

DC Shunt Installation Manual (EU Standard Compliance)

1. General Information

1.1 Product Overview

This DC shunt is a precision current measurement component, designed for measuring DC current in electrical systems. It is compliant with EU standards including IEC 60335-1:2020 and DIN EN ISO 13297:2021, suitable for low-voltage DC systems ($\leq 50\text{V DC}$) and single-phase AC systems ($\leq 250\text{V AC}$) as specified in relevant EU regulations[4]. The product features high measurement accuracy, stable performance, and reliable insulation, widely used in industrial equipment, power supplies, battery management systems, and other electrical devices that require precise current monitoring. It works by providing a known low-resistance path, generating a voltage drop proportional to the current, which can be measured to calculate the actual current value.

1.2 EU Compliance Statement

This product complies with the essential requirements of the European Union's Low Voltage Directive (LVD 2014/35/EU) and meets the safety and performance standards specified in IEC 60335-1:2020 and DIN EN ISO 13297:2021. It bears the CE marking, indicating its eligibility for sale and use within the European Economic Area (EEA). All markings on the product are clear, durable, and can withstand wiping with a water-soaked cloth for 15 seconds and a gasoline-soaked cloth for 15 seconds without fading or peeling.

1.3 Safety Warnings

- Installation must be performed by a qualified electrician who is familiar with EU electrical safety standards and local electrical codes.
- Before installation, ensure all power sources are disconnected and the system is in a de-energized state to avoid electric shock or equipment damage. For battery systems, disconnect all negative battery cables first to prevent communication chip damage.
- Do not install the shunt in environments with high temperature, humidity, dust, corrosive gas, or flammable substances. Avoid mounting it in closed battery compartments where moisture can enter and cause short circuits or corrosion, as

such failures are not covered by the warranty.

- Ensure the rated current and voltage of the shunt match the system parameters; overloading may cause permanent damage to the shunt or pose a safety hazard. The shunt can withstand 120% of the rated current for 2 hours, but long-term overloading is prohibited.
- Use only insulated tools during installation and wear personal protective equipment (gloves, goggles) to prevent electric shock and injury.

2. Installation Preparation

2.1 Tools and Materials Required

- Qualified DC shunt (matching the system's rated current and voltage)
- Insulated screwdrivers, spanners, or socket wrenches (suitable for the shunt's terminal bolts)
- Multimeter (for post-installation testing)
- Suitable cross-sectional area cables (complying with EU standard, recommended to use pre-wired cables if possible)
- Cable lugs, heat-shrink tubing, and crimping tool (for cable connection)
- Insulation tape, wire stripper (if cable stripping is required; note: cable stripping should be performed by a qualified electrician if unfamiliar with the operation)
- Mounting brackets, screws (corrosion-resistant, suitable for the installation environment)
- Personal protective equipment (insulated gloves, safety goggles)

2.2 Installation Environment Requirements

- Ambient temperature: $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$, relative humidity $\leq 95\%$ (at 35°C).
- Install in a dry, well-ventilated area with sufficient space for heat dissipation; ensure the shunt is away from heat sources (e.g., transformers, resistors) to avoid affecting measurement accuracy.
- The installation location should be easy to access for wiring, maintenance, and testing; ensure the shunt's screws, bolts, and terminals are reachable after installation.
- Avoid installation in areas prone to vibration or mechanical impact, as this may loosen connections and affect performance. The shunt can withstand an acceleration of 70m/s^2 and an impact frequency of 80~120 times per minute for 6 hours during transportation, but long-term vibration should be avoided during use.

2.3 Product Inspection Before Installation

1. Check the shunt's nameplate to confirm that the rated current, rated voltage, and accuracy class (0.5 class for 1~4000A, 1 class for 5000~15000A) match the system requirements.
2. Inspect the shunt's appearance for damage, cracks, or loose terminals; check the insulation layer for scratches or aging. If any abnormality is found, do not install or use the product.
3. Use a multimeter to measure the shunt's resistance value; it should be consistent with the parameters on the nameplate. For shunts with a secondary voltage drop (default 75mV, optional 50mV, 60mV, etc.), confirm the secondary voltage drop parameter matches the matching instrument (e.g., DC ammeter).

