SOLUTIONS GUIDE

# HelioProtection® Program

## Solutions for photovoltaic

(ISSUE 9)



MERSEN

Ferraz Shawmut is Mersen

# The commitment of Mersen in safer and more reliable solar photovoltaic installations

**In the solar market more especially, Mersen is a driving force in the development of safer and more reliable solar photovoltaic installations.**

**To participate in implementing such installations, Mersen has developed a special program of solutions branded HelioProtection®.**

## HelioProtection® program is a mix of:

- **Dedication** – all the solutions have been designed for the specific solar photovoltaic applications.
- **Innovation** – the solutions in this program are all on the technological edge.
- **Expertise** – this program is supported in the marketplace by a team of Mersen's experts for helping the customer to select and apply the proper solution.

**HelioProtection® is a brand of Mersen.**



HelioProtection®

# Going even further together



To support all those we work with - developers, designers, engineering consultants, purchasers, quality managers, qualification inspectors, insurance companies, rating and listing agencies - in their efforts to specify, design, build, test and run solar power systems, Mersen has invested in the necessary resources:

- a qualified design department to help with the most complex and arduous projects and get involved in co-design or co-development initiatives;
- a technical support department with attentive engineering staff listening to other professionals and helping them match protection components or solutions to their equipment;
- a hotline at **+33 4 26 29 29 29.**

## Two labs dedicated to quality

**The proof of that quest for continual improvement: a total of more than a million tests in 25 years! Mersen has two test labs: one in Newburyport, Massachusetts, and one in Saint Bonnet de Mure in France. The two are complementary, in terms of the available resources, to be able to offer the widest possible range of a.c. and d.c. tests to UL-CSA and IEC standards.**







**Mersen welcomes customers at both locations to run test campaigns focused on critical points in their own bills of requirements.**

## Saint-Bonnet-de-Mure:

### Types of Tests

Measurement of short-circuit characteristics of electrical protection gear, certification tests, tests on monitoring systems and inverters, tests of **faults (to ground, between panels, between strings of panels)** and their impact on equipment.

All other usual tests on actual systems.

### Testing Equipment

- 144 panels of polycrystalline silicon at 240Wp (30 to 37V, 8A, 18 kg) for a total of approx. 35 kW with two possible configurations:
- 400VDC wiring, 12 parallel strings of 12 panels in series;
- 800VDC wiring, 6 parallel strings of 24 panels in series.

An innovative PV installation for product test and validation with a total power of 35KW and an exclusive modular architecture to configure the installation: 6 strings of 24 PV modules or 12 strings of 12 PV modules.

## Newburyport:

- a specialized d.c. lab - obviously an asset in designing fuses for photovoltaic applications;
- a low power test lab;
- fusion tests at 0 to 6000A constant current;
- simulations of equipment starting up and stopping from 0 to 3000A;
- a low voltage test bench for surge protective devices;
- temperature tests, etc.

# Standardization Components, systems and installations



**Photovoltaic equipement and systems are governed by international general standards. IEC and UL standards provide the rules to apply to implement state-of-the-art PV installations.**
**Besides that international or more local standards relay and complete the general standards. They concern more precise fields such as: complete systems and installations, components incorporated in the systems and connection to the grid.**

## General Standards

IEC 62548 Edition 1
Installation and safety requirements for photovoltaic (PV) generators




## Standards, Guidelines, Recommendations

**PV Installations**
**PV Systems**
IEC 60364-7-712
Low Voltage Installations – PV Installations.

DIN V VDE V0126-5
Junction boxes for photovoltaic modules.

IEC 61439-1
Low voltage switchgear and controlgear assemblies

**Surge Protective Devices (SPDs)**
EN 50539-11
Low voltage surge protective devices – Surge protective devices for specific application including D.C. – Part 11: Requirements and tests for SPDs in photovoltaic applications

**Fuses for Photovoltaic Systems**
UL 2579
IEC 60269-6
Low voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar PV energy systems.

**Photovoltaic Fuseholders**
UL 4248-18

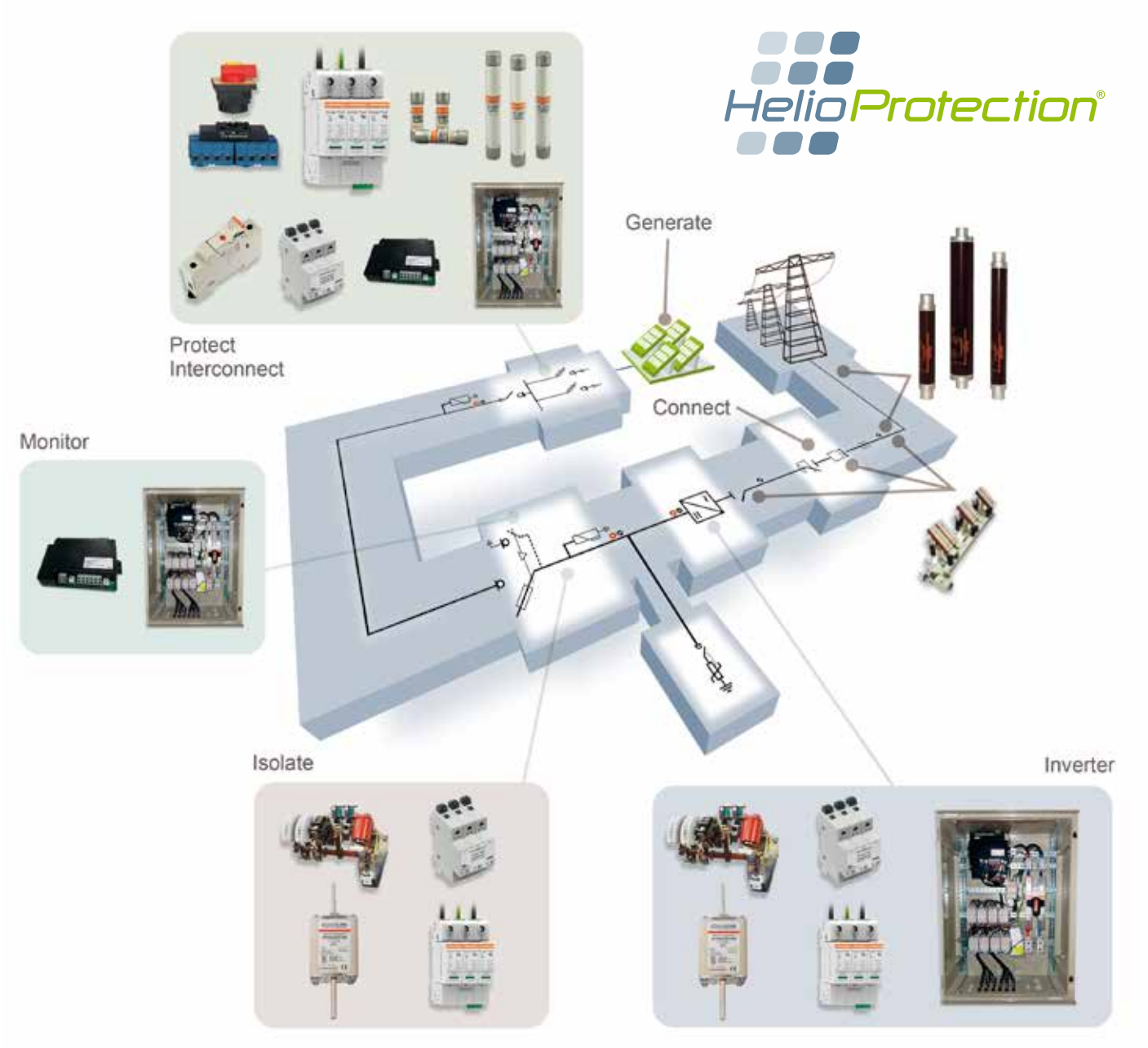
**Enclosed and Dead-Front Switches for use in Photovoltaic Systems**
UL 98B

**PV Power Converters And Grid Connection**
IEC 61727
Photovoltaic (PV) systems – Characteristics of the utility interface.

# GUARANTEED PROTECTION, FROM THE CELL TO THE GRID

**The fact that a solar device is both a DC environment and a non interruptible source of current whenever the sun is shining makes things pretty complicated compared to our customary AC world. Ensuring the safety of solar power generating facilities is a tricky business, because there are very specific risks inherent to this kind of electrical equipment.**

**So compliance with standards and recommendations is critical to guaranteeing the safety of people and property.**



# Product Offering
# Residential DC & AC Combiner Boxes




**A dedicated product offer for private home and small apartment building PV system from 3 to 5kW.**

## DC combiner box

DC combiner boxes are located between the solar modules and the inverter. This provides an optimal connection system for 2 strings of 25A under 600VDC or 20A under 1000VDC.
The DC combiner boxes include load isolation and surge protection in 2 different configurations, depending on inputs connection type.

| Catalog Number | Number of inputs | DC ratings | DC surge protection | Input connection type | Output connection type | Protection class |
|---|---|---|---|---|---|---|
| HSB2IT20SP10Z | 2 | 25A, 600VDC or 20A, 1000VDC | Type II, 1000VDC | M16, Ø: 4.5-10mm | M16, Ø: 4.5-10mm | IP65, IK07 |
| HSB2IT20SP10X | 2 | | | MC4 connection | M16, Ø: 4.5-10mm | |




## AC combiner box

AC combiner boxes are located between the inverter and the meter.
This provides an optimal connection and protection for the AC network.
The AC combiner boxes include a differential load breaker and an AC surge protection.

| Catalog Number | AC ratings | AC surge protection | Input connection type | Output connection type | Protection class |
|---|---|---|---|---|---|
| HSAC16A230V | 16A, 230VAC | Type II, 230VAC | M20, Ø: 7-13mm | M20, Ø: 7-13mm | IP65, IK07 |
| HSAC25A230V | 25A, 230VAC | | M20, Ø: 7-13mm | M20, Ø: 7-13mm | |

