

# Operating instructions

Compleo SOLO N+

40800703/40800704

Article number: A15AE1



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# 1 About this manual

This manual contains descriptions and important information for the safe and trouble-free use of the charging system. The manual is part of the charging system and must be accessible at all times to all persons working on and with the charging system. The manual must be kept in a clearly legible condition.

The personnel must have carefully read and understood this manual before starting any work. The basic prerequisite for safe working is the observance of all specified safety and warning instructions as well as handling instructions in this manual.

In addition to the instructions in this manual, the local accident prevention regulations and the national industrial safety regulations apply.

Illustrations are for basic understanding and may differ from the actual design of the charging system.

More information about the product: https://www.compleo-cs.com/service/installation-service.



# 1.1 Scope of application

This manual is valid for the following article numbers of the charging system Compleo SOLO N+:

neoom international	Compleo Charging Solutions	Ausstattung	
40800703	i00019539	A15AE11003.22	
40800704	i00019540	A15AE12103.11	

# 1.2 Further requirements

The operator must ensure that the charging system is properly installed and used as intended.

During installation and start-up, the national legal requirements and regulations for accident prevention must be observed. In Germany these include the requirements according to DIN VDE 0100 and the accident prevention regulations according to DGUV V3.

Before the system is released, an appropriate test must be carried out to ensure all safety features and the proper functionality of the charging system. In addition, the operator must ensure the operational safety of the charging system by means of regular maintenance (see chapter 10.1 Maintenance plan, page 68).

This document reflects the state-of-the-art of the product at the time of publication.

#### **ATTENTION**

A list of the normative references and regulations according to which the charging system was designed and constructed can be found in the declaration of conformity. When installing and commissioning a charging system from Compleo Charging Solutions, nationally applicable standards and regulations must also be observed.

#### NOTE

All standards, regulations, test intervals and the like mentioned in this document are valid in Germany. If a charging system is set up in another country, equivalent documents with a national reference must be used.



#### 1.3 Manufacturer and contact address

Compleo Charging Solutions AG
Oberste-Wilms-Straße 15a
44309 Dortmund, Germany

Tel.: +49 231 534 923 - 777 Fax: +49 231 534 923 - 790

e-mail address: info@compleo-cs.com

# 1.4 Conventions of presentation

For easy and quick understanding, different information in this manual is presented or highlighted as follows:

- List without fixed order
- List (next item)
  - Subitem
  - Subitem
- 1. Handling instruction (step) 1
- 2. Handling instruction (step) 2
  - Additional notes for the previous step
- 1 Position number in figures and legends
- 2 Consecutive position number
- 3 ...
- ☑ List/check point
- ☑ List/next check point

Reference (example): See "chapter 6.5, page 27"

# **NOTE**

A note contains application tips and useful information, but no warnings of hazards.



# 1.5 Abbreviations

Abbreviation	Explanation
AC	Alternating Current
DC	Direct Current
EMC	Electromagnetic Compatibility
EVSEID	Electric Vehicle Supply Equipment ID
НМІ	Human-Machine Interface
ID	Identification Number
IR	Infrared
kWh	Kilowatt hour
LCD	Liquid Crystal Display
LS	Charging system/charging station
МСВ	Miniature Circuit Breaker
MessEG	Measuring and calibration law
MessEV	Measuring and calibration regulations
N/A	Not Available/Applicable
ОСРР	Open Charge Point Protocol
PSU	Power Supply Unit
RCD	Residual Current Device
RDC-DD	Residual Direct Current-Detecting Device
RTC	Real-Time Clock
S/N	Serial number
SAM	Memory and display module
SPD	Surge Protective Devices
SW	Software
UV	Sub-distribution
VNB	Distribution system operator



# 2 Safety

In order to ensure operational safety of the charging equipment and to avoid serious injuries caused by flashovers or short circuits, the following information and safety instructions for operating the unit must be observed. Repair work on the unit must only be carried out by authorised specialist personnel. The housing of the unit may only be opened by persons who have been properly instructed. The following points therefore apply:

- · Read and observe safety and warning instructions
- Read and follow instructions

# 2.1 Warnings

In this manual, warnings and notes are presented as follows.

# **A** DANGER

Indicates an imminent danger that will result in death or serious injury if not avoided. There is great danger to life.

# **A** WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

#### **A** CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

#### **ATTENTION**

Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

# 2.1.1 Sectional warnings

Sectional warnings refer to entire chapters, a section or several paragraphs within this manual. Sectional warnings are presented as follows (example warning):

#### **A** WARNING

# Type and source of the danger.

Possible consequences if the danger is not observed.

Measures to avoid the danger.



#### 2.2 Intended use

The charging system is intended exclusively for charging electric vehicles.

The charging system is suitable for public and semi-public areas and can be used indoors and outdoors.

The charging system is intended exclusively for stationary installation.

Any use beyond this is considered improper use. The manufacturer is not liable for damages resulting from this.

#### 2.3 Foreseeable misuse

The use of the charging system as a power source for other power consumers is not in accordance with its intended use and is considered misuse.

Only charging cables of type 2/20 A or only charging cables of type 2/32 A may be used on charging systems equipped with a charging socket type 2. Charging cables that deviate from this are not accepted by the systems.

Charging systems may only be connected to the power supply via a fixed and non-separable supply line.

# 2.4 Safety instructions for the user

This charging system may only be used in the manner described in this manual. If the charging system is used for other purposes, the operator may be endangered and the charging equipment may be damaged. This manual must always be accessible. Note the following points:

- If no charging process is active, anchor any existing charging cables on the charging system in the brackets provided or wrap them around the housing of the charging system.
- The distance between a charging system and a vehicle must not exceed 3 metres.
- The charging system may only be operated when completely closed. Do not remove covers inside the charging system.



# 2.5 Personnel qualification

Qualified and trained electricians meet the following requirements:

- Knowledge of general and special safety and accident prevention regulations.
- · Knowledge of the relevant electrical engineering regulations.
- Product-specific knowledge through appropriate training.
- Ability to identify hazards associated with electricity.

# **▲** DANGER

# Danger due to electric current

Touching live parts will result in electric shock with serious injury or death.

- Work on electrical components may only be carried out by a qualified electrician and in accordance with electrical engineering rules.
- Ensure they are de-energised and take suitable protective measures.



# 2.6 Dangers and residual risks

#### NOTE

Compleo charging systems as a whole do not contain SVHCs (Substances of Very High Concern) in a concentration of more than 0.1 % (w/w), related to the individual charging station. However, individual components may contain SVHCs in concentrations > 0.1 % (w/w).

• When the charging stations are used as intended, no SVHCs are released and there are no risks to humans or the environment.

# 2.6.1 Electrical voltage

Dangerous electrical voltages may be present inside the housing of the charging system after the housing has been opened. There is a danger to life if contact is made with live components. Serious injury or death is the result.

- Work on electrical equipment may only be carried out by a qualified electrician and in accordance with electrical engineering rules.
- Disconnect the charging system from the power supply.
- The system has life-threatening DC voltages, which only disappear after five minutes after switching off due to capacitor charges. A corresponding period of five minutes must elapse before working on exposed parts.

#### 2.6.2 Incorrect handling

- Pulling on the charging cable can lead to cable breakage and damage. Only pull the charging cable out of the socket directly at the plug.
- The use of extension cables is not permitted. To avoid the risk of electric shock or cable fire, only one charging cable may be used at a time to connect the electric vehicle and charging system.
- A charging system whose charging cables are in contact with the ground involves a risk of tripping or mechanical damage if run over. The operator of the charging system must implement appropriate measures for cable routing and affix appropriate warnings.

#### **A** WARNING

#### Risk of electric shock and fire due to the use of adapters!

Using adapters on the charging cable can cause serious injury and damage to property.

Do not use any adapters on the charging cable!



# 3 Product description

The Compleo SOLO N+ charging system described below is suitable for charging electric vehicles indoors and outdoors with installation on a load-bearing wall or a pole.

Instructions, states and messages are indicated by means of status LEDs and/or displays.

# 3.1 Design

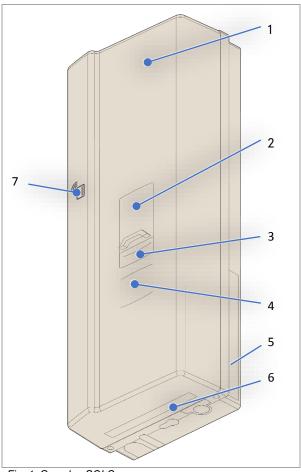


Fig. 1: Compleo SOLO

- (1) Housing
- (2) Charging interface, socket type 2, or parking position for charging plug type 2
- (3) Status display of the charging interfaces
- (4) Meter MID/ SAM®
- (5) Series label
- (6) Near-field lighting (optional)
- (7) RFID

The illustration shows a charging system of type Compleo SOLO N+ with AO2 socket or fixed charging cable and charging plug type 2.

The equipment features are listed in the table below.

The scope of delivery is shown in chapter .

A complete overview of the technical data is listed in chapter .

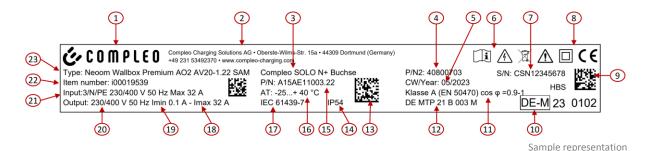


- Avvening		Charging interfaces  HC2 (fixed charging cable with charging plug type 2)
Н	C2	or
1		AO2 (socket type 2 with sliding cover)
AC	D2	
		Status display
	RGB	Status LED
3-cc	olour	
		<ul> <li>Authentication</li> <li>RFID tag &amp; RFID card</li> <li>Giro-E (optional)</li> <li>Remote authorisation (optional)</li> </ul>
		Surge protection (optional)  • Surge arrester
		Documentation - Operating instructions incl. associated documents
8		Installation accessories  • Fastening set  • Installation material



#### 3.2 Series label

There is a serial label on the charging system. The following figure shows the arrangement of information on a serial label:



The following information can be identified by means of the serial label:

- (1) Name of the unit manufacturer
- (2) Address, service number, website of the unit manufacturer
- (3) System designation of the system manufacturer
- (4) Material number or article number of the system
- (5) Calendar week and year of manufacture
- (6) Pictograms (manual, disposal)
- (7) Serial number of the charging system
- (8) Pictograms (safety information, protection class)
- (9) QR code: Serial number of the charging system
- (10) Metrology marking (year, conformity assessment body)
- (11) Accuracy class of the measuring device according to EN 50470 and cos phi: permissible power factor
- (12) Number of the type examination certificate
- (13) QR code: Article number of the unit manufacturer
- (14) Protection type and protection class of the charging system
- (15) Equipment features of the unit manufacturer
- (16) Permitted ambient temperature
- (17) Manufacturing standard
- (18) Imin: Minimum current of the charging station
- (19) Imax: Maximum current of the charging station
- (20) Output: Voltage, frequency, max. current, power
- (21) Input: Connections, voltage, frequency, max. input current
- (22) Article number of the unit
- (23) Unit designation of the unit operator



# 3.3 Technical specifications

# **General information**

Charging system	Compleo SOLO N+
Article number	40800703/ 40800704
Equipment (version abbreviation)	A15AE1xxxxxx.xx
Charging standard	Mode 3/ IEC 61851

# Connections

Connections				
Mains connection	Terminals			
Max. connection cross- section <sup>1)</sup>	rigid: 10 mm²; flexible: 6 mm² (with and without ferrule)			
Max. equipotential bonding 6),1)	16 mm <sup>2</sup>			
Ethernet	LSA terminals/ RJ45 socket			
Min. connection cross-section	26 AWG (LSA terminals)			
Max. length	30 m			
Ripple control receiver	Contacts for mains-supporting load control (not potential-free/not galvanically isolated)			
Max. connection cross-section	1.5 mm²			
Max. length	30 m			



# **Electrical characteristics**

Mains voltage	230 V/ 400 V				
Max. rated current	16 A		32 A		
Article number	40800704	i00019540	40800703	i00019539	
Mains frequency	50 Hz				
Network form	TT/TN				
Protection class	II	II			
Overvoltage category	III				
Charging voltage	400 V/ 3~				
Max. charging capacity	11 kW		22 kW		
Article number	40800704	i00019540	40800703	i00019539	
Charging current	16 A/ 3~		32 A/ 3~		
Article number	40800704	i00019540	40800703	i00019539	
Charging interface(s)	1 x type 2 chargir charging cable	ng plug with	1 x type 2 charg	ing socket	
Article number	40800704	i00019540	40800703	i00019539	

# **Protective devices**

MCB <sup>2)</sup>	C20 A 3)		C40 A 3)	
Article number	40800704	i00019540	40800703	i00019539
RCD	RCCB: 40 A/0,03 A, type A; RDC-DD: 6 mA			
SPD	ÜS 1/2/3 - DIN EN 61643-11 5			



# **Product description**

# **Ambient conditions**

Ambient temperature	-25 °C to +40 °C
Operating temperature (Ø 24 h)	≤ 35 °C
Storage temperature	-25 °C to +50 °C
Relative humidity	≤ 95 % (non-condensing)
Altitude	≤ 2000 m above sea level

# **Mechanical data**

Dimensions (H x W x D)	663 x 253 x 148 mm			
Housing	screwed; polycarbonate (PC); IK 08; DIN EN 61439-(17)			
Protection type	IP54			
Max. weight	10.5 kg		8.0 kg	
Article number	40800704	i00019540	40800703	i00019539

# **Communication interfaces**

Data communication	TCP/IP
Data connection	LTE modem for mini SIM card
(frequency/ transmission power)	(800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz/ 23.0 ±1 dBm)
Backend communication	OCPP: 1.6J, 2.0-ready
RFID standard	RFID mini
(frequency/ transmission power)	(13.56 MHz/ 13.9 mW,11.4 dBm)



# Legal regulations

2014/53/EU (Radio Equipment Directive)			
2011/65/EU (RoHS Directive)			
2001/95/EG (Directive on General Product Safety)			
2012/19/EU (WEEE Directive)			
(EU) 2019/1021 (EU-POP Ordinance)			
(EU) 1907/2006 (REACH Regulation)			
SVHC	EU no.	CAS no.	
Lead (Pb)	231-100-4	7439-92-1	

1) = Use copper cable only

4,4'-isopropylidenediphenol

(bisphenol A; BPA)

- 2) = Circuit breaker must be located in the sub-distribution upstream of the charging system
- 3) = according to IEC 60898-1, IEC 60947-2 or IEC 61009-1 (deviations possible due to country-specific regulations)

80-05-7

4) = Residual current circuit breaker must be upstream of the charging system

201-245-8

- 5) = Surge protection must be provided upstream of the charging system, if required
- 6) = Only when equipped with surge protection device type 1/2/3 DIN EN 61643-11

#### **NOTE**

For data relevant to measurement and calibration, see chapter14.3 Memory and display module SAM®, page 81.



