EN

H·I·S Renewables

HISkon+

■ pre-assembled cable harnesses

Installation Manual

04/2026

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Legal Requirements

Guarantee terms and conditions

The current terms and conditions of the guarantee can be found for download at our website *www.his-renewables.com* or can be requested by phone.

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1. Notes on the manual

1.1 Scope of validity

This manual is valid for all HISkon+® hereinafter referred to as “pre-assembled cable harness” or “harness”. In addition to this general installation manual, please observe the product-specific description and the relevant product data sheets of specific products.

1.2 Target groups

HISkon+® products must only be installed by qualified electrical specialists. For more detailed information, see *Section 2.3*.

1.3 Symbols

In this manual the following safety advice and references are used:

Symbol	Description
 Danger	Danger sign the non-observance of which can lead directly to death or to serious injury
 Attention	Danger sign, the non-observance of which can lead to serious injury
 Warning	Warning sign the non-observance of which can lead to property damage
	Information

2. Safety

2.1 Intended use

HISkon+® is a factory-assembled DC cable harness for photovoltaic systems, manufactured using certified photovoltaic cables of type HIKRA SOL or HIKRA TECH (H1Z2Z2-K) in accordance with EN 50618 and IEC 62930. The cables used in the assembly are designed for long-term outdoor operation in photovoltaic installations and are suitable for a service life of at least 25 years under normal photovoltaic operating conditions.

All connectors are factory-crimped under controlled production conditions using manufacturer-approved automatic crimping equipment. The crimping process is monitored during production and periodically verified by pull-out and electrical resistance testing. These verification methods follow the relevant requirements of IEC 62852 and IEC 61238-1. Only connectors from the same manufacturer and series shall be mated in the field unless otherwise approved.

HISkon+® is intended exclusively for the connection of PV strings between photovoltaic modules and inverters or DC combiner boxes. The product shall only be used in photovoltaic systems and shall be installed and operated in accordance with the applicable international standards and the technical specifications of the cables and connectors installed.

Installation shall be carried out in accordance with the requirements of IEC 60364-7-712 and IEC 60364-5-52 (and their national adaptations), as well as EN 50618 and IEC 62930. In particular, the installation shall consider:

- permissible operating temperature range
- minimum bending radius
- permissible mechanical loads
- environmental conditions
- routing and fastening requirements
- mechanical protection of cables

The permissible current-carrying capacity of the cable depends on the installation conditions and shall be determined in accordance with IEC 60364-5-52, considering the installation method, ambient temperature, grouping or bundling of cables, and possible thermal insulation effects. The installation contractor and system designer are responsible for ensuring that the selected cable cross-section and installation method are suitable for the expected operating current of the PV strings and comply with the system design.

HISkon+® is supplied as a pre-terminated and coiled cable harness. Each assembly is manufactured with project-specific cable lengths and pre-agreed connector types. The connectors on the module side and on the inverter or DC combiner side must be compatible with the connectors of the PV equipment. Connector types and configurations must be agreed between the customer and HIS Renewables GmbH prior to production.

Cable routing, string assignment, connector types, and cable lengths shall be defined in accordance with the installation layout provided by the installation contractor. All project-specific details requiring clarification must be agreed before production.

Before installation and commissioning, the technical specifications of all PV components, including modules and inverters, shall be checked to ensure compatibility with the system design and operating conditions.

HISkon+® has been designed exclusively for the intended use described above. Any use outside this scope, as well as deviations from the installation, commissioning, operation, or maintenance instructions, or any unauthorized modification of the product, will void all warranty and liability claims.

This manual forms an integral part of the product documentation and must always be kept accessible for installation and maintenance personnel. HISkon+® is intended solely for use in photovoltaic systems. Any other use is considered improper use.

2.2 Safety advice

This section gives safety advice which must be followed at all times and without exception, when working with the product. Please read this section carefully and observe all safety instructions at every step to prevent personal injury and damage to property and to guarantee lasting operation of the product.

Danger of fatal electric shock from high voltages!

High voltages may be present on conductive parts. Contact with live components can cause death or serious injury.

