

Maximising yield with simple, safe and reliable components for installation



Dr. Rüdiger Meyer

Manager Product Marketing
Field Device Connectors
SOLAR / DEVICE

Lifetime Management of PV systems

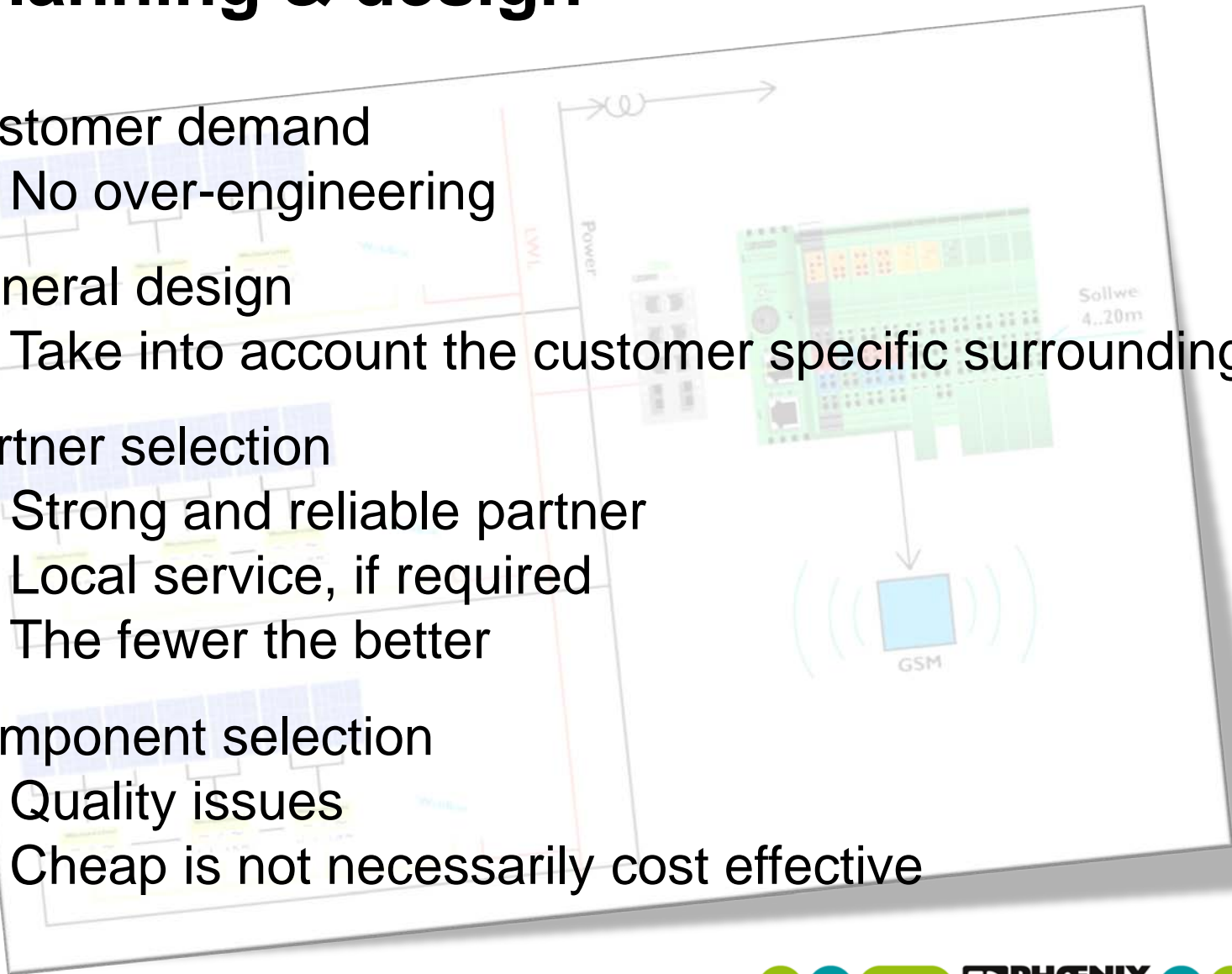
1 – Planning

2 - Installation

3 - Operation

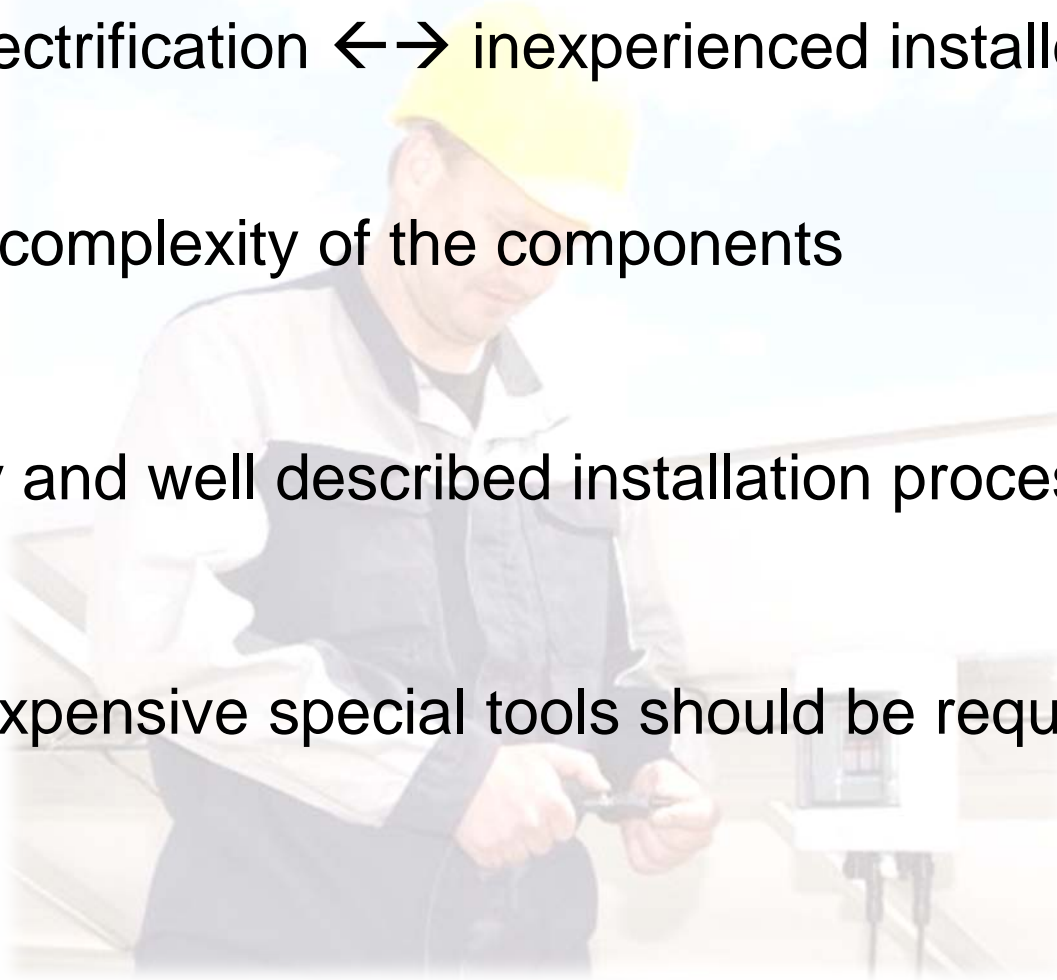
1 – Planning & design

- Customer demand
 - ✓ No over-engineering
- General design
 - ✓ Take into account the customer specific surroundings
- Partner selection
 - ✓ Strong and reliable partner
 - ✓ Local service, if required
 - ✓ The fewer the better
- Component selection
 - ✓ Quality issues
 - ✓ Cheap is not necessarily cost effective