# 4 Transport, packaging and storage

# 4.1 Transport Inspection

Depending on the type and product scope of the charging system, it is delivered either upright or horizontally in appropriate transport and protective packaging. Depending on the type of charging system, air-cushioned protective films and/or cardboard boxes are used. The materials can also be used as underlay during subsequent assembly.

- 1. After unpacking, thoroughly inspect the charging system for transport damage.
- 2. Compare the serial number of the charging system with that of the delivery documents to exclude faulty deliveries.
- 3. Check delivery according to purchase and scope of delivery for completeness.
- 4. Proceed as follows in case of deviations or recognisable damages:
  - Do not accept delivery or only accept it conditionally.
  - Complaints must be reported immediately to the manufacturer in writing.

#### **NOTE**

We recommend to keep and reuse the original packaging for further transportation. Otherwise, the packaging material must be disposed of in accordance with the applicable local regulations.

## Scope of delivery:

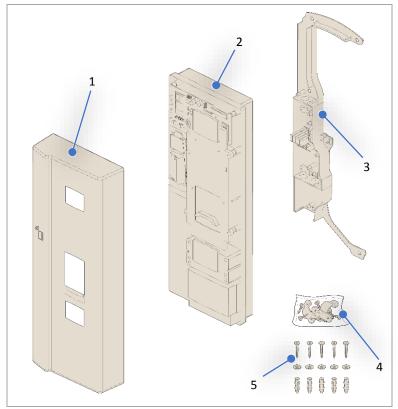


Fig. 2: Scope of delivery

- (1) Housing cover
- (2) Connection box
- (3) Bottom shell
- (4) Fixing material for wall mounting
- (5) Fixing material for bottom shell and housing cover



# 4.2 Storage conditions

The system should be stored in the same position that it was transported in. If this is not possible for undetermined reasons, it should be stored in the installation position of the charging system.

- Ambient temperature for storage: -25 °C to +50 °C
- Permissible relative humidity: maximum 95 % (non-condensing)
- · For intermediate storage, store the charging system in the original packaging



## 5 Installation

#### 5.1 Installation work

The assembly and installation work requires specific technical qualifications and expertise. There is a danger to life for persons who carry out work for which they have neither been qualified nor instructed. The work may only be carried out by persons who are familiar with it, have been informed about dangers and have the necessary qualifications.

Observe the national legal requirements and regulations during assembly and installation.

#### **ATTENTION**

#### Damage to the unit

Environmental influences due to rain, splash water or heavy dust exposure on exposed installation components without an installation cover cause damage to the unit.

• Do not leave the charging station unattended with the installation cover open.

# 5.2 Notes on mechanical installation

#### **A** WARNING

#### Incorrect installation and start-up

Improper performance of work can lead to serious injuries and damage to property.

- Work may only be carried out by trained specialist personnel.
- Meet all safety requirements before installation.
- Only carry out mechanical installation in a de-energized state.
- Provide sufficient free space for the installation.
   The installation site must be sufficiently accessible so that the charging system can be installed and serviced without interference.
- Use a suitable material and tool for installation.

The following description of installation with specific installation material is exemplary. Local conditions are not dealt with in detail.

#### **NOTE**

The necessary installation material for wall mounting is included in the delivery.



# ATTENTION

# Danger from falling charging system

If the charging system is installed on a wall structure that does not have sufficient load-bearing capacity, the fastening may tear out and cause the charging system to fall down. Damage to the charging system can be the result.

- Ensure that the wall construction has sufficient load-bearing capacity.
- Do not pull the spiral charging cable beyond its maximum extension.
- Do not place any objects on the installed charging system.



#### 5.3 Notes on electrical installation

# **A** DANGER

# Danger due to electric current

Touching live parts will result in electric shock with serious injury or death.

- Work on electrical components may only be carried out by a qualified electrician and in accordance with electrical engineering rules.
- Ensure they are de-energised and take suitable protective measures.
- For safe disconnection during installation work, disconnect the charging system from the power supply.
  - Switch off the circuit breaker or main switch.

Observe the national legal requirements and regulations during electrical installation. In Germany, these include the following safety requirements:

- DIN VDE 0100-100
- DGUV Regulation 1
- DGUV Regulation 3+4
- TRBS 1201

#### **NOTE**

The protection technology required for the charging point (MCB) is not installed within the charging system.

- Suitable protection technology must be installed in the upstream sub-distribution.
- The MCB must be selected with a type C tripping characteristic.
- See chapter 3.3 Technical specifications, page 16.

#### **NOTE**

The residual current circuit breaker (RCCB) required for the charging point is not installed within the charging system.

- Suitable protection technology must be installed in the upstream sub-distribution.
- The RCCB must comply with the characteristic 40 A/0.03 A, type A.
- See chapter 3.3 Technical specifications, page 16.



# ATTENTION

#### **Unit fault**

Installing an additional RCCB protection device can cause irritation during the automatic self-test for charging systems with built-in RCCB.

Faults and unit failure can be the result.

• If an additional RCCB is required due to installation conditions, the additional RCCB must be selective to the built-in RCCB.

#### NOTE

The surge protection (SPD) required for the charging point is not installed within the charging system.

- Suitable protection technology must be installed in the upstream sub-distribution.
- See chapter 3.3 Technical specifications, page 16.



# 5.4 Unpacking the charging system

#### Tool

TORX-TR20 bit

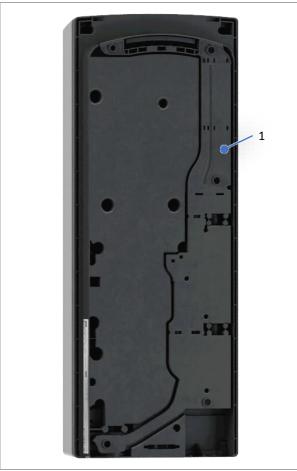


Fig. 3: SOLO rear side

- 1. Open the packaging and remove the accessory kit
- 2. Remove the loading system from the packaging and place it face down on the moulded fibre insert (egg carton) to protect it from scratches.
- 3. Remove the adhesive safety strip between the connection box and the bottom shell.
- 4. Lift the connection box (1) at the bottom, unlatch and remove it
- 5. Turn the charging system onto its rear and put it down.

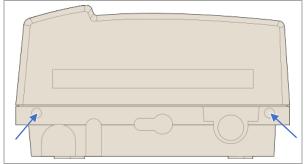


Fig. 4: Housing cover locking screws

- 6. Loosen and remove 2 TORX screws on the underside of the housing cover with TORX-TR20 bit.
- 7. Grasp the housing cover at the lower end, push it slightly to the upper end, lift it off and remove it.
- 8. Carefully remove all components and accessories; sort and place them as required.

See also chapter 4.1 Transport Inspection, page 20.



#### 5.5 Location

For professional installation, safe operation and barrier-free access to the charging system, the following points must be observed when selecting the location.

- National or local regulations.
- Do **not** install the charging system in the hazard areas of:
  - Flammable, combustible and explosive materials
  - Running or jet water
- Do not install the charging system in the following areas:
  - Areas that are potentially explosive (e.g. gas filling stations)
  - Areas where backwater or storm water is to be expected
  - Areas where flooding is to be expected
  - Areas where heat domes or heat accumulation can occur
- The substrate must have sufficient strength and load-bearing capacity to withstand the mechanical loads.
- Provide sufficient space to maintain the minimum distances:
  - Approx. 120 cm between two charging systems
- Ensure a sufficient fresh air supply for cooling the charging system and heat dissipation.
- Observe ambient conditions, see also chapter 3.3 Technical specifications, page 16.

#### **ATTENTION**

## Damage to the unit

Vehicles unintentionally running into the unit can cause damage.

- Select the installation site in such a way that damage due to vehicles unintentionally running into the unit is prevented.
- If damage cannot be ruled out, suitable protective measures must be taken.



# 5.6 Mounting on pillar with SMC base

#### **NOTE**

The pillar for the compleo Solo charging system is available either with 1 mounting plate (single-sided pillar) or with 2 mounting plates (double-sided pillar).

Due to the design similarities of the base plate and the standpipe, only the one-sided pillar is used in the illustration of the following installation instructions. All assembly steps for installation are also applicable for the double-sided pillar.

#### Installation sequence

- 1. Select a suitable installation site.
- 2. Check ground for stability.
- 3. Check parts and installation material for completeness.
- 4. Excavation of the installation pit.
- 5. Lay the supply lines<sup>1)</sup>.
- 6. Compact and level the ground of the excavation pit.
- 7. Place and align the SMC base.
- 8. Feed the supply lines through the centre of the base.
- 9. Fix the base by filling.
- 10. Feed the supply line through the pillar.
- 11. Place the pillar on the base and screw it down.
- 12. Fasten the charging system with installation material.
- 13. Prepare electrical installation.

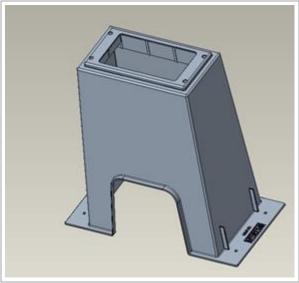


Fig. 5: Pillar on SMC base

The SMS base is installed exclusively in soil with sufficient load-bearing capacity and soil condition.

In case of doubt, a qualified civil engineering company must prepare the ground and carry out the installation.

The charging system is then mounted using the fixing material included in the scope of delivery and finally installed.

The exact dimensions and weights of the charging system and the pillar can be found in the corresponding documents in chapter 14 Annexes, page 76.

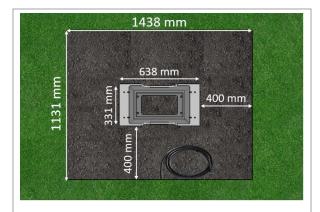
1) = The design and number of supply lines depends on the number and equipment of the compleo Solo charging system to be installed. See chapter 3.3 Technical specifications, page 16.



# 5.6.1 Installing the SMC base

#### Installation requirements

- Ground condition with sufficient load-bearing capacity
- At least 600 mm free space around the charging system for heat dissipation
- Horizontal alignment of the supporting surface
- Base filling material (not in scope of delivery)



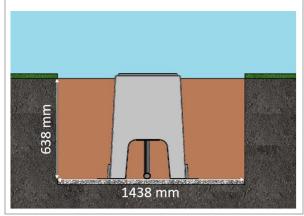


Fig. 6: Excavation pit

## Carrying out installation

- Dig the excavation pit with the following dimensions:
  - Width: approx. 1150 mm
  - Length: approx. 1450 mm
  - Depth: approx. 640 mm
- If necessary (depending on soil conditions or special local conditions), pour a flat concrete surface. Deepen the excavation pit accordingly.
- 3. Place the SMC base in the centre of the excavation pit.
- 4. Feed the supply lines through the soil to the excavation pit and lead them through the side recess in sufficient length (approx. 1800 mm) centrally in the base upwards out of the pit.
- 5. Align the height of the SMC base in the excavation pit so that the top edge of the base protrudes approx. 20 mm above the top edge of the ground (ground level).
- 6. Align the upper mounting surface of the SMC base horizontally in all directions.
- 7. Fix the outer sides of the SMC base by filling with excavated earth, check for dimensional accuracy and fill the excavation pit to 300 mm below ground level. Leave the centre of the base free!
- 8. If necessary, place a lateral lean concrete layer 150 mm high around the base for fixation before filling.
- 9. Compact the excavated earth every 200 mm in height.
- 10. Fill the outer sides and the centre of the base with base filling material up to ground level.



## 5.6.2 Installing the pillar

#### Installation material and tools

- 4 screws (M10 x 90, V4A) (accessory kit)
- 4 large diameter washers (DIN 9021 10.5 mm, V2A) (accessory kit)
- Open-end or ring wrench SW 17
- Torque wrench

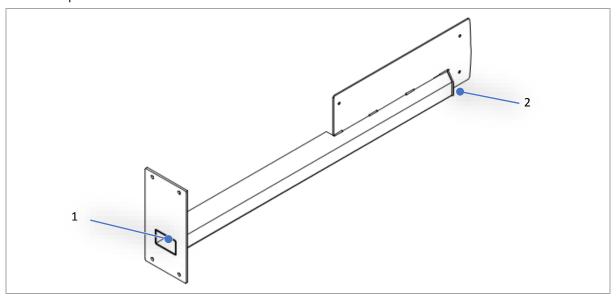


Fig. 7: Supply line routing

#### Carrying out installation

- 1. Lay the pillar flat on the ground as close as possible to the installation location.
- 2. Guide prepared supply lines through the ground opening (1) of the base into the pillar and push them through the standpipe (2) to the upper opening.
- 3. Pull the supply lines out of the upper opening as far as necessary.

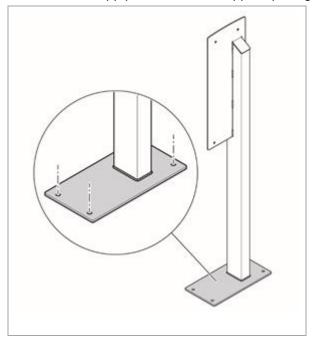


Fig. 8: Screw connection

- 4. Erect the pillar and place it on the prepared SMC base. While doing so, carefully pull the supply lines further out of the upper opening to avoid looping.
- 5. Align the pillar so that the fixing holes are aligned with the mounting points of the SMC base. Check that no supply lines are crushed!
- Place washers over the mounting holes of the pillar, insert the screws through and hand-tighten them in the threaded bushings of the SMC base.
- 7. Check the connection and the pillar for correct fit and tighten the screws crosswise. Observe the corresponding tightening torques!



# 5.7 Installation on pillar with asphalt or concrete base mounting

#### NOTE

The pillar for the compleo Solo charging system is available either with 1 mounting plate (single-sided pillar) or with 2 mounting plates (double-sided pillar).

Due to the design similarities of the base plate and the standpipe, only the one-sided pillar is used in the illustration of the following installation instructions. All assembly steps for installation are also applicable for the double-sided pillar.

#### Installation sequence

- 1. Select a suitable installation site.
- 2. Check ground for stability.
- 3. Check parts and installation material for completeness.
- 4. Lay the supply lines<sup>1)</sup>.
- 5. Measure and drill fixing holes on the ground.
- 6. Insert ground anchorage.
- 7. Feed the supply line through the pillar.
- 8. Place the pillar on the ground anchoring and screw it down.
- 9. Fasten the charging system with installation material.
- 10. Prepare electrical installation.

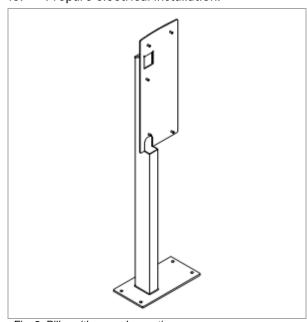


Fig. 9: Pillar with ground mounting

The pillar is installed exclusively on level ground with sufficient load-bearing capacity and condition.

In case of doubt, a qualified civil engineering company must prepare the ground and carry out the installation.

