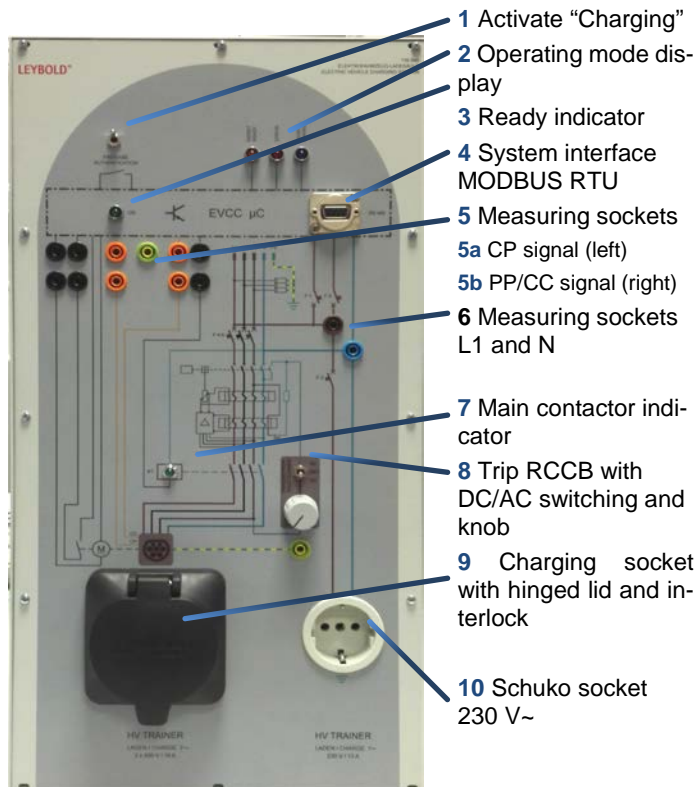


09/19-W13-Wei

**Instructions for use 739 948****Electric vehicle charging station**11 RJ45 connector  
(Option!)

12 Fault switch

13 RCCB Type B

14 Triple fuse  
(charging socket)15 Fuses  
single16 Power supply connection 3\*400 V,  
50/60 Hz17 Connection *auto-*  
*motive high voltage*  
*trainer,*  
739 947**Scope of delivery:**

- 1 Electric vehicle charging station, 739 948
- 2 4 mm safety bridge connector orange
- 3 4 mm safety bridge connector black
- 1 CEE connection cable 400 V/16 A, 3 m
- 1 Instructions for use 739 948

**0. Intended use**

The "electric vehicle charging station" device is a teaching aid for vehicle high-voltage technology training.

The device allows the trainee to perform typical workshop measurements realistically.

Together with the *automotive high voltage trainer, 739 947*, the device is used to create an electric vehicle charging infrastructure situation. A three-phase passive charging cable or a single-phase active charging cable can be connected.

## Safety Information

Read these instructions for use completely before commissioning and operating the device!

Failure to observe these operating instructions will void the warranty/guarantee. No liability will be assumed for any consequential damage!

No liability will be assumed for material damage or personal injury resulting from improper handling or non-observance of the safety information and the warranty/guarantee will expire as a result!

- The device is only approved for use in dry indoor areas that are installed in accordance with VDE 0100 Part 723!
- Operate and use only in accordance with DIN VDE 0105-112!
- The device must **not** be put into operation if it exhibits visible signs of damage or behaves irregularly. If you are unsure, then do not put the device into operation! Have the device immediately inspected by our service repair shop!
- The device may be used for training purposes only! The device is not a toy and is not suitable for children!
- The device may only be used under the expert supervision of skilled and responsible personnel!
- Unauthorised modifications and/or changes to the device are not permitted. The device may neither be opened nor repaired!