- When working on the HISkon+®, wear appropriate personal protective equipment (PPE).
- Do not touch any live components or connected/disconnected conductors.
- Before performing any work on the HISkon+®, it must be electrically isolated.
- Switch off the DC load-break switch at the inverter or DC combiner.
- Switch off the relevant sub-array or string input at the inverter or main DC distribution point.
- Ensure that all connected PV strings are de-energised.
- Disconnect the solar connectors on the HISkon+® to isolate the string cables.
- Secure any isolating devices to prevent them from being switched on again and verify that the system and all connected conductors are voltage-free.
- Earth and short-circuit the system if required by applicable standards.
- Protective covers and connector locking mechanisms must remain in place. Adjacent live parts must be covered or shielded.

Danger of fatal electric shock due to damage to the device!

HISkon+® must be checked regularly to ensure that it remains intact and may only be operated if it is in perfect, operationally safe condition. The functionality of all safety-relevant components and connections must be guaranteed.

Risk of fatal electric shock from unsecured HISkon+®

Contact with live components can cause death or serious injury. HISkon+® must be secured against access by unauthorized persons. On completion of the work, ensure that all connectors are correctly engaged and locked, and that the cable harness is routed and fixed securely.

Risk of fire and damage due to incorrect cable routing and unsecured installation.

Pre-assembled cable harnesses must be routed and supported so that they do not lie directly on the roof surface. According to IEC 60364-7-712, PV cables must be properly fastened and protected from mechanical damage; they should be installed in cable ducts, trays, or on appropriate support structures to avoid direct contact with the roof surface and to provide adequate mechanical protection.

Cable lengths, fastening points and supports must be designed and installed so that cables cannot touch the roof surface, sag, or rub against sharp edges; mechanical protection such as UV-resistant clips or cable trays should be used where necessary.

Risk from incompatible connectors and incorrect mating.

PV connectors and cables must be of the correct type and fully compatible. Connectors from different series or manufacturers such as MC4-Evo2 and MC4-Trina must not be cross-mounted, as this can lead to poor contact, increased resistance, overheating, and potential safety hazards. Connector compatibility must be verified and agreed before production and installation. (Compatibility rules are generally defined in IEC 62548 standards for PV installations.)

Warning

Damage to components by moisture, dust, or environmental exposure.

Only connect or disconnect the HISkon+® when the environment is dry and free from dust or moisture. Keep protective caps on unused connectors. Do not work during precipitation, sandstorms, or extremely high humidity.

Warning

Risk of fatal electric shock due to damaged connectors or cables!

Damaged connectors, insulation, or cables can lead to exposed live parts. High voltages may be present. Touching live components can result in death or serious injury from electric shock. Do not operate the HISkon+® if any damage is visible.

Always observe:

- The generally recognized rules of technology and all applicable legal and official regulations.
- The IEC 60364 standards, in particular IEC 60364-5-52 (wiring systems) and IEC 60364-7-712 (PV power supply systems), including cable routing, fastening and protection requirements.
- Occupational safety and accident prevention regulations of the responsible trade association.
- The rules and guidelines of the grid operator and the Technical Connection Conditions (TCC).
- If necessary, additional protective devices should be implemented based on local conditions.
- Installation and commissioning of the HISkon+® must only be carried out by qualified electrical specialists.

2.3 Qualification of the electrical specialists

All the functions described must be carried out only by qualified electrical personnel who must have the following qualifications:

- The ability to recognize risks and avoid possible dangers of electricity due to training and experience.
- Knowledge of the risks and dangers which can arise during the installation, service and maintenance of AC/DC-Cables in photovoltaic plants.
- Comprehensive knowledge of relevant standards and guidelines.
- Knowledge of the content of this document and observance of all safety advice.

2.4 Nomenclature of the type label

Symbol	Designation
	The HISkon+® itself does not generate electronic waste, as it is a pre-assembled cable harness without electronic components. After installation, only packaging and auxiliary materials remain, such as cable drums, wrapping film used to secure the palletized drums, and protective plastic caps on the connectors. • Protective caps must be disposed of as plastic waste in accordance with local regulations. • Wrapping film must be disposed of as plastic packaging waste in accordance with applicable recycling requirements. • Cable drums must be disposed of or recycled as wooden waste in accordance with local disposal regulations. All packaging and residual materials must be disposed of in compliance with the applicable local, national, and environmental regulations.

