22 and R-410a refrigeration system components, chiller logging and maintenance procedures.

Trane scroll CSHA, CHSD and CSHN compressors construction, operation, maintenance requirements and troubleshooting will also be discussed. Factory recommended installation, start up procedures and chiller logging will be discussed in detail.

Note: This course may be held at the Training Center in La Crosse, Wisconsin; at the factory in Pueblo, Colorado or an alternate location.

### Specific course objectives

Upon completion of this course, participants should be able to:

- Understand chiller construction and the relationship of components
- Understand the field charging, handling and troubleshooting of R-22 and R-410a scroll refrigerant systems
- Learn CSHA, CHSD and CSHN compressor construction, operation and maintenance
- Understand unit wiring and interconnecting diagrams
- Understand proper installation, start up and maintenance procedures
- Be able to set up, program and troubleshoot the CH530 chiller control platforms
- Be able to perform a chiller service log and compare to design performance parameters

### Lab safety

Student participation in any hands-on “live-circuit exercise” portion of this course is dependent upon adherence to the safety prerequisites located on page five of the catalog.

### Who should attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane CGAM and/or CGWF scroll chillers. In the La Crosse factory training facility, there is extensive hands-on training.

### Prerequisites

Technicians must have solid electrical skills equal to HVAC Electrical Troubleshooting. Service experience with other types of liquid chillers and/or Trane’s chiller control systems would be helpful but are not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

### Plant tour requirement

Leather shoes which give good protection and long trousers are required for plant tours.

Students attending the course in Pueblo, Colorado, should bring a basic function electronic calculator.

## Course outline

- Introduction
  - Course Overview and Objectives
  - La Crosse Training Center Logistics
- Scroll Chiller Specifics
  - CGWF Chiller Component Overview
  - CGAM Chiller Component Overview
  - Scroll Chiller Refrigeration Cycle
- Scroll Chiller Concept
  - Operation & Advantages
  - AHRI Conditions
  - Machine Logging
    - R-22 Systems
    - R-410a Systems
  - Operational Parameters
    - R-22 Systems
    - R-410a Systems
- CSHA/CSHD/CSHN Scroll Compressor (R-410a)
  - Construction
  - Bearing Configuration
  - Oil Distribution
  - Minimum On/Off Times
  - Troubleshooting
- Evaporators
  - Tube and Shell
  - Brazed Plate
    - R-22
    - R-410a
  - Water Flow/Performance Calculation
- Freeze Avoidance
  - Pump Control
  - Heat Tape Operation/Wiring
  - Adaptive Control
  - Ifm Effector Flow Switch (CGAM)
- Condensers
  - Air Cooled–CGAM
  - Water Cooled–CGWF
    - Service
    - Proper Charging Techniques
    - Proper Recovery Techniques
  - Heat Exchanger Troubleshooting
    - Approach Temperature
    - Operating Temperatures/Pressures
    - Sub-cooling
    - Non-condensables
  - Maintenance
    - Intervals
    - Proper Techniques
    - Acceptable Chemicals
- Expansion Valves
  - Electronic Expansion Valves
    - Operation
    - Troubleshooting
  - Thermostatic Expansion Valves
    - Operation
    - Troubleshooting
- Tracer CH530 Adaptive Control™
  - Control Platform
    - Main Processor
    - LLID (Low Level Intelligence Device)
- Adaptive Control Logic
- Operator Interfaces
  - DynaView
    - Operational Capabilities
    - Menu/Submenus
  - TechView Service Tool
  - Operational Capabilities
  - Trane.com
    - Software Download
    - Configuration
    - Binding–LLID Replacement
    - Reports
- CGAF IntelliPak™ Control Package
  - Control Modules
  - Service
    - Verifying Outputs
- Installation and Start-up
  - Installation Electrical
    - Proper Wiring
    - Access
    - Rated Voltage/Amperage
  - Installation Mechanical

## Online Classes

### Introduction: Online Classes

Technical Service Training has a growing list of online e-learning courses that are available 24 hours a day, which allow you the opportunity to get training at your own pace. To see the courses that are currently available, follow the procedure below:

- Login to the [Trane Education Center](#)
- Click on Catalog and then Browse
- Click on Technical Service Training

All e-learning offerings are available in the Technical Service Training e-learning category.

A detailed description of each module appears on the opposite page.



## Online Classes

### IntelliPak® Human Interface Navigation and Status Menu

**Length:**

1 hour

**Register here:**

[Trane Education Center](#)

**Recommended search:**

IntelliPak Human

**Course description**

The IntelliPak Human Interface Navigation and Status Menu program walks a service technician through basic navigation and status screens for IntelliPak Rooftop Units 20 to 162 tons.

## Online Classes

### ReliaTel™ Zone Sensor Testing

**Length:**

30 minutes

**Register here:**

[Trane Education Center](#)

**Recommended search:**

Reliatel

**Course description**

This course is designed to provide Trane service technicians with in-depth information on ReliaTel Zone Sensor Module testing and troubleshooting.

**Specific course objectives**

Upon completion of this course, participants should be able to:

- Understand the basic operation of a Zone sensor
- Gain understanding of how to properly test the Zone Sensor Module
- Gain understanding of troubleshooting the Zone Sensor Module









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