# PRODUCT OFFERING

# HelioProtection® Fuse gPV

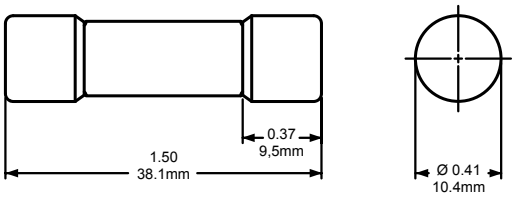
## HP6M – 600VDC



Mersen's HP6M photovoltaic (PV) fuse series is designed specifically to protect the PV modules against the reverse currents. These HP6M fuses, designed for low minimum breaking capacity capabilitiesof 1.35 times the fuse rated current value, allows for safe circuit interruption under typical low fault current conditions produced by PV arrays.

| Minimum Breaking Capacity = 1.35In Maximum Breaking Capacity = 10kA | | | | |
|---|---|---|---|---|
| **Max.Operating Voltage = Rated Voltage** | **Rated Current** | **Catalog Number** | **Reference Number** | **Packaging** |
| 600VDC<br>UL Listed<br>CSA Certified<br>IEC 60269-6 Approved (gPV) | 1 | HP6M1 | L1018565 | 10 |
| | 2 | HP6M2 | M1018566 | |
| | 3 | HP6M3 | N1018567 | |
| | 4 | HP6M4 | Q1018569 | |
| | 5 | HP6M5 | R1018570 | |
| | 6 | HP6M6 | S1018571 | |
| | 7 | HP6M7 | T1018572 | |
| | 8 | HP6M8 | V1018573 | |
| | 10 | HP6M10 | X1018575 | |
| | 12 | HP6M12 | Y1018576 | |
| | 15 | HP6M15 | Z1018577 | |
| | 20 | HP6M20 | A1018578 | |
| | 25 | HP6M25 | K1018610 | |
| | 30 | HP6M30 | L1018611 | |

### Drawing







### Fuse holders

| Nb of poles | Catalog Number | Reference Number | Nb of modules (17.5mm) | Packaging | Indicator |
|---|---|---|---|---|---|
| 1 | US101HEL | D1009979 | 1 | 12 | No |
| 1 | US101IHEL | Q1009461 | 1 | 12 | Yes |
| 1 | USGM1HEL | P1022294 | 1 | 12 | No |
| 1 | USGM1IHEL | N1022293 | 1 | 12 | Yes |

### Electrical Characteristics

| Rated Voltage (V) | Nominal Current (A) | Catalog Number | 70% AMP RATING (W) | 80% AMP RATING (W) | 100% AMP RATING (W) |
|---|---|---|---|---|---|
| 600 | 1 | HP6M1 | 0.14 | 0.19 | 0.31 |
| 600 | 2 | HP6M2 | 0.19 | 0.26 | 0.43 |
| 600 | 3 | HP6M3 | 0.64 | 0.85 | 1.4 |
| 600 | 4 | HP6M4 | 0.58 | 0.77 | 1.3 |
| 600 | 5 | HP6M5 | 0.65 | 0.87 | 1.4 |
| 600 | 6 | HP6M6 | 0.69 | 0.92 | 1.5 |
| 600 | 7 | HP6M7 | - | - | - |
| 600 | 8 | HP6M8 | 0.92 | 1.23 | 2.0 |
| 600 | 10 | HP6M10 | 0.96 | 1.28 | 2.1 |
| 600 | 12 | HP6M12 | 1.12 | 1.49 | 2.5 |
| 600 | 15 | HP6M15 | 0.99 | 1.32 | 2.2 |
| 600 | 20 | HP6M20 | 1.25 | 1.67 | 2.8 |
| 600 | 25 | HP6M25 | 1.38 | 1.84 | 3.1 |
| 600 | 30 | HP6M30 | 1.5 | 2.0 | 3.3 |

# PRODUCT OFFERING

# HelioProtection® Fuse gPV

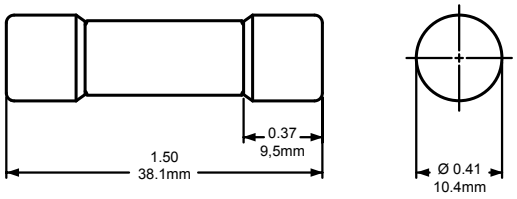
## HP10M – 1000VDC

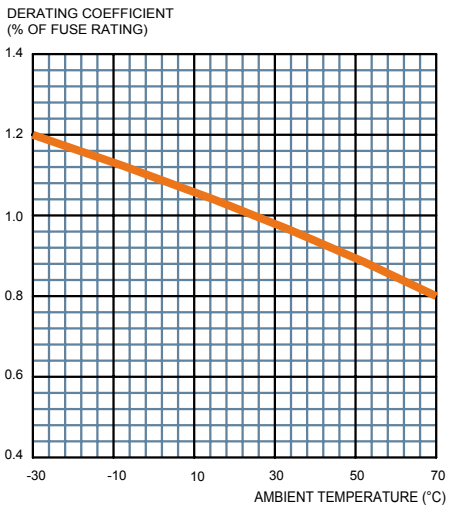


Mersen's HP10M photovoltaic (PV) fuse series is designed specifically to protect the PV modules against the reverse currents. These HP10M fuses, designed for low minimum breaking capacity capabilities of 1.35 times the fuse rated current value, allows for safe circuit interruption under typical low fault current conditions produced by PV arrays.

| Minimum Breaking Capacity = 1.35In Maximum Breaking Capacity = 10kA | | | | |
|---|---|---|---|---|
| **Max.Operating Voltage = Rated Voltage** | **Rated Current** | **Catalog Number** | **Reference Number** | **Packaging** |
| 1000VDC<br>UL Listed<br>CSA Certified<br>IEC 60269-6 Approved (gPV) | 1 | HP10M1 | B1018579 | 10 |
| | 2 | HP10M2 | C1018580 | |
| | 3 | HP10M3 | D1018581 | |
| | 4 | HP10M4 | E1018582 | |
| | 5 | HP10M5 | F1018583 | |
| | 6 | HP10M6 | G1018584 | |
| | 7 | HP10M7 | H1018585 | |
| | 8 | HP10M8 | J1018586 | |
| | 10 | HP10M10 | L1018588 | |
| | 12 | HP10M12 | M1018589 | |
| | 15 | HP10M15 | N1018590 | |
| | 20 | HP10M20 | P1018591 | |
| | 25 | HP10M25 | D1023825 | |
| | 30 | HP10M30 | E1023826 | |

### Drawing




### Fuse holders

| Nb of poles | Catalog Number | Reference Number | Nb of modules (17.5mm) | Packaging | Indicator |
|---|---|---|---|---|---|
| 1 | US101HEL | D1009979 | 1 | 12 | No |
| 1 | US101IHEL | Q1009461 | 1 | 12 | Yes |
| 1 | USGM1HEL | P1022294 | 1 | 12 | No |
| 1 | USGM1IHEL | N1022293 | 1 | 12 | Yes |

### Electrical Characteristics

| Rated Voltage (V) | Nominal Current (A) | Catalog Number | 70% AMP RATING (W) | 80% AMP RATING (W) | 100% AMP RATING (W) |
|---|---|---|---|---|---|
| 1000 | 1 | HP10M1 | 0.125 | 0.175 | 0.250 |
| 1000 | 2 | HP10M2 | 0.160 | 0.250 | 0.320 |
| 1000 | 3 | HP10M3 | 0.66 | 0.87 | 1.36 |
| 1000 | 4 | HP10M4 | 0.69 | 0.8 | 1.25 |
| 1000 | 5 | HP10M5 | 0.59 | 0.73 | 1.12 |
| 1000 | 6 | HP10M6 | 0.42 | 0.67 | 1.05 |
| 1000 | 7 | HP10M7 | 0.40 | 0.64 | 1.0 |
| 1000 | 8 | HP10M8 | 0.77 | 0.88 | 1.48 |
| 1000 | 10 | HP10M10 | 0.67 | 0.90 | 1.5 |
| 1000 | 12 | HP10M12 | 0.72 | 1.0 | 1.8 |
| 1000 | 15 | HP10M15 | 0.9 | 1.3 | 2.2 |
| 1000 | 20 | HP10M20 | 1.1 | 1.5 | 2.8 |
| 1000 | 25 | HP10M25 | 1.3 | 1.8 | 3.0 |
| 1000 | 30 | HP10M30 | 1.5 | 1.9 | 3.7 |

# PRODUCT OFFERING

# HelioProtection® Fuse gPV

## 10x85 - 1200/1500 VDC



Mersen's 10x85 photovoltaic (PV) fuse series is designed specifically to protect the PV modules against the reverse currents. These 10x85 fuses, designed for low minimum breaking capacity capabilities of 1.35 times the fuse rated current value, allows for safe circuit interruption under typical low fault current conditions produced by PV arrays.
They are rated 1200V and 1500V and meet the trend for increasing the maximum open circuit voltage across the PV modules.
DC HelioProtection® Fuse complies with new IEC 60269-1 and with the new 60269-6 introducing the gPV type of fuse.