Symbol	Designation
CE	The HISkon+® complies with the relevant EU guidelines.
EN50618 IEC 62930	Certified solar cables according to EN50618 /IEC62930 / TUV 2PfG2750, offering a 25-year lifetime and exceptional resistance to water and weather conditions.
	Impact-Resistance UL 854.23 and Crushing-Resistance UL 854.24 (internal examination)
	Minimum temperature for installation -25 °C

3. Scope of supply

3.1 Drum Weight and Pallet Identification

Up to **18 cable drums** (*see Figure 1.1*) can be packed on a single pallet, ensuring efficient transportation, storage, and handling. The optimized pallet configuration allows for secure stacking and minimizes space requirements during logistics and on-site delivery.

The drums are fastened and protected with wrapping film to prevent movement and damage during transport. This packaging concept ensures safe delivery and simplifies unloading and installation logistics on site.

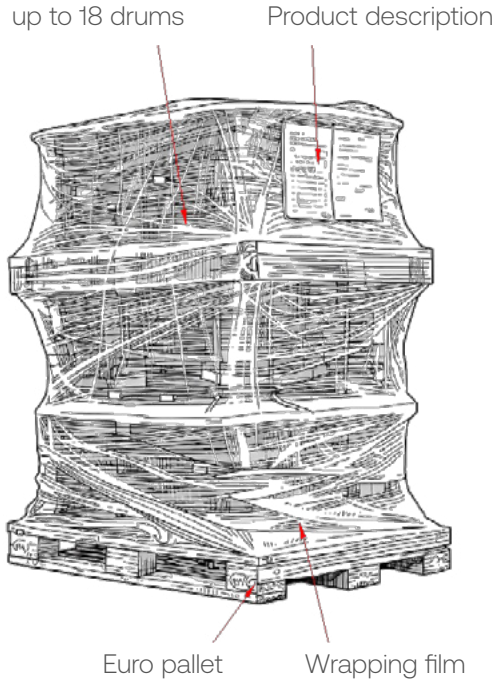


Figure 1.1

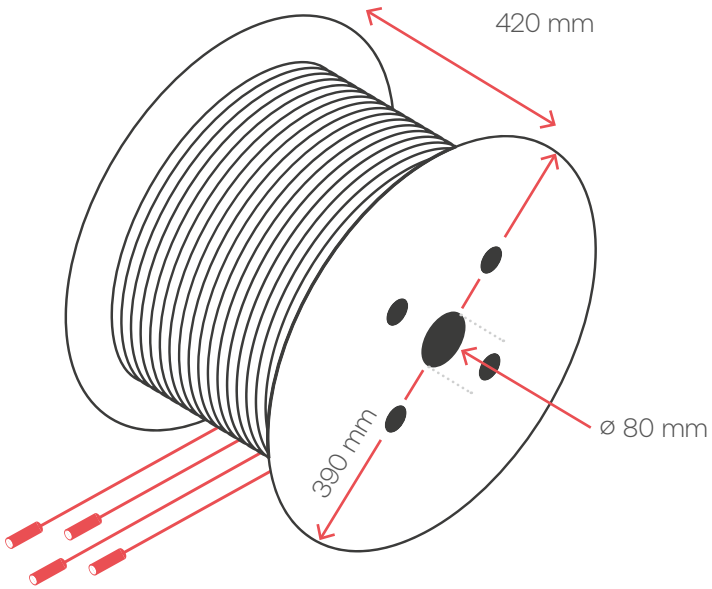


Figure 1.2

3.2 Drum configuration

Each drum can accommodate up to 6 cable strings (12 separate cables). By default, the HISkon+® cable harness is manufactured using black photovoltaic cable.

Upon project-specific request, the cable harness can be supplied in a two-colour configuration (red for positive "+" and black for negative "–") for polarity identification.

The assembly is based on certified HIKRA® photovoltaic cables compliant with EN 50618, IEC 62930 and TÜV 2PfG 2750. Detailed technical characteristics, electrical ratings and environmental properties of the HIKRA® solar cables are specified in the corresponding product datasheets, which form an integral part of the product documentation.

The cables are offering a service life of 25 years and provide exceptional resistance to water, UV radiation, and harsh weather conditions, ensuring reliable performance in outdoor and long-term photovoltaic installations.