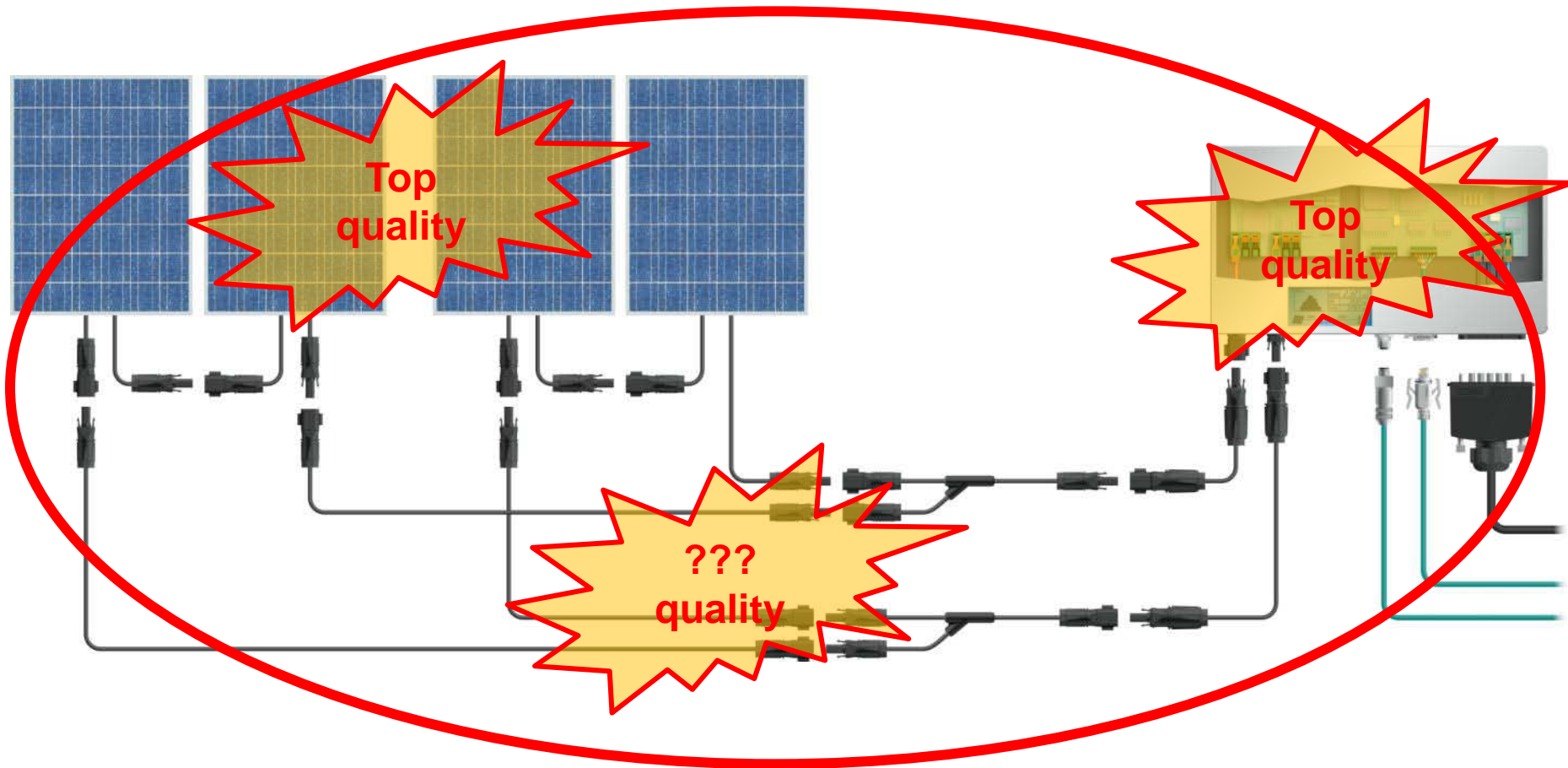


2 – Installation

- Rural electrification \leftrightarrow inexperienced installers
 - ✓ Low complexity of the components
 - ✓ Easy and well described installation process
 - ✓ No expensive special tools should be required



