



TtControl
HYDAC INTERNATIONAL

Training Catalog

TTC : ACADEMY

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General information

TTC Academy

TTC Academy has been originated with the primary purpose to train customers using TTControl products. Training courses range from one-day sessions to an entire week covering all TTControl hardware products.

Technical equipment

Special built all-purpose training kits are used to provide a realistic environment and the possibility to simulate every input and output on TTControl's controllers.

Scheduling

Our standard training day lasts 7 hours starting at 9 a.m. and is divided into a theoretical part and a hands-on workshop. This is an optimal combination of theory and practice to provide maximum success to participants.

Training locations

Standard trainings are held either in our Brixen (IT) office or the HYDAC Training Center in Sulzbach (GER). These locations offer the best environment to present and set up the hands-on workshops.

Optionally individual trainings and workshops can also be scheduled directly at your facilities. Similar to standard trainings, we provide special training equipment to make the training as successful as possible.

Dates and prices

For actual dates and prices please refer to www.ttcontrol.com/news-events/events or contact us via email (training@ttcontrol.com).





Controller

Controller basics and introduction to CODESYS

Code: TTC_BASE_01

This seminar is intended for manufacturers who want to gain knowledge in controller basics and CODESYS. It's not directly related to a special TTControl product, but the contents of this training are prerequisites for further TTControl controller and HMI trainings.

Objectives

- » Understanding basics of controllers
- » Understanding the principle of CODESYS programming

Prerequisites

- » Technical background
- » Programming skills

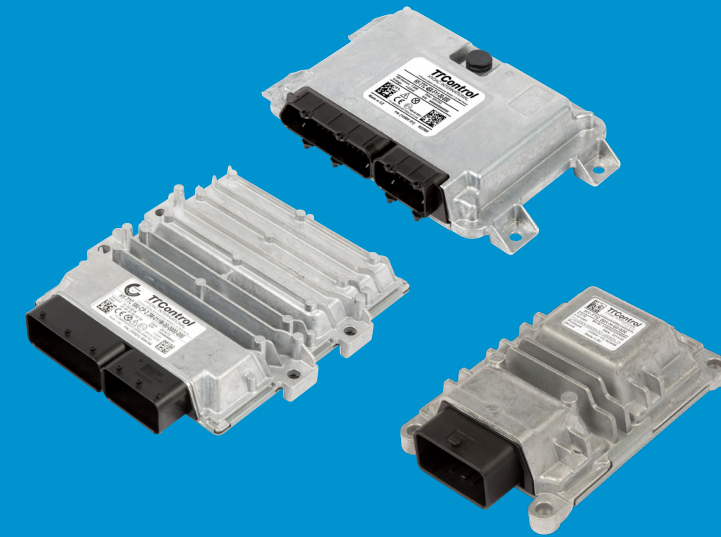
Contents

- » Main components of a controller
- » Connectors and plugs
- » Processor and memory

- » Inputs and outputs
- » Communication interfaces
- » Basics in functional safety according to EN ISO 13849
- » Introduction to CODESYS
- » Differences between CODESYS and C
- » Programming in CODESYS

Duration

1 day (approx. 4 hours of theory + approx. 3 hours of practice)



This seminar is intended for manufacturers who want to gain knowledge in controller basics and CODESYS.

HY-TTC 32 – programming in CODESYS V2.3

Code: *TTC_CD30_01*

This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 32 devices into their system. The focus of this seminar is basic programming of the HY-TTC 32 using CODESYS.

Objectives

- » Understanding hardware characteristics of TTControl's HY-TTC 32 controller
- » Understanding how to develop applications using CODESYS

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C

Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller
- » Differences between specific controller variants
- » Installing the programming environment

- » Use of inputs, outputs and communication channels within the programming environment
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory + approx. 5 hours of programming)



*The focus of this seminar is
basic programming of the
HY-TTC 32 using CODESYS.*

HY-TTC 30X or HY-TTC 48X – CANopen training I/O module

Code: TTC_IOX_01

This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 30X or HY-TTC 48X I/O module into their system. The focus of this seminar is the implementation of I/O modules to TTControl's programmable controller and its configuration.