The cables feature high mechanical durability, excellent insulation stability, and low electrical resistance, making them suitable for high-current DC applications.

PV connectors (e.g. Stäubli MC4, MC4-Evo2 or equivalent connectors from Tier-1 PV connector manufacturers) can be supplied and factory-assembled upon customer request. Connector type, current rating and compatibility with PV modules and inverters shall be defined and agreed prior to production.

Cable length of HISkon+® per the Drum:
4 mm^2 → up to 1000 m
6 mm^2 → up to 800 m
10 mm^2 → up to 500 m

Each cable drum has a maximum weight of up to **65 kg**. For a fully loaded drum with **500 m of 10 mm^2 cable**, the cable weight is approximately **60 kg**, plus **5 kg** for the empty drum itself.

Each pallet has its own unique identification, which must be checked against the shipping documents to correctly determine which drums are packed on which pallet. This ensures that the correct drums can be delivered quickly and easily to the designated cable unrolling location on site.

In cases where operational or logistical constraints apply, HISkon+® cable assemblies with short string lengths (10 m / 20 m / 30 m) that cannot be combined with other strings on a single drum shall preferably be supplied as cable bundles instead of drums, to optimize handling and packaging efficiency.

The cable bundles shall be delivered in sealed, moisture- and dust-proof packaging, providing protection against environmental contamination during transportation, storage, and on-site handling, and preserving the electrical and mechanical integrity of the cable system.

As an optional packaging variant, HISkon+® cable assemblies may be supplied in cardboard boxes, upon customer request.

For drum-based deliveries, it is recommended to design the drum layout for the maximum achievable total cable length, subject to the selected cable cross-section, bending radius, and allowable drum load.

This approach ensures optimal material utilization, reduced cable waste, and improved installation efficiency at the photovoltaic power plant construction site, minimizing cable handling, cutting operations, and installation time for the installation contractor. The labeling shown in Figure 1.3 and Figure 1.4 are provided for illustration purposes only. The project-specific identification and naming convention for cable drums shall be defined by the customer or EPC and agreed prior to production. Any equivalent labeling system suitable for correct installation and traceability may be used.

Figure 1.3

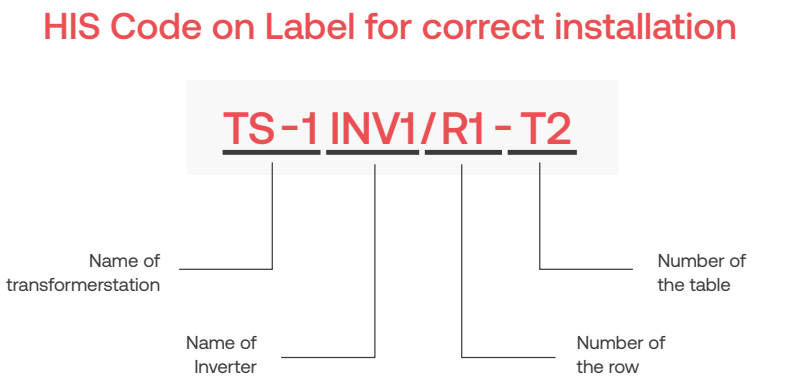


Figure 1.4

3.3 Identification & Labeling (Default from Factory)

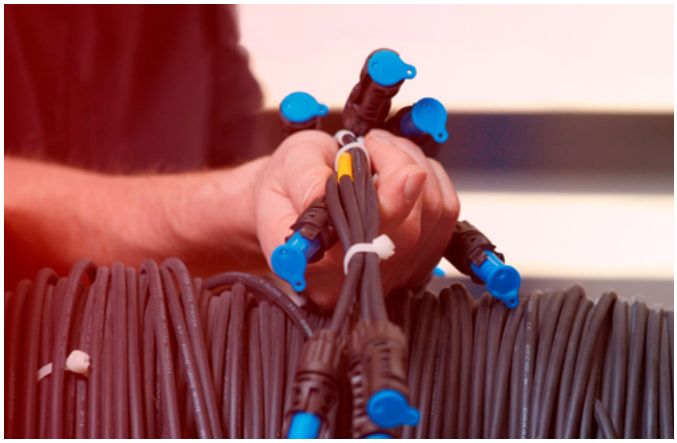
All HISkon+® cable harnesses are supplied from the factory with a standardized identification and labeling system to ensure correct installation and to prevent wiring errors on site.