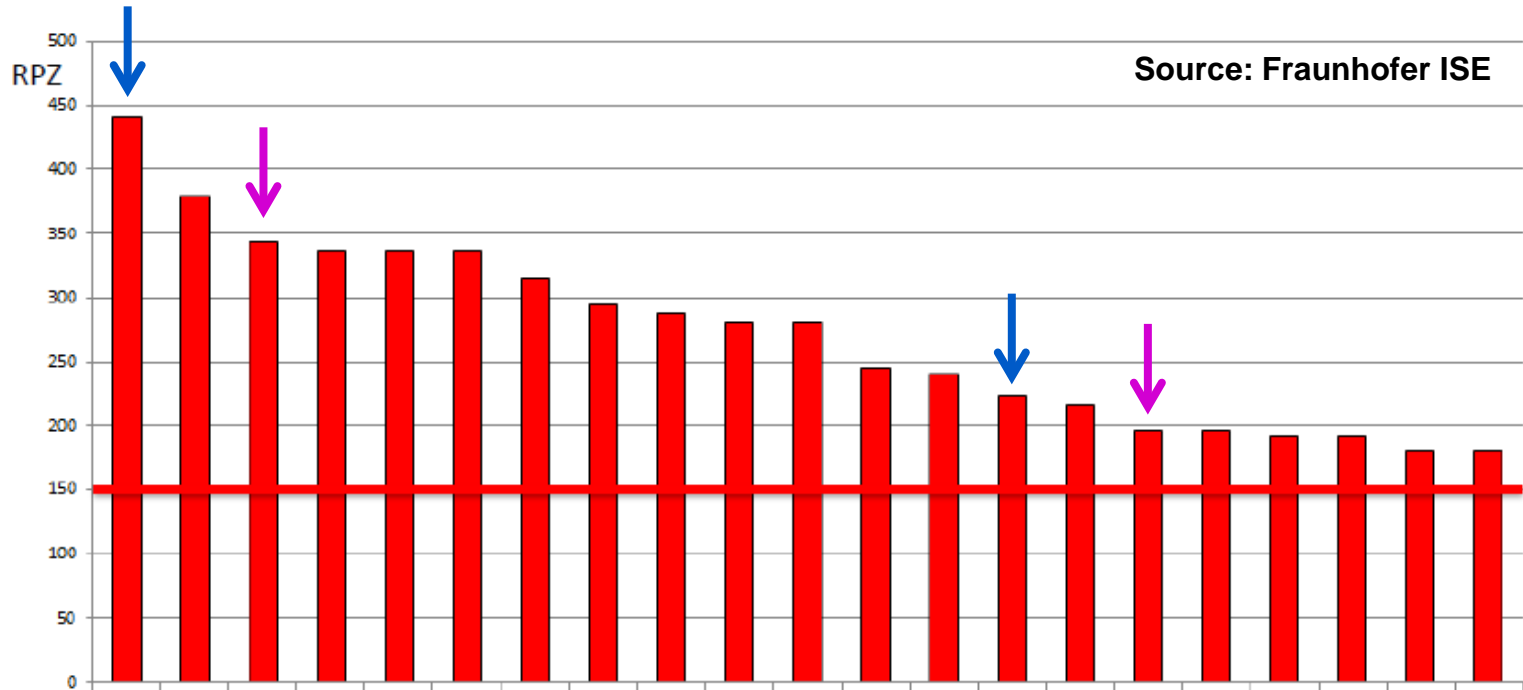
2 – Installation – System yield



System yield is determined in the field!

