Catalogue

Educational

CAREL's program of training courses to make the best use of HVAC/R application technologies and systems





Educational

CAREL's experts are available to provide specific training on new technologies and the optimal configuration of typical HVAC/R application architectures and systems.



CAREL's training courses are designed to provide a complete overview of its tools and products.

The standard courses are available in English and Italian, based on a set calendar, while dedicated courses can be requested by contacting your sales representative.

What you get from taking part in our training courses:

- Certificate of participation: a certificate will be issued to participants who pass the final test. Some courses may require a minimum number of hours of attendance;
- Course materials: at the end of the course, all of the materials will be provided to participants;
- CAREL manuals: links will be provided for downloading CAREL manuals

Taking part in a CAREL training course will help you:

- Expand your knowledge on the functions of the tools and products, and learn how to use them autonomously;
- Improve your work, whether design, installation, configuration or field services, or simply using the products.

The training courses will be held at the CAREL Knowledge Centre, a 4500 m² space devoted to experimenting, research and training for the HVAC/R market.

Upon request, and for some courses only, the courses can be offered in webinar mode.



Vertical experience in the HVAC/R sector

By acquiring thermodynamic skills and knowledge of CAREL's most advanced software and digital technologies.



New experiences from around the world

Participants from all over the world can share and compare experiences.



Workshops and simulators for real use experiences

Not just theory, but practical exercises that let to expand your knowledge of our tools and products.



STone basic course

The STone tool basic course is aimed at users who are approaching the development tool for the first time.

The STone basic course analyses the main functions of the development tool, with explanations and many practical exercises. Participants will thus have a complete overview of the main product features.

At the end, participants will have a simple program for Chiller units that manages:

- temperature control with set point/differential for 4 ON/OFF compressors;
- display values, states, parameters and alarms via pGD1 terminal;
- management of high temperature, frost protection, probe fault alarms;
- management of unit status via keypad;
- · communication with other devices via Modbus Server and Client protocols;
- data logger.

Furthermore:

- loading the SW onto a physical controller and a virtual controller;
- translation of pGD1 user interface texts into different languages;
- automatic test configuration;
- unit of measure conversion management;
- troubleshooting using various debugging tools.



NOTICE:

The course is focused on the use of the development environment, therefore no commercial information will be provided (prices, range of terminals/ controllers, etc.) or information regarding the hardware (connection of probes or devices, types of device connections, characteristics of the connection cables, etc.).

- Application project life cycle: how to create a new application program:
- how the control strategy is defined;
- how the user interface is defined;
- how to simulate the program on a PC and on the controller (debug on target);
- how to load the program onto the controller (USB & ETHERNET);
- how to backup the project.
- Strategy editor: how to create a parameter (example: set point, number of compressors):
 - how to create simple control strategies using basic elements and structured text (ST) programming language statements: IF, FOR, ARRAY, STRUCT;
 - how to create and use a Function/ FunctionBlock;
 - how to enable the operation of a device (for example a compressor based on the number of compressors configured);
 - how to read/write physical inputs/ outputs;

- how to manage protocols (exercise with Modbus Server and Client);
- unit of measurement management (°C/°F, bar/psi, ...);
- alarm management (message on the display, buzzer, red LED);
- how to manage the built-in Datalogger;
- how to create and install a .pack update package;
- User Interface editor: how to create a new screen (user interface page):
 - how to define the function of a button (Key Function Editor);
- how to enable a screen based on a configuration parameter (example: based on the number of compressors configured);
- how to create a loop (group) of screens;
- explanation of the typical structure of the user interface;
- alarm management;
- multi-language application management (for example, Italian/ English/Chinese);
- display static and dynamic images.



Item code	9STSW06Q1*
Duration	32 h
Type of course	in attendance
Workshop	yes
Level	basic
Maximum number of participants	10

* Replace the asterisk in the item code with the letter corresponding to the area where the course is provided.

