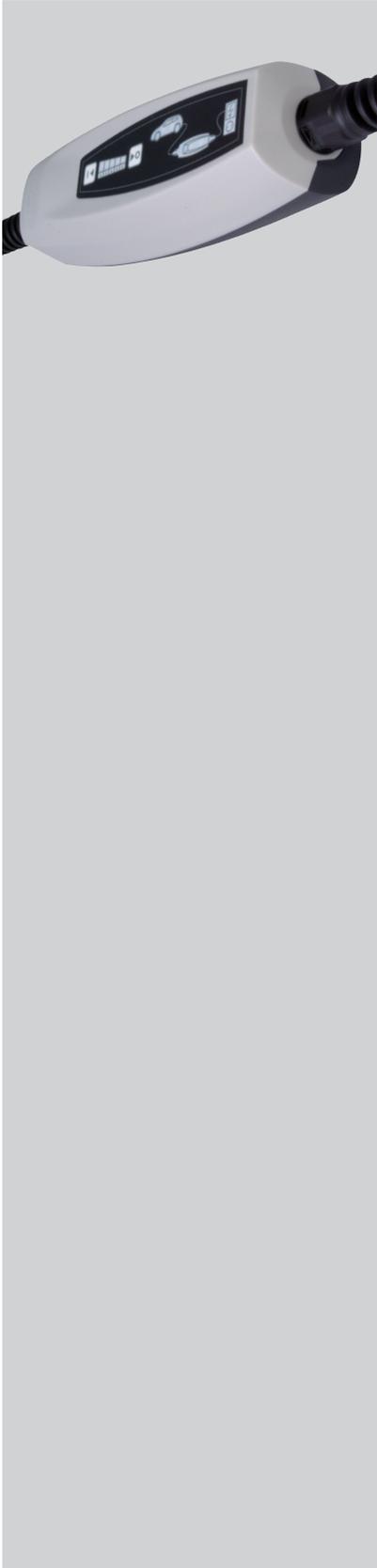




# **PERCEDOS®**

**Instruction Manual/Technical Information**

## Instruction Manual PERCEDOS®



### **Function description:**

PERCEDOS® is a portable protective system (IC-RCD\*) including communication interface to the electrical vehicle and intended for use on the charging cable in mode 2. The device checks the power supply for proper function and only allows current to be drawn from a safe power source.

The charger of the electrical vehicle controls the charging procedure of the batteries and prompts the PERCEDOS® to switch the charging procedure on or off by means of the communication connection. In order to activate the charging procedure, the PERCEDOS® must be activated. An inactive PERCEDOS® status is the equivalent of a standby function. Without PERCEDOS®, it is impossible to charge the vehicle in mode 2.

When connected to an outlet, the device automatically recognizes whether mains voltage is present at the feed point. It is not necessary to manually switch on the PERCEDOS®

If mains voltage is recognized, the device automatically starts the protective ground monitoring. This monitoring function is constantly active as long as the device is operated with mains voltage and monitors the protective ground connection between PERCEDOS® and the outlet for the presence of the protective ground wire and its freedom from faults.

So that the PERCEDOS® can detect external voltage on the protective ground, the device must be connected to the electrical vehicle. The function external voltage detection is also automatically activated as soon as the plug connection to the vehicle has been created and detected.

As soon as the PERCEDOS® finds one of these faults, the charging procedure is immediately interrupted or a beginning of the charging procedure is prevented

The fault current circuit breaker integrated into the device additionally protects the user against an electrical accident in case of a system defect.

### **Sequence of the charging procedure:**

1. Check the maximum possible charging current of the outlet and reparameterize the charging current of the PERCEDOS® after connection to the mains voltage, if necessary.
2. Connect PERCEDOS® to outlet (mains voltage) and to vehicle.
3. PERCEDOS® automatically starts its test sequence; (outlet and connection cables) are checked for proper function.
4. After the test sequence and if no malfunctions have been determined, the PERCEDOS® is ready to activate the charging procedure.
5. For this, the PERCEDOS® must be activated in operating status.
6. Check operating status and switch to active if necessary
7. The charging current of the PERCEDOS® may need to be reparameterized.
8. The vehicle electronics switch the PERCEDOS® on and off for the charging procedure.

\* IC-RCD = In Cable - Residual Current Device

## Instruction Manual PERCEDOS®

### Protective ground monitoring - external voltage detection:

Depending upon the connection configuration, the protective ground is monitored as follows:

#### **PERCEDOS connected to outlet (mains voltage) without connection to the vehicle:**

*The symbols vehicle, PERCEDOS®, and power column blink red/green for approx. 2 seconds.*

- The constant monitoring of the protective ground connection (PE) between the PERCEDOS® and the outlet for wire breakage is activated.
- No external voltage detection possible.

