

## Power Source and SRS 121.1 DC Safety Instruction



## Precautions



### Important!

Before the first operation of the system, this safety instruction must be read carefully. Especially the listed safety precautions in chapter 1, where working with exposed voltages is described. The static power source is designed in accordance with EN, IEC, DIN und BS standards.

Depending on what version of the static power source, especially with external components, the connection of the external Emergency Stop buttons must be done.



### Important!

Before the equipment is being connected to the mains, it is necessary to check if all printed circuit boards are plugged in their position correctly (after transportation, their correct seating cannot be guaranteed.). For that purpose, all unsealed front plates must be screwed off and the plugged in PCBs must be checked.



In case of a technical problem or a defect, please contact your local distributor and/or the ASS After Sales Service of the manufacturer EMH directly.

Email: support@emh.de

Phone Service: +49 4185 5857 90

When you contact your local distributor or the manufacturer, always mention the following information about your equipment:

- **Exact type**
- **Serial number**
- **Firmware version** shown on PC
- A **detailed description of the error** will help to shorten the repair time and makes it possible for the manufacturer to estimate the repair time and costs.

The ASS After Sales Support will instruct you how to solve or localize the problem and where to send the equipment in case of a repair.

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# 1 Safety

The following symbol appears on the product and in the operation manual with the meaning:



**Caution! Please consult the operation manual before using the instrument.**

Failure to follow or carry out instructions preceded by this symbol may result in personal injury or damage of the device and the installation.



## General precautions for use



To prevent electric shock:

- ◆ **This product must be only used by qualified personnel practicing applicable safety precautions.**
- ◆ **Use caution during installation and use of this product; high voltages and currents may be present in circuit under test.**
- ◆ **Local safety regulations must be observed.**



## Precautions for repairs



- ◆ **Only persons with knowledge in servicing electronic equipment should open the Power Source to localize errors and defective parts**
- ◆ **Modifications or own repairs by the customer during the warranty time without permission and instructions by the manufacturer will lead to the loss of the warranty**
- ◆ **Before opening the unit, disconnect all cables, including power supply cable.**
- ◆ **Take care not to touch the connections of big capacitors in the supply section of the unit. They can still be loaded long time after power is switched off.**
- ◆ **Before touching any printed circuit board, electronic components or connectors inside the unit take precautions, to prevent damages to the components by Electrostatic Discharge (ESD). Ground your wrist with an anti-static kit**

### 1.1 Safety Guidelines



**The information in this chapter is intended to protect you and the devices but cannot cover all possible safety aspects. In any case, the local safety regulations must be observed!**



Death or serious injury may result if proper precautions are not taken. Property damage can occur if the appropriate precautionary measure is not taken. An undesirable result or condition may occur if the corresponding note is ignored.

In cases where two or more levels of danger apply, only the most severe level warning is used. For the personal safety of the installation and operating personnel, please observe and follow the safety instructions in this chapter of the instruction!

### **1.1.1 Safety**

This document contains detailed descriptions to safely when working with the product.

- Read this safety document carefully to familiarize yourself with the product.
- This safety document is part of the product.
- Read and pay special attention to the safety instructions in this chapter.
- Observe the warnings in this document to avoid dangers arising from the operation.
- The product is manufactured according to the state of the art. Nevertheless, dangers to life and limb of the user or impairments of the product and other material assets may occur due to functional use.

### **1.1.2 Warning Symbols**

#### **1.1.2.1 General Warning Sign**



The "General warning symbol" indicates that special instructions apply in this chapter.

#### **1.1.2.2 Warning of electrical voltage**



The "Warning of electrical voltage" indicates dangerous voltages in this area

### **1.1.3 Intended Use**

This device is especially appropriate for test laboratories to perform compliance, acceptance or type test of electricity meters and different types of power, energy and power quality measurement devices.

### **1.1.4 Basic safety instructions**

To prevent accidents, breakdowns, accidents and environmental damage, the person responsible for the transport, installation, operation, maintenance and disposal of the product or parts of the product must ensure the following:

#### **1.1.4.1 Personal protective equipment**

Loosely worn or unsuitable clothing increases the risk of danger for getting caught on protruding parts. This poses a danger to life and limb.

- Have all the necessary equipment ready and wear the personal protective equipment required for the job, such as helmet, protective work shoes, etc. Also observe the section "Personal protective equipment".
- Never wear damaged personal protective equipment.
- Never wear rings, necklaces and other jewelry.

#### **1.1.4.2 Workspace**

Messy and unlit work areas can lead to accidents.