• Debugging:

- display variable values ("watch") and function block inputs/outputs;
- debugging using breakpoints, stepby-step simulation;
- online debugging;
- profiling, code coverage, snapshot target log.
- Implementation of a test plan using "Automatic Tests";
- Library management: use, creation, editing;
- · Controller firmware update;
- Introduction to development guidelines;
- How to get technical support.
- Topics may change without notice.



STone Commissioning Tool – basic course

The STone Commissioning Tool basic course is aimed at users who are approaching the commissioning tool for the first time.

The STone Commissioning Tool basic course analyses the main functions of the development tool, with explanations and many practical exercises. Participants will thus

have a complete overview of the main product features.



Topics

- Overview of commissioning tools;
- Explanation of the workflow that is common to all commissioning tools;
- How to create the "workspace" (file that describes the variables used and their properties);
- Definition of Configurations, Profiles, Parameter descriptions, Tags;
- Export the workspace and upload to the "Content Manager" cloud portal;
- Packet Coordinates: the four data

items that uniquely identify the SW application for a specific customer; Basic use of commissioning tools:

- Spark;
- Sparkly;
- Applica Desktop;
- Applica Mobile (via Bluetooth gateway).

Item code	9STSW07Q1*
Duration	8 h
Type of course	in attendance
Workshop	yes
Level	basic
Maximum number of participants	10

* Replace the asterisk in the item code with the letter corresponding to the area where the course is provided.



c.suite

The c.suite basic course is aimed at users who are approaching the development tool for the first time.

The c.suite basic course analyses the main functions of the development tool, with explanations and many practical exercises. Participants will thus have a complete overview of the main product features.

At the end, participants will have a simple program for Chiller units that manages:

- temperature control with set point/differential for 4 ON/OFF compressors;
- display of values, states and parameters via pGD1 terminal;
- management of high temperature, frost protection, probe fault alarms;
- management of unit status via keypad;
- communication with other devices via Modbus Master and Slave protocols;
- · Datalogger, web server.



NOTICE:

The course is focused on the use of the development environment, therefore no commercial information will be provided (prices, range of terminals/ controllers, etc.) or information regarding the hardware (connection of probes or devices, types of device connections, characteristics of the connection cables, etc.).



Item code	9STSW01Q1*
Duration	24 h
Type of course	in attendance
Workshop	yes
Level	basic
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

program for communication with tERA

- c.factory Editor
- how to load project files onto the controller (USB & ETHERNET)
- how to create and install an .AP1 update package
- Debugging
 - online debugging
 - display of variable values ("spy list") and function block inputs/outputs
 - step-by-step simulation
- use of break points
- Introduction to the web server (pGDweb and Web trends)
- Introduction to development guidelines.
- Introduction to development
 methodology (optional)
- How to get technical support
 Topics may change without notice.

Topics

•Introduction/Objective of the course

•Life cycle of an application project:

- how to create a new application program (Solution Explorer window)
- how to define the control strategy (c.strategy Editor environment)
- how to define the user interface (c.mask Editor environment)
- how to simulate the program on a PC and on the controller (Online Debug)
- how to load the program onto the controller (c.design/c.factory environment)
- how to backup the project
- c.strategy Editor
- how to create a parameter (example: set point, enable cooling)
- how to use and connect function blocks
- how to create and use a Function/ FunctionBlock
- how to enable operation of a device (for example, a compressor)

- c.mask Editor
- how to create a new screen (user interface page)
- how to define the function of a key (Key Function Editor)
- how to enable a screen based on a configuration parameter (example: enable cooling)
- how to create a loop (group) of screens
- explanation of the typical structure of the user interface
- alarm management
- multi-language application management (for example, Italian/ English/Chinese)
- c.design Editor
 - how to define an I/O configuration
 - how to manage protocols (exercise with Modbus Slave)
 - how to create a parameter configuration
- how to manage the built-in Datalogger
- how to prepare the application



c.web

The c.web basic course is aimed at users who are approaching the development tool for the first time.