#### **PERCEDOS® connected to outlet (mains voltage) and vehicle:**

*The symbols vehicle, PERCEDOS®, and power column blink red/green for approx. 2 seconds.*

- The constant monitoring of the protective ground connection (PE) between the PERCEDOS® and the outlet for wire breakage is activated.
- The constant detection of external voltage on the protective ground wire is activated.

#### **PERCEDOS® only attached to the vehicle:**

- Device is not being supplied with mains voltage (device off).
- No visual feedback possible.
- No protective ground monitoring possible.
- No external voltage detection possible.

### Possible results of the protective ground monitoring - external voltage detection:

- There is no protective ground connection between the PERCEDOS® and the outlet (mains connection).
- Charging procedure is not activated.

*Display power column blinks red.*

#### **The protective ground connection between the PERCEDOS® and the outlet (mains connection) is interrupted during the charging procedure.**

- The current charging procedure is switched off.

*Display power column blinks red.*

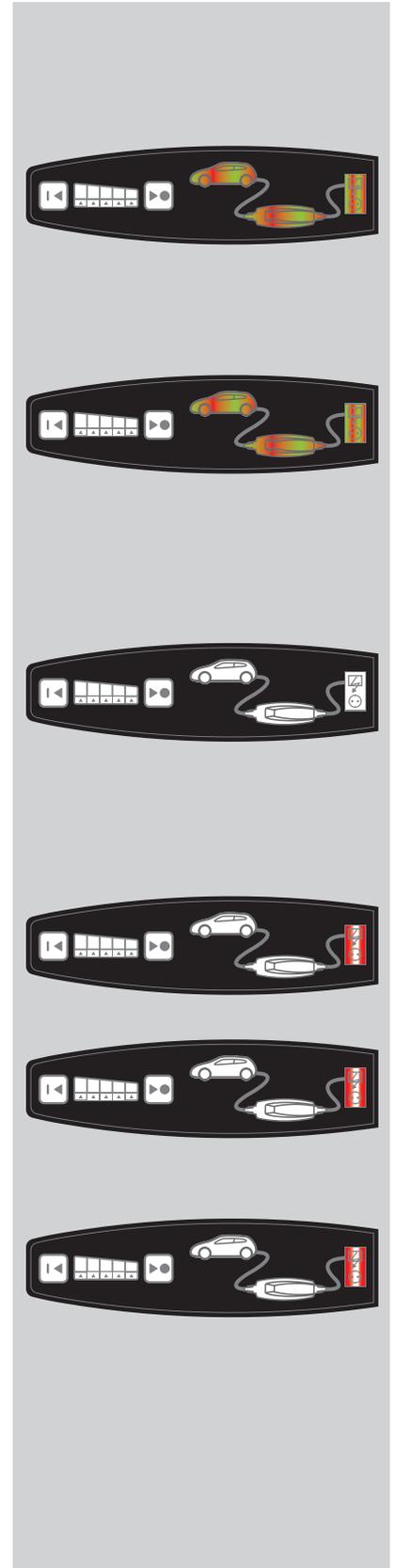
#### **Protective ground wire between electrical vehicle, PERCEDOS®, and outlet (mains connection) is carrying external voltage.**

- Charging procedure is not activated.
- The current charging procedure is switched off.