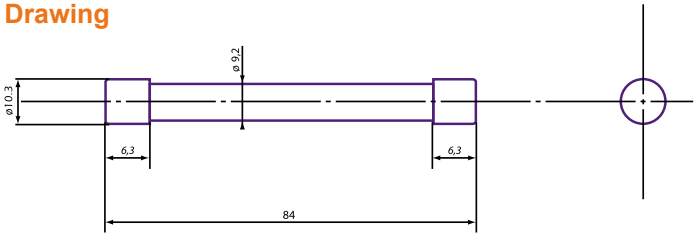
**Basics characteristics**

| Size | Maximum operating voltage for L/R ≤ 0,5ms | Rated Current | Operation | Breaking Capacity @ Un | Power losses End contacts | | Catalog number | Ref. number | Packaging |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0.7In | 0.8In | | | |
| mm | V | A | | kA | W | W | | | |
| D10xL85 | 1500 | 12 | gPV type | 10 | 1.5 | 3.7 | HP15MGPV12 | Y1044106 | 10 |
| | | 16 | | | 2.3 | 5.7 | HP15MGPV16 | Z1044107 | 10 |
| | 1 200 | 8 | | | 1,3 | 1,7 | DC10HEL12C8 | D1014188 | 45 |
| | | 10 | | | 1,3 | 1,7 | DC10HEL12C10 | T1012017 | 45 |
| | | 12,5 | | | 1,3 | 1,9 | DC10HEL12C12,5 | X1008754 | 45 |
| | | 16 | | | 1,5 | 2,1 | DC10HEL12C16 | Y1008755 | 45 |
| | | 20 | | | 1,8 | 2,5 | DC10HEL12C20 | Z1008756 | 45 |
| | 900 | 25 | | | 2,2 | 3 | DC10HEL9C25 | A1008757 | 45 |

*Other ratings available on request.*

RoHS CE

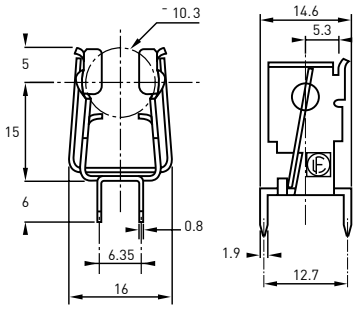
### Drawing



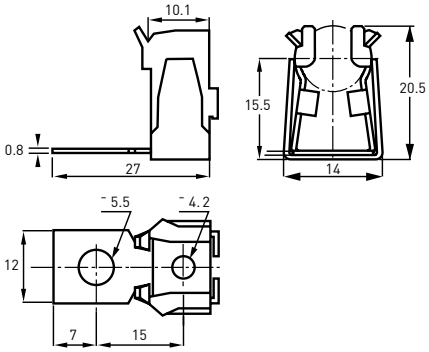

### Fuse clips

| Catalog Number | Reference number | Designation | Weight (g) | Pack |
|---|---|---|---|---|
| MR10RESSORTCI | Y098507 | MR10 CI | 4.5 | 200 |
| MR10RESSORTCI | Y098507 | MR10CI | 4.5 | 1000 |

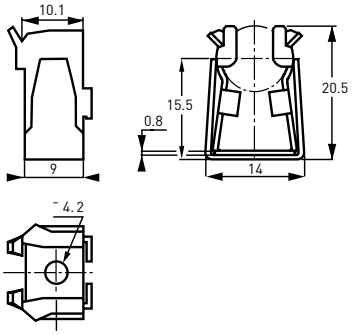
### MR10 CI




### MR10




### MR10 without compressor



# PRODUCT OFFERING

# Modulostar HelioProtection®



The Modulostar HelioProtection® fuse holders from Mersen are very well known in the power low voltage distribution application market. HelioProtection® Fuse gPV were specially designed for PV, and DC more generally speaking, applications.
They comply with both UL512 and IEC 60269-1 standards and RoHS as well.
The plastic parts of our Modulostar HelioProtection® are UL94 V0 to V2 (Yellow Card).Two models are available: one with and one without blown fuse indication via an indicator light which is on when the fuse is blown (open circuit). The blown fuse indication operates from 350VDC up to 1000VDC.

## Characteristics

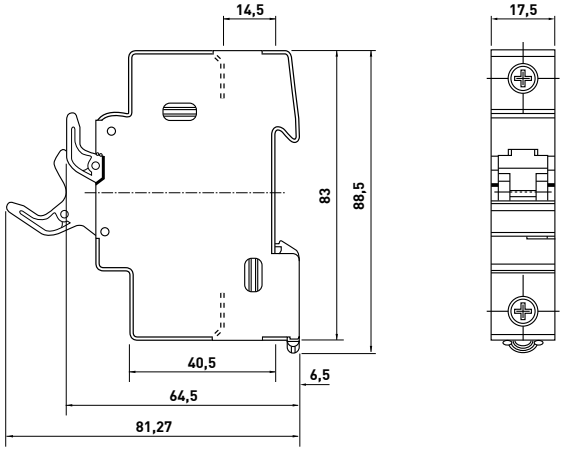
- **Wiring:** rigid wire = 1 - 16mm2 (18-6AWG), flexible wire = 0.75 - 10mm2 (18-8AWG) use 75°C wire CO only.
- **Screw driver heads: Mersen** recommends use of PZ 2 or flat 5.5x1mm heads (maximum diameter 6mm).
- **Maximum tightening torque:** 2.2Nm
- DC20B-IP2X.

## Recommendations

- Do not operate under load.
- **Non insulated conductive parts:** preferably the equipment should be laid out keeping the + and - polarities separate.
- **Mounting with SPD:** check that the SPD' Up is compatible with the US10's IU imp=6kV (see UTE C15-712).

| Nb of pole | Cat. Number | Ref. Number | Nb of Mode (17.5mm) | Pack | Indicator |
|---|---|---|---|---|---|
| 1 | US101HEL | D1009979 | 1 | 12 | Without Ind. |
| 1 | US101IHEL | Q1009461 | 1 | 12 | With Ind. |

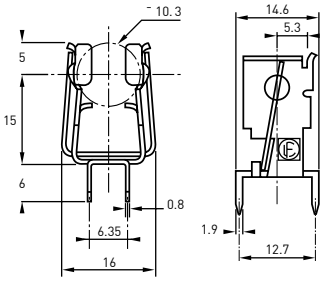
| Nominal Voltage Ui DC | Voltage Isolation Uimp | Nominal Current | Max. power losses in the fuse links | Fuse links rating | Cable wire section (mm²) recommended |
|---|---|---|---|---|---|
| | 6kV | 32A | 3W | ≤12 | 2.5 |
| 1000VDC | 6kV | 32A | 3W | 16 | 2.5 |
| Pollution | 6kV | 32A | 3W | 20 | 2.5 |
| Degree 2 | 6kV | 32A | 3W | 25 | 4 |
| | 6kV | 32A | 3W | 30 | 6 |



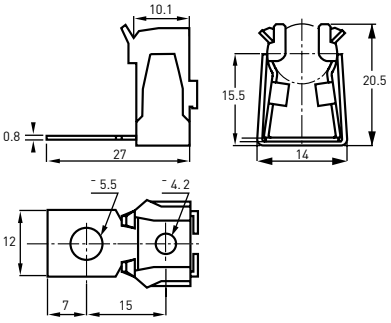

## Fuse clips

| Cat. Number | Designation | Weight (g) | Pack |
|---|---|---|---|
| MR10RESSORTCI | MR10 CI | 4.5 | 200 |
| MR10RESSORT | MR10 | 7.0 | 20 |
| MR10RESSORTSP | MR10 without compressor | 5.7 | 20 |

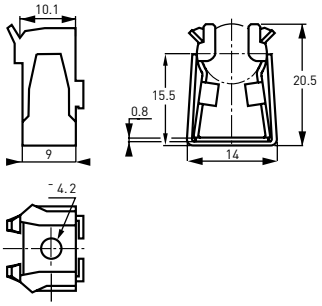
### MR10 CI




### MR10




### MR10 without compressor



# PRODUCT OFFERING

# USGM1HEL

## UltraSafe™ Fuseholders



### Innovative UltraSafe midget fuseholders with screw-less, spring pressure, wire termination technology

Mersen's new USGM series fuseholders deliver the ultimate ease-of-use, time (labor) saving and reliable solution available in the marketplace. Mersen is the first manufacturer to offer screw-less, spring pressure, wire termination technology into a power fuseholder, delivering the best of both technologies to its customers.
They comply with UL4248-18 standard and IEC 60947-3. Now you can experience the combined benefits of safety, ease-of-use, labor savings and reliability of UltraSafe fuseholders and spring pressure technology.

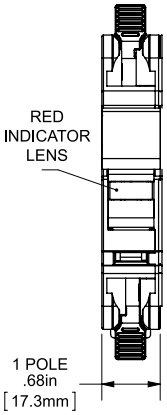
| Fuse Type | No. of Poles | Voltage Rating | Ampere Rating | Visual Indication | Catalog Number | Ref. Number | Packaging |
|---|---|---|---|---|---|---|---|
| Photovoltaic | 1 | 1000VDC | 30 | No | USGM1HEL | P1022294 | 12 |
| | | | | Yes | USGM1IHEL | N1022293 | 12 |

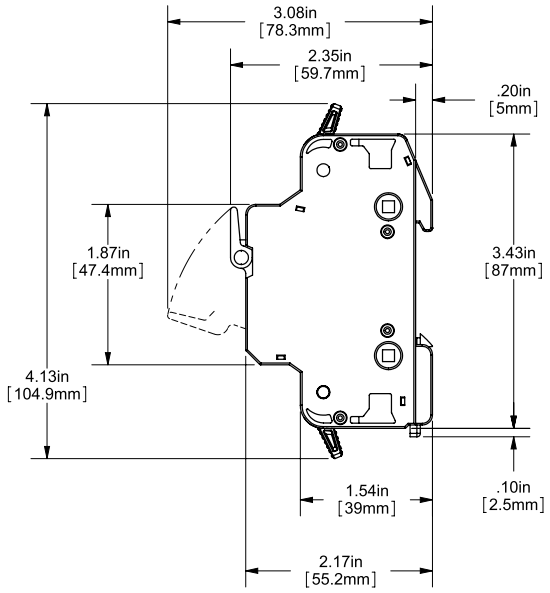
**Recommended Fuse Usage:**

- USGM1HEL use with Photovoltaic Fuses: HP6M, HP10M.

**Additional Specifications:**

- **Screw-less, spring pressure terminals:**
  WAGO CAGE CLAMP®.
- **Wire Range:**
  #14 to 6 AWG (2.5 to 16mm²) Single Conductor;
  #14 to 10 AWG (2.5 to 5.0mm²) Dual Conductor.
- **Wire Type:** 60/75/90°C Solid/ Stranded Copper.

