



eclipseina

List of Charging Trainings  
(Online, onsite and In-house)  
by Eclipseina GmbH  
Status May 2022



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## Training Dates and Registration

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### Training dates

All current dates can be found on our website: <https://eclipseina.com>

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### Registration

Please send us an e-mail to: [training@eclipseina.com](mailto:training@eclipseina.com)

Please include the following data:

- Training title:
- Training date:
- Name of participant:
- Participant's contact details:
- Company:
- Billing address:



# Trainings

## Introduction to Electric Charging

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### Electric Charging for Managers

#### Description

This training offers you a quick introduction to the topic of electric charging in the context of electromobility. You will first receive a general introduction to the topic of charging. Then we will go into electric driving and finally you will be familiarized with charging communication via Power-Line-Communication PLC.

#### Target Group

Line managers, project managers

#### Prerequisites

Electrical engineering basics are of advantage

#### Training Content

Introduction to electric charging

- Charging technology basics
- Charging with alternating current AC versus direct current DC
- Status quo

Introduction to electric driving

- Motivation for electric driving
- Energy consumption
- Development of the electric vehicle
- Current challenges of e-mobility
- Components of an electric vehicle

Introduction to the Power-Line-Communication PLC

- Overview of charging types, plugs and currents



- Pulse width modulation PWM and control pilot
- Orthogonal frequency division multiplexing and the billing system via PLC

### Duration

1 day

### Price

Online: 890 € per participant

Onsite: 990 € per participant

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## Electric Charging Introduction

In this training you will learn the basics of electric charging. First, you will receive a general introduction to the topic of charging. Then we will go into electric driving and finally you will be introduced to charging communication via Power-Line-Communication PLC.

### Target Group

Developers who want to get into the topic of charging

### Prerequisites

Electrical engineering fundamentals are of advantage

### Training Content

#### Electric Charging: Introduction

- Charging technology basics
- Differences between AC and DC charging
- Current status regarding electric charging

#### Electric driving: Introduction

- Why drive electric?
- Consideration of energy consumption
- The evolution of the electric vehicle over time
- Current challenges of e-mobility
- Overview of the different components of an electric vehicle



## Power line communication: Introduction

- Overview of different charging types, plugs and current levels
- Pulse width modulation PWM and control pilot CP
- Orthogonal frequency division multiplexing OFDM and the billing system via power line communication PLC

### Duration

1 day

### Price

Online: 690 € per participant

Onsite: 770 € per participant

## Charging communication for hardware developers

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### Introduction to hardware development for PLC in electric charging

In the first part of this training, you will get an introduction to charging, to electric driving. In the second part, charging communication via Power-Line-Communication PLC will be discussed in more detail.

### Target Group

Hardware developers who want to get into the development of components for charging communication

### Prerequisites

Electrical engineering fundamentals

### Training Content

#### Introduction

- Electric Charging: Charging technology, differences between AC and DC charging



- Electric driving: Motivation, energy consumption, evolution over time, challenges, components of the electrified powertrain

#### Power Line Communication PLC

- Introduction to PLC: charging types, connectors and currents, pulse width modulation PWM and control pilot CP, orthogonal frequency division multiplexing OFDM and the billing system via power line communication PLC
- Hardware consideration: Standardized charging interface, overview of network forms, components of the charging pole EVSE, sequence of charging communication, differences between various hardware components
- PWM signal: circuit for Control Pilot CP, tolerances and disturbances of the PWM signal, open points in the definition of the CP, detailed consideration of standards
- Power Line Communication PLC transmitter

#### Duration

2 days

#### Price

Online: 1290 € per participant

Onsite: 1390 € per participant

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## Hardware development and calibration of parameters

The first part of this training deals with the hardware for the Power-Line-Communication PLC. The second part deals with the Signal Level Attenuation Characterization SLAC and explains the SLAC functionality as well as the calibration of the SLAC.