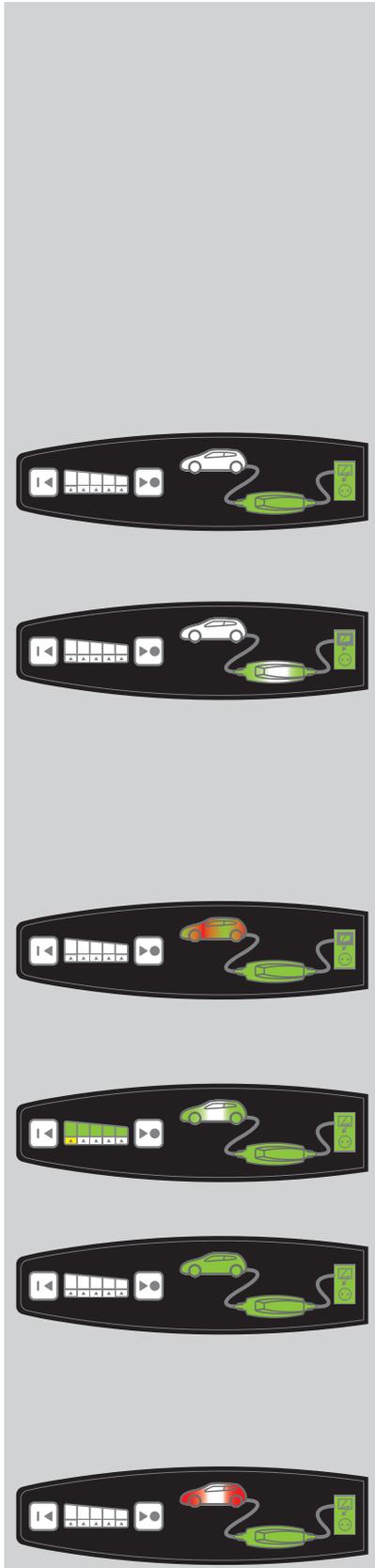
*Display power column blinks red.*

#### **Recommendation:**

- Check the charging cable and plug connections.
- Use another outlet.
- Then, restart the charging procedure.



## Instruction Manual PERCEDOS®



### "Activate/deactivate" PERCEDOS® operating status:

If no fault is detected after commissioning and test sequence, the charging procedure is permitted. For this, the device must be activated in operating status.

- The PERCEDOS® is delivered inactive.
- The respective operating status, whether active or inactive, is permanently saved in the device even in case of power loss.
- For every startup or after the return of voltage note which operating status the device assumes after fault-free test sequence.
- If the device was deactivated as its last operating status inactive, the PERCEDOS® must be switched to active so that the vehicle can be charged.

#### Activate PERCEDOS®:

- Press button (I).
- Charging procedure activated.

*Display PERCEDOS® illuminates green.*

#### Deactivate PERCEDOS®:

- Press button (O).
- The charging procedure is switched off or interrupted.
- Standby mode.

*Display PERCEDOS® blinks green.*

### Battery charging procedure:

Only possible if the PERCEDOS® has not detected any fault and is activated.

#### Standby

- Vehicle connection has been detected.
- Charging procedure possible, but not yet switched on by the vehicle electronics.

*Current indicators are off.*

*Display vehicle illuminates red/green.*

#### Charging procedure

- Charging procedure was switched on by the vehicle electronics.
- Vehicle battery is being charged.

*Maximum possible current level illuminates yellow.*

*Momentary current level illuminates as a green bar.*

*Display vehicle blinks green.*

#### Charging procedure concluded:

- Vehicle batteries are completely charged.

*Current indicators are off.*

*Display vehicle illuminates green.*

- Switch PERCEDOS® to inactive and remove the connections to the vehicle and the mains connection.
- Vehicle operation can be resumed.

#### Charging procedure not possible:

- Communication error between the PERCEDOS® and the electrical vehicle.
- Ventilation required by the vehicle electronics is not present, not activated, or faulty

*Display vehicle blinks red.*

*Current indicators are off.*

## Instruction Manual PERCEDOS®

### Parameterization mode charging current:

When connecting the electrical vehicle to an unknown power source, the maximum possible charging current of the power source should be checked before the beginning of the charging procedure.

**Example:** If the utilized power source is fused for 13A, the maximum possible charging current on the PERCEDOS® must be reduced by one level from 16A to 13A. Otherwise, the power source will be overloaded. The fuse can trigger prematurely or the connection cables will be destroyed by overheating.

Five different current levels can be set manually. (16A, 13A, 11A, 8A, 6A). As delivered, the maximum possible charging current is preset at 16A. Parameterization of the maximum possible charging current is only possible in inactive operating status.

### To manually parameterize the maximum possible charging current, proceed as follows:

- Check the operating status of the PERCEDOS® and switch from active to inactive, if necessary.

#### Display PERCEDOS® blinks green.

- Then, press button (0) and button (I) simultaneously and keep pressed for approx. 5 seconds.

- During initial parameterization (delivered status), all of the LED's of the current indicator light up.

#### Current indicator illuminates as yellow bar.

- If charging current parameterization has already been performed and this setting will now be changed, the yellow bar illuminates up to the previously set maximum possible current level.

**Example:** Preset 13A maximum possible charging current corresponds to 80% of the bar display.

### Reduce maximum possible charging current:

- Press button (0).
- Each time the button is pressed, the maximum possible charging current is reduced by one charging level until the lowest charging level is reached.