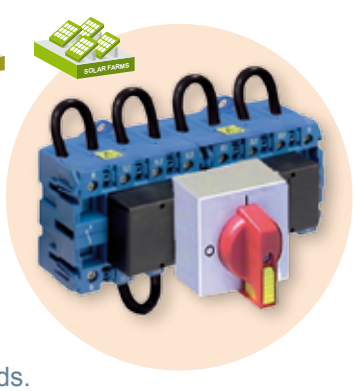



**Ratings:**

- Volts: 1000VDC maximum
- Amps : 30A maximum
- SCCR : 200kA AC, 100kA DC

# PRODUCT OFFERING
# HelioProtection® Switch



These disconnect switches comply with IEC 60947-3 and VDE 0660 part 107 standards.

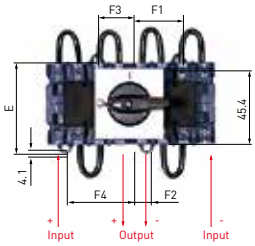
- These are real d.c. switches, specially designed for PV applications.
- HelioProtection® switches are complete compact products, and are delivered already assembled with their shunts (so there's only one catalog number for the whole unit!).
- Connections are IP20 rated finger safe. HelioProtection® switches are fitted to be mounted directly on a DIN rail.
- They must be installed and tested by qualified personnel with thorough knowledge of the rules governing installation in PV applications.

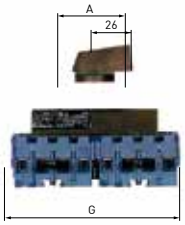
| Category of use | Uoc - Max. Offload Voltage<br>Ue - Operational Voltage | | 780 VDC<br>650 VDC | 1000 VDC<br>800 VDC | Insulation Voltage | Number of Poles |
|---|---|---|---|---|---|---|
| | Catalog Number | Ref. Number | Rated Current (A) | | | |
| DC21B | IT20HEL6CCF | P1015026 | 25 | 21 | 1000VDC | 6 |
| | IT32HEL6CCF | Q1015027 | 32 | 28 | | 6 |
| | IT40HEL6CCF | W1015032 | 40 | 28 | | 6 |
| | IT70HEL6CCF | X1015033 | 60 | - | | 6 |
| | IT20HEL10CCF | M1016427 | - | 25 | | 8 |
| | IT25HEL10CCF | Z1011930 | - | 32 | | 8 |
| | IT32HEL10CCF | A1011931 | - | 32 | | 8 |
| | IT40HEL10CCF | B1011932 | - | 40 | | 8 |
| | IT70HEL10CCF | E1011935 | - | 60 | | 8 |

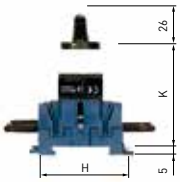
*All our models of HelioProtection® switch can be equipped with a handle for door mounting.*

**These HelioProtection® switches are complete compact products, and are delivered already assembled with their shunts (so there's only one catalog number for the whole unit!)*

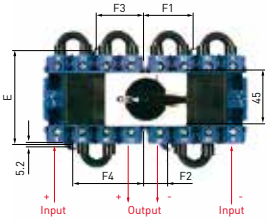
## IT20HEL10CCF
## IT32HEL10CCF
## IT40HEL10CCF

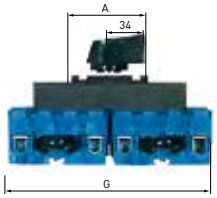


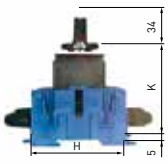



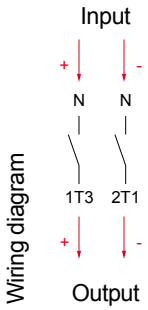




## IT70HEL10CCF



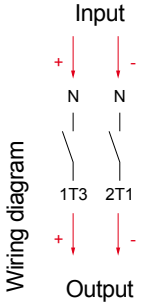



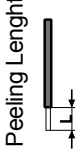




| Dimensions | IT20HEL10CCF<br>IT32HEL10CCF | IT40HEL10CCF | IT70HEL10CCF |
|---|---|---|---|
| A | 43,7 | 105,4 | 70 |
| E | 60 | 70 | 90 |
| F1 | 32 | 37,5 | 47,5 |
| F2 | 10 | 12,5 | 22,5 |
| F3 | 23,5 | 28,5 | 44,5 |
| F4 | 45,5 | 53,5 | 69,5 |
| G | 111 | 132 | 184 |
| H | 54 | 64 | 80 |
| K | 64 | 62,5 | 76,2 |
| L | 9 | 10 | 14 |

Recommended tightening torque

| | |
|---|---|
| IT32HELI0CCF | 1,25 Nm |
| IT32HELI0CCF | 1,80 Nm |

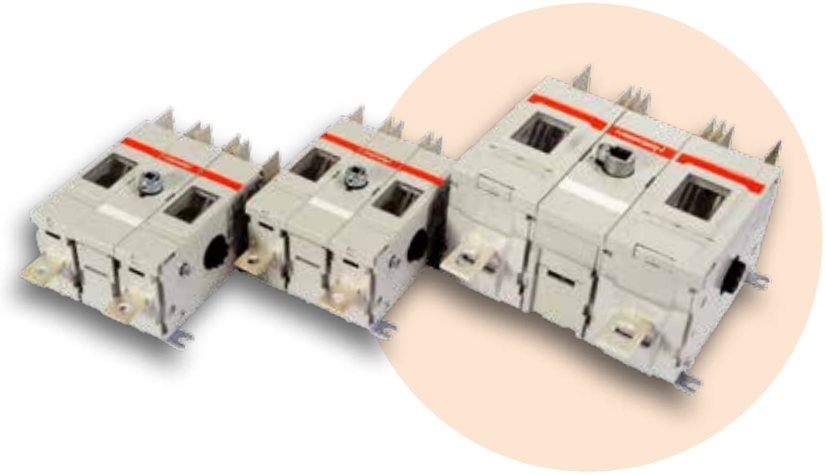


# PRODUCT OFFERING
# PV-Rated Disconnect Switches

NEW LINE

**Mersen launches a global line of premium compact low voltage switchgear**



## PV-rated Switches
100A to 500A Up to 1000VDC

### Function

Standard switch-disconnect provides the load break switching function: making, carrying, breaking current plus isolation

### Applications

2-pole PV-rated switches disconnect individual strings, individual arrays and PV inverter from the DC side

### Features

- **Safety:** Robust design, visible contacts, user-independent operation
- **Performance:** Specifically designed for DC applications: dual magnetic breaking
- **Size:** 40% to 57% smaller footprint = greatly reduced installation area
- **Flexibility in installation:** Symmetrical power-pole design independent of polarity
- **Flexibility in logistics:** Ordering process and stock control is more fluent due to reduced part numbers
- **Environmental impact:** No harmful material

### Versions and accessories

- Extended shaft
- Pistol type handle
- Direct mounting type handle
- Auxiliary contact
- Module for auxiliary contact
- Mechanical and electrical interlock
- Terminal clamp
- Short-circuit link
- Terminal shroud

# PRODUCT OFFERING
# PV-Rated Disconnect Switches

NEW LINE

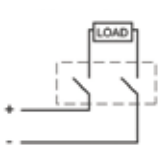
## UL 98 and IEC-Rated DC Switches

Mersen offers a range of DC disconnect switches especially designed for PV applications, in 2 poles and 2x2 poles configurations for double circuit applications. The technology inside the switch and the visible contacts allow a quick, safe, and reliable DC breaking power at all current levels up to 1000VDC.
With a symmetric 2-pole design, the product is ready and simple to install independently of the polarity, with very limited power losses, and with a smaller footprint than competition.

## IEC DC Switches

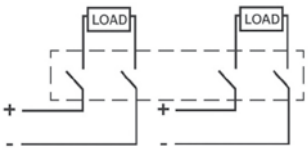


*MD100E11*



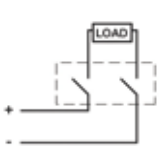



*MD100E22*



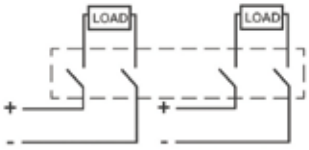



*MD400E11*






*MD400E22*




## Switch Body

| Ampere Rating | 100 | 160 | 200 | 250 | 315 | 400 | 500 |
|---|---|---|---|---|---|---|---|
| 2-pole Configuration | MD100E11 | MD160E11 | MD200E11 | MD250E11 | MD315E11 | MD400E11 | MD500E11 |
| Handle and shaft configuration 2x2-pole | MD100E22 | MD160E22 | MD200E22 | MD250E22 | MD315E22 | MD400E22 | MD500E22 |

## Handles and Shafts



*HD250*



*HB65*

| Direct Front Operation Locking Handle | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HD250 | HD250 | HD250 | HD250 | HD400 | HD400 | HD400 |
| **Pistol Style** | | | | | | | |
| | HB65 | HB65 | HB65 | HB65 | HB95/ HB125 | HB95/ HB125 | HB95/ HB125 |

B=Black. Substitute 'R' for 'B' if a red handle is desired. Ex. HR65

| Shafts | | | | | | | |
|---|---|---|---|---|---|---|---|
| Shaft | SPA__ | SPA__ | SPA__ | SPA__ | SFB__ | SFB__ | SFB__ |

SPA Lengths: 130, 210, 290, 360, 430 Ex. SPA130. SFB Lengths: 280, 325, 395 Ex. SFB280