Objectives

- » Understanding hardware characteristics of TTControl's I/O modules
- » Understanding the principles of CANopen
- » Understanding how to develop applications using CODESYS in combination with CANopen

Prerequisites

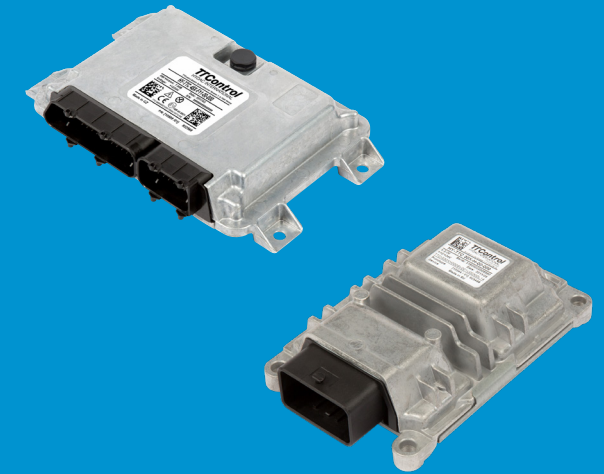
- » Knowledge of controller basics
- » Knowledge of CODESYS or C
- » Basic knowledge of CAN communication

Contents

- » Characteristics of inputs and outputs of I/O modules
- » Communication interfaces of I/O modules
- » Differences between specific variants
- » Installing the programming environment
- » Use of inputs, outputs and communication channels within the programming environment
- » Configuration of a CANopen I/O module using a TTControl master controller
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory +
approx. 5 hours of programming)



This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 30X or HY-TTC 48X I/O module into their system.

HY-TTC 30XS or HY-TTC 48XS – CANopen safety training I/O module

Code: TTC_IOXS_01

This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 30XS or HY-TTC 48XS safety I/O module into their system. The focus of this seminar is the implementation of a safety I/O module to TTControl's programmable controller and its configuration.

Objectives

- » Understanding hardware characteristics of TTControl's safety I/O modules
- » Understanding the principle of CANopen and CANopen Safety
- » Understanding how to develop applications using CODESYS in combination with CANopen

Prerequisites

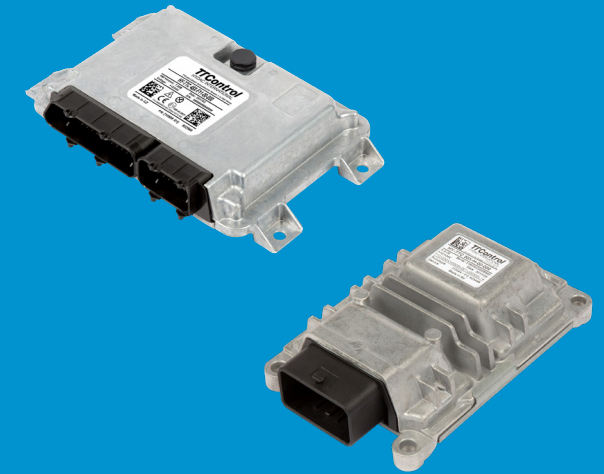
- » Knowledge of controller basics
- » Knowledge of CODESYS or C
- » Basic knowledge of CAN communication

Contents

- » Characteristics of inputs and outputs of I/O modules
- » Communication interfaces of I/O modules
- » Differences between specific variants
- » Safety-concept of the controller
- » Installing the programming environment
- » Use of inputs, outputs and communication channels within the programming environment
- » Configuration of a CANopen safety I/O module using a TTControl master controller
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory +
approx. 5 hours of programming)



The focus of this seminar is the implementation of a safety I/O module to TTControl's programmable controller and its configuration.

HY-TTC 50 family – programming in CODESYS V2.3

Code: *TTC_CD50_01*

This seminar is intended for manufacturers who want to integrate TTEControl's HY-TTC 50 family devices into their system. The focus of this seminar is basic programming of the HY-TTC 50 family devices using CODESYS.

Objectives

- » Understanding hardware characteristics of TTEControl's HY-TTC 50 family controller
- » Understanding how to develop applications using CODESYS

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C

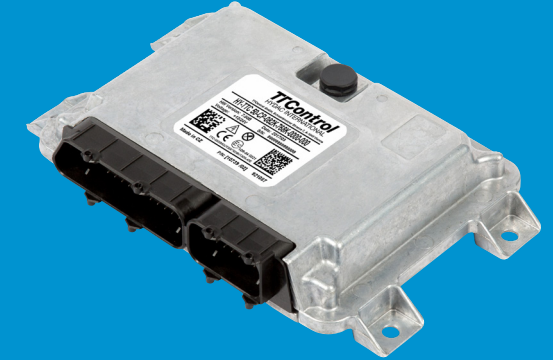
Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller
- » Differences between specific controller variants
- » Installing the programming environment

- » Use of inputs, outputs and communication channels within the programming environment
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory + approx. 5 hours of programming)



The focus of this seminar is basic programming of the HY-TTC 50 family devices using CODESYS.