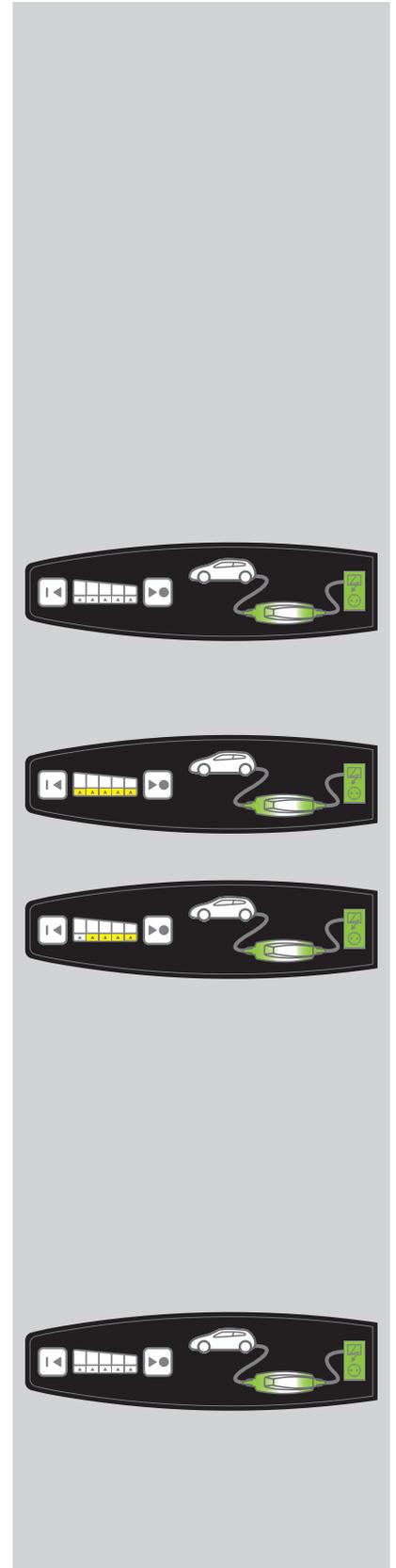
### Increase maximum possible charging current:

- Press button (I).
- Each time the button is pressed, the maximum possible charging current is increased by one charging level until the highest charging level is reached.

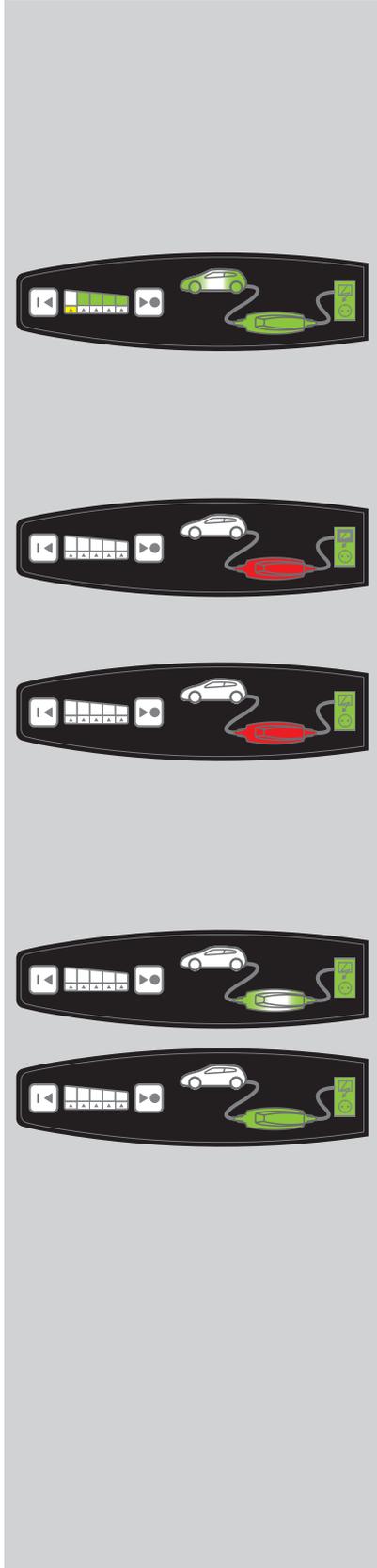
### Close charging current parameterization:

- Parameterization mode is automatically closed if no button is pressed for at least 5 seconds.

Yellow current indicator goes out completely.



## Instruction Manual PERCEDOS®



### **Temperature monitoring:**

In order to ensure safe charging of the electrical vehicle at all times, the PERCEDOS® has internal temperature monitoring and temperature-related charging current optimization. This ensures that the permissible charging current is set automatically with consideration for safety aspects. This guarantees safe, unsupervised operation with optimized charging times.

### **Charging current optimization by means of internal temperature monitoring:**

- The temperature monitoring is switched on automatically, as soon as the charging of the vehicle battery begins.
- As soon as the temperature sensor measures an excessive temperature, the preset charging current is automatically reduced by one charging level (e.g. from 16A to 13A).
- In case of temperature reduction, the charging current is automatically increased by one charging level up to the maximum possible charging current (e.g. from 13A to 16A).
- The charging procedure is permanently switched off if the excessive temperature continues to be measured when the lowest charging level of 6A is reached.