- Measurements on all 4 mm measuring sockets may only be made as described in the instructions for use. Applying external voltages or generating high and low impedance short circuits is expressly prohibited!
- Only the components described in these instructions for use may be used on all 4 mm connection sockets!
- The device may only be used in conjunction with the *automotive high voltage trainer, 739 947* or the *test adapter for e-charging station, 739 953*. Do not connect it to a real vehicle!
- Exercise caution when handling the device. It can be damaged by impacts, blows or from being dropped even from a low height!
- Attention: the device is very heavy and may only be carried by two persons!
- Only connect it to the mains using the supplied connection cable!

## 1. Operation

### 1.0 Switch-on conditions

1. Make sure that all fault switches **12** are in the lower position

### 1.1 Power supply

1. Plug the CEE socket of the **supplied connection cable** into the right CEE socket **16** at the rear
2. a.) Switch fuses **F1** and **F2 (15)** on (top position)  
b.) Switch fuses **F4- F6 (14)** on (top position)  
b.) Switch residual-current circuit breaker **RCCB (13)** on (top position)

### 1.2 Connecting the automotive high voltage trainer, 739 947

1. Plug the CEE plug of the connection cable of the *automotive high voltage trainer, 739 947*, into the left CEE socket **17** into the back of the device
2. Plug the CEE plug of the connection cable of the *automotive high voltage trainer, 739 947*, into the CEE socket to the right of the *Automotive high voltage trainer, 739 947*
3. Put the *automotive high voltage trainer, 739 947* into operation according to the instructions for use

### 1.3 Connecting the three-phase charging cable

4. Plug the *charging cable mode 3, 3~*, 739 951, into the charging socket **9** on the charging station
5. Plug the *charging cable mode 3, 3~*, 739 951, into the charging socket on the right side of the *Automotive high voltage trainer, 739 947*



Fig. 1 - Charging socket on the automotive high voltage trainer, 739 947

**1.4 Charging**

6. Activate the charging station by actuating enabling switch **1**
7. Activate the “charging” switch on the *automotive high voltage trainer, 739 947*
8. The main contactor switches the charging voltage on and blue indicator light **2** lights up.

**2. Application**

**2.1 CP communication signal**

Communication with vehicle via the CP contact begins. The charging current upper limit is transmitted to the vehicle by a PWM signal. The protective earth conductor connection is checked at the same time. A warning symbol or faulty installation lights up when the protective earth conductor is missing.

The communication signal between the vehicle and charging station can be measured at the CP (5) socket against the PE socket while charging.

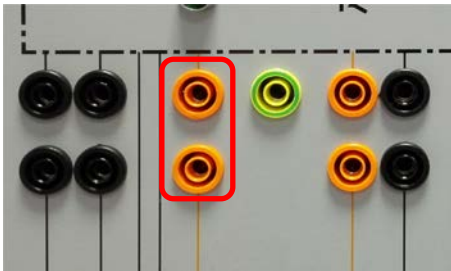


Fig. 2 - Measuring sockets for the CP contact

The positive amplitude of the CP signal depends on the charging status:

- Status **A** «Active»             $U_{max} = +12\text{ V}$
- Status **B** «Ready»             $U_{max} \approx +9.3\text{ V}$

Status **C** «Charging»             $U_{max} \approx +6.7\text{ V}$ , PWM active:

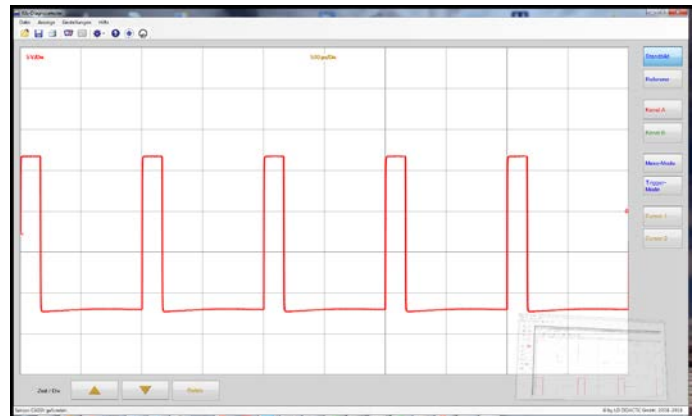


Fig. 3 - Status C, Charging

The coding resistance for the maximum permissible charging current can be measured between the PP/CC and PE measuring sockets. For *charging cable mode 3, 3-*, 739 951 that is 680 Ω, which corresponds to 20 A.