#### Target Group

Developers who want to get into the development of components for charging communication

#### Prerequisites

Electrical engineering fundamentals, electrical charging fundamentals



## Training Content

Hardware considerations of the Power-Line-Communication PLC

- Hardware consideration: standardized charging interface, overview of network forms, components of the charging station EVSE, sequence of charging communication, differences between various hardware components
- PWM signal: circuit for Control Pilot CP, tolerances and disturbances of the PWM signal, open points in the definition of the CP, detailed consideration of standards
- Power Line Communication PLC transmitter

Signal Level Attenuation Characterization SLAC

- SLAC function: description of SLAC functionality, parking lot test
- Calibration description of SLAC: SLAC level measurement, measurement of SLAC with a test system

## Duration

2 Days

## Price

Online: 1290 € per participant

Onsite: 1390 € per participant

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## Expert training: PSD power spectral density calibration of PLC modems

PSD calibration of PLC modems according to ISO 15118-3 for EV and EVSE

In the first part of this training, we briefly discuss the hardware for the Power-Line-Communication PLC.

The second part deals with the Signal Level Attenuation Characterization SLAC and explains the SLAC functionality as well as the calibration of the SLAC.

You will get to know the PSD power spectral density calibration of PLC modems according to ISO15118-3 for EV and EVSE.





## Target Group

Hardware developers who develop or test controllers for charging communication.

## Prerequisites

Electrical engineering expertise, electrical charging fundamentals

## Training Content

Hardware considerations of the Power-Line-Communication PLC

### Introduction

- standardized charging interface
- different forms of networks
- charging station EVSE components
- charging communication sequence
- differences between various hardware components

### PWM signal

- Control Pilot CP circuit
- possible tolerances and disturbances of the PWM signal
- open points in the definition of the CP
- standards

### Power Line Communication PLC transmitter

PSD power spectral density calibration of PLC modems

### Signal Level Attenuation Characterization SLAC function

- description of SLAC functionality
- parking lot test

### Calibration description of SLAC

- SLAC level measurement
- measurement of SLAC with a test system
- PSD power spectral density calibration including practical exercise with expert equipment



Calibration is carried out in practical exercises with the aid of special measuring equipment.

#### Duration

1 Day

#### Price

Onsite: 1290 € per participant

## Charging communication for software developers

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### Introduction to software development for PLC in electric charging

In the first part of this training, you will get an introduction about charging, electric driving and about the Power-Line-Communication PLC. In the second part, the software stack in charging communication will be discussed in detail.

#### Target Group

Software developers who want to start developing components for charging communication

#### Prerequisites

Electrical engineering fundamentals are of advantage, software development experience

#### Training Content

##### Introduction

- Electric charging: Charging technology, differences between AC and DC charging
- Electric driving: Motivation, energy consumption, evolution over time, challenges, components of the electrified powertrain
- Introduction to PLC: charging types, connectors and currents, pulse width modulation PWM and control pilot CP, orthogonal frequency division multiplexing OFDM and the billing system via power line communication PLC

##### Charging communication in software



- Short introduction to Orthogonal Frequency Division Multiplexing OFDM and the billing system via Power-Line-Communication PLC
- V2G communication in the charging process, and start of charging communication
- OSI Layer 3 7 with IPv6, DHCPv6, UDP, TCP, TLS, V2G Session Layer, EXI, and Application Layer

### Duration

2 Days

### Price

Online: 1290 € per participant

Onsite: 1390 € per participant

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## Electric Charging Communication for Software Developers of SW Stack

In this training you will get to know the software stack necessary for charging communication.

### Target Group

Software developers who want to start developing components for charging communication

### Prerequisites

Software experience in the area of communication is an advantage

### Training Content

Introduction to Orthogonal Frequency Division Multiplexing OFDM

- Short introduction to OFDM

Charging communication in software

- V2G communication in the charging process, as well as start of charging communication
- OSI Layer 3 7 with IPv6, DHCPv6, UDP, TCP, TLS, V2G Session Layer, EXI and Application Layer



**Duration**

1 day

**Price**

Online: 790 € per participant

Onsite: 870 € per participant