



CHARX control modular

Installing and starting up the charging controller with firmware version 1.5.1

User manual

User manual

CHARX control modular

Installing and starting up the charging controller with firmware version 1.5.1

UM EN CHARX SEC, Revision 04

2024-03-14

This manual is valid for CHARX SEC-XXXX:

Designation	Firmware version	Item No.
CHARX SEC-3150	1.5.1	1138965
CHARX SEC-3100	1.5.1	1139012
CHARX SEC-3050	1.5.1	1139018
CHARX SEC-3000	1.5.1	1139022
CHARX SEC-1000	1.5.1	1139034

Table of contents

1	For your safety	7
1.1	Identification of warning notes	7
1.2	Qualification of users	7
1.3	Field of application of the product	8
1.3.1	Intended use	8
1.3.2	Area of application for charging controllers with cellular interface	9
1.4	Safety notes	10
2	CHARX control modular product family	13
2.1	Product overview of the product family	13
2.2	Ordering data	15
2.3	Application overview	17
2.3.1	The ETH1 interface is not available for access to the web-based management or unrestricted operation in Ethernet networks. Combination of CHARX SEC-3xxx and -1000 charging controllers	19
2.3.2	CHARX SEC-3xxx charging controllers in the Ethernet network	20
2.3.3	CHARX SEC-3xxx in a client/server group	21
2.4	Overview of the charging controller	24
2.4.1	Connections and operating elements	24
2.4.2	Indication elements	27
2.5	Software for the CHARX SEC-3xxx charging controller	28
2.5.1	Linux operating system	28
2.5.2	Directory structure and accessing the file system	29
2.5.3	Firewall and port sharing	30
2.5.4	Installing software on the charging controller	30
2.5.5	Resetting to default settings	31
2.5.6	Web-based management (WBM)	31
2.5.7	OCPP communication	32
2.5.8	Modbus/TCP	33
2.5.9	MQTT	35
2.5.10	Load management	36
2.5.11	ISO 15118 communication	39
3	Mounting the hardware	41
3.1	Transport, storage, and unpacking	41
3.2	Safety notes	42
3.3	Mounting the charging controller	43
3.4	Connecting the cables	44
3.5	Connecting Ethernet	46
3.6	Inserting the SIM card	47
3.7	Connecting the antenna	48

3.8	Inserting the microSD card	49
4	Connecting and wiring the hardware	51
4.1	Safety notes	51
4.2	Supply voltage.....	52
4.2.1	Dimensioning the supply voltage	52
4.3	Connecting the supply voltage	52
4.4	Connecting the charging interface.....	53
4.4.1	Charging stations with charging socket	53
4.4.2	Charging stations with charging connector	55
4.5	Connecting the load contactor.....	56
4.5.1	Load contactor for charging controllers without ISO/IEC 15118 communication	56
4.5.2	Load contactor for charging controllers with ISO/IEC 15118 communication	57
4.5.3	Monitoring the load contactor for malfunction	58
4.6	Residual current monitoring.....	59
4.6.1	Operation without a DC residual current sensor – with a type B residual current device	59
4.6.2	Operation with a DC residual current sensor	60
4.7	Connecting the energy measuring device.....	61
4.8	Connecting an RFID reader.....	62
4.8.1	Connecting an RFID reader from ELATEC	63
4.8.2	Connecting a DUALI DE-950-4 RFID reader	64
4.8.3	Connecting a CHARX RFID/NFC RFID reader	65
4.9	Connecting digital outputs	66
4.10	Connecting digital inputs	68
4.11	Connecting temperature sensors	69
5	Starting up the charging controller	71
5.1	Notes on the configuration of the CHARX SEC-1000	71
5.2	Access to CHARX SEC-3xxx charging controllers	71
5.2.1	Access via the USB-C interface	72
5.2.2	Access via an Ethernet network with router	73
5.2.3	Access via the Ethernet interface directly from the PC	74
5.3	WBM – Dashboard and Login.....	75
5.3.1	Dashboard	76
5.3.2	Language selection	77
5.3.3	Login	77
5.3.4	User roles	78
5.3.5	Change Password	78
5.4	WBM – Charging Stations	79
5.4.1	Configuration of the charging stations	79
5.4.2	Charging Stations/Charging Point/Status	82
5.4.3	Charging Stations/Charging Point/Configuration	87

5.4.4	Charging Stations/Charging Point/Event Actions	94
5.5	WBM – OCPP.....	104
5.6	WBM – Whitelist	109
5.7	WBM – Load Management.....	111
5.8	WBM – Network.....	115
5.8.1	Network/Ethernet	115
5.8.2	Network/Port Sharing	117
5.8.3	Network/Modem	118
5.9	WBM – System Control	120
5.9.1	System Control/Status	120
5.9.2	System Control/Time	121
5.9.3	Import/Export	121
5.9.4	System Control/Calibration Law	122
5.9.5	System Control/Developer Mode	123
5.9.6	System Control/Log Files	124
5.9.7	System Control/Module Switch	125
5.9.8	System Control/Software	126
6	Maintenance, repair, and disposal	127
6.1	Maintenance of the charging controller.....	127
6.2	Software update	127
6.3	Removing the hardware	128
6.3.1	Safety notes	128
6.3.2	Removal	129
6.4	Disposal	131
6.5	Device replacement.....	131
6.6	Device defects and repairs	132
A	Technical data	133
A 1	CHARX SEC-1000	133
A 2	CHARX SEC-3xxx.....	136
B	Error codes, protocols, and interfaces	141
B 1	Error codes	141
B 2	OCPP function and configuration overview	144
B 3	Modbus communication and register overview.....	148
B 4	MQTT topics.....	155
B 5	REST API	156

C Appendix for document lists..... 157

 C 1 List of figures 157

 C 2 List of tables 161

 C 3 Index..... 163

1 For your safety

Read this manual carefully and keep it for future reference.

1.1 Identification of warning notes



This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER

Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING

Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION

Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.



This symbol together with the **NOTE** signal word warns the reader of actions that might cause property damage or a malfunction.



Here, you will find additional information or detailed sources of information.

1.2 Qualification of users

The use of products described in this manual is oriented exclusively to:

- Electrically skilled persons or persons instructed by them. Users must be familiar with the relevant concepts and directives for installing electrical systems and maintaining electrical safety.
- Users who are familiar with the setup and startup of charging stations for electric vehicles and with the applicable standards and any additional national regulations.

1.3 Field of application of the product

1.3.1 Intended use

The charging controllers in the **CHARX control modular** series (CHARX SEC-XXXX) are designed for use in electric vehicle charging stations in accordance with IEC 61851-1, charging mode 3. The charging stations are permanently connected to the power grid. No other uses are permitted. Observe all applicable national requirements and regulations pertaining to the design of charging stations.

- This applies in particular when using charging connectors and charging sockets in accordance with IEC 62196.
- The housing of your charging station must suit the operating conditions and meet all applicable national requirements, e.g., IEC 61439-7.
- When selecting the housing, take into account the local ambient conditions (temperatures, sunlight, humidity, pollution).
- Observe the limit values and requirements for the charging controller, which are specified in the technical data (see [“Technical data” on page 133](#)). The housing design should satisfy these requirements.
- When connecting to the power grid, observe all applicable national and regional requirements (e.g., IEC 60364-7-722).



Check for latest firmware

For information on running firmware updates, refer to [“System Control/Software” on page 126](#).

Operate the charging controller with the latest firmware version.

The latest firmware version is available for downloading at the following URL: phoenixcontact.com/qr/1139012.

Observe the release notes regarding the firmware version.

Product changes

Modifications to hardware and firmware of the device are not permitted.

Incorrect operation or modifications to the device can endanger your safety or damage the device. Do not repair the device yourself. If the device is defective, please contact Phoenix Contact.

1.3.2 Area of application for charging controllers with cellular interface

Europa

The CHARX SEC-3100 and CHARX SEC-3150 charging controllers have an integrated 4G/2G cellular interface. They are intended for use within Europe.

Other countries

If the required general conditions are met, use in other countries is possible.



To gain an idea of which frequency bands are available in your country of use, visit www.frequencycheck.com.

You will find the frequency bands for your device under “[Frequency](#)” on page 138.

- Check with your provider whether any of these frequency bands are available at the installation location.
- Check with your provider whether there is network coverage at the installation location.
- Check with your provider whether the device is approved for operation at the installation location.

1.4 Safety notes

Observe the country-specific installation, safety, and accident prevention regulations.

Installation by specialist personnel only

The charging controller is a built-in device. Installation, startup, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described. When installing and operating the charging station for electric vehicles, the applicable regulations and safety directives (including national safety directives), as well as general technical regulations, must be observed. The safety data is provided in this manual, in the packing slip, and on the certificates (conformity assessment, additional approvals where applicable) in the download area for the relevant item. For example, for the item CHARX SEC-3100, 1139012, at phoenixcontact.com/qr/1139012.

Danger to life from electric shock

It may be necessary to connect to hazardous contact mains voltage to operate the charging controller. Protection against electric shock must be ensured.

Dangerous contact voltage

You may only install and remove the device when the power supply is disconnected. Only operate the device in closed housing that protects against electric shock.

Provide a disconnecting device for disconnecting the charging station from the voltage.

Potentially lethal voltage

The device contains dangerous live elements and high levels of stored energy. Never carry out work when voltage is present.

Before startup, observe the following

- Mains connection must be performed by specialist personnel. Protection against electric shock must be ensured.
- It must be possible to disconnect the device other than via the power supply in accordance with the regulations of IEC 61010 (e.g., via line protection on the primary side).
- Ensure supply lines have sufficient fuse protection and are the correct size.
- Ensure output cables are the correct size for the maximum device output current or have separate fuse protection.
- Ensure sufficient convection.

Risk of burns

The temperature of the connection terminal blocks may be increased during operation.

Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.

Do not open or modify the device

With the exception of configuration, opening or modifying the device is not permitted. Do not repair the device yourself; replace it with an equivalent device. Only the manufacturer is authorized to carry out repairs.

Operation in a clean and dry environment

The IP20 degree of protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. Only use the device in an environment that does not exceed pollution degree 2 in accordance with IEC 60664-1. Using the device in an environment that is outside of the specified limits may cause damage to the device.

Only operate the device in a housing that meets the requirements for charging stations.

Devices for an outdoor charging infrastructure: You achieve pollution degree 2 in the microenvironment, for example, by using a housing with IP5X degree of protection in accordance with IEC 60529.

Device failure outside permitted ambient temperature range

Operating the device in ambient temperatures that are not within the permitted range may lead to malfunctions or even device failure.

- Ensure that the device is operated within the permitted ambient temperature range ([“Technical data” on page 133](#)).

Device failure due to vibration and shock

If the device is subjected to vibrations and shock levels above the permitted specifications during operation, this may lead to malfunctions or even device failure.

- Ensure that the permitted specifications for vibration and shock are adhered to when operating the device (see [“Technical data” on page 133](#)).

Device failure due to foreign objects in device

Foreign objects in the device can lead to malfunctions or even device failure.

- Ensure that no foreign objects find their way into the device (e.g., into the vents, SIM card slot, SD card slot).

Network security: Risk of unauthorized network access

Connecting devices to a network via Ethernet always entails the risk of unauthorized access to the network.

Therefore, please check for the option of disabling active communication channels in your application (e.g., FTP, DCP, HTTP, HTTPS, etc.) or setting passwords to prevent third parties from accessing the controller without authorization and modifying the system.

Due to its communication interfaces, the controller should only be used in safety-critical applications if additional security appliances are used.

Please take additional protective measures in accordance with the IT security requirements and the standards applicable to your application (e.g., virtual networks (VPNs) for remote maintenance access, firewalls, etc.) to prevent unauthorized network access.

On first request, you shall release Phoenix Contact and the companies associated with PHOENIX CONTACT GmbH & Co. KG, Flachsmarktstrasse 8, 32825 Blomberg, Germany in accordance with §§ 15 ff AktG (German Stock Corporation Act), hereinafter collectively referred to as "Phoenix Contact", from all third-party claims made due to improper use.

For the protection of networks for remote maintenance via VPN, Phoenix Contact offers the mGuard product series security appliances; further information on this is available in the latest Phoenix Contact catalog (phoenixcontact.com/products).

Additional measures for protection against unauthorized network access can be found in the "Industrial Security" application note. The application note can be downloaded at phoenixcontact.com/qr/2404267.

- Application note, German, measures to protect network-capable devices with communication interfaces, solutions, and PC-based software against unauthorized access (AH DE INDUSTRIAL SECURITY)
- Application note, English, measures to protect network-capable devices with communication interfaces, solutions, and PC-based software against unauthorized access (AH EN INDUSTRIAL SECURITY)

Disposal

Do not dispose of the device with household waste, it should instead be disposed of in accordance with the currently applicable national regulations. It can also be returned to Phoenix Contact.

2 CHARX control modular product family

2.1 Product overview of the product family

Table 2-1 Product overview of the CHARX control modular product family

	CHARX SEC -1000	CHARX SEC -3000	CHARX SEC -3050	CHARX SEC -3100	CHARX SEC -3150
Interfaces for operating an AC charging point	x	x	x	x	x
Embedded system, web-based management, OCPP, load management		x	x	x	x
LAN/WAN Ethernet		x	x	x	x
4G cellular communication				x	x
ISO 15118			x		x

The electronics modules of the charging controllers feature the functions and interfaces required to perform a charging process in a typical AC charging station.

Charging point-specific interfaces and functions

- Interface for vehicle charging connector and infrastructure charging socket with control of locking mechanism and automatic release of the charging connector in the event of voltage failure
- Control of the charging contactor
- Connection option for an RFID reader for user release
- Connection option for a sensor for DC residual current detection
- Connection option for an energy measuring device to record the current charging current and energy values
- Digital inputs with configurable function assignment
- Digital outputs with configurable function assignment
- Temperature measurement via Pt 1000 sensors or PTC chains

An embedded system with Linux operating system is also integrated in the CHARX SEC-3xxx charging controllers. This system is the platform for the higher-level application software used to control the charging processes and to communicate with external systems.

The CHARX SEC-3xxx charging controller has additional communication interfaces that can be used to connect to external systems and other charging controllers.

CHARX SEC-3xxx functions and interfaces

- Linux-based embedded system and system software
- Two independent Ethernet interfaces for WAN/LAN and LAN/LAN operating modes
- 4G/2G cellular interface (CHARX SEC-31xx only)
- microSD card slot
- USB type C configuration interface

Application software and communication protocols

- Web-based management (WBM) for configuration, diagnostics, and operation (dash-board)
- Open Charge Point Protocol (OCPP) communication
- Load management for connected charging points
- Vehicle-to-grid communication in accordance with ISO/IEC 15118 (CHARX SEC-3x50 only)
- Modbus/TCP communication
- MQTT
- REST API

2.2 Ordering data

Charging controller

Description	Type	Item No.	Pcs./Pkt.
AC charging controller in accordance with IEC 61851-1 - Configurable charging controller - Stand-alone or client operating mode - Interface: CHARX control modular backplane bus - Connectable I/O devices: energy measuring device, RFID, DC residual current detection - DIN rail mounting	CHARX SEC-1000	1139034	1
AC charging controller in accordance with IEC 61851-1 as for CHARX SEC-1000, additionally: - Embedded Linux system - Interface: Ethernet (2x), USB type C - Communication protocol: OCPP 1.6J, Modbus/TCP, MQTT	CHARX SEC-3000	1139022	1
AC charging controller in accordance with IEC 61851-1, ISO/IEC 15118 as for CHARX SEC-3000 with ISO/IEC 15118	CHARX SEC-3050	1139018	1
AC charging controller in accordance with IEC 61851-1 as for CHARX SEC-3000, with cellular interface (4G/2G)	CHARX SEC-3100	1139012	1
AC charging controller in accordance with IEC 61851-1, ISO/IEC 15118 as for CHARX SEC-3100 with ISO/IEC 15118	CHARX SEC-3150	1138965	1

Accessories

Description	Type	Item No.	Pcs./Pkt.
Residual current sensor , residual current monitoring in accordance with IEC 62955 for disconnecting the power supply in charging stations for electric vehicles at DC residual currents >6 mA	EV-RCM-6DC-WAT	1309697	1
	EV-RCM-6DC-WAT-X10	1309695	10
Cable set for connecting the EV-RCM-6DC-WAT residual current sensor to modules in the CHARX control modular charging controller family, cables on one side with plug-in contact, 4-pos, length: 0.4 m	CHARX SEC JST-RCM-CBL	1360462	10
	CHARX SEC JST-RCM-CBL 100	1486193	

CHARX control modular

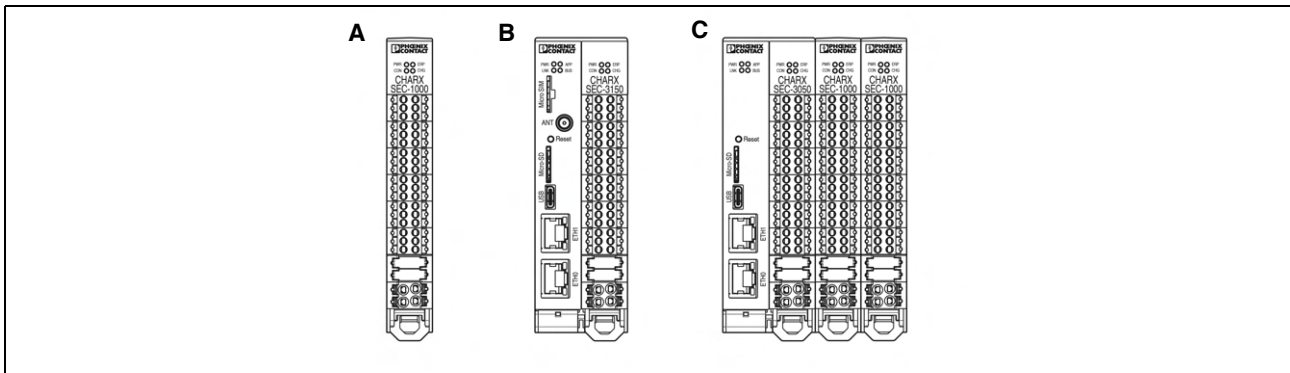
Accessories

Description	Type	Item No.	Pcs./Pkt.
RFID reader for connection to CHARX control modular charging controllers, PCB variant	EV-RFID-ELT-PCB	1309772	1
	EV-RFID-ELT-PCB-X10	1309752	10
	CHARX RFID/NFC-PCB	1391227	1
	CHARX RFID/NFC-PCB-X10	1399372	10
RFID reader for connection to CHARX control modular charging controllers, IP65 housing mounting	EV-RFID-ELT-IP65	1309687	1
Multiband cellular antenna with mounting bracket for outdoor installation, 5 m antenna cable with SMA circular connector, suitable for LTE/4G and 5G	TC ANT MOBILE WALL 5M	2702273	1

2.3 Application overview

The modular approach offered by the CHARX control modular product family allows you to set up various AC charging stations for electric vehicles in accordance with IEC 61851-1. The charging controllers can be operated autonomously or combined to create a group of multiple charging points, and can communicate with external systems.

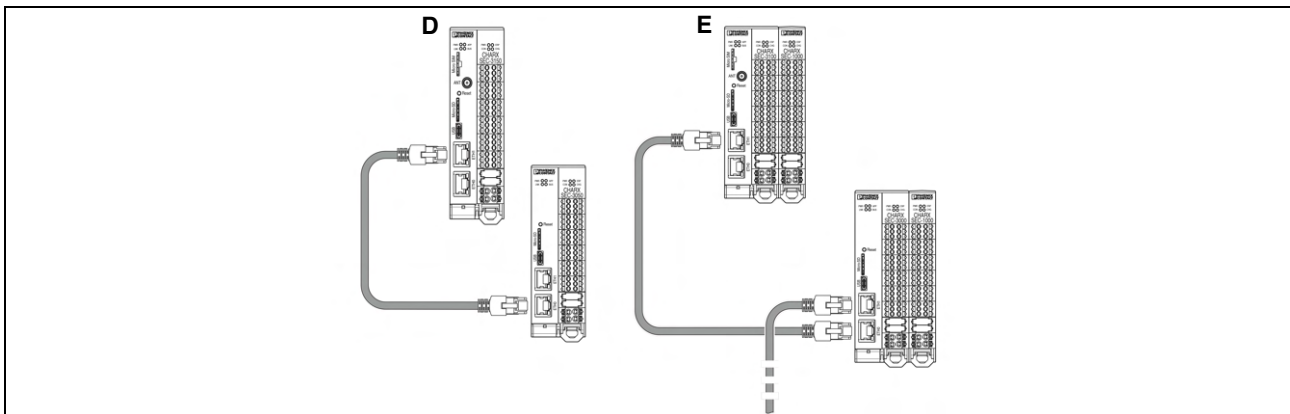
Figure 2-1 CHARX control modular application overview A-C



The charging controllers can be used in the following operating modes:

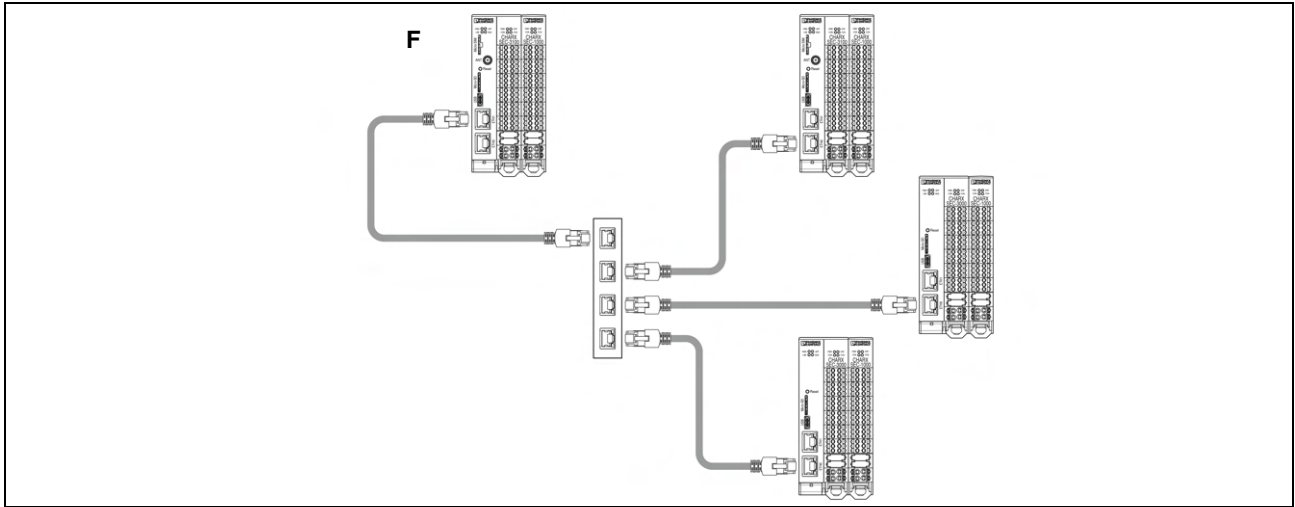
- A** Individual charging stations consisting of one CHARX SEC-1000 charging controller
- B** Individual charging stations consisting of one CHARX SEC-3xxx charging controller
- C** Multiple charging stations with a combination of CHARX SEC-3xxx and additional CHARX SEC-1000 charging controllers, attached via the backplane bus

Figure 2-2 CHARX control modular application overview D/E



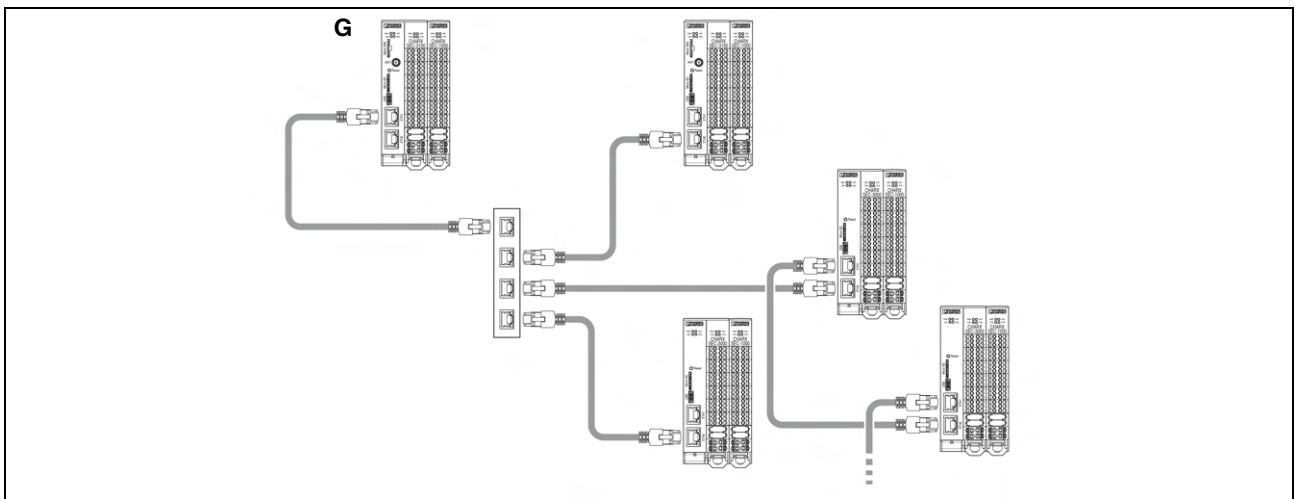
- D** Multiple charging stations with multiple CHARX SEC-3xxx charging controllers, connected via Ethernet using daisy chaining, not attached via the DIN rail connector
- E** Charging parks with multiple charging stations that are connected together via Ethernet using daisy chaining, each with at least one CHARX SEC-3xxx and possibly additional CHARX SEC-1000 charging controllers that are attached via the DIN rail connector.

Figure 2-3 CHARX control modular application overview F



F Charging parks with multiple charging stations that are connected together via Ethernet, centrally connected via a switch, each with at least one CHARX SEC-3xxx and possibly additional CHARX SEC-1000 charging controllers that are attached via the DIN rail connector.

Figure 2-4 CHARX control modular application overview G



G Charging parks with multiple charging stations that are connected together via Ethernet, centrally connected via a switch, each with at least one CHARX SEC-3xxx and possibly additional CHARX SEC-1000 charging controllers that are attached via the DIN rail connector. Additional SEC-3xxx charging controllers, connected via Ethernet using daisy chaining.



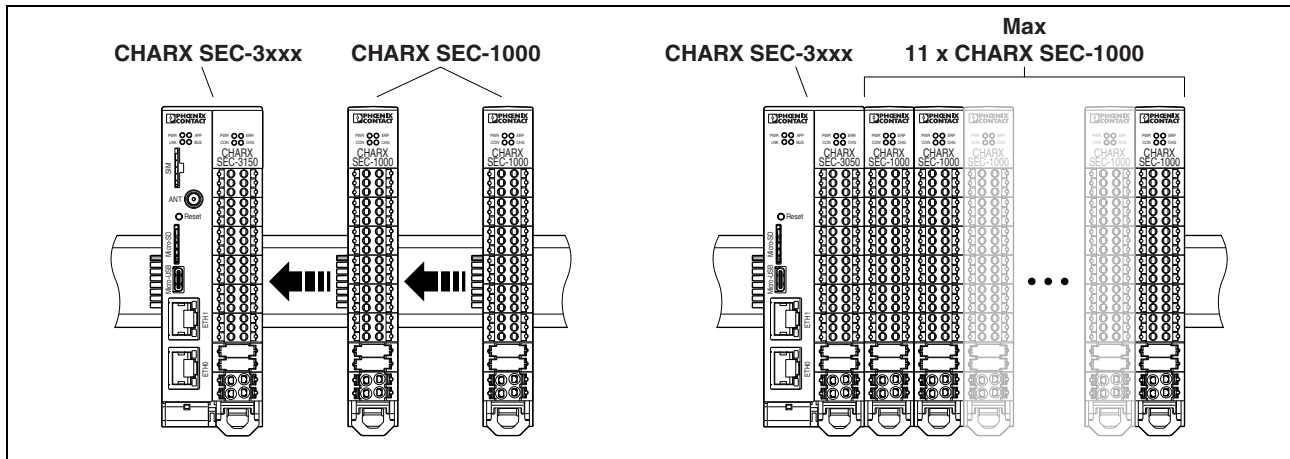
No web-based management or general Ethernet access via the ETH1 interface

The ETH1 interface is reserved for setting up client/server systems with additional CHARX SEC-3xxx charging controllers.

2.3.1 The ETH1 interface is not available for access to the web-based management or unrestricted operation in Ethernet networks. **Combination of CHARX SEC-3xxx and -1000 charging controllers**

You can attach up to 11 CHARX SEC-1000 charging controllers to one CHARX SEC-3xxx charging controller using the DIN rail connector that is supplied. This means that the functions and communication interfaces available on the CHARX SEC-3xxx are then available to all attached charging controllers.

Figure 2-5 Module arrangement of CHARX SEC-3xxx and -1000 on the DIN rail



All attached charging controllers are supplied with voltage via the DIN rail connector. The supply voltage is fed in via the CHARX SEC-3xxx charging controller or one of the attached CHARX SEC-1000 charging controllers.

Communication is automatically established between the CHARX SEC-3xxx charging controller and the attached CHARX SEC-1000 charging controllers.

You can access the attached modules via the web-based management of the CHARX SEC-3xxx charging controller for configuration and diagnostics.



NOTE: Electronics may be damaged if overloaded

The nominal current of the backplane bus for supplying power to the modules is 6 A. On the system side, it is ensured that the charging connector locking mechanism cannot be controlled at the same time.

Observe the current consumption of the individual devices and connected I/O devices when configuring a CHARX control modular station.

Please note that the current consumption of the individual devices depends on the connected I/O devices and the configuration. Determine the maximum possible current consumption of your setup.

2.3.2 CHARX SEC-3xxx charging controllers in the Ethernet network

The CHARX SEC-3xxx charging controller has two separate Ethernet interfaces: ETH0 and ETH1.

The ETH0 interface is configured to DHCP in the delivery state. ETH1 is used to connect the charging controllers to each other. Connecting two CHARX SEC-3xxx charging controllers via an ETH1 and ETH0 interface enables these charging controllers to find and access each other.



No web-based management or general Ethernet access via the ETH1 interface

The ETH1 interface is reserved for setting up client/server systems with additional CHARX SEC-3xxx charging controllers.

The ETH1 interface is not available for access to the web-based management or unrestricted operation in Ethernet networks.

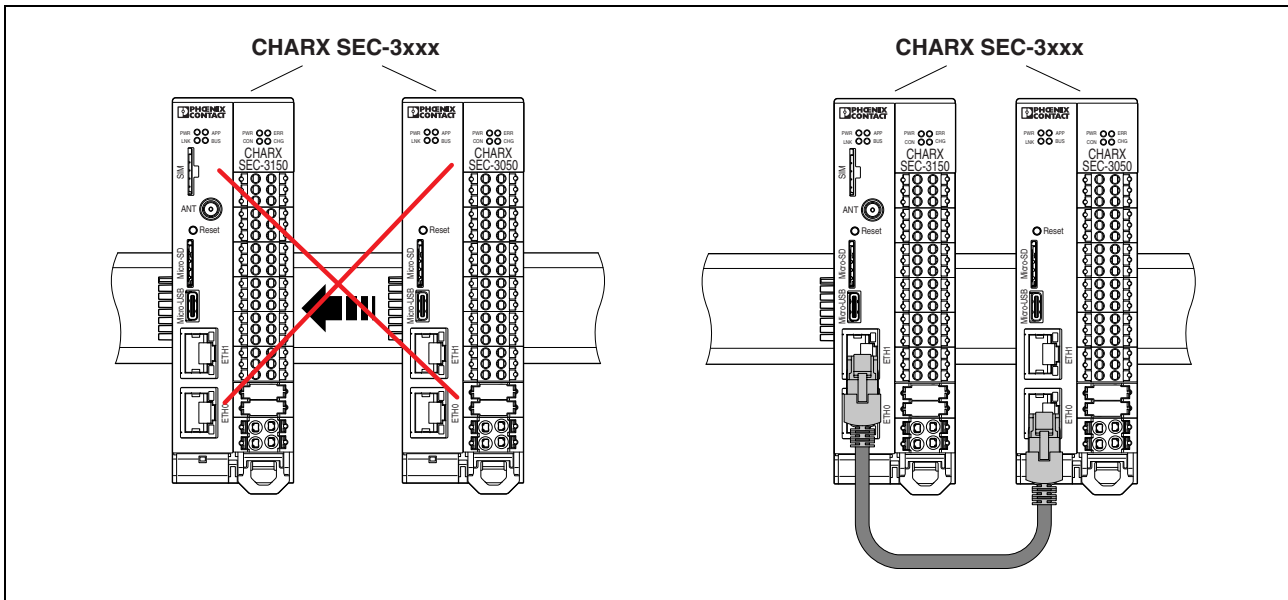
For the description of how to access the web-based management and information on IP address assignment, refer to [“Access to CHARX SEC-3xxx charging controllers” on page 71](#).

2.3.3 CHARX SEC-3xxx in a client/server group

! **NOTE: Do not connect CHARX SEC-3xxx charging controllers via DIN rail connectors**

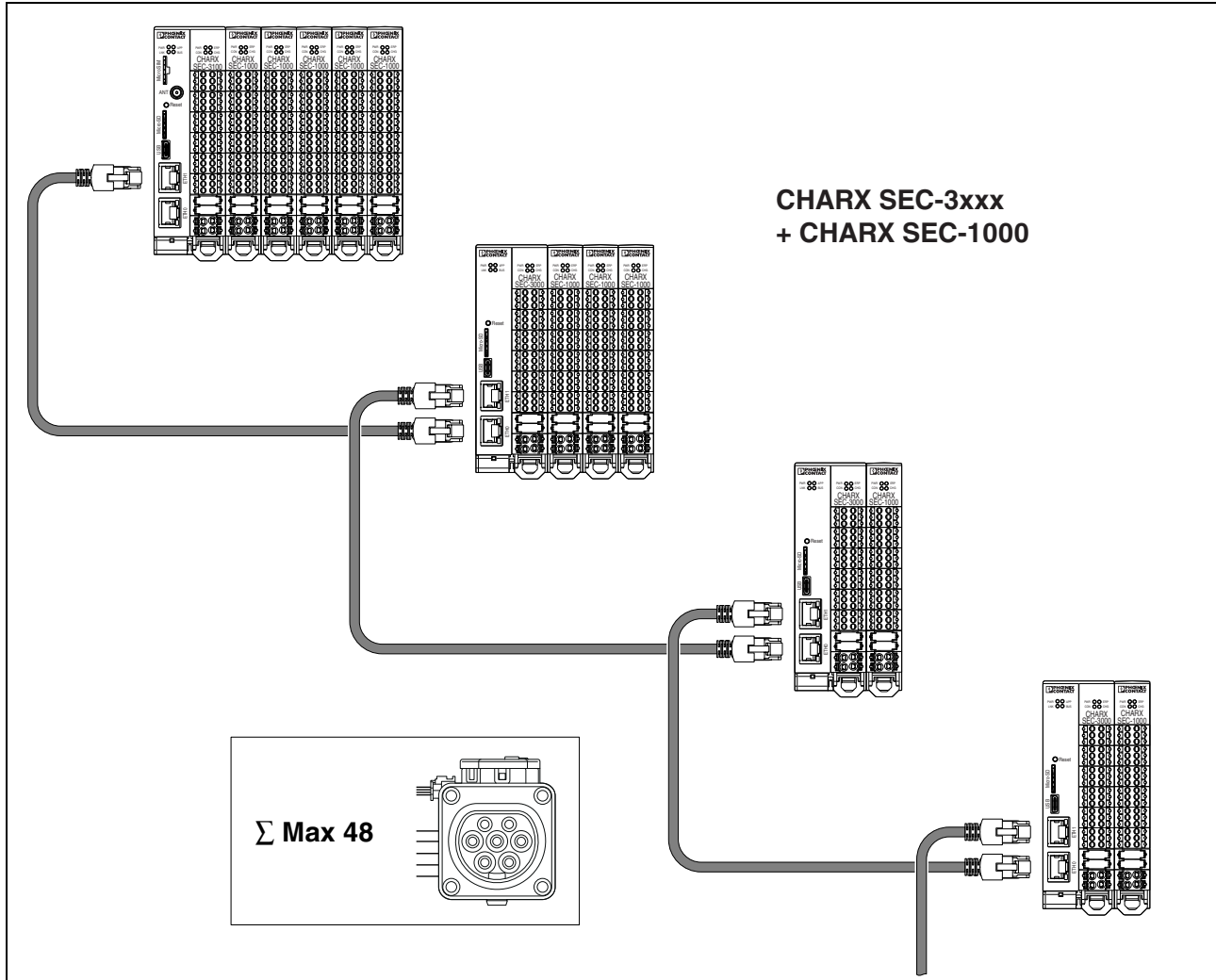
If you snap multiple CHARX SEC-3xxx charging controllers onto a DIN rail, you must not connect them together via the DIN rail connector.

Figure 2-6 Combination of CHARX SEC-3xxx on the DIN rail



You can combine multiple CHARX SEC-3xxx charging controllers in a local network into a serial client/server group (daisy chain) or centrally via a switch.

Figure 2-7 CHARX control modular in a client/server mode group



To set up the local network, connect the charging controllers as a server and client. Always connect the ETH1 interface of the higher-level charging controller to the ETH0 interface of the lower-level charging controller. Add further clients by connecting the ETH1 interface to the ETH0 interface of the next client.