The charging system is then mounted using the fixing material included in the scope of delivery and finally installed.

The exact dimensions and weights of the charging system and the pillar can be found in the corresponding documents in chapter 14 Annexes, page 76.

1) = The design and number of supply lines depends on the number and equipment of the compleo Solo charging system to be installed. See chapter 3.3 Technical specifications, page 16.



## 5.7.1 Inserting the ground anchorage

#### **NOTE**

The design of the ground anchorage must be adapted to the subsoil condition and/or special local conditions.

The following description of the assembly is therefore only exemplary. Local conditions are not dealt with in detail. Deviating procedures may only be initiated by competent persons.

#### Installation requirements

- Ground condition with sufficient load-bearing capacity and evenness.
- At least 600 mm free space around the charging system for heat dissipation.
- · Laid supply line

#### Installation material and tools

- Depending on ground conditions, 4 suitable ground anchors (e.g. expansion or injection anchors) with threaded bolt M10 or internal thread M10 (not in scope of delivery)
- Suitable drilling tool

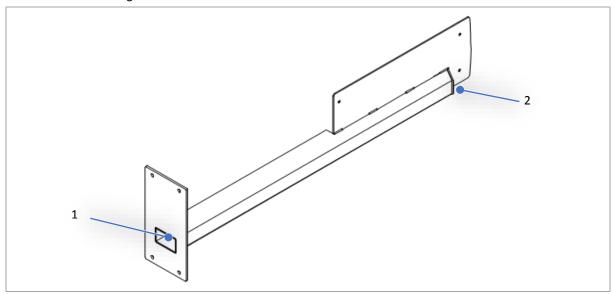


Fig. 10: Supply line routing

#### Carrying out installation

- 1. Lay the pillar flat on the ground as close as possible to the installation location.
- 2. Guide prepared supply lines through the ground opening (1) of the base into the pillar and push them through the standpipe (2) to the upper opening.
- 3. Pull the supply lines out of the upper opening as far as necessary.



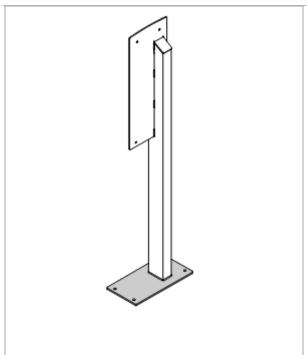


Fig. 11: Boreholes

- 4. Erect the pillar and place it on the selected location. While doing so, carefully pull the supply lines further out of the upper opening to avoid looping.
- 5. Align the pillar at the selected position. Check that no supply lines are crushed!
- 6. Mark the hole pattern of the pillar base on the ground.
- Move the pillar to the side so that the markings on the ground are accessible.
   Check that the supply lines are not twisted or strained.
- 8. Drill holes on the markings using a suitable drilling tool.
  - Drill hole diameter: according to the manufacturer's specification of the ground anchor
  - Drill hole depth: according to the manufacturer's specification of the ground anchor
- 9. Insert ground anchor according to manufacturer's instructions. Allow injection mortar to harden if used.



# 5.7.2 Installing the pillar

#### Installation material and tools

- Matching screw connection to selected ground anchorage
- 4 large diameter washers (DIN 9021 10.5 mm, V2A) (not in scope of delivery)
- Open-end or ring wrench SW 17
- Torque wrench

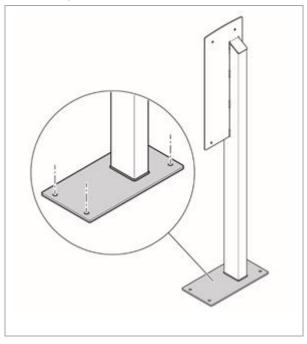


Fig. 12: Screw connection

#### **Carrying out installation**

- Place the pillar over the inserted ground anchors. While doing so, carefully pull the supply lines further out of the upper opening to avoid looping.
- 2. Align the pillar so that the fixing holes are aligned with the mounting points of the ground anchorage. Check that no supply lines are crushed!
- 3. Place washers over the mounting holes of the pillar, insert the screw fasteners through and hand-tighten them.
- 4. Check the connection and the pillar for correct fit and tighten the screw connections crosswise. Observe the corresponding tightening torques!



# 5.8 Mounting the terminal box (single-sided pillar)

#### Installation material and tools

- 5 nuts (M10, V4A) (accessory kit)
- 5 large diameter washers (DIN 9021 10.5 mm, V2A) (accessory kit)
- Open-end or ring wrench SW 17
- Torque wrench

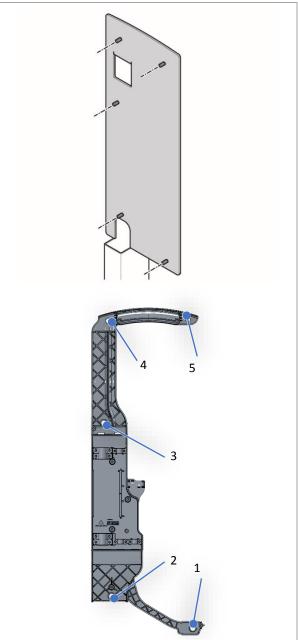


Fig. 13: Boreholes

# **Carrying out installation**

- 1. Push the terminal box onto the 5 threaded bolts of the pillar.
- 2. Place the large diameter washers on the threaded bolts.
- 3. Screw nuts onto the threaded bolts and hand-tighten.
- 4. Check the terminal box for correct seating and tighten the nuts in the sequence 3-4-2-1-5. Observe the corresponding tightening torques!
- 5. Break out and deburr the lower pre-punched bushings in the terminal box.

#### NOTE

The further steps for installation and connection of the charging system are described from the chapter 5.10 Installation and connection, page 38.

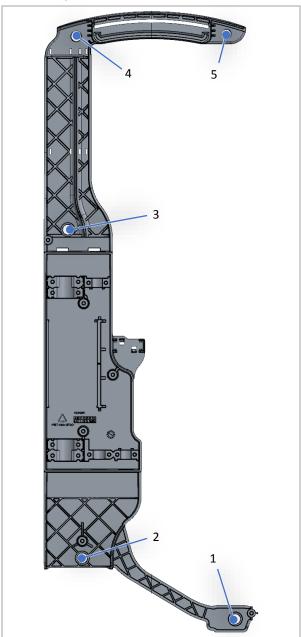




## 5.9 Mounting the terminal box (double-sided pillar)

#### Installation material and tools

- 5 fixing screws (M10 x 60, V4A) (accessory kit)
- 5 nuts (M10, V4A) (accessory kit)
- 5 large diameter washers (DIN 9021 10.5 mm, V2A) (accessory kit)
- Open-end or ring wrench SW 17
- Torque wrench



# Carrying out installation

- Place the large diameter washers on the fixing screws, align the terminal box on the desired side of the pillar at the existing mounting holes of the mounting plate and fix with the fixing screws of the pillar.
- 2. On the back of the mounting plate, screw the nuts onto the fixing screws and hand-tighten.
- Check the terminal box for correct seating and tighten the nuts in the sequence 3-4-2-1-5. Observe the corresponding tightening torques!
- 4. Break out and deburr the lower prepunched bushings in the terminal box.

Fig. 14: Boreholes

#### **NOTE**

The further steps for installation and connection of the charging system are described from the chapter 5.10 Installation and connection, page 38.



#### 5.10 Installation and connection

### **ATTENTION**

#### Damage to the unit

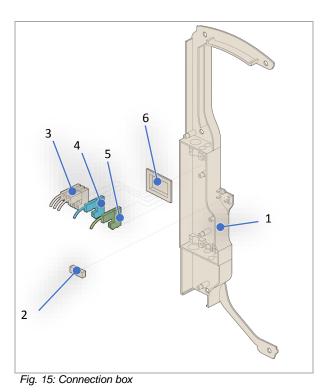
Vehicles unintentionally running into the unit can cause damage.

- Select the installation site in such a way that damage due to vehicles unintentionally running into the unit is prevented.
- If damage cannot be ruled out, suitable protective measures must be taken.

## 5.10.1 Wall mounting

#### Installation requirements

- · Wall with sufficient load-bearing capacity, e.g. masonry or concrete construction
- · Smooth supporting surface on the wall
- At least 600 mm lateral free space around the charging system for heat dissipation.
- · At least 150 mm distance to the building ceiling
- At least 900 mm from the top of the ground or the soil.



- (1) Connection box
- (2) Spirit level
- (3) Through terminal outer conductor
- (4) Through terminal neutral conductor
- (5) Through terminal protective earth
- (6) Plastic top-hat rail clips

Installation is carried out on walls with a suitable load-bearing capacity.

The charging system is then mounted using the fixing material included in the scope of delivery and finally installed.

The exact dimensions and weights of the charging system can be found in the corresponding documents in chapter 14.1 Housing dimensions, page 76.



#### Installation material and tools

- Drill
- Masonry drill Ø 8 mm
- 5 wood screws (6 x 60, V2A) (accessory kit)
- 5 large diameter washers (DIN 9021 10.5 mm, V2A) (accessory kit)
- Wrench WAF 10
- TORX-TR15 bit
- · TORX-TR20 bit
- · Torque wrench

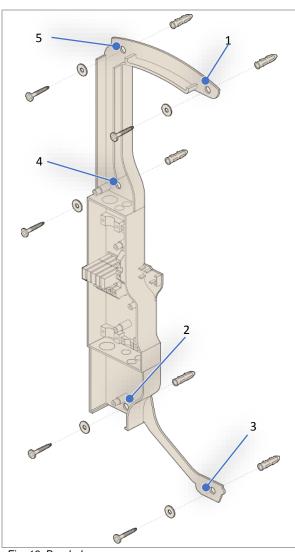


Fig. 16: Boreholes

#### Carrying out installation

- Place the connection box on the wall at the selected position and align it using the integrated spirit level.
- 2. Mark the boreholes (1 5).
- 3. Drill boreholes with a depth of Ø 8 mm and 60 mm.
- 4. Insert Ø 8 mm hole plug.
- Mount the connection box on the wall with screws and large diameter washers.
   Observe the corresponding tightening torques.
- 6. Depending on the cable routing from above or below, break out and deburr the pre-punched bushings in the connection box accordingly.



## 5.10.2 External supply line

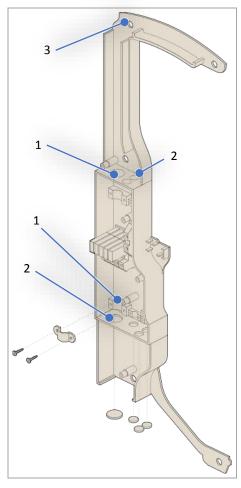


Fig. 17: Cable bushings

- Push the terminal block into the centre, disengage it from the side and - depending on the upper or lower installation type - turn it into the required position. Then re-engage and push to the end stop.
- 2. Break the pre-punched cable gland (1) out of the terminal box, deburr and insert the supplied membrane grommets. If the cable is routed from above, also break out and deburr the upper prepunched tab (3).
- 3. Guide the supply line of the required length through the grommet in the connection box and secure it with the supplied screws (4 x 25 mm; M = 1.5 Nm) and installed strain reliefs (2).

Cable routing from above: Select the cable length up to the lower edge of the connection box.

Cable routing from below: Select the cable length up to the middle of the connection box.

For flush-mounted cable routing (concealed wall connection), the wall outlet point must be 2 - 10 cm from the underside of the connection box.



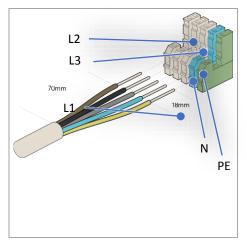


Fig. 18: Terminal block assignment

- Route the supply line up to the terminal block, cut to length and strip the sheath to a length of approx.
   70 mm.
- 5. The individual wires must be stripped 18 mm.
- Connect all conductors of the supply line to the external wiring side according to the adjacent illustration.
  - The conductor cross-section must be selected taking into account the maximum charging capacity and the length and type of routing of the power supply cable.
  - Conductor cross-section, rigid: max. 10 mm²
  - Conductor cross-section, flexible: max. 6 mm<sup>2</sup> (with and without ferrule)
- 7. Connect all conductors of the supply line to the external wiring side according to the figure opposite.
- 8. Ensure that the individual wires are connected correctly and the clamping screws (4 x 16 mm) are tightened firmly (M = 1.5 1.8 Nm).

#### 1- or 2-phase connection

Depending on the local grid structure, the compleo solo charging system can also be operated with 1 or 2 phases. The maximum charging power is reduced analogously to the number of connected phases.

						11 kW system	22 kW system
1 phase	Phase L1	->	Terminal L1	=>	Max. charging power:	approx. 3.6 kW	approx. 7.2 kW
2 phase	Phase L1	->	Terminal L1	1	Max. charging	approx. 7.2 kW	approx. 14.4 kW
z priase	Phase L2	->	Terminal L2	J	power:	арргох. 7.2 кw	арргол. 14.4 км



#### 5.10.3 Data line

- 1. Break the pre-punched cable gland out of the terminal box, deburr and insert the supplied membrane grommets.
- 2. Guide the data line in the required length (max. 30 m) through the bushing in the terminal box and secure it with the installed strain relief devices (M = 1.5 Nm).
  - Cable routing from above: Select the cable length up to the lower edge of the connection box + 15 mm.
  - Cable routing from below: Select the cable length up to the upper edge of the connection box.
  - In the case of flush-mounted cable routing (concealed wall connection), the wall outlet point must be 2 10 cm from the underside of the connection box.

### 5.10.4 Ripple control line

- 1. Break the pre-punched cable gland out of the terminal box, deburr and insert the supplied membrane grommets.
- 2. Guide the ripple control line in the required length (max. 30 m) through the bushing in the terminal box and secure it with the installed strain relief devices (M = 1.5 Nm).

(1)

- Cable routing from above: Select the cable length up to the lower edge of the terminal box.
- Cable routing from below: Select the cable length up to the upper edge of the connection box.
- In the case of flush-mounted cable routing (concealed wall connection), the wall outlet point must be 2 10 cm from the underside of the connection box.

#### 5.10.5 Strain relief

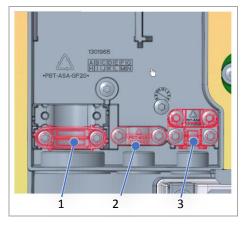


Fig. 19: Strain relief

- External supply line strain relief
- (2) Equalisation potential strain relief
- (3) Network and control line strain relief



### 5.10.6 Mounting the bottom shell

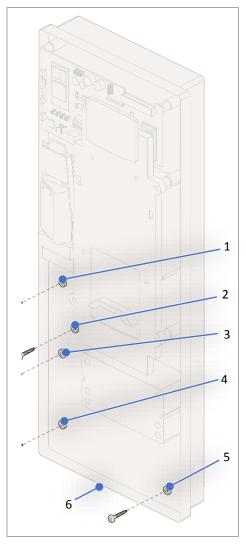


Fig. 20: Bottom shell fixing points

- 1. Guide the cables to be connected through the openings provided for this purpose in the bottom shell.
- 2. Hook the lower shell onto the retaining bar of the connection box at an angle of 45° and slowly swing it downwards to the wall support. Make sure that the bottom shell is correctly and completely seated.
- Preliminarily secure the bottom shell against falling down using the screws supplied (raised head 4 x 12 mm) in mounting holes (2) and (3).
- 4. Unclip the lower lighting strip (6) on the left-hand side so that the fixing hole (1) is accessible.
- 5. Screw in all 5 fastening screws (1 5) completely.Observe the correct torque (M = 1.5 Nm).
- 6. Re-engage the lower lighting strip.
- 7. For the optionally supplied profile half-cylinder lock, break out and deburr the pre-punched opening on the underside of the bottom shell before fitting.



