

RADOX[®] Solar Blue-Safety

Fire protection system for PV installations

Edition 2013



Reliable and safe connections





Your partner for integrated solutions

HUBER+SUHNER is a leading international manufacturer and supplier of components and systems for electrical and optical wireless connectivity. HUBER+SUHNER unites core competencies in radio frequency, fiber optics and low frequency technologies under one roof and offers a high quality product range for the communication, transport and industrial markets.

Solar technology with a system

HUBER+SUHNER offers a wide range of quality products in particular for solar technology applications that are exposed to the weather. The materials that we use are subjected to the toughest tests possible in our laboratory to make sure the products can stand up to extreme demands and can work safely and reliably for decades. Thanks to our experience and expertise, we offer perfectly matched components and customer-specific system solutions from a single source.



PV plants - perfectly protected and monitored

Safety systems are already required for PV installations in many countries to allow the photovoltaic modules to be switched to a voltage- and current-free state in case of fire.

The RADOX® Solar Blue-Safety fire protection system offers this possibility. The system thus increases plant safety and guarantees safe fire-fighting in case of fire, as well as safe conditions for maintenance work.

On top of this, the system offers important monitoring functions. Voltage, temperature and current can be monitored; individual modules can be switched off if critical temperatures are exceeded, or if safety-relevant system components fail.

RADOX® Solar Blue-Safety

This is what the system offers

- Safe working conditions for fire-fighters, installers and maintenance personnel
- Ability to switch off the voltage and current of individual solar modules
- Automatic switch off in case of individual solar modules overheating
- Performance monitoring for individual modules

Features

- Scalable solution to fit any size of PV installation
- Patented Power Line Communication (PLC)
- Minimal power loss in case of shading thanks to active bypass elements
- Safety Integrity Level 2 (SIL2) in accordance with DIN EN 61508

Conformity

RADOX® Solar Blue-Safety system

The system meets the requirements of existing national guidelines for the maintenance of safety in photovoltaic installations in the case of fire fighting or technical assistance, such as:

- DE: VDE-AR-E 2100-712
- F: UTE C15 712-1&2
- USA: NEC2014

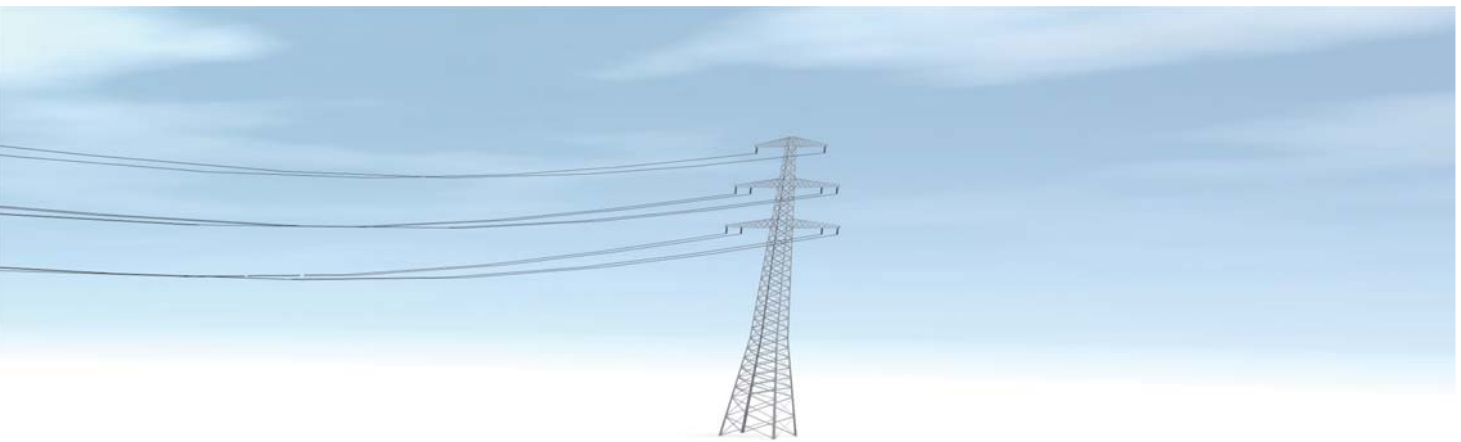
The system meets the requirements for functional safety of electrical and electronic systems as per DIN EN 61508 Safety Integrity Level 2 (SIL2).