# PRODUCT OFFERING
# PV-Rated Disconnect Switches



## Technical Data

| Technical data according to IEC 60947 for switch-disconnectors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Switch size** | | **A** | **MD100E** | **MD160E** | **MD200E** | **MD250E** | **MD315E** | **MD400E** | **MD500E** |
| Rated Insulation voltage $U_i$ | Pollution degree 2 | V | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 |
| | Pollution degree 3 | V | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 |
| Rated impulse withstand | 50 Hz 1 min kV | kV | | | | | | | |
| | | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current $I_{th}$ …with minimum cable or bar cross section | In open air, normal conditions[1] | A | 100 | 160 | 200 | 250 | 315 | 400 | 630 |
| | In enclosure 40°C | A | 100 | 160 | 200 | 250 | 315 | 400 | 550 |
| | In enclosure 60°C | A | 100 | 160 | 200 | 250 | 315 | 400 | 440 |
| | Cu | $mm^2$ | 35 | 70 | 95 | 120 | 185 | 240 | 240 |
| Rated operational current / poles in series DC-21B | 1000 | V | 100 / 2 | 160 / 2 | 200 / 2 | 250 / 2 | 315 / 2 | 400 / 2 | 500 / 2 |
| | | | | | | | | | |
| | | | 100 / 2x2 | 160 / 2x2 | 200 / 2x2 | 250 / 2x2 | 315 / 2x2 | 400 / 2x2 | 500 / 2x2 |
| Rated short-time withstand current, 1000 V, 1 s | R.M.S. -value $I_{cw}$ | kA | 5 | 5 | 5 | 5 | 10 | 10 | 10 |
| Rated short circuit making capacity, 1000 V | Peak value $I_{cm}$ | kA | 5 | 5 | 5 | 5 | 10 | 10 | 10 |
| Power loss / pole | At rated current | W | 2 | 4 | 6 | 9,5 | 6 | 9,7 | 15,1 |
| Cable size | Cu | $mm^2$ | | | | | | | |
| Terminal bolt size | Metric thread diameter x length | mm | M8x25 | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 |
| Terminal tightening torque | Counter torque required | Nm | 15-22 | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 |

*1) Normal conditions defined in IEC 60947-1-6.1*

## IEC DC-rated Non-Fused switches

| Part # | Description | Ref |
|---|---|---|
| MD100E11 | DC Switch 100A IEC 1000V 2p | G1043217 |
| MD160E11 | DC Switch 160A IEC 1000V 2p | H1043218 |
| MD200E11 | DC Switch 200A IEC 1000V 2p | J1043219 |
| MD250E11 | DC Switch 250A IEC 1000V 2p | K1043220 |
| MD100E22 | DC Switch 100A IEC 2x1000V 4p | L1043221 |
| MD160E22 | DC Switch 160A IEC 2x1000V 4p | M1043222 |
| MD200E22 | DC Switch 200A IEC 2x1000V 4p | N1043223 |
| MD250E22 | DC Switch 250A IEC 2x1000V 4p | P1043224 |
| MD315E11 | DC Switch 315A IEC 1000V 2p | Q1043225 |
| MD400E11 | DC Switch 400A IEC 1000V 2p | R1043226 |
| MD500E11 | DC Switch 500A IEC 1000V 2p | S1043227 |
| MD315E22 | DC Switch 315A IEC 2x1000V 4p | T1043228 |
| MD400E22 | DC Switch 400A IEC 2x1000V 4p | V1043229 |
| MD500E22 | DC Switch 500A IEC 2x1000V 4p | W1043230 |

## Handles

| Part # | Description | Ref |
|---|---|---|
| HB65 | Handle black 65mm IP65 NEMA 3R | W1043368 |
| HB95 | Handle black 95mm IP65 NEMA 3R | N1043913 |
| HB125 | Handle black 125mm IP65 NEMA 3R | A1043372 |
| HD250 | Handle black 250mm IP65 NEMA 3R | W1043391 |
| HD400 | Handle black 400mm IP65 NEMA 3R | X1043392 |

## Shafts

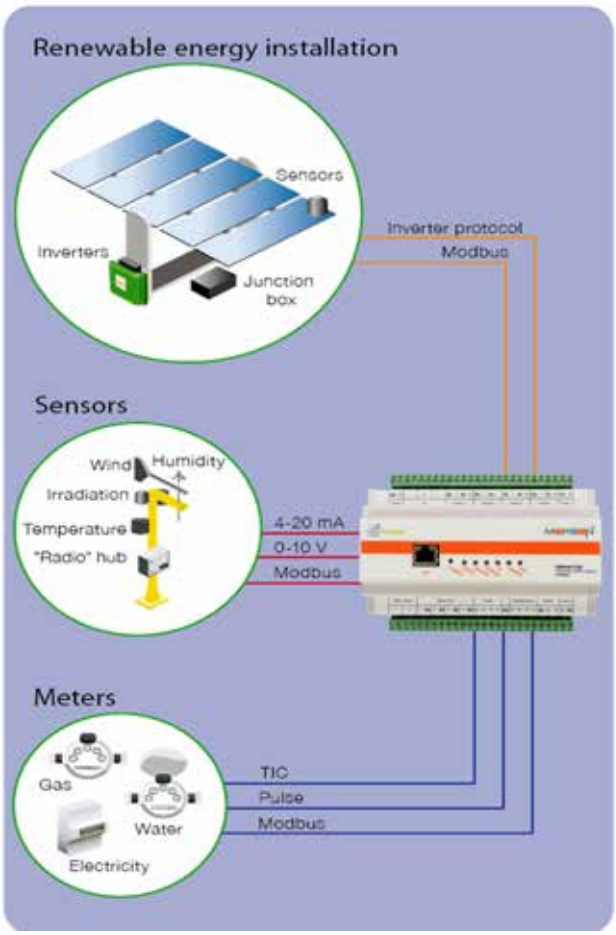
| Part # | Description | Ref |
|---|---|---|
| SFB280 | Shaft SwitchFuse 12x12x280mm | F1043423 |
| SFB325 | Shaft SwitchFuse 12x12x325mm | G1043424 |
| SFB395 | Shaft SwitchFuse 12x12x395mm | H1043425 |
| SPA130 | Shaft pistol handle 6x6x130mm | V1043919 |
| SPA210 | Shaft pistol handle 6x6x210mm | P1043431 |
| SPA290 | Shaft pistol handle 6x6x290mm | Q1043432 |
| SPA360 | Shaft pistol handle 6x6x360mm | W1043920 |
| SPA430 | Shaft pistol handle 6x6x430mm | X1043921 |

# PRODUCT OFFERING
# WebCom
## Energy data logger



### Network connectivity, operation and configuration

WebCom is an easy to configure data logger operating via Ethernet. WebCom is configured through the web interface on the embedded HTTP server. WebCom collects data from connected devices and stores them in the CSV format. At a configurable time, it sends the data to a central server where it can be treated and analysed to optimise maintenance and operation management.WebCom can be fully configured and updated remotely to reduce maintenance costs.




### Inverters supported

The WebCom gateway integrates an auto-detect function to identify the number of inverters and their address. The majority of inverters available on the market are supported: Danfoss (ComLynx), Diehl Ako (Platinum), Fronius, Ingeteam (IngeconSun & Modbus TCP), Kaco, LTI, PowerOne, Refu (USS), Schneider-Electric (SunEzy & Xantrex), Siemens (USS), SMA, SMA Central, Socomec (Sunsys-Home & Sunsys-Pro) and Mastervolt.

### Technical data

| | Intpus | Characteristics |
|---|---|---|
| **Connection Type** | | |
| Serial Interfaces | Port1 | RS485 - Inverter protocols |
| | Port2 | RS485/RS232 - Modbus equipments |
| Meter Intefaces | TIC1, TIC2 & TIC 3 | 1 multiplex meter* (TIC) |
| GPIO | Pulse input<br>Analog inputs<br>Digital inputs<br>Digital outputs | 2 inputs, pulse length: 40 ms to 1,000 ms<br>4 inputs 0-10<br>2 dry contact inputs<br>2 relay outputs |
| Network Interfaces | Ethernet RJ45 | 10/100 Mb/s IP services |
| **Environmental** | | |
| | Service temperature | -5°C to +50°C |
| | Box format | DIN rail |
| | Dimensions | 70 x 157 x 59 mm |
| **Approvals** | | |
| | CE | EN 50082EN & 55022 class B |
| | UL | UL 60950-1 |

### Ordering Information

| Product Type | Cat. number | Reference | Comment |
|---|---|---|---|
| WebCom | HM2RS485COMA | D1039304 | 24Vdc power supply included |

# PRODUCT OFFERING
# Greenstring
## PV String Monitoring



The Mersen solution provides a modular electronic cards approach offering a high degree of customization. It allows to monitor from 1 to 30 PV strings by adding up to **4 AUX Card(s)** to the **MAIN Card** and up to 8 external sensors by adding the **PROBE Card.**

### Technical data

| | MAIN card | AUX Card | PROBE card |
|---|---|---|---|
| **Electrical Features** | | | |
| Number of inputs | 6 | 6 | 8 |
| Maximum rated voltage | 1000 VDC | 1000 VDC | - |
| Maximum current per Input | 25 A | 25 A | - |
| Maximum current Output | 150 A | 150 A | - |
| **String Voltage measurement** | | | |
| Measurement range | ± 1000 VDC | ± 1000 VDC | - |
| Accuracy | ± 0.5% (± 5 V) | ± 0.5% (± 5 V) | - |
| **String Current measurement** | | | |
| Measurement range | ±20 A | ±20 A | - |
| Accuracy | ± 0.5% (± 100 mA) | ± 0.5% (± 100 mA) | - |
| **Measurement inputs** | | | |
| Digital inputs | - | - | 1 potential-free or pulse input, 0 - 100 Hz |
| Analog inputs | - | - | 7 inputs, individually configurable:<br>- 4-20 mA: precision ± 1%, impedance 100 Ω<br>- 0-10 V: precision ± 1% |
| **Temperature measurement** | | | |
| Measurement range | -40 °C to +100 °C | -40 °C to +100 °C | - |
| Precision | ± 2 °C | ± 2 °C | - |
| **Communication** | | | |
| Protocol | Modbus RTU on RS-485 | - | - |
| **Monitoring and Signaling inputs** | | | |
| SPD end-of-life status | 1, potential-free input | - | - |
| DC breaker status | 1, potential-free input | - | - |
| **Power Supply from PV strings** | | | |
| Voltage range | 250 VDC to 1000 VDC | - | - |
| Power consumption | 2.5W @ 1000 VDC | 0.5W | - |
| **Mechanics** | | | |
| Input connection type | Cage Clamp (max. 6mm²) | Cage Clamp (max. 6mm²) | Cage Clamp (max. 2.5mm²) |
| Dimensions (L x W x H) in mm | 190 x 160 x 35 | 190 x 160 x 35 | 190 x 160 x 35 |
| **Environmental Conditions** | | | |
| Operating & Storage temperature | -30°C to +70°C | -30°C to +70°C | -30°C to +70°C |
| Relative humidity | 10% to 95% non-condensing | 10% to 95% non-condensing | 10% to 95% non-condensing |

### Ordering Information

| Product Type | Cat. number | Reference | Comment |
|---|---|---|---|
| MAIN card | HMMC6B | V1042309 | - |
| AUX card | HMAC6A | A1034632 | - |
| PROBE card | HMPC8A | B1034633 | 24Vdc power supply mandatory |
| Connection Kit | HMKCNA | C1034634 | 1 RS485 shielded cable and 1 connection card |
| Configuration kit | HMKCGA | D1034635 | The configuration software and the RS485 to USB cable |

# PRODUCT OFFERING
# Surge-Trap®-DC




Surge protective devices for PV applications:
large-scale, rooftop and self-consumption DC installations.
The Surge-Trap® PV pluggable SPDs provide advanced overvoltage protection to photovoltaic systems by utilizing Mersen's new optimized dynamic thermal disconnection system, which does not require additional overcurrent protection (back-up fuse) due to its high short-circuit withstand rating. These devices are designed to be mounted on 35mm DIN-rail while complying with EN-50539-11 and UL 1449 3rd Ed.