- Keep the work area clean and tidy.
- Make sure the work area is well lit.
- Comply with applicable accident prevention legislation in the country.

#### **1.1.4.3 Explosion protection**

Highly flammable or explosive gases, vapors and dusts can lead to severe explosions and fire.

- Do not operate the product in potentially explosive atmospheres.

#### **1.1.4.4 Safety information**

Warning labels and safety labels are an important part of the security concept.

- Observe all safety labels on the product.
- Keep all safety labels on the product complete and legible.
- Replace damaged or obsolete safety markings.

#### **1.1.4.5 Environmental conditions**

To ensure reliable and safe operation, the product must be operated under the ambient conditions specified in the technical data only.

- Observe specified operating conditions and site installation requirements.

#### **1.1.4.6 Changes and conversions**

Unauthorized or improper modifications of the product may result in personal injury, property damage or malfunction.

- Modify the product only after consultation of EMH Energie-Messtechnik GmbH or MTE Meter Test Equipment AG.

#### **1.1.4.7 Spare Parts**

Spare parts not approved by EMH Energie-Messtechnik GmbH, or MTE Meter Test Equipment AG can lead to personal injury and property damage to the product.

- Use only replacement parts approved by the manufacturer.
- Contact EMH Energie-Messtechnik GmbH or MTE Meter Test Equipment AG.

#### **1.1.5 Qualification of the staff**

The person responsible for installation, commissioning, operation, maintenance and inspection must ensure adequate qualification of the personnel.

##### **1.1.5.1 Electrician**

The qualified electrician has knowledge and experience as well as knowledge of the relevant standards and regulations due to their professional training. In addition, the electrician has the following skills:

- The electrician independently identifies possible dangers and can avoid them.
- The electrician can carry out work on electrical installations.
- The electrician is specially trained for the working environment in which he works.
- The electrician must comply with the provisions of the applicable accident prevention legislation.

##### **1.1.5.2 Electrically and mechanical trained persons**

A person trained in electrical and mechanical engineering is instructed by a qualified electrician or mechanic about the tasks assigned to him and possible dangers of improper behavior, as well as protective devices and protective measures. The person trained in electrical and mechanical engineering works exclusively under the direction and supervision of a qualified electrician and mechanic.

##### **1.1.5.3 Operator**



The operator uses and operates the product within the scope of this safety document. He is informed and trained about the special tasks and the possible dangers of improper behavior.

#### **1.1.6 Personal protective equipment**






At work, personal protective equipment is required to minimize health hazards.

- Always wear the necessary protective equipment during work.
- Never wear damaged protective equipment.
- Follow instructions in the work area for personal protective equipment.

#### 1.1.6.1 Basic protective equipment

	<b>Protective clothing</b> Close-fitting work clothing with low tear resistance, with tight sleeves. It is mainly used for protection from being caught by protruding parts.
	<b>Safety shoes</b> To protect against heavy falling parts and slipping on slippery surfaces.

#### 1.1.6.2 Special protective equipment for special ambient conditions

	<b>Safety goggles</b> To protect the eyes from flying parts and liquid splashes.
	<b>Face Shield</b> To protect the face from flying parts and liquid splashes or other dangerous substances.
	<b>Helmet</b> To protect against falling and flying parts and materials.
	<b>Ear protection</b> To protect against hearing damage.
	<b>Protective gloves</b> For protection against mechanical, thermal and electrical hazards.

#### 1.1.7 IT security

Observe the following recommendations for the safe operation of the product.

- Make sure that only authorized persons have access to the device.
- Use the device only within an electronic security perimeter (ESP).
- Make sure that the device is operated only by trained personnel who are sensitized to IT security.

## 2 Safety precautions

These safety precautions must be read before the first operation of this system and the operating personnel must be instructed accordingly.

- Only authorized personnel may open the system cabinet and do the mounting and dismounting of components.
- Repair or maintenance operations are to be practiced by authorized personnel only
- After completion of maintenance, repair or all other operations, the system cabinet is to be brought into safe state again. An inspection of all safety measures (e.g. emergency cut off) must occur.
- After maintenance or repairs, the control cabinet must be returned to a safe condition. An inspection of all safety measures (e.g. emergency cut off) must be done.
- The operator may **never touch live parts** if the test values are switched on. **Danger of live!**

- Because of the special conditions during a meter test, the test voltage on the open test items is not protected against unintentional touching. Therefore, the tester must do his job with the appropriate caution.
- Test voltage and test current are floating compared to the mains voltage and the protective ground.
- The user of the test material must be continuously instructed about the use of the test equipment and the required safety measures.