2 – Installation – Focus on DC cabling

Risk analysis of failures in PV systems



different DC connector types

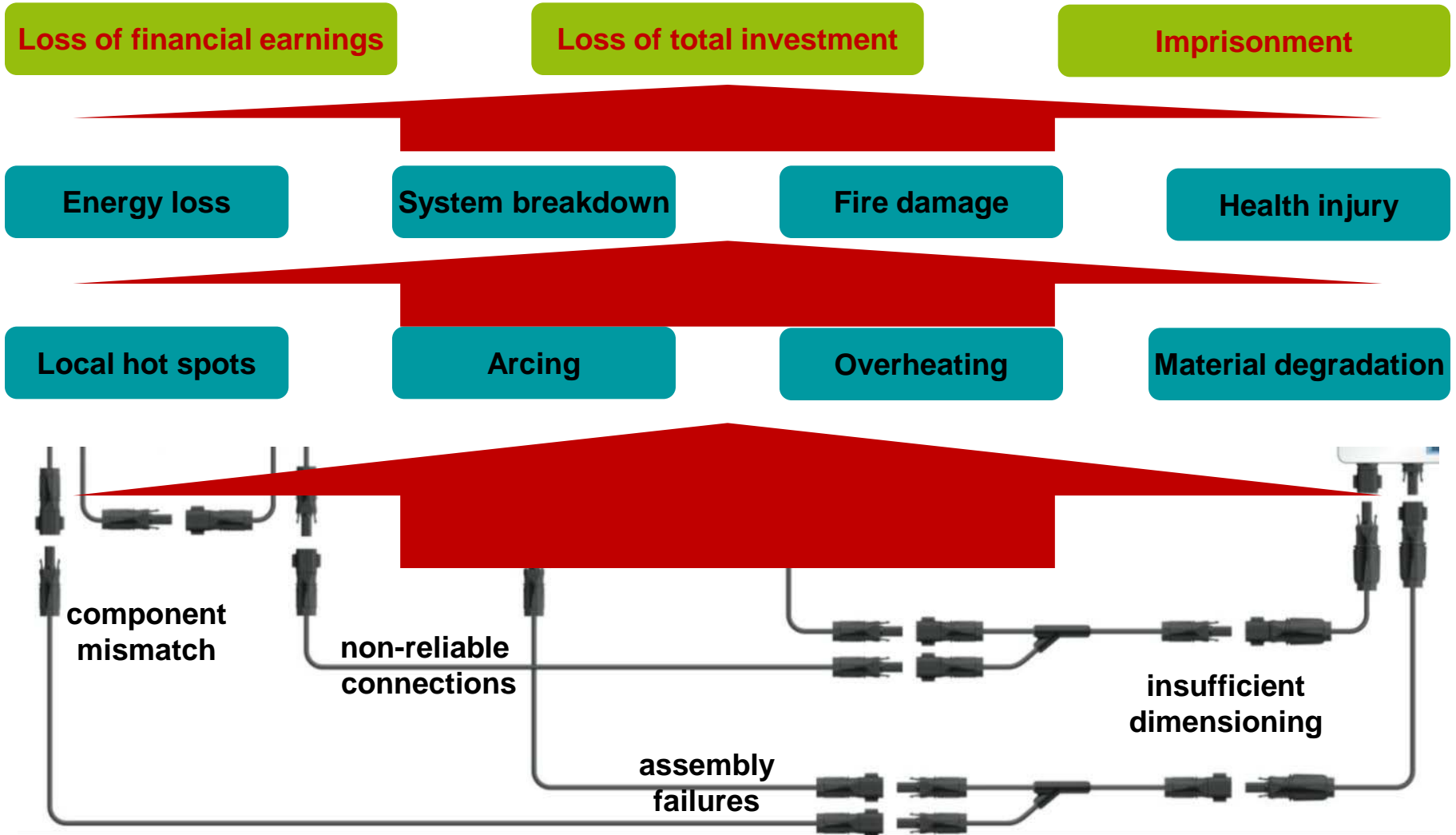
non-reliable DC connection

crimp DC connector

damaged DC connectors

2 – Installation

Possible failures und consequences



2 – Installation

Component mismatch

Transition resistances cause heating

Emitted equivalent electric

Lost energy causes millions of medium size PV systems:



2 – Installation

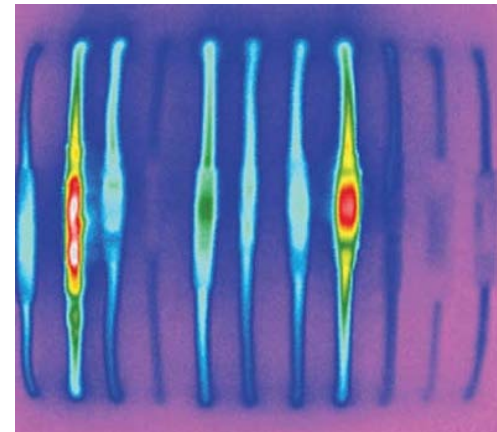
What the experts say!!



GRID-CONNECTED SOLAR PV SYSTEMS

Install and Supervise Guidelines
for Accredited Installers

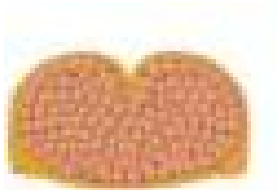
7.8.7 Only connectors which are the same type/model from the same manufacturer are allowed to be married at a connection point.