## 5.10.7 Connecting the internal supply line

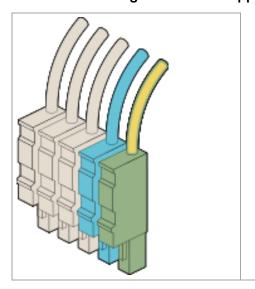
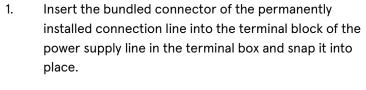


Fig. 21: Bundled connector



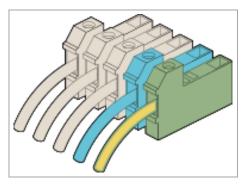


Fig. 22: Terminal block



### 5.10.8 Connecting the Ethernet cable

#### **ATTENTION**

When connecting the LSA terminals, the minimum cross-section of the individual strands of the network cable must not be less than AWG 26. When using a smaller cross-section than AWG 26, it cannot be guaranteed that a connection can be established.

#### NOTE

As a network cable to be used on the network side, we recommend using a cable with the following designation and article number:

- Designation: HELUKAT 600E S/FTP PVC
- Article number: 802167, S/FTP 4x2xAWG23/1 PVC (S-STP)

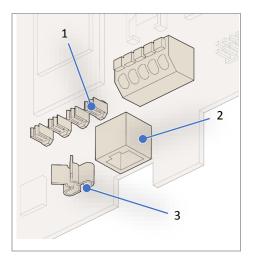


Fig. 23: Ethernet connection

#### Connection via RJ45 socket:

- Guide the prefabricated network cable or data connection cable through the line channel provided and fix it in place with the cable ties supplied.
- 2. Crimp the RJ45 plug onto the data line or use a prefabricated network cable and connect it to the RJ socket (2).

#### **Connection via LSA terminal:**

- 1. Route the data connection line through the intended line channel and fix it with the cable ties supplied.
- 2. Remove the insulation sheath of the data connection line to just below the shield clamp (3) down to the braided shield and press the line into the terminal.

  Make sure that the shield makes good contact with the terminal.
- 3. Strip the insulation from the data connection cable above the shield clamp.
- 4. Place the wire pairs of the data connection cable on the other side of the cable and the colour coding on the LSA insulation cutting clamp (1) with the attachment tool in accordance with the layout diagram.



## 5.10.9 Connecting the radio ripple control receiver

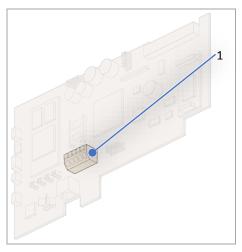


Fig. 24: Radio connection

- 1. Route the ripple control line through the intended line channel and fix it with the cable ties supplied.
- 2. Connect the ripple control line to the terminal (1).

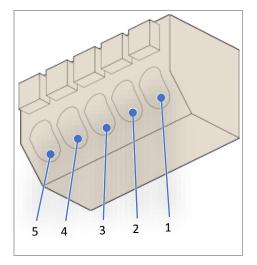


Fig. 25: Radio connection PIN assignment

Functions with terminal assignment (-> GND)

(1) Input 1: 0% charging power
(2) Input 2: 30% charging power
(3) Input 3: 60% charging power
(4) Input 4: 100% charging power

(5) GND

## 5.10.10 Inserting SIM card (optional)

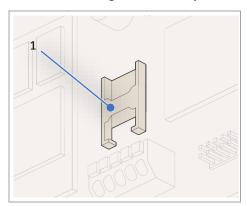


Fig. 26: SIM card reader

1. Insert the SIM card into the SIM card reader (1).



## 5.10.11 Putting on the housing cover

#### Installation material and tools

- 2 TORX screws (4 x 16, V2A)
- · TORX-TR20 bit
- · Torque wrench
- Profile half cylinder lock (option)

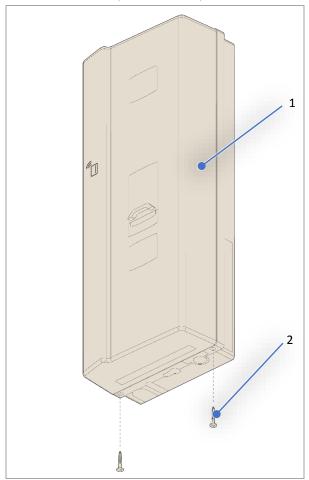


Fig. 27: Housing cover

- (1) Housing cover
- (2) Retaining screw with countersunk head
- Place the housing cover on the upper retaining bar of the bottom shell and close it downwards. Check for correct and tight fit.
- 2. Lightly press on the bottom of the housing cover and secure it on the underside with the screws supplied, ensuring the correct tightening torques (M = 1.5 Nm).



## 5.10.12 Attaching the optional safety lock

### Locking

- 1. Break out the pre-punched opening in the housing cover and deburr.
- 2. Insert the key into the lock and turn it until the locking lug is flush with the cylinder.
- 3. Press the housing cover lightly at the bottom and insert the lock.
- 4. Turn the key anticlockwise to the "horizontal" position and remove.

### Unlocking

- 1. Insert the key, turn it clockwise as far as it will go.
- 2. Press the cover down slightly and remove the lock.

### 5.10.13 Safety sign

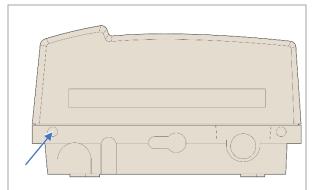


Fig. 28: Underside of housing cover

If necessary, the operator can place a safety sign on the left-hand safety screw.



## 6 Commissioning

## **A** DANGER

#### Danger due to electric current

Damage to the charging systems or components may expose live parts.

Touching live parts will result in electric shock with serious injury or death.

- Only operate the charging system when it is undamaged.
- In the event of damage, immediately disconnect the charging system from the power supply at the circuit breaker and take suitable safety measures to prevent it from being switched on again.
- Work on electrical components may only be carried out by a qualified electrician.
- · Repair work may only be carried out by the customer service.

Commissioning must be carried out by a qualified electrician or by a person trained and instructed in electrical matters. The effectiveness of the protective measures and the correct mechanical and electrical installation must be checked by a qualified electrician.

Commissioning may only be carried out when all necessary internal covers are fitted and the housing is completely closed.

Observe the national legal requirements and regulations during commissioning.

The correct mechanical installation is checked according to the following criteria:

- ☐ The degree of protection of the housing is not reduced or removed
- ☑ The charging system has a good optical condition
- The specifications for the buried depth of the housing or the specifications for the mounting height were complied with
- ☐ The housing has a safe installation condition according to its installation version

The correct electrical installation is checked according to the following criteria:

- ☑ All electrical components are functional and not damaged
- All display elements of the charging system are functional, visible and can be read
- ☐ The function of any installed residual current circuit breakers can be verified by pressing a button
- ☐ The function of any installed counters is available and readable
- ☐ The function of the charging system can be verified by means of a charging process
- The electrical installation was carried out in compliance with all safety and warning instructions and the listed safety requirements

### **NOTE**

The Annex of this manual contains a test protocol with which the necessary steps can be recorded, written down and archived.

See chapter 14.2 Commissioning and test report for AC charging systems, page 77.



## 6.1 Testing the charging system



Fig. 29: Function simulator

The functionality of the installed charging system can be tested either with a vehicle or with a function simulator.

With the function simulator it is possible to simulate the functions of an electric vehicle and check the functionality of a charging system or charging point.

The figure shows an example of a function simulator for testing an AC charging system or AC charging point.

Another suitable test device must be used for all metrological tests.

### 6.2 System start-up

After the charging system has been correctly installed, the system can be started.

- 1. Switch on the power supply.
- 2. Switch on the line and residual current circuit breaker.

The system starts up.

The duration of the system start-up may vary depending on the type of charging system, configuration and product characteristics. The successful completion of the system start-up is indicated by the status LEDs and the display according to the configuration and product scope of the charging system. The average start-up time is approx. 60 seconds.

A successful system start-up is indicated by the LED of the respective charging point temporarily lighting up green. In the case of a charging system with display, the message "Ready for operation" also appears for the respective charging point.



## 6.3 Configuration of the charging system with Compleo DUCTO

Compleo DUCTO refers to the software used to manage Compleo charging systems using an end device.

Various parameters of the charging system can be set via the configuration interface.

The charging system management information is stored on the charging system itself. By specifying the IP of the charging system in the browser of a suitable end device, such as a notebook, a start page is called up and the connection to the charging system is established. After logging in, an overview of the parameters that can be called up or changed is listed.

To connect to the charging system, the end device used must have an IP address in the same IP address range.

#### **NOTE**

The following steps are illustrated using the example of a network configuration with Microsoft Windows 10 and a simulated charging system.

The user must have administrator rights for network configuration.

### 6.3.1 Creating a network connection

- 1. Connecting charging systems to the network using a network cable.
- 2. Connect your endpoint to your network.
- 3. Call up router settings and identify the IP of the charging system.

#### NOTE

A connection via the "http" protocol is not possible. In the case of automatic protocol assignment by the browser, this must be changed manually to "https" once.

#### 6.3.2 Calling up the configuration interface



- 1. Identify password on DUCTO sticker.
- 2. Open the local browser and enter the identified IP of the charging system.
- oxdot The DUCTO start page is displayed.

#### 6.4 DUCTO Guide

More information about DUCTO: https://www.compleo-charging.com/fileadmin/Documentcenter/Ducto/Ducto\_Guide.pdf



## 7 Operation

Before using the charging system, read the respective documents that are provided with the charging system or that are necessary for operation.

This chapter explains the general use of the charging system. The charging processes at the charging systems can be started and stopped by different authorisation methods. Depending on the charging system and product scope, the following forms of operation and authorisation are possible:

#### Free charging:

With the "Free charging" method, a charging process is started or stopped at a charging system without special authorisation. The charging process is started as soon as a charging cable has been connected to the charging system and/or the vehicle. The charging process can only be terminated at the vehicle.

#### RFID:

With the "RFID" method, a charging process is started or stopped at a charging system using a card or chip. The charging process is started as soon as authorisation has been successfully completed and a charging cable has been connected to the charging system and/or the vehicle.

#### Giro-e:

With the "Giro-e" method, a charging process is started on a charging system by means of a Giro card and then confirmed or terminated. The charging process is started as soon as authorisation has been successfully completed and a charging cable has been connected to the vehicle.

#### Remote authorisation:

With the "remote authorisation" method, a charging process is started or stopped at a charging system using an app or a web interface. Depending on the authorisation type and provider, registration may be necessary. The charging process is started as soon as the charging system, charging point and tariff have been selected. The display complying with weights and measures regulations shows an ID number assigned to the charging process. Depending on the provider, billing may be via PayPal or invoice (different payment methods are possible). The charging process is started as soon as a charging cable has been connected to the charging system and/or the vehicle.

Information on which app is necessary and how to operate the app should be obtained from the operator of the charging system.



## 7.1 Charging process

The Compleo SOLO charging system is produced in different versions. Depending on the configuration of the charging system, the type of charger interfaces and the procedure for starting a charging process differ.

During a charging process, the plug is locked in the vehicle.

If a ventilation function is requested from the vehicle, the charging system interrupts the charging process.

The charging process stops automatically after the existing authorisation method has been successfully executed.

This is followed by brief instructions on how to start and end a charging process. The brief instructions are divided into variants and differ depending on the type of charger interface and operating method.

## **A** DANGER

#### Danger due to electric current

Damage to the charging systems or components may expose live parts.

Touching live parts will result in electric shock with serious injury or death.

- · Only operate the charging system when it is undamaged.
- In the event of damage, immediately disconnect the charging system from the power supply at the circuit breaker and take suitable safety measures to prevent it from being switched on again.
- Work on electrical components may only be carried out by a qualified electrician.
- · Repair work may only be carried out by the customer service.

### **NOTE**

#### Pause the charging process for a short time

The charging system has a function for optimising self-consumption in the event of PV surplus.

This process is controlled by the neoom energy management system (NTUITY).

For a two-phase or three-phase charging vehicle and the available surplus PV power transmitted by the energy management system, this allows switching between charging on one phase and charging on three phases.

If the surplus exceeds the maximum charging power of the vehicle, the resulting surplus is fed into the grid.

To maintain communication between the charging system and the vehicle, the charging process is paused for a short time during this change and then restarted automatically.



## 7.2 Charging the vehicle

6.3 Configuration of the charging system with Compleo DUCTO, page 51

#### 7.2.1 Authorisation

#### RFID:

- Hold the RFID card or chip in front of the RFID field.
   LED lights up "green" when authorisation is successful.
- 2. Follow the instructions on the display.

#### Remote authorisation:

- 1. Download and install the app for the operator's smartphone or tablet.
- Follow the instructions of the app for the authorisation process.
   LED lights up "green" when authorisation is successful.
- 3. Follow the instructions on the display.



## 7.2.2 Charging process with type 2 socket

			The charging system indicates the standby state.  LED "grey": Authorisation must be given.  LED "green": A charging process can be started.
Ō			Plug in the charging cable in the socket of the charging system.
4			Insert the charging plug into the vehicle's socket.
		4.	LED changes from "green" to "blue". The charging process has started.



## 7.2.3 Charging process with type 2 plug

		1.	The charging system indicates the standby state.	
		•	LED "grey": Authorisation must be given.	
		•	LED "green": A charging process can be started.	
		2.	Insert the charging plug into the vehicle's socket.	
		3.	LED changes from "green" to "blue". The charging process has started.	





## 7.3 Ending the charging process

### 7.3.1 Authorisation

#### RFID:

- Hold the RFID card or chip in front of the RFID field.
   LED lights up "green" when authorisation is successful.
- 2. Follow the instructions on the display.

#### Remote authorisation:

- 1. The display indicates the charging process:
  - "Type 2 Charged: XXX Charging duration: XXX Charge".
- 2. Follow the instructions of the app or web interface for finishing the charging process.

## 7.3.2 Ending charging with type 2 socket

		1.	LED changes from "blue" to "green". The charging process has ended.		
		2.	LED "green": Ready for plug removal.		
•	<b>a</b> = 6		Pull the charging plug out of the vehicle's socket.  Pull out the charging cable from the socket of the charging system.		
		5.	The charging system changes to the standby state.  LED "grey": Authorisation must be given.  LED "green": A charging process can be started.		