The clients are automatically detected and addressed in the network. Once you have joined the charging controllers in the network, you can access all the clients and their attached extension modules via the IP address of the server.



Application-dependent: In a network group, a total maximum of 48 charging controllers can be controlled via one server. Depending on the application, even a small number can lead to restrictions in operation.

Proceed as follows:

- Check the charging controller that is to act as the client. The ETH0 interface must be configured to DHCP (default setting).
- Connect the ETH1 interface on the server to the ETH0 interface on the client.
- Restart the server.

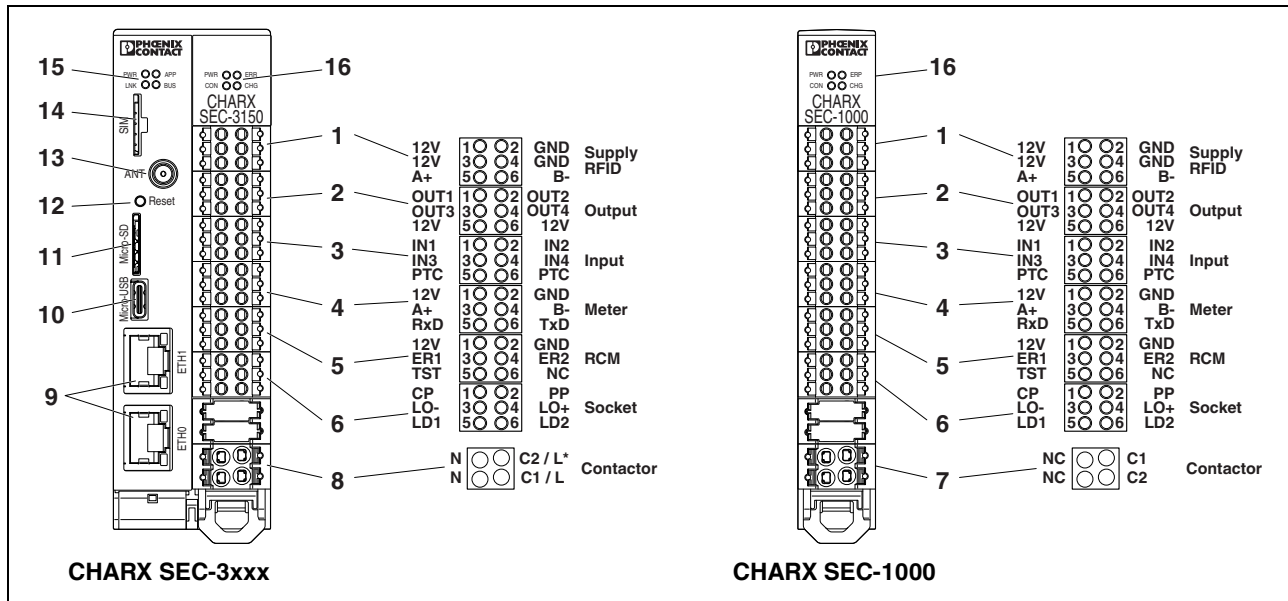
Once the server has been restarted and it has detected the client, it waits three minutes before configuring the client. The client is then restarted. Once the boot phase has been completed successfully, all the charging controllers gradually appear in the dashboard. This process takes around five to ten minutes to complete.

To speed up network setup, you can configure the charging controllers for client mode manually via the WBM prior to switch-over (see [“System Control/Module Switch” on page 125](#)).

You can operate a client outside of the client/server group again and restore the disabled services. To do this, connect to the charging controller via the USB interface and undo the relevant configuration settings in the web-based management (see [“System Control/Module Switch” on page 125](#)).

2.4 Overview of the charging controller

Figure 2-8 Connections and operating and indication elements on the charging controller



2.4.1 Connections and operating elements

Table 2-2 Connections and operating elements on the charging controller

No.	Connection group	Pos.	Designation	Description	Note
1	Supply + RFID	1	12V	Power supply, +12 V	
		2	GND	Power supply, ground	
		3	12V	Power supply, +12 V, RFID reader	
		4	GND	Power supply, ground, RFID reader	
		5	A+	RS-485, connection for RFID reader	
		6	B-		
2	Output	1-4	OUT1... OUT4	Digital outputs, "High Side (12 V)" or "Low Side (0 V)" operating mode	
		5-6	12V	Power supply, +12 V	
3	Input	1-4	IN1... IN4	Digital/analog inputs (0 V ... 12 V)	
		5-6	PTC	Temperature input (Pt 1000)	

Table 2-2 Connections and operating elements on the charging controller

No.	Con- nection group	Pos.	Designa- tion	Description	Note
4	Meter	1	12 V	Power supply, +12 V	
		2	GND	Power supply, ground	
		3	A+	RS-485, connection for energy measuring device	
		4	B-		
		5	RxD	Reserved for future applications	
		6	TxD		
5	RCM	1	12 V	Power supply for residual current sensor	
		2	GND		
		3	ER1	Trigger signal for residual current detection, Active High (0 V = no error)	Internal pull-up to 12 V
		4	ER2	Trigger signal for residual current detection, 12 V Active Low (12 V = no error)	
		5	TST	Test and reset signal of residual current sensor (+12 V)	
		6	NC	Signal is not connected	
6	Socket	1	CP	Control pilot in accordance with IEC 61851-1, Annex A	
		2	PP	Proximity (proximity detection in accordance with IEC 61851-1, Annex B)	
		3	LO-	Control of connector locking mechanism, ±12 V	
		4	LO+		
		5	LD1	Feedback signal for locking	
		6	LD2		
7	Contactor	C1		Mains input voltage for controlling the charging contactor (floating switch contact)	CHARX SEC -1000 only
		C2			
		NC (2x)		Not connected	
8	Contactor	C1/L		Mains input voltage for controlling the charging contactor (floating switch contact) and zero cross detection during communication in accordance with ISO/IEC 15118, to be connected to the supply network phase	CHARX SEC -3xxx only
		C2/L*		Switching output for controlling the charging contactor	
		N (2x)		Neutral conductor for zero cross detection during communication in accordance with ISO/IEC 15118	

CHARX control modular

Table 2-2 Connections and operating elements on the charging controller

No.	Conne- tion group	Pos.	Designa- tion	Description	Note
9	ETH0...1			2x Ethernet RJ45 (WAN/LAN or LAN/LAN operation) Default addresses: ETH0: DHCP (ev3000/ev3000.local) ETH1: 192.168.4.1 (only for communication with other CHARX SEC-3xxx charging controllers)	CHARX SEC -3xxx only
10	USB			USB, type C IP address (RNDIS): 192.168.5.1	
11	Micro-SD			microSD card slot	
12	Reset			Reset button Press once: System restart Press for >10 s: Reset to default settings	
13	ANT			SMA cellular antenna	CHARX SEC -31xx only
14	SIM			SIM card slot, micro SIM	

2.4.2 Indication elements

Table 2-3 Indication elements on the charging controller

No.	Designation	Meaning	Note
15	PWR (green)	System control status	Heartbeat: Embedded system in boot phase
			On: Embedded system ready for operation
			Flashing: Update active
	APP (red)	Application software	Flashing: OCPP agent active, but no connection to the backend
			Off: OCPP agent active, connection established to the backend
	LNK (yellow)	Cellular connection	Flashing: Modem establishing connection
			On: Modem is logged into the cellular network
	BUS (blue)	Backplane bus (via the DIN rail connector)	Flashing: Addressing bus devices in the backplane bus
			On: Module defined as the client in the backplane bus
16	PWR (green)	Charging interface status	Flashing: Charging controller starting up
			On: Charging controller ready for operation
	ERR (red)	Error status	Flashing: Error status with an external cause (on vehicle side, charging cable, residual current, etc.)
			On: Error status in the charging controller
	CON (yellow)	Charging connector	Flashing: Valid charging connector detected in the charging socket
			On: Charging connector locked in the charging socket
	CHG (blue)	Vehicle communication	Heartbeat: Vehicle connected (status B1)
			Flashing: Vehicle connected, charging enabled
			On: Vehicle is being charged
		If all LEDs flash simultaneously, the respective controller can no longer be addressed by the CPU module. This can only be rectified with a voltage reset.	

2.5 Software for the CHARX SEC-3xxx charging controller

2.5.1 Linux operating system

The CHARX SEC-3xxx charging controllers work with a Linux operating system.

License information for the individual Linux packages can be found in the file system of the charging controller under: /usr/share/common-licenses.

Alternatively, you can also call up the license information via the web-based management of the charging controller.

Notes on LGPL software libraries

All open source software that you use in the product is subject to the respective license terms. These apply irrespectively of the Phoenix Contact Software License Terms (SLT) for the product. In particular, the license holder can change the respective open-source software in accordance with the applicable license terms. If the license holder changes an LGPL software library contained in this product, reverse engineering is permitted for debugging such modifications.

Note on OpenSSL

This product includes software Developer by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>). This product Includes cryptographic software written by Eric Young (eyay@cryptsoft.com).

Requesting the source code

The charging controllers contain software components that are licensed by the rights holder as free software or open source software under the GNU General Public License. You can request the source code of these software components for a processing fee of 100 euros within three years after delivery of the charging controller. To do so, contact the Phoenix Contact After Sales Service in writing at the following address:

PHOENIX CONTACT GmbH & Co. KG
After Sales Service
Flachsmarktstrasse 8
32825 Blomberg
GERMANY

Subject: "Source code for CHARX SEC-3000"

2.5.2 Directory structure and accessing the file system

The charging controllers work with a Linux operating system. You can access the charging controller via Secure File Transfer Protocol (SFTP) or via Secure Shell (SSH) and view and modify the directories and files on the file system.



Authentication required

Authentication with a user name and password is always required for SSH and SFTP access and cannot be deactivated. Only users with administrator rights can access the file system. Change the password the first time you log in.

In the delivery state, the following access data is preset with restricted administrator rights:

- User name: user-app
- Password: user

The file system is accessed via the SFTP protocol. SFTP client software is required for this (e.g., WinSCP).

Table 2-4 Directory structure of CHARX SEC-3xxx charging controllers

Path	Contents
/usr/share/common-licenses	License terms
/log/	System log messages
/data/user-app/	Storage location for external applications and your start script

2.5.3 Firewall and port sharing

A list of the ports that use the services belonging to the charging controller can be found in the web-based management. These can be opened or closed individually. You can add further ports to the list for software that is additionally installed. For further information, refer to [“System Control/Calibration Law” on page 122](#).



NOTE: Check the firewall settings.

The firewall is enabled by default. Open but unused ports increase the risk of an attack. Open only those ports that are necessary for your application.

2.5.4 Installing software on the charging controller

The charging controller allows you to install your own software. The individual programs or program parts can be programmed in any development environment (e.g., Eclipse, Microsoft® Visual Studio®, etc.) in C++ or Python programming languages, for example.

An MQTT interface and a REST API are available as the interface to the process data of the charging controller.

The MQTT interface allows read access to the data.

The REST API allows write access to frame data, such as charging releases and charging current settings. For a detailed description of the MQTT topics and the REST API, refer to the download area for this charging controller at phoenixcontact.com/qr/1138965.



NOTE: Various applications may have write access to frame data at the same time

Multiple applications may have write access to frame data at the same time via the REST API and this is not monitored by the system. This can result in frame data such as charging releases or charging current settings being overwritten. Make sure that other applications with access to the same process data are not active.

SDKs for compiling your C++ project are available. Please contact your Phoenix Contact sales representative.

You will find the “user-application-start” script in the /home/user-app directory. This script is run when the controller is started. It serves as the configurable starting point of your application.

You can store your software permanently in the /data/user-app/ directory.

Then add your application to this script. Restart the charging controller. Your software is automatically started when the charging controller is restarted.

As an example, a Python script is stored in /usr/lib/user-app/, which connects to MQTT and sends a message when a vehicle is connected.



NOTE: Program deletion in the event of a full system update and reset to the default settings

Note that the /usr/lib/user-app/ directory will be overwritten in the event of a full system update and in the event of a reset to the default settings.

2.5.5 Resetting to default settings

Using the reset button, you can reset the charging controller to the delivery state. Press and hold the reset button for ten seconds.

The reset includes:

- System and user software are reset to the version supplied on delivery.
- Device configurations and network settings are deleted.
- Allowlists are deleted.
- Passwords are deleted.
- Software implemented by the customer is deleted.



NOTE: Automatic reset to default settings

The system automatically resets itself to the default settings if three boot processes in a row were unsuccessful.

2.5.6 Web-based management (WBM)

In the web-based management (WBM) of the CHARX SEC-3xxx charging controllers, you can access static and dynamic charging controller information and modify certain charging controller settings. You can call up the WBM via the Ethernet interface ETH0 and the USB interface on the charging controller (see [“Access to CHARX SEC-3xxx charging controllers” on page 71](#)).

The web-based management offers the following functions:

- Dashboard function for the operation and monitoring of the connected charging controllers
- User management
- Status indicators for individual charging controllers for operation monitoring and diagnostics
- Status indicators for the system services and application software
- Configuration of individual charging controllers
- Configurations for operating the overall system of all connected charging controllers
- Network settings
- Management of local user lists (allowlist)
- Access to log files for extended diagnostics
- Firmware update management

A detailed description of how to start up the charging controller via the WBM can be found in [“Starting up the charging controller” on page 71](#).

2.5.7 OCPP communication

With the CHARX SEC-3xxx charging controllers, you can connect a central management system via the OCPP (Open Charge Point Protocol).

Connection can be established via the Ethernet interface (ETH0) as well as via the cellular interface (ppp0).

When operating multiple charging controllers in a client/server group, OCPP communication with the central management system takes place via the server using a common ChargePoint ID (see [“CHARX SEC-3xxx in a client/server group” on page 21](#)). In this case, the individual charging controllers are listed under a separate Connector ID in the central management system.

The charging controller supports OCPP version 1.6J. Transmission takes place in JSON data format and supports the following profiles in accordance with the OCPP specification:

- Core
- Firmware Management
- Local Authorisation List Management
- Smart Charging
- Reservation
- Remote Trigger

 NOTE: OCPP Smart Charging Profile only possible with activated load management

To use OCPP Smart Charging Profile, load management must be activated. This is also necessary for a single charge point.

Via the OCPP communication protocol, individual configuration parameters can be queried from the central management system. Individual configuration parameters can be modified from the central management system. The OCPP communication protocol contains configuration parameters which are defined in the OCPP standard as well as device-specific parameters.

For an overview, refer to appendix [“OCPP operations” on page 144](#).

- Supported messages and functions in the respective profiles
- Existing restrictions
- List of configuration parameters
- List of assigned access rights

2.5.8 Modbus/TCP

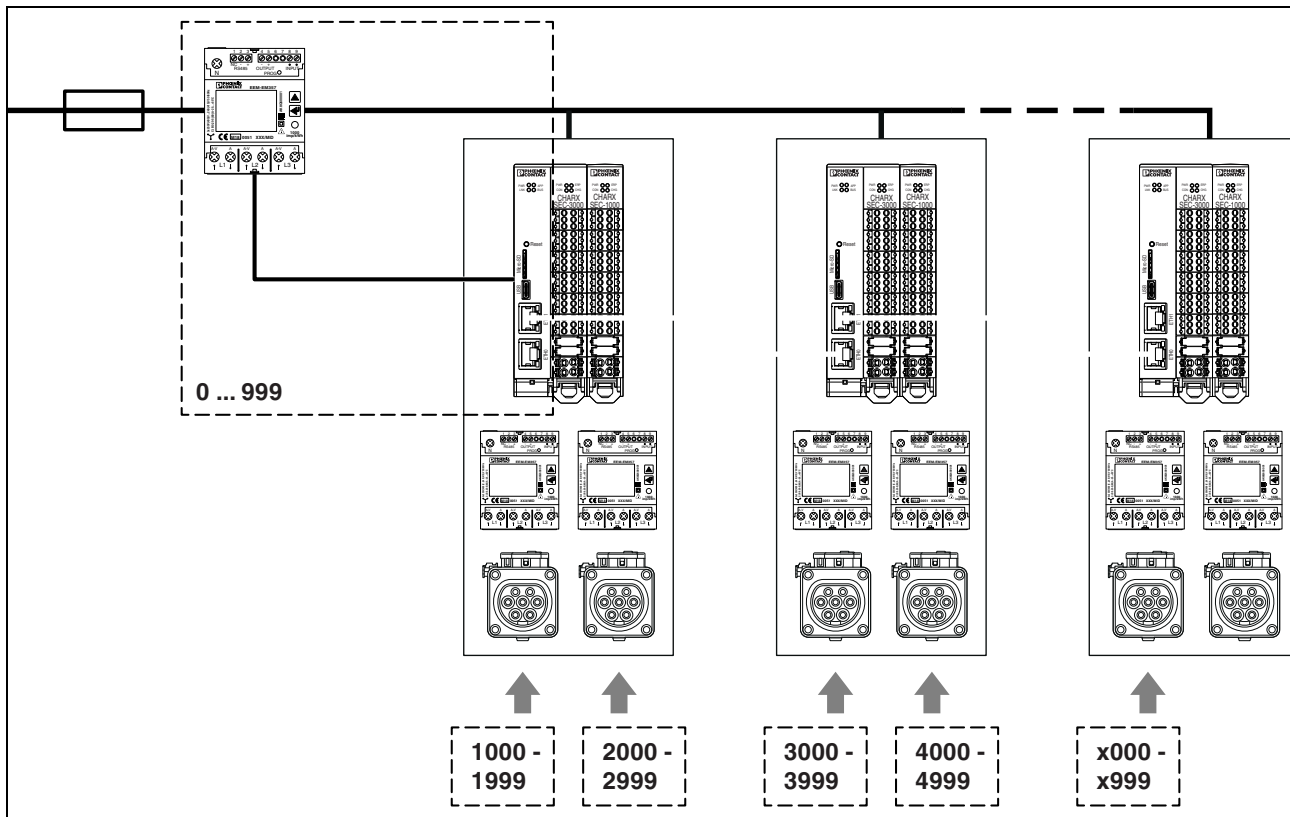
For remote control and monitoring of the CHARX SEC-3xxx, you can access the device registers via Ethernet or Modbus/TCP.

The device operates as a Modbus server using address 1. The port for incoming Modbus requests is 502.

The data is made available on the Modbus/TCP interface in 16-bit holding registers.

In client/server mode, the Modbus data of all clients and attached charging controllers is accessed centrally via the server (see [“CHARX SEC-3xxx in a client/server group” on page 21](#)).

Figure 2-9 Subdivision of the Modbus/TCP register areas



Register area 0 - 999 is reserved for data that is relevant centrally for all of the charging points in the group. This includes, for example, the current total consumption or the permitted maximum current in the complete client/server group.

Register area x000 to x999 contains the data and commands that are valid for one specific charging point from the group. The x stands for the respective position of the charging controller in the group. For example, this can be the system state or the assignment of a charging release to a selected charging point.

default: Start registers are assigned automatically.

Address “-1”: Automatic registers

The start registers can also be configured manually in the web-based management. Manually assigned registers do not change and “mixed operation” is not possible. If at least one start register is assigned manually, further controllers can only be accessed via Modbus if they are also assigned to manual start registers.

For a detailed description, please refer to the tables in appendix [“Modbus communication and register overview” on page 148](#).

2.5.9 MQTT

The CHARX SEC-3xxx charging controllers have an MQTT broker to which the MQTT clients can connect via port 1883. Status and value changes can be provided in this way. For example, this is how the EV status, real-time data, or measured energy data is published.

The data of the attached CHARX SEC-1000 charging controllers is managed by the MQTT server of the CHARX SEC-3xxx in separate topics under the respective device UID.

In client/server applications, a configuration to the client causes the MQTT servers of these devices to be disabled (see [“CHARX SEC-3xxx in a client/server group” on page 21](#)). The data of the clients and attached charging controllers is managed by the MQTT server in separate topics.

In addition, self-programmed user applications can implement MQTT client libraries (e.g., paho) in order to also subscribe to MQTT broker messages.



Port sharing for MQTT access

Connection to MQTT broker port 1883 is always possible if the client application is running on the same host (via localhost/127.0.0.1).

If the client is running on a different host, then you must configure TCP port 1883 so that it is open and accessible via ETH0 by editing the firewall settings in the WBM (see [“System Control/Calibration Law” on page 122](#)). Authorization, for example, via user name and password, is not required for this.

MQTT clients can subscribe to topics in order to be informed when values are changed.

A list of MQTT topics that can be subscribed to can be found in the documentation for this charging controller at phoenixcontact.com/qr/1138965.

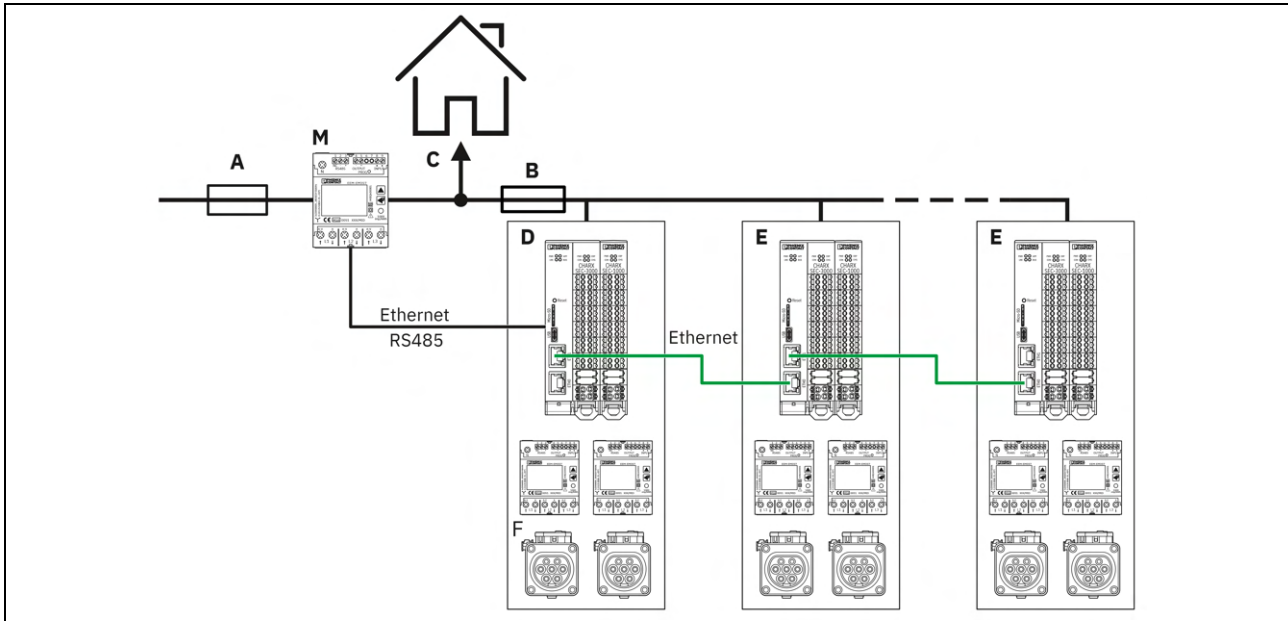
The MQTT topics used are utilized for communication between the system services of the CHARX SEC-3xxx.

Write access is not permitted to MQTT topics of the system services. This type of access can result in inconsistent system behavior. Write access is therefore not possible via external applications. Write access to process data, for example, setting the charging release, can instead be performed via the REST API (see appendix [“REST API” on page 156](#)).

As soon as an MQTT connection has been acknowledged (CONNACK), the MQTT client can subscribe to one or more topics. The usual MQTT wildcards, for example, “+” and “#”, are supported.

2.5.10 Load management

Figure 2-10 Load management with multiple charging stations and charging points



- A:** Main fuse
- B:** Load circuit fuse
- C:** Load
- D:** Server charging controller
- E:** Client charging controllers
- F:** Measuring device at charging point
- M:** Higher-level measuring device

- NOTE: Activating load management**
Load management is deactivated by default if there are no charging points in the load circuit. Making a mistake with a setting may cause an upstream circuit breaker to trip. You must initially make settings for load management to function in a meaningful way (see [“WBM – Load Management” on page 111](#)).
- NOTE: OCPP Smart Charging Profile only possible with activated load management**
To use OCPP Smart Charging Profile, load management must be activated. This is also necessary for a single charge point.
- NOTE: Use just one type of energy measuring device at the RS-485 interface**
For recording the total current, energy measuring devices can be connected via the Ethernet interface ETH0 or the RS-485 interface on a charging point. Connect energy measuring devices with an RS-485 interface to the same interface which is also used for recording the charging currents on the relevant charging point.
In this case, both energy measuring devices must be of the same type. The Modbus address of the central energy measuring device (M) is incremented by 1 (compared to the default settings).

Once the necessary information has been entered, the load management distributes the available current up to the level of the fuse value on the connected vehicles. The following aspects are considered:

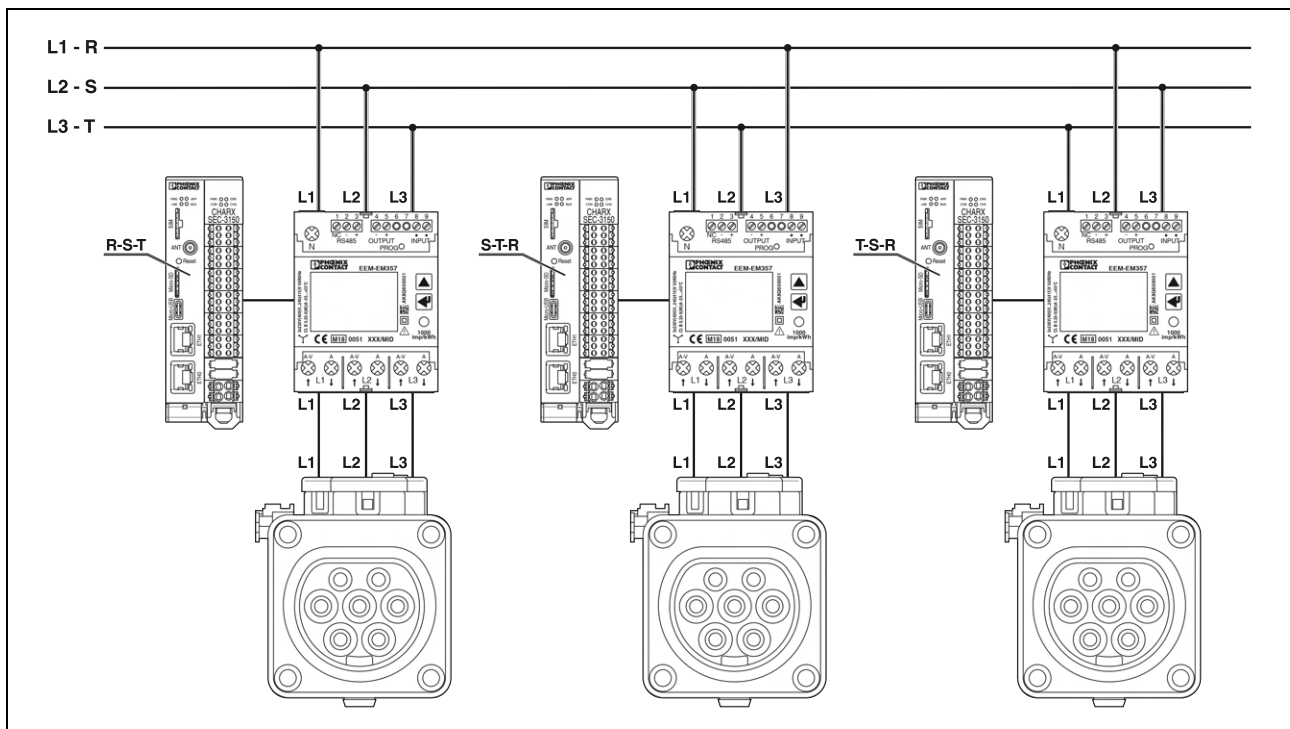
- Equal distribution of the available current
- Distribution with phase accuracy including residual current distribution
- Event-based and time-based redistribution of the currents
- Dynamic setting by higher-level systems via REST API or Modbus/TCP
- Dynamic setting of the fuse value by a higher-level measuring device

An example setup for dynamic load management is shown in [Figure 2-10](#).

The main fuse (A) is protected by the higher-level measuring device (B), which measures the current. The CHARX SEC-3xxx charging controller (D) serves as the server for the load management in the charging park. The charging controller thus records the current of the load (C) and the current of the charging stations. It distributes adjusted settings to the other client charging controllers (E).

In addition, a second, static fuse value can be specified (B). This value can only be specified in the web-based management if a higher-level measuring device is selected.

Figure 2-11 Example connection schemes with configuration



To avoid asymmetrical grid loads, the individual charging points can be connected to the supply network in a rotated order. Please note that the rotation of the phase sequence takes place at the mains connection and is stored in the charging controller configuration, see [“Charging Stations/Charging Point/Configuration” on page 87](#). For a correct calculation of the resulting currents in the supply network, it is imperative that no phase rotation takes place within the charging station. [Figure 2-11](#) shows examples of connection schemes with the corresponding configuration in the charging controller.



Maintaining the fuse rating

Maintain the distance to the actual fuse rating to protect the fuse.

For example:

- <100 A -> 10%
- >100 A -> 20%

2.5.11 ISO 15118 communication

The CHARX SEC-3050 and -3150 charging controllers are designed to establish communication with the electric vehicle in accordance with standard ISO/IEC 15118. The following operating modes are envisaged:

- **Disabled:** The electric vehicle is charged in accordance with IEC 61851-1, Annex A.
- **Optional:** The charging controller attempts to establish communication in accordance with ISO/IEC 15118. If communication is not completed within 10 s, the controller reverts to communication in accordance with IEC 61851-1, Annex A.
- **Required:** Communication in accordance with ISO/IEC 15118 is mandatory for charging. Vehicles that do not support this type of communication will not be charged.

The settings required for communication are made via the web-based management (see [“Charging Stations/Charging Point/Event Actions” on page 94](#)).

Data exchanged via the ISO/IEC 15118 protocol can be read out via MQTT (see [“MQTT topics” on page 155](#)).

The EVCC ID of the electric vehicle transmitted within the framework of ISO 15118 communication can be stored in the local allowlist on the charging controller (see [“WBM – Whitelist” on page 109](#)).



The Plug and Charge function is not supported at present

The Plug and Charge function is envisaged for a future software release.

3 Mounting the hardware

3.1 Transport, storage, and unpacking

Transport

The device is delivered in cardboard packaging.

- Observe the humidity specifications and the temperature range specified for transport (see [“Technical data” on page 133](#)).
- When transporting the device or storing it temporarily, make sure that the surfaces are protected from the elements and any external influences or damage, and that they are kept dry and clean.

Storage

The storage location must be:

- Dry
- Protected from unauthorized access
- Protected from harmful environmental influences such as UV light
- For storage, observe the humidity and air pressure specifications, and the temperature range (see [“Technical data” on page 133](#)).

Unpacking

The device is delivered in packaging together with a packing slip that provides installation instructions.

- Read the entire packing slip carefully.
- Retain the packing slip.



NOTE: Electrostatic discharge

Electrostatic discharge can damage or destroy components. When handling and unpacking the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.

Checking the delivery

- Check the delivery for transport damage.
- ⇒ Damaged packaging is an indicator of potential damage to the device that may have occurred during transport. This could result in a malfunction.
- Submit claims for any transport damage immediately, and inform Phoenix Contact or your supplier as well as the shipping company without delay.
- Enclose photos that clearly document the damage to the packaging and/or delivery together with your claim.
- Immediately upon delivery, refer to the delivery note to ensure that the delivery is complete.

3.2 Safety notes



DANGER: Risk of fatal electric shock

It is necessary to connect to hazardous contact mains voltage to operate the charging controller.

Protection against electric shock must be ensured.

Only mount or remove the device when it is disconnected from the voltage.

Make sure that the supply voltage cannot be switched on again by unauthorized persons.



NOTE: Damage to electronics due to inadequate external fuse protection

The electronics in the device will be damaged if external fuse protection is inadequate. Provide external fuse protection for the supply voltage in accordance with the connected load (number of CHARX control modular/total current consumption of the devices). Ensure that the external fuse trips reliably in the event of a fault.

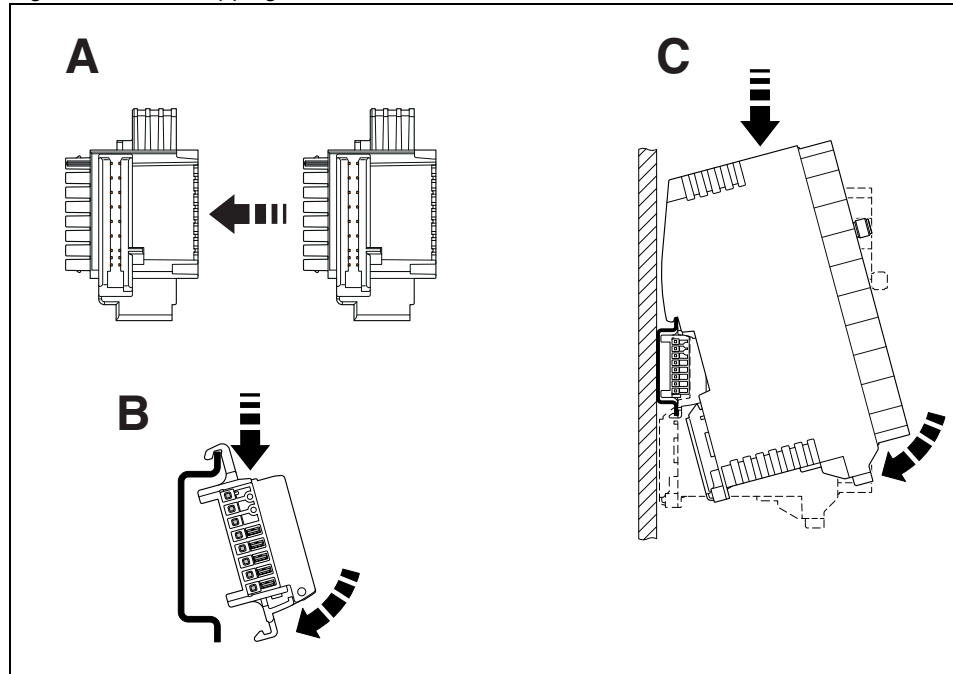


NOTE: Electrostatic discharge

The device contains components that may be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.

3.3 Mounting the charging controller

Figure 3-1 Snapping the CHARX control modular onto the DIN rail



The charging controller is mounted on a 35 mm standard DIN rail – without any tools – using the DIN rail connector (NS35/7,5). It is mounted perpendicular to the DIN rail.

- Join the DIN rail connectors so that they form a block (A).
- Insert the DIN rail connector into the DIN rail until it engages with a click (B). Make sure that the protruding connector side is facing to the left.
- Place the device onto the DIN rail from above (C). For this, hook the upper housing keyway onto the top edge of the DIN rail. Holding the device by the housing cover, carefully push it toward the mounting surface.
- Once the snap-on foot has snapped onto the DIN rail with a click, check that it is attached securely.

3.4 Connecting the cables

The CHARX control modular charging controllers feature plug-in connection technology. The supplied connectors use Push-in connection technology.

Figure 3-2 Conductor connection to the CHARX control modular

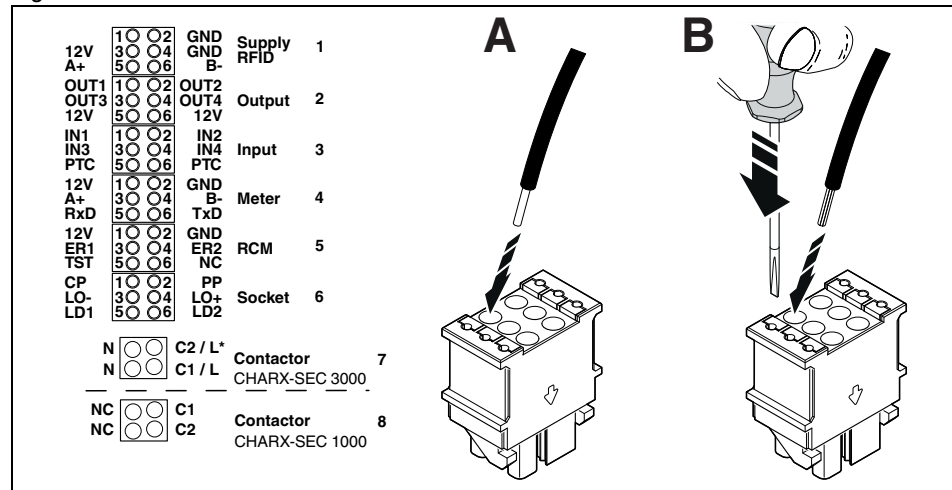


Table 3-1 Connection data

Conductor cross-section	Connection 1 to 6	Connection 7 and 8
Rigid	0.2 mm ² ... 1.5 mm ²	0.2 mm ² ... 1.5 mm ²
Flexible	0.2 mm ² ... 1.5 mm ²	0.2 mm ² ... 2.5 mm ²
With ferrules without insulating collar	0.25 mm ² ... 1.5 mm ²	0.25 mm ² ... 1.5 mm ²
With ferrules with insulating collar	0.25 mm ² ... 1.0 mm ²	0.25 mm ² ... 1.5 mm ²
Conductor cross-section, AWG	AWG 24 ... 16	AWG 24 ... 16
Stripping length	8 mm ... 10 mm	10 mm
Ferrule length for ferrules with insulating collar	0.25 mm ² ... 0.34 mm ² : 8 mm ... 10 mm 0.5 mm ² to 1.0 mm ² : 10 mm	10 mm
Ferrule length for ferrules without insulating collar	0.25 mm ² ... 1.0 mm ² : 8 mm ... 10 mm 1.5 mm ² : 10 mm	10 mm

Rigid conductors or flexible conductors with ferrule (A)

- Insert the stripped conductor into the round opening of the terminal block without using a tool.