RADOX® SolarBox HM-Blue-Safety

The junction box meets the requirements of DIN EN50548 and UL3730 for junction boxes for photovoltaic modules.

The fire protection system



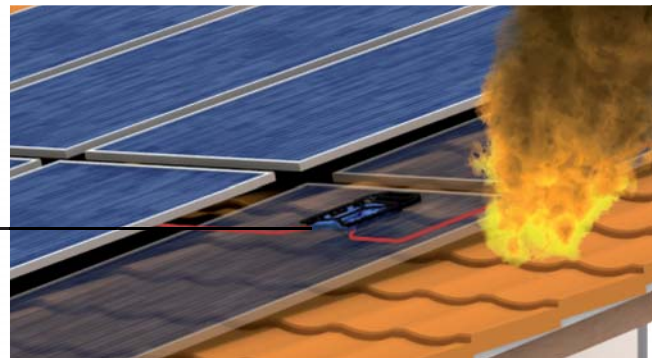


Mode of operation

- Switch off of all solar modules when the fire emergency switch is actuated (e.g. for extinguishing work or system maintenance)
- Switch off of all solar modules in case of faulty DC wiring (e.g. wire break, rodent bite, opening connectors under load)
- Switch off of individual solar modules in case of overheating (e.g. in the vicinity of a fire source or in case of hotspots in the PV module)

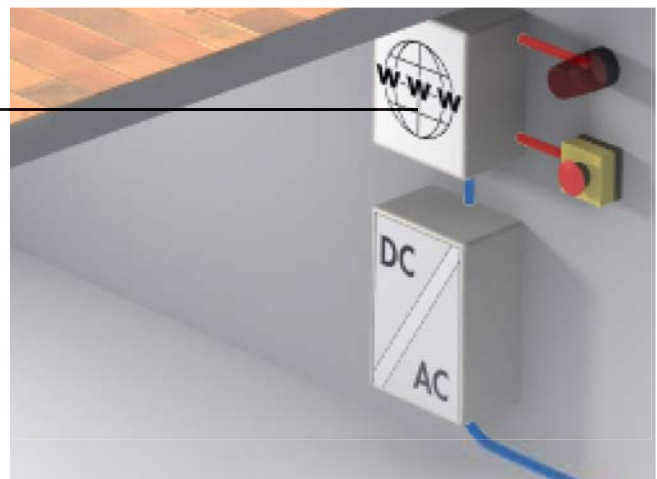
Component overview

Junction box with integrated safety switch



Combiner box with

- Central unit
- String control unit
- Monitoring and communication



RADOX® SolarBox HM-Blue-Safety

The RADOX SolarBox HM-Blue-Safety is an essential part of the Blue-Safety fire protection system. The junction box provides the electrical connection between the individual solar modules.

Thanks to the safety switch built into the box, individual modules can be switched-off in case of fire or for maintenance.

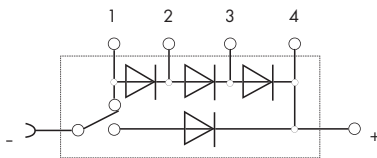
An integrated temperature sensor also registers potential overheating of the solar modules, thus allowing a timely shutdown of a defective PV installation before ignition of a fire.

In addition to this, the junction box has active bypass elements. With a very low power loss in bypass mode, they protect the cells in the solar panels in shaded conditions.

Patented wired communication (Power Line Communication) transmits the performance data of each solar module to the optional Blue-Safety-M communication unit.



Switching principle



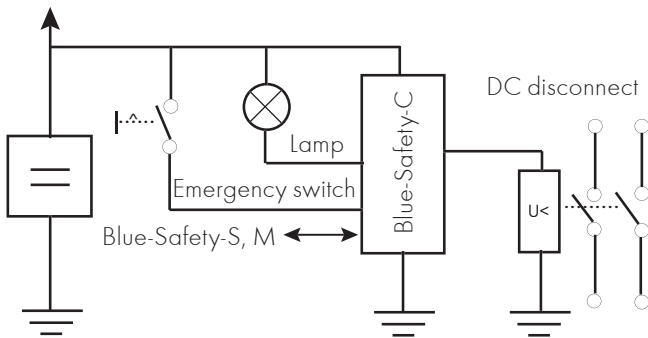
Technical data		
General data	system voltage	1000 V DC
	max. module voltage (V_{OC})	80V DC
	rated current	10 A
	protection class	IP67
	ambient temperature range	-40 °C to +85 °C
	dimensions	62 x 128 x 26 mm
Monitoring	data transfer	Power Line Communication
	frequency	1 data sample/second
	module voltage	accuracy: +/- 3 %
	temperature	accuracy: +/- 2 °C

Central unit: Blue-Safety-C

The Blue-Safety-C module controls the DC disconnecting switch of the photovoltaic installation. The current flow can thus be interrupted in case of fire or for maintenance. Potentially dangerous electric arcs are thus permanently extinguished. Connections exist for an external fire service emergency switch and signal lamp. Additionally, the Blue-Safety-C module provides the supply voltage to the series-connected Blue-Safety-S and Blue Safety-M components.