HY-TTC 500 family – programming in CODESYS V3

Code: *TTC_CD500_01*

This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 500 family devices into their system. The focus of this seminar is basic programming of the HY-TTC 500 family devices using CODESYS.

Objectives

- » Understanding hardware characteristics of TTControl's HY-TTC 500 family controller
- » Understanding how to develop applications using CODESYS

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C

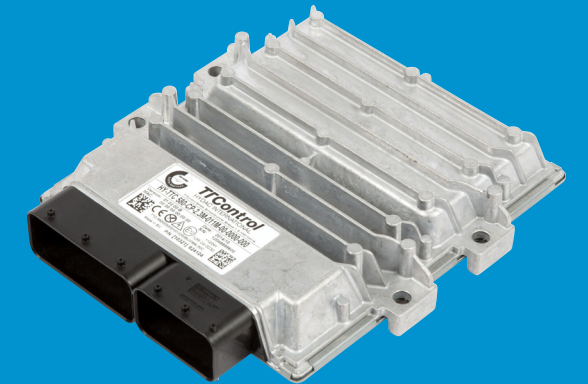
Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller
- » Differences between specific controller variants
- » Installing the programming environment

- » Use of inputs, outputs and communication channels within the programming environment
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory + approx. 5 hours of programming)



This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 500 family devices into their system.

HY-TTC 500 SIL 2 – safety programming in CODESYS V3

Code: TTC_CD500S_01

This seminar is intended for manufacturers who want to integrate TTControl's HY-TTC 500 family devices into their safety system. The focus of this seminar is basic programming of the HY-TTC 500 family devices using CODESYS and a SIL 2 plugin.

Objectives

- » Understanding hardware characteristics of TTControl's HY-TTC 500 family controller
- » Understanding how to develop applications using CODESYS
- » Understanding the safety concept of HY-TTC 500 family devices
- » Understanding how to use a SIL 2 plugin in CODESYS

Prerequisites

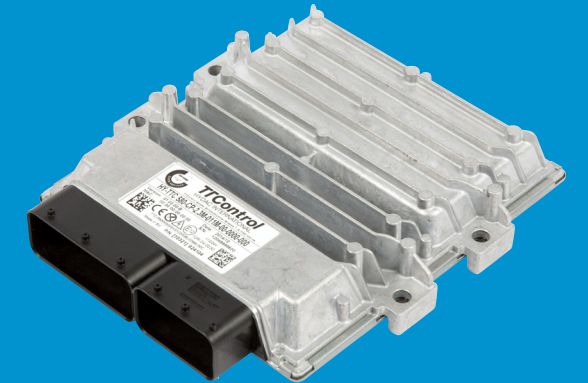
- » Knowledge of controller basics
- » Knowledge of CODESYS or C
- » Basic knowledge in functional safety

Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller
- » Differences between specific controller variants
- » Safety concept of the controller
- » Installing the programming environment
- » Use of inputs, outputs and communication channels within the programming environment
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory + approx. 5 hours of programming)



The focus of this seminar is basic programming of the HY-TTC 500 family devices using CODESYS and a SIL 2 plugin.



HMI

HY-eVision² family - programming in CODESYS V3

Code: TTC_CDVIS_01

This seminar is intended for manufacturers who want to integrate TTEControl's HY-eVision² family devices into their system. The focus of this seminar is basic programming of the HY-eVision² family devices using CODESYS.

Objectives

- » Understanding hardware characteristics of TTEControl's HY-eVision² family
- » Understanding how to develop applications using CODESYS

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C

Contents

- » Characteristics of HY-eVision² family
- » Communication interfaces of HY-eVision² family
- » Differences between specific HMI variants
- » Workflow for developing application projects with HY-eVision² family