Flexible conductors without ferrule (B)

- Press the push button with a screwdriver to open the spring.

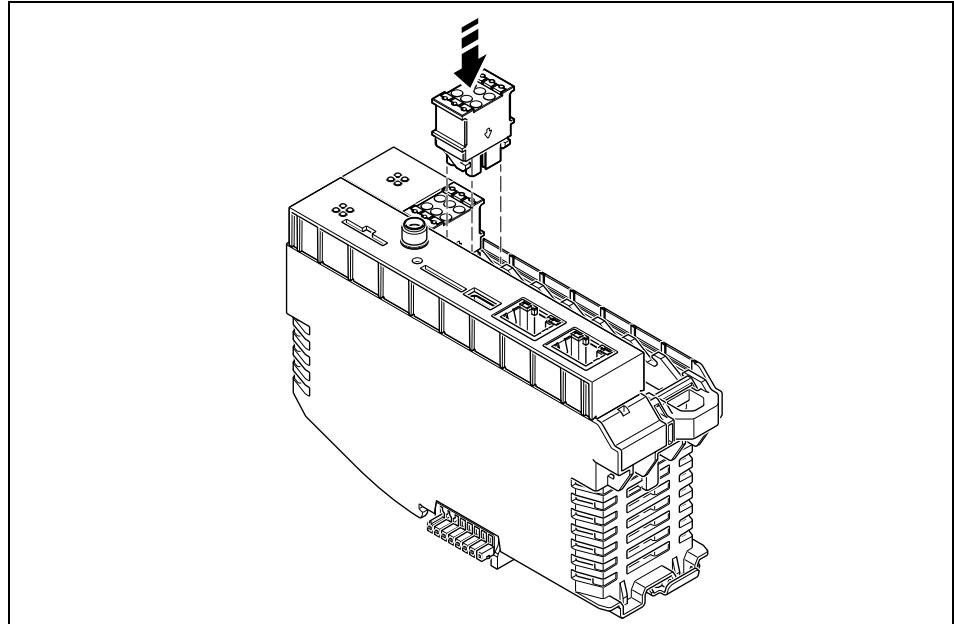
Removal

- To release, press the pushbutton using a screwdriver.
- Pull out the conductor.



We recommend the following bladed screwdriver: SZS 0,4X2,5 VDE, 1205037.

Figure 3-3 Conductor connection to the CHARX control modular



- Push the connector into the header of the charging controller until it engages with a click. Make sure that the connectors are oriented correctly.

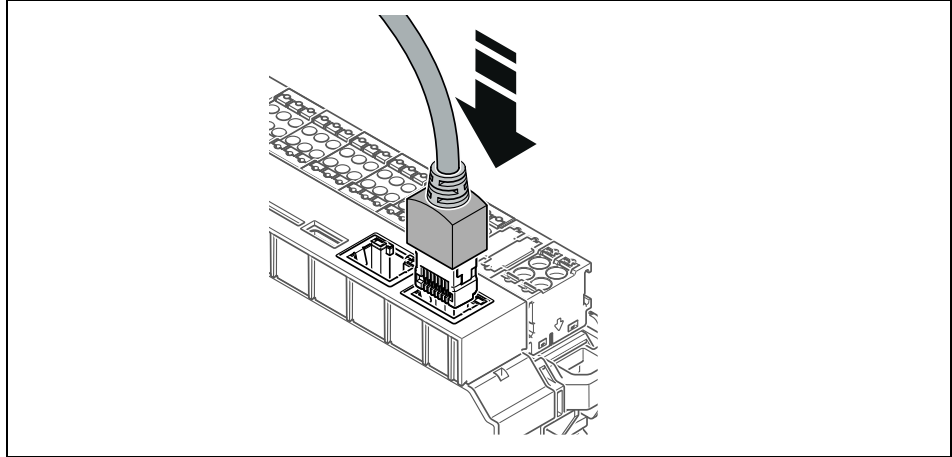


NOTE: No coding on the connectors

The connectors that are to be connected are not coded. When connecting the I/O devices, ensure the correct assignment of the connectors that are to be connected.

3.5 Connecting Ethernet

Figure 3-4 Connecting Ethernet

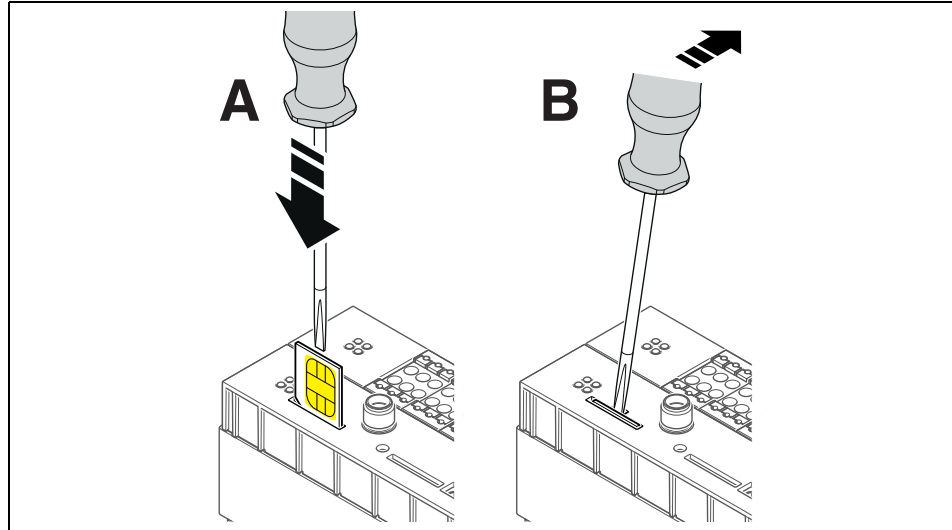


- Only use shielded twisted pair cables and corresponding shielded RJ45 connectors.
- Insert the Ethernet cable with the RJ45 connector into the ETH0 or ETH1 interface until the connector engages with a click. Observe the connector coding.

Certain network interface settings may be necessary in order to start up and operate the charging controller. The settings can be made in the web-based management (see ["Access to CHARX SEC-3xxx charging controllers" on page 71](#)).

3.6 Inserting the SIM card

Figure 3-5 Inserting (A) and removing (B) the SIM card



- Insert the SIM card into the slot as far as it will go.
- Check that it is inserted all the way in by gently pressing with a small screwdriver or similar.



NOTE: Electrostatic discharge

Electrostatic discharge can damage or destroy components. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.



NOTE: Operation only with micro SIM cards (3FF)

The device only supports SIM cards in micro SIM format (3FF). Do not use adapters for nano SIM cards. If necessary, contact your provider.



NOTE: Correct orientation of the SIM card

When the charging controller is mounted perpendicular, the contact surfaces of the SIM card should be on the left. The angled edge of the SIM card should point toward the top edge of the device. Make sure that the SIM card is oriented correctly.

The necessary settings for using the SIM card (PIN, APN access data) can be made in the web-based management (see [“Network/Modem” on page 118](#)). The necessary data can be obtained from your provider.

3.7 Connecting the antenna

Safety notes on antennas



DANGER: Risk of fatal electric shock

Antennas are electrically conductive. Contact with live cables can lead to death or serious injury.

- The antenna must not be in the vicinity of live cables during installation or removal.
- Never carry out work on antennas during a storm.



CAUTION: High frequency

Mount the antenna in a way that ensures that persons will not be within a radius of 40 centimeters during operation.



NOTE: Malfunction

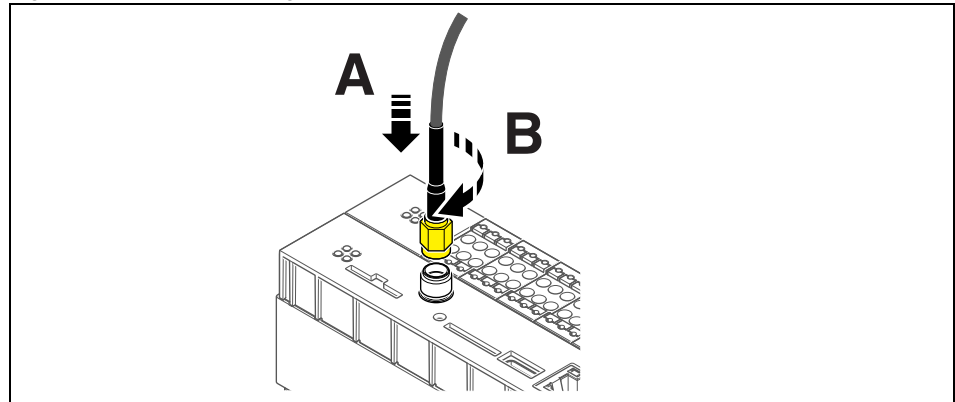
- If you route the antennas outside the building: Limit transient overvoltages to 1500 V_{peak} in accordance with IEC 62368-1. To do so, use external protective circuits.
- Remember that metallic objects and surfaces located near the antenna reduce signal quality.
- Keep the antenna cable as short as possible. The antenna cable must not be longer than five meters.



Approved accessories for antennas

For the approved accessories for the antenna, refer to CHARX SEC-3100 at phoenix-contact.com/q/1139012. Please refer to the documentation for the antenna.

Figure 3-6 Connecting the antenna



- Attach the antenna connector to the antenna socket (A).
- Screw the antenna onto the device until it is hand-tight (B).
- Check the signal quality in the web-based management (see “Network/Modem” on [page 118](#)).
- Fix the antenna in place when reception is good or very good.

3.8 Inserting the microSD card

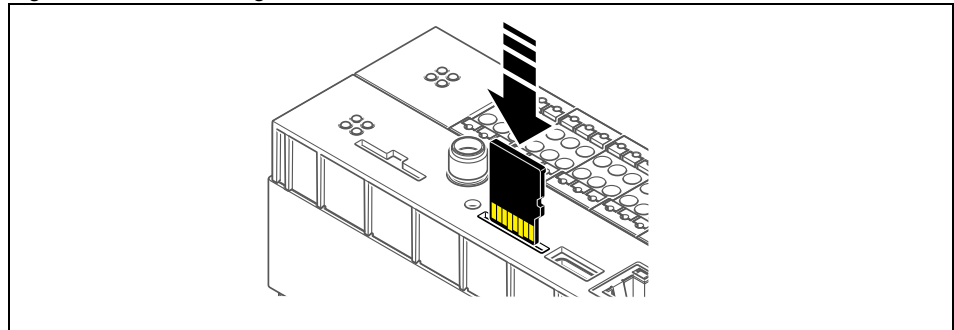
**NOTE: Electrostatic discharge**

Electrostatic discharge can damage or destroy components. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.

**NOTE: Correct orientation of the microSD card**

When the charging controller is mounted perpendicular, the contact surfaces of the SD card should be on the left. Insert the card into the device with the contact end first. Make sure that the microSD card is oriented correctly.

Figure 3-7 Inserting the microSD card



The charging controller has an SD card holder with push/push technology.

- Gently push the SD card into the SD card holder until it engages with a click in the SD card holder.

4 Connecting and wiring the hardware

4.1 Safety notes

**DANGER: Risk of fatal electric shock**

It is necessary to connect to hazardous contact mains voltage to operate the charging controller.

- Protection against electric shock must be ensured.
- Only perform work on the device when the power is disconnected.
- Make sure that the supply voltage cannot be switched on again by unauthorized persons.

**NOTE: Observe the connection notes**

When wiring, observe the connection instructions regarding conductor connection and connectors (see [“Connecting the cables” on page 44](#)).

4.2 Supply voltage

4.2.1 Dimensioning the supply voltage

The charging controller operates with a supply voltage of +12 V DC, ± 0.6 V.

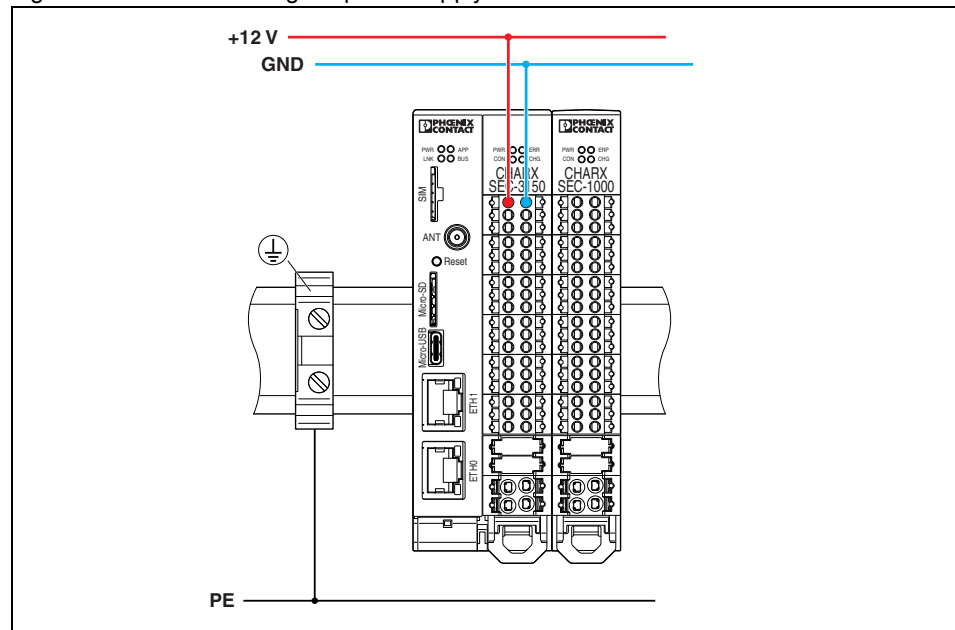
You can connect multiple charging controllers using the DIN rail connector. Only one charging controller has to be supplied with power. The attached devices are supplied via the DIN rail connector.

Dimension the power supply for your station in accordance with the connected charging controllers and the I/O devices that are supplied by them. For the no-load current consumption of the relevant devices, refer to [“Technical data” on page 133](#).

NOTE: Observe the maximum current carrying capacity of the backplane bus
 The nominal current of the backplane bus for supplying power to the modules is 6 A. On the system side, it is ensured that the charging connector locking mechanism cannot be controlled at the same time. Observe the current consumption of each device when configuring a CHARX control modular station. Please note that the current consumption of the individual devices depends on the connected I/O devices and the configuration. Determine the maximum possible current consumption of your setup.

4.3 Connecting the supply voltage

Figure 4-1 Connecting the power supply



- Connect the supply voltage to the “Supply” connector.
- Make sure that the DIN rail is connected to the protective conductor of the charging station.

4.4 Connecting the charging interface

You can operate the charging controller in a charging station with a charging socket (charging case B in accordance with IEC 61851-1). Alternatively, the charging station can also be equipped with a permanently fastened charging cable with charging connector (charging case C). The corresponding configuration is performed in the web-based management (see [“Charging Stations | Charging Point | Create Configuration” on page 88](#)).

4.4.1 Charging stations with charging socket

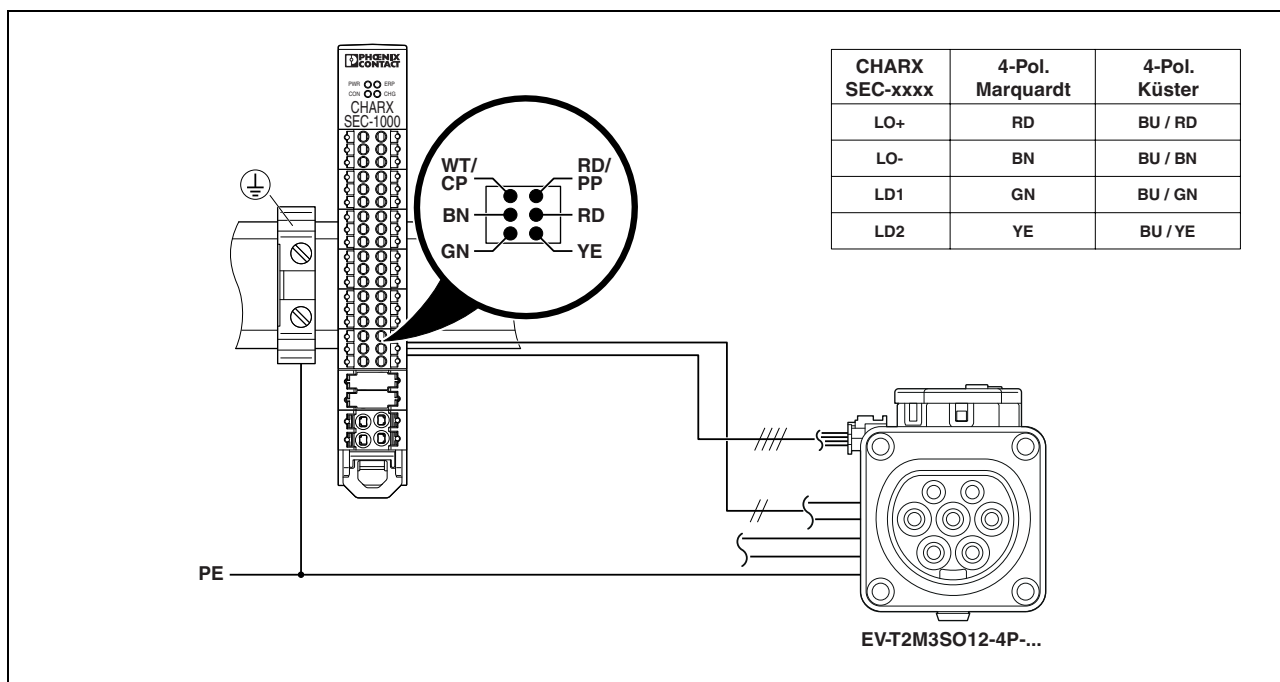
NOTE: Operation with 3-pos. locking actuators only with external protective circuit

The charging controller is optimized for operation with charging sockets with a 4-pos. locking actuator. Operation of the charging controller with charging sockets with 3-pos. locking actuators can result in the charging controller malfunctioning and becoming damaged. Provide an external protective circuit (see [“Charging sockets with 3-pos. locking actuator” on page 54](#)).

NOTE: Observe the maximum current carrying capacity of the charging socket
Make sure that the set maximum charging current does not exceed the current carrying capacity of the charging socket used (see [“Energy” on page 89](#)).

4.4.1.1 Charging sockets with 4-pos. locking actuator

Figure 4-2 Connecting the charging socket with 4-pos. locking actuator



- Connect Control Pilot (CP) and Proximity (PP) to the “Socket” connector of the charging controller.
- Make sure that the protective conductor connection of the charging socket is connected to the DIN rail of the charging controller.

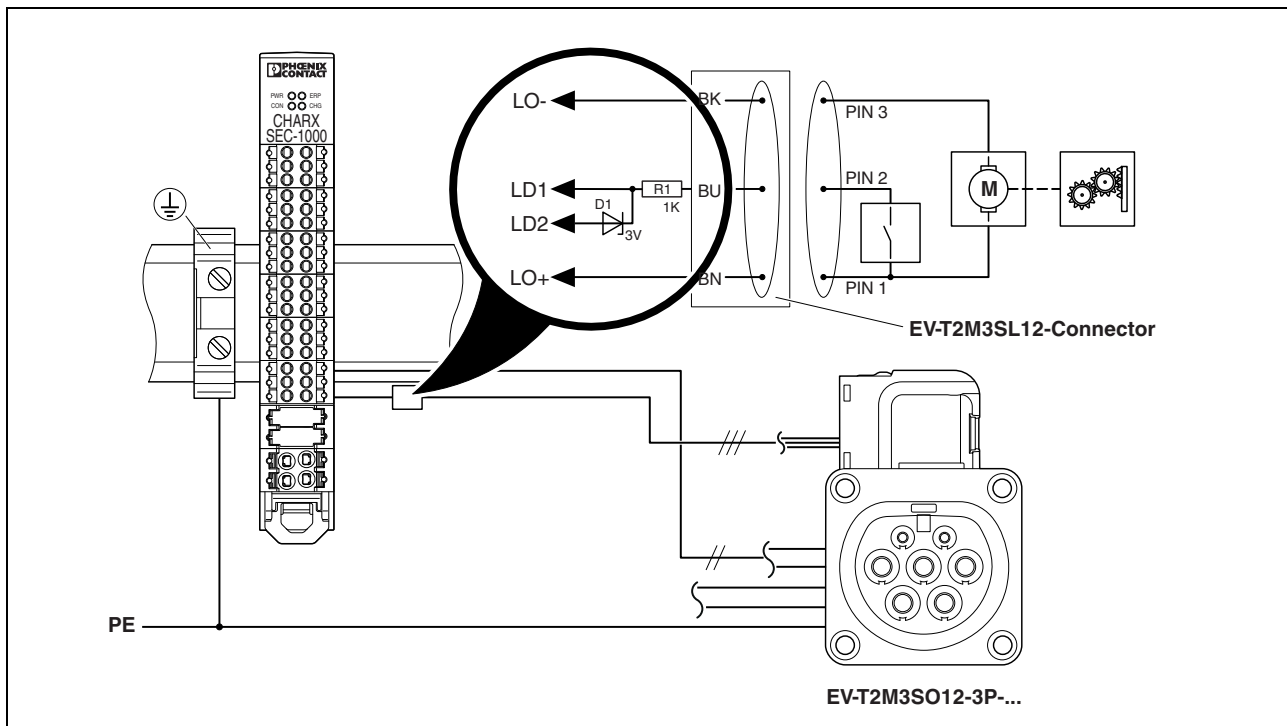
- Connect the locking actuator as per [Figure 4-2](#) and the installed charging socket to the “Socket” connector.

Configuration of the control and feedback signals of the charging socket is performed in the web-based management. There, select a charging socket from Phoenix Contact (see [“Charging Connection” on page 88](#)).

- Select “Socket” as the connection type. Select the type of the charging socket used from the drop-down menu.
- ⇒ The corresponding parameters for evaluation and control are set automatically.

4.4.1.2 Charging sockets with 3-pos. locking actuator

Figure 4-3 Connecting the charging socket with 3-pos. locking actuator



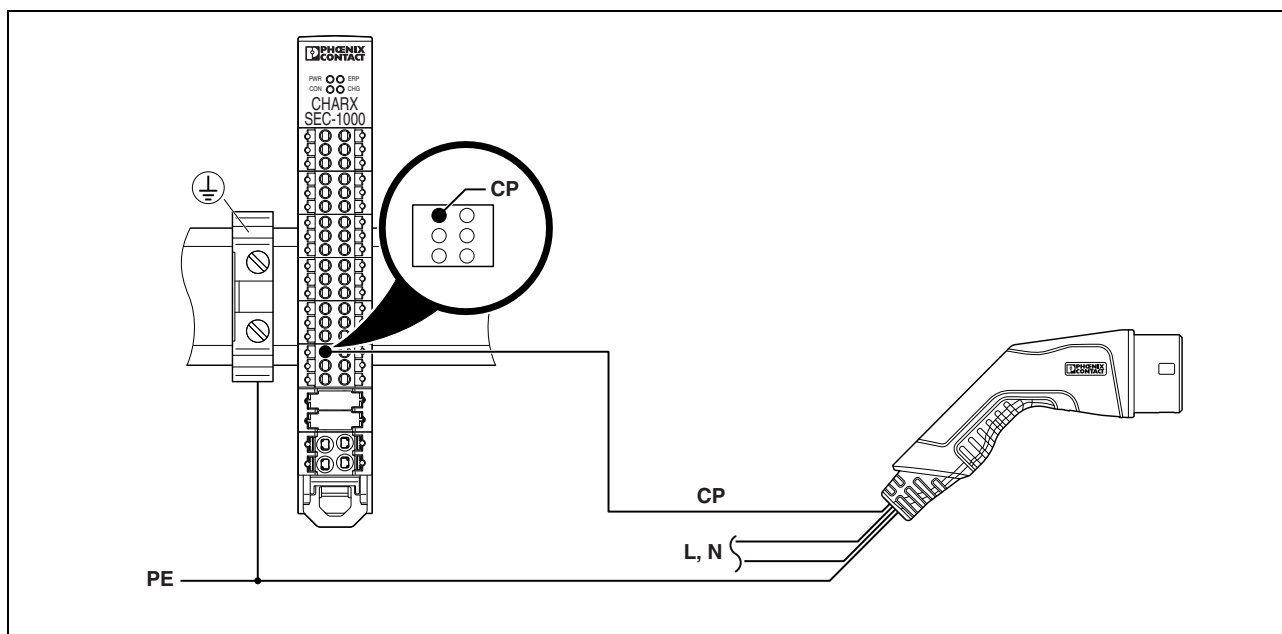
- Connect Control Pilot (CP) and Proximity (PP) to the “Socket” connector of the charging controller.
- Make sure that the protective conductor connection of the charging socket is connected to the DIN rail of the charging controller.
- Provide a protective circuit to protect the “Lock Detection” input against excessively high voltages. The protective circuit consists of a 1 kΩ resistor and a 3 V Zener diode in accordance with [Figure 4-3](#).

Configuration of the control and feedback signals of the charging socket is performed in the web-based management. There, select a charging socket from Phoenix Contact (see [“Charging Connection” on page 88](#)).

- Select “Socket” as the connection type. Select the type of the charging socket used from the drop-down menu.
- ⇒ The corresponding parameters for evaluation and control are set automatically.

4.4.2 Charging stations with charging connector

Figure 4-4 Connecting the charging connector



- Connect the Control Pilot (CP) of the charging connector to the “Socket” connector of the charging controller.
- Make sure that the protective conductor connection of the charging connector is connected to the DIN rail of the charging controller.
- Select “Connector” as the connection type in the web-based management (see [“Charging Connection” on page 88](#)).

NOTE: Observe the current carrying capacity of the charging connector
 Make sure that the set maximum charging current does not exceed the current carrying capacity of the charging connector used (see [“Energy” on page 89](#)).

4.5 Connecting the load contactor

The load contactor connects the electric vehicle to the power grid. It is automatically switched on and off by the charging controller via a floating contact. Switching is in accordance with the normative requirements and charging releases.

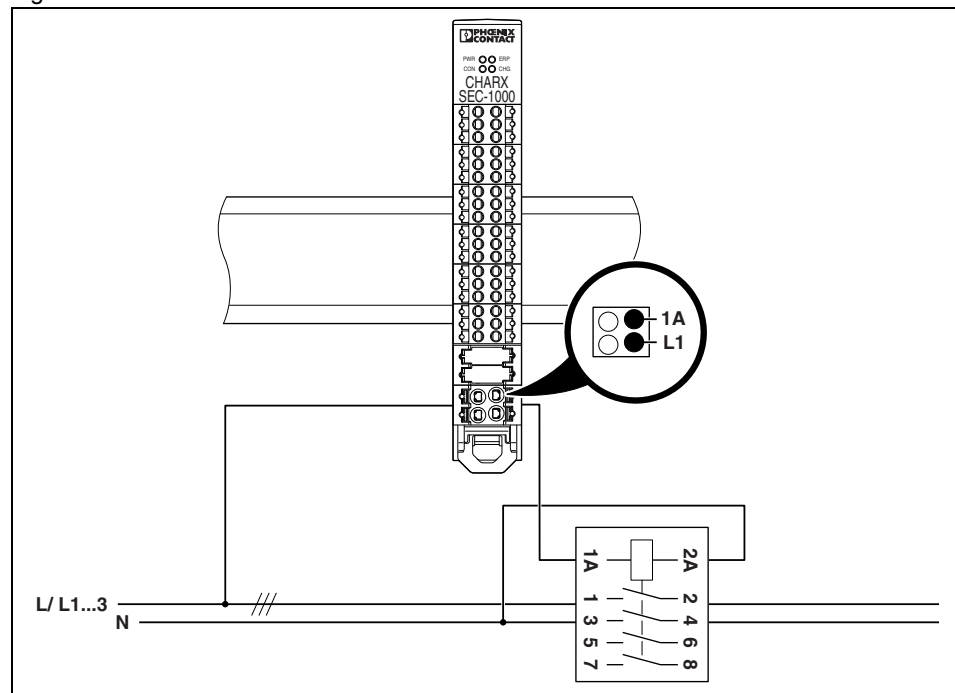
Charging stations **without communication** with the electric vehicle in accordance with ISO/IEC 15118 (CHARX SEC-1000, CHARX SEC-3x00): In this case the load contactor is switched with a DC voltage <30 V or with a mains voltage <250 V AC.

Charging stations **with communication** with the electric vehicle in accordance with ISO/IEC 15118 (CHARX SEC-3x50): The mains voltage should be used for contactor control in order to detect the zero crossing of the mains voltage (zero cross detection).

If the load contactor does not close despite charging being released, check that the residual current sensor or the bridge is wired correctly (see [“Residual current monitoring” on page 59](#))

4.5.1 Load contactor for charging controllers without ISO/IEC 15118 communication

Figure 4-5 Load contactor control without ISO/IEC 15118 communication

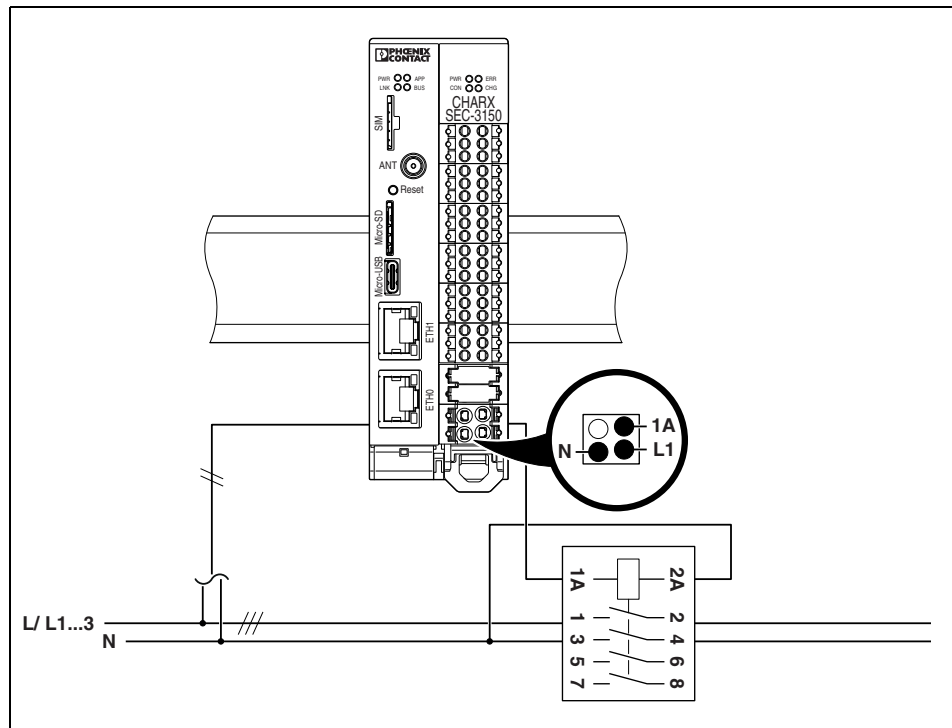


- Connect the control voltage for the load contactor to the mains voltage or a DC supply voltage.
 - Input C1 (CHARX SEC-1000)
 - Input C1/L1 (CHARX SEC-3xxx)
- Connect the output to control input 1A of the load contactor.
 - Output C2 (CHARX SEC-1000)
 - Output C2/L1* CHARX SEC-3xxx)

- Route output 2A of the load contactor to the neutral conductor or to the GND potential of the DC power supply.
 - Neutral conductor for contactor control with mains voltage
 - GND potential for control with DC supply voltage

4.5.2 Load contactor for charging controllers with ISO/IEC 15118 communication

Figure 4-6 Load contactor control with communication in accordance with ISO/IEC 15118

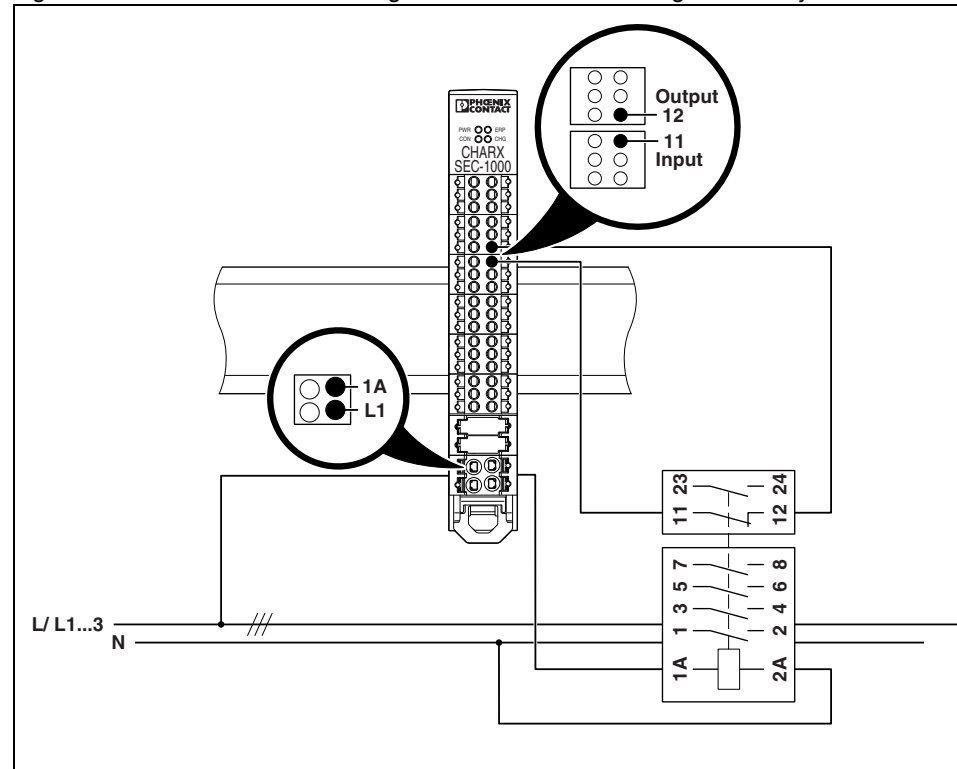


- Connect conductor L1 of the mains voltage to input C1/L1.
- Connect the neutral conductor to contact N on the “Contactor” connector.
- Connect output C2/L1* to control input 1A of the load contactor.
- Route output 2A of the load contactor to the neutral conductor.

4.5.3 Monitoring the load contactor for malfunction

It is possible for you to monitor the load contactor for malfunction using an auxiliary switch.

Figure 4-7 Contactor monitoring at the load contactor using an auxiliary switch



- To monitor the load contactor, connect a 12 V potential to a free digital input via the auxiliary switch.

In the web-based management of the charging controller, specify the input you use for the function. Specify whether the auxiliary contact is normally closed or normally open (see ["Monitoring | Charge Current Monitoring" on page 91](#)).

4.6 Residual current monitoring

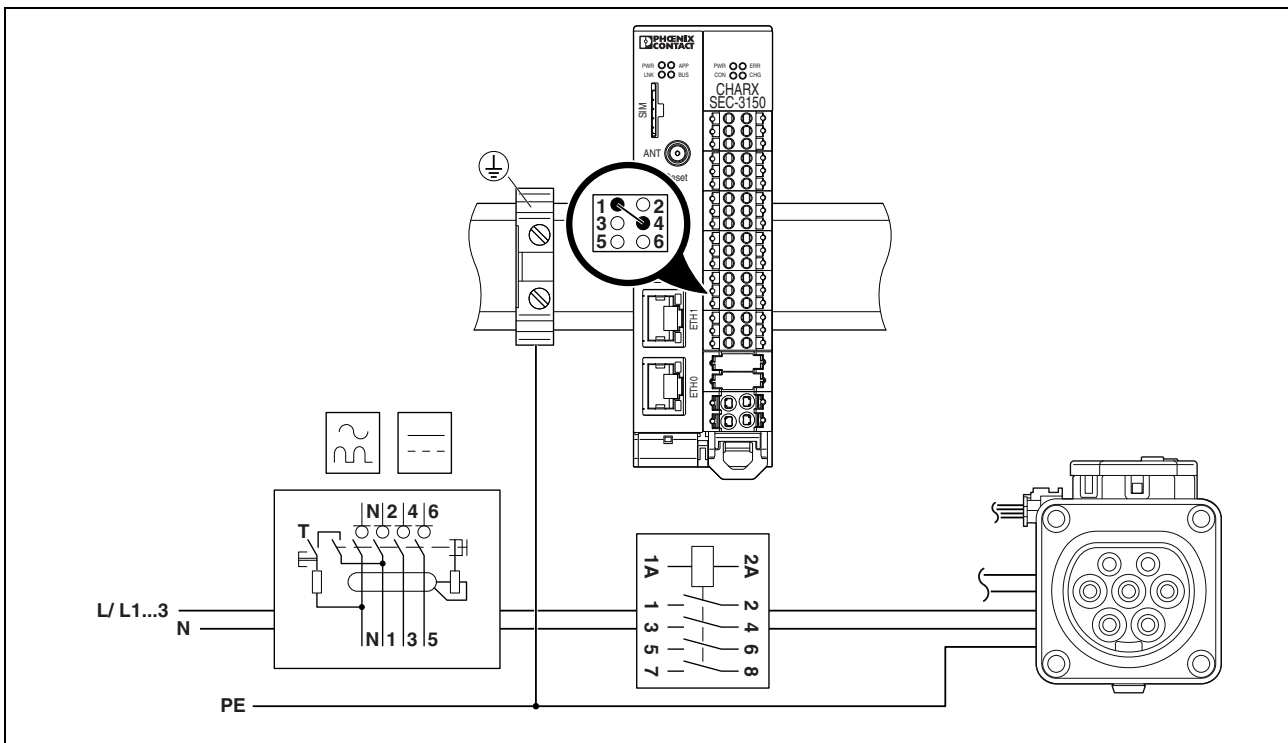
In accordance with IEC 61851-1, DC residual currents are to be expected in charging stations for electric vehicles, which can impair the function of the residual current protection. Therefore, according to the standard, one of the following measures should be implemented:

- Use of a type B residual current device
- Use of a type A residual current device. In addition, use of equipment to ensure that the power supply is safely disconnected in the event of a DC residual current greater than 6 mA.