Each cable harness is equipped with color-coded labels to clearly distinguish the connection sides: a white label marks the inverter side, and an orange label marks the module side. This visual differentiation allows installers to immediately recognize the correct orientation of the cable during installation.

In addition, each cable harness is provided with a string identification, which uniquely identifies the harness and assigns it to a specific PV string or inverter input. This ensures that every cable can be routed and connected to the correct inverter or DC box without confusion.

Furthermore, the polarity of each conductor is clearly marked with “+” and “–” symbols. This polarity marking ensures correct DC connection and helps prevent reverse polarity, which could lead to equipment damage or safety hazards.

This factory-default identification and labeling system enables fast, safe, and error-free installation of the HISkon+® on site.



4. Storage & Installation

4.1 Storage conditions

Please ensure that for long-term storage of HISkon+®, the ambient temperature is between -25 °C and +40 °C, and the relative humidity is between 0% and 50%. Additionally, make sure all the cable caps are sealed during the storage period. In case of any unexpected issues after long-term storage, the customer must contact HIS before commissioning HISkon+®.

4.2 Installation

Do not carry out any installation work on the HISkon+® in rainy, foggy, or very humid conditions (>95%), in environments with high levels of dust, or under other adverse external conditions. Installation must only be performed under suitable weather and environmental conditions to avoid damage to the cable harness and connectors.

4.3 Choice of installation site

Danger of fatal electric shock from fire and explosions. Do not:

- Route or place the HISkon+® on flammable materials.
- Install or route the cable harness in areas with easily combustible materials.
- Do not install or route the HISkon+® in areas with a risk of explosion.

4.4 Requirements

Warning

- The installation area must always be accessible; emergency exits must not be blocked and must not be in residential or office spaces.
- The cable route must be mechanically protected and free of sharp edges.
- The cable route must be suitable for the cable length, diameter, and bending radius of the HISkon+®.
- The installation path must be sufficiently stabilized and secured against vibration and movement in all directions.
- Protection from extreme temperatures: climatic conditions must be complied with (see data sheet).
- The HISkon+® must not be exposed to direct sunlight and must be protected from rain and splashing water.
- The cable harness shall be routed on suitable support structures, cable trays or mounting profiles where required by the installation concept and applicable standards. Direct contact with surfaces that could cause mechanical damage shall be avoided unless the selected cable type and installation method permit such routing.

4.5 Installation Variants

4.5.1 Installation with Vehicle-Mounted Cable Unwinder

Step 1

Install the drum(s) on the cable unwinder mounted on the vehicle (*see Figure 1.5*).

Step 2

Identify the ends of the cable:

- **Orange label** → module side
- **White label** → inverter side

Step 3

Place the **orange**-labeled connectors into the mounting profile. If required, secure the cables with cable ties to prevent lateral movement.

Figure 1.5

Step 4
Move from the **module side** towards the **inverter/DC combiner** at a low, controlled speed. The installer must manually monitor:

- The cable position in the mounting profile.
- The correct separation of strings.

Continue until the full cable length is installed.

Figure 1.6

4.5.2 Manual Installation (without vehicle)

Step 1
Place the cable unwinder near the **inverter** or **DC combiner**.

Step 2
Mount the drum on the unwinder.

Step 3
Pull the cables manually using the orange-labeled ends. Lay the cables temporarily on a suitable prepared surface.

Before laying the cables on the ground, the installation path and surface shall be checked and cleared of sharp objects such as stones, metal parts, reinforcement bars, debris or other objects that could damage the cable and connectors. Cables shall not be dragged over sharp edges or abrasive surfaces.

4.5.3 Installation between module tables (cable bridges)

Routing of the HISkon+® cable harness between module tables may be carried out on support structures without additional protective braiding or corrugated conduits.

HIKRA® solar cables used within the HISkon+® assembly are suitable for such installation methods when installed in accordance with the cable manufacturer's specifications and the project-specific installation design.
HIKRA® solar cables are suitable for direct burial installation without additional mechanical protection (e.g. braided sleeve or conduit), if installation depth, soil conditions and other requirements specified by the cable manufacturer and applicable standards are observed.