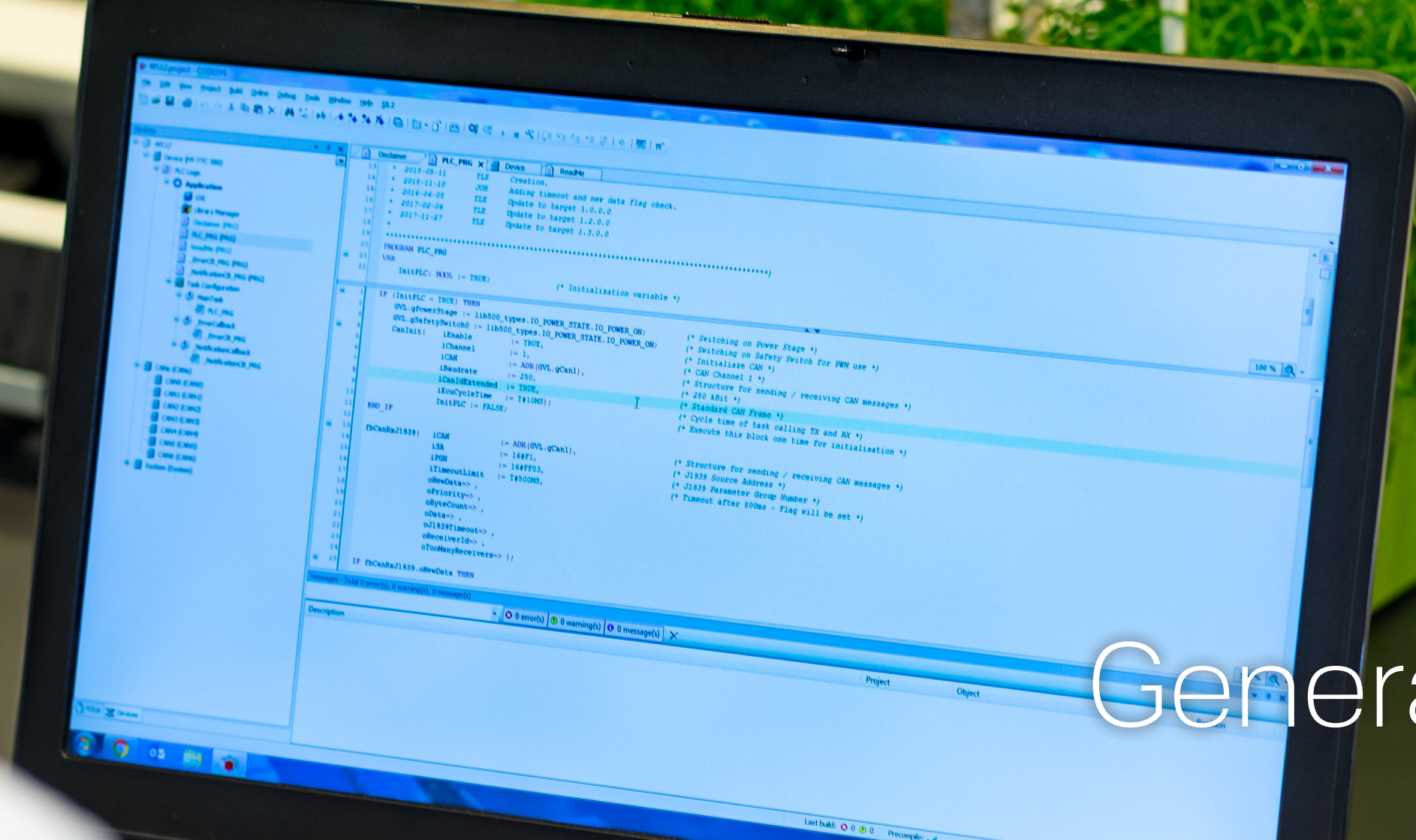
- » Understanding how to create visualization pages on HY-eVision² family
- » Using interfaces such as touch screen, keys, USB, camera of HY-eVision² family
- » Installing the programming environment
- » Use of communication interfaces within the programming environment
- » Download and debug applications

Duration

1 day (approx. 2 hours of theory + approx. 5 hours of programming)



The focus of this seminar is basic programming of the HY-eVision² family devices using CODESYS.



General

CAN, CANopen, J1939 – basics

Code: TTC_BASE_02

This seminar is intended for manufacturers who want to use CAN, CANopen and J1939 on TTControl devices. The purpose of this training is to show the principles of these communication standards and some basic programming with TTControl devices.

Objectives

- » Understanding CAN low level communication
- » Understanding principles of J1939
- » Understanding principles of CANopen
- » Use of these communication standards on TTControl devices

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C

Contents

- » Introduction to CAN
- » J1939 communication standard
- » CANopen communication standard

Duration

1 day (approx. 3 hours of theory + approx. 4 hours of programming)



CAN

This seminar is intended for manufacturers who want to use CAN, CANopen and J1939 on TTControl devices.