2 – Installation

Effects of assembly failures

Correct crimp zone acc. to
EN 60352-2, UL486A/B



... after few months of operation.



to wrong crimp tool

Installation – SUNCLIX from Phoenix Contact



- Spring force technology – consistently safe and reliable connections without special tools

Assembly – 3 simple steps



Insert the stripped PV conductor



Press spring and snap in

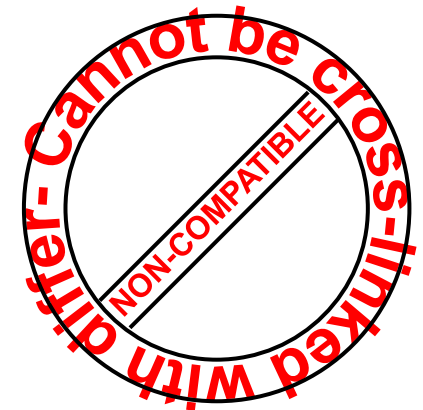


Tighten the screw connection

Unlocking



Can only be released by using a screwdriver



2 – Installation Examples



Example PV installation in India

How it should NOT look like!

How it COULD look like!



PHOENIX CONTACT String Combiner Box

3 – Operation

➤ Protection

✓ Anticipate unexpected occurrences

➤ Service

✓ Monitoring may help in case of troubleshooting

3 – Operation

Minimizing maintenance costs

Unexpected occurrences

Searching for the needle in the haystack



Overvoltage protection

DC string monitoring



Fuse terminal blocks

Summary

- Successful *Rural Electrification* with PV needs
 - Specific planning and design
 - Consistently safe and reliable components
 - Non-complex installation skills
 - Effective protection and service in operation
- Cheap is not necessarily cost effective
- Strong partners with worldwide local presence are advantageous

PHOENIX CONTACT

One-stop shop for reliable solar solutions

String monitoring

Effective DC monitoring

- No add. 24V supply
- Modbus interface
- Scalable structure

PV combiner box

Fully qualified boxes

- 8 / 12 / 16 - String
- -40 .. +45 °C
- Monitoring included
- Protection included

PLC & interfaces

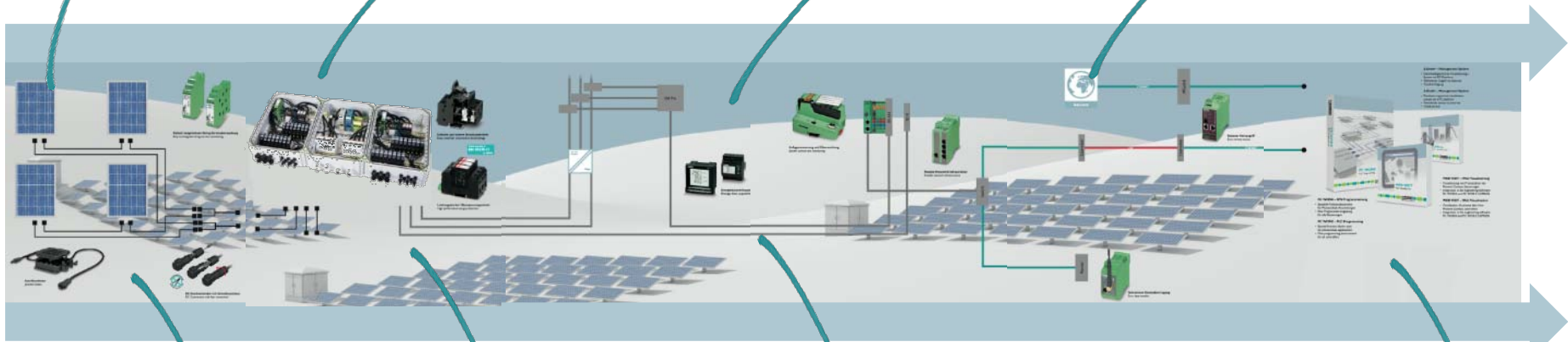
Data, Control & logging

- Software function library
- Inverter interfaces
- Data logging

Communication

Wired & wireless

- Switches & routers
- Cu & FO interfaces
- Wired & wireless
- Firewalls & VPN tunnels



Field cabling

Easy & quick

- Fast & easy
- No crimping
- No special tool

Protection

Increase performance

- Made for PV applications
- Crystalline & thin film panels
- Proved in many applications

AC monitoring

Acquisition & power supply

- AC monitoring
- Solution-in-a-box
- Fully qualified customer solutions

Software

Visualisation & control

- Programming
- Visualisation
- Diagnostics

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