**Display PERCEDOS® illuminates red.**

**Display vehicle and current indicators are off.**

### **Switch-off in case of critical temperature:**

- If a critical temperature occurs, the charging procedure is immediately permanently switched off.

**Display PERCEDOS® illuminates red.**

**Display vehicle and current indicators are off.**

### **Reset of temperature monitoring:**

- If the charging procedure has been permanently switched off automatically by the temperature monitoring, this must be manually reset after eliminating the fault.

For this, proceed as follows:

- Switch the operating status of the PERCEDOS® from active to inactive.
- This resets the temperature monitoring.

**Display PERCEDOS® blinks green.**

- If the charging procedure is to be continued, switch the operating status of the PERCEDOS® from inactive to active.

**Display PERCEDOS® illuminates green.**

### **Recommendation:**

- Only reset temperature monitoring if the cause of the excessive temperature has been eliminated and the device has first been tested for proper function, e.g. testing by an electrician.

## Instruction Manual PERCEDOS®

### Fault current circuit breaker:

A fault current circuit breaker has been integrated into the device, which additionally protects the user against an electrical accident in case of a system defect.

### Automatic switch-off in case of detected differential fault current:

- In case of detected differential fault current  $I_{\Delta n}$  30 mA, the PERCEDOS® initially switches off the charging procedure temporarily.

**Display PERCEDOS® illuminates red.**

**Display vehicle and current indicators are off.**

- The PERCEDOS® will reactivate the charging procedure up to three times with a waiting period of 20 seconds.
- If the fault still exists, the charging procedure will no longer be allowed after it is switched off for the fourth time (permanent switch-off).

**Display PERCEDOS® illuminates red.**

**Display vehicle and current indicators are off.**

### Manual test of the differential fault current monitoring:

- Check the operating status of the PERCEDOS® and switch from active to inactive, if necessary.
- Then, press the button (0) again for approx. 1 second.
- Test of the differential fault current monitoring is started.

**Display PERCEDOS® goes off.**

### Possible results of the manual test of the differential fault current monitoring:

#### Fault current triggering is working properly:

**Display PERCEDOS® blinks green.**

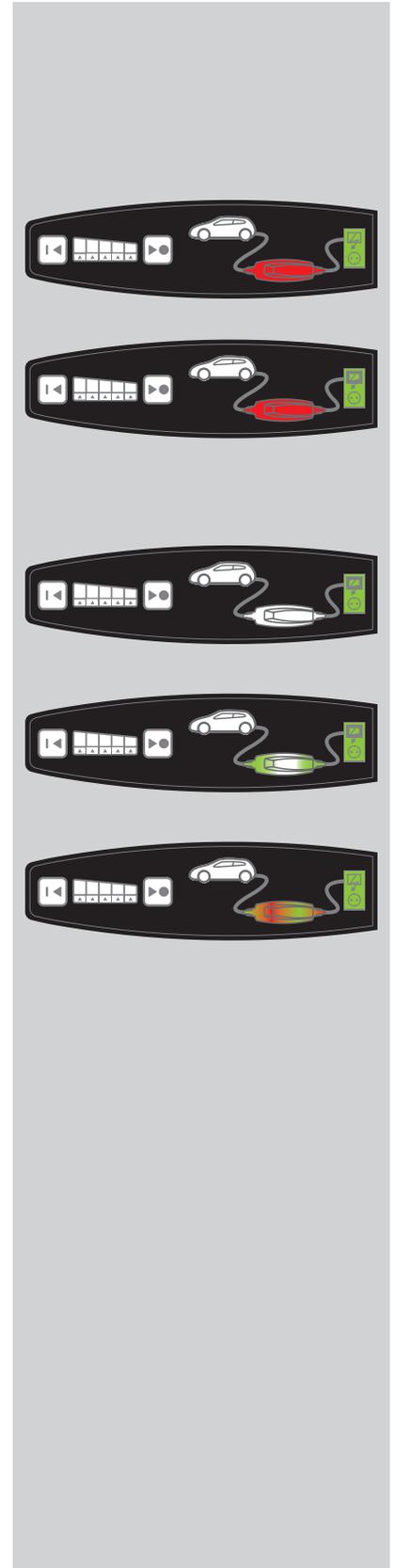
- The charging procedure can begin or be continued.
- For this, switch the operating status back to active.