The c.web basic course analyses the main functions of the development tool, with explanations and many practical exercises. Participants will thus have a complete overview of the main product features. Some pages are built starting from scratch so as to view and modify the values and parameters in the c.pCO application created during the c.suite course.



Item code	9STSW02Q1*
Duration	8 h
Type of course	in attendance
Workshop	yes
Level	basic
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

NOTICE:

Although c.web can be used to create web interfaces for both the c.pCO system and supervisory systems (BOSS / tERA / RemotePRO / PlantVisorPRO), this course is optimised for the c.pCO system. For information on courses optimised for supervisory systems, please contact the sales network.

Topics

- •Project management (create a new project, programming, upload to c.pCO, etc.).
- Basic widgets: Label, Images, Thermometers, Value settings, ... (temperature display, compressor status, unit status, ...)
- Display objects depending on a condition (e.g. image of a compressor when the compressor is on)
- Widget animation through wizard and Java script (intro)
- Create widgets from scratch and modify library widgets

- Manage languages and translations
- How to embed generic HTML code (e.g. complex objects such as code for displaying active alarms, logs, pGDweb)
- How to create a new web page and move from one to another
- Presentation of c.web project templates.

Local supervisors and cloud portals

Supervisors (boss family)

Learning in detail how to install and configure the supervisors becomes fast, efficient and secure service for your customers, who will thus be able to make the most of their products. Correct configuration includes alarm notifications, automated management of daily activities and more efficient operating costs. The course is dedicated to installers and system integrators.

**on request the course can be offered in webinar mode



- Commissioning and initial configuration
- Introduction to Boss family supervisors
- Commissioning and initial configuration
- · Configuration of serial lines and communication protocols
 - Configuration of serial lines based on the device model and communication protocol
- Third-party device management
- · Description of the devices and customisation possibilities
 - Setting parameters and managing favourite variables
- · Creation of data reports and related scheduling

- Report creation procedure for analysis of logged data
- Introduction to scheduled reporting functions
- Setting and use of notification channels
- Notification channels (email, Telegram, SMS, relay)
- Logic applied for internal rules and management of alarms and events
 - Creation of rules for the automatic management of alarms and sending notifications
- Scheduling of periodical actions
 - Scheduled management of activities (send reports, modify parameters, heartbeat)
 - Purpose and use of the system

Item code	9STIT07Q1*
Duration	6 h
Type of course	in attendance**
Workshop	no
Level	basic
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

calendar

- Interaction with external BMS
 - Main communication protocols that can be enabled via plug-ins (Bacnet, SNMP, Modbus)



c.web for supervisors (boss family)

For personnel involved in installing and configuring the supervisors, the knowledge acquired during the course allows them to make the supervisor data immediately available and easy to read for the end user, through quick creation of custom pages using c.web and autonomous creation of maps for individual devices or more complex systems.

*on request the course can be offered in webinar mode



- · Installation and commissioning
 - c.web installation
 - Boss demo installation
- An overview of the tool
 - Project Console
- webMI server configuration
- First test project
 - Datapoint acquisition setup
 - Demo server
 - Project deployment

- · Graphic elements
 - Displays and object displays
 - Quick dynamics and simple dynamics - Library management
- Create an example map
- Preliminary exercise
- Create a first dashboard
- Documentation
 - Resources available for developers

Item code	9STIT04Q1*
Duration	6 h*
Type of course	in attendance*
Workshop	yes
Level	intermediate
Maximum number of participants	10





Local supervisors and cloud portals



Cloud portals - RED optimise

The in-depth knowledge of the tool provided during the course means cloud portal users will be able to manage the connected systems/sites more efficiently, as well as improve management of the personnel involved in the various related activities.