## 7.3.3 Ending charging with type 2 plug

		1.	LED changes from "blue" to "green". The charging process has ended.		
		2.	LED "green": Ready for plug removal.		
<b>A</b>	<b>a</b> = 6		Pull the charging plug out of the vehicle's socket.		
		4.	The charging system changes to the standby state.  LED "grey": Authorisation must be given.  LED "green": A charging process can be started.		
		5.	Insert the charging plug into the holder of the charging system.		



## 7.4 Operating Signals and Displays

## 7.4.1 Charging state display

The following charging state display explains the colour states and the possible colour changes of a charging system with status LEDs:

Charging sta	Charging state display: LED colour state				
	LED: "grey"	<ul><li>The charging system indicates the standby state.</li><li>Authorisation can be carried out.</li></ul>			
	LED: "green"	<ul><li>The charging system indicates readiness for operation.</li><li>A charging process can be started.</li></ul>			
	LED: "blue"	<ul><li>The charging system indicates a charging process.</li><li>The charging process can be maintained or finished.</li></ul>			

Charging state display: LED colour change				
	LED:	4	The charging system indicates an authorisation process.	
	"grey-green"			
	LED:	5	The charging system indicates an unsuccessful authorisation.	
	"green-grey"			
	LED:	6	The charging system indicates the start of a charging process.	
	"green-blue"			
	LED:	7	The charging system indicates a voltage drop after starting a	
	"blue-grey"		charging process.	
	LED:	8	The charging system indicates an unsuccessful authorisation.	
	"blue-green"			

8.1 Residual current circuit breaker (RCCB), page 60



## 7.4.2 Acoustic signals

In the following table the possible acoustic signals are listed and explained:

Acoustic signals					
1 x short	Sounds when the RFID card is presented and indicates "Card read".				
	This signal requires user interaction:				
2 x short	- Present card for authorisation				
Z X SHOLL	or				
	Plug the charging cable into the charging system and car				
1 x long	Authorisation timeout: Sounds if user interaction has not occurred within a certain time.				
2 y long	The charging system is in an error state.				
2 x long	- If there is a display, note the error message.				



## 8 Malfunctions

### 8.1 Residual current circuit breaker (RCCB)

In the event of a residual current, the residual current circuit breaker trips and the charging system is switched off.

To switch on again, proceed as follows:

- 1. Eliminate the cause of the error.
- 2. Activate the residual current circuit breaker by pushing up the locking slide on the side of the housing.

The system starts up.

#### 8.2 Circuit breaker (MCB)

In the event of an overcurrent, the affected circuit breaker trips and the charging system is switched off

To switch on again, proceed as follows:

- 1. Eliminate the cause of the error.
- 2. Reactivate the circuit breaker at the sub-distribution.

The system starts up.



The charging system displays an error code on the display in case of errors.

If several errors occur at the same time or in combination, the respective error codes are shown one after the other on the display.

Basically, a distinction is made between ErrorStatus and ErrorEvents.

- An ErrorStatus is an error that occurs and persists until it is corrected.
- An ErrorEvent is an error event that occurs once and then again.

#### NOTE

For charging systems that are not equipped with a display, a connection via a backend must exist for error detection.

### 9.1 About this advices

Column name	Explanation
Title	String sent to the backend when the charging station is in online mode.
Code	Symbol that is shown individually or in combination with other symbols on the charging station display depending on the status.
Troubleshooting advice	Description of the fault and troubleshooting advice.

## 9.1.1 Field of application

Firmware 5.X and 6.X (SOLO, DUO, CITO)

### 9.2 OCPP 1.6

Title	Code	Troubleshooting advice	
GroundFailure	В	The RCD, the circuit breaker or the 6mA sensor of the charging point has tripped. Inspection by qualified electrician required.	
InternalError D		Error in internal hardware or software component. Inspection by qualified electrician required.	
OverVoltage E		The voltage has risen above an acceptable level. Inspection by qualified electrician required.	
PowerMeterFailure F		Error when reading the meter. Check SAM or meter for function and report fault.	
PowerSwitchFailure	G	Contactor fault. Inspection by qualified electrician required.	



UnderVoltage I		The voltage has dropped below an acceptable level. Inspection by qualified electrician required.	
ConnectorLockFailure	-	Error when locking or unlocking the plug. It must be checked whether the plug is connected correctly.	
OverCurrentFailure	-	The vehicle has drawn more current than specified for an extended period of time.	

Not used: EVCommunicationError, HighTemperature, ReaderFailure, WeakSignal



## 9.3 Compleo-specific

Title	Code	Troubleshooting advice
IsolationWarning	K	Insulation problems occurred before or during a charging process. Inspection by qualified electrician required.
IsolationError	L	Insulation problems occurred before or during a charging process. Inspection by qualified electrician required.
DoorOpen	М	The door contact signals that the door has been opened. Close door. If this condition is permanent, a test by a qualified electrician is required.
DoorClosed	N	The door contact signals that the door has been closed.  No action required.
Inoperative	0	The charging point is not available because a resource, such as the power module, is occupied by another charging point. Inspection by qualified electrician required.
FuseError	Р	A circuit breaker has tripped. Inspection by qualified electrician required.
TemperatureSensorMissing	Q	The temperature sensor does not provide any values. Inspection by qualified electrician required.
AutomaticRcdTestRunning	Т	Automatic test of the RCD is running. No action required.
RCSensorTestRunning	W	Test of the 6mA sensor test in progress. No action required.



···		
samTransactionMemoryFull	4	SAM has no more free memory for new charging processes. SAM must be replaced by an authorized electrician.
samEVSEIDMemoryFull	5	SAM has no more free memory for new configuration parameters. SAM must be replaced by an authorized electrician.
samFirmwareCorrupted	6	The SAM firmware checksum check has failed. If this condition is permanent, SAM must be replaced by an authorized electrician.
samNoTouchControllerComm	7	The connection to the SAM keys is disturbed. Check by qualified electrician required. If this condition is permanent, SAM must be replaced by an authorized electrician.
samNotInitialized	8	SAM could not be initialized. If this condition is permanent, SAM must be replaced by an authorized electrician.
samInternalError	9	SAM reports an internal error. SAM must be replaced by an authorized electrician.
UnlockPlugFailure	а	The plug could not be unlocked. The locking unit of the charging point must be checked by trained personnel and replaced if necessary.
OutletCloseError	b	The sliding lid could not be closed. The locking unit of the sliding lid must be checked by trained personnel and replaced if necessary.
LPCCommunicationError	С	The communication between the charging point controller and the charging station controller is disturbed. The corresponding connection must be checked by trained personnel and replaced if necessary.
CableError	d	A non-approved charging cable has been detected. A different charging cable must be used.
RCSensorTestError	е	The test of the 6mA sensor has failed. Inspection by qualified electrician required.
PowerMonitoringError	f	The charge point controller has detected a power failure. Inspection by a qualified electrician is required.
ADCError	g	The charge point controller has detected an ADC error. Inspection by qualified electrician required.



ShortCircuitError	h	The charge point controller has detected a short circuit between CP and PE. Inspection by qualified electrician required.
LPCOverVoltageError	i	The charge point controller has detected an overvoltage. Inspection by qualified electrician required.
LPCHighTemperatureError	j	The charging point controller has detected a temperature that is too high. Inspection by qualified electrician required.
LPCSelftestError	k	The self-test of the charging point controller has failed. Inspection by qualified electrician required.
AutomaticRcdTestFailed	m	The automatic test of the RCD has failed. Inspection by qualified electrician required.
LPCTemperatureSensorError	n	The charging point controller reports a temperature sensor error. Replacement by qualified electrician required.
CurrentSensorFailure	0	The charging point controller reports a current sensor error. Inspection by qualified electrician required.
PolarityProtectionError	р	The charging point controller reports that the phases are connected with reversed polarity. Inspection by qualified electrician required.
sam Compensations Parameters Mismatch	q	Compensation parameters in SAM and in meter do not match. Inspection by authorized electrician required.
samCompensationTariff Mismatch	r	Selected tariff in the meter does not correspond to that which the meter reports as active. Inspection by authorized electrician required.
samMeterIdMismatch	s	The SML ID of the connected meter does not correspond to that of the meter connected to the SAM. Inspection by authorized electrician required.
AutomaticRcdTestSuccess	-	Automatic test of the RCD successful. No action required.
AutomaticRcdTestTripFailure	-	Automatic test of the residual current circuit breaker failed. Inspection by qualified electrician required.
AutomaticRcdReset ContactorTestFailed	-	The cause of the failed RCD test has not been eliminated. Inspection by qualified electrician required.



AutomaticRcdResetSuccess	-	The cause of the failed test of the RCD has been eliminated. No action required.
OutletOpenError	-	The socket could not be opened. Inspection by qualified electrician required.
RCSensorErrorDuringCharge	-	The 6mA sensor has tripped during a charging process. Inspection by qualified electrician required if the error occurs frequently.



### 10 Maintenance

Careful and regular maintenance ensures that the functional condition of the charging system is maintained. Only a regularly checked and maintained charging system is able to guarantee maximum availability and reliable charging processes.

The maintenance intervals depend on the prevailing operating conditions, such as the frequency of use and environmental influences such as the degree of contamination.

We recommend a cyclically recurring inspection according to the maintenance plan. In special cases, the cycles can be shorter.

## **A** DANGER

#### Danger due to electric current

Touching live parts will result in electric shock with serious injury or death.

- Work on electrical components may only be carried out by a qualified electrician and in accordance with electrical engineering rules.
- Ensure they are de-energised and take suitable protective measures.

### **A** WARNING

#### Danger due to improper maintenance

Improper performance of work can lead to serious injuries and damage to property.

- Work may only be carried out by trained specialist personnel.
- Meet all safety requirements before maintenance.



## 10.1 Maintenance plan

Interval	Component/location	Maintenance work
Every 6 months	Residual current circuit breaker	Self-test cycle adjustable via DUCTO (see chapter fehlender Linktext, page fehlender Linktext).  Check with simulation device if RCD is not installed in the charging system.
Yearly	Location	Visual inspection, e.g. for distances to objects (bushes, installations ,etc.), attachment.
Mechanical components  Charging system	Electrical components	Visual inspection, e.g. cables, lines, screw connections, plugs, RCD, MCB, display, LED, display, surge protection.
		Metrological verification according to test report, see Annex.
		Check for function, e.g. RCD, MCB.
	Mechanical components	Visual inspection, e.g. housing, paint, foils, covers.
		Check for function, e.g. sliding cover; parking position.
	Charging system	Check for function, e.g. start and stop of a charging process at all charger interfaces.
As required	Charging system	Clean the outer casing of the housing.

#### 10.1.1 Automatic RCD test

At the preset time, the RCD is automatically tripped by a fault current generated by the DUCTO control. The letter "T" is shown on the display of the correspondingly equipped charging system (see chapter --- fehlender Linktext ---).

By pushing up the sliding cover, the RCD is switched on again and the test is completed.

#### **NOTE**

If the RCD test is unsuccessful, the letter "U" appears on the display (see chapter ).

· Customer service must be notified.

#### **NOTE**

A test report is included in the Annex of this manual. See chapter 14.2 Commissioning and test report for AC charging systems, page 77.



## 10.2 Maintenance and repair

## **A** DANGER

### Danger due to electric current

Damage to the charging systems or components may expose live parts.

Touching live parts will result in electric shock with serious injury or death.

- Only operate the charging system when it is undamaged.
- In the event of damage, immediately disconnect the charging system from the power supply at the circuit breaker and take suitable safety measures to prevent it from being switched on again.
- · Work on electrical components may only be carried out by a qualified electrician.
- · Repair work may only be carried out by the customer service.

Maintenance and repair work may only be carried out by the manufacturer.

· Replace the charging station if necessary.



## 10.3 Cleaning

The components inside the charging system need to be cleaned according to the assessment of an expert but this is not always necessary. Any necessary cleaning of the interior must only be carried out after consultation with the operator of the charging system. Cleaning may only be carried out by a properly and professionally instructed person and must never be carried out by a user.

Only materials and dry cleaning agents which are antistatic and do not damage the electrical or mechanical components may be used as cleaning agents for the interior. Only materials and agents that do not attack or damage the surface of the housing or any applied foiling or paintwork should be used as cleaning agents for the external housing. If chemical agents are used during cleaning, the work must be carried out outdoors or, if this is not possible, only in well-ventilated rooms.

## **A** DANGER

#### Danger due to electric current

Touching live parts will result in electric shock with serious injury or death.

- Only clean the charging system when it is switched off.
- Do not clean the outer housing with water jets, e.g. with a hose or a high-pressure cleaner.
- Do not clean the interior of the charging system with liquid cleaning agents.
- Do not clean any plugs in the charging system.

## ATTENTION

#### Damage to the unit

Environmental influences due to rain, splash water or heavy dust exposure on exposed installation components without an installation cover cause damage to the unit.

Do not leave the charging station unattended with the installation cover open.



## 11 Decommissioning, dismantling and disposal

The decommissioning and dismantling of the charging system may only be carried out by a qualified electrician. The national legal requirements and regulations must be observed.

## **A** DANGER

#### Danger due to electric current

Touching live parts will result in electric shock with serious injury or death.

- Work on electrical components may only be carried out by a qualified electrician and in accordance with electrical engineering rules.
- Ensure they are de-energised and take suitable protective measures.
- 1. Finish charging processes properly.
- 2. Disconnect the charging system from the power supply.
  - Activate using the internally installed safety elements such as MCB, RCD and any installed main switch.
  - Release the upstream fuse element of the charging system.

Dismantling may only be carried out after it has been established that no voltage is present and suitable protective measures have been taken.

## 11.1 Disposal

The unit contains materials that can be recycled. To protect the environment and human health, disposal must be carried out in accordance with the laws of the country and the existing take-back organisations.

- Observe the requirements of the WEEE Directive 2012/19/EU.
- Dispose of the unit accordingly only via the take-back organisation.
- Dispose of dismantled components only via the take-back organisation.

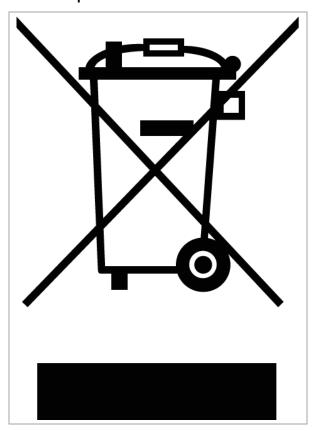
### **NOTE**

Incorrect or negligent disposal causes environmental pollution.

• If you have any questions about environmentally friendly disposal, ask your specialist dealer or the manufacturer for information.



## 11.1.1 Disposal instructions



The symbol with the crossed-out dustbin indicates that this electrical or electronic appliance must not be disposed of with household waste at the end of its service life.