## Large-scale and rooftop PV

| Cat. number | Ref. number | Number of poles/phases | Ucpv | $I_{scpv}$ | $I_{max}$ (8/20) | $I_n$ (8/20) | $U_p$ at $I_n$ | Remote | Cartridge No L-N |
|---|---|---|---|---|---|---|---|---|---|
| **Y PV** | | | | | | | | | |
| STPT2-40K600V-YPV | 83020138 | 3 | 660 VDC | 10000 A | 40 kA | 20 kA | ≤ 2.6 kV | No | SP2-40K600V-PV |
| STPT2-40K600V-YPVM | 83020139 | 3 | 660 VDC | 10000 A | 40 kA | 20 kA | ≤ 2.6 kV | Yes | SP2-40K600V-PV |
| STPT2-40K1000V-YPV | 83020140 | 3 | 1060 VDC | 10000 A | 40 kA | 20 kA | ≤ 4 kV | No | SP2-40K1000V-PV |
| STPT2-40K1000V-YPVM | 83020141 | 3 | 1060 VDC | 10000 A | 40 kA | 20 kA | ≤ 4 kV | Yes | SP2-40K1000V-PV |
| STPT2-40K1500V-YPV | 83020158 | 3 | 1500 VDC | 10000 A | 40 kA | 10 kA | ≤ 5 kV | No | SP2-40K1500V-PV |
| STPT2-40K1500V-YPVM | 83020159 | 3 | 1500 VDC | 10000 A | 40 kA | 10 kA | ≤ 5 kV | Yes | SP2-40K1500V-PV |

## Self-consumption PV

| Cat. number | Ref. number | Number of poles/phases | Ucpv | $I_{scpv}$ | $I_{max}$ (8/20) | $I_n$ (8/20) | $U_p$ at $I_n$ | Remote | Cartridge No L-N |
|---|---|---|---|---|---|---|---|---|---|
| **U PV** | | | | | | | | | |
| STPT2-40K60V-2P | 83020128 | 2 | 65 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.7 kV | No | SP2-40K60V |
| STPT2-40K60V-2PM | 83020129 | 2 | 65 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.7 kV | Yes | SP2-40K60V |
| STPT2-40K75V-2P | 83020130 | 2 | 80 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.8 kV | No | SP2-40K75V |
| STPT2-40K75V-2PM | 83020131 | 2 | 80 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.8 kV | Yes | SP2-40K75V |

## Electrical diagrams

| Cat. number | Ref. number | Ucpv | $I_{scpv}$ | $I_{max}$ (8/20) | $I_n$ (8/20) | $U_p$ at $I_n$ |
|---|---|---|---|---|---|---|
| **PV** | | | | | | |
| SP2-40K60V | 83020008 | 65 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.35 kV |
| SP2-40K75V | 83020009 | 80 VDC | 1000 A | 40 kA | 20 kA | ≤ 0.4 kV |
| SP2-40K600V-PV | 83020005 | 330 VDC | 10000 A | 40 kA | 20 kA | ≤ 1.3 kV |
| SP2-40K1000V-PV | 83020006 | 530 VDC | 10000 A | 40 kA | 20 kA | ≤ 2 kV |
| SP2-40K1500V-PV | 83020010 | 750 VDC | 10000 A | 40 kA | 10 kA | ≤ 2.5 kV |

## Environmental & Physical characteristics

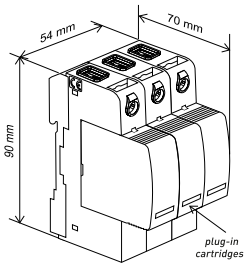
- Operating and storage temperature (C°): -40 to +80
- Response time (ta) (ns): <25
- Enclosure material: PA66 CT1, V-0
- Cross section flexible (mm²): 6 to 25
- Cross section solid (mm²): 6 to 35
- Terminal torque (N.m): 4 max

## Approvals / Standards

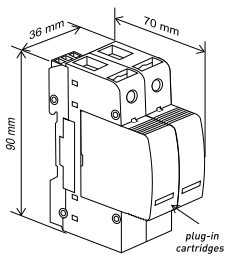
- EN-50539-11
- UTE C 61740-51
- UL 1449 3rd Ed recognized, File No E468946
- CE

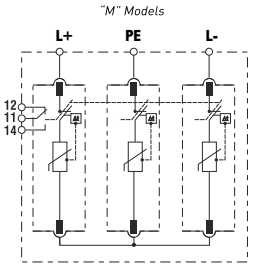
**Ucpv –** Maximum continous operating voltage (PV)
**Iscpv –** Short-circuit current rating (PV)
**Imax –** Maximum discharge current (8/20µs)
**In –** Nominal discharge current (8/20µs)
**Up –** Voltage protection level

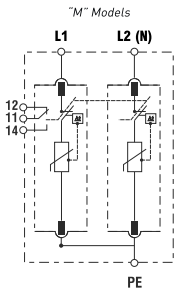
***Large-scale and rooftop PV***
*STPT2-40K600V-YPV(M)*
*STPT2-40K1000V-YPV(M)*




***Self-consumption PV***
*STPT2-40K60V-2P(M)*
*STPT2-40K75V-2P(M)*



# PRODUCT OFFERING
# DC Combiner Boxes

Mersen offers a complete range of modular solutions for the most varied requirements. Designed and assembled on customer demand, DC combiner boxes can contain terminal blocks, surge protection, fuses and load circuit breakers and systems that permanently monitor the performance of the strings.

Thanks to its long standing expertise in safety solutions, Mersen is performing the electrical validation and qualification of the systems, to ensure product quality and reliability in extreme conditions.

## A Perfect Solution for every customer's requirements



***Reliable Protection***
*Polyester reinforced with glass fiber enclosure protecting up to IP66 to ensure a safe use outside.*

***String performance monitoring***
*Mersen monitoring system continuously detects the string current and the voltage. Any abnormality is detected .immediately.*

***Fuse and fuse-holder***
*A complete range of fuse and fuse-holder to protect PV module against overload from 1 to 30A and 600 to 1200V.*

***100% Tested***
*All DC combiner boxes are certified in Mersen laboratory and 100% tested after assembly.*

***Individual Solutions***
*DC combiner box are assembled on customer demand to answer the most varied requirements.*

***Load-Break switch***
*To isolate the DC side of a PV system load-break switch are used.*

***Power Distribution blocks***
*Specially for use in the PV area, Mersen offers blocks to distribute power over wiring from 2.5 to 300mm².*

***Surge protection***
*The surge protection is using Mersen's patented TPMOV technology in a pluggable design up to 1000V to meet higher demands of PV systems.*

# Product Offering
# DC Combiner Boxes







## Technical data

| | | | |
|---|---|---|---|
| **Enclosure** | | | |
| Dimensions (HxWxP) | 270 x 360 x 230 mm | 308 x 255 x 150 mm | 847 x 636 x 300 mm |
| Casing | polyester reinforced with glass fiber | polyester reinforced with glass fiber | polyester reinforced with glass fiber |
| IP protection class (IEC60529) | IP 65 | IP 65 | IP 65 |
| IK resistance classe (IEC 62262) | IK 09 | IK 10 | IK 10 |
| Colour | RAL 7032 | RAL 7032 | RAL 7032 |
| **Electrical Properties** | | | |
| Max. rated voltage DC | 1000 VDC | 1000 VDC | 1000 VDC |
| Max. current per input DC | 10.5 A | 3 A | 14 A |
| DC switching capacity (IEC 60947-3) | 40 A (DC21B 1000V) | 20 A (DC21B 1000V) | 315 A (DC21B 1000V) |
| Surge Protection DC | Type II / Up < 3,2kV @ 5kA | - | Type II / Up < 3,2kV @ 5kA |
| Over-voltage category | Cat. III | - | Cat. III |
| Internal IP class | IP 20 | IP 20 | IP 20 |
| **Inputs** | | | |
| Number of DC inputs | 3 | 5 | 18 |
| Connection DC input cable to | - | US101HEL (1-16mm²) | - |
| Connection type DC input | MC4 Connectors | M16 connection, IP68, Ø: 4.5-10mm | MC4 Connectors |
| Fuses | yes | yes | yes |
| **Outputs** | | | |
| Number of DC outputs | 1 | 1 | 1 |
| Connection DC output cable to | spring terminal (max. 10mm²) | spring terminal (max. 10mm²) | FSPDB4A (16-185mm²) |
| Connection type DC output | M20 connection, IP68, Ø: 7-13mm | M20 connection, IP68, Ø: 7-13mm | M40 connection, IP68, Ø: 19-28mm |
| Connection DC earth protection | M16 connection, IP68, Ø: 4.5-10mm | - | M20 connection, IP68, Ø: 7-13mm |
| **String Monitoring** | | | |
| Monitoring board | - | - | - |
| Circuit breaker status | - | - | - |
| Surge Protection EOL | - | - | - |
| External Sensors | - | - | - |
| Power Supply | - | - | - |
| **Environmental** | | | |
| Condensation Management | 2 climatic valves IP68 | - | 2 climatic valves IP68 |
| Water evacuation | 1 water drain plug IP55 | 1 water drain plug IP55 | 1 water drain plug IP55 |
| Ambiant temperature range | -20°C to +45°C | -20°C to +45°C | -20°C to +40°C |
| | IEC 61439-2, Class II | | IEC 61439-2, Class II |