**the course can also be offered in webinar mode; the duration of the course may vary



- Purposes of the course
- Prerequisites for connecting supervisors to RED optimise
- Integration of supervisors into RED optimise
- Main features of RED optimise
- Configuration of KPIs to populate dashboards
- General overview of dashboards
- Prerequisites
 - Type of connections
 - Plugin activation
- Access to the RED optimise portal
- Login
- Users & user migration
 Local users
- Integration of supervisors into Red optimise
- Boss side
- RED optimise side
- Remove a system from RED optimise
- Home page
 - List of systems
 - Geolocation
 - Global dashboard
 - Supervisor status list
- Alarms
 - Active alarms
 - Reset alarms
 - Statistics
 - Degree of maintenance
 - Alarm notification
- Models
 - Load models
 - Model parameters for KPIs
- Efficiency dashboard energy consumption
 - Setting (type of load)
 - Consumption
- Quality dashboards KPI configuration
- Auto-configuration
 - Templates Template configuration settings
- System configuration
- Device configuration

- Thresholds Threshold configuration
- settings
- Control
- HACCP report
- System connectivity dashboard
- List of events
- Broadcast
 - Prerequisites and rule configuration
 - Scheduling
- Results
- FAQs



* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.



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MPX series advanced configuration - MPXzero

The course aims to train personnel responsible for installing and configuring these controllers, with in-depth information on the features of the devices and new technologies (apps), and on troubleshooting features via mobile and PC apps. The knowledge acquired during the course allows customers to be offered efficient service, both in terms of configuration and support, guaranteeing optimised operating costs due to correct food preservation and reduced energy consumption

**on request the course can be offered in webinar mode





- Quick overview
- Background and contextualisation
- Complete product offering (MPXzero Basic and Advanced)
- Hardware description and options
 - Models and features
 - List of available I/Os, sensors, analogue outputs
- External connectivity and serial ports
- Starting the controller: first steps
 Description of the display, menu
 - navigation and passwords
 - Wizard, how to set the first parametersReset the controller
 - Reset the controller
 - MPXzero basic features
 - Input/output configurationTemperature control and virtual probe configuration

- Single and dual compressor management
- MPXzero Advanced and VCC compressor management
- Fixed- and variable-speed fan management
- MPXzero advanced features
- Anti-sweat heater management
- Defrost functions
- Main/secondary network configuration
- Generic stage, modulating and alarm functions
- Installation and configuration tool
 - Applica app (connection and navigation, NFC and BT options)
 - Applica desktop for PC (connection and navigation)

- Wizard via app
- Set parameters, upload and download configurations and upload firmware
- Real-time data log
- Alarm management
- Connect MPXzero to the Boss supervisor
- How to configure MPXzero on Boss
- Available parameters and options
- Practical example with a single
 MPXzero and an M/S network



MPX series advanced configuration - MPXone

Aimed at installers, the course provides the knowledge needed to provide customers correct controller configuration and thus optimise their operating costs due to food storage and energy consumption. The course provides specific details on the new features and technologies (apps). It also helps reduce response times in the event of malfunctions, through knowledge of the troubleshooting features via app, both mobile and PC.

**on request the course can be offered in webinar mode





- Quick overview
- Background and contextualisation
- Complete product range (MPXone Medium and Advanced)
- Hardware description and options
 Models and features
 - Models and features
 - List of available I/Os, sensors, analogue outputs
- External connectivity and serial ports
- Starting the controller: first steps
 Description of the display, menu
 - navigation and passwords
 - Wizard, how to set the first parameters
- Reset the controller
- MPXone basic features
- Input/output configuration Temperature control and virtual probe
 - configuration

- Single and dual compressor management
- Fixed- and variable-speed fan management
- MPXone advanced features
- Anti-sweat heater managementDefrost functions
- Main/secondary network configuration
- Generic stage, modulating and alarm functions
- Electronic expansion valves management
 - Driver type
 - PID management
 - Smooth lines function
- Installation and configuration tools
 - Applica app (connection and navigation, NFC and BT options)

- Applica desktop for PC (connection and navigation)
- Wizard via app
- Set parameters, upload and download configurations and upload firmware
- Real-time data log
- Alarm management
- Connect MPXone to the Boss
 supervisor
 - How to configure MPXone on Boss
 - Available parameters and options
 - Practical example with a single MPXone and an M/S network





pRack: solutions for compressor racks (Basic)

The course provides in-depth knowledge of possible controller configurations and basic features, such as input and output configuration, basic management of compressors and fans, and valve parameter settings for a transcritical CO2 cycle. The main benefits deriving from the course include being independently able to download, convert and upload a configuration and performs basic diagnosis, as well as correctly size a board and configure the controller in a CAREL supervisory system.