To return the product, contact the manufacturer or dealer.

The separate collection of Waste from Electrical and Electronic Equipment (WEEE) is intended to enable the reuse, recycling or other forms of recovery of WEEE and to avoid negative consequences on the environment and human health from the disposal of hazardous substances that may be contained in the equipment.



### 12 Memory and display module SAM

The charging system is equipped with a permanently installed memory and display module (SAM).

Charging systems with a built-in memory and display module (SAM) are subject to the weights and measures law. This means that the documentation in the Annex associated with the SAM is relevant under the weights and measures law. and must be observed.

See chapter 14.3 Memory and display module SAM®, page 81

### **NOTE**

If a charging system with a built-in memory and display module (SAM) is taken out of service, the module must be stored by the operator of the charging system until the end of the storage period. This ensures that the stored data about previous loading processes complying with weights and measures regulations can be accessed. Each SAM must be stored in such a way that it can be assigned to the charging system and the charging interfaces.



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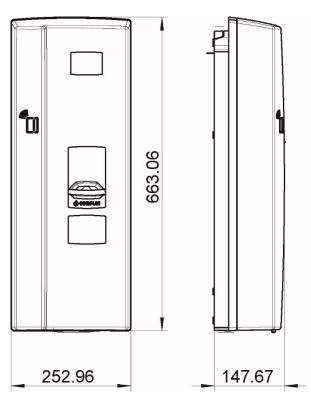
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### 14 Annexes

### 14.1 Housing dimensions





### 14.2 Commissioning and test report for AC charging systems

# Commissioning and test report for AC charging systems

Applicable to SOLO Operator of the system: **Testing company:** Company/name: Company/name: Street: Street: Post code/town: Post code/town: Telephone number: Telephone number: Location of the system: Date: ☐ Initial commissioning: according to DIN VDE 0100-600 (2017:06) ☐ **Periodic inspection:** according to DIN VDE 0105-100 (2015:10) **General information** Pre-installation carried out by customer □no □yes Pre-installation documentation available (pre-installation protocol) □yes □no Designation of the test item: Serial number: Network form:  $\Box$ TT  $\square$ TN-S □TN-C-S □TN-C Local earthing available □yes  $\square$ no Lightning protection concept  $\square$ no Point out the necessity to the □yes recognisable/available at the site 1.1 Equipment-dependent specifications Not installed Component Serial number Counter reading in kWh Charging point counter 1 Not installed Component Type designation **Comments** Overvoltage protection

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Version: 2.3

Issue:

Compleo Charging Solutions AG



### 2 Work before initial commissioning

INFO: Cut the cable insulation to length according to the installation instructions (failure to do so may result in a <b>FIRE HAZARD</b> )
Check of the cable glands (torque) and tensile test on cables in a de-energised state carried out? <b>Yes</b> $\Box$ <b>No</b> $\Box$

### 2.1 Measuring and testing equipment used

Manufacturer	Designation	Serial number	Next calibration

### 3 Visual inspections

External visual inspection	ОК	NOK	n.a.	Comments
Housing condition				
Contamination				
Display disc counter/SAM				
Display disc controller				
Charging cable AC				Replacement is mandatory in the event of a defect!

Internal visual inspection	ОК	NOK	Comments
Components (meter, SAM,			
control unit, terminals)			
Cabling			
General level of contamination			
Humidity			
Overvoltage protection (if available)			Visual display = green
Covers for active parts			

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### 4 Metrological inspection (to be carried out once a year)

Test		Individual measurements	Limit	value	Chargin g point 1	Comments		
Continuity of conductor	protective	Protective conductor				Measurement from charging cable/charging socket to charging station feed-in		
Main equipo		Earth	Low impedance			Recommendation: <1Ω:		
bonding rail (		connection						
Insulation res		L1-PE	≥1.0MΩ		ΜΩ	For charging systems with two charging points, disconnect one		
without consumer (from		L2-PE			ΜΩ	charging point by switching off one MCB and measure the other side		
	supply point of charging system to charging plug, with				МΩ	before starting the measurement, then repeat this procedure on the		
fixed cable or		N-PE			МΩ	other side.  VDE 0100-600 Section 6.4.3.3		
coupling)		L1-L2	≥1.0MΩ	)	МΩ	Reduce the measuring voltage to 250V when testing the active		
		L2-L3			МΩ	conductors with each other and		
		L1-L3			МΩ	repeat the test if <b>Riso &lt;1MOhm</b>		
		L1-N	1		МΩ			
		L2-N	1		ΜΩ			
		L3-N			ΜΩ			
LP wiring to clock	wise rotating field	□ок □ пок						
Mains voltag	e	L1-N	230V		V			
		L2-N	+/-10%		V			
	L3-N		-		V			
		L1-L2	400V		V			
		L2-L3	+/-10%		V			
		L1-L3			V			
Rel. voltage o	drop (calc. meas.)	□ок □пок	Max. 5% u					
Error loop	TN network	L1-PE	$Z_S \le \frac{U_0}{I_a}$		□OK □ NOK	VDE 0100-600 Section 6.4.3.7.1 Note 1:		
impedance –		L2-PE	$I_a$ $U_0$ = nominal AC voltage $I_a$ = trip current (MCB/RCD)		□OK □ NOK	If residual current devices (RCDs) with IΔN ≤ 500 mA are used as		
$Z_S$		L3-PE			□ок □	shutdown devices, measurement of the fault loop impedance is generally		
	TT network	L1-PE	$Z_S \leq \frac{50\text{V}}{1}$		NOK	not required.		
		L2-PE	$I_{\Delta N} = I_{\Delta N}$ $I_{\Delta N} = rated$		NOK □			
		L3-PE	current in A	of the RCD	NOK □			
		N-PE			NOK □			
Residual current	AC Residual current,	Trip current	>12 mA ≤30mA  <300ms  <40ms  ≤6mA for 6mA sensor ≤60mA for RCD type B		> <b>12</b> mA ≤30mA		MOK mA	
device RCD	sinusoidal	Trip time 1x I <sub>N</sub>			ms			
		Trip time 5x I <sub>N</sub>			ms			
	DC (6mA sensor = pos. and neg. edge RCD type B = rising DC residual current)	Trip current I <sub>ΔN</sub> =30mA			mA mA			
		Trip time	<10s for 6mA	Pos. flank	s			

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	< 0.3s for	Neg.	s	
	type B	flank		

### 5 Functional tests

Test	Charging point				Comments
	ОК	NOK			
Authorisation via RFiD					
Charging process AC					
Charging plug lock					
Sliding cover					
SAM buttons (if present)					

### 6 Result:

Test results	Yes	No
All tests were carried out		
Defects present		
Defect eliminated		
Inspection tag attached		

Comments:
Next test date on:
Next test date on.
Place, date:
Tester: First and last name in block capitals
Signature:

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### 14.3 Memory and display module SAM®



Fig. 30:Title page - memory and display module (SAM) (exemplary)



Notes			
-			
	_		
	_		
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## Operating instructions

SAM

Article number: SAM\_EN



Issue: 2023-06 Revision: 04



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### 1 About this manual

These instructions will enable you to handle your product safely and efficiently.

### Safety

Before attempting to install or operate the product you have purchased, read the operating instructions carefully to familiarise yourself with the product.

These instructions are intended for qualified personnel only. These are persons who, due to their technical training and knowledge of the relevant standards, are able to assess the work assigned and recognise possible hazards.

The basic prerequisite for safe working is compliance with all the safety instructions and handling instructions given in these instructions. In addition, the local accident prevention regulations and the general safety regulations for the application area of the product apply.

The illustrations in these instructions are for basic understanding and may differ from the actual design.

In addition to these instructions, the local legal regulations for connection to the local low-voltage network of a grid operator or the technical regulations of the trade associations apply.

### **Validity**

These instructions reflect the state-of-the-art of the product at the time of publication. The contents of these instructions are not the subject of a contract, but are for information purposes. Compleo Charging Solutions AG reserves the right to make changes to the content and technical specifications of these instructions without having to disclose them. Compleo Charging Solutions AG cannot be held responsible for any inaccuracies or unsuitable information in these instructions that have arisen due to changes in content and technology after delivery of the product, as there is no obligation to update these instructions on an ongoing basis.

### Warranty

Our deliveries and services are based on the general terms of delivery for products of the electrical industry as well as our general terms of sale. The information in these instructions, in particular the technical data, operation, dimensions and weights, are subject to change at any time.

### Handling

These instructions are organised so that all work necessary for operation and use can be carried out by suitably qualified personnel.

In order to clarify and facilitate the necessary work, images are assigned to certain processing steps. If hazards to persons and material cannot be excluded for certain work, these activities are identified by certain pictograms. Their meaning can be found in the Safety Instructions chapter.

### Storing the instructions

Also keep these instructions in a suitable place for future reference.

Hand out these instructions with the unit when changing operators.



### **Abbreviations**

Abbreviation	Explanation
AC	Alternating Current
AP	Delivery point
CCS	Plug designation for: Combined Charging System
CHA	Abbreviation for plug designation: CHAdeMO
СРО	Charge Point Operator
CRC	Cyclic Redundancy Check
DC	Direct Current
EMC	Electromagnetic Compatibility
EVSEID	Electric Vehicle Supply Equipment
НМІ	Human-Machine Interface
HW	Hardware
ID	Identification Number
IR	Infrared
kWh	Kilowatt hour
LCD	Liquid Crystal Display
LES	Charging device controller
LIEF	Energy supplier
LS	Charging station
LV	Charging process
MessEG	Measuring and calibration law
MessEV	Measuring and calibration regulations
MSB/MDL	Metering point operators/ metering service providers
MSP/ EMSP	(Electric) Mobility Service Provider
OCPP	Open Charge Point Protocol
RTC	Real-Time Clock
S/N	Serial number
SAM	Memory and display module
SML	Communication protocol
JIVIL	Smart Message Language
SW	Software
VNB	Distribution system operator



### 2 SAM product description

SAM is the memory and display module that permanently stores the start and final meter reading of the charging processes and displays them on request.

### 2.1 Product information

SAM, in combination with a verified meter, fulfils the possible requirements of the local calibration law when charging an electric vehicle at a charging station.

The unit offers advantages for several market participants:

### User:

- Verified billing of kWh and charging time
- SAM is visible to the user at the charging point from the outside and enables a comparison of the meter values on site and on the bill
- Checking of the meter values by the user is possible without additional devices (e.g. computer, internet access, etc.)
- - The displayed values are binding in case of dispute

### **Charging station operator:**

- Significant reduction of complexity in the system compared to alternative solutions ("keep it simple")
- SAM is a cross-market solution: It is roaming-capable from the start and offers independence from CPO, MSP, backend
- No additional technical requirements for the CPO backend system and downstream data transfer (e.g. communication, storage, transparency software, etc.)
- OCPP 1.5 ff can be used unchanged, no transmission of signed meter values is required
- All data relevant to the bill is transferred to the backend via OCPP and is available to all market participants
- One-off costs for procurement no running costs



### 2.2 Intended use

The SAM is used to collect, store, display and verify meter reading and customer identification data for charging points in charging stations for electric vehicles. One SAM is used per charging point. The SAM is a measuring capsule and consists of the display & storage module and an electronic energy meter. It displays the determined data and stores it permanently in the device itself.

The SAM is designed for mounting on a wall or for a charging station and is to be installed weather protected. The intended use of the product also includes compliance with all the information in these instructions. Any use beyond the intended use or any other use is considered misuse.

The specified ambient conditions for this product must also be observed in all cases (see also chapter "Technical data"). The SAM has been designed, manufactured and tested in compliance with the relevant safety standards.

If the safety instructions are observed and the product is used as intended, there is normally no risk of damage to property or to the health of persons.

Failure to observe the instructions contained in this manual may create sources of danger or render safety devices ineffective. Furthermore, the local safety and accident prevention regulations must be observed for the respective application.

The chapter "Responsibility of the network operator with SAM" must also be observed.

### 2.3 Controls and display

The following figure shows an assignment of the main components of the SAM.

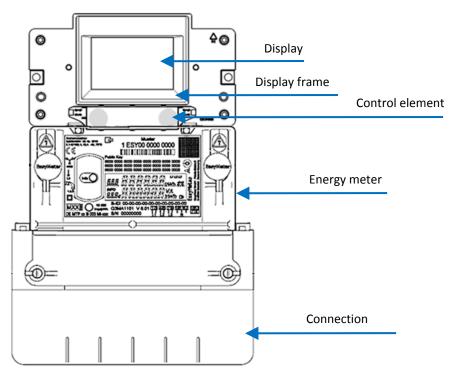


Figure 1: SAM overview image (example)

Display: Used to display customer information about the current charging process and to

display historical charging processes.

**Display frame:** Labelled with type-related data.

**Control element:** The SAM can be operated via two keys.

**Energy meter:** Used to measure the electrical energy drawn.

**Connection cover:** The connection terminals for the mains connection and charging current are located

behind the connection cover.



### 2.4 Type and rating plates

The SAM type plate and meter rating plate are listed below. Typically, the SAM type plate is visible from the outside (view of the charging station) and the meter rating plate is not.

### Type plate of the SAM



Figure 2: Type plate of the SAM (example)

Display frame: Labelled with

Upper field: Company logo

- Left field: Product name

- Right field: Manufacturer's address

- Lower field:

- Metrology marking incl.
  - production year
  - Notified body
- CE marking
- Type designation SAM incl. serial number/type key (can be used for HW identification)
- QR code (contains the type designation and serial number)
- Accuracy classification

### Rating plate of the meter

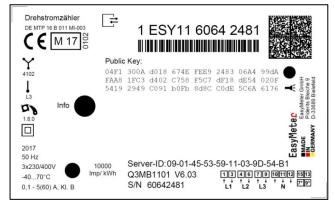


Figure 3: Rating plate of the meter (example)



### 2.5 Overview of all displays (examples)

Info screens (without interaction with the user)			
Compleo CS - SAM  SAM S/N: SAM-AA11112 Meter S/N: 1 ESY11 61132767 HW: V1.0 SW: V1.4.4-dirty Checksum: 0x6A72 Production date: 04.03.2022 charge possible: 65462	19.12.2021 07:54:22  TYP2: Right 126 CCS5 12345  Ready for operation		
Boot screen	Ready for operation (idle state)		
13.04.2022 09:22:12	13.04.2022 09:22:12		
ID: 98Df456Hgt43 TYP2: SAM-001 Ready for operation	ID: 98Df456Hgt43 TYP2: SAM-001 Ready for operation		
Display of the ID after a successful authorisation.	2 second progress bar (from left to right) until the timing starts.		
13.04.2022 09:22:28	13.04.2022 09:22:50		
Consumption: 0,00 kWh	Consumption: 0,00 kWh		
Start: 13.04.2022 09:22:28	Start: 13.04.2022 09:22:28		
Duration: 00:00:01.5	Duration: invalid		
ID: 98Df456Hgt43 EVSEId SAM-001 >>> Charging active <<<	ID: 98DfXXXXXXXX EVSEId SAM-001 > Charging active <		
Current measured values. The number of arrow symbols represent the number of loaded phases.	After a few seconds, the last digits of the ID are substituted.		
13.04.2022 09:22:50	13.04.2022 10:00:42		
Consumption: 0,00 kWh	Start mtr reading: 1,81 kWh Final mtr readg: 1,81 kWh		
Start: 13.04.2022 09:22:28  Duration: 00:00:25	Consumption:       0,00 kWh         Start:       13.04.2022 09:22:28         End:       13.04.2022 09:23:08         Duration:       00:40		
ID: 98DfXXXXXXXX EVSEId SAM-001	ID: 98Df456Hgt43 EVSEId SAM-001		
Charging active	(12)		
Display of duration with tenths of seconds, only in the first minutes after the start.	Summary at the end of the charging process.		