Functional safety – basic knowledge for users

Code: TTC_BASE_03

This seminar is intended for all manufacturers who have to develop safety-relevant functions in all aspects of mobile machinery.

Objectives

- » Understanding the requirements of EN ISO 13849
- » Obtaining an overview of EN ISO 13849 when developing safety functions for mobile machines

Prerequisites

- » None

Contents

- » EU directives, laws and engineer standards
- » Legal principles of functional safety
- » Basic definitions
- » Risk assessment according to EN ISO 12100:2010
- » Ways to determine and realizing the necessary performance level

- » Hardware requirements
- » Software requirements (V-Model)
- » Verification and validation of safety critical controls
- » Introduction to IFA Software SISTEMA

Duration

1 day



This seminar is intended for all manufacturers who have to develop safety-relevant functions in all aspects of mobile machinery.

CSE/M – certified safety engineer hydraulic mobile applications

Code: TTC_CSEM_01

This seminar is intended for all manufacturers who have to develop safety-relevant functions for mobile machinery with respect to the European machine directive. The seminar will be held by HYDAC Service GmbH, TTControl and with a final exam of SGS TÜV Saar. The whole seminar is based on certified training material and a certified trainer according to EN ISO 13849.

Objectives

- » Understanding safety principles from machinery directives to functional safety
- » Competence in the practical application of the standards in developing machine controls

Prerequisites

- » min. 2 years of job experience in functional safety
- » Knowledge about machinery directives and basic knowledge in risk assessment

Contents

- » EU directives, laws and engineer standards
- » Risk assessment according to EN ISO 12100:2010

- » Functional safety according to EN ISO 13849-1
- » Ways to determine and realizing the necessary performance level
- » Safety relevant sensors
- » Safety relevant actors and hydraulics
- » Safety relevant logic
- » Verification of the entire system
- » Systematic errors and validation
- » Introduction to IFA Software SISTEMA

Duration

4 days + TÜV exam



*The whole seminar is based
on certified training material
and a certified trainer
according to EN ISO 13849.*

MATCH

Code: TTC_MATCH_01

This seminar is intended for participants who want to learn the basics of MATCH, the Machine Application Tool Chain in combination with TTCControl controllers. Programming examples make it easy for participants to start programming directly after the seminar.

Objectives

- » Getting an overview of TTCControl controllers
- » Getting an overview of the tools provided by MATCH
- » Understanding how to use the Project Definition Tool (PDT) of MATCH to develop applications using C
- » Understanding how to use the Machine Service Tool (MST) of MATCH

Prerequisites

- » Knowledge of controller basics
- » Knowledge of C
- » Knowledge in CAN

Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller
- » Safety-concept of the controller
- » Workflow for developing application projects using MATCH
- » Installing the programming environment
- » Configuration of inputs, outputs and communication channels within PDT
- » Configuration of parameters and errors within PDT
- » Usage of library blocks within PDT
- » Usage of MST
- » Download and debug applications

Duration

2 days



*Programming examples
make it easy for participants
to start programming
directly after the seminar.*

Standard training week

Code: TTC_WEEK_01

The standard training week is a combination of four single training days covering all TTControl product families. This seminar is intended for participants who want to learn the basics of all TTControl products including programming examples using TTControl's training kits.

Standard training weeks are organized quarterly in Brixen (IT) and in Sulzbach (GER). Dates for standard training weeks can be found on TTControl's website.

Objectives

- » Understanding hardware characteristics of TTControl's controllers and HMIs
- » Understanding how to develop applications using CODESYS

Prerequisites

- » Knowledge of controller basics
- » Knowledge of CODESYS or C
- » Basic knowledge in CAN

Contents

- » Characteristics of inputs and outputs of the controller
- » Communication interfaces of the controller and HMI
- » Differences between specific controller variants
- » Safety-concept of the controller
- » Workflow for developing application projects with HY-eVision²
- » Understanding how to create visualization pages on HY-eVision²
- » Using interfaces such as touch screen, keys, USB, camera of HY-eVision²
- » Installing the programming environment
- » Use of inputs, outputs and communication channels within the programming environment
- » Download and debug applications

Duration

4 days – 1 day for each product – days can also be booked as single training days

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The standard training week is a combination of four single training days covering all TTControl product families.



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Printed by Paco Medienwerkstatt, Vienna

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