**Safety note**

**While charging is active, the plug is locked. Do not attempt to forcibly pull out the plug since the locking mechanism could otherwise be damaged!**

In the delivery state, the charging request with Status D is rejected with an error message. This behaviour can be reprogrammed via the MODBUS interface by setting the 4010 address (16 bit) from «0» (default) to «1».

Status **D** «Charging»             $U_{max} \approx +3.4\text{ V}$ , PWM active:

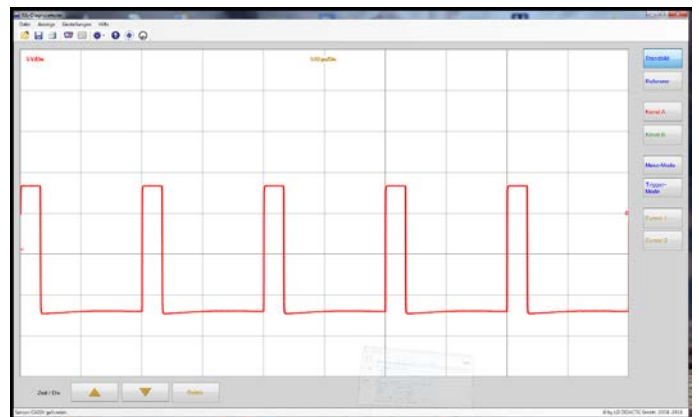


Fig. 4 - Status D, charging with ventilation

The positions of the 4 mm measuring sockets of the CP and PP/CC signals are selected so that a plug-in element can be inserted as a replacement directly against PE.

Insert an STE *diode 578 51* as shown in order to ground the voltage of the CP signal and thus induce the «Status E» fault state. This is indicated by an indicator light.

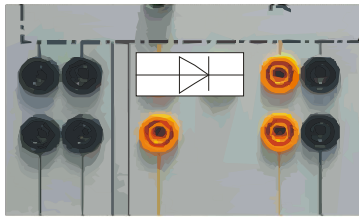


Fig. 5 - Fault simulation of the CP contact

### 2.2 Checking the residual current circuit breaker (“RCCB”)

RC can be tripped while charging. To do this, first activate fault #F5 and set the potentiometer to the left stop. Subsequently use switch 8 to select whether you would like to induce an AC fault current (top position)

or a DC fault current (bottom position). Since residual current circuit breaker 13 must be a Type B model, residual DC currents are detected as well.

Begin with an AC fault current (switch up). Slowly turn knob 8 clockwise to the right until the RCCB trips audibly. Keep the knob in this position! Now switch to the “DC fault current” position (switch down) and switch the residual current circuit breaker on again. Keep turning the knob until the DC fault current trips the residual current circuit breaker as well.

### 2.3 PP resistance

Insert an STE resistor as shown in order to simulate different current carrying capacities of the charging cable as per IEC 61851. Refer to the following table for the values.

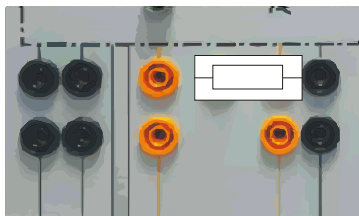


Fig. 6 - Simulation of the current carrying capacity of the charging cable

Value [Ω]	Current [A]	Item number
100	63	577 32
220	32	577 36
680	20	577 42
1500	13	577 46
>2200	0	-