The CHARX control modular charging controllers are designed to support the implementation of both of these measures.

4.6.1 Operation without a DC residual current sensor – with a type B residual current device

Figure 4-8 Operating the charging controller with a type B all-current-sensitive residual current device



To operate the charging station with type B all-current-sensitive residual current protection, you must create a bridge between contacts 12V and ER2 on the “RCM” connector.

- Make sure that residual current monitoring is disabled in the web-based management (see [“Monitoring | Charge Current Monitoring” on page 91](#)).

4.6.2 Operation with a DC residual current sensor

When operating the charging controller with a 6 mA DC residual current sensor, sensors that provide either an Active High or an Active Low signal in the event of a fault can be used. The signal is provided via an open-collector or open-drain output. The charging controller has an integrated pull-up resistor to 12 V.

Contacts 12V and 0V on the "RCM" connector are available to supply power to external sensors. To test the residual current sensor, the charging controller provides a 12 V test signal at terminal point 5 of the "RCM" connector. The charging controller controls the test signal automatically.

To use the charging controller with external residual current sensors, enable the function in the web-based management of the charging controller (see ["Monitoring I Charge Current Monitoring" on page 91](#)).

Figure 4-9 Operation of the charging controller with a DC residual current sensor

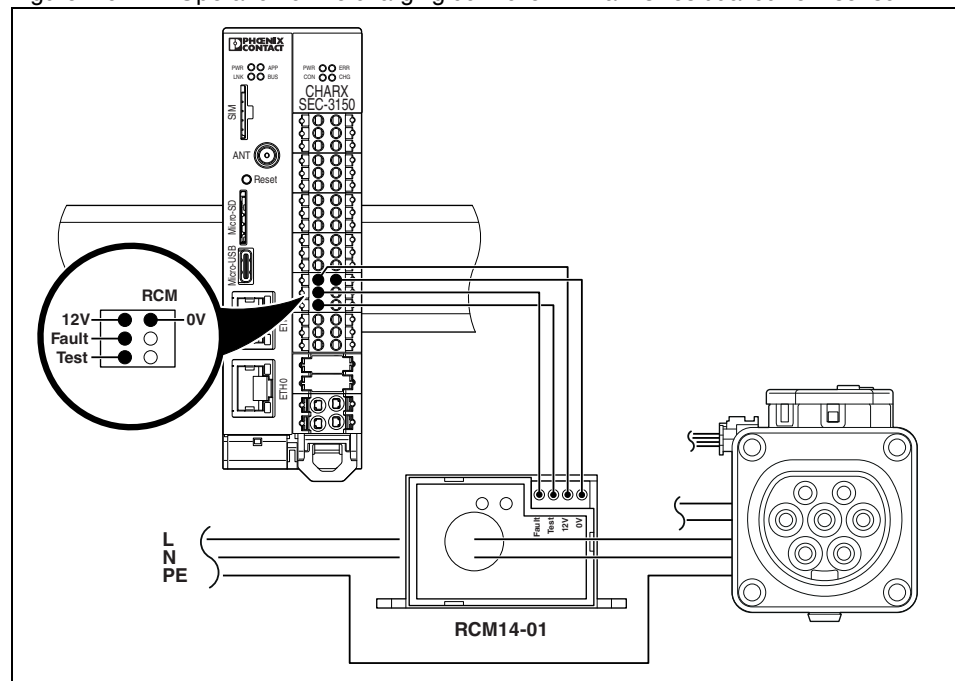


Figure 4-9 shows the operation of the charging controller with a DC residual current sensor with 12 V fault signal (e.g., Western Automation RCM14-01/RCM14-03).

- When using residual current sensors that provide an Active High or 12 V signal in the event of a fault, connect the fault output of the sensor to contact ER1 on the "RCM" connector (see Figure 4-9).
- When using residual current sensors that provide an Active Low or 0 V signal in the event of a fault, connect the fault output of the sensor to contact ER2 on the "RCM" connector. The connection between the charging controller and the RCM module is established via an XHP-4 connector from JST. An assembled cable for connecting the components is available as CHARX SEC JST-RCM-CBL, 1360462.

NOTE: Reversing the polarity of the "Fault" and "Test" contacts leads to a short circuit on the DC residual current sensor. The DC residual current sensor is then no longer functional!

PHOENIX CONTACT 61 / 166

The diagram illustrates the connection between a DPHOMEX SEC-3150 sensor and an EEM-EM357 meter. The sensor's terminal block has pins labeled 1 through 16. The meter's terminal block has pins labeled 1 through 9. Wires connect the sensor's pins to the meter's pins. A callout shows the meter's internal circuitry, including a battery and a switch.

The charging controller currently supports the following energy measuring devices:

- ### Configuration of the communication interface for the energy measuring device

In order to establish a connection between the charging controller and energy measuring device, the settings for communication must correspond to the default settings of the selected device. This applies, for example, to the device address and transmission speed.



Always connect an energy measuring device if you want to use functions for current monitoring (overcurrent and out-of-balance monitoring) or load management.

4.8 Connecting an RFID reader

In order to authorize users, you can connect RFID readers via the “Supply/RFID” RS-485 interface. You can check the read RFID cards against a local allowlist or an external management system.

It is possible to use one RFID reader for multiple charging points.

The RFID reader can be supplied with 12 V voltage from the “Supply/RFID” connector.

- Connect the communication cables of the RFID reader to contacts A+/B- of the “Supply/RFID” connector.

Proceed as follows to configure the communication interface for the RFID reader:

- Specify the charging releases in the web-based management of the charging controller.
- Select the RFID reader used and the charging interface used to connect the RFID reader (see [“Charging Stations/Charging Point/Event Actions” on page 94](#)).

In order to establish a connection between the charging controller and RFID reader, the settings for communication must correspond to the default settings of the selected device. This applies, for example, to the device address and transmission speed.

The charging controller currently supports the following RFID readers:

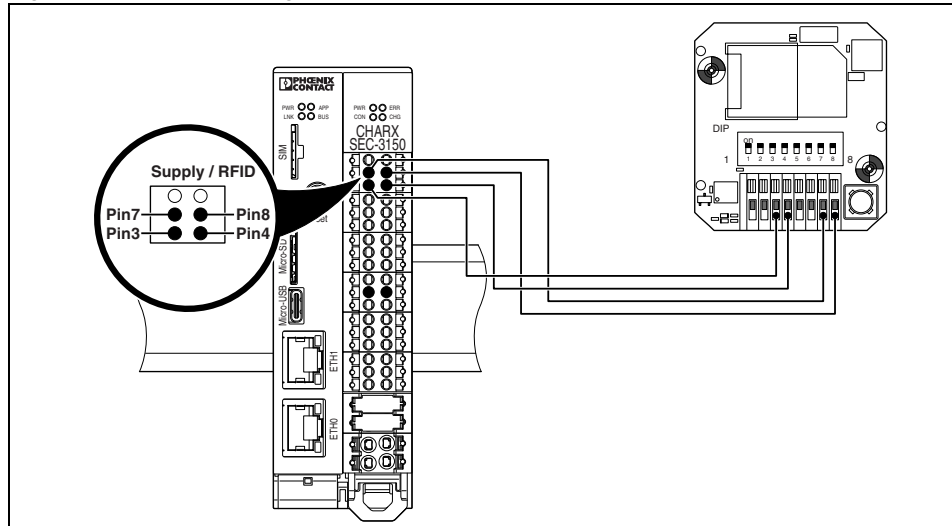
- CHARX RFID/NFC
- ELATEC T4W2 PALON COMPACT LIGHT PCB (T4W2-F02B6)
- ELATEC TWN4 PALON COMPACT LIGHT Panel (T4PK-F02TR6)
- DUALI DE 950-4, DUALI DE 950-4-CXP
- Netronix UW-XEU1

The list of supported RFID readers may be extended in future software updates.

You can view the RFID readers implemented in your software version in the charging point configuration in the web-based management (see [“Charging Stations/Charging Point/Configuration” on page 87](#)).

4.8.1 Connecting an RFID reader from ELATEC

Figure 4-11 Connecting an ELATEC T4W2-F02B6/T4PK-F02TR6



NOTE: Adapt software to ELATEC reader.

Use appropriate software to operate the RFID reader from ELATEC on CHARX charging controllers. Use the “AppBlaster” program provided by the manufacturer and the “TWN4_NCx320_STD203_Standard.bix” program file for installation.

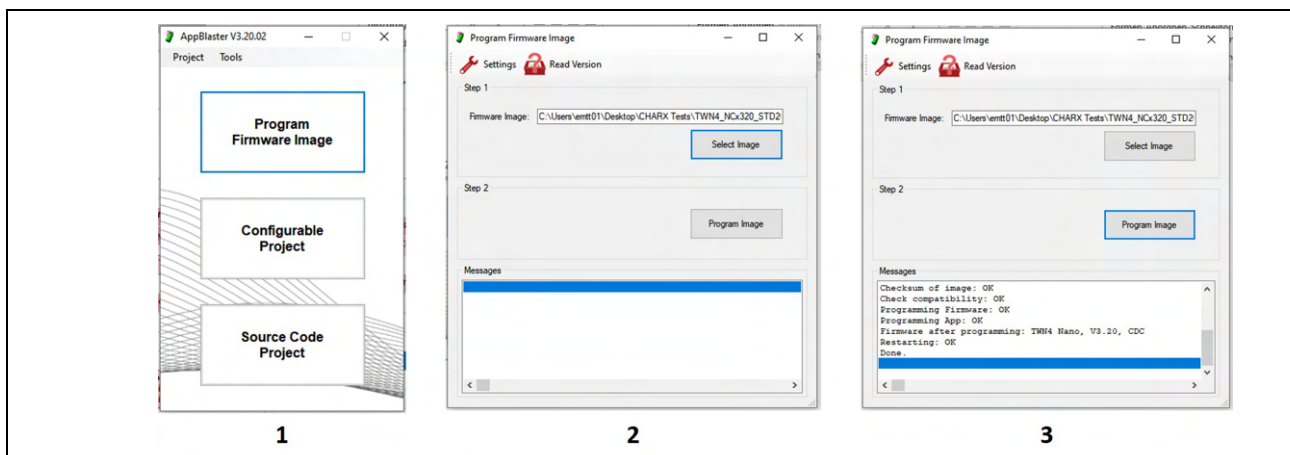
NOTE: Do not use a termination resistor

The termination resistor (DIP switch 8) must be switched off.

The software and the program file are available in the download area for the RFID readers (1309772 and 1309687). The RFID reader can be connected to a PC via a standard micro USB cable.

i The program file provided is only compatible with bootloader version 1.08 of the Elatec readers.

Figure 4-12 Software update on ELATEC RFID readers

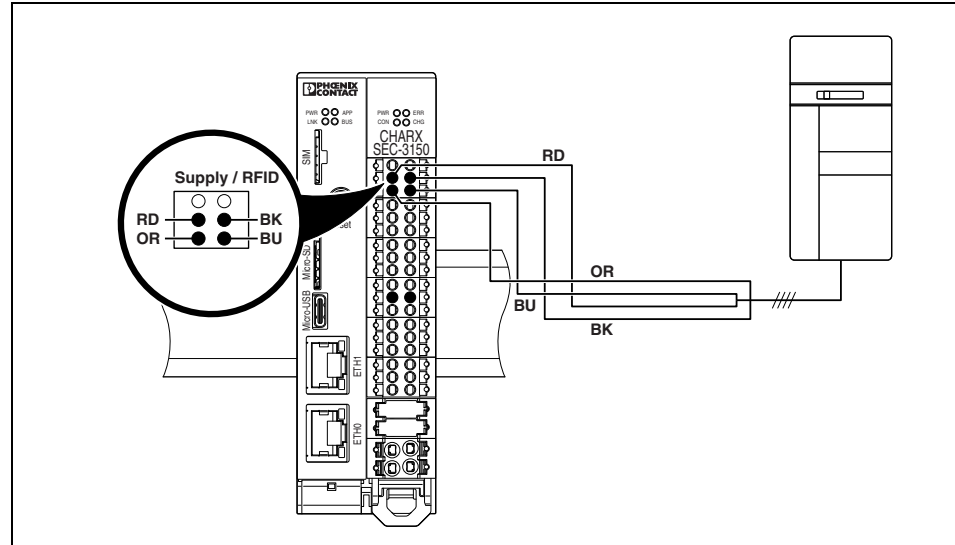


Proceed as follows to update the software:

- Start the "AppBlaster.exe" program.
- Select "Program Firmware Image".
- Select the "TWN4_NCx320_STD203_Standard.bix" file.
- Start the download via "Program Image".

4.8.2 Connecting a DUALI DE-950-4 RFID reader

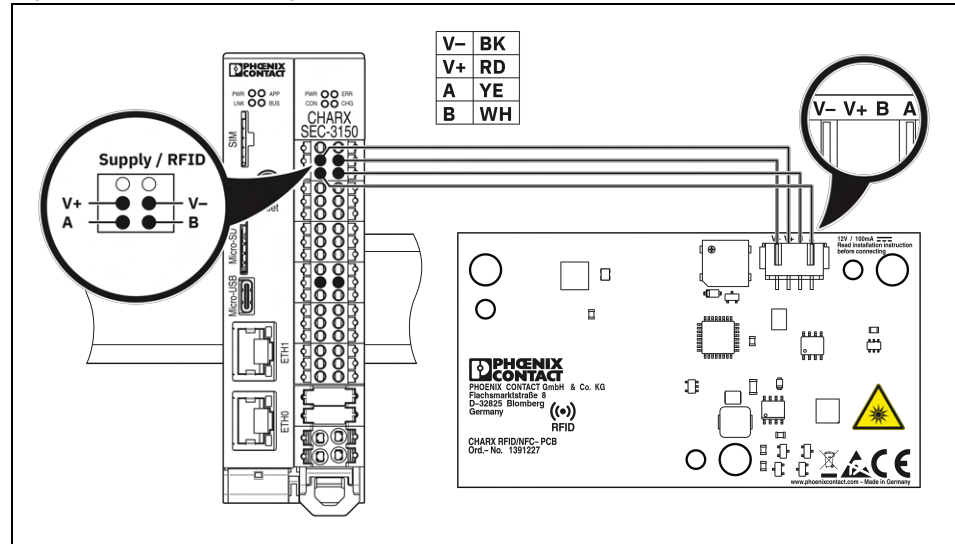
Figure 4-13 Connecting a DUALI DE-950-4-CXP



If the RFID reader is in the default settings, no further settings need to be made on it.

4.8.3 Connecting a CHARX RFID/NFC RFID reader

Figure 4-14 Connecting a CHARX RFID/NFC



NOTE: Reduced wireless range

Metallic components in the direct vicinity of the RFID reader may affect the wireless range. The housing must not be made of metal. The housing must not shield the antenna of the RFID reader. The distance between the RFID reader and the housing must be as small as possible, but not less than 2 mm.

- Install the RFID reader inside the housing with screws. Alternatively, the RFID reader can be fastened on screw bosses.
- Use the connecting cable to connect the RFID reader to the charging controller. The connecting cable must not exert any mechanical strain on the RFID reader.

The RFID reader is configured via the charging controller.

4.9 Connecting digital outputs

You can operate the digital outputs in the operating modes “Low Side”, “High Side”, and “Floating”.

- With “Low Side”, the output is connected to ground potential when activated.
- With “High Side”, the output is connected to a 12 V voltage when activated.
- With “Floating”, there is no through-connection to one of the reference potentials.

! NOTE: Observe the maximum current carrying capacity of the digital outputs
The digital outputs are not protected against overload. Make sure that the maximum output current is not exceeded. For the maximum current carrying capacity, refer to [“Technical data” on page 133](#).

! NOTE: Observe the maximum voltage of the digital outputs
In “Low Side” operating mode, the supply voltage of the connected loads must not exceed the maximum output voltage of the digital outputs, which is 12 V.

- Make sure that the maximum output voltage of 12 V is not exceeded.
- When power is supplied from external sources, make sure that the ground potential is connected to the ground potential of the charging controller.

Figure 4-15 Control of LEDs in “High Side” operating mode

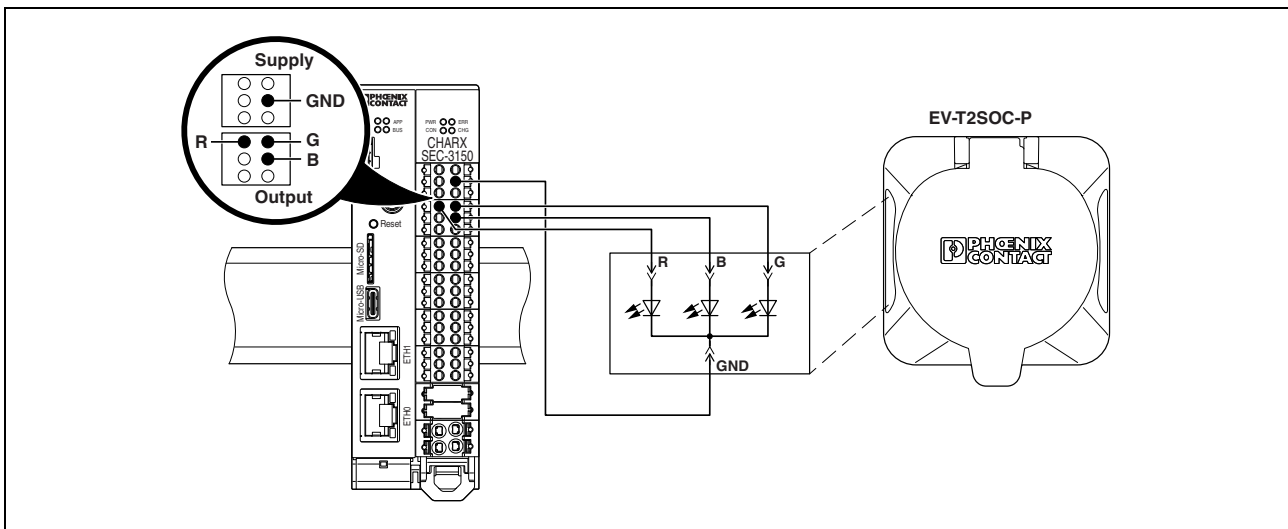


Figure 4-15 shows an example of control in “High Side” operating mode. The EV-T2SOC-P protective cover with the LED area is connected to the outputs.

Figure 4-16 Control of LEDs in “Low Side” operating mode

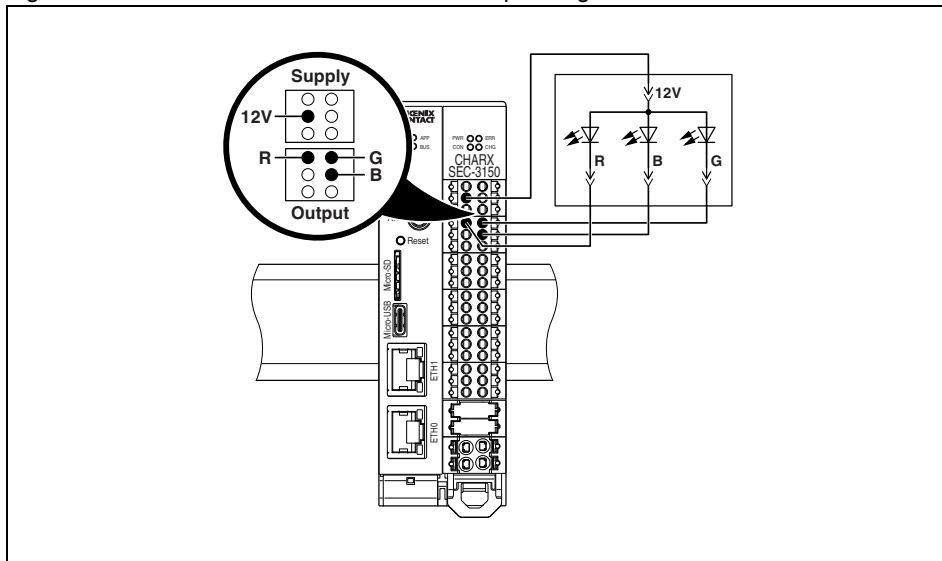


Figure 4-16 shows an example of control in “Low Side” operating mode using a 3-color LED. The outputs are configured in the web-based management (see [“Charging Stations/Charging Point/Event Actions”](#) on page 94).

Select from a predefined list to specify under which conditions and system states or on which events an output should be activated.

- Examples of conditions and system states: Vehicle connected, charging the vehicle, charging station in error state
- Examples of events: RFID invalid, temperature derating activated

In case of activation, the digital outputs can be configured to the following operating modes:

- Permanent 12 V (“High”)
- Permanent 0 V (“Low”)
- Flashing 12 V (“Flashing High”)
- Flashing 0 V (“Flashing Low”)
- Pulsating 0 V (“Pulsatile Low”)
- Floating (“Floating”)

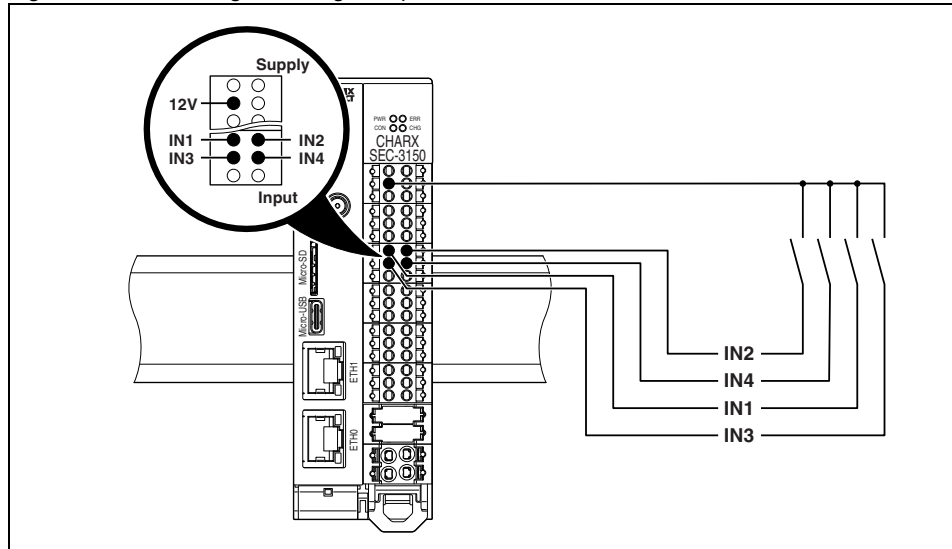
For flashing output signals, it is possible to specify the operating time per pulse (PWM duty cycle).

The activation time of an output can be limited using a timer.

You can link an output to multiple conditions, system states, or events and assign a different operating mode to each of them. This enables different system states to be signaled via one output.

4.10 Connecting digital inputs

Figure 4-17 Wiring of the digital inputs



You can connect the digital inputs to passive or active signal generators. The passive signal generators (switches, buttons) use the 12 V supply of the charging controller. The active signal generators have their own 12 V supply.



NOTE: Use the same GND potential.

If the digital inputs are controlled when signal generators are active, the ground potential of the signal generators must be connected to the ground potential of the charging controller.

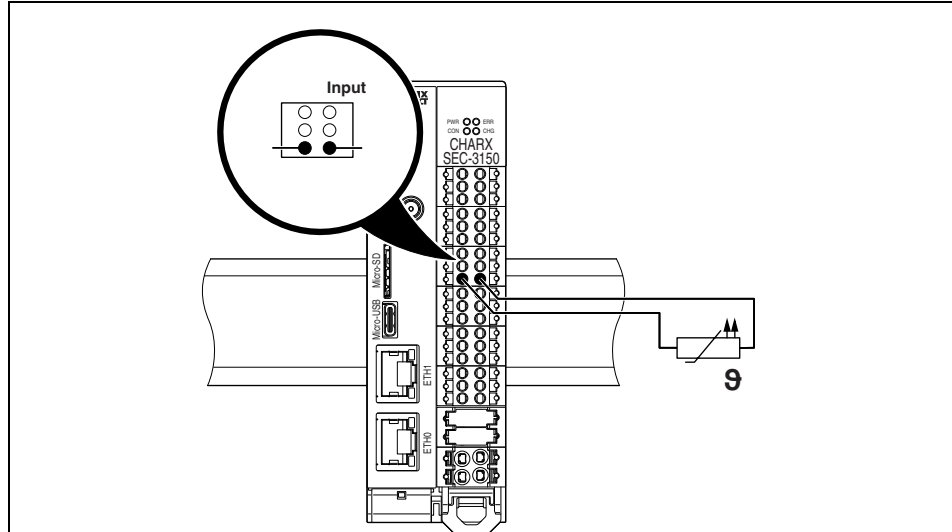
The digital inputs are configured in the web-based management (see [“Charging Stations/Charging Point/Event Actions”](#) on page 94).

For the “Rising edge” and “Falling edge” events, you can select an action from a predefined list for the relevant input. Multiple actions can be assigned to one input signal.

You can use the digital inputs as analog threshold switches by assigning the “Digital input 1 ... 4 above/below xxx mV” condition to the action.

4.11 Connecting temperature sensors

Figure 4-18 Connecting a PTC sensor



You connect the temperature sensors via the PTC terminal points on the “Input” connector. You can use both PTC chains and Pt 1000 sensors. The configuration of this is performed in the web-based management (see [“Monitoring | Derating” on page 91](#)).

For “PTC” operating mode, specify a resistance value at which the charging process will be interrupted. Reactivation is performed with a hysteresis of 3%.

For “Pt 1000” operating mode, a temperature range is defined in which the charging current is derated. The respective temperatures are assigned a current value that is still permissible for derating at the relevant temperatures. When the start temperature is reached (1), the charging controller commences derating. Linear interpolation of the permissible current ($A \rightarrow B$) occurs between the two limit temperatures. When the stop temperature is reached (2), the current setting is set to 0 A. The method of operation is shown in [Figure 4-19](#).

Figure 4-19 Derating curve for temperature measurement with Pt 1000 resistor

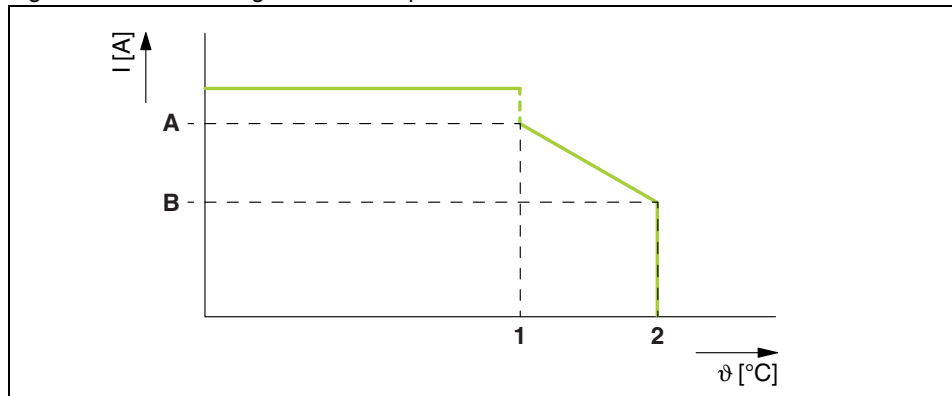


Figure 4-20

5 Starting up the charging controller

**NOTE: Check for latest firmware prior to startup**

Operate the charging controller with the latest firmware version. The latest firmware version is available for downloading at phoenixcontact.com/qr/1138965. Observe the change notes regarding the firmware version. If necessary, update the firmware. For information on running firmware updates, refer to “System Control/Software” on page 126.

5.1 Notes on the configuration of the CHARX SEC-1000

You can configure the CHARX SEC-1000 charging controller in two different ways:

- Connect the charging controller to a CHARX SEC-3xxx. Perform the configuration via the web-based management. You can then disconnect the devices again and operate the CHARX SEC-1000 separately.

**Note for configuration with CHARX SEC-3xxx:**

Two Event Actions must be created. See “Charging Stations/Charging Point/Event Actions” on page 94.

**Charging releases for stand-alone operation of a CHARX SEC-1000**

The configured charging releases are processed via the application software on the CHARX SEC-3xxx. For stand-alone operation of a CHARX SEC-1000 charging controller, the charging release must be configured via Event Actions. An example of a corresponding event can be the connection of the vehicle to the charging station or an edge at one of the digital inputs.

- You can connect the charging controller to a PC via a USB to CAN bus converter and an adapter cable. Configuration is performed via a software tool, which you can download in the download area for the charging controller at phoenixcontact.com/qr/1139034. Here, you will also find notes on operation of the software and on configuration of the adapter cable.

5.2 Access to CHARX SEC-3xxx charging controllers

You can access the CHARX SEC-3xxx charging controllers in two different ways. This access is required to make settings in the web-based management or to prepare the charging controller for use in the network.

1. Access via the USB-C interface and the USB slot on the computer
2. Access via an Ethernet network made up of the charging controller, router, and computer
3. Access via the Ethernet interface directly from the computer

**No WBM or general Ethernet access via the ETH1 interface**

The ETH1 interface is reserved for setting up client/server systems with additional CHARX SEC-3xxx charging controllers. The ETH1 interface is not available for access to the WBM or unrestricted operation in Ethernet networks.

5.2.1 Access via the USB-C interface

This is the preferred way, since it avoids restrictions in Ethernet networks.

- You must always download an RNDIS driver for your computer. You will find the driver at “catalog.update.microsoft.com”.
- Search for “USB\VID_0525&PID_A4A2” or “RNDIS Gadget”. Select a driver for your operating system, for example, the driver from Acer for “Win7/8.1/later”.

Figure 5-1 Driver from Acer for “Win7/8.1/later”

Acer Incorporated. - Other hardware - Acer Netchip RNDIS/Ethernet Gadget	Windows 7, Windows 8, Windows 8.1 and later drivers	Drivers (Other Hardware)
--	---	--------------------------

- Download the driver. It is approximately 21 KB in size.
- Unpack the zip file to a directory, for example, c:\rndis-driver.
- Open the Device Manager on your computer by entering “Device Manager” in the search bar.

Figure 5-2 Device Manager



- Connect the CHARX SEC-3xxx to the computer.
- If the charging controller is already connected, you need to disconnect it briefly.
- ⇒ A device appears when a charging controller is connected and disappears again when it is disconnected. This is the interface for the charging controller. Depending on the operating system, it will be called “USB Device” or something similar.
- In the Device Manager for the newly found device, select the menu “Update Driver” and browse manually. Select the target directory below.
- ⇒ The driver is found in the target directory. The device is displayed under “Network, USB Ethernet/RNDIS Gadget”.
- Find the device with the installed driver at the IP address 192.168.5.1. Access the WBM by entering the address in the browser.

If access is not possible although the driver has been installed, it may be for one of the following reasons:

- The computer is attempting to establish the connection via an Ethernet or WLAN interface. In this case, disable the interfaces for a brief time.
- The driver was not assigned to the correct interface. Check which interface appears or disappears by plugging in and unplugging the module.

5.2.2 Access via an Ethernet network with router

- Connect the charging controller to a router via the ETH0 interface.
- Connect your computer to the router as well.
- ⇒ By default, the ETH0 interface is set to dynamic address assignment by a DHCP server. Once the address has been assigned by the router, the interface can be found in the network.
- ⇒ Depending on the system, the charging controller can be accessed at `http://ev3000.local` or `http://ev3000`.

If multiple charging controllers are integrated in a network via DHCP, successive consecutive numbers are appended to the subsequent charging controller names (ev3000-2, ev3000-3, etc.). The charging controllers can then be accessed accordingly via these names.

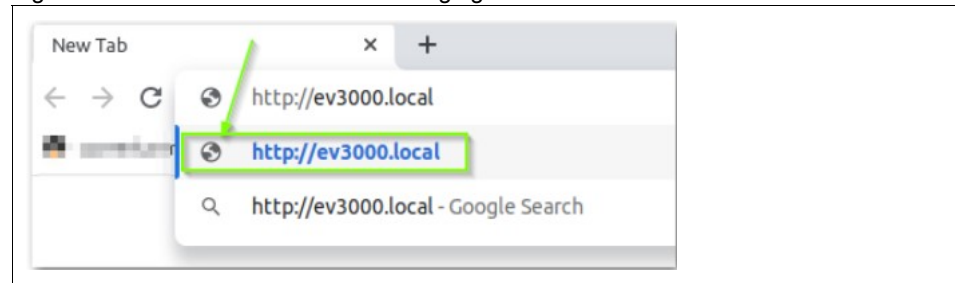
Procedure in case of limited access rights

If you are operating in a network with limited access rights, the address assignment is often blocked or your computer is not able to find the charging controller. In this case, you must search the network for the IP address or select a different access method.

Local search for the charging controller

Avoid using a search engine to search for the charging controller. Establish a direct connection.

Figure 5-3 Local search for the charging controller



5.2.3 Access via the Ethernet interface directly from the PC

The initial connection to the charging controller can also be established without a router. In this case, there is generally no DHCP server available to assign an IP address to the charging controller.

- To be able to assign an IP address initially with your PC, you need a corresponding program. Phoenix Contact recommends “Rockwell BOOTP/DHCP Server 2.3”.
- The program detects BootP and DHCP requests and can manually assign an IP address to the charging controller based on the requests.

5.3 WBM – Dashboard and Login

You can use the web-based management (WBM) to read static and dynamic frame data and to make configuration settings.



Standby time until the WBM is started

To ensure rapid availability in operational mode after restarting the charging controller, one of the last processes to be started is the WBM. This can result in a delay until the full scope of functions of the WBM is available.

If necessary, press F5 to refresh the web page in the browser and update the status of the WBM.

Following successful login, you can access further areas of the WBM.

Login

- Language selection
- Login
- User roles
- Change password

Dashboard

- Summary of the connected charging controllers

Charging Park

- Status indicators and configuration of the individual charging controllers
- Status indicators and configuration for operation on an OCPP backend
- Status indicators and displays for load management
- Display and management of the local whitelist

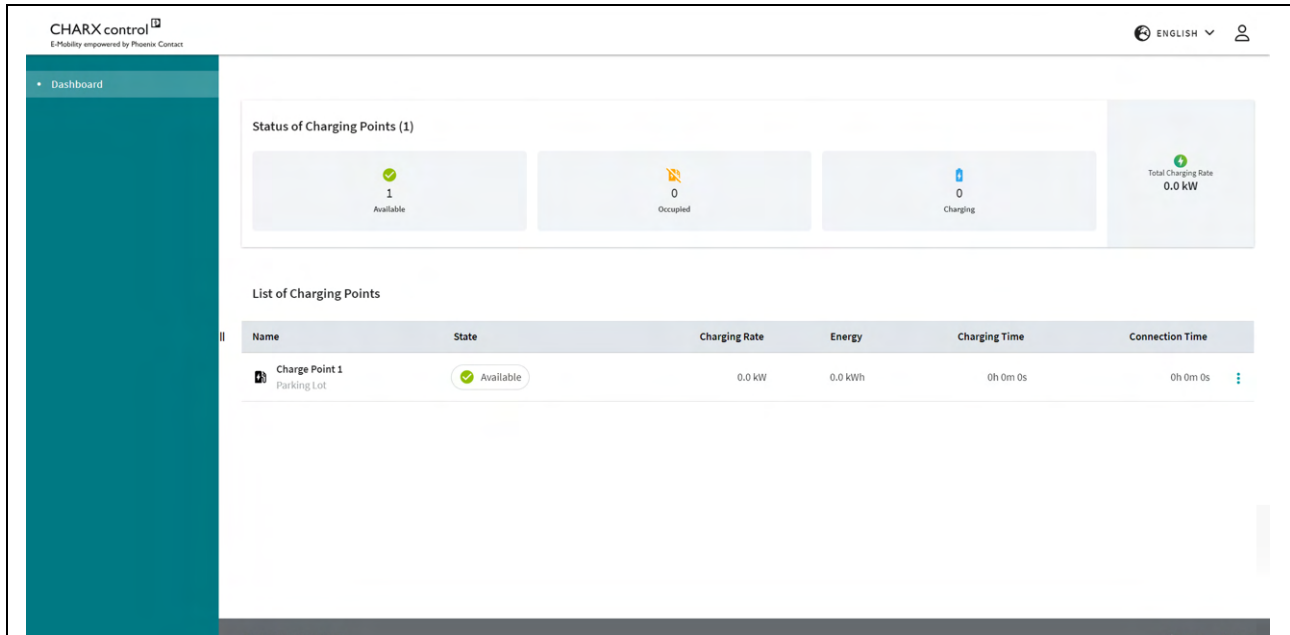
System Control

- General system status and version information
- Display and setting of the time
- Network settings and connection status
- Modem settings and connection status
- Download of log files for diagnostic purposes
- Module switch-over to client/server mode
- Software update

5.3.1 Dashboard

When you access the WBM via the browser, the dashboard provides you with an overview of all charging points that are connected and set up via this charging controller. This includes additional extension modules on the backplane bus. If the charging controllers are operating in a client/server group, further clients together with their respective extension modules will be shown.