### 3 General

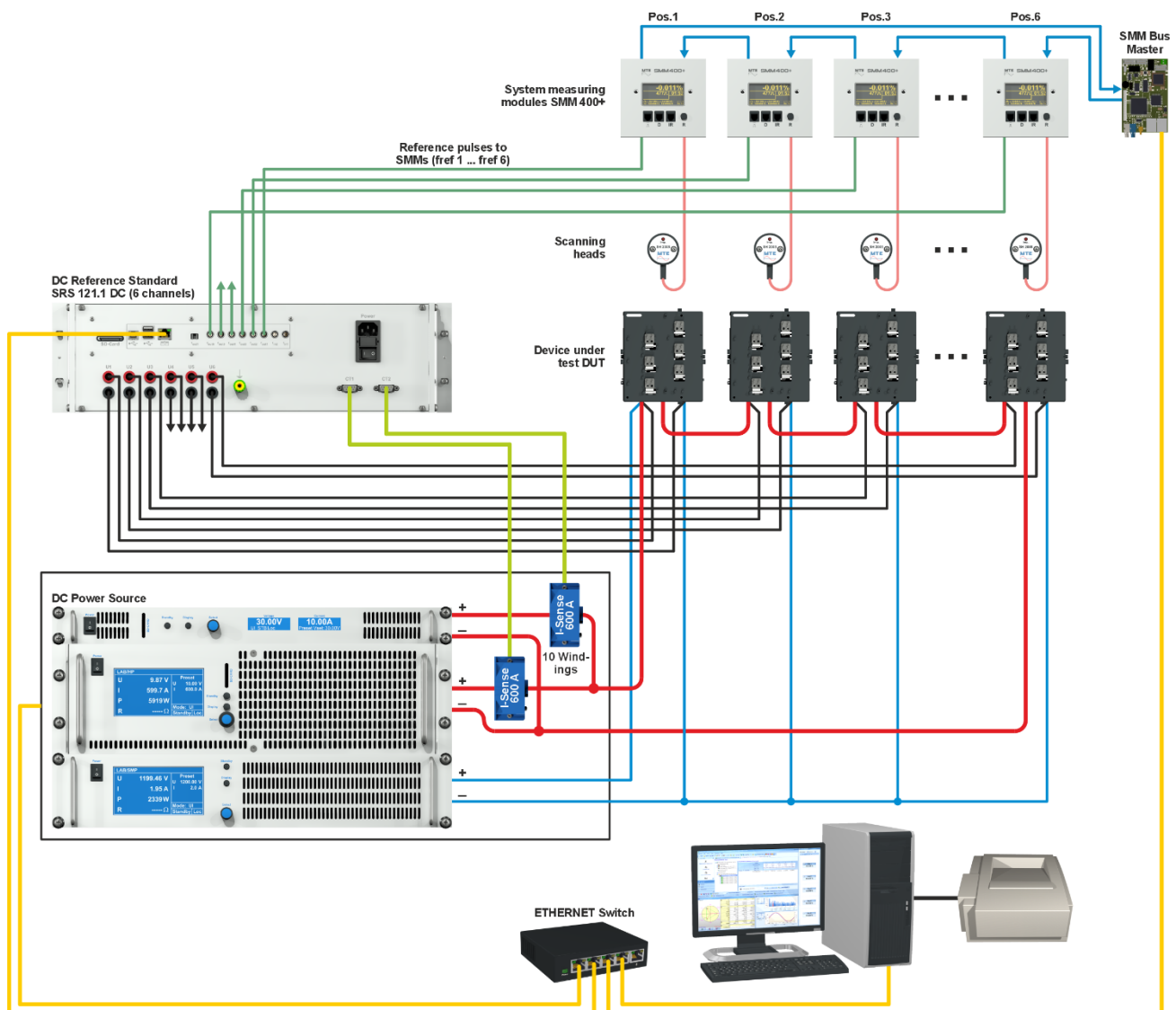
The SRS 121.1 DC is a 6-channel single-phase reference standard for DC Power/Energy accuracy class 0.04 for verification of 1 up to 6 DC Meters or DC Energy Measuring Units of EVSE (Electric Vehicle Supply Equipment) at the same time.

The voltage is measured with 6 independent channels U1 to U6. The current is measured common for all channels with two external Zero Flux Precision Current Transducers connected to the two Current Transducer inputs CT1 and CT2.