Switching principle



Technical data		
General data	iInstallation	on DIN Rail
	protection class	IP20
	ambient temperature range	-30 °C to +70 °C
	dimensions	145 x 72 x 90 mm
Connections	Blue-Safety-S modules	up to 4 units (max. 8 strings)
	Blue-Safety-M modules	1 unit
	power supply	24V DC +/- 5% / 15 W
Fire service switch and signal lamp	switch type	normally closed
	switching voltage	24 V DC
	switch tripping level	$U < 24 \text{ V DC}$
	signal lamp	24V DC / max. 3W

String control unit: Blue-Safety-S

The Blue-Safety-S module controls the junction box installed on each solar module and provides the release signal for switching on the solar modules. Personnel can safely work on the solar modules until the release signal is issued. The modules are not switched on until connected to the system.



Technical data		
General data	installation	on DIN Rail
	protection class	IP20
	ambient temperature range	-30 °C to +70 °C
	dimensions	145 x 99 x 90 mm
DC inputs	number of DC inputs	2
	system voltage	1000 V DC
	rated current	12.5 A
	number of Blue Safety solar boxes	up to 24 units per line
	connection terminals	spring terminals (max. 6 mm ²)
DC outputs	number of DC outputs	1
	system voltage	1000 V DC
	rated current	25 A
	connection terminals	spring terminals (max. 6 mm ²)

Monitoring and communication: Blue-Safety-M

On request, the fire protection system can be extended with the Blue-Safety-M module. This optional component records and monitors the performance of the individual solar modules. The module voltages, string current, as well as the DC disconnecting switch and surge protection status, are continuously analysed and displayed on a monitoring platform via Ethernet or Modbus. The Blue-Safety-M module also uses this to generate an alert if a surge protection is tripped.



symbolic picture

Technical data		
General data	installation	on DIN Rail
	protection class	IP20
	ambient temperature range	-30 °C to +70 °C
	dimensions	145 x 99 x 90 mm
Monitoring	PV module monitoring	module identification number
		module voltage
		temperature
	line monitoring	string voltage
		string current
	system status monitoring	surge protection
DC disconnecting switch		
Communication	RS485 / Modbus	19.2 kbps
	Ethernet	10 Mbps

System design

Factory standard

At least one Blue-Safety-C and one Blue-Safety-S module are required in the combiner box to operate the Blue Safety system. Two strings with up to 24 solar modules per string can be connected with this minimal configuration.

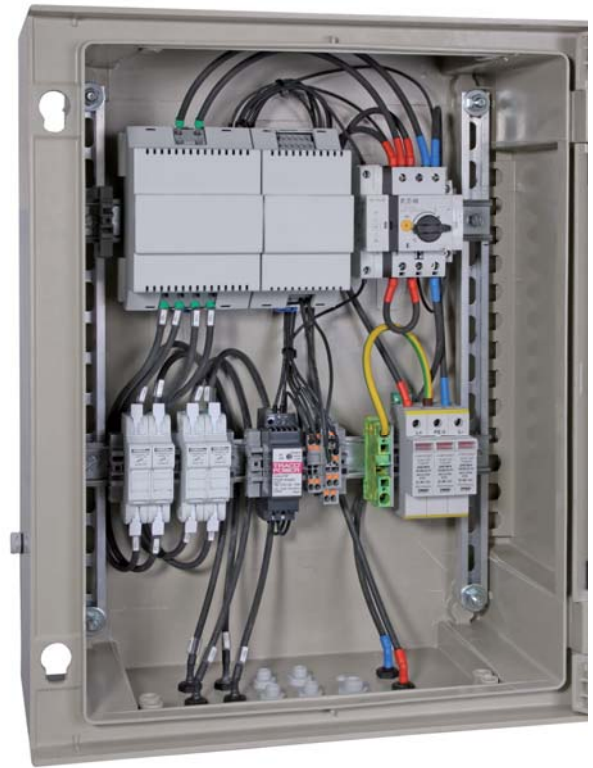
Customised solutions

Each photovoltaic installation has different requirements in terms of selecting and configuring the system components. To meet these requirements, the combiner box of the Blue-Safety system can be customised.