Interactive screen displays w	ith the user to invoke ch	narging procedure	s.	
13.04.2022	09:58:41	13.04.20	22	09:59:32
Start meter rea	ading entry	Final :	meter rea	ding entry
Start mtr reading000000,00 kWh		Start mtr reading000001,81 kWh Final mtr readg: 000000,0 <mark>0</mark> kWh		
Next		Check		
Cancel	Cancel			
After entering the start value, press "Next" to enter the final value.  (Called up after touching one of the two buttons).		After enter	ing the final va	lue, press "Check".
13.04.2022	10:00:42	13.04.20	22	10:00:25
Start mtr reading: Final mtr readg: Consumption:	1,81 kWh 1,81 kWh 0,00 kWh	Start mt Final mtr Consump		1,81 kWh 1,81 kWh 0,00 kWh
	2022 09:22:28 2022 09:23:08 00:40	Start: End: Duration	12.04.2	2022 14:48:39 2022 14:51:35 invalid
ID: SEVSEId	98Df456Hgt43 SAM-001	ID: EVSEId	330	Of9932fr4166 SAM-001
	(12)	Next	1/2	(13)
Screen output for a found entry.			eral data sets ( OWh), scrolling	possible with a charge

Possible information screen	ns	1		
13.04.2022	10:00:25	13.04	.2022	09:22:50
Start mtr reading Final mtr readg:	1,81 kWh	Consu	imption:	0,00 kWh
Consumption:	0,00 kWh	Start:	13.04.202	2 09:22:28
	4.2022 14:48:39 4.2022 14:51:35 invalid	Durat	ion:	invalid
ID: 33	3Df9932fr4166	ID:	98DfX	XXXXXXX
EVSEId	SAM-001	<b>EVSEI</b>	d	SAM-001
Next 1/2	(13)	>	Charging activ	/e <
"Invalid" notice in the charging process summary if there was a communication problem.		Notice if the	ere was a communication the charging proce	•
The data set is not billable according to time!		The dat	a set is not billable acco	ording to time!



Possible error screens	
19.12.2021 07:54:27	19.12.2021 07:54:12
Limited operation	
Billing not possible on basis of measured values	Billing not possible based on the measured values
Data query possible	
Error message: there is a communication or memory problem.	Error message: there is an internal fault in the SAM.
19.12.2021 07:53:47	19.12.2021 07:53:47
Entry not found	Entry not found
Renewed Cancel	Renewed Cancel
Error message: no entry was found.	Error message: the data set found is inconsistent.
Billing is only possible with a data set that complies with calibration law!	The data set does not comply with calibration law and is therefore cannot be billed!

Lock screen	
19.12.2021 07:54:32	
Data verification blocked  Next check option in 13 seconds	
Ok	
Lock screen after 5 incorrect queries/entries	



### **Explanation of the display positions**

Text displays during	Text displays during boot screen after switching on and restarting the SAM.		
SAM S/N	Serial number of the SAM		
Meter S/N	Serial number of the meter		
HW	Placeholder		
SW	Firmware version		
Checksum	Firmware checksum		
Production date	Day of manufacture (day of programming)		
Charging processes	Number of charging processes that are still possible and can be saved.		
Text displays during	ng operation of the charging column.		
Date & time	The current date and time are permanently displayed in the first line. The date is displayed in the format dd.mm.yyyy, the time is displayed in the format hh:mm:ss.		
Initial reading	The initial value represents the meter reading at the beginning of a specific charging process. It is displayed during a charging process and also when a completed charging process is displayed. The display is in kilowatt hours.		
Final reading	The final value is displayed after finishing and when retrieving a finished charging process. The display is in kilowatt hours.		
Consumption	Difference between the initial value and the actual value. After completion of the charging process, it is the difference between the start and final value (power extracted). The display is in kilowatt hours.		
Start	At this point, the start time of the charging process is recorded. Both the date and the time are relevant here.		
End	At this point, the end time of the charging process is recorded. Both the date and the time are relevant here.		
Duration	Time from the start of the charging process to the current time. When charging is complete, the total time from start to finish is displayed. The duration is displayed in the format hh:mm:ss ss or, from a duration of 1 day, in the format dd:hh:mm.		
ID	The user ID used for authorisation is shown here. During the charging process, this cannot be recognised except for a few leading digits.		
Typ2	- Delivery point has a type 2 plug.		
CCS	- Delivery point has a CCS plug.		
CHA	- Delivery point has a CHAdeMO plug.		



### 2.6 SAM system overview

The SAM forms a unit with the associated meter, which is used to record and store measured values.

The following image shows the functional arrangement of the SAM (green) in a charging station.

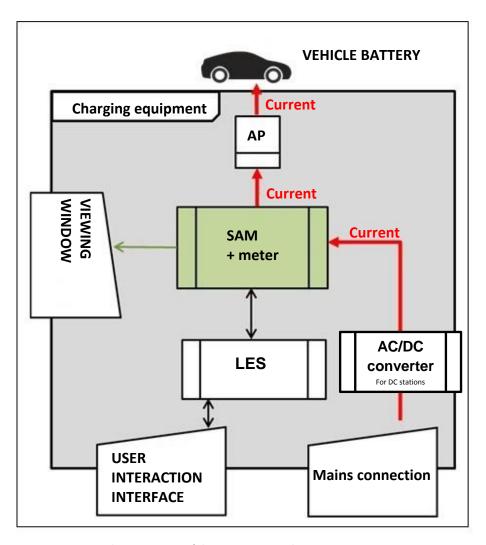


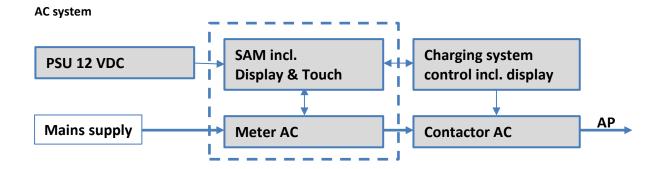
Figure 4: Functional arrangement of the SAM in an AC charging station

For DC charging stations, an AC/DC converter is also used between the mains connection and the measuring capsule (SAM + meter).



### 2.7 Integration of the subsystem in a charging column

With the subsystem, it is possible to carry out all measurements and data collection. The following illustrations show the required connections between the components within a charging column.



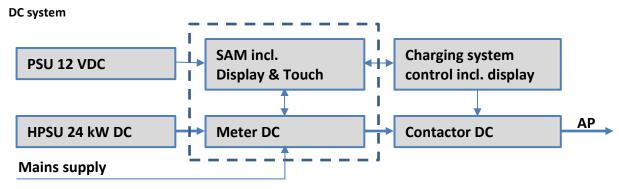


Figure 5: Integration of the subsystem in a charging column (for AC and DC version)

On the left is the 12 V power supply for the SAM and the control unit. In the immediate vicinity is the

mains supply line to the AC meter (LS fuses and other components may be connected upstream here) or the DC power unit to the DC meter.

On the right is the control unit that communicates with the SAM module via the 20 mA interface and controls the contactor (AC and DC) to release the energy to the AP.

The SAM (measuring capsule) is shown in the centre (dashed frame).



### 2.8 Communication connections

The SAM is equipped with the following non-reactive communication interfaces:

- IR interface: Point-to-point connection to the electricity meter
- 20 mA interface: Point-to-point connection to the charging system control unit (LES)
- HMI interface (2 buttons and display) for interaction with the user

### Connection to the electricity meter

The memory and display module is connected to the electricity meter via a secure connection. This connection is established via an optical interface.

Depending on the operating state, the values are

- automatically sent out cyclically by the meter or
- actively queried by the SAM.

### **Connection to the LES**

The memory and display module is connected to the LES via a 20 mA interface (current loop). The SAM sends the received meter values unchanged to the control unit. In addition, the result of a start and final meter reading query is transmitted.

The control unit sends the following information to the SAM:

- a) Start of the charging process for the corresponding delivery point
- b) End of the corresponding charging process
- c) ID for the associated start and final meter reading
- d) Date and time
- e) Voltage
- f) Correction factor (resistance to system power loss)

### 2.9 Power supply

In the AC system, the AC meter is connected to the mains connection on the input side via electrical protective measures such as charging station fuses and main switches. On the output side, the delivery point (AP) is supplied with power via an AC contactor. The user can charge his vehicle via the delivery point (socket or charging cable).

For the DC system, the DC meter is connected on the input side via an AC/DC converter with integrated protective devices. On the output side, the delivery point (AP) is supplied with power via DC contactors.

### 2.10 SAM module system overview

The following image shows the internal relevant components of the SAM.

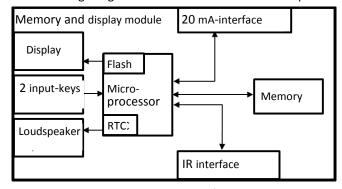


Figure 6: Functional block diagram of the SAM

The memory and display module is equipped with the following components:

### Micro-controller

The micro-controller has an integrated flash memory and an RTC.



The flash memory is used for the firmware (without update function).

The RTC is used for the calendar, time and stopwatch function.

### Additional flash memory

The additional and non-volatile long-term memory is used for storing charging processes and can be read out by the control unit.

The following data is collected and stored as a tupel:

(1) RecordId (1 byte) Identifier byte assigned to memory entry for charging data

(2) StartTime (4 byte): Date and time at the start of the loading process

(3) StartTimeOffset (2 Byte) UTC offset at start

(4) EnergyStart (4 byte): Meter reading at the start of the charging process [kWh]

(5) Authentication-Id: ID (21 byte)

(6) SLIN (1 byte): Security level of the ID
 (7) ParameterRef-Id (2 byte) Reference to parameter set

(8) Reserved (13 byte): Reserved area

(9) CRC\_Begin (2 byte): CRC over all written values at the start time(10) EndTime (4 byte): Date and time at the end of the loading process

(11) EndTimeOffset (2 byte) UTC Offset at stop

(12) EnergyStop (4 byte): Meter reading at the end of the charging process [kWh]
 (13) ValidityStatus (2 byte): Bit0: No communication from the meter with MeasureStop

Bit1: Measuring duration not valid Bit2: CRC error in the data set

(14) CRC\_Complete (2 byte): CRC over all written values

### IR interface (optical)

The IR interface is used for communication with the MID electricity meter.

### 20 mA current interface

The 20 mA current interface is used for communication with the control unit.

### Display

The display is used to show values relevant to the bill and to check the input of the bill data.

### Input keys

The two capacitive input keys can be used for function selection and meter reading input by the user.

### Loudspeaker

The loudspeaker is used for acoustic feedback, e.g. when keys are touched.

### 12 V supply connection

The SAM is supplied with 12 V operating voltage via the connection



### 2.11 Time measurement of the charging service duration (stopwatch function)

The SAM has an internal quartz-controlled real time clock (RTC). This is used for time measurement (for the charging time or standing time).

The charging service time is the time between the moment the charging equipment detects the connection of a vehicle and the moment the charging equipment detects the disconnection of the vehicle from the charging equipment.

The start condition for recording the charging service duration is successful authorisation at the charging station and the connection to the vehicle (plug inserted on both sides).

The stop condition for recording the charging service duration:

- 1. For a charging line connected at the charging point of the charging equipment, the disconnection of the to the charging equipment (the trigger is the disconnection of the control pilot signal of the pilot circuit according to EN 61851-1).
- 2. For a socket at the charging point of the charging equipment, the disconnection of the external charging cable at the charging station.

Internally, the time is measured with a resolution of one millisecond. The time is shown to the second on the display (for clarity), with the milliseconds truncated. This means that the seconds display does not show rounded values. The following figure illustrates this.

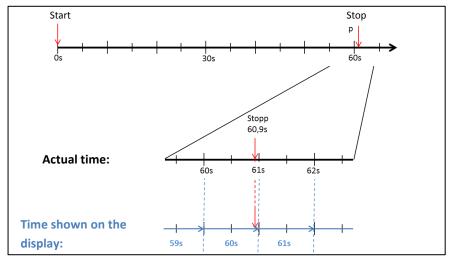


Figure 7: Measurement period on the display is not rounded.

The options for checking this time measurement are described below.

### Checking the time measurement by means of the display

In the display, a start bar accurate to the second is also shown, which begins a 2 second countdown (bar progresses from left to right) after the charging column is connected to the vehicle. The time starts to be measured after the countdown. The measurement stops when the vehicle is disconnected from the charging station.

### NOTE

The stopwatch continues to run after charging has stopped.

If the vehicle has its own charging cable, it is not sufficient to simply unplug the vehicle. The time measurement only stops when the plug is pulled out of the charging station.

To check the stopwatch yourself, the start time can be recognised via the start bar and the accuracy of the stopwatch function can be checked via a stopwatch. The verification time should be at least 10 minutes in order to demonstrate sufficient accuracy. According to the standard, a deviation of 1% is permissible.



### Checking the time measurement by means of the data interface

The time measurement accurate to a millisecond can be read out from the SAM via the available 20 mA interface using the SML protocol.

### Checking the time measurement in the manufacturing process

In each SAM, a connection pin is available which signals the start and stop time by means of a signal change (flank-controlled). With this signal in combination with the digital time measurement value (via the 20 mA interface), all SAMs are checked in the manufacturing process for the functionality and accuracy of the internal RTC.



### The following diagram illustrates the check procedure.

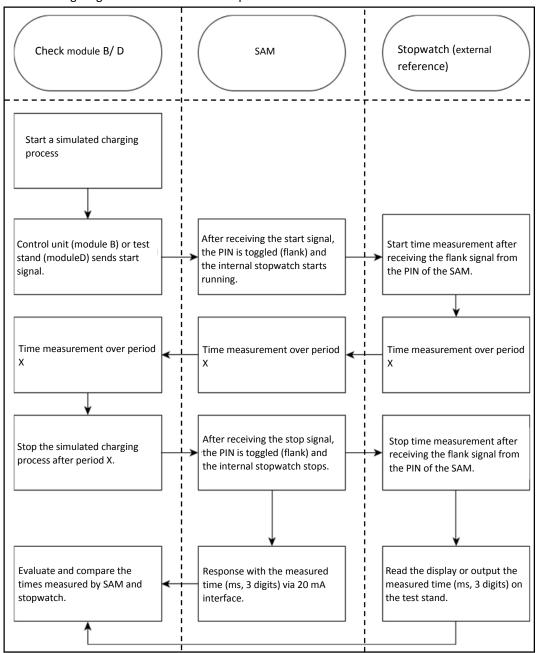


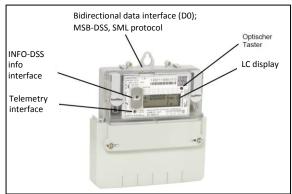
Figure 8: Test procedure regarding the stopwatch function in the manufacturing process.