Figure 5-4 Dashboard of the charging controller



The overview provides a summary of the connected charging controllers:

- Number of charging points available for new charging processes
- Number of occupied charging controllers without an active charging process
- Number of charging controllers currently engaged in a charging process
- Total power currently being charged at all connected charging controllers

The following information is displayed for the individual charging controllers:

- Name and location of the charging controller (specified in the configuration)
- Current status
- Current power (for active charging processes)
- Amount of energy currently being charged
- Charging time
- Plug-in duration

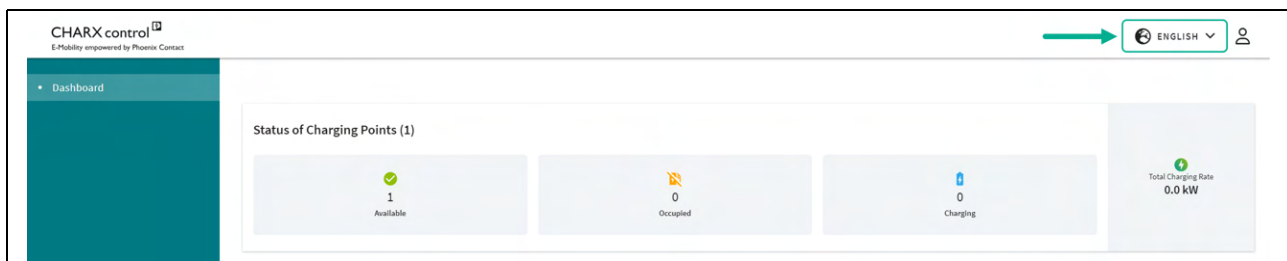


Only configured charging points are visible in the dashboard

Only charging points that are configured are shown in the dashboard view.

5.3.2 Language selection

Figure 5-5 Language selection



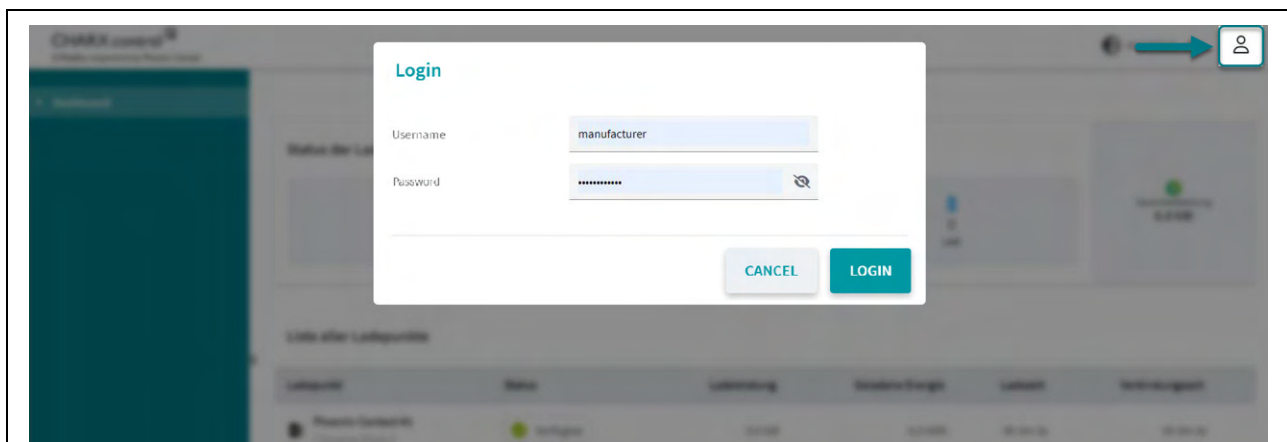
You can switch between the following languages via the language selection option:

- German
- English

5.3.3 Login

When you access the WBM, you are logged into the charging controller in the “Guest” user role and will not have any other rights. For other activities, you must log in with the appropriate user role. To do this, click on the figure icon in the upper right-hand area of the screen.

Figure 5-6 Login to the WBM



5.3.4 User roles

The WBM provides various user roles with corresponding login and different rights.

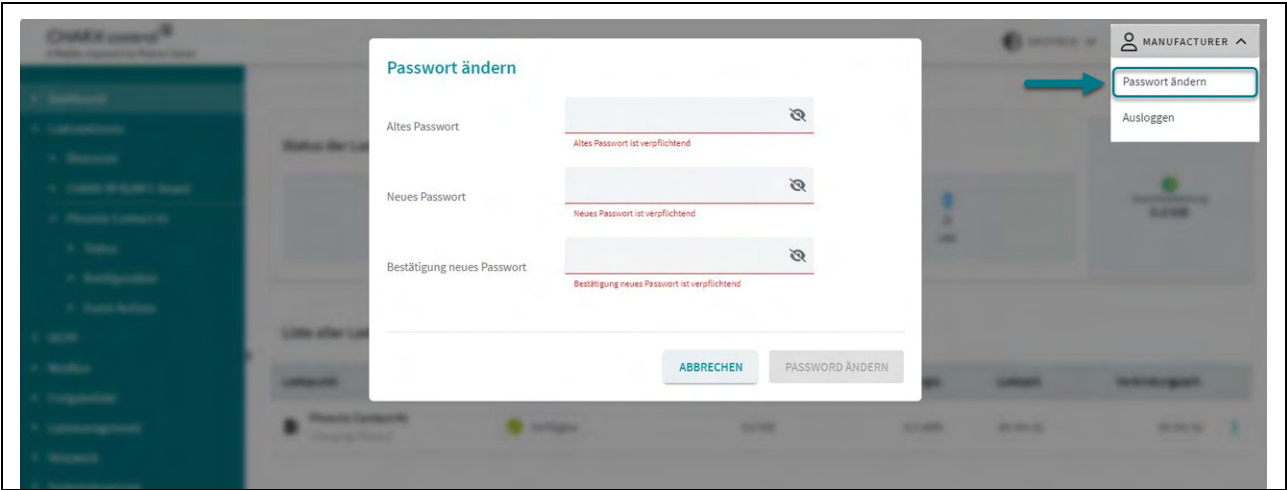
Table 5-1 User roles and rights management in the WBM

Role	Login	Default password	Rights
Guest	“---”	“---”	Read-only access only to the dashboard
User	“user”	“user”	All read-only access rights, charging releases, editing of wh- itelists, download of log files
Operator	“operator”	“operator”	User rights, plus settings required for operation and local startup (network, backend, load management), software updates
Manufacturer	“manufacturer”	“manufacturer”	No restrictions

5.3.5 Change Password

NOTE: Change your password regularly
To prevent misuse and invalid device settings, change your passwords during startup at the installation location, at the very latest. Assign a new password for your user role by clicking the “Profile” button.

Figure 5-7 Changing the password via the WBM



NOTE: Log out when not using the WBM
To prevent misuse and invalid device settings under your user profile, log out by clicking the “Logout” button if temporarily not using the WBM.

5.4 WBM – Charging Stations

5.4.1 Configuration of the charging stations

Pressing the “Charging Stations/Overview” button takes you to an overview of all charging stations and charging points. A displayed charging station can have up to twelve charging points.

Figure 5-8 Charging Stations/Overview

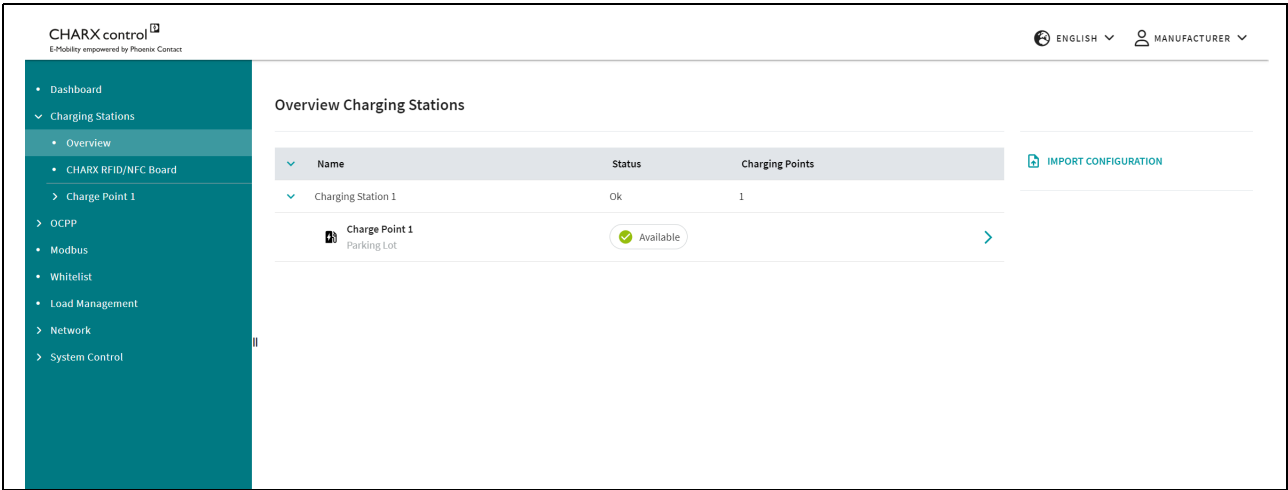
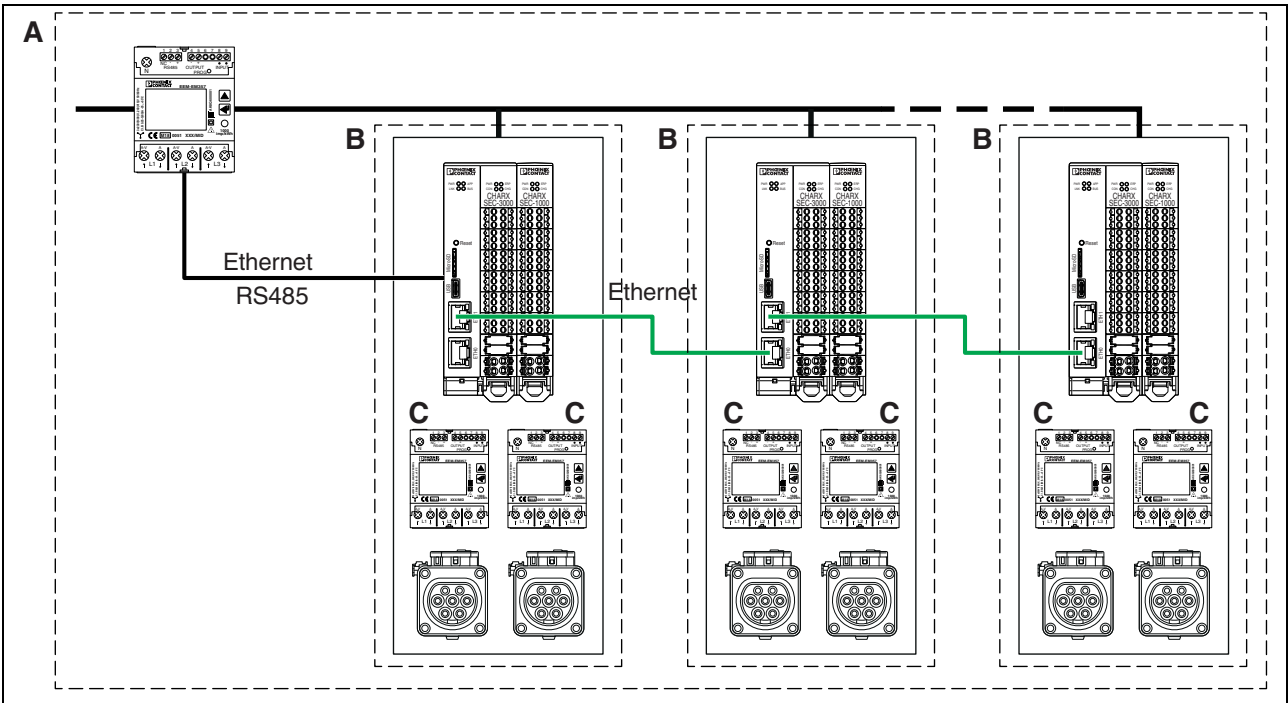


Figure 5-9 Charging station and charging point



CHARX control modular

Charging park (A)

A charging park consists of all the charging controllers combined in a network. A charging park has a server, clients connected via Ethernet, and extension modules attached to the clients or the server.

For example: A CHARX SEC-3150 module as the server, with attached CHARX SEC-1000 extension modules, which are connected to additional CHARX SEC-3050 modules and attached extension modules.

Charging station (B)

A charging station is a grouping of precisely one server or client module. Additional extension modules can be attached to the server or client module.

For example: A CHARX SEC-3150 module with additional attached CHARX SEC-1000 modules.

Charging point (C)

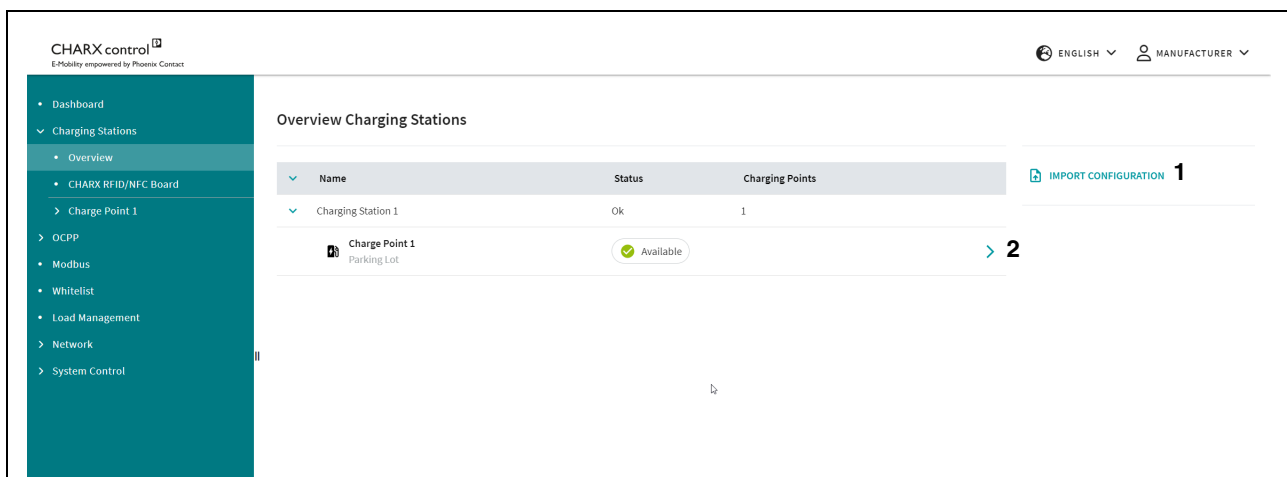
A charging point is precisely one charging interface with the associated I/O device.

For example: The charging interface of the CHARX SEC-3150 module or a CHARX SEC-1000 module.

Charging stations

Figure 5-10 shows a charging park view together with the respective status of the charging stations and charging points. The charging park consists of a charging station with two charging points. The charging points are a CHARX SEC-3100 and CHARX SEC-1000.

Figure 5-10 Importing a configuration

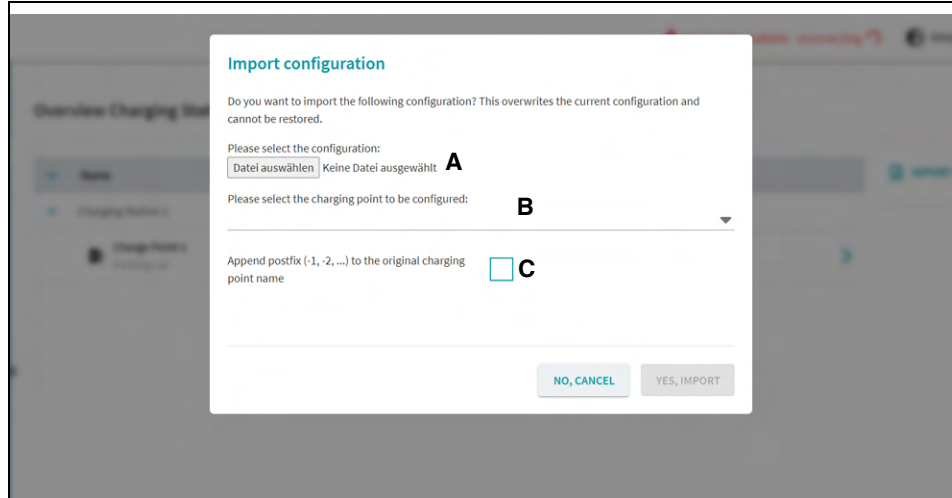


In the charging park view, you can import configurations to the charging points (1) or access the charging point details (2).

You can run the individual charging points with different configurations. You can export the configurations beforehand from a configured charging point. Exporting makes it easier to reproduce charging point configurations.

- Click on the “IMPORT CONFIGURATION” button.

Figure 5-11 Importing charging point configurations



Proceed in accordance with [Figure 5-11](#) to import configurations:

- Select the saved configuration file (A)
- Select the charging point to which you want to transfer the configuration (B)

If you configure multiple charging points in a charging park with the same file, then you can automatically add an incrementing extension “-1”, “-2”, etc. to the charging point names stored in the configuration file (C).

If an existing configuration is not available, you can view the charging points on an individual basis and edit them step by step. To do this, select the respective charging point (see [“Charging Stations/Charging Point/Configuration” on page 87](#)).

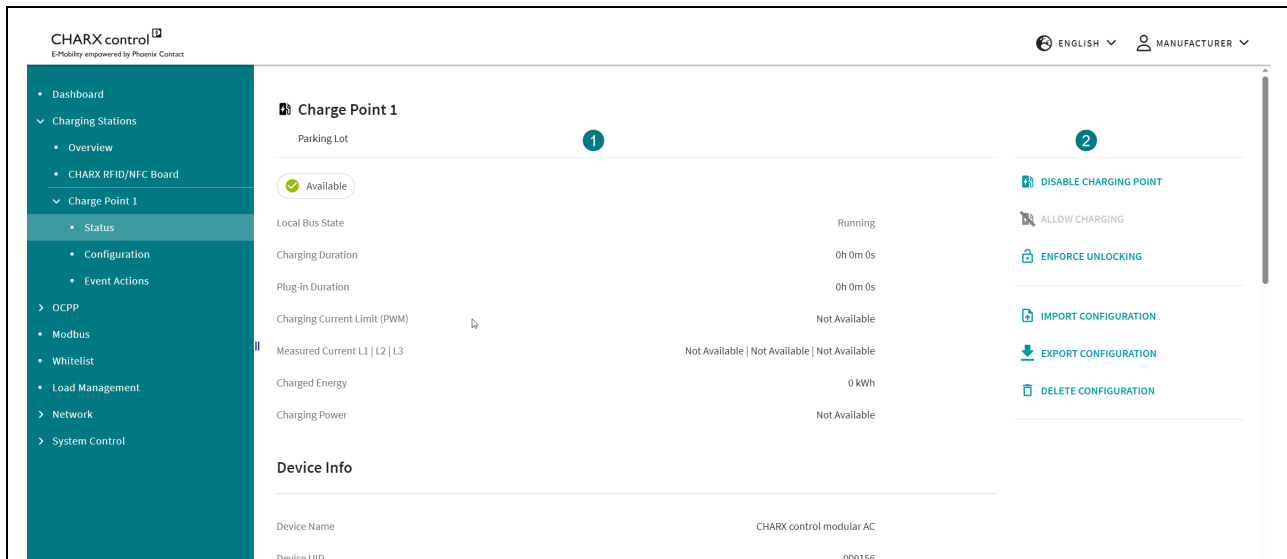
5.4.2 Charging Stations/Charging Point/Status

You access the “Charging Point Status” view by clicking on the “Status” button under the selected charging point (see [Figure 5-10](#)).

The “Charging Point Status” view contains the “Status” page, which displays information (1) and operating options (2) for the charging point.

The only user with full operational authorization for charging points is the “Manufacturer”.

Figure 5-12 Charging Point Status



The information is divided into the following groups:

- Current charging status
- Device information
- Base module
- Bus communication
- Energy measuring device
- Charging point details
- ISO 15118-specific status data

The information (1) is shown in [Table 5-2](#).

Operation (2) is described in [Table 5-3](#).

Table 5-2 Charging Point Status (Information)

Charging Stations Charging Point Status	
CHARX charging point X	
Status	The same display as on the dashboard. The current status of the charging point is shown here. – Available – Occupied – Charging – Reserved – Error (see “Error codes” on page 141)
Local Bus Status	The status of the bus communication connection.
Charging Duration	The total duration that the connected vehicle was in “Charging” status or status “C”. This time is normally shorter than the plug-in duration.
Plug-in Duration	The plug-in duration indicates the total time the charging point has been in the “Occupied”, “Charging”, or “Error” state, and resets to “0” when the vehicle is disconnected.
Charging Current Limit (PWM)	The charging current setting that the charging controller is currently communicating to the connected vehicle. The setting is always 0 A when a vehicle is not connected.
Measured Current L1 L2 L3	The currents currently measured at the charging point are displayed. If a measuring device is not connected, the currents are displayed as not available.
Charged Energy	The charged energy during the current charging process is displayed. If no measuring device is connected, “Not Available” is displayed here. If no measuring device is configured, this data is not visible.
Charging Power	The current charging power is displayed. If no measuring device is connected, then it is shown as not available. If no measuring device is configured, this data is not visible.
Device Info	
Device Name	Factory designation of the charging controller
Device UID	The Device UID is unique throughout the charging park. It can be used to clearly identify a charging controller. The UID that can be read here can also be used for communication from a higher-level system (e.g., MQTT).
Base Module	
Hardware version	Hardware version of the charging station
Firmware version	Firmware version of the charging station. This can be updated via the “System Control/Software” menu (“System Control/Software” on page 126).
Bus Communication	
Backplane Bus Position	The position in the backplane bus helps identify the current charging controller in question. “1” is the server or client module, “2” to “12” are extension modules.
Head Module IP Address	The IP address via which the server or client module of the charging point can be accessed.
Head Module MAC Address	MAC address of the server or client module.

Table 5-2 Charging Point Status (Information) [...]

Charging Stations Charging Point Status	
Energy Measuring Device	
The information on the energy measuring device is only displayed if an energy measuring device is connected. Otherwise, "Not Available" is displayed in the relevant fields.	
Current L1	Current current on phase L1 of the energy measuring device
Current L2	Current current on phase L2 of the energy measuring device
Current L3	Current current on phase L3 of the energy measuring device
Voltage U1	Current voltage U1 of the energy measuring device
Voltage U2	Current voltage U2 of the energy measuring device
Voltage U3	Current voltage U3 of the energy measuring device
Total Energy	Total counter value of the energy measuring device
Power Factor	Power factor of the energy measuring device
Frequency	Mains frequency applied at the energy measuring device
Charging Point Details	
Status	Status of the charging point in accordance with IEC 61851-1
Current RFID	If an RFID card has been read by the RFID reader configured in the charging point, the RFID tag is displayed here.
External Temperature	If a temperature evaluation is configured, then the read temperature is displayed here.
ISO 15118	
If communication via ISO 15118 is configured in the charging point configuration, the ISO 15118 section is displayed below the charging point details. If ISO 15118 is not configured, then no further information is displayed here.	
Start Charging Time (UTC)	The time that the vehicle gives as the desired time to start charging. This is the time at which the charging process starts.
Scheduled Departure Time (UTC)	The time that the vehicle gives as the scheduled departure time.
Charging Progress (15118)	The current charging progress is displayed. – Start: The process is running. – Stop: Charging is stopped. – Renegotiate: The vehicle renegotiates with the charging point.
Session ID	The session ID describes the process with a unique number.
EVCC ID	The EVCC ID given by the vehicle.
Energy Transfer Mode	The energy transfer mode requested by the vehicle can either be "AC_single_phase_core" or "AC_three_phase_core" and determines how many phases are used to charge the vehicle.
TCP Connection Status	Status of the TCP connection: UNKNOWN, DISCONNECTED, CONNECTED
QCA Link Status	Status of the QCA link: UNKNOWN, NOT_AVAILABLE, DOWN, UP

Table 5-2 Charging Point Status (Information) [...]

Charging Stations Charging Point Status		
Error	SLAC_FAILED	The SLAC process has failed. One reason may be that the time constraints are not met or messages are damaged.
	PROTOCOL_HANDSHAKE_FAILED	The EVSE and the EVCC were unable to agree on the same ISO 15118 communication protocol version. The current EVSE implementation only supports “urn:iso:15118:2:2013:MsgDef Version 2.0”.
	SSL_HANDSHAKE_FAILED	The SSL/TLS handshake for the TCP connection, which is used for the actual high-level communication, failed for some reason. This may be because there is no valid V2G root certificate installed on the EVSE side or the EVCC does not accept the certificate.
	SEQUENCE_ERROR	The EVCC sends a request that is not expected in the current state. The EVCC interrupts the message flow order specified by communication protocol ISO 15118.
	SESSION_SETUP_TIMEOUT	Once the SLAC procedure has been completed and the data connection is established, the EVSE and the EVCC must set up a charging session within the eighteen seconds specified, otherwise high-level communication will be aborted by the EVSE.
	SEQUENCE_TIMEOUT	The EVCC does not send any request(s) within the time constraints specified by the ISO 15118 protocol. High-level communication is aborted by the EVSE.
	UNKNOWN_SESSION	The EVCC has sent a session ID to resume a previously paused charging session that is not known on the EVSE side. High-level communication is aborted by the EVSE.
	TARIFF_SELECTION_INVALID	A current output request received from the EVCC contains an SA tuple ID that was not previously sent by the EVSE in the “charge parameter discovery response”.
	CHARGING_PROFILE_INVALID	High-level communication is aborted by the EVSE. The charging profile sent by the EVCC violates a power limitation that is specified in the “charge parameter discovery response”. High-level communication is aborted by the EVSE.

Table 5-3 Charging Point Status (Operation)

Charging Stations Charging Point Status (Operation)	
Disable or Enable Charging Point	If the charging point is active, it can be disabled using this button. The charging point is set to status F (in accordance with IEC 61851-1) and shown as being in "Error" state. An active charging process is aborted. The same button is used for activation.
Allow or Prohibit Charging	When a vehicle is connected to the charging point, charging can be enabled by the operator of the web page. Charging can be prohibited using the same button.
Enforce or Revert Unlocking	If unlocking cannot be performed on the vehicle side, it can also be performed via the web page. An active charging process is aborted. The "Enforce Unlocking" state must be maintained until the connector has been removed from the charging socket. The enforced unlocking can then be reverted.
Only available for the user "Manufacturer"	
Import Configuration	A previously saved configuration can be loaded onto the charging controller via the "IMPORT CONFIGURATION" button. The current configuration on the selected charging point will be overwritten and cannot be restored. The available charging controllers are displayed in order of their backplane bus position.
Export Configuration	The configuration is exported as a JSON file and is normally saved in the "Downloads" folder.
Delete Configuration	A configuration can only be deleted if the charging point is configured. Pressing the button restores the charging point to its factory default configuration. The deletion of the configuration cannot be undone. A configuration can be exported beforehand as a backup.

5.4.3 Charging Stations/Charging Point/Configuration

When a charging controller is in the factory default configuration, the charging point is not configured. The charging controller is configured for the first time under “Create Configuration”. The name of the menu changes to “Configuration” later in the process. You can copy the configuration of a different charging point at the top of the page. This makes it easier to create identical or almost identical charging points. [Figure 5-13](#) shows the configuration page view.

Figure 5-13 Configuration page for an unconfigured charging point

The screenshot displays the CHARX control web interface. The sidebar on the left contains a menu with the following items: Dashboard, Charging Stations (expanded), Overview, CHARX RFID/NFC Board, Charge Point 1 (expanded), Status, Configuration (selected), Event Actions, OCPP, Modbus, Whitelist, Load Management, Network, and System Control. The main content area is titled 'Edit Charging Point Configuration'. It features two main sections: 'General' and 'Charging Connection'. The 'General' section includes input fields for 'Name' (filled with 'Charge Point 1'), 'Location' (filled with 'Parking Lot'), and 'EVSE ID'. The 'Charging Connection' section includes dropdown menus for 'Connection Type' (set to 'Socket Outlet') and 'Standard' (set to 'IEC 62196'). On the right side of the 'General' section, there are two buttons: 'SAVE CHANGES' and 'COPY CHARGING POINT CONFIGURATION'.

Settings for the charging point name and location are required. The name serves to uniquely identify the charging point and configuration. The charging controller you assign to the charging point is identified by a UID. If you change the settings, click the “Save Settings” button to save your changes.

The remaining structure of the configuration is divided into different areas. The available areas are: Charging Connection, Energy, Monitoring, Release Charging, and ISO 15118.

Table 5-4 Charging Point: Create Configuration

Charging Stations Charging Point Create Configuration	
Charging Connection	
The settings for "Charging Connection" cover the area between the charging controller and the vehicle.	
Connection Type	Type of connection from the charging point. – Socket Outlet: A charging socket is mounted at the charging point. The connection is established by a mobile charging cable. – Connector: A permanently connected charging cable with charging connector is attached to the charging point.
Standard	Standard of the charging socket to be connected. – IEC 62196 This setting is only available in conjunction with the "Socket Outlet" connection type.
Socket Outlet Type	In this field, you select the charging socket type. This is abbreviated according to the actuator selection in the item designation. – 4-pos. charging socket, Marquardt type actuator – 4-pos. charging socket, Küster type actuator – 3-pos. charging socket, Hella type actuator This setting is only available in conjunction with the "Socket Outlet" connection type.
Locking Mode	You select the moment when the actuator should lock the charging socket. – On EV connected – disconnected: As soon as a vehicle is connected to the charging socket, it is locked. Disconnection on the vehicle side is required first to unlock the charging socket. – Remote control: Locking is not controlled automatically, instead it must be controlled externally. This can be done via OCPP (corresponding configuration required), Modbus, or the REST API, for example. This setting is only available in conjunction with the "Socket Outlet" connection type.
Plug Rejection	Charging connectors with cables with low current carrying capacity will be rejected by the charging controller. In this case, charging does not take place and the charging point switches to the error state. – Reject 13 A – Reject 20 A & 13 A This setting is only available in conjunction with the "Socket Outlet" connection type.
Status D Vehicle Rejection	The charging controller rejects or accepts vehicles that require additional ventilation. – Reject – Accept

Table 5-4 Charging Point: Create Configuration [...]

Charging Stations Charging Point Create Configuration	
Energy	
Charging current settings and settings for the energy measuring device are made in the “Energy” area. The settings are not linked; charging current settings are also valid without an energy measuring device.	
Energy Charge Currents	
Charge Current Minimum	The configured minimum set current of the charging point in amps.
Charge Current Maximum	The configured maximum set current of the charging point in amps. The set current is always within the limits of the minimum and maximum charging current.
Fallback Charging Current	Fallback charging current in amps. This charging current setting is automatically set when the fallback time has elapsed.
Fallback Time	The fallback time in seconds. In the event that the connection to the relevant front module is lost, the charging controller waits a certain amount of time before switching to the fallback charging current. During an active connection, the elapsing timer is repeatedly increased to the fallback time and therefore the fallback charging current is not applied.
Energy Energy measuring device settings	
Energy Measuring Device Type	You select the energy measuring device type here. – Phoenix Contact EEM-350 → EEM-350-D-MCB, 2905849 – Phoenix Contact EEM-EM357/EEM-DM357 → EEM-EM357, 2908588 → EEM-DM357, 252817 → EEM-DM357-70, 1219095 – Phoenix Contact EEM-EM357-EE → EEM-EM357-EE, 1311985 – Phoenix Contact EEM-157-EE → EEM-EM157-EE, 1311993 – Phoenix Contact EEM-AM157-70 → EEM-AM157-EE, 1219090 – Carlo Gavazzi EM24 – Carlo Gavazzi EM340 – Carlo Gavazzi EM111 – Inepro Metering PRO380 – Iskra WM3M4(C)
Connector Phase Rotation	You define the phase rotation at the measuring device connection here. This configuration is not required, but does improve load management behavior and makes it possible to limit out-of-balance loads. This setting can only be set in conjunction with a configured energy measuring device type.
Calibration Law	
Charging Point Abbreviation for Screen	The specified abbreviation is shown on the display.

Table 5-4 Charging Point: Create Configuration [...]

Charging Stations Charging Point Create Configuration	
Selection of the charging point:	Selection of the charging point: – Via RFID reader: An RFID card is assigned to a charging point automatically. – Via screen: The charging point to be activated must be selected manually on the CHARX display when an RFID card is read. The settings are only relevant if the calibration law function is used.

Table 5-4 Charging Point: Create Configuration [...]

Charging Stations Charging Point Create Configuration	
Monitoring Protection The safety equipment detects errors at the charging point and switches the charging point to the error state. Safety equipment is configured in the “Monitoring” settings. Connect the safety equipment in accordance with “Connecting and wiring the hardware” on page 51.	
Contactor Monitoring	Load contactor monitoring is used to detect a non-opening contactor. Specify one of the digital inputs for this.
Auxiliary contact	Select the type of the auxiliary contact for monitoring. N/C contact: When the contactor is stuck, the contact is open and no voltage is applied. N/O contact: When the contactor is stuck, the contact is closed and 12 V are applied.
DC Residual Current Monitoring	You can enable or disable DC residual current monitoring via a check box. The residual current sensor must be connected in accordance with “ Operation without a DC residual current sensor – with a type B residual current device ” on page 59.
Monitoring Charge Current Monitoring Charging current monitoring is only possible if a measuring device is configured. The charging current can then be checked for an impermissible overrange or out-of-balance load of the defined set current.	
Over Current Detection	Select the type of overcurrent monitoring. – EV/ZE Ready: Derating is performed in defined stages as per the EV/ZE Ready standard. – Overcurrent shutdown: Shutdown in the event of an overcurrent in a time period of 100 s (>110% of the set current) or 10 s (>120% of the set current) If overcurrent monitoring has been triggered, charging is started again after one minute. If residual current occurs again, an error status is set for the charging point.
Out-of-balance Suppression	Out-of-balance suppression to a maximum of 20 A can be enabled and disabled via the check box. Out-of-balance suppression is implemented for each charging point.
Monitoring Derating Derating is performed in the event that a measured temperature is exceeded. The derating function can be configured as linear derating or as activation. The connection and method of operation is illustrated in “Connecting temperature sensors” on page 69.	
Sensor Type	Select the sensor type for temperature monitoring and derating here. – Pt 1000: A Pt 1000 sensor is connected to the charging controller. Then you can configure the start temperature, stop temperature, start current, and stop current. – PTC: A PTC chain is connected to the charging controller. Then you can configure a terminating resistor.
Start Temperature (when Pt 1000 is selected)	Temperature in °C at which derating begins. To ensure that derating is applied, the start temperature must be less than the end temperature. The start current must be greater than the end current.
Stop Temperature (when Pt 1000 is selected)	Temperature in °C at which derating stops the charging process.

Table 5-4 Charging Point: Create Configuration [...]

Charging Stations Charging Point Create Configuration	
Release Charging	
The charging release determines when a vehicle is authorized to charge. Without a charging release, the vehicle stays in status B.	
Release Mode	Via Dashboard: The release is only issued via the web page and must be issued manually. This is only possible on the dashboard and the status page of the charging controller. By Local whitelist: The whitelist, which is checked when an RFID card or EVCC ID is presented, is stored locally on the charging controller. The RFID cards or EVCC IDs must be managed under "whitelist". Via Remote Control: The release is issued and withdrawn via an external system. For example, the release is issued via the REST API or Event Actions. Permanent Charging Release: The charging release is issued on a permanent basis and is not withdrawn. The charging release cannot be withdrawn via the web page. If the charging release is to be withdrawn, the charging point can be unlocked or locked. By OCPP: The release is issued and withdrawn via the connected OCPP backend. Additional release via the web page is not possible. ❗ NOTE: OCPP backend connection is only possible with this setting. ❗ NOTE: If you change the settings or switch from OCPP to the local whitelist, you must restart the OCPP agent. Via Modbus: The release is issued and withdrawn via the Modbus registers. Additional release via the web page is not possible.
RFID Reader	The RFID reader used at the charging point is specified via the RFID reader terminal point. All the charging points available in the network are therefore listed here. For example: "Chargepoint 2". This means the RFID reader at "Chargepoint 2".
Type of RFID Reader	You can select the type of the RFID reader. – ELATEC TWN4 – DUALI MDE 950-4 XCP – Netronix UW-XEU1 – CHARX RFID/NFC
RFID Timeout	Time after which a charging release via RFID is discarded if no vehicle is connected. The time is specified in seconds.
OCPP ConnectorID	The default value is "-1". You must specify an ID here; this ID must be unique in the charging park. You must specify the ID starting from 1. The ID represents the ID in the OCPP backend. ❗ NOTE: The ID is required at the OCPP backend for operation of the OCPP.

Table 5-4 Charging Point: Create Configuration [...]