- Overview of control
 - Complete offering and contextualisation
 - pRack300/300T hardware description
 - pRack300/300T main differences
 - Software overview and multi-board configuration
- Installation and commissioning
- Initial setup (wizard)
- Description of the display
- Menu navigation
- Manage a configuration
 - Download and upload a configuration with USB flash drive
 - Introduction to the RHEC manager tool
- Download, convert and upload a configuration with RHEC manager
- Practical example with the simulator

- Manage standard controller features
 - Main compressor parameter settings
 - Main condenser parameter settingsOptions and customisations available
- pRack PID
 - Set the proportional and proportional+integral algorithm correctly
 - How the dead band works and how to set it correctly
- pRack300T for transcritical CO2
 - Introduction to the concept of transcritical CO2 and additional features
 - Purpose of the HPV valve and correct parameter settings
 - RPRV valve management and correct parameter settings
- pRack 300/300T High Speed (HS) version.

Item code9STRP02Q1*Duration6 hType of coursein attendanceWorkshopyesLevelBASICMaximum number
of participants10

- Differences and compatibility with the standard pRack series
- Field replacement
- Repairing controllers
- pRack board sizing
 - Description of the Excel tool
 - Example of board sizing with Excel tool
- Connect pRack to the Boss supervisor
 - How to configure the pRack controller in the Boss supervisor
 - Available parameters and options
 - Practical example with the simulator and the Boss demo



pRack: solutions for compressor racks (Advanced)

The aim of the course is to provide participants with in-depth knowledge of advanced control features, such as heat recovery and oil management, making them able to independently create additional functions, as well as use the RHEC manager. The expertise acquired in management of the controller and its configurations is useful in responding to customer requests, thanks to the ability to use the many extra features available in the software, such as management of a CO2 water chiller, management of backup valves, and synchronisation between lines.



- Complete description of the controller's standard features
- Advanced compressor management (single and double inverter, different types of compressors, alarm management, floating suction)
- Advanced fan configuration (inverter, alarms, floating condensation, high pressure prevention function)
- pRack300T parallel compressor
- Purpose of the parallel compressor
- Single and multi-compressor configuration
- Heat recovery with pRack300T
- Introduction to heat recovery
- Available options
- Passive and active heat recovery
- Heat recovery characteristics and actions
- Gas cooler bypass

......

- Generic functions
 - Introduction to and main differences between the generic functions
 - Additional generic analogue and digital inputs
 - Create a custom feature using a generic function
 - Practical example with the simulator
 - Additional features of pRack300T
 - Dual line synchronisation (DSS)
 - Chiller function with transcritical CO2

Rec

- pRack300T backup valve management
- Oil management on pRack300T
- Ejectors
- How the ejector works
- Operation overview
- RHEC management software
- PC connection
- Software update

Item code9STRP03Q1*Duration6 hType of coursein attendanceWorkshopyesLeveladvancedMaximum number
of participants10

- Browser software emulatorMonitor internal variables
- pRack 300/300T High Speed (HS) version
- Differences and compatibility with the standard pRack series
- Field replacement
- pRack returns with RMA
- Connect pRack to the Boss supervisor
- How to configure the pRack controller in the Boss supervisor
- Available parameters and options
- Log new variables
- Practical example with the simulator and Boss demo
- Floating suction configuration





High efficiency solutions (Heos)

The course aims to train personnel responsible for installing and configuring these controllers, with in-depth information on the features of the devices and new technologies (apps), and on troubleshooting features via mobile and PC apps. The knowledge acquired during the course allows customers to be offered efficient service, both in terms of configuration and support, guaranteeing optimised operating costs due to correct food preservation and reduced energy consumption.