The DC Power/Energy measurement with 6 channels (voltage  $U_x$  multiplied with current  $I$ ) allows to calibrate up to 6 DUTs with closed test link (voltage and current path connected) at the same time.

The operation and processing of the measured values of this device without display is carried out by using special operation commands from a personal computer.

### 4 Block Diagram



## 5 Technical Data SRS 121.1 DC

### General

Auxiliary power supply:	88 VACmin ... 264 VACmax / 47 ... 63 Hz 125 VDCmin ... 373 VDCmax
Power consumption:	max. 45 VA
Housing:	19" plug-in unit, 3 HE
Dimensions:	W 483 x D 133 x H 326 mm
Ambient temperature:	-10 °C ... +50 °C (Operating range) +10 °C ... +40 °C (Specified range)
Storage Temperature:	-20 °C ... +60 °C
Relative humidity:	≤ 85% at Ta ≤ 21°C ≤ 95% at Ta ≤ 25°C, 30 days / year spread
<b>Safety</b>	CE
Isolation protection:	IEC 61010-1:2010
Measurement Category:	1000 VDC CAT II (2000 VDC CAT II <sup>3</sup> )
Degree of protection:	IP-20

### Measurement Ranges

Measuring Quantity	Range	Input
<b>DC Voltage</b>	10 V ... 1000 V (2000 V) <sup>3</sup>	U1 ... U6
<b>DC Current 60A / 600A</b>	0.5 A ... 60 A	CT2
	60 A ... 600 A	CT1

### Measurement Accuracy

<b>Voltage / Current</b>		≤ ± E [%] <sup>1 2</sup>
Measuring Quantity	Range	<b>Class 0.04</b>
<b>DC Voltage</b>	100 V ... 1000 V (2000) <sup>3</sup>	0.04
	10 V ... 100 V	<u>0.04</u>
<b>DC Current</b>	5 A ... 600 A	0.04
	0.5 A ... 5 A	<u>0.06</u>

<b>DC Power / Energy</b> Voltage: 100 V... 1000 (2000) V		≤ ± E [%] <sup>1 2</sup>
Measuring quantity / Input I	Range	<b>Class 0.04</b>
DC Current CT1, CT2	5 A ... 600 A	0.04
	0.5 A ... 5 A	<u>0.06</u>
<b>DC Power / Energy</b> Voltage: 10 V... 100 V		
Measuring quantity / Input I	Range	
DC Current CT1, CT2	5 A ... 600 A	<u>0.04</u> (Un)
	0.5 A ... 5 A	<u>0.06</u> + <u>0.04</u> (Un)

#### Notes

<sup>1</sup> x.x : Related to the measuring value

x.x : Related to the internal measuring range final value (full scale, FS), Un, In in the U, I range left or Un at x.x (Un) in the U range indicated above

E(M) = FS/M \* x.x (e.g. 5 A, 0.06: FS = 6 A, E(5) = 6 / 5 \* 0.06 = 0.072 %)

<sup>2</sup> at temperature + 23 °C ± 2 °C

<sup>3</sup> 2000 V version on demand

## Pulse inputs 1 ... 2

Level:	5 ... 24 VDC
Frequency:	max. 200 kHz
Supply:	12 VDC (I < 60 mA)

## Pulse outputs 1 ... 6

Pulse output 1 parallel electrical and optical (fiber optic connection)

Level:	5 ... 24 VDC				
Frequency:	max. 60 kHz				
Pulse length:	$\geq 8 \mu\text{s}$				
Supply:	12 VDC (I < 60 mA)				
<b>Meter constant:</b> DC energy	C = C <sub>0</sub> / (I <sub>n</sub> * U <sub>n</sub> ) C <sub>0</sub> = 216'000'000 [imp/Wh] The meter constant depends on the highest selected internal ranges I <sub>n</sub> , U <sub>n</sub> .				
	Internal current ranges I <sub>n</sub> [A]				
DC Current CT2	6	12	25	50	60
DC Current CT1	60	120	250	500	600
	Internal voltage ranges U <sub>n</sub> [V]				
DC Voltage U1 ... U6	30	60	120	250	500
	1000	(2000)			
	Example: U <sub>n</sub> = 500 V, I <sub>n</sub> = 250 A C = 1'728 [imp/Wh]				
Output frequency:	CPZ <sub>1</sub> = C / 3'600 [imp/Ws] f <sub>0</sub> = CPZ <sub>1</sub> * P f <sub>max</sub> = CPZ <sub>1</sub> * U <sub>n</sub> * I <sub>n</sub> = 0.48 imp/Ws * 500V * 250A = 60'000 [imp/s]				