## Ordering Information

| | | | |
|---|---|---|---|
| Catalog Number | HS5IT20V10Z | HS3IT40SP10X | HS18IT315SP10X |

# Product Offering

# DC Combiner Boxes with String Monitoring









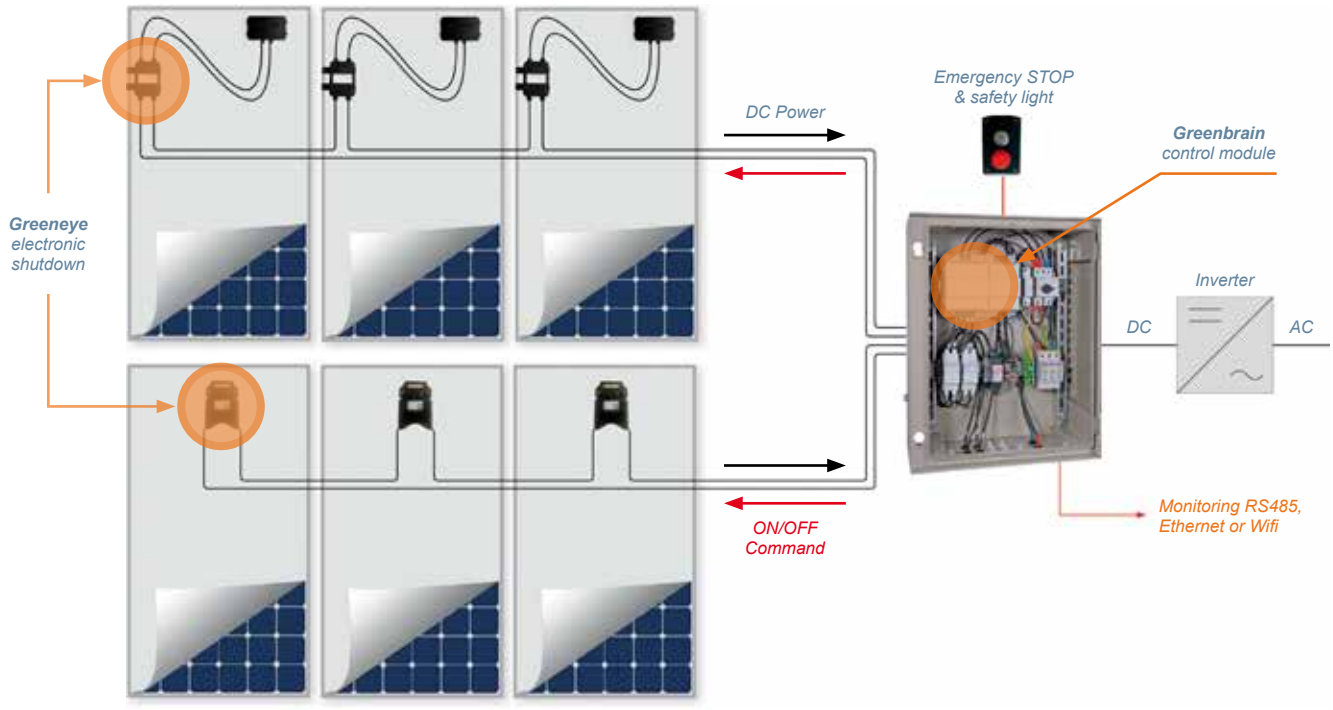
| Enclosure | | | |
|---|---|---|---|
| 647 x 436 x 250 mm | 747 x 536 x 300 mm | 1056 x 852 x 350 mm | 1056 x 852 x 350 mm |
| polyester reinforced with glass fiber | polyester reinforced with glass fiber | polyester reinforced with glass fiber | polyester reinforced with glass fiber |
| IP 65 | IP 65 | IP 65 | IP 65 |
| IK 10 | IK 10 | IK 10 | IK 10 |
| RAL 7032 | RAL 7032 | RAL 7032 | RAL 7032 |
| **Electrical Properties** | | | |
| 1000 VDC | 1000 VDC | 1000 VDC | 1000 VDC |
| 10.5 A | 13 A | 14 A | 11 A |
| 80 A (DC21B 1000V) | 100 A + 100A (DC21B 1000V) | 315 A (DC21B 1000V) | 400 A (DC21B 1000V) |
| Type II / Up < 3,2kV @ 5kA | Type II / Up < 3,2kV @ 5kA | Type II / Up < 3,2kV @ 5kA | Type II / Up < 3,2kV @ 5kA |
| Cat. III | Cat. III | Cat. III | Cat. III |
| IP 20 | IP 20 | IP 20 | IP 20 |
| **Inputs** | | | |
| 6 | 12 | 18 | 28 |
| - | - | - | - |
| MC4 Connectors | MC4 Connectors | MC4 Connectors | MC4 Connectors |
| yes | yes | yes | yes |
| **Outputs** | | | |
| 1 | 2 | 1 | 1 |
| FSPDB2A (2.5-70mm²) | FSPDB2A (2.5-70mm²) | FSPDB4A (16-185mm²) | FSPDB4A (16-185mm²) |
| M32 connection, IP68, Ø: 11-21mm | M32 connection, IP68, Ø: 11-21mm | M40 connection, IP68, Ø: 19-28mm | M40 connection, IP68, Ø: 19-28mm |
| M16 connection, IP68, Ø: 4.5-10mm | M16 connection, IP68, Ø: 4.5-10mm | M20 connection, IP68, Ø: 7-13mm | M20 connection, IP68, Ø: 7-13mm |
| **String Monitoring** | | | |
| 1 HMMC6A | 1 HMMC6A + 1 HMAC6A | 1 HMMC6A + 2 HMAC6A+ 1 HMPC8A | 1 HMMC6A + 4 HMAC6A |
| optional | yes | yes | yes |
| optional | yes | yes | yes |
| - | - | yes | - |
| self-supplied | self-supplied | 24 VDC ±10% | self-supplied |
| **Environmental** | | | |
| 2 climatic valves IP68 | 2 climatic valves IP68 | 2 climatic valves IP68 | 2 climatic valves IP68 |
| 1 water drain plug IP55 | 1 water drain plug IP55 | 1 water drain plug IP55 | 1 water drain plug IP55 |
| -20°C to +40°C | -20°C to +45°C | -20°C to +45°C | -20°C to +40°C |
| IEC 61439-2, Class II | IEC 61439-2, Class II | IEC 61439-2, Class II | IEC 61439-2, Class II |
| | | | |
| HM6IT80SP10X | HM122IT100SP10X | HM18IT315SP10X | HM18IT315SP10X |

# Product Offering
# Greeneye Greenbrain
## PV Safety Solution

**Protection system for workers, electricians and firefighters against electrocution hazards, providing an individual shutdown feature per PV module to reduce PV module output current and voltage down to zero.**

### Total Safety Solution
- Individual shutdown of each PV module: **0VDC & 0A**
- **Failsafe** safety system with **25 year warranty**
- Emergency stop and safety light control
- Control input from DC arc fault detector
- Control over DC wires through PLC
- Monitoring at PV module level
- Modular solution

### Certified Safety
- SIL2 according to IEC 51508-1 and IEC 51508-2
- Fire Safety Compliance
  - UTE C15 712-1:2013-07
  - VDE-AR-E 2100-712:2013-05
  - ÖVE R11-1:2013-03
  - NEC 2014 revision
- Easy installation: plug & play



# Product Offering
# Greeneye Greenbrain
## PV Safety Solution



### Greeneye Add-On module

When connected to a PV module, the Greeneye smart PV switch provides an individual shutdown feature of that module through a control over the DC string wires. It is a failsafe safety system designed according to **SIL2** safety standard. The Greeneye Add-On module is available with several PV connector options for an easy and fast installation.

| Cat. Number | Reference | Ordering Information | Package |
|---|---|---|---|
| HGEME80V12AX | X1038631 | Add-On module with Multi-Contact MC4 connectors | 12 |
| HGEME80V12AZ | Z1038633 | Add-On module with HUBER+SUHNER RADOX® connectors | 12 |
| HGEME80V12AY | Y1038632 | Add-On module with Amphenol Helios H4 connectors | 12 |



### Greeneye Embedded module

When connected to a PV module, the Greeneye smart PV switch provides an individual shutdown feature of that module through a control over the DC string wires. It is a failsafe safety system designed according to **SIL2** safety standard. The Greeneye embedded in the modular PV junction box RADOX® Blue-Safety from HUBER+SUHNER AG is using three cool bypass diodes to reduce power dissipation.

| Cat. Number | Reference | Ordering Information | Package |
|---|---|---|---|
| HGEHS80V12AX | A1038634 | Embedded module with Multi-Contact MC4 connectors | 20 |
| HGEHS80V12AZ | C1038636 | Embedded module with HUBER+SUHNER RADOX® connectors | 20 |
| HGEHS80V12AY | B1038635 | Embedded module with Amphenol Helios H4 connectors | 20 |





### Greenbrain

The **Greenbrain-C** manages the emergency stop button, the safety light and the remote control DC switch if used. The Greenbrain-C is mandatory to control and power supply to the other Greenbrain modules.
The **Greenbrain-S** manages the operating mode (ON / OFF) of the Greeneye modules through PLC system over DC wires. Each Greenbrain-S can manage 2 strings of 24 modules, limited to 1 000 VDC, 4 Greenbrain-S can be connected together to support up to 8 strings.

| Cat. Number | Reference | Ordering Information | Package |
|---|---|---|---|
| HGB-C1000V | K1041495 | 1 Greenbrain-C to control 4 Greenbrain-S | 1 |
| HGB-S1000V12A | J1041494 | 1 Greenbrain-S for 2 strings of Greeneye | 1 |

### Accessories

| Cat. Number | Reference | Ordering Information | Package |
|---|---|---|---|
| HGE-TEST | A1042843 | GreenTester to test Greeneye installed on PV modules | 1 |
| HEL-STOP+LED | W1042310 | Emergency STOP button and safety light | 1 |
| HEL-ALIM24VDC | H1042988 | 24Vdc power supply | 1 |

# PRODUCT OFFERING

# HelioProtection® Fuse

## HP10NH 1000VDC

Mersen HP10NH photovoltaic (PV) fuse series was engineered and designed specifically for the protection of photovoltaic systems. HelioProtection® HP10NH fuse links are designed for the protection of cables in a PV group of chains when a short circuit occurs in a panel (main fuse category). This HelioProtection® main fuse range enlarges our PV fuse links offering on a size having a worldwide acceptance. They are of the gPV type and comply with both IEC 60269-6 and UL 2579 PV standards.