Table 1 - Coding resistances of the PP contact

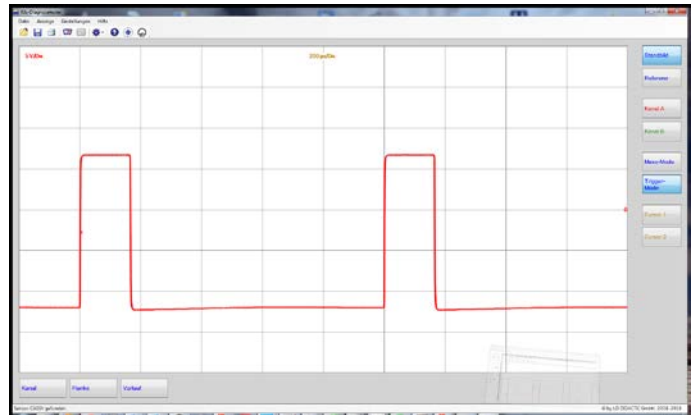


Fig. 7 - 13 A

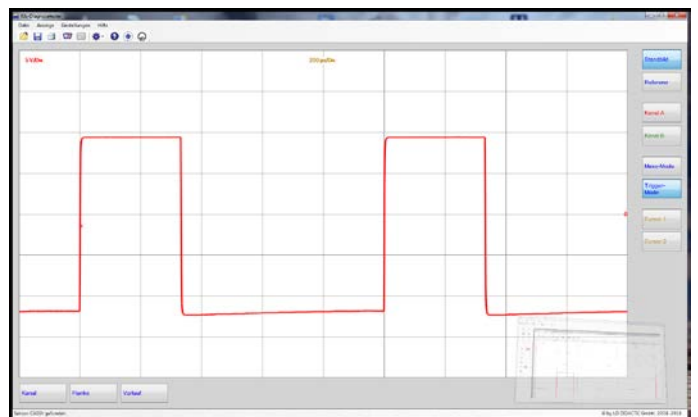


Fig. 8 - 20 A, duty cycle 33 % ( $33 \cdot 0.6 \text{ A} = 19.8 \text{ A} \approx 20 \text{ A}$ )

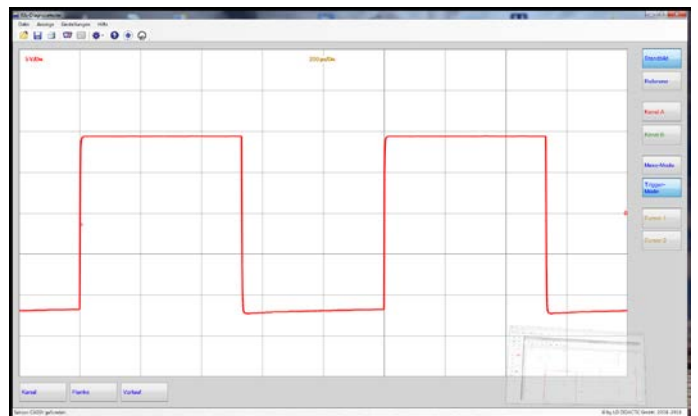


Fig. 9 - 32 A, duty cycle 53 % ( $53 \cdot 0.6 \text{ A} = 31.8 \text{ A} \approx 32 \text{ A}$ )

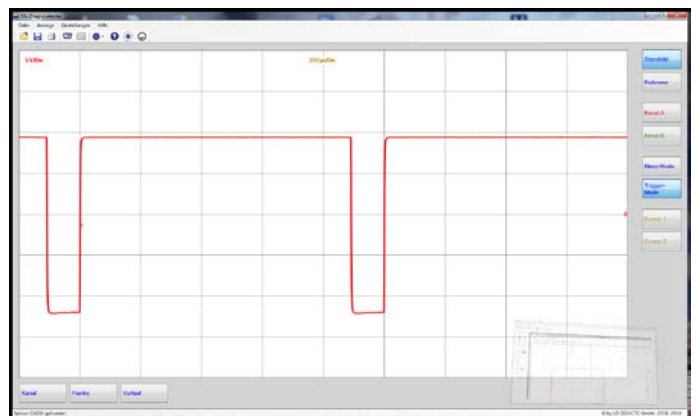


Fig. 10 - 63 A, duty cycle 89 % ( $[89-64] \cdot 2.5 \text{ A} = 62.5 \text{ A} \approx 63 \text{ A}$ )

The communication signals between the vehicle and charging station can also be measured on the *automotive high voltage trainer, 739 947* at the intended 4 mm measuring socket for CP against the PE socket while charging.