Notwithstanding the above, it is recommended to provide local mechanical protection in areas where the cable may come into contact with mounting structures, fasteners, bolts, sharp edges or other components that could cause mechanical damage during installation or operation.

Upon customer request, HISkon+® cable assemblies may be factory-supplied with an overall polyester braided sleeve (*see Figure 1.7*). Depending on the selected configuration, up to 12 individual cables may be installed within a single braided sleeve. The use of braided protection and the number of cables per sleeve shall be defined according to project requirements and agreed prior to production.

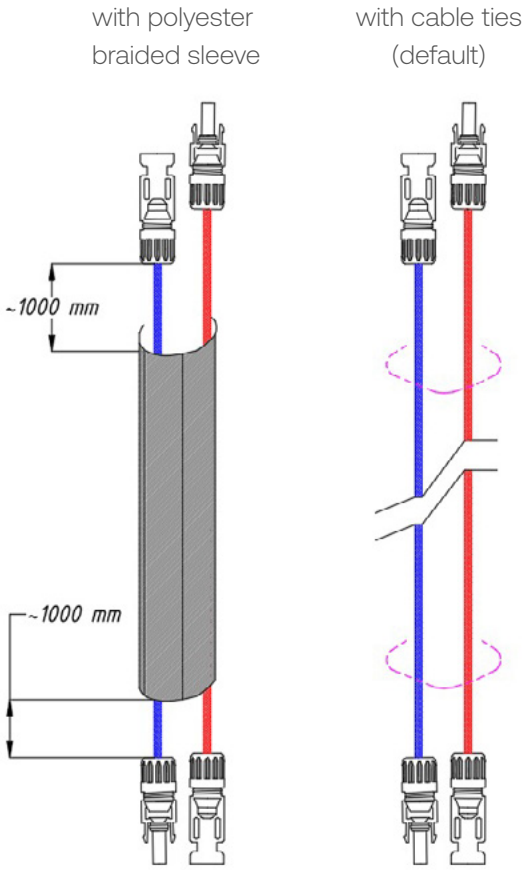


Figure 1.7

Responsibility for defining the detailed routing concept, mechanical protection measures and compliance with project-specific installation requirements remains with the installation contractor and system designer.

The sheath dimension and configuration shall be selected so that sufficient space is available for cable movement, heat dissipation and installation tolerances. The permissible number of cables per sheath shall be determined based on:

- outer cable diameter
- permissible bending radius
- installation method
- sheath manufacturer's specifications

The selected filling ratio shall prevent excessive compression of cables, thermal accumulation or restriction of flexibility. Adequate thermal dissipation and grouping effects shall be considered when determining the permissible current-carrying capacity in accordance with IEC 60364-5-52.

Final verification of the sheath configuration and number of cables per sheath shall be carried out as part of the project-specific installation design by the installation contractor or system designer.

Cable routing between tables shall ensure that:

- no tensile load is applied to connectors
- minimum bending radius is maintained
- cables are protected from abrasion and sharp edges
- sufficient clearance from ground and structure is maintained
- cables are secured against movement caused by wind or mechanical forces

For tracker systems or moving mounting structures, sufficient cable slack and strain relief shall be provided to accommodate operational movement. Cable routing shall be designed to prevent mechanical stress on connectors during operation. Where required by the installation concept, drip loops shall be provided to avoid water ingress into connectors.

Where cables are installed directly in the ground, installation depth, soil conditions and mechanical protection measures shall comply with the cable manufacturer's specifications and applicable standards. The suitability of direct burial installation shall be verified for the selected cable type.

The exact routing concept, number of cables per sheath, fixing distances, burial conditions and strain-relief measures shall be defined by the installation contractor or system designer in accordance with the project-specific installation layout.

The installation contractor and system designer remain responsible for defining the detailed cable routing concept and ensuring compliance with project-specific requirements and applicable standards.


Warning

Note:

All cables on the drum are bundled together using cable ties.

During manual pulling:

- Monitor cable behavior continuously.
- Prevent cable ties from snagging on the mounting profile.
- Untangle the cables immediately if resistance occurs.

5. Final Connection


Attention

Perform a **visual inspection** of cable routing and fixation in the mounting profile. Ensure that all cables are correctly positioned and secured.