Charging Stations Charging Point Create Configuration	
ISO 15118	
You must make special settings to activate ISO 15118 communication on the CHARX SEC-3050 and -3150 modules.	
High Level Communication	ISO 15118 communication is activated via the High Level Communication (HLC) setting. – Required: Only vehicles with HLC can be charged at the charging point. – Optional: Vehicles with HLC as well as vehicles without HLC can be charged. – Disabled: There is no HLC, i.e., no communication in accordance with ISO 15118, at the charging point.
EVSE ID	The assigned EVSE ID for the charging point is entered here. The format is "CountryCode"+"Operator ID"+"E"+"ChargingStation ID", e.g., DE123E4567
Free EVSE Charge Service	The vehicle can be informed via HLC that charging is free. This option is selected via the check box.
Payment Options	Payment can either be made by means of vehicle identification or conventional external payment. If certificates cannot be loaded via the web page, customers can only select the following option: Allow External Payment.
TLS Policy	Certificates cannot be loaded via the web page at present. The TLS policy is for display purposes only.

5.4.4 Charging Stations/Charging Point/Event Actions

In the “Charging Stations | Charging Point | Event Actions” menu item, specific actions can be assigned to events that occur. The combination of an event and action is referred to as an Event Action. The current state of the inputs and outputs of the controller is shown in the top area of the web page in [Figure 5-14](#).

Figure 5-14 View of the Event Actions

The Event Actions can be triggered internally in the charging controller or also by changes to the input signals. For example, an internal signal could be the rejection of an RFID or the detection of a vehicle. An input signal could be the change of a voltage level at the input or a rising/falling edge. The configured Event Actions are listed below the status of the inputs and outputs. In [Figure 5-13](#), there are three configured Event Actions for controlling the digital outputs.

Each Event Action is associated with an event, which represents the time of the request in the system. Assign an action resulting from the event. You can also request a condition. This is ANDed to the required event. Here, you can add further Event Actions or delete existing Event Actions. The maximum number of configured Event Actions is 32.

Repeated processing of Event Actions

The Event Actions are processed in an endless loop in the specified sequence. This can lead to actions from an Event Action being directly overwritten by a subsequent action and thus not being effective.

Targeted resetting of actions necessary

Depending on the configuration, it may be necessary to cancel actions resulting from Event Actions in a targeted manner when the condition no longer applies. If a condition is not met or a configured event does not occur, this does not automatically mean that the configured action is inverted.

Creating a new Event Action or editing an existing one

Pressing the buttons to create or edit Event Actions opens the Editor. You can select events, actions, and conditions from drop-down fields and make additional settings for them. Figure 5-15 shows the configuration view.

Figure 5-15 Configuration view for Event Actions (Event)

Edit Event Action

1 Event:
Always Triggered

2 Condition:
Status A

3 Action:
Digital Output 3 High
Action Timer: 10ms

> CONTINUE

✗ CANCEL

Choose an event
Please select the trigger for an event action first.

Temperature Derating
Started Ended

Plug
Connected Disconnected

RFID
Released Denied

Car status
EV Connected EV Disconnected

RFID Teach-In
Successful Failed

RFID Teach-Out
Successful

Error
Detected Resolved

Contactors Failure
Detected

Digital Input
Input 1 2 3 4
Value Rising Falling

Trigger
Never Always

Different options can be selected in each column. First, select an input or event that should cause the Event Action in question.

Input or event



The Event Action is only triggered in the case of an event and is ignored for the rest of the time. An event represents a one-time request. If an event is no longer present, the action is **not** reset.

Table 5-5 Input or events with description

Charging Park Charging Stations Charging Point Details Event Actions	
Input/Event	
Never Triggered	The event is never triggered, the Event Action is never used.
Always Triggered	The condition is always queried. An action can be triggered at any time. If a condition changes, this is immediately registered and the Action Timer starts running from the moment of this change.
New Error	An error is detected.
Error Resolved	An error no longer occurs.
Digital Input X Rising	The selected digital input has detected a rising edge.
Digital Input X Falling	The selected digital input has detected a falling edge.
Plug Connected	A charging connector has been plugged into the connected charging socket.
Plug Disconnected	A charging connector has been removed from the connected charging socket.
EV Connected	A vehicle has been connected to the charging point.
EV Disconnected	A vehicle has been disconnected from the charging point.
RFID Charge Release	A charging process has been enabled via an RFID card.
RFID Denied	An RFID card has been rejected.
Temperature Derating Started	Curtaiment started by the charging controller due to excessively high temperature.
Temperature Derating Ended	Curtaiment has been lifted.
Contactor Failure Detected	A contactor error has been detected.
Teach-in Successful	An RFID card has been successfully read and stored in the system.
Teach-out Successful	An RFID card has been successfully read and removed from the system.
Teach-in Failed	An RFID card has not been read successfully.

Condition

Another configuration option is available in the form of conditions that specify the function of Event Actions. Some conditions require further additional settings, which appear below the selection.

Figure 5-16 Configuration view for Event Actions (Condition)

Table 5-6 Condition with description

Charging Stations Charging Point Event Actions		
Condition		
Never True		The condition is never met, the action cannot be triggered.
Always True		The condition is always met, the action just depends on the event.
Digital Input High	Selection of the input	The selected input corresponds to the High state.
Digital Input Low	Selection of the input	The selected input corresponds to the Low state.
Connector plugged		A charging connector is inserted into the charging socket.
Error		An error is available in the charging controller.
Error Internal		An internal error has occurred in the charging station.
Error External		An external error has occurred on the vehicle.
PP XX A		The resistance value of the plugged-in charging cable corresponds to the carrying capacity of XX amps.
Status A		The charging point is in status A.
Status B		The charging point is in status B.
Status C		The charging point is in status C.
Status D		The charging point is in status D.

Table 5-6 Condition with description [...]

Charging Stations Charging Point Event Actions		
EV Connected		A vehicle is connected.
EV not Connected		There is no vehicle connected.
Available		The charging point is in "Available" status.
Preparing		The charging point is in "Preparing" status.
Charging		The charging point is in "Charging" status.
Suspended EV		The charging point is in "Suspended EV" status.
Suspended EVSE		The charging point is in "Suspended EVSE" status.
Finishing		The charging point is in "Finishing" status.
Reserved		The charging point is in "Reserved" status.
Unavailable		The charging point is in "Unavailable" status.
Contactor Failure Detected		A contactor error has been detected.
Last RFID Invalid		The last read RFID is not valid.
PP Under Value	PP current in amps	The resistance value of the charging cable is below a specific current value.
PP Over Value	PP current in amps	The resistance value of the charging cable is above a specific current value.
Analog Input X Over Value	Analog input voltage	The voltage at the selected input X is above the entered value.
Analog Input X Under Value	Analog input voltage	The voltage at the selected input X is below the entered value.
Charge Release		The charging release is present.
No Charge Release		The charging release is not present.
External Release		The charging point is available.
No External Release		The charging point is not available.
Temperature Derating		The charging point is curtailed due to excessively high temperature.
No Temperature Derating		The charging point is not curtailed.
Authorization Request ongoing		Authorization of the RFID card is being requested.
No Contactor Failure Detected		The charging contactor is working properly, a contactor error has not been detected.
Current reduced for External Reasons		The charging current is reduced by an external specification.
Current not reduced for External Reasons		The charging current is not reduced by an external specification.
CP PWM on		The charging point communicates with the vehicle via the PWM signal. The PWM signal is active.
CP PWM off		The charging point does not communicate with the vehicle via the PWM signal. The PWM signal is not active.
Backend offline		No connection to the backend available

Table 5-6 Condition with description [...]

Charging Stations Charging Point Event Actions	
Backend offline, but charging point available	No connection to the backend, but charging station available
Backend online	Connection to the backend available
Backend online and charging point available	Connection to the backend and charging station available

You can save the edited Event Actions below the settings or cancel editing.

Output or action

You then select an action for the event. This action can be performed continuously or for a specific time. Continuously means until the action is revoked by another Event Action. To define the time you use an Action Timer, which requires a value to be entered in milliseconds. In this way you can, for example, switch on LEDs for a specific time after the triggering.

Some actions require further additional settings, which appear below the Action Timer if this is the case.

Table 5-7 Output or actions with description

Charging Stations Charging Point Event Actions		
Output or Action		
No Action		There is no action linked to the event.
Enable Charging	Enable Status	The charging release is switched. Bus controlled: The charging release is issued and withdrawn via Modbus. Enable: The charging release is set. Disable: The charging release is withdrawn.
Lock Connector		The actuator moves to the locking position in the charging socket.
Unlock Connector		The actuator moves to the unlocking position in the charging socket.
Digital Output X Low		The digital output goes to 0 V.
Digital Output X High		The digital output goes to 12 V.
Digital Output X Floating		The digital output has no potential.
Digital Output X Flashing High	Flashing PWM	The digital output flashes and assumes 12 V for a specific period. The entry in Flashing PWM affects the setting of the percentage value for how long the output is set to High in relation to the total period length. Period length = 2 s.
Digital Output X Flashing Low	Flashing PWM	The digital output flashes and assumes 0 V for a specific period. The entry in Flashing PWM affects the setting of the percentage value for how long the output is set to Low in relation to the total period length. Period length = 2 s.
Digital Output X Pulsatile Low		The output pulsates and assumes the voltage level of 0 V, increasing and decreasing in time.
Digital Output X Buscontrolled		The output can be controlled via internal or external software.
Reduce maximum charging current	Reduction maximum current	The set current at the charging point is reduced. The set current should be reduced to this set value in amps.
External Release	Enable Status	The availability of the charging point is switched. Bus controlled: The availability is set via the Modbus registers. Enable: The charging point is set to available. Disable: The charging point is set to not available. Optionally, a freely definable error description can be sent to an OCPP backend.

Action Timer

If an action should cease immediately when a condition changes, set the Action Timer to a very low value (e.g., 10 ms).

If an action should not cease automatically when a condition changes, set the Action Timer to 0 ms.

The action remains until it is manually reset (e.g., by another Event Action). If the one-time occurrence of a short event is to be followed by a longer action, set the Action Timer to the duration of this action.

For example: The RFID card is rejected via OCPP. Then a flashing red LED appears for five seconds.

Examples of Event Action configuration

Event Actions for external specifications

Table 5-8 Event Action configuration – example 1

Input	1	2	3
Description	Charging release via a digital input as a button when a car is connected.	Shutdown of the charging point by an input	Current reduction to 16 A by an input
Event	Digital input 1 rising	Always Triggered	Always Triggered
Action	Create Charging Release	External Release	Reduce maximum charging current
Action Timer	0 ms	1000 ms	10 ms
	Activation status: Enable	Activation status: Bus controlled	Reduce maximum Current: 16 A
Condition	Status B	Digital Input High: "Low"	Digital Input High: "High"

Event Action configuration for the LED charging socket

Connection to the first digital output: Red

Table 5-9 Event Action configuration – example 2

State	Charging point error	Vehicle error	Invalid RFID	Reserved charging point	Vehicle rejected
Description	In the event of a charging point error, the red LED is steady on.	In the event of a vehicle error, the red LED flashes.	In the event of a rejected RFID, the LED flashes for 3 seconds.	If the charging point is reserved, the LEDs light up yellow.	If there is no charging release for the charging point, the LEDs flash yellow.
Event	Always Triggered	Always Triggered	RFID Denied	Always Triggered	Always Triggered
Action	Digital Output 1 High	Digital Output 1 Flashing High	Digital Output 1 Flashing High	Digital Output 1 High	Digital Output 1 Flashing High
Action Timer	10 ms	10 ms	3000 ms	10 ms	10 ms
Condition	Error External	Error External	Always True	Reserved	Suspended EVSE

Connection to the second digital output: Green

Table 5-10 Event Action configuration – example 3

State	Available	Reserved charging point	Vehicle rejected
Description	If the charging point is available, the green LED lights up.	If the charging point is reserved, the LEDs light up yellow.	If there is no charging release for the charging point, the LEDs flash yellow.
Event	Always Triggered	Always Triggered	Always Triggered
Action	Digital Output 2 High	Digital Output 2 High	Digital Output 2 Flashing High
Action Timer	10 ms	10 ms	10 ms
Condition	Available	Reserved	Suspended EVSE

Connection to the third digital output: Blue

Table 5-11 Event Action configuration – example 4

State	Preparing	Charge	Vehicle paused
Description	If charging is started, the blue LED is steady on.	When the vehicle is charging, the blue LED flashes.	If the vehicle is fully charged or rejects charging, the blue LED flashes slowly.
Event	Always Triggered	Always Triggered	Always Triggered
Action	Digital Output 3 High	Digital Output 3 Flashing High; Flashing PWM 50%	Digital Output 3 Flashing High; Flashing PWM 80%
Action Timer	10 ms	10 ms	10 ms
Condition	Preparing	Charging	Suspended EV

5.5 WBM – OCPP

In the “WBM/OCPP” area, you can view the current status of the OCPP configuration, configure the communication parameters for the backend, and make settings regarding operation.

The charging point must be configured as an OCPP charging point (“[Release Charging](#)”, “[By OCPP:](#)” under “[Charging Stations | Charging Point | Create Configuration](#)”).

OCPP Status Information

Figure 5-17 Status indicator for OCPP communication

The screenshot shows the CHARX control web interface. On the left is a sidebar menu with options: Dashboard, Charging Stations (Overview, CHARX RFID/NFC Board), Charge Point 1 (Status, Configuration, Event Actions), OCPP (Status, Configuration, Servervariables, Modbus, Whitelist, Load Management), Network, and System Control. The main content area is titled "OCPP Status Information" and contains a "Status" section with a table of messages.

Timestamp	Type	Message ID	Action
2023-04-15 17:20:19.949827	3	b858ccc-bad2-4718-84a0-6737d7823a5f	BootNotification
["status":"Accepted","currentTime":"2023-04-28T07:15:40.000Z","interval":1800]			
2023-04-15 17:20:19.321501	2	b858ccc-bad2-4718-84a0-6737d7823a5f	BootNotification
["chargePointModel":"Phoenix_Contact_M1","chargePointVendor":"Phoenix_Contact","chargePointSerialNumber":"123456","firmwareVersion":"V1.4.0","iccid":"8988303000047101461","imsi":"295050900355695"]			
2023-04-15 12:58:54.178412	3	7a6d5ba7-7b3a-4c20-9d74-5e8cb16aaf9a	StopTransaction
["idTagInfo":{"status":"Accepted"}]			
2023-04-15 12:58:53.314842	2	7a6d5ba7-7b3a-4c20-9d74-5e8cb16aaf9a	StopTransaction

At the bottom of the interface, there is a footer with "© 2023 PHOENIX CONTACT" and links for "Licenses" and "Contact".

On the Status page, you can see the current connection status for the OCPP management system.

- Green indicates that a connection exists.
- Red indicates that no connection exists. If a connection exists, check the settings for the modem or the Ethernet interface in the System Control.

It also shows the status of the charging points controlled via the backend. In addition, you can keep track of the last 50 messages between the charging controller and the backend.



Menu does not show any OCPP charging points

If the menu does not show any or not all charging points, check the “[Release Charging](#)” area in the charging point configuration. Check whether all charging points controlled via OCPP have been configured for release via OCPP and a valid connector ID has been assigned in each case.

The headers of the messages in the list contain the last messages that were exchanged with the OCPP backend:

- Time stamp of transmission
- Message type (2 = CALL, 3 = CALL RESULT)
- Message ID (unique ID of the message, used by CALL and the associated CALL RESULT)
- Action (OCPP instruction/message)
- Payload with the user data belonging to the action



Additional OCPP messages available in the log files

If necessary, you can refer back to previous messages in the log file, which can be downloaded via System Control/Log Files.

OCPP settings

In the “OCPP settings” area, you can enter the configuration parameters required to operate the charging station on a server.

 If the parameters are changed, the OCPP agent must be restarted, for example, via the “RESTART OCPP SERVICE” button.

 **Make additional settings in the charging point configuration**
See [“Charging Stations/Charging Point/Configuration” on page 87](#).

Figure 5-18 Configuration of the OCPP connection

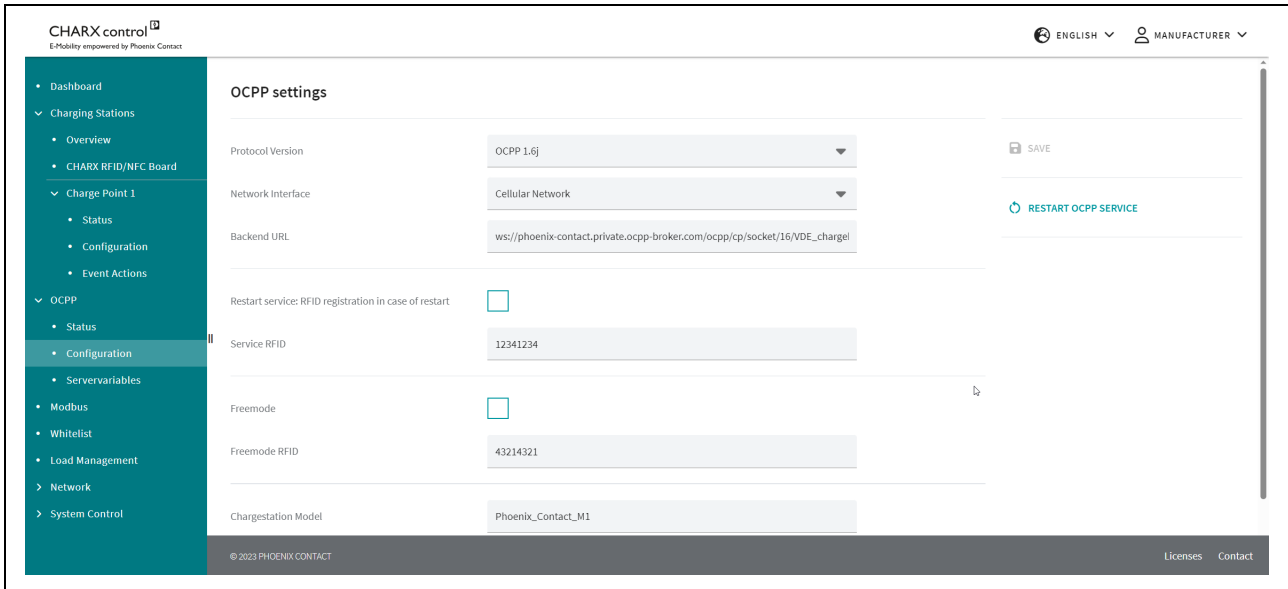


Table 5-12 Configuration parameters for the backend connection

OCPP Configuration	
OCPP settings	
Protocol Version	Selection of the OCPP protocol standard; only OCPP 1.6J can be selected at present.
Network Interface	Selection field to specify whether connection to the backend should be via cellular communication (ppp0) or Ethernet (LAN ETH0).
Backend URL	URL/IP address to access the backend with unique charge box ID (provided by the operator). Example: ws://testserver.net:8080/chargeboxid
Restart service: RFID registration in case of restart	If this button is enabled, the occupied charging points are registered under the service RFID at the backend after a restart.
Service RFID	RFID with which vehicles can be registered when the charging station is restarted, if the restart service is enabled.
Freemode	If this button is enabled, charging processes are automatically authorized at the backend on plug-in.
Freemode RFID	RFID with which vehicles are authorized when Freemode is enabled.
Charging Station Model	Manufacturer's model designation for the charging station

Table 5-12 Configuration parameters for the backend connection

OCPP Configuration	
Charging Station Manufacturer	Manufacturer of the charging station
Charging Station Serial Number	Charging station serial number assigned by the manufacturer (optional)
SAVE	Button to save the modified configuration
RESTART OCPP SERVICE	OCPP software restart, recommended after making changes to the configuration
OCPP Servervariables	
The “OCPP Servervariables” area provides you with an overview and some options for entering configuration keys for operating the charging station at the backend. A distinction is made here between variables that are defined in the OCPP communication protocol and variables that are specific to the CHARX control charging controller. Variables that have the status “ReadOnly = False” can be modified from the backend via a ChangeConfiguration as well as via the web-based management. Variables with the status “ReadOnly = True” are displayed, but cannot be modified.	
 Information on OCPP standard configuration keys Detailed information on the standardized OCPP configuration keys is available from the Open Charge Alliance (www.openchargealliance.org).	

Table 5-13 Configuration parameters for the backend connection 2

CHARX Variables Servervariables	
EVDiscardTimeout	Time interval [s] after which a read UID is discarded if no vehicle is connected.
ForceUpdate	Software update is installed even if charging processes are still active.
GlobalMaxCurrent	Maximum total current [A] of all charging points in the system.
LogLevel	– DEBUG (high level of log detail) – INFO (low level of log detail)
MaxCurrent	Maximum charging current [A] at the individual charging points.
ModemRestartTimeout	Time interval [s] after which the modem is restarted in the event of unsuccessful connection.
NewBackendURL	Text string for transferring the backend connection to a new URL.
PreUnavailabilityForUpdate	Time interval [s] in which the charging station is set to status F before an update is performed.
RFIDByteOrder	Switch-over of the byte order of the RFID card (Little Endian/Big Endian).
RFIDCharacterOrder	Switch-over of the UID character order to 16-bit data words.
WebSocketPingTimeout	Time interval after which the web socket connection is re-established in the absence of a response.
AllowTimeSyncDuringSession	System time is synchronized, even during an active charging process.
AvailabilityOnlyWhenTimeSynchronized	Charging station is only available when the system time is synchronized.
CalibrationLawAdminList	UIDs for administrator access on the CHARX display.
MessageAtKeyTransfer	Configurable value within the DataTransfer message for transmitting the public key.
MeterValuesSignatureContexts	Not used in the current software.
PresentingRFIDEndCharging	Charging process is ended and lock is opened when the same RFID card is read again.

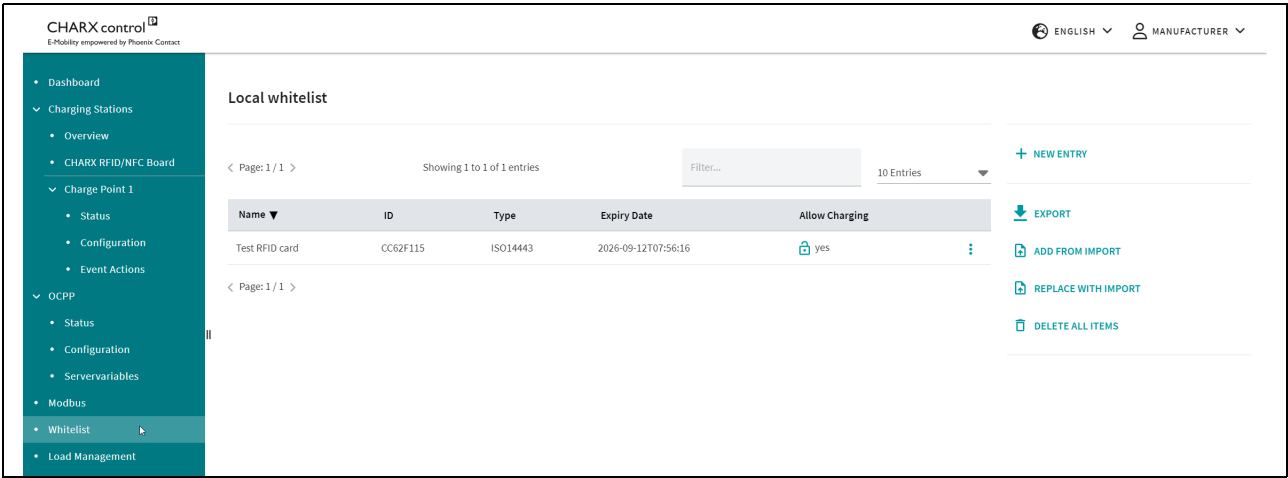
CHARX control modular

Table 5-13 Configuration parameters for the backend connection 2

CHARX Variables Servervariables	
SignedDataFormat	Format of the data sent with the StopTransaction 0 = OCMF format 1 = Transparency software format (xml) 2 = Measuring device-specific format
StopTransactionSignatureContexts	Not used in the current software.
StopTransactionSignatureFormat	Not used in the current software.
VendorAtKeyTransfer	Configurable value within the DataTransfer message for transmitting the public key.

5.6 WBM – Whitelist

Figure 5-19 Local Whitelist



Each charging park has an optional whitelist to which you can add charging authorizations. The whitelist for the CHARX SEC-3xxx modules is not limited to a set number of users. Different actions can be performed.

In charging parks that support charging controllers with ISO 15118 communication, you can add both the RFID UUIDs and the EVCC ID of the vehicle to the whitelist. This enables the automatic detection and release of the charging process if a vehicle supports communication in accordance with ISO 15118.

You can export the local whitelist. On export, you save the user list in the download area in the form of a csv file.

You can also import the whitelist. There are two options for this. You can add the imported user releases to the whitelist. Use the “Add From Import” field for this. You can also overwrite the whitelist with a file. Use the “Replace with Import” field for this.

In addition, you can add new user releases individually via the “+ NEW ENTRY” button.

Table 5-14 Entering new charging releases

Whitelist	
+New Entry	
Type	Selection field of whether the entry is an RFID card or EVCC ID.
RFID Tag / EVCC-ID	You must specify whether the entry is an RFID tag or an EVCC ID. The last read RFID tag is displayed right at the bottom of the menu window. You can paste this into the input field. An RFID tag is normally displayed in hexadecimal notation.
Name	A name is optional.

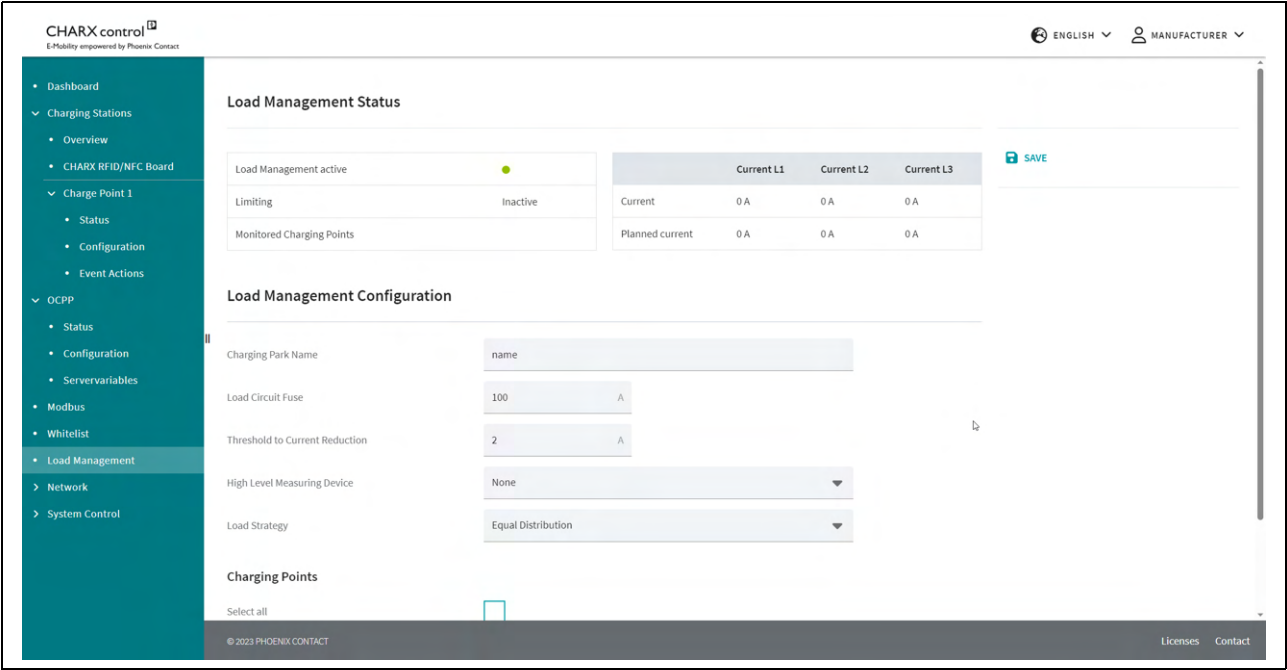
Table 5-14 Entering new charging releases

Whitelist	
Allow Charging	This check box lets you specify whether the user is authorized to charge. You can change this check box to prevent a user from charging.
Expiry Date/Expiry Time	You must specify an expiry date and expiry time. As of this date/time, the user will no longer be able to charge with their card. For permanent use, you can select an expiry date in the distant future.
Recently scanned RFIDs/EVCC IDs	Displays the last read RFID card and is used for entering the data in the system.

The whitelist is displayed below the buttons. You can delete or edit an entry on the right of the screen.

5.7 WBM – Load Management

Figure 5-20 Load Management



The web page for load management in the charging park is divided into three parts. The current status of load management is shown at the top of the page. Below it, you can define configurations and add charging points to the load management.

Load Management

Table 5-15 Load Management

Load Management	
Charging Management Status	
Load Management Active	A color indicator signals whether the load management agent in the charging controller is running. Green: The load management agent is running. Red: The load management agent is not running.
Limiting	Shows whether the charging current is being limited. In this case, the load circuit fuse value is below the current required by the electric vehicles.
Monitored Charging Points	Shows how many charging points are being monitored by the load management.
Current	Shows the total charging currents at all monitored charging points.
Planned Current	Shows the planned total currents at all monitored charging points. The planned currents reflect the settings for the vehicles. The actual current is usually slightly below this set current. There is no need for action here because the cars determine the current with a safety margin from the set value.
Charging Management Configuration	
Charging Park Name	The name of the charging park can be specified.
Load Circuit Fuse	The fuse value of the load circuit in amps. The fuse value applies to all connected charging points. See Figure 2-10 "Load management with multiple charging stations and charging points" (fuse B). This value determines the maximum amount of current that may be obtained by all connected charging points.
Threshold to Current Reduction	Defines the maximum possible deviation of the charging current of a connected car from the load management current specification in amps; if this threshold is exceeded, the current specification is reduced. <u>Example:</u> Current specification by load management: 16 A Actual charging current: 13 A Threshold to current reduction: 4 A Current specification is not reduced. Threshold to current reduction: 2 A Current specification is reduced by load management.

Table 5-15 Load Management [...]

Load Management	
High-Level Measuring Device	If other loads are connected to the same fuse as the charging park, a higher-level measuring device can record the total current. This ensures that the load circuit fuse value is respected, even if the charging points are significantly below this current value. The measuring device is configured via the connection type. – Disabled: No higher-level measuring device connected. – TCP/IP connection: The higher-level measuring device is connected via a network connection. – RS-485 connection: The higher-level measuring device is connected to the charging interface of a charging controller via the RS-485 connection. Only energy measuring devices of the same type can be connected to an RS-485 interface. The Modbus address of the higher-level measuring device must be set to “Default setting +1”.
Configured RS-485 Controller	The charging point to which the measuring device is connected is selected here. Only available when “RS-485 connection” is selected.
Higher-Level Fuse Value	The fuse value of the feed-in in amps. The fuse value applies to all charging points and loads connected to the feed-in. This fuse is monitored by the higher-level measuring device. See Figure 2-10 “Load management with multiple charging stations and charging points” (fuse A). This value determines the maximum amount of current that may be obtained by all connected charging points and additional loads.
IP Address	The IP address of the measuring device is entered here. Only available when “TCP/IP connection” is selected.
Energy Measuring Device Type	Here, you can select the energy measuring device type for the measuring device configured via the IP address. – Phoenix Contact EEM377 → EEM-EM377, 2908590 – Phoenix Contact MA370 → EEM-MA370-R, 2907980 → EEM-MA370-24DC, 1127059 → EEM-MA370, 2907983
Load Strategy	Here, you select the potential charging strategy. Equal distribution: All charging points receive the same settings. The charging points are not prioritized.
Charging Management Charging Points	
	Here, you can add charging points to the load management. Selected charging points are assigned to the load circuit.

In addition to the chosen charging strategy, other optimizations are made that have no priority on a specific charging point.

- If a setting exceeds the desired charging current of a vehicle, the remaining charging current will be distributed to the other charging points. This redistribution is checked at regular intervals and repeated.

- The redistribution is performed with no phase delay. In the event of an uneven distribution, current that is left on a phase will be taken into consideration in the calculation and assigned elsewhere in the redistribution. This ensures that the maximum current is distributed to one-, two-, and three-phase vehicles.
- Reducing the charging current settings may not be enough to charge below the load circuit fuse value. This can happen due to the parking lot being busy, for example. In this case, load management disconnects individual vehicles. The vehicles with the longest charging duration are disconnected first. These can be connected again during a subsequent redistribution.

5.8 WBM – Network

5.8.1 Network/Ethernet

The settings for the ETH0 Ethernet interface are made via the “Network” area. The corresponding status data is displayed. Login as “Operator” or “Manufacturer” is required for this.



No configuration option for the ETH1 interface

The ETH1 interface is intended to connect additional charging controllers in a daisy chain network or star network. Configuration is performed automatically by connecting charging controllers together and setting the operating mode to “Client”. Further configuration settings are not necessary or intended.

Figure 5-21 Network settings of the ETH0 interface

The screenshot shows the CHARX control web interface. On the left is a sidebar menu with options: Dashboard, Charging Stations, OCPP, Modbus, Whitelist, Load Management, Network (selected), Ethernet (selected), Port Sharing, Modem, and System Control. The main content area is divided into two panels: 'Network Status ETH0' and 'Network Configuration ETH0'. The status panel displays IPv4 Address, IPv6 Address, Received (Rx), Transmitted (Tx), and MAC Address, each with a corresponding data field. The configuration panel includes a checkbox for 'Automatic Assignment (DHCP)', input fields for 'IP Address', 'Subnet Mask', and 'Gateway', and a 'SAVE' button.

Table 5-16 Network settings of the ETH0 interface

Network	
Network Settings	
IPv4 Address	Display field for the current IPv4 network address of the charging controller (specified by DHCP or set manually).
Broadcast Address	Display field for the broadcast address that can be used to reach all devices in the network (specified by DHCP server).
IPv6 Address	Display field for the current IPv6 network address of the charging controller (specified by DHCP).
Received (Rx)	Data volume received since the charging controller was started.
Transmitted (Tx)	Data volume transmitted since the charging controller was started.
MAC Address	Factory-set MAC address of the charging controller.
Automatic Assignment (DHCP)	Button to enable automatic IP address assignment by the external DHCP server.
No Gateway	Field is visible once DHCP has been selected. When the selection field is enabled, no gateway is entered. Software applications on the charging controller cannot access the Internet via ETH0 in this case. When the selection field is not enabled, the gateway specified by the DHCP server is used.

Table 5-16 Network settings of the ETH0 interface [...]

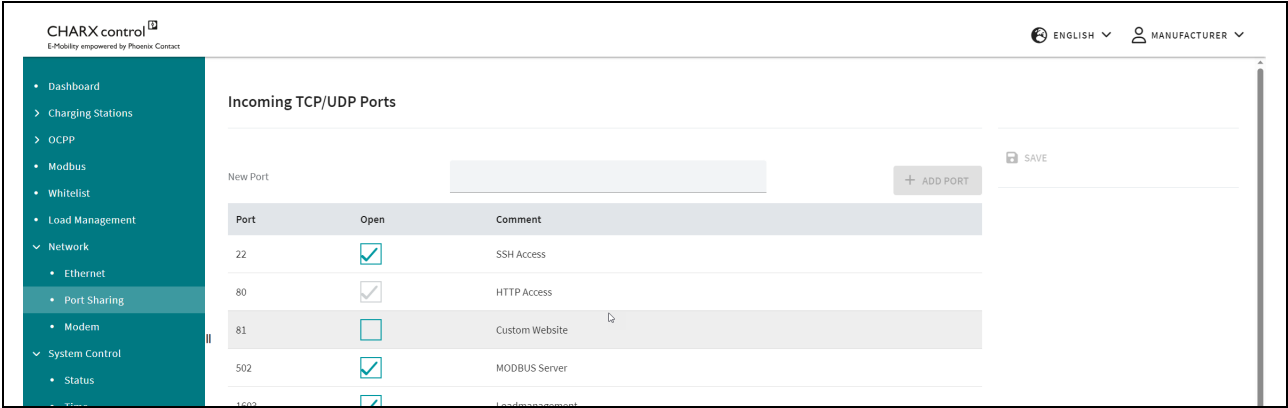
Network	
IP Address	Input field for specifying the IPv4 address of the charging controller when DHCP address assignment is disabled.
Subnet Mask	Input field for the subnet mask of the charging controller. This subnet mask is used if there is no active DHCP service. (Default: 255.255.255.0)
Gateway	Input field for the IP address of the default gateway. This IP address is used if there is no active DHCP service.
SAVE NETWORK	Button to transfer the network settings.

IP address and gateway must not be in the range 192.168.4.X and 192.168.5.X. These are reserved for the USB-C connection and the internal server-client connection.

5.8.2 Network/Port Sharing

In the “Network/Port Sharing” area, you can block individual incoming ports and in this way prevent external network access.

Figure 5-22 Port Sharing



NOTE: Close ports that are not required
To protect the charging controller against unauthorized access, close ports that are not required.

Ports that may be used by the charging controller software are specified in the web-based management.

Table 5-17 Port Sharing

System Control Port Sharing	
Incoming TCP/UDP Ports	
22	SSH Access
80	HTTP Access
81	Custom Website
502	MODBUS Server (for Modbus/TCP requests)
1603	Frame data for load management
1883	MQTT
2106	OCPP Remote
5000	Web Server
5353	mDNS (multicast DNS)
5555	Jupicore
9502	MODBUS Client Configuration

NOTE: Web page requires Jupicore access via port 5555
Port 5555 must be open in order to use the full scope of functions of the web-based management. If you use the WBM only occasionally, you can open this port temporarily via the WBM as required.