3. Installation Steps (EU Standard Compliance)

Note: The DC shunt must be installed in the negative DC line; installing it on the positive side may cause equipment damage. Follow the steps below strictly to ensure compliance with EU safety standards and measurement accuracy.

Step 1: Determine the Installation Position

Select a suitable installation position according to the "Installation Environment Requirements" (Section 2.2). Mark the mounting holes on the installation surface (e.g., metal bracket, equipment chassis) using the shunt's mounting hole positions as a template. Ensure the position allows the system's energy to flow through the shunt, as otherwise, the shunt cannot measure the current correctly.

Step 2: Fix the Shunt

1. Place the shunt on the marked installation surface, aligning the shunt's mounting holes with the marked positions.
2. Insert the mounting screws into the holes and tighten them with a screwdriver or spanner. Ensure the shunt is fixed firmly without looseness; the torque should be appropriate (refer to the shunt's product specifications) to avoid damaging the shunt or installation surface.
3. After fixing, check the shunt's levelness and stability; adjust if necessary to ensure no vibration during operation.

Step 3: Cable Connection (Critical for EU Compliance)

Cable connection must comply with EU LVD 2014/35/EU and IEC 60335-1:2020 standards. Use cables with appropriate cross-sectional area (matching the rated current) and ensure reliable connection to avoid poor contact, overheating, or fire hazards. The primary circuit cables or copper bars should be tightly connected to the shunt's main terminals.

1. Disconnect all power sources of the system again to confirm the system is de-energized. For battery systems, recheck that all negative battery cables are disconnected.
2. Strip the insulation layer of the DC power cable (positive and negative) and the measurement cable according to the required length (avoid stripping too long to prevent short circuits). If using cable lugs, crimp the cable lugs to the stripped cable ends and use heat-shrink tubing to insulate the connection.
3. Connect the DC negative cable of the power supply to the "BATTERY -" terminal of the shunt; connect the DC negative cable of the load (e.g., electrical equipment, inverter) to the "LOAD -" terminal of the shunt. Ensure the cables are inserted deeply into the terminals and tightened with the terminal screws. The torque for terminal screws should be 16 to 20 ft-lbs to ensure a secure connection.
4. Connect the two measurement wires (red and black) of the multimeter or current display instrument to the "SIGNAL +" and "SIGNAL -" terminals of the shunt respectively. Ensure the polarity is correct; reverse connection will cause incorrect measurement results. The secondary voltage drop of the shunt (e.g., 75mV) should match the input range of the measurement instrument.
5. After connection, check all cable connections again to ensure no looseness, wrong polarity, or short circuits between cables. Use insulation tape to wrap the terminal connections if necessary to enhance insulation performance.

Step 4: Post-Installation Inspection

1. Visual inspection: Check the shunt's installation position, fixing status, and cable connections again to ensure compliance with the requirements of this manual and EU standards. Confirm all terminals are tight, and insulation layers are intact.
2. Insulation test: Use a multimeter to measure the insulation resistance between the shunt's terminals and the housing; the resistance should be $\geq 1\text{M}\Omega$ to ensure no leakage. Regularly check the insulation performance during use to prevent electric leakage.
3. Function test: Turn on the system power supply, and use a multimeter to measure the voltage drop across the shunt's signal terminals. Calculate the actual current according to the shunt's resistance value ($\text{Current} = \text{Voltage Drop} / \text{Shunt Resistance}$) and compare it with the system's rated current. Ensure the measurement result is accurate (within the shunt's accuracy class) and stable. If the

reading is abnormal, check the connection polarity or whether the shunt is damaged.

4. Heat dissipation check: Run the system for 30 minutes, and check the shunt's surface temperature. The temperature rise should be within the specified range ($\leq 80^{\circ}\text{C}$ for rated current $\leq 50\text{A}$, $\leq 120^{\circ}\text{C}$ for rated current $> 50\text{A}$) after the temperature stabilizes. If the temperature is too high, check for poor contact or overloading.