### System overview of electricity meter

The meter is an approved meter under calibration law and is used to measure the amount of energy delivered to the delivery point.

The following picture shows the meter with its functional components.



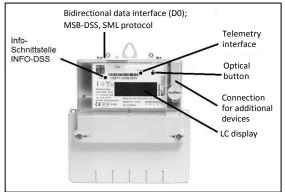


Figure 9: EasyMeter meter (example)

### LC display

The display is a non-backlit liquid crystal display (LCD).

### Optical button (not used by the SAM module)

The "optical keystroke" requires an optical energy equivalent of 400 LUX (e.g. torch) and is used to display additional information of the meter.

### Data interfaces (MSB and INFO-DSS)

The potential-free data interface of the meter is a bidirectional, optical (infrared) communication interface for communication with the SAM module.

### Info interface (not used by the SAM module, interface only for AC)

The meter has a potential-free optical data interface (INFO-DSS). The info interface is a unidirectional, infrared communication interface.

### Telemetry interface (not used by the SAM module)

The telemetry interface is an infrared optical test output according to EN50470-1 (pulse output).



### 3 Charging process with SAM

This chapter explains in more detail the displays that are shown in the SAM during a charging process. For information on how to charge at a charging station, please refer to the operating instructions for the respective charging station.

### 3.1 Readiness

After the boot process, the SAM is ready for operation. The current date and time are displayed. If the display illumination is deactivated due to prolonged inactivity or restart, it can be activated by pressing one of the two keys.

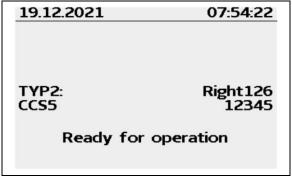


Figure 10: Readiness display (example)

### 3.2 Authorisation

As soon as a user logs into the charging station and receives the corresponding authorisation to charge, the display changes and shows the corresponding ID for the upcoming charging process.



Figure 11: Display after authorisation (example)



### 3.3 Two seconds until charging

As soon as a vehicle and the charging column are connected and the authorisation was successful, a black two-second progress bar (from left to right) is shown in the display.

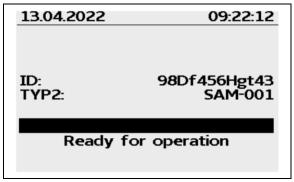


Figure 12: Two-second progress bar (example)

### 3.4 Charging process

After this time has elapsed, the display changes to the next representation and the time measurement begins. During the entire charging process, the current information is shown on the display as in the following illustration.

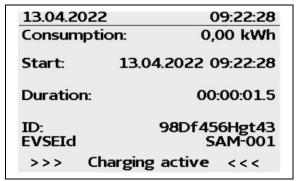


Figure 13: Active charging process (example)

In the last line, in addition to the information text "Charging active", the large and small characters (arrow symbols) are displayed. The number of characters indicates, here three on each side, that all three phases in the charging line supply energy. If only two or only one character is displayed on each side, then correspondingly fewer phases provide energy. This depends on the onboard charger installed in the vehicle. Information about the installed onboard charger can be obtained from the car dealer or from the associated instructions for the vehicle.

If no characters are displayed, then the vehicle's battery probably cannot be charged any further.

### NOTE

A few seconds after the start of the charging process, the personal ID is substituted by crosses except for a few leading digits for data protection reasons.



### 3.5 End of the charging process

After the charging process is completed (after disconnection from the vehicle<sup>1</sup> on the charging station side), the information is shown on the display for checking purposes. The display can be extended by a further 20 seconds by pressing the right key and it closes automatically after this period has elapsed.

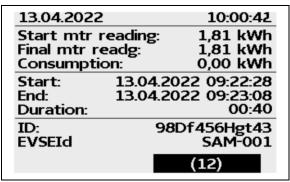


Figure 14: End of the charging process (example)

### NOTE

In order for the end user to be able to exercise the option of a billing check, there should be a visible indication for the customer that the he should take a photo of the summary for this purpose (after the charging process!).

If the displayed time deviates by >75 min. from the real time, it is recommended not to use the charging station.

A measured value with a time duration < 60s must not be used for billing purposes!

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<sup>&</sup>lt;sup>1</sup>If the vehicle has its own charging cable, it is not sufficient to simply unplug the vehicle. The time measurement only stops when the plug is pulled out of the charging station.



### 4 Query previous charging processes with SAM

### 4.1 Query via backend

Using OCPP, individual or all stored data sets can be retrieved from the backend via the charging equipment control unit.

### 4.2 Query on site

Within the scope of saving all charging processes, the same can be called up after entering the start and final values of the meter readings of a specific charging process.

The following steps can be carried out using the two keys on the SAM. The left key is always used to advance the cursor to the next selection option and the right key to select an option or increase the selected digit. The currently selected position appears on a dark background.

The options at the bottom of the field cannot be selected directly by pressing the keys below, but are selected one after the other with the left key according to the individual digits. After selecting the last available option, the last digit is selected again so that corrections can be made without aborting.

### **Entering the start value**

The start value of the charging process to be queried is to be entered as previously described. Then select the "Next" option and confirm.

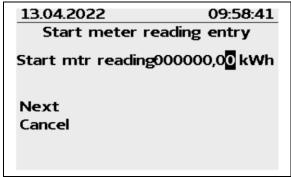


Figure 15: Entering the start value (example)



### **Entering the final value**

The final value of the same charging process is entered in the same way. Selecting the "Check" option outputs the desired information.

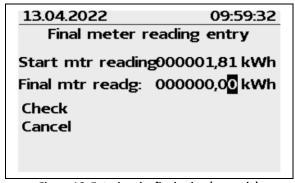


Figure 16: Entering the final value (example)

### Display of the stored data

If the actual values are entered correctly, the information will be as shown in the illustration below. The display can be closed with the right key, but it also closes itself after an appropriate time window.

13.04.2022		10:00:42
Start mtr reading: Final mtr readg: Consumption:		1,81 kWh 1,81 kWh 0,00 kWh
Start: End: Duration:		022 09:22:28 022 09:23:08 00:40
ID: EVSEId	981	Df456Hgt43 SAM-001
		(12)

Figure 17: Output of the desired information (example)

If there are several data sets (possible with a charges ≤ 0Wh), scrolling is possible.

13.04.2022	2	10:00:25
Start mtr reading: Final mtr readg: Consumption:		1,81 kWh 1,81 kWh 0,00 kWh
Start: End: Duration:		022 14:48:39 022 14:51:35 invalid
ID: EVSEId	33Df	F9932fr4166 SAM-001
Next 1	./2	(13)

Figure 18: Example: further entries



### Information screens

In certain situations, information screens are displayed if technical problems occur during a charging process.

The following information screens are displayed if either a power failure or the communication between the SAM and the control unit was interrupted during a charging process. Then the word "Invalid" is shown in the display under Duration.

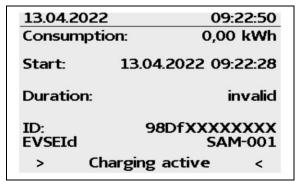


Figure 19: Duration: Invalid, during a charging process (example)

Likewise, in the summary (at the end of the charging process), the word "Invalid" is shown in the display under Duration.

13.04.2022		10:00:25
Start mtr reading: Final mtr readg: Consumption:		1,81 kWh 1,81 kWh 0,00 kWh
Start: End: Duration:		022 14:48:39 022 14:51:35 invalid
ID: EVSEId	33D1	F9932fr4166 SAM-001
Next 1	/2	(13)

Figure 20: Duration: Invalid, in the summary after a charging process (example)

### NOTE

Billing by time not possible!

If the duration is declared invalid, then the time measurement cannot be billed.



### **Error screens**

Permanent error states in charging equipment cannot be excluded either. The following error screens are possible and are explained here.

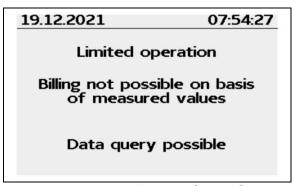


Figure 21: Limited operation (example)

### "Limited operation" occurs when

- energy measurements are no longer possible. (e.g. meter is not working correctly).
   Consequence: The charging point goes to "Out of service".
- the data memory is full or no further charging processes can be saved.
   Consequence: Charging processes are still enabled, but these may not be billed.
- the RCD trips during a charging process.
   Consequence: The charging point goes to "Out of service" and the charging process is terminated.

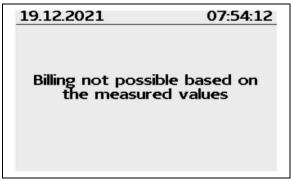


Figure 22: Out of service (example)

### The SAM is "Out of service" when

- key operation no longer works.
  - Consequence: Charging processes are still enabled, but they may not be billed.
- the firmware of the SAM is inconsistent.
  - Consequence: The charging point goes to "Out of service".

### NOTE

Bills may only be made with existing legally compliant data sets.





Figure 23: Entry not found (example)

An entry in the data memory cannot be found if

the two start and end meter readings entered are not found in the data set (Tubel).
 The operator has either entered incorrect values or has entered the data at an incorrect charging point (SAM).

### NOTE

Only charging processes at the respective charging point are saved. There is no data exchange between the charging points.



### Lock screen

The following picture shows the lock screen.



Figure 24: Lock screen (example)

This screen appears if five incorrect entries took place while entering readings to retrieve historical data. This function is intended to prevent misuse.



### 5 Technical data

Unless otherwise stated, the technical specifications are the same for all unit types.

### 5.1 Measuring capsule

### **Ambient conditions**

Specification	Value	Unit
	Internal spaces or	
Approved installation site	at least IP34 protected area	
Temperature range	-25 - +70	°C
Humidity	≤ 95	%
Mechanical/EMC requirement class:	M1/E2	

### Technical data of the SAM nominal operating conditions

Specification	Value	Unit
Supply voltage	12	V
Power consumption	≤ 0.7	W
Protection class (housing)	IP 54	
Limit current Imax	≤ 60	mA
Range power factor cos φ during the		
charging process	0.9 - 1	
Electromagnetic environmental		
conditions	Testing was carried out according to DIN EN 50470	

### Technical data of the meter nominal operating conditions

Value AC	Unit
50	Hz
4-wire meter: 3 x 230/400 2-wire meter: 230 V at L3	V
5	Α
60	Α
10	mA
100	mA
500	mA
IR LED output with 10,000	Imp/kWh
8 terminals each with Ø 6.5 Screws 2 x M6 per terminal	mm
Current path: ≤ 1,1 W at 60A Voltage path: ≤ 0.7 W/ 2 VA	
	50  4-wire meter: 3 x 230/400 2-wire meter: 230 V at L3  5  60  10  100  500  IR LED output with 10,000  8 terminals each with Ø 6.5 Screws 2 x M6 per terminal  II  IP 54  Current path: ≤ 1,1 W at 60A

### 5.2 Accuracy of the charging equipment

The accuracy of the charging equipment at the delivery point corresponds to that of an electricity meter of MID class A at nominal operating conditions.



### 6 SAM installation

### 6.1 Connections

The following illustrations provide an overview of the available connections. The SAM has a 6-pole plug-in connection for the 12 V operating voltage and the 20 mA interface, which is connected to the control unit.

The AC meter has connection terminals for the conductors L1 - L3 and the neutral conductor.

The DC meter has connection terminals for the plus and minus lines, sense lines and the auxiliary power supply (230 VAC).

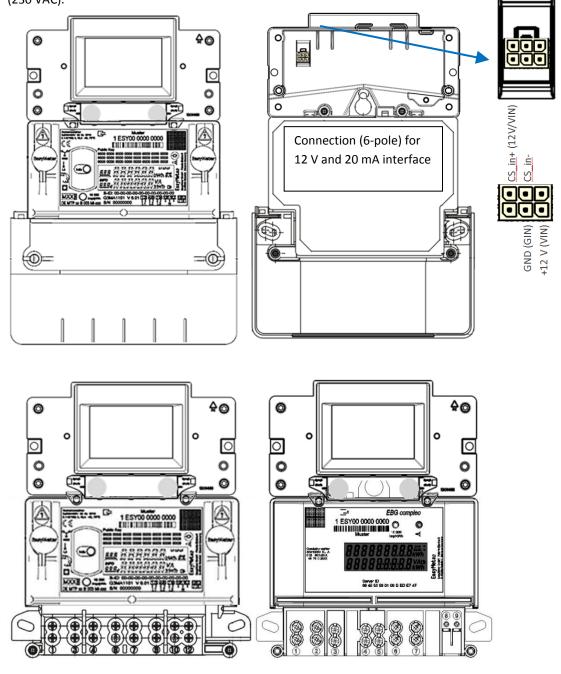


Figure 25: Top: Front and rear with AC meter, below the representation of the connections; left AC, right DC 1)

1) = not relevant for compleo Solo



### 6.2 Connection of SAM and meter

Please observe the following safety instructions before connecting the unit.

### Specifications for the electrical connection

- The supply line must be hard-wired into the existing installation and comply with the nationally applicable legal requirements.
- The rated current I<sub>N</sub> must be selected to match the back-up fuse and the circuit breaker.
- When designing the supply line, take into account the increased ambient temperatures inside a charging station or possible reduction factors. Increased line cross-sections may be necessary to adapt the temperature resistance of the supply line.

### NOTE

The SAM as well as the meter must be connected when the system is de-energised.

The mounting position does not affect the functionality.

The tightening torque of the terminal screws 3 Nm (M6) must be observed.

The recommended conductor cross-section for connecting the meter is: Q3MB1020 (Imax = 60A) =  $16mm^2$ 

Damage to property may occur due to incorrect connection!

### **A** WARNING

When connecting the meter, there is a risk of fire if the connection cables have too high an internal resistance!

### Connecting the SAM to the controller

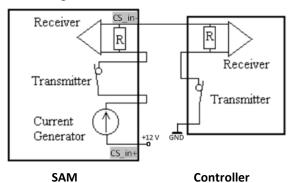


Figure 26: Wiring diagram SAM 20 mA interface to the controller

The pin assignment of the SAM is listed in the Connections chapter.

For the pin assignment of the controller, please refer to the corresponding operating instructions of the controller.



# Connection of the meter to the supply network DC-Plus DC-Minus

Figure 27: Connection diagrams for meter; left AC, right DC

Please refer to the charging station manufacturer's documentation for information on how the connection is made within a charging station.



# Notes







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