You can add further ports that are required for software implemented by the customer via the WBM, this is done via the “New Port” input field and “ADD PORT” button. This function can be used for incoming as well as outgoing ports.

5.8.3 Network/Modem

In the “Network/Modem” area, you can configure the cellular interface and acquire current status data. Login as “Operator” or “Manufacturer” is required for this.

Figure 5-23 Modem status and configuration data

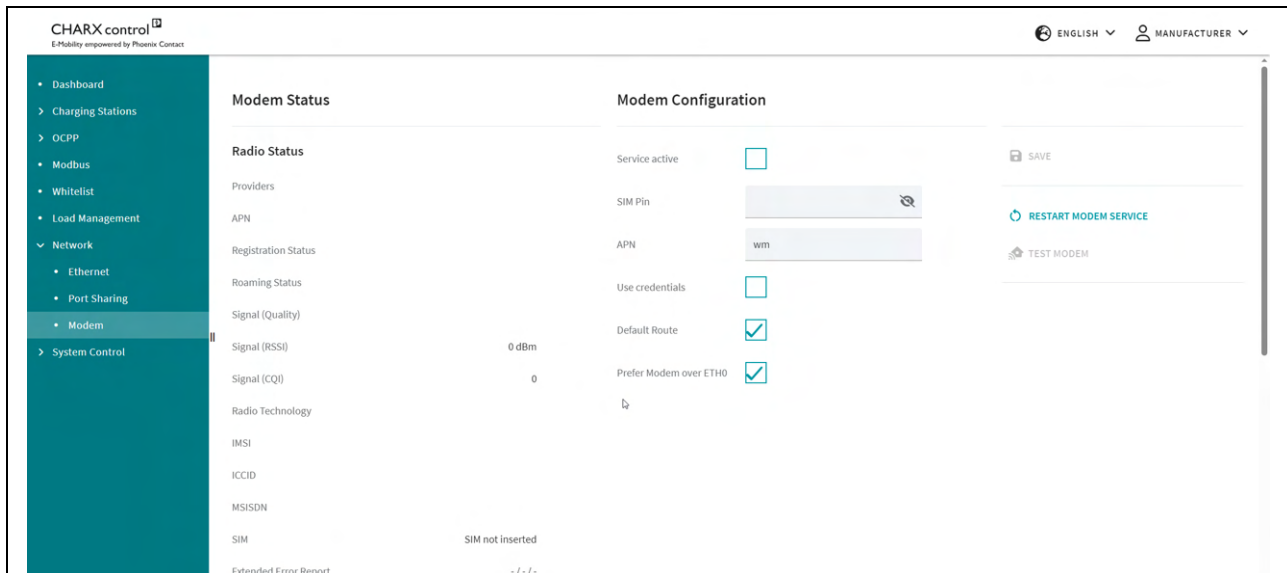


Table 5-18 Network/Modem

Network Modem	
Modem Status	
Providers	Operator of the grid to which the charging controller is currently connected.
APN	Access point name of the currently active access point to the data network.
Registration Status	Not registered/Not searching, Registered, Searching, Registration denied, Unknown.
Roaming Status	Shows whether the charging controller is logged into the home network or another network (HOME/ROAMING).
Signal Quality	Current signal quality of the cellular connection (Unknown, Marginal or less, Marginal, OK, Good, Excellent).
Signal (RSSI)	Displays the RSSI value, the reception strength (power level) of the cellular signal in dBm (Received Signal Strength Indicator).
Signal (CQI)	Displays the CQI value, the channel quality of the cellular connection (Channel Quality Indicator).
Radio Technology	Currently active wireless technology (LTE, GSM).
IMSI	Unique ID of the cellular communication subscriber (International Mobile Subscriber Identity).
ICCID	Unique ID of the SIM card used.
MSISDN	MSISDN is the unique calling number of the SIM card used (Mobile Subscriber Integrated Services Digital Network).

Table 5-18 Network/Modem [...]

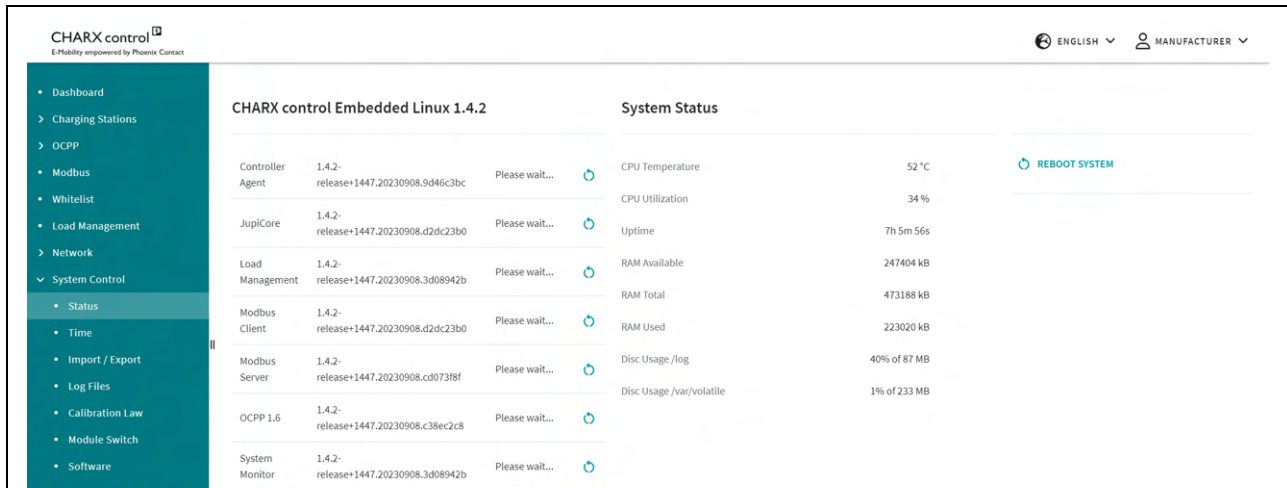
Network Modem	
SIM Status	Status of the SIM card used: READY, SIM PIN, SIM PUK, SIM not inserted, SIM PIN required, SIM PUK required, SIM failure, SIM busy, SIM wrong, Incorrect password, No network service.
Modem Configuration	
Service active	Button to activate the integrated modem.
SIM Pin	Input field for the SIM card used, provided by the cellular provider.
APN	Input field for the APN (access point), provided by the cellular provider.
Use credentials	Input field when you require a user name and password for access to the APN, specified by the cellular provider.
User name	User name for access to the APN, provided by the cellular provider.
Password	Password for access to the APN, provided by the cellular provider.
Default Route	If this selection field is enabled, the cellular connection is used as the default route for data traffic. In this case, an explicit route via ETH0 or ppp0 (cellular communication) is not specified in the user program.
Prefer Modem over ETH0	If another interface is selected as the default route, the cellular interface will be selected preferentially via the selection field (smaller metric).
SAVE	Button to transfer the configuration data to the charging controller.
Restart Modem	Restarts the modem.
Test Modes	Sends a ping to the entered network address.
Cellular Network Connection	
Connection Status	Status of the connection to the target system (Disconnected, Connecting, Connected).
IP Address	IP address of the charging controller in the cellular network.
Primary DNS Server	IP address of the primary DNS server in the cellular network.
Secondary DNS Server	IP address of the secondary DNS server in the cellular network.
RX Bytes	Amount of data sent since the last boot process (bytes).
TX Bytes	Amount of data received since the last boot process (bytes).
Device Information	
IMEI	International Mobile Equipment Identity, the unique ID of the integrated cellular modem.
Manufacturer	Manufacturer of the integrated cellular modem.
Model	Model of the integrated cellular modem.
Revision	Current revision of the integrated cellular modem.

5.9 WBM – System Control

5.9.1 System Control/Status

Information regarding the embedded Linux system and the software services (applications) that run on it is provided via the System Control/Status area.

Figure 5-24 System Control in the WBM



You can see the currently installed version and the status via the application overview. If necessary, you can restart individual programs via the overview. You can restart the entire system via the “REBOOT CONTROLLER” button. Please note that a system restart will terminate active charging processes. It will then be necessary to log into the system again.

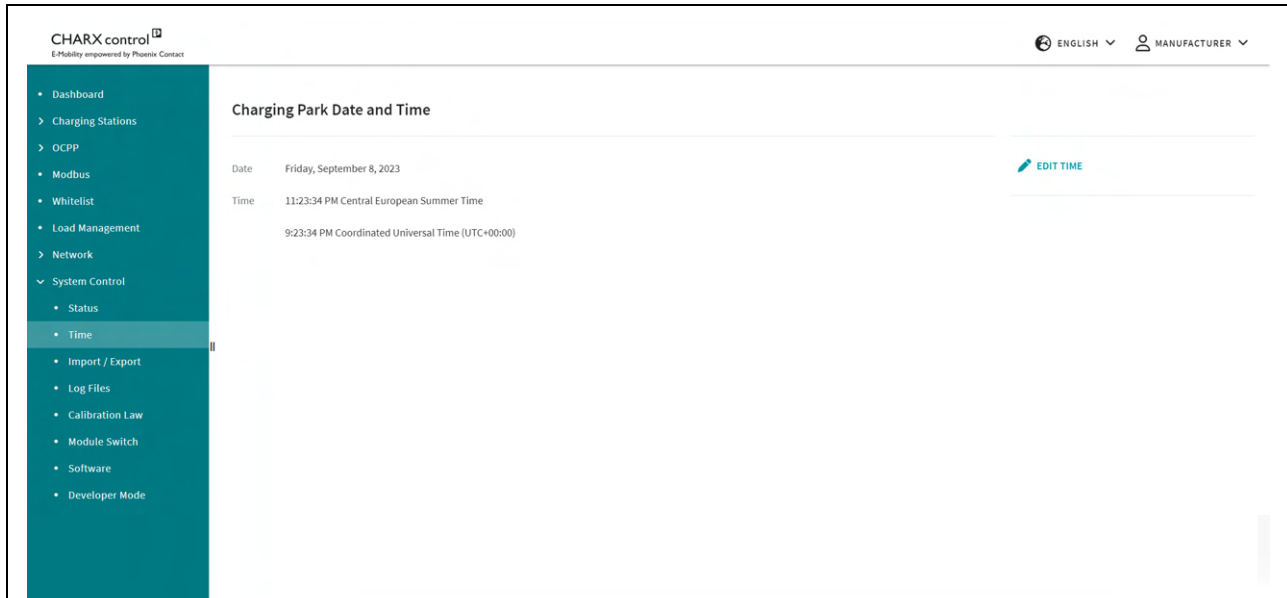
Table 5-19 Software services on the CHARX SEC-3xxx

System Control Status	
Application	
System Monitor	Provides current system data such as network status or memory capacity and modem data.
Controller Agent	Standardizes the interface between local charging controllers connected via backplane bus and the clients connected via Ethernet as well as the extension modules connected to them.
OCPP 1.6J	OCPP 1.6J backend communication.
Modbus Client	Connection of the Modbus/TCP meters connected via Ethernet.
Modbus Server	Provision of the Modbus/TCP interface for reading charging data and controlling charging processes.
JupiCore	Collection of data from all connected charging points and its forwarding to the MQTT broker, internal services, and external services via REST API.
Load Management	Local load and charging management.
Webserver	Web-based management of the charging controller.
Calibration Law Agent (only visible when calibration law is active)	Ensures that the charging station is operated in compliance with calibration laws.

5.9.2 System Control/Time

You can view and set the current system time and date via the “System Control/Time” area.

Figure 5-25 Setting the time in the WBM



It is possible to apply the time set on the PC from the web browser.



UTC time used internally in the system

The charging controller operates internally with the UTC time and uses this for time stamps in the log files and in OCPP communication.



Conversion of OCPP time stamps to the system time

Time stamps from an OCPP backend are converted to the charging controller system time. In order to do this, the UTC time must be sent.

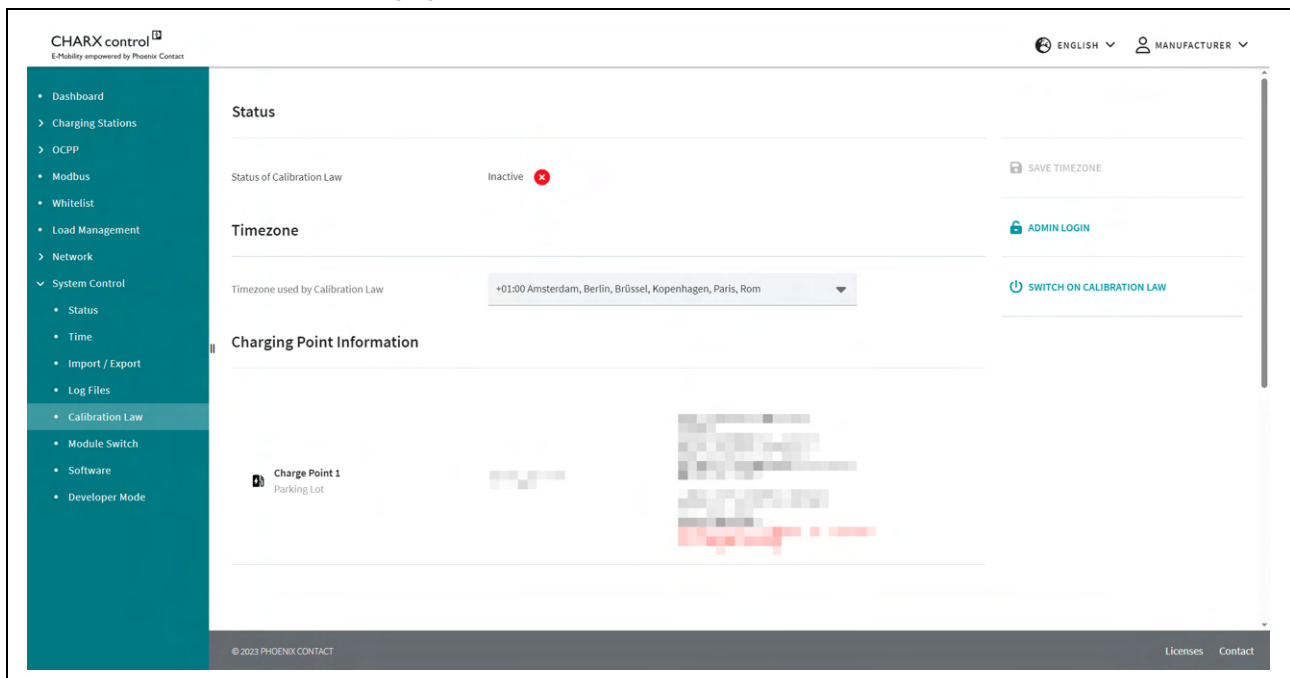
5.9.3 Import/Export

In the “Import/Export” area, you can export or import the current settings for the following sub-registers:

- Charging Park
- whitelist
- Load Management
- OCPP
- System Configuration (Ethernet, Port Sharing, Modem)

5.9.4 System Control/Calibration Law

In the “System Control/Calibration Law” area, you can make settings for the calibration law. You will also see an overview of the settings relevant to calibration law for the individual charging points and OCPP.



Settings that are not compliant with calibration laws are displayed in red. Warnings are displayed in yellow.

You can activate calibration law using the “Activate Calibration Law” button. The controller is then restarted and an additional software service is started.

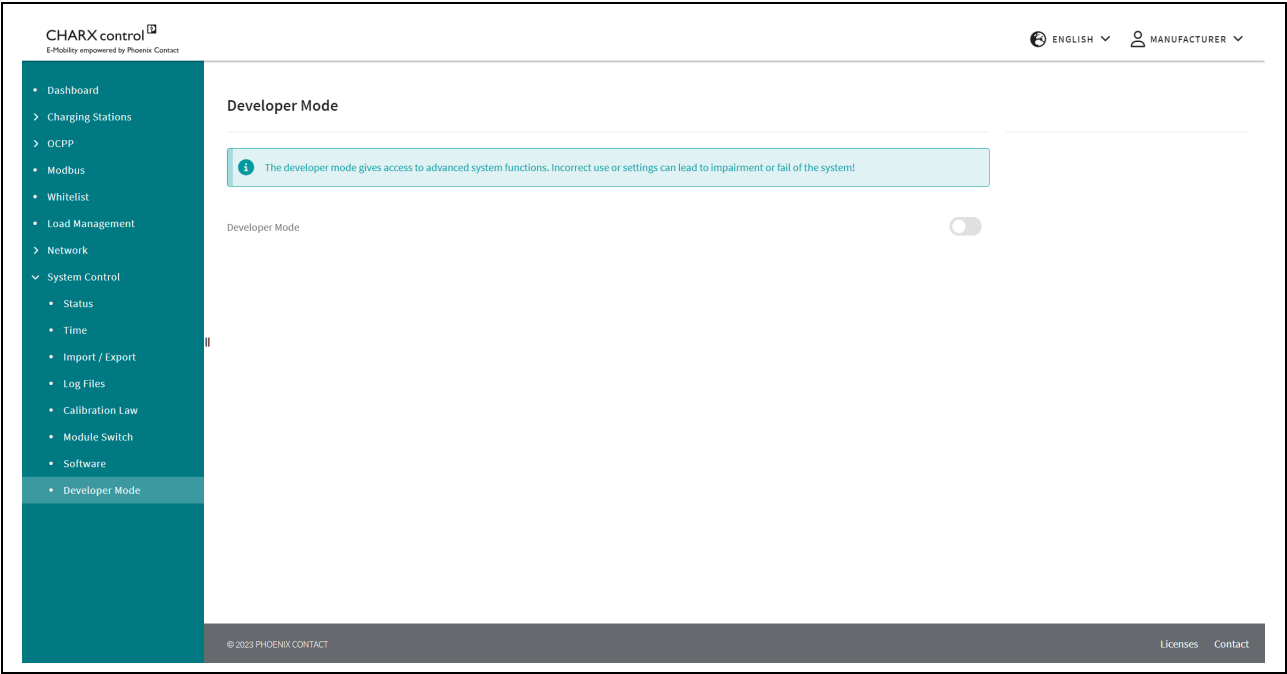


Further calibration law information

You can find more information on calibration law on the “Application example” tab in the download area at: <https://www.phoenixcontact.com/en-us/products/ac-charging-controller-charx-sec-3150-1138965>.

5.9.5 System Control/Developer Mode

In the “System Control/Developer Mode” area, you have access to advanced system functions.



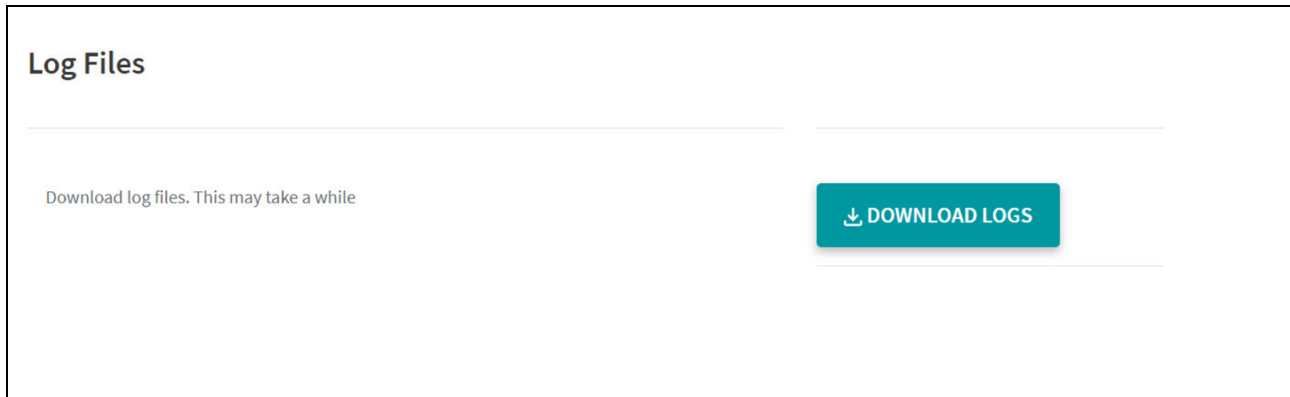
 **NOTE:**
Incorrect settings can result in impairment or failure of the system.

5.9.6 System Control/Log Files

In the “System Control/Log Files” area, you can download the current log data for the system and the application software by pressing the “DOWNLOAD LOGS” button.

The log data for the relevant software services is saved in various files. When the log files are downloaded, they are compressed into one file. The log files can be extracted on the target computer.

Figure 5-26 Downloading log files in the WBM



Phoenix Contact Support

If problems occur when operating the charging controller, you can contact Phoenix Contact Support (automation-service@phoenixcontact.de).

Have the following information ready:

- Log files
- Error description
- Details of the charging controllers used



Accessing the log files via OCPP

The log files can also be accessed by the charging controller via the OCPP command “GetDiagnostics”.

5.9.7 System Control/Module Switch

In the “System Control/Module Switch” area, you can prepare charging controllers for operation as a client in client/server mode (see [“CHARX SEC-3xxx charging controllers in the Ethernet network” on page 20](#)).

By preparing for this switch-over, the automated processes involved when combining charging controllers to create a client/server group can be performed faster.

Some software services are shut down when the button is activated. The system will be re-started. This process can take a few minutes.



Reduced scope of functions in the WBM after module switch-over

Switching to client operating mode deactivates some important functions of the charging controller, which are taken over by the server. This means that only a reduced scope of functions is available in the WBM after switch-over.



WBM only accessible via USB after module switch-over

Following configuration, the WBM can only be accessed via the USB interface under IP address 192.168.5.1.

5.9.8 System Control/Software

You can update individual application programs, the charging controller firmware, or the entire system via the “System Control/Software” area.

Figure 5-27 Software update via the WBM



Pressing the “INSTALL UPDATE” button opens a file selection dialog where you can select the corresponding software package.

Following successful update, the charging controller must be restarted manually.

If there are additional charging controllers in the network, the updates will be automatically transferred to the relevant connected charging controllers.



Waiting time until software is transferred to connected charging controllers in the network

After the software update on the server and its restart, the server checks the software version on the connected clients and updates the clients in an additional step. The software update is installed on the clients after a restart.

6 Maintenance, repair, and disposal

6.1 Maintenance of the charging controller

The device is maintenance free.

6.2 Software update

You can update individual software programs or perform a complete software update on the charging controller. You will find the available updates as well as the associated release notes at phoenixcontact.com/qr/1139012 under the respective item number of your charging controller.

You can perform the update locally via the web-based management or via the backend using the OCPP connection. In this case, please contact your backend provider. Updates from the OCPP backend can be performed via the Ethernet connection and via the cellular interface.



Increased data volume for a full update via cellular communication

Performing a software update via cellular communication can be more expensive due to the volume of data involved. Before performing a software update, check whether a full system update is required. It may be sufficient to just update individual applications. Contact Phoenix Contact Support if necessary.

6.3 Removing the hardware

6.3.1 Safety notes



DANGER: Risk of fatal electric shock

It is necessary to connect to hazardous contact mains voltage to operate the charging controller.

- Protection against electric shock must be ensured.
- Only mount or remove the device when it is disconnected from the voltage.
- Make sure that the supply voltage cannot be switched on again by unauthorized persons.



NOTE: Electrostatic discharge

Electrostatic discharge can damage or destroy components. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN/IEC 61340-5-1.

6.3.2 Removal

Tool used:

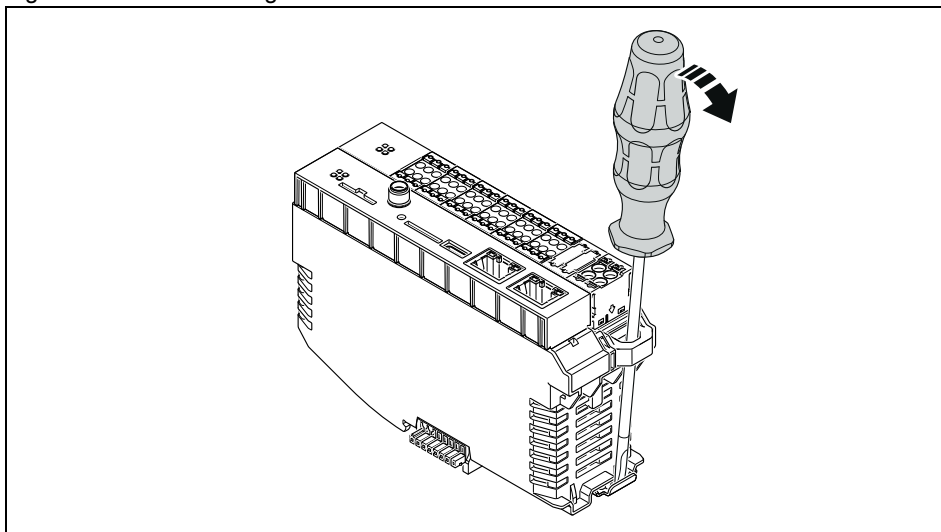
We recommend the following bladed screwdriver: SZS 0,4X2,5 VDE, 1205037.

Removing the cables

- To remove the conductors, press the push button using a screwdriver.
- Pull out the conductor.

Releasing the connectors

Figure 6-1 Releasing the connectors



- Insert a screwdriver through the opening of the lock and release system.
 - Hook the tip of the screwdriver into the base latch.
 - Pull the screwdriver forward to release the lock and release system.
- ⇒ The connectors are lifted and the contact is released. However, the connectors do not fall out. The housing cover remains in its position.

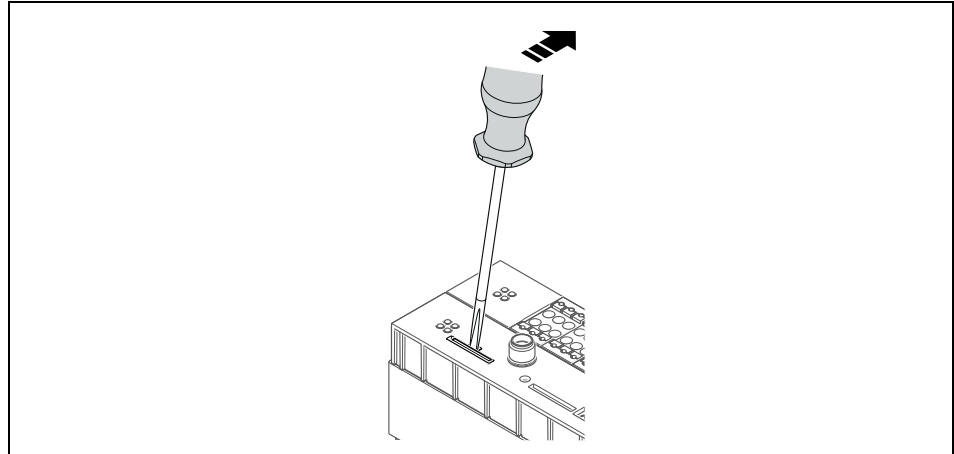
Removing the microSD card

The charging controller has an SD card holder with push/push technology.

- Gently press on the SD card with a small screwdriver.
- ⇒ The SD card will be ejected enough for you to grasp it with your fingers and remove it.

Removing the SIM card

Figure 6-2 Removing the SIM card



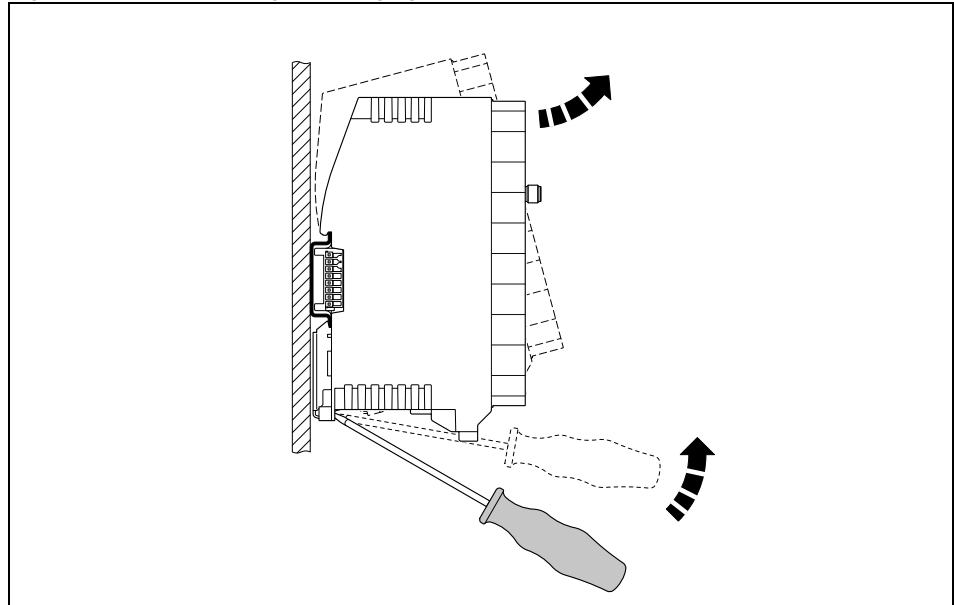
- Insert a small screwdriver a few mm into the gap next to the SIM card.
- Carefully lever the SIM card out of the holder until you can grasp it with your fingers.

Removing the antenna

- Loosen the union nut on the antenna connector and unscrew it completely.
- Pull the antenna connector out of the antenna socket.

Removing the charging controller

Figure 6-3 Removing the charging controller



- Make sure that the module is free of current.
- Release the connectors using the lock and release system (see [“Releasing the connectors” on page 129](#)).
- Lever the module off the DIN rail.

6.4 Disposal

- Do not dispose of the device with household waste, it should instead be disposed of in accordance with the currently applicable national regulations.
- Dispose of packaging materials that are no longer needed (cardboard packaging, paper, bubble wrap sheets, etc.) with household waste in accordance with the currently applicable national regulations.

6.5 Device replacement

It is possible to remove individual charging controllers from a group or to replace them with other devices.



DANGER: Risk of fatal electric shock

It is necessary to connect to hazardous contact mains voltage to operate the charging controller.

- Protection against electric shock must be ensured.
- Only mount or remove the device when it is disconnected from the voltage.
- Make sure that the supply voltage cannot be switched on again by unauthorized persons.

Devices that are already identified by their UID in the charging controller group and are configured can be plugged back in. These devices will be automatically added to the group again.

Devices with a new UID are recognized automatically. However, you must configure these devices via the web-based management. You can do this manually or by transferring a complete configuration to the device via the web-based management.

6.6 Device defects and repairs

Repairs may only be carried out by Phoenix Contact.

- Send defective devices back to Phoenix Contact for repair or to receive a replacement device.
- We strongly recommend using the original packaging to return the product.
- Include a note in the packaging indicating that the contents are returned goods.

If the original packaging is no longer available, observe the following points:

- Observe the humidity specifications and the temperature range specified for transport (see ["Technical data" on page 133](#)).
- If necessary, use dehumidifying agents.
- Use suitable ESD packaging to protect components that are sensitive to electrostatic discharge.
- Secure any loose parts.
- Make sure that the packaging you select is large enough and sufficiently thick.
- Only use plastic bubble wrap sheets as wadding.
- Attach warnings to the transport packaging so that they are clearly visible.
- Please ensure that the delivery note is placed inside the package if the package is to be shipped domestically. However, if the package is being shipped internationally, the delivery note must be placed inside a delivery note pocket and attached to the outside so that it is clearly visible.

A Technical data

A 1 CHARX SEC-1000

Version		CHARX SEC-1000
Standard		IEC 61851-1
Charging standard		IEC 61851-1
Charging mode		Mode 3, Case B + C
Compliance		CE compliant
Dimensions		CHARX SEC-1000
Height		121 mm
Width		18.8 mm
Depth		85 mm
Ambient conditions		CHARX SEC-1000
Ambient temperature (operation)		-25°C ... 65°C
Ambient temperature (storage/transport)		-40°C ... 80°C
Humidity (operation)		5% ... 95% (non-condensing)
Humidity (storage/transport)		5% ... 95% (non-condensing)
Air pressure (operation)		70 kPa ... 106 kPa (up to 3000 m above mean sea level)
Air pressure (storage/transport)		58 kPa ... 106 kPa (up to 4500 m above mean sea level)
Degree of protection		IP20
Pollution degree		2 in accordance with IEC 60664-1
Overvoltage category		III
Shock (operation)		Shock in accordance with EN 60068-2-27/IEC 60068-2-27
Test specification		15 g, 11 ms period, half-sine shock pulse
Vibration (operation)		Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6
Test specification		5 g, 10 ... 150 Hz, 2.5 h, in XYZ direction
Device supply		CHARX SEC-1000
Supply voltage		12 V DC
Supply voltage range		11.4 V DC ... 12.6 V DC
Maximum current consumption		2 A (stand-alone operation)
No-load current		<50 mA (without external loads)

CHARX control modular

Data interfaces		CHARX SEC-1000
Energy measuring device		
Bus system		RS-485
Transmission speed		9.6 kbps ... 115.2 kbps (depending on the selected energy measuring device, preset on the basis of the default values of the energy measuring device)
RFID reader		
Bus system		RS-485
Transmission speed		9.6 kbps ... 115.2 kbps (depending on the selected RFID reader, preset on the basis of the default values of the RFID reader)
CHARX control modular backplane bus		
Number		1
Connection method		DIN rail connector
CHARX SEC-1000 function interfaces		CHARX SEC-1000
Vehicle interface		
Communication protocol		IEC 61851-1
Proximity		IEC 61851-1
Charging cases		Mode 3, Case B + C
Control voltage		±12 V (locking actuator)
Rated current		2 A
Locking release in the event of mains failure		Integrated release function of the locking actuator for the disconnection of charging connector and charging socket
Residual current detection		
Sensor supply voltage		12 V DC
Error state signal level		12 V (different terminal points) 0 V (different terminal points)
Test and reset signal level		12 V
Temperature monitoring		
Sensor type		Pt 1000 or PTC chain
Tripping characteristics		Configurable
Contactor control		
Interface description		Floating switch contact
Switching voltage		250 V AC, maximum; 30 V DC, maximum
Rated current		2 A
Interrupting rating		1500 VA, maximum

Digital inputs		CHARX SEC-1000	
Number of inputs		4	
Nominal input voltage UN		12 V	
Input voltage range		0 V ... 3 V (off) 9 V ... 15 V (on)	
Function		Configurable	
Digital outputs		CHARX SEC-1000	
Number of outputs		4	
Operating mode		High side (output switched to internal 12 V voltage) Low side (output switched to GND potential)	
Output voltage		12 V (high-side operation) ≤12 V (low-side operation)	
Output current		600 mA, maximum	
Function		Configurable	
Connection data		Connection 1 to 6	Connection 7 and 8 (for contactor control)
Connection technology		Plug-in, Push-in technology (HSCP-SP 1,5...)	Plug-in, Push-in technology (HSCP-SP 2,5...)
Conductor cross-section, rigid		0.2 mm ² ... 1.5 mm ²	0.2 mm ² ... 1.5 mm ²
Conductor cross-section, flexible		0.2 mm ² ... 1.5 mm ²	0.2 mm ² ... 2.5 mm ²
Conductor cross-section with ferrules without insulating collar		0.25 mm ² ... 1.5 mm ²	0.25 mm ² ... 1.5 mm ²
Conductor cross-section with ferrules with insulating collar		0.25 mm ² ... 1.0 mm ²	0.25 mm ² ... 1.5 mm ²
Conductor cross-section, AWG		AWG 24 ... 16	AWG 24 ... 16
Stripping length		8 mm ... 10 mm	10 mm
Ferrule length depending on the conductor cross-section for ferrules with insulating collar		0.25 mm ² ... 0.34 mm ² : 8 mm ... 10 mm 0.5 mm ² to 1.0 mm ² : 10 mm	10 mm
Ferrule length depending on the conductor cross-section for ferrules without insulating collar		0.25 mm ² ... 1.0 mm ² : 8 mm ... 10 mm 1.5 mm ² : 10 mm	10 mm

A 2 CHARX SEC-3xxx

Version		CHARX SEC-3xxx
Standards/regulations		IEC 61851-1 ISO/IEC 15118 (CHARX SEC-3050, -3150 only)
Charging standard		IEC 61851-1 ISO/IEC 15118 (CHARX SEC-3050, -3150 only)
Charging mode		Mode 3, Case B + C
Compliance		CE compliant
Dimensions		
Height		121 mm
Width		37.6 mm
Depth		85 mm
Ambient conditions		CHARX SEC-3xxx
Ambient temperature (operation)		-25°C ... 65°C
Ambient temperature (storage/transport)		-40°C ... 80°C
Humidity (operation)		5% ... 95% (non-condensing)
Humidity (storage/transport)		5% ... 95% (non-condensing)
Air pressure (operation)		70 kPa ... 106 kPa (up to 3000 m above mean sea level)
Air pressure (storage/transport)		58 kPa ... 106 kPa (up to 4500 m above mean sea level)
Degree of protection		IP20
Pollution degree		2 in accordance with IEC 60664-1
Overvoltage category		III
Shock (operation)		Shock in accordance with EN 60068-2-27/IEC 60068-2-27
Test specification		15 g, 11 ms period, half-sine shock pulse
Vibration (operation)		Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6
Test specification		5 g, 10 ... 150 Hz, 2.5 h, in XYZ direction
Device supply		CHARX SEC-3xxx
Supply voltage		12 V DC
Supply voltage range		11.4 V DC ... 12.6 V DC
Maximum current consumption		2 A (stand-alone operation)
No-load current		<200 mA (without external loads)