4. Operation and Maintenance (EU Standard Requirements)

4.1 Daily Operation

- During operation, regularly observe the shunt's working status, including surface temperature, cable connections, and measurement results. If any abnormality (e.g., overheating, loose connections, incorrect measurement) is found, stop the system immediately, disconnect the power supply, and troubleshoot.
- Do not touch the shunt's terminals or cables during operation to avoid electric shock. The shunt's surface may be hot during operation, so avoid contact to prevent burns.
- Ensure the shunt is not subjected to external mechanical impact or vibration during operation.

4.2 Regular Maintenance

Regular maintenance is required to ensure the shunt's long-term stable operation and compliance with EU standards. The maintenance cycle is recommended to be 6 months, or as per the system's maintenance schedule.

- Clean the shunt's surface regularly to remove dust, dirt, and debris, which may affect heat dissipation and measurement accuracy. Use a dry cloth for cleaning; do not use water or corrosive cleaning agents.
- Check the tightness of the terminal screws and cable connections; retighten if loose. Loose connections may cause poor contact, overheating, or measurement errors.
- Use a multimeter to recheck the shunt's resistance value and insulation resistance to ensure they are within the specified range. If the resistance value changes significantly, replace the shunt immediately.
- Check the shunt's nameplate and markings; if they are blurred or worn, contact the manufacturer for replacement to ensure compliance with EU marking requirements.

4.3 Troubleshooting

Fault Phenomenon	Possible Causes	Troubleshooting Methods (Compliant with EU Safety Standards)
No measurement signal	1. Wrong polarity of measurement wire connection; 2. Loose terminal connections; 3. Damaged shunt or measurement instrument; 4. Shunt installed on the positive DC line	1. Disconnect power, check and correct the measurement wire polarity; 2. Retighten terminal screws; 3. Replace the shunt or measurement instrument after inspection; 4. Reinstall the shunt in the negative DC line
Inaccurate measurement results	1. Shunt's rated parameters do not match the system; 2. Poor contact of terminals; 3. Shunt is overheated; 4. Dust or debris affects heat dissipation	1. Replace the shunt with matching rated parameters; 2. Retighten terminals and check cable connections; 3. Stop the system, check for overloading, and wait for the shunt to cool down; 4. Clean the shunt's surface
Shunt overheats seriously	1. System current exceeds the shunt's rated current; 2. Poor contact of terminals; 3. Installation environment has poor heat dissipation	1. Reduce the system current or replace the shunt with a higher rated current; 2. Retighten terminals and check cable connections; 3. Adjust the installation position to improve heat dissipation
Insulation failure (leakage)	1. Insulation layer is damaged; 2. Shunt is damp; 3. Contaminated by corrosive substances	1. Replace the shunt immediately; 2. Dry the installation environment and check for moisture sources; 3. Clean the shunt and avoid contact with corrosive substances

5. EU Compliance and CE Marking

5.1 CE Marking Requirements

The CE marking on the shunt indicates that the product meets the essential requirements of the EU Low Voltage Directive (LVD 2014/35/EU) and other relevant directives. The marking is printed on the shunt’s nameplate, which is clear, durable, and complies with the requirements of IEC 60335-1:2020. The product shall not be sold or used in the EEA without the CE marking.

5.2 Disposal Requirements (EU WEEE Directive)

This product is classified as electrical and electronic equipment (EEE) and shall be disposed of in accordance with the EU WEEE Directive (2012/19/EU). Do not dispose of it as household waste. When the product reaches the end of its service life, it should be handed over to a qualified EEE recycling facility for proper disposal to protect the environment.

6. Technical Parameters (EU Standard)

Parameter	Specification (Compliant with EU Standards)
Type	DC Shunt
Rated Current	5~1000A (Customizable)
Rated Voltage	≤50V DC (Extra-low voltage, compliant with DIN EN ISO 13297:2021)
Accuracy Class	0.5 class (5~1000A)
Secondary Voltage Drop	50mV, 60mV, 75mV (default), 100mV, etc. (Customizable)
Operating Temperature	-40℃ ~ +60℃
Relative Humidity	≤95% (35℃)
Insulation Resistance	≥1MΩ

Compliance Standards	IEC 60335-1:2020, DIN EN ISO 13297:2021, LVD 2014/35/EU, WEEE 2012/19/EU
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