4 mm measuring sockets at the front of the device:

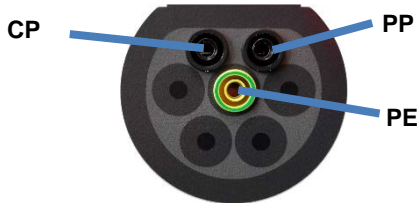


Fig. 11 - Measuring sockets on the automotive high voltage trainer, 739 947

**Note**

Even while charging, the PE socket of the charging socket is not connected to the PE sockets of the *automotive high voltage trainer!*

A "Status A" must follow after each change in resistance, otherwise the new value is not loaded!

### 3. Fault switch

Fault	Description
#F1	Return information Interlock Interruption
#F2	Control Interlock Interruption
#F3	PP signal Interruption
#F4	CP signal Interruption
#F5	Fault during residual current circuit breaker test

Table 2 - Meaning of the fault switches

Several faults may be activated at the same time!

### 4. Modbus communication

#### 4.1 Description

You can access the device's registers via Modbus/RTU via system interface 4. Modbus/RTU also allows you to make additional configurations on the device, retrieve status information and control access to the charging process. The device works as a Modbus slave; the address is permanently set to 1. The baud rate is 9600 for communication. You can find a detailed description of the register assignment at the time this document was created [here](#).

#### 4.2 Establishing a connection

You need an RS485 interface (e.g. LEYBOLD 735 315USB), optionally a 9-pin serial standard connection cable as well communication software (everything not included in the scope of delivery). You use the cable to connect interface 4 on the charging station to the RS485 interface of the computer. The 9-pin Sub-D socket is assigned as follows (without fixed 120 Ωterminating resistor!):

- Pin 8 A
- Pin 3 B

#### 4.3 Programming

Install and start the software according to the manufacturer's specifications. An Internet search for «Modbus TCP RTU Master Software» provides useful results for free software or for demo versions of programs offered commercially.

Regardless which software you are using, you will need the following information for input:

Mode: **RTU**

COM port: look in the *Windows Device Manager* to see the port number under which the interface you use was set up, here, for example, number 7:

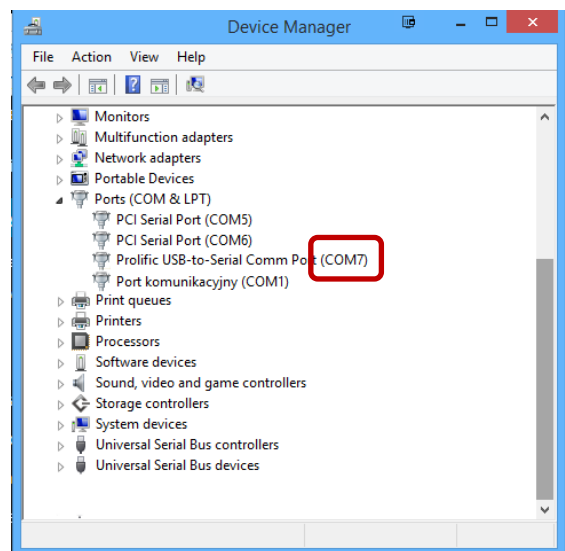


Fig. 12 - Determining the COM port number

- Baud: **9600**
- Data bits: **8**
- Stop bits: **1**
- Parity: **none**
- Slave ID: **1**

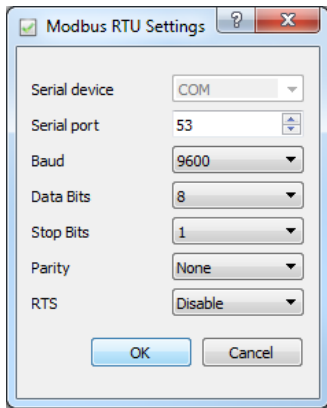


Fig. 13 - Entering the interface parameters

If you want to read out «hardware revision», for example, you will find a reference in the manufacturer information that the hardware revision number is located in register **1030**. The terms «address» and «register» are sometimes used interchangeably.