#### Fault current triggering is not working properly:

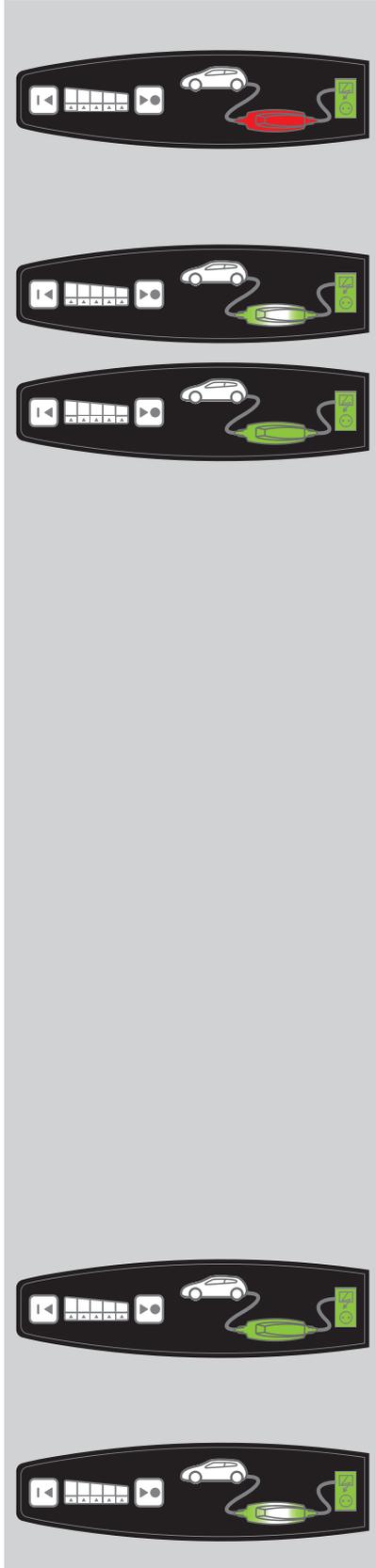
**Display PERCEDOS® blinks green.**

#### Recommendation:

- Do not switch on charging procedure.
- Have the PERCEDOS® checked immediately by an electrician!



## Instruction Manual PERCEDOS®



### **Fault current monitoring:**

- If the charging procedure has been permanently switched off automatically by the activation of the differential fault current monitoring, this must be manually reset after eliminating the fault.

**Display PERCEDOS® illuminates red.**

### **For this, proceed as follows:**

- Switch the operating status of the PERCEDOS® from active to inactive.
- This resets differential fault current monitoring.

**Display PERCEDOS® blinks green.**

- If the charging procedure is to be continued, switch the operating status of the PERCEDOS® from inactive to active.

**Display PERCEDOS® illuminates green.**

### **Recommendation:**

- Only reset differential fault current if the cause of the fault current has been eliminated and the device has first been tested for proper function, e.g. testing by an electrician.

### **Service functions:**

In order to ensure safe charging of the electrical vehicle at all times, PERCEDOS® has internal protective mechanisms. A periodic self-test checks the internal differential fault current function and an operating hours meter monitors the maximum recommended operating time until the next retesting

### **Periodic self-test:**

- The PERCEDOS® checks the differential fault current function with the aid of an internal self-help routine. This self-test is automatically performed every 4 operating hours, both in active and inactive operating status. The running of the self-test does not have an influence on the charging procedure.

### **Operating hours meter:**

- The operating hours meter keeps track of the active charging time until the next service interval.
- We recommend having the PERCEDOS® checked by an electrician after every 5,000 operating hours.

### **Possible results of the service functions:**

#### **Display PERCEDOS® illuminates green.**

- No error determined during differential fault current testing.
- Maximum operating hours not yet reached.
- PERCEDOS® operating status is active.
- Charging procedure is possible and activated.

#### **Display PERCEDOS® blinks green.**

- No error determined during differential fault current testing.
- Maximum operating hours not yet reached.
- PERCEDOS® operating status is inactive.
- Charging procedure would be possible but is not activated.

## Instruction Manual PERCEDOS®

### **Display PERCEDOS® illuminates constantly red/green.**

- Error has occurred during differential fault current testing, or operating hours have been exceeded.
- PERCEDOS® operating status is active.
- Charging procedure still possible and activated.

#### **Recommendation:**

- Cancel charging procedure.
- Have the PERCEDOS® checked immediately by an electrician!

### **Display PERCEDOS® blinks red/green.**

- Error has occurred during differential fault current testing and/or operating hours have been exceeded.
- PERCEDOS® operating status is inactive.
- Charging procedure would be possible but is not activated.

#### **Recommendation:**

- Do not switch on charging procedure.
- Have the PERCEDOS® checked immediately by an electrician!

#### **Reset operating hours meter:**

The operating hours meter can be manually reset in inactive operating status.

#### **For this, proceed as follows:**

- Check the operating status of the PERCEDOS® and switch from active to inactive if necessary.
- Then, press the button (0) again for approx. 2-3 seconds.
- This resets the operating hours meter.