RHEC manager installed and basic knowledge of the tool

**on request the course can be offered in webinar mode

Item code	9STRP00Q1*
Duration	6 h
Type of course	in attendance**
Workshop	no
Level	basic
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.



 Guide to selecting the Heos kit to be combined with the showcase (PI or SPI)

Requirements:

- Tips/checklist for installing Heos units (ours or other OEMs) -> special focus on multi-evaporator configuration and oil return
- Tips/checklist for unit commissioning
- Troubleshooting examples

- Guide to the technical documentation
 available
- Main software features of the application
- Guide to using the RHEC manager SW
- Examples of creating and managing configurations (DEV)
- Predictive maintenance through dashboards/analytics



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Humidification systems

Basic humidification



Topics

- Isothermal humidifiers (humiSteam, heaterSteam, gaSteam)
- Operating principle
- Summary of correct installation methods
- Commissioning
- Planned preventive maintenance and unscheduled service
- Adiabatic humidifiers (humifog, humisonic, optimist)
- Operating principle
- Summary of correct installation methods
- Commissioning
- Planned preventive maintenance and unscheduled service

- Evaporative cooling (chillbooster)
 - Operating principle
 - Summary of correct installation methods
 - Commissioning
 - Planned preventive maintenance and unscheduled service
 - Water treatment systems (WTS)
 - Operating principle
 - Summary of correct installation methods
 - Commissioning
 - Planned preventive maintenance and unscheduled service
- Remote control (DigitalHum)
- Installation and configuration

Item code	9STHU00Q1*
Duration	16 h
Type of course	in attendance
Workshop	yes
Level	basic
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

- Use for planned preventive maintenance and prevention of alarms that shut down the humidifiers

Advanced humidification



- New humidifiers included in the Humidification Catalogue
- Any updates or technical information relating to existing humidifiers
- Advanced troubleshooting and description of the types of warnings or alarm signals generated by humidifiers, in relation to the request for planned preventive maintenance, unscheduled service or repairs

Item code	9STHU01Q1*
Duration	4 h**
Type of course	in attendance
Workshop	yes
Level	advanced
Maximum number of participants	10

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

**the course program may be subject to change based on releases and updates available at the time the course is delivered.

DigitalHUM cloud portals



- DigitalHUM overview
- Introduction of the features and presentation of the portal, with live demos and practiial examples
- Documentation and references
- Configuration guide

Item code9STIT03Q1*Duration2 hType of coursein attendance/
webinarWorkshopnoLevelbasic

Maximum number

of participants

* Replace the star in the article code with the letter corresponding to the area in which the course is delivered.

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Natural refrigerants and new technologies



Natural refrigerants and new technologies

Training course designed to provide not only an overview of natural refrigerant technologies, but also information on regulations and safety



- Refrigerant regulations in Europe and the rest of the world
- Safety regulations for the use of flammable refrigerants in refrigeration and air conditioning equipment and

systems (IEC 60335-2-40, IEC 60335-2-89, ATEX)

Ammonia

• Natural refrigerant technologies: CO2 (subcritical and transcritical), propane and ammonia

ltem code	9STTI00Q10
Duration	6 h
Type of course	webinars
Workshop	no
Level	basic
Maximum number of participants	10

Legislation and certifications



Connected units: guide to regulations

Specific to European legislation, the course provides information on the regulatory framework applicable to connected units for correct management of CE marking and certifications.



- Introduction to the regulatory framework applicable to connected units
 - Overview of the directives ((LVD, EMC, RED) and their application
 - Application of the regulatory framework to a product and related test plan
 - CE marking and/or certification: how to complete the procedures and the differences between them

Item code	9STTI01Q10
Duration	3 h
Type of course	webinars
Workshop	no
Level	basic
Maximum number of participants	10

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