In the program you also enter:

- Address: **1030** (no offset or offset=0) ❶
- Value/data type: **16 bit** (if necessary)
- Function: **0x03** (read access) ❷

Now start the requirement diagram with a «SEND» command or similar ❸

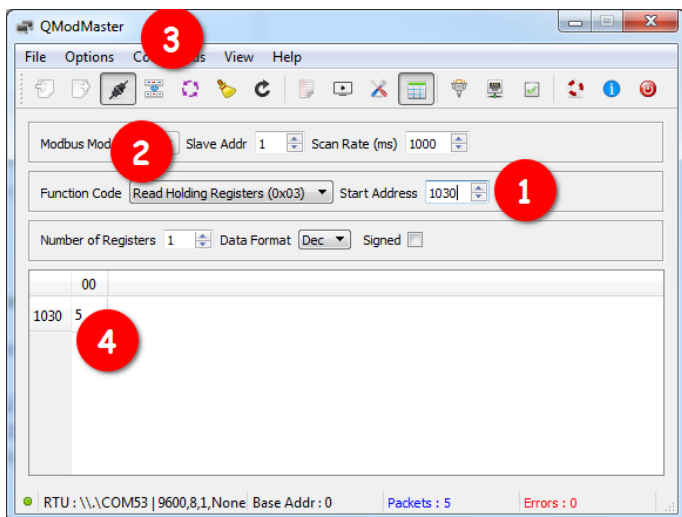


Fig. 14 - Reading out a register value

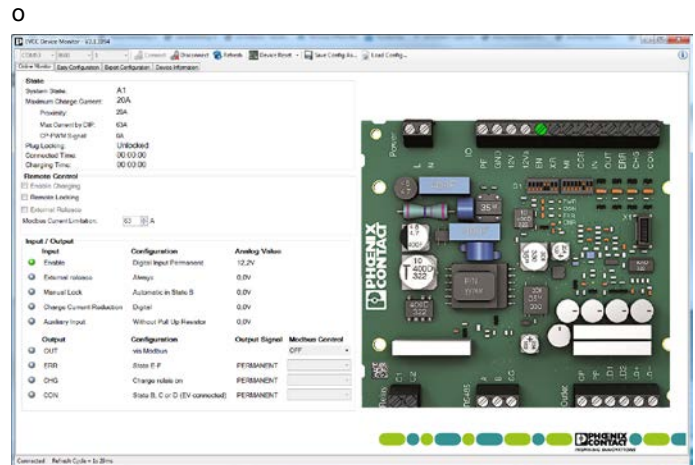
As a result, the charging controller returns the revision number that is displayed in the software (in the example here, «5» ❹).

Use this procedure to set register «4010» to «1», for example, in order to allow vehicles with charging status «D» (ventilation required) without error messages (see point 2.1).

## 5. Monitoring software

Follow the steps to establish a connection as described under 4.2. You can download at the time this document was created the «EV CC Device Monitor» program from PHOENIX CONTACT in order to display various information directly and make changes. **Caution: improper handling can put the device in a state that no longer permits a factory reset!**

Start the program, agree to the licence then enter the interface parameters and click the button «Connect». Available parameters will be shown automatically, changing parameters is simply made by entering and confirming the new value.



## 6 Maintenance

The device does not require special maintenance. Only the test button of residual current circuit breaker **13** must be pressed every month.

## 7 Technical data

- Power supply: 3x400 VAC, 50 Hz, 16 A
- Connection CEE socket 400 V/16 A, 6h
- Output voltage: 3x400 VAC, 50 Hz, 2 A
- Connection CEE plug 400 V/16 A, 6h
- Charging socket: Type 2, 16 A
- Weight: approx. 25 kg
- Protection class 1

## 8 Disposal



Do not dispose of electric and electronic products with normal household waste. Dispose of the unusable product in accordance with the applicable statutory requirements.