### **Display PERCEDOS® blinks green.**

#### **Recommendation:**

- Only reset the operating hours meter if the device has first been tested for proper function, e.g. testing by an electrician!

#### **Notes:**

Follow the rules of electrical engineering and the technical data. Do not make any changes to the device.

You can find additional information and an overview of the assortment under [www.kopp.eu](http://www.kopp.eu).



## PERCEDOS® mk4

Series mk4 – Article-No.: 2940.0001.0

The listed facts relate to the technical data of the expected serial device.

This data may be modified according to technical and normative (further development) evolution.

For the single device the enclosed data sheet is effective.

| Function   | Technical data  |
|--|---|
| Rated voltage  | 160–240V~; 1-phase; ± 10%   |
| Rated current  | 16A   |
| Frequency  | 50Hz  |
| Switching capacity   | 3,600W (permanent load at 230V~)  |
| Power discipation  | approx. 7W  |
| Stand by consumption   | < 1W  |
| Nominal residual current                                     | I <sub>Δn</sub> 30mA / I <sub>Δn</sub> 10mA on request  |
| Tripping characteristic (RCD)                                | Typ A   |
| Charging current   | 5-steps<br>16A/13A/10A/8A/6A<br>Parameters adjustable at manufacturing process<br>Automatical treduction of charging current at over-temperature                                |
| Programing mode  | manually adjustment of permitted charging load  |
| Parametering interface                                       | integrated  |
| Disconnection  | all pole (L,N,PE) according Norm IEC 62335  |
| Circuitry  | Relais with electric strength > 1.500 V / short-circuit strength 1.500 A  |
| Power connection   | L, N, PE / 1-phase<br>L1, L2, PE / 1-phase  |
| Usable main power supply networks                            | TN: TN-C, TN-C-S, TN-S  |
| Operating hours of charging                                  | > 40,000h   |
| Protection class   | IP 55   |
| Environmental Temperature                                    | -30 °C to +50 °C  |
| Dimensions (l x w x h)                                       | approx 210 x 80 x 68 mm   |
| Weight   | approx 600 g  |
| Operating elements   | 2 push-buttons (tactil) with pre-stamped keypad<br>suitable for left- and right-handed persons  |
| Operating functions  | ON, OFF/Test; Prog-Modus; +; -  |
| Display function concept                                     | self-explaining graphical touch panel and function display<br>Imagery (eCar, PERCEDOS, charging pillar)   |
| Dispaly  | colour back-illuminated imagery<br>colour variance: red = failure; green = active; red/green = service or Standby   |
| Service indication   | after 5,000h  |
| Periodical self test function                                | every 4h  |
| Thermal monitoring   | mandatory: Internal temperature observation (NTC-resistance)<br>optional: External temperature observation (NTC-resistance in power supply plug)                                |
| Vehicle communication  | Integrated communication modul (PWM) according IEC 61851<br>Data port short-circuit proof   |
| Saftey functions   | Residual Current Device (RCD Type A)<br>Protection Conductor Presence (PCP)<br>Protection Conductor Monitoring (PCM)  |
| Operation recognition  | Automatic restart after power failure. The PERCEDOS must be previously activated and not switched off through residual current.<br>No automatic restart after manual switch off |
| Undervoltage release   | Undervoltage release with automatic reset after self test procedure   |
| Case fastener  | screwed with safety torx screws<br>exclusively to open from professionals   |
| Protection against misuse                                    | 1. PERCEDOS only operates in Mode 2<br>2. Cabinet can not opened with ordinary tools  |
| Cord grip  | cord crip on both side with 2 torx screws<br>surface tempered according DIN ISO 4042, zinc coated 5µm A2x   |
| Connector cable protective sleeve                            | both side<br>sealed range for IP 55: cable fitting 6–13mm<br>protective sleeve 11,6 mm ± 0,4 mm   |
| Connector pins for power voltage                             | receptacle 6,3x0,8 Ms (Type: Tyco 63012-2 or equivalent)  |
| Connector pins for temperature sensor and communication wire | receptacle 2,8x0,5 Ms or 2,8x0,8 Ms   |
| Prefered components  | Automotive standard   |
| Certification and manufacturer's declaration                 | CE self declaration (based on VDE information test)   |
| Standards  | IEC 61851-1:2001; IEC 62196-1:2003; IEC 62335; ISO 6722   |

## PERCEDOS® mk4

### Indications on the PERCEDOS display:

No displays: no mains voltage

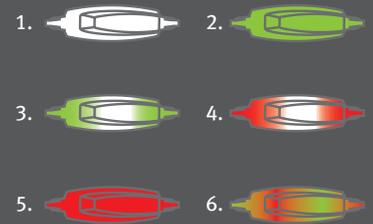
#### Charging station:

- |                       |  |
|-----------------------|--|
| 1. No display (off):  | no mains voltage.                              |
| 2. Illuminates green: | charging procedure possible.                   |
| 3. Blinks red:        | charging procedure not possible. Outlet fault. |



#### PERCEDOS:

- |                           |   |
|---------------------------|---|
| 1. No display (off):      | no mains voltage or outlet fault.                           |
| 2. Illuminates green:     | device activated.   |
| 3. Blinks green:          | device deactivated.   |
| 4. Blinks red:            | detected fault current. Temporary switch-off.               |
| 5. Illuminates red:       | detected fault current. Permanent switch-off.               |
| 6. Illuminates red/green: | periodic self-test has activated. Operating hours exceeded. |



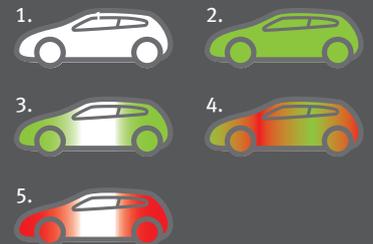
#### Current indicator:

- |                          |  |
|--------------------------|--|
| 1. Displays illuminates: | when the vehicle is being actively charged. Otherwise, no display (off). |
| 2. Illuminates green:    | momentary current level.   |
| 3. Illuminates yellow:   | maximum possible current level.  |

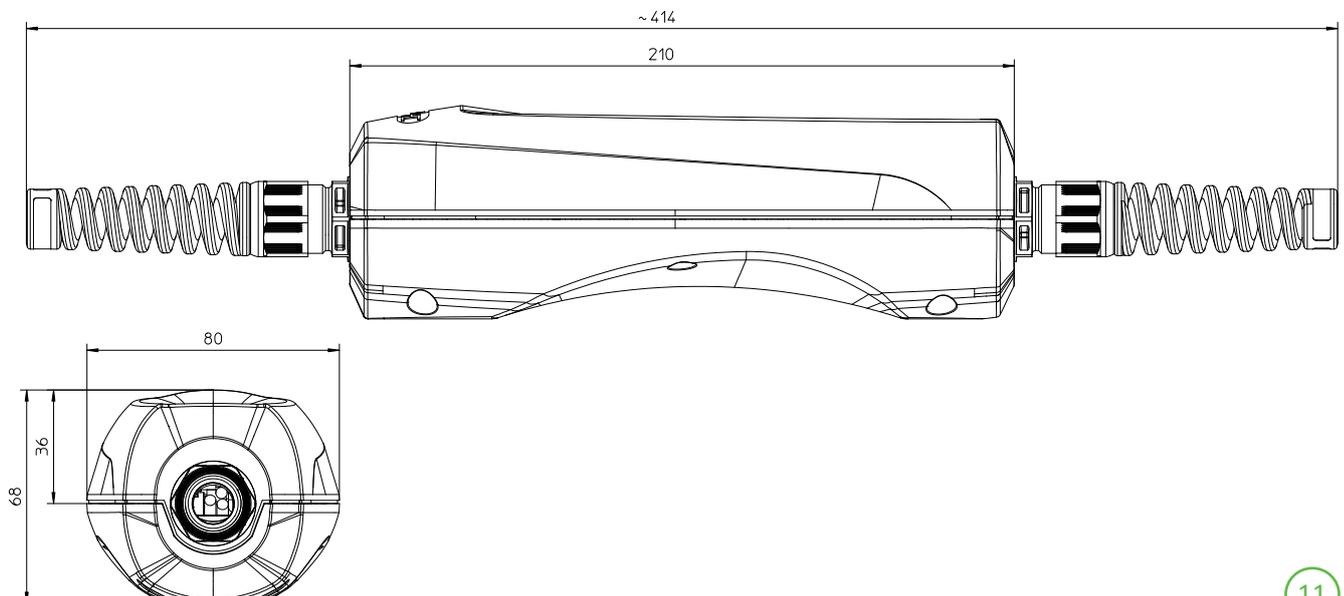


#### Vehicle:

- |                           |   |
|---------------------------|---|
| 1. No display (off):      | No mains voltage.<br>No vehicle detected.<br>Switch-off due to fault current.<br>Switch-off due to temperature. |
| 2. Illuminates green:     | vehicle battery completely charged.   |
| 3. Blinks green:          | vehicle is being charged.   |
| 4. Illuminates red/green: | vehicle connection detected, no charging procedure.   |
| 5. Blinks red:            | charging procedure not possible, communication error, among others.   |



### Dimensional drawing (all dimensions in mm)



# **PERCEDOS®**

by **Kopp**



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