⚠️Important note before insulation testing:

Before performing insulation resistance tests using a suitable measuring device (e.g. Benning insulation tester), all protective plastic caps must be removed from the connectors to ensure correct measurement results and to prevent damage to the test equipment.

- Verify correct string assignment and polarity
- Connect orange-labeled cable ends to the PV modules
- Connect white-labeled cable ends to the inverter

6. Commissioning


Danger

Danger of fatal electric shock from high voltages!

High voltages may be present on conductive components. Contact with live parts can cause death or serious injury.

- Ensure that the PV inverter is switched off and isolated from the DC side.
- Ensure that all relevant DC disconnectors are switched off (OFF position).
- Ensure that all connectors are disconnected and that no PV strings are connected to an energized PV generator.
- Ensure that the HISkon+® cable harness is de-energized.

Danger

- Personal protective equipment (PPE) must be worn while working on the HISkon+®.
- Do not touch any conductive components or connected / disconnected conductors.
- Secure any isolating devices to prevent them from being switched on again and verify that all parts are voltage-free.
- Earth and short-circuit the system if required by applicable standards.
- Do not remove protective caps or covers from connectors unless the system is voltage-free.
- Adjacent or energized parts must remain covered.

6.1 Verification before Connection

Danger

Use only appropriate measuring instruments rated for DC applications.
Ensure that the measuring device is suitable for the maximum system voltage (up to 1500 V DC).

- Ensure that the PV inverter is switched off and isolated from the DC side.
- Ensure that all PV strings are disconnected from the live PV generator.
- Measure the open-circuit voltage of each PV string.
- Check the polarity (+ / –) of each string. Never connect polarity-reversed strings.
- Verify that all strings have the same polarity and comparable voltage levels.
- Never connect strings with significantly different voltage levels.
- Do not make connectors under load. Connectors are not designed for load switching.

6.2 Connecting the HISkon+®

Danger

Ensure that the PV inverter is switched off and isolated from the DC side. Ensure that all PV strings are de-energized. Wear personal protective equipment. After the voltage verification (*see 6.1*) has been carefully completed and all safety rules have been followed, the connectors of the HISkon+® may be mounted.

- Connect the orange-labeled connectors to the module side.
- Connect the white-labeled connectors to the inverter or DC combiner side.
- Ensure that all connectors are fully engaged and properly locked.
- Ensure that polarity markings (+ / –) are correctly observed.

6.3 Final Checks

Danger

- Ensure that all connectors are correctly mounted and locked.
- Ensure that cable route is correct and that cables are mechanically protected.
- Ensure that the HISkon+® is not under mechanical tension and that the minimum bending radius is respected.
- Ensure that all protective covers and caps are installed where required.
- Ensure that the inverter and all upstream DC components are ready for operation

Important Notes:

- All cable lengths, connector types, labeling, and string assignments must be confirmed and approved between the customer and HIS Renewables GmbH **before the start of production** of HISkon+®.
- The HISkon+® is operated in the same manner as standard DC solar cables.
- In case of insulation damage during installation or operation, the damaged cable section must be replaced. Alternatively, the damaged section may be cut out and manually re-terminated using the correct and approved connector type.
- Manual termination and repair work may only be carried out by specially trained and qualified personnel.
- In the event of unforeseen situations or uncertainties, always contact **HIS Renewables GmbH**.

7. Maintenance

Attention

Note the safety advice in *Sections 2.2* and *2.3*.

The HISkon+® must be checked regularly for function and safety.

This includes in particular:

	Check	Recommended frequency
No visible damage to cables, insulation, or connectors	Visual inspection	Annually
No excessive amounts of water, dust, or contamination on cables and connectors	Visual inspection	Annually
Correct seating and locking of connectors	Visual inspection	Annually
Insulation properties	Insulation test	Every 5 years
No signs of overheating, discoloration, or burn marks	Visual inspection	Annually
Cable routing and fastening in mounting profiles or trays	Visual inspection	Annually

Electrical installations and fixed electrical equipment must be maintained regularly in accordance with the applicable standards. Maintenance is the responsibility of the plant operator.

When replacing components or repairing cable sections, only identical or approved components and connector types may be used.

If you have any questions, please contact the manufacturer

8. Further Information

For detailed information please see the Datasheet and Manual of your specific HIS Product.

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