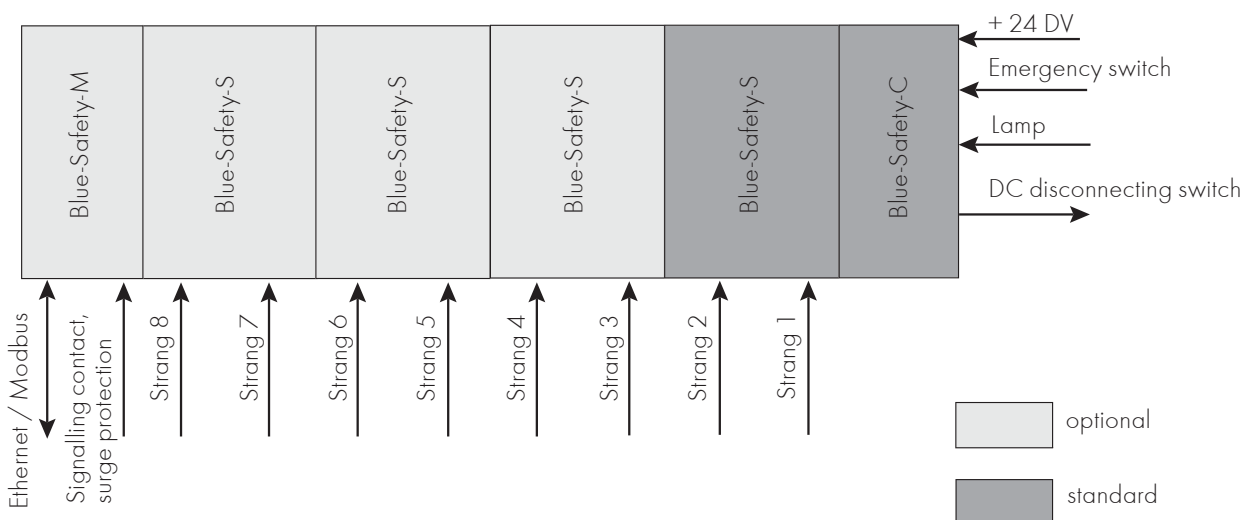
Besides the size of the switch cabinet, the string configuration, surge protection and string fuses can be individually selected.

Expansion options

Up to eight lines can be connected in a single combiner box by connecting additional Blue-Safety-S modules in series. In order to monitor all the connected lines, the Blue-Safety-M module can be optionally built into the configuration.



Switching principle



For detailed information on customised solutions, please contact HUBER+SUHNER sales.




Ordering information

RADOX® Solar Blue-Safety system components






Product	HUBER+SUHNER Item No.	
<p>RADOX® SolarBox HM-Blue-Safety HS (complete junction box) with HUBER+SUHNER twist-lock solar connectors</p>	85015343	
<p>RADOX® SolarBox HM-Blue-Safety MC (complete junction box) with Multi-Contact MC4 solar connectors</p>	85015344	
<p>Blue-Safety-C - central unit</p>	85015351	
<p>Blue-Safety-S - string control unit</p>	85015350	
<p>Blue-Safety-M - monitoring and communication</p>	85015349	<p>symbolic picture</p> 

Ordering information

Components of the modular junction box

Product	HUBER+SUHNER Item no.	
RADOX® SolarBox HM0-30 B	84150548	
Installation rail HM-125 MR	85009334	
BlueBox Blue-Safety	85011710	

Installation accessories

Product	HUBER+SUHNER Item no.	
RADOX® Solar cable 4 mm ² , black	12545802	
RADOX® Solar connector twist-lock 4 mm ² male	24500094	
RADOX® Solar connector twist-lock 4 mm ² female	24500095	
Wire strippers for 2.5, 4 and 6 mm ²	24101804	
Crimp tongs chromium-plated (including dies for 4 and 6 mm ²)	24101803	

HUBER+SUHNER AG
Degersheimerstrasse 14
9100 Herisau
Switzerland
Phone +41 71 353 4111
Fax +41 71 353 4444
hubersuhner.com

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