System data		CHARX SEC-3xxx
Operating system		Linux
Processor		Arm® Cortex®-A7 single-core processor
RAM		512 MB (RAM)
Data storage system		8 GB (eMMC)
User interface		Web-based management
Security functions		IP, port, protocol
Data interfaces		CHARX SEC-3xxx
Ethernet		
Number		2
Connection method		RJ45 jack
Number of MAC addresses		2
Transmission speed		10/100 Mbps
Transmission length		100 m
Operating mode		– WAN/LAN – LAN/LAN
Supported protocols		– OCPP 1.6J – Modbus/TCP – MQTT – HTTP – HTTPS
Configuration and diagnostics		
Number		1
Connection method		Micro USB type C
Supported protocols		RNDIS
Energy measuring device		
Bus system		RS-485
Transmission speed		9.6 kbps ... 115.2 kbps (depending on the selected energy measuring device, preset on the basis of the default values of the energy measuring device)
RFID reader		
 Delivery state of the measuring and RFID devices is assumed		
Bus system		RS-485
Transmission speed		9.6 kbps ... 115.2 kbps (depending on the selected RFID reader, preset on the basis of the default values of the RFID reader)
CHARX control modular backplane bus		
Number		1
Connection method		DIN rail connector

Cellular interface (CHARX SEC-3100 and -3150 only)	
Interface description	GSM/GPRS/EDGE/LTE (FDD)
Frequency	700 MHz (LTE B28), as of hardware revision 1.4 800 MHz (LTE B20) 900 MHz (LTE B8) 1800 MHz (LTE B3) 2100 MHz (LTE B1), as of hardware revision 1.4 2600 MHz (LTE B7), as of hardware revision 1.4 900 MHz (GSM/GPRS/EDGE) 1800 MHz (GSM/GPRS/EDGE)
Transmission power	max. 24 dBm (LTE B28 / B20 / B8 / B3 / B1 / B7) max. 34 dBm (900 MHz / GSM/GPRS/EDGE) max. 31dBm (1800 MHz / GSM/GPRS/EDGE)
Antenna	50 Ω impedance SMA antenna socket, a suitable antenna can be found under the accessories for the charging controller at phoenixcontact.com
SIM card	Micro SIM
LTE	CAT1
Country support	Europe
Supported protocols	OCPP 1.6J
Function interfaces	
CHARX SEC-3xxx	
Vehicle interface	
Communication protocol	IEC 61851-1 ISO/IEC 15118 (CHARX SEC-3050 and -3150 only)
Proximity	IEC 61851-1
Charging cases	Mode 3, Case B + C
Control voltage	±12 V (locking actuator)
Rated current	2 A
Locking release in the event of mains failure	Integrated release function of the locking actuator for the disconnection of charging connector and charging socket
Residual current detection	
Sensor supply voltage	12 V DC
Error state signal level	12 V (different terminal points) 0 V (different terminal points)
Test and reset signal level	12 V

Function interfaces [...]	CHARX SEC-3xxx	
Temperature monitoring		
Sensor type	Pt 1000 or PTC chain	
Tripping characteristics	Configurable	
Contactor control		
Interface description	Floating switch contact	
Switching voltage	250 V AC, maximum; 30 V DC, maximum	
Rated current	2 A	
Interrupting rating	1500 VA, maximum	
Digital inputs	CHARX SEC-3xxx	
Number of inputs	4	
Nominal input voltage UN	12 V	
Input voltage range	0 V ... 3 V (off) 9 V ... 15 V (on)	
Function	Configurable	
Digital outputs	CHARX SEC-3xxx	
Number of outputs	4	
Operating mode	High side (output switched to internal 12 V voltage) Low side (output switched to GND potential)	
Output voltage	12 V (high-side operation) ≤12 V (low-side operation)	
Output current	600 mA, maximum	
Function	Configurable	
Connection data	Connection 1 to 6	Connection 7 and 8 (for contactor control)
Connection technology	Plug-in, Push-in technology (HSCP-SP 1,5...)	Plug-in, Push-in technology (HSCP-SP 2,5...)
Conductor cross-section, rigid	0.2 mm² ... 1.5 mm²	0.2 mm² ... 1.5 mm²
Conductor cross-section, flexible	0.2 mm² ... 1.5 mm²	0.2 mm² ... 2.5 mm²
Conductor cross-section with ferrules without insulating collar	0.25 mm² ... 1.5 mm²	0.25 mm² ... 1.5 mm²
Conductor cross-section with ferrules with insulating collar	0.25 mm² ... 1.0 mm²	0.25 mm² ... 1.5 mm²
Conductor cross-section, AWG	AWG 24 ... 16	AWG 24 ... 16

CHARX control modular

Connection data	Connection 1 to 6	Connection 7 and 8 (for contactor control)
Stripping length	8 mm ... 10 mm	10 mm
Ferrule length depending on the conductor cross-section for ferrules with insulating collar	0.25 mm ² ... 0.34 mm ² : 8 mm ... 10 mm 0.5 mm ² to 1.0 mm ² : 10 mm	10 mm
Ferrule length depending on the conductor cross-section for ferrules without insulating collar	0.25 mm ² ... 1.0 mm ² : 8 mm ... 10 mm 1.5 mm ² : 10 mm	10 mm

B Error codes, protocols, and interfaces

B 1 Error codes

Table B-1 Error codes

Error bit	Error code on the web page	Error description	Possible troubleshooting
1	External temperature too high	The connected temperature sensor (Pt 1000 or PTC) indicates a temperature that is too high.	Check temperature. Check configuration. Check sensor.
2	Temperature derating active	When temperature sensor = Pt 1000 is selected, the temperature at the sensor triggers derating of the charging controller.	Check temperature. Check configuration. Check sensor.
3	Not used	–	–
4	Charging point configuration error	The charging point has been configured inconsistently on the web page.	Check configuration for inconsistencies. Observe current settings, current monitoring, and measuring device settings.
5	EV paused Load management active	Load management rejects a charging release due to the charging current being distributed to other charging points or the lack of available charging current.	Check utilization in load management.
6	Event Actions configuration unclear	There are inconsistencies in the Event Actions.	Check Event Actions configuration for inconsistencies. Observe external release and charging releases. Check for duplications.
7	RFID reader error	The RFID reader triggers an error or is not connected.	Check cable routing to the RFID reader.
8 to 16	Not used	Not used	Not used
17	13 A and 20 A connector rejected	A cable with low current carrying capacity has been rejected.	Replace charging cable or reconfigure charging controller.
18	13 A connector rejected	A cable with low current carrying capacity has been rejected.	Replace charging cable or reconfigure charging controller.
19	PP error	Proximity plug error in the charging cable, the charging cable does not conform to specifications, is defective.	Measure PP resistance of the charging cable, replace charging cable.
20	CP error	No attributable CP signal present, the vehicle or charging cable is defective.	Test another charging cable. Test another vehicle. Test CP signal using an oscilloscope.
21	Vehicle error F	The vehicle notifies the charging controller of an error state, the error was triggered by the vehicle.	Test another vehicle.

CHARX control modular

Table B-1 Error codes [...]

Error bit	Error code on the web page	Error description	Possible troubleshooting
22	Locking error	The charging socket cannot be locked.	Reinsert charging cable. Check actuator.
23	Lock release error	The charging socket cannot be unlocked.	Check actuator for defects. Use another charging cable.
24	Unknown locking state	The status of locking/unlocking cannot be determined.	Check connection between actuator and charging controller.
25	Overcurrent detected	A vehicle has not followed the current setting of the charging controller, charging was interrupted by the active overcurrent monitoring.	Change vehicle. Deactivate overcurrent shutdown.
26	Measuring device communication error	Unable to establish communication with the configured measuring device.	Check cable routing to the measuring device. Check measuring device type. Synchronize with configuration.
27	Invalid status D	A vehicle with additional ventilation was connected and rejected by the charging controller.	Reconfigure charging controller.
28	Contactor error	A contactor error has been detected. The charging controller enters the error state until the contactor error is eliminated.	Replace contactor.
29	EV diode error	The PWM signal to the vehicle is not implemented to -12 V amplitude level.	Test with another vehicle.
30	Power supply error	Insufficient power supply, the charging controller performs an automatic lock release.	Check power supply type. Check cable routing. Ensure supply.
31	Residual current tripping	A residual current was detected, the charging controller interrupts charging and switches to the error state.	Check cable routing (especially RCM module), change vehicle.
32	Residual current sensor self-test error	Unable to perform self-test on the residual current safety equipment.	Check cable routing to the RCM module. Use another RCM module.

B 1.1 ISO 15118 error list

Table B-2 ISO 15118 error list

Error	Possible states:
SLAC_FAILED	The SLAC process has failed. One reason may be that the time constraints are not met or messages are damaged.
PROTOCOL_HANDSHAKE_FAILED	The EVSE and the EVCC were unable to agree on the same ISO 15118 communication protocol version. The current EVSE implementation only supports "urn:iso:15118:2:2013:MsgDef Version 2.0".
SSL_HANDSHAKE_FAILED	The SSL/TLS handshake for the TCP connection, which is used for the actual high-level communication, failed for some reason. One reason may be that there is no valid V2G root certificate installed on the EVSE side or the EVCC does not accept the certificate.
SEQUENCE_ERROR	The EVCC sends a request that is not expected in the current state. The EVCC interrupts the message flow order specified by communication protocol ISO 15118.
SESSION_SETUP_TIMEOUT	Once the SLAC procedure has been completed and the data connection is established, the EVSE and the EVCC must set up a charging session within the 18 seconds specified, otherwise high-level communication will be aborted by the EVSE.
SEQUENCE_TIMEOUT	The EVCC does not send any request(s) within the time constraints specified by the ISO 15118 protocol. High-level communication is aborted by the EVSE.
UNKNOWN_SESSION	The EVCC has sent a session ID to resume a previously paused charging session that is not known on the EVSE side. High-level communication is aborted by the EVSE.
TARIFF_SELECTION_INVALID	A current output request received from the EVCC contains an SA tuple ID that was not previously sent by the EVSE in the "charge parameter discovery response". High-level communication is aborted by the EVSE.
CHARGING_PROFILE_INVALID	The charging profile sent by the EVCC violates a power limitation that is specified in the "charge parameter discovery response". High-level communication is aborted by the EVSE.

B 2 OCPP function and configuration overview

B 2.1 OCPP functions

Table B-3 Supported OCPP operations

OCPP operations	Notes
Authorize	Full implementation
BootNotification	Full implementation
Heartbeat	Full implementation
MeterValues	Voltage, Current.Import, Energy.Active.Import.Register, Power.Active.Import, Current.Offered, Temperature
StartTransaction	Full implementation
StatusNotification	Full implementation
StopTransaction	Full implementation
CancelReservation	Full implementation
ChangeAvailability	Full implementation
ClearChargingProfile	Full implementation
RemoteStartTransaction	Full implementation
RemoteStopTransaction	Full implementation
ReserveNow	Full implementation
Reset	Full implementation
SetChargingProfile	Full implementation
TriggerMessage	Only for the implemented messages
UnlockConnector	Full implementation
ChangeConfiguration	For modifiable configuration parameters, see Table B-4 and Table B-5
GetDiagnostics	Upload to a FTP server
FirmwareUpdate	Firmware update downloaded from an FTP server

B 2.2 OCPP configuration parameters

Configuration parameters which are not write protected ("Read only" = "False") can be overwritten via the OCPP backend.

Table B-4 OCPP configuration parameters (in accordance with OCPP specification)

Configuration parameter	Read only	Value
AllowOfflineTxForUnknownId	False	False
AuthorizationCacheEnabled	False	False
AuthorizeRemoteTxRequests	False	True
BlinkRepeat	False	0
ClockAlignedDataInterval	True	0
ConnectionTimeOut	False	30
ConnectorPhaseRotation	True	According to the local setting
ConnectorPhaseRotationMaxLength	True	1
GetConfigurationMaxKeys	True	100
HeartbeatInterval	False	300
LightIntensity	False	100
LocalAuthorizeOffline	False	False
LocalPreAuthorize	False	False
MaxEnergyOnInvalidId	False	0
MeterValuesAlignedData	True	
MeterValuesAlignedDataMaxLength	True	10
MeterValuesSampledData	False	"Voltage", "Current.Import", "Energy.Active.Import.Register", "Power.Active.Import", "Current.Offered", "Temperature"Voltage,
MeterValuesSampledDataMaxLength	True	10
MeterValueSampleInterval	False	900
MinimumStatusDuration	False	1
NumberOfConnectors	True	According to the local installation
ResetRetries	False	3
StopTransactionOnEVSideDisconnect	False	True
StopTransactionOnInvalidId	False	True
StopTxnAlignedData	True	
StopTxnSampledData	True	
SupportedFeatureProfiles	True	Core FirmwareManagement LocalAuthListManagement SmartCharging Reservation RemoteTrigger

CHARX control modular

Table B-4 OCPP configuration parameters (in accordance with OCPP specification) [...]

Configuration parameter	Read only	Value
SupportedFeatureProfilesMaxLength	True	6
TransactionMessageAttempts	False	3
TransactionMessageRetryInterval	False	10
UnlockConnectorOnEVSideDisconnect	False	True
WebSocketPingInterval	False	0
LocalAuthListEnabled	False	False
SendLocalListMaxLength	True	2000
ReserveConnectorZeroSupported	True	False
ChargeProfileMaxStackLevel	True	5
ChargingScheduleAllowedChargingRateUnit	True	Current, Power
ChargingScheduleMaxPeriods	True	96
ConnectorSwitch3to1PhaseSupported	True	False
MaxChargingProfilesInstalled	True	50
LocalAuthListMaxLength	True	10000

Table B-5 Specific OCPP configuration parameters of the charging controllers

Configuration parameter	Read only	Value	Description
MaxCurrent	False	16	Maximum charging current at the individual charging points
GlobalMaxCurrent	False	16	Maximum total current of all charging points in the system
NewBackendURL	False		Text string for transferring the backend connection to a new URL
ForceUpdate	False	False	Software update is installed if charging processes are still active.
PreUnavailabilityForUpdate	False	30	Time interval in which the charging station can be set to status F before an update is performed.
ModemRestartTimeout	False	300	Time interval after which the modem is restarted in the event of unsuccessful connection.
EVDiscardTimeOut	False	120	Maximum time period between the connection of a vehicle and authorization.
RFIDByteOrder	False	False	Switch-over of the byte order of the RFID card (Little Endian/Big Endian).
RFIDCharacterOrder	False	False	Switch-over of the UID character order to 16-bit data words.
AllowTimeSyncDuringSession	False	True	System time is synchronized, even during an active charging process
AvailabilityOnlyWhenTimeSynchronized	False	True	Charging station is only available when the system time is synchronized

Table B-5 Specific OCPP configuration parameters of the charging controllers [...] [...]

Configuration parameter	Read only	Value	Description
CalibrationLawAdminList	False		UIDs for administrator access on the CHARX display
MessageAtKeyTransfer	False	setMeterConfigura- tion	Configurable value within the DataTrans- fer message for transmitting the public key
MeterValuesSignatureContexts	True	Transaction.Begin	Not used in the current software
PresentingRFIDEndCharging	False	True	Charging process is ended and lock is opened when the same RFID card is read again
SignedDataFormat	False	0	Format of the data sent with the Stop- Transaction 0 = OCMF format 1 = Transparency software format (xml) 2 = Measuring device-specific format
StopTransactionSignatureCon- texts	True	Transaction.End	Not used in the current software
StopTransactionSignatureFormat	True	MR	Not used in the current software
VendorAtKeyTransfer	False	generalConfiguration	Configurable value within the DataTrans- fer message for transmitting the public key
LogLevel	False	Debug	– DEBUG (high level of log detail) – INFO (low level of log detail)
WebSocketPingTimeout	False	30	Time interval after which the web socket connection is re-established in the ab- sence of a response

B 3 Modbus communication and register overview

Preparation of the configuration

- The Modbus server must be running, see [“System Control/Status”](#) (WBM: System Control, Status)
- **Port 502** must be open, [“Network/Port Sharing”](#)
- If you want to control the full scope of functions, you must set charging to be enabled via Modbus, see [“Charging Stations/Charging Point/Configuration”](#) (under “Release Mode”)
- If the phase rotation of one of the configured charging points is not known, then the register for total current will indicate the value “-1” (placeholder to indicate that the value is invalid)



If you modify a configuration, you will need to restart the Modbus server or the charging controller, see [“System Control/Status”](#) (WBM: System Control, Status)

General communication data

Table B-6 General communication data

Attribute	Data
Modbus server address	1
Port	502
Object type	Holding, 16-bit

Holding register (0x03) and Input register (0x04) return the same value

Modbus register

Address range 0-999 relates to data that is assigned to the overall installation. This includes charging controllers that are attached via the backplane bus of the server as well as clients connected via Ethernet and the extension modules that are attached to them.

Address range x000-x999 relates to data that is assigned to an individual charging point. The x stands for the assigned number of the charging point.

Table B-7 Modbus register in address range 0-999

Address	Number of data words	Access	Meaning	Value/coding
Charging station data (100 - 199)				
100	10	R	Device designation	20 characters, ASCII coded
110	4	R	Linux software version	8 characters, ASCII coded
114	1	R	Number of charging controllers in the system (backplane bus and in the Ethernet network)	Integer
115	3	R	MAC address ETH0	HEX characters
118	3	R	MAC address ETH1	HEX characters
121	4	R	IPv4 IP address ETH0	4x integer
125	4	R	IPv4 IP address ETH1	4x integer

Table B-7 Modbus register in address range 0-999 [...]

Address	Number of data words	Access	Meaning	Value/coding
129	4	R	Subnet mask ETH0	4x integer
133	4	R	Subnet mask ETH1	4x integer
137	4	R	Gateway ETH0 (placeholder, returns 0)	4x integer
141	4	R	Gateway ETH1 (placeholder, returns 0)	4x integer
145	1	R	Modem registration status	Integer 0: Not registered/Not searching 1: Registered 2: Searching 3: Registration denied 4: Unknown
146	1	R	Modem signal quality	Integer 0: Unknown 1: Inadequate to none 2: Inadequate 3: OK 4: Good 5: Excellent
147	1	R	Number of charging controllers in the system (backplane bus and in the Ethernet network) in the non-critical error state	Integer
148	1	R	Number of charging controllers in the system (backplane bus and in the Ethernet network), which results in status E or F	Integer
149	1	R	Number of charging controllers in status A in the system (backplane bus and in the Ethernet network)/number of unoccupied charging points in the system	Integer
150	1	R	Number of charging controllers in status B, C, or D in the system (backplane bus and in the Ethernet network)/number of occupied charging points	Integer
151	1	R	Number of charging controllers with an active charging process (C2)	Integer

CHARX control modular

Table B-7 Modbus register in address range 0-999 [...]

Address	Number of data words	Access	Meaning	Value/coding
152	2	R	Total power measured at the terminal point for the group of charging controllers. Aggregated power of the configured charging points	Integer [mW]
154	2	R	Total reactive power measured at the terminal point for the group of charging controllers. Aggregated power of the configured charging points	Integer [mVAR]
156	2	R	Total apparent power measured at the terminal point for the group of charging controllers. Aggregated power of the configured charging points	Integer [mVA]
158	2	R	Total current on phase L1 measured at the terminal point for the group of charging controllers. Aggregated current of the configured charging points, no phase delay	Integer [mA] -1, if phase rotation = unknown
160	2	R	Total current on phase L2 measured at the terminal point for the group of charging controllers. Aggregated current of the configured charging points, no phase delay	Integer [mA] -1, if phase rotation = unknown
162	2	R	Total current on phase L3 measured at the terminal point for the group of charging controllers. Aggregated current of the configured charging points, no phase delay	Integer [mA] -1, if phase rotation = unknown
164	1	R/(W, if configured)	Controlling the availability of the charging controller	0: All assigned charging controllers are set to status F 1: All assigned charging controllers are in normal operating mode
165	1	W	Reset	1: Charging controller restart (only performed on the server)
166	1	W	System reset	1: Restart of all charging controllers connected in the group
167	1	R	Dynamic maximum target charging current for load management. With reference to the first load circuit (placeholder).	Integer [A]

Table B-8 Modbus registers for the respective charging point

Address	Number of data words	Access	Meaning	Value/coding
Configuration data (x100 - x199)				
X100	1	R	Configuration of the charging interface in accordance with IEC 61851-1	0: Charging case B (charging socket) 1: Charging case C (charging connector)
X101	1	R	Set maximum charging current for the respective charging point	Integer [A]
X102	1	R	Set minimum charging current for the respective charging point	Integer [A]
X103	1	R	Residual current monitoring via input RCM	1: External residual current sensor configured 0: No external residual current sensor configured
X104	1	R	Lower temperature threshold for starting derating mode (Pt 1000 sensor active)	Integer [°C]
X105	1	R	Upper temperature threshold for stopping derating mode (Pt 1000 sensor active)	Integer [°C]
X106	1	R	Charging current setting when derating mode is started	Integer [A]
X107	1	R	Charging current setting when derating mode is stopped	Integer [A]
X108	1	R	Temperature monitoring	0: Inactive 1: With Pt 1000 sensor 2: With PTC sensor
X109	1	R	Accept vehicles in status D	0: Blocked 1: Allow
X110	1	R	Configuration of proximity evaluation	0: In accordance with IEC 61851-1
X111	1	R	Configuration of overcurrent monitoring	0: Inactive 1: Shutdown thresholds 120% (10 s) and 110% (100 s) 2: As per EV/ZE Ready

CHARX control modular

Table B-8 Modbus registers for the respective charging point [...]

Address	Number of data words	Access	Meaning	Value/coding
X112	1	R	Energy measuring device type	0: No energy measuring device
				1: Phoenix Contact EEM-350-D-MCB, 2905849
				2: Phoenix Contact EEM-EM357, 2908588 EEM-DM357, 1252817 EEM-DM357-70, 1219095
				3: Carlo Gavazzi EM24
				4: Phoenix Contact EEM-EM357-EE - 1311985
				5: Reserved
				6: Carlo Gavazzi EM340
				7: Reserved
				8: Reserved
				9: Reserved
				10: Reserved
				11: Iskra WM3M4(C)
				12: Inepro Metering PRO380
				65535: Unknown energy measuring device
X113	3	R	UID of the charging controller	ASCII
X116	3	R	UID of the associated client or server charging controller	ASCII
X119	1	R	Position of the charging controller in the backplane bus	Integer
X120	1	R	Charging controller charging release mode	0: Dashboard
				1: Local Allowlist
				2: External Control
				3: Permanent Charging Release
				4: OCPP
				5: Modbus
X121	3	R	RFID reader, UID of the charging controller (placeholder, returns 0)	6 characters, ASCII

Table B-8 Modbus registers for the respective charging point [...]

Address	Number of data words	Access	Meaning	Value/coding
Status data (x200 - x299)				
X232	2	R	Voltage of phase L1	Integer [mV] (X232=MSW, X233=LSW)
X234	2	R	Voltage of phase L2	Integer [mV]
X236	2	R	Voltage of phase L3	Integer [mV]
X238	2	R	Current of phase L1	Integer [mA] (X238=MSW, X239=LSW)
X240	2	R	Current of phase L2	Integer [mA]
X242	2	R	Current of phase L3	Integer [mA]
X244	2	R	Active power	Integer [mW]
X246	2	R	Reactive power	Signed Integer [mVAR]
X248	2	R	Apparent power	Integer [mVA]
X250	4	R	Counter value for active energy	Integer [Wh]
X254	4	R	Counter value for reactive energy	Signed Integer [VARh]
X258	4	R	Counter value for apparent energy	Integer [VAh]
x262	2	R	SOC in kWh (placeholder, returns 0)	Integer [Wh], as of ISO 15118-20
x264	1	R	SOC in % (placeholder, returns 0)	Integer [%], as of ISO 15118-20
X265	10	R	Last EVCC ID at the charging point	ASCII
X275	10	R	Last RFID UID at the charging point	ASCII
X285	2	R	Connection time (time in status B/C/D)	Integer [s]
X287	2	R	Total charging duration in status C/D, reset by status change from B → A	Integer [s]
x289	4	R	Transmitted active energy for the current charging process	Integer [Wh]
X293	2	R	Error code	Hexadecimal, an error bit is assigned to every single error, see “Error codes” on page 141 MSB: X293, LSB: X294 Example: X293=0x0000, X294=0040 = RFID reader error
X295	1	R	Digital inputs	Binary, 1 bit per input
X296	1	R	Current charging current setting (PWM duty cycle in accordance with IEC 61851-1)	Integer [%]
X297	1	R	Current charging current setting (current strength)	Integer [A]

CHARX control modular

Table B-8 Modbus registers for the respective charging point [...]

Address	Number of data words	Access	Meaning	Value/coding
X298	1	R	Current carrying capacity of the plugged-in charging connector in accordance with IEC 61851-1	Integer [A]
X299	1	R	Vehicle status according to IEC 61851-1	ASCII (A1, A2, B1, B2, C1, C2, E0, F0, IN)
Control registers (x300 - x399)				
X300	1	R/(W, if configured)	Charging release (must be configured to release via Modbus)	0: Charging process not enabled 1: Charging process enabled
X301	1	R/W	Maximum charging current (can be changed by higher-level systems) Value range: 6 - 80 The charging release is withdrawn if the value is exceeded or fallen below	Integer [A]
X302	1	R/W	State of the digital outputs 0: Undefined 1: Floating ("Floating") 2: Permanent 0 V ("Low") 3: Flashing 0 V ("Flashing Low") 4: Pulsating 0 V ("Pulsatile Low") 5: Permanent 12 V ("High") 6: Flashing 12 V ("Flashing High")	Binary coded, 4 bits per output Example: 0001 0001 0010 0011 Out 4 Out 3 Out 2 Out 1 1 1 2 3
X303	1	R/(W, if configured)	Locking (must be configured to external control)	0: Unlocking 1: Locking
X304	1	R/(W, if configured)	Status F (availability, must be configured to release via Modbus)	0: Not available (status F) 1: Available
X305	1	R/W	Enforce unlocking (if not configured to external control)	1: Unlocking is performed
X306	1	R/W	Maximum charging current when watchdog timer expires Value range: 6 - 80 The charging release is withdrawn if the value is exceeded or fallen below.	Integer [A]
X307	1	R/W	Expiry timer, reset by writing a new value within the time interval; 65535 disables the watchdog	Integer [s]

B 4 MQTT topics

The MQTT connection can be established by entering the host address at port 1883 (see [“MQTT” on page 35](#)).

Figure B-1 Example of an MQTT connection to a charging controller

Protocol	Host	Port
mqtt:// ▼	192.168.3.11	1883

The following MQTT topics are available when connected to the CHARX SEC 3xxx charging controller.

For a description of the MQTT interface, refer to the download area (under “Various”) for this charging controller at phoenixcontact.com/qr/1139012.

B 5 REST API



For a description of the REST API interface, refer to the download area (under “Various”) for this charging controller at phoenixcontact.com/product/1139012.

C Appendix for document lists

C 1 List of figures

Section 1

Section 2

Figure 2-1:	CHARX control modular application overview A-C	17
Figure 2-2:	CHARX control modular application overview D/E	17
Figure 2-3:	CHARX control modular application overview F	18
Figure 2-4:	CHARX control modular application overview G	18
Figure 2-5:	Module arrangement of CHARX SEC-3xxx and -1000 on the DIN rail	19
Figure 2-6:	Combination of CHARX SEC-3xxx on the DIN rail	21
Figure 2-7:	CHARX control modular in a client/server mode group	22
Figure 2-8:	Connections and operating and indication elements on the charging controller	24
Figure 2-9:	Subdivision of the Modbus/TCP register areas	33
Figure 2-10:	Load management with multiple charging stations and charging points	36
Figure 2-11:	Example connection schemes with configuration	37

Section 3

Figure 3-1:	Snapping the CHARX control modular onto the DIN rail	43
Figure 3-2:	Conductor connection to the CHARX control modular	44
Figure 3-4:	Connecting Ethernet	46
Figure 3-5:	Inserting (A) and removing (B) the SIM card	47
Figure 3-6:	Connecting the antenna	48
Figure 3-7:	Inserting the microSD card	49

Section 4

Figure 4-1:	Connecting the power supply	52
Figure 4-2:	Connecting the charging socket with 4-pos. locking actuator	53
Figure 4-3:	Connecting the charging socket with 3-pos. locking actuator	54
Figure 4-4:	Connecting the charging connector	55
Figure 4-5:	Load contactor control without ISO/IEC 15118 communication	56

Figure 4-6:	Load contactor control with communication in accordance with ISO/IEC 15118	57
Figure 4-7:	Contactor monitoring at the load contactor using an auxiliary switch	58
Figure 4-8:	Operating the charging controller with a type B all-current-sensitive residual current device	59
Figure 4-9:	Operation of the charging controller with a DC residual current sensor	60
Figure 4-10:	Connecting EEM357	61
Figure 4-11:	Connecting an ELATEC T4W2-F02B6/T4PK-F02TR6	63
Figure 4-12:	Software update on ELATEC RFID readers	63
Figure 4-13:	Connecting a DUALI DE-950-4-CXP	64
Figure 4-14:	Connecting a CHARX RFID/NFC	65
Figure 4-15:	Control of LEDs in "High Side" operating mode	66
Figure 4-16:	Control of LEDs in "Low Side" operating mode	67
Figure 4-17:	Wiring of the digital inputs	68
Figure 4-18:	Connecting a PTC sensor	69
Figure 4-19:	Derating curve for temperature measurement with Pt 1000 resistor	69
Figure 4-20:		69

Section 5

Figure 5-1:	Driver from Acer for "Win7/8.1/later"	72
Figure 5-2:	Device Manager	72
Figure 5-3:	Local search for the charging controller	73
Figure 5-4:	Dashboard of the charging controller	76
Figure 5-5:	Language selection	77
Figure 5-6:	Login to the WBM	77
Figure 5-7:	Changing the password via the WBM	78
Figure 5-8:	Charging Stations/Overview	79
Figure 5-9:	Charging station and charging point	79
Figure 5-10:	Importing a configuration	80
Figure 5-11:	Importing charging point configurations	81
Figure 5-12:	Charging Point Status	82
Figure 5-13:	Configuration page for an unconfigured charging point	87
Figure 5-14:	View of the Event Actions	94
Figure 5-15:	Configuration view for Event Actions (Event)	95
Figure 5-16:	Configuration view for Event Actions (Condition)	97
Figure 5-17:	Status indicator for OCPP communication	104

Figure 5-18:	Configuration of the OCPP connection	106
Figure 5-19:	Local Whitelist	109
Figure 5-20:	Load Management	111
Figure 5-21:	Network settings of the ETH0 interface	115
Figure 5-22:	Port Sharing	117
Figure 5-23:	Modem status and configuration data	118
Figure 5-24:	System Control in the WBM	120
Figure 5-25:	Setting the time in the WBM	121
Figure 5-26:	Downloading log files in the WBM	124
Figure 5-27:	Software update via the WBM	126

Section 6

Figure 6-1:	Releasing the connectors	129
Figure 6-2:	Removing the SIM card	130
Figure 6-3:	Removing the charging controller	131

Appendix A

Appendix B

Figure B-1:	Example of an MQTT connection to a charging controller	155
-------------	--	-----

Appendix C

C 2 List of tables

Section 1

Section 2

Table 2-1:	Product overview of the CHARX control modular product family	13
Table 2-2:	Connections and operating elements on the charging controller	24
Table 2-3:	Indication elements on the charging controller	27
Table 2-4:	Directory structure of CHARX SEC-3xxx charging controllers	29

Section 3

Table 3-1:	Connection data	44
------------	-----------------------	----

Section 4

Section 5

Table 5-1:	User roles and rights management in the WBM	78
Table 5-2:	Charging Point Status (Information)	83
Table 5-3:	Charging Point Status (Operation)	86
Table 5-4:	Charging Point: Create Configuration	88
Table 5-5:	Input or events with description	96
Table 5-6:	Condition with description	97
Table 5-7:	Output or actions with description	100
Table 5-8:	Event Action configuration – example 1	102
Table 5-9:	Event Action configuration – example 2	103
Table 5-10:	Event Action configuration – example 3	103
Table 5-11:	Event Action configuration – example 4	103
Table 5-12:	Configuration parameters for the backend connection	106
Table 5-13:	Configuration parameters for the backend connection 2	107
Table 5-14:	Entering new charging releases	109
Table 5-15:	Load Management	112
Table 5-16:	Network settings of the ETH0 interface	115
Table 5-17:	Port Sharing	117
Table 5-18:	Network/Modem	118
Table 5-19:	Software services on the CHARX SEC-3xxx	120

Section 6

Appendix A

Appendix B

Table B-1:	Error codes	141
Table B-2:	ISO 15118 error list	143
Table B-3:	Supported OCPP operations	144
Table B-4:	OCPP configuration parameters (in accordance with OCPP specification)	145
Table B-5:	Specific OCPP configuration parameters of the charging controllers.....	146
Table B-6:	General communication data	148
Table B-7:	Modbus register in address range 0-999	148
Table B-8:	Modbus registers for the respective charging point	151

Appendix C

C 3 Index

A

Antenna	
Configure.....	118
Connecting.....	48
Ordering data	16
Auxiliary contact.....	91

C

Cellular communication.....	118
Cellular interface	9
Charging connector	
Connecting.....	55
Connection Type.....	88
Connector Phase Rotation	89
Contact monitoring.....	58, 91
Control Pilot (CP)	
Connecting.....	55
Connection point	25
Current carrying capacity	53

D

Dashboard	75, 76
DC Residual Current Monitoring	91
DC residual current sensor.....	60
Derating	91
Device defect	132
Digital inputs	
Configure.....	96
Connecting.....	68
Digital outputs	
Configure.....	100
Connecting.....	66
Disposal	12

E

Energy measuring device	
Configure.....	113
Connecting.....	61
Ethernet	
Connecting.....	46
Network with router	73
Network without router.....	74

Event Action

Create	95
Examples	102

F

Fallback Charging Current	89
Fallback Time.....	89
Frequency bands	9

H

High Level Communication	93
--------------------------------	----

L

Language selection.....	77
Load contactor	
Connecting.....	56
Monitoring for malfunction	58
Locking actuators.....	53
Locking Mode	88
Log files	124
Login.....	77, 78

M

Measuring device, see Energy measuring device.....	113
microSD card	
Inserting	49
Modbus communication.....	148
Modem.....	118
Module Switch	125
MQTT	
Description	35
Topics	155

O

OCPP

Configuration parameters.....	145
Operations	144
Servervariables	107
Settings	106
Status Information	104
Out-of-balance Suppression	91

P

Password	
Change.....	78
Default.....	78

R

Release Mode.....	92
Removal.....	129
Repairs	132
Residual current monitoring	59
Residual current monitoring, see Residual current	
REST API.....	156
RFID reader	
Configure.....	92
Connecting.....	62
Role	78

S

Safety notes	10
SIM card	
Inserting	47
Status	119
Software.....	126
Software update.....	127
Stuck contactor contact, see Auxiliary contact	91
Supply voltage	52
System Control	120

T

Technical data.....	133
Temperature sensors	
Configure.....	91
Connecting.....	69
Time.....	121

U

User roles.....	78
-----------------	----

W

Welding feedback, see Contactor monitoring	91
--	----

Please observe the following notes

General Terms and Conditions of use for technical documentation

Phoenix Contact reserves the right to alter, correct, and/or improve the technical documentation and the products described in the technical documentation at its own discretion and without giving prior notice, insofar as this is reasonable for the user. The same applies to any technical changes that serve the purpose of technical progress.

The receipt of technical documentation (in particular user documentation) does not constitute any further duty on the part of Phoenix Contact to furnish information on modifications to products and/or technical documentation. You are responsible to verify the suitability and intended use of the products in your specific application, in particular with regard to observing the applicable standards and regulations. All information made available in the technical data is supplied without any accompanying guarantee, whether expressly mentioned, implied or tacitly assumed.

In general, the provisions of the current general Terms and Conditions of Phoenix Contact apply exclusively, in particular as concerns any warranty liability.

This manual, including all illustrations contained herein, is copyright protected. Any changes to the contents or the publication of extracts of this document are prohibited.

Phoenix Contact reserves the right to register its own intellectual property rights for the product identifications of Phoenix Contact products that are used here. Registration of such intellectual property rights by third parties is prohibited.

Other product identifications may be afforded legal protection, even where they may not be indicated as such.

How to contact us

Internet

Up-to-date information on Phoenix Contact products and our Terms and Conditions can be found on the Internet at:

phoenixcontact.com

Make sure you always use the latest documentation.

It can be downloaded at:

phoenixcontact.net/products

Subsidiaries

If there are any problems that cannot be solved using the documentation, please contact your Phoenix Contact subsidiary.

Subsidiary contact information is available at phoenixcontact.com.

Published by

PHOENIX CONTACT GmbH & Co. KG

Flachsmarktstraße 8

32825 Blomberg

GERMANY

Should you have any suggestions or recommendations for improvement of the contents and layout of our manuals, please send your comments to:

tecdoc@phoenixcontact.com

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg, Germany
Phone: +49 5235 3-00
Fax: +49 5235 3-41200
E-mail: info@phoenixcontact.com
phoenixcontact.com

© PHOENIX CONTACT 2024-03-14

109999_en_04
Order No. —04



INSPIRING INNOVATIONS