### Features Benefits

- Global acceptance
- Low fault current interrupting capability
- Temperature cycle withstand capability
- Durable construction for enhanced system longevity
- High efficiency with low power losses
- Small footprint

### Applications

- All photovoltaic applications
- Inverter DC input protection
- Re-combiner applications (sub combiner, array combiner, master combiner)

### Ratings

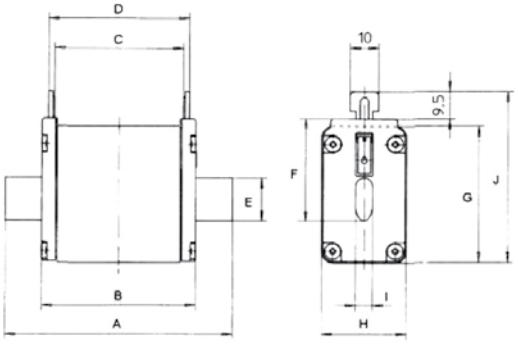
- 1000VDC
- IR = 50kA (L/R = 1ms)

### Approvals

- IEC 60269-6
- UL 2579
- RoHS compliance

| Size | Rated Voltage (V) | Nominal Current (A) | Class | Catalog Number | Reference Number | Watt losses @ 100% In (W) | Watt losses @ 70% In (W) | Package |
|---|---|---|---|---|---|---|---|---|
| NH1 | 1000VDC | 50 | gPV | HP10NH1GPV50 | Z1028283 | 11 | 4.6 | 3 |
| | | 63 | | HP10NH1GPV63 | A1028284 | 13 | 5.4 | 3 |
| | | 80 | | HP10NH1GPV80 | B1028285 | 15 | 6.1 | 3 |
| | | 100 | | HP10NH1GPV100 | C1028286 | 17 | 7.2 | 3 |
| | | 125 | | HP10NH1GPV125 | D1028287 | 18 | 7.4 | 3 |
| | | 160 | | HP10NH1GPV160 | E1028288 | 23 | 9.6 | 3 |
| NH2 | | 200 | | HP10NH2GPV200 | X1037619 | 27 | 11.3 | 3 |
| | | 250 | | HP10NH2GPV250 | Y1037620 | 31 | 12.9 | 3 |






| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| NH1 | 135 | 70.8 | 63 | 68 | 20 | 40 | 52.5 | 39.5 | 6 | 64.5 |
| NH2 | 150 | 68 | 63 | 68 | 26 | 48,5 | 60 | 51 | 6 | 72 |

# PRODUCT OFFERING

# HelioProtection® Fuse

## HP12NH – 1250VDC



Mersen HP12NH photovoltaic (PV) fuse series was engineered and designed specifically for the protection of photovoltaic systems. HelioProtection® HP12NH fuse-links are designed for the protection of cables in a PV group of chains when a short circuit occurs in a panel (main fuse category). This HelioProtection® main fuse range enlarges our PV fuse-links offering on a size having a worldwide acceptance. They are of the gPV type and comply with both IEC 60269-6 and UL 2579 PV standards.

### Features Benefits

- Global acceptance
- Low fault current interrupting capability
- Temperature cycle withstand capability
- Durable construction for enhanced system longevity
- High efficiency with low power losses

### Applications

- All photovoltaic applications
- Inverter DC input protection
- Re-combiner applications (sub combiner, array combiner, master combiner)

### Ratings

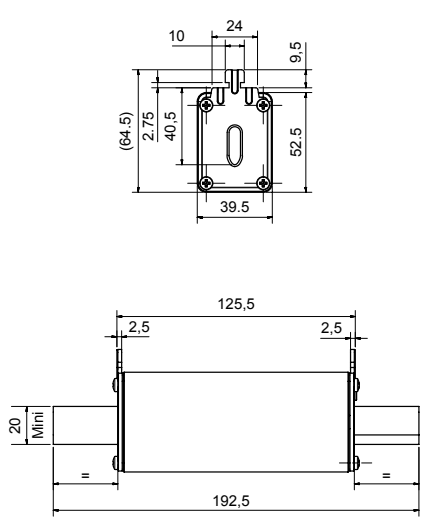
- 1250VDC
- IR = 50kA (L/R = 1ms)

### Approvals

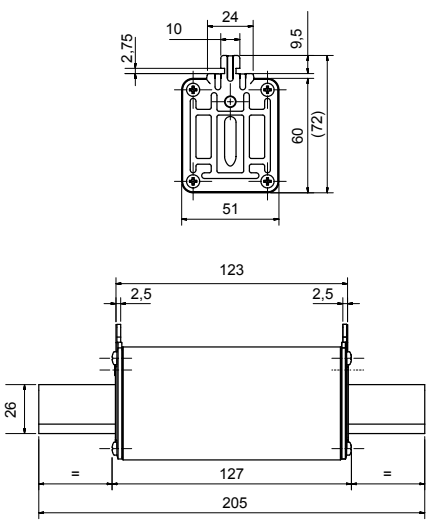
- IEC 60269-6
- UL 2579
- RoHS compliance

| Size | Rated Voltage (V) | Nominal Current (A) | Class | Catalog Number | Reference Number | Power dissipation at 0.7xIn | Power dissipation at In | Package |
|---|---|---|---|---|---|---|---|---|
| NH1XL | 1250VDC | 125 | gPV | HP12NH1XLGPV125 | G1039744 | 11.5 | 29 | 1 |
| | | 160 | | HP12NH1XLGPV160 | H1039745 | 14 | 36 | 1 |
| NH2XL | | 200 | | HP12NH2XLGPV200 | J1039746 | 16 | 40 | 1 |
| | | 250 | | HP12NH2XLGPV250 | K1039747 | 18 | 44 | 1 |
| NH3L | | 250 | | HP12NH3LGPV250 | Z1033389 | 18 | 46 | 1 |
| | | 315 | | HP12NH3LGPV315 | A1033390 | 22 | 46 | 1 |
| | | 350 | | HP12NH3LGPV350 | B1033391 | 23 | 55 | 1 |
| | | 400 | | HP12NH3LGPV400 | C1033392 | 29 | 73 | 1 |

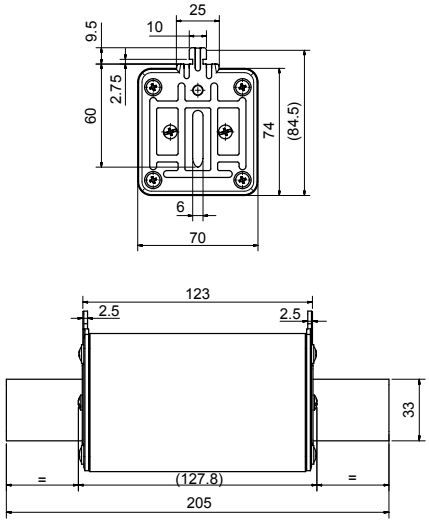
### Dimensions NH1XL




### Dimensions NH2XL




### Dimensions NH3L



# PRODUCT OFFERING

# HelioProtection® Fuse

## HP15NH – 1500VDC



Mersen HP15NH photovoltaic (PV) fuse series was engineered and designed specifically for the protection of photovoltaic systems. HelioProtection® HP15NH fuse links are designed for the protection of cables in a PV group of chains when a short circuit occurs in a panel (main fuse category). This HelioProtection® main fuse range enlarges our PV fuse links offering on a size having a worldwide acceptance. They are of the gPV type and comply with both IEC 60269-6 and UL 2579 PV

### Features Benefits

- Global acceptance
- Low fault current interrupting capability
- Temperature cycle withstand capability
- Durable construction for enhanced system longevity
- High efficiency with low power losses

### Applications

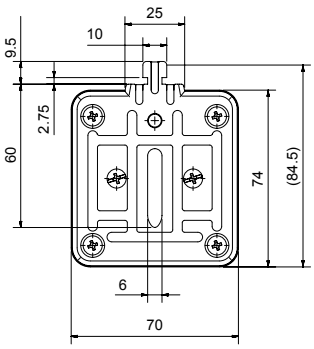
- All photovoltaic applications
- Inverter DC input protection
- Re-combiner applications (sub combiner, array combiner, master combiner)

**Standards**

- IEC 60269-6
- UL 2579 (pending)
- RoHS compliance

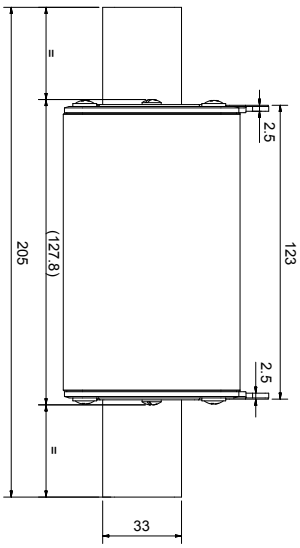
HelioProtection RoHS CE

| Size | Rated Voltage (V) | Nominal Current (A) | Class | Catalog Number | Reference Number | Power dissipation at 0.7xIn | Power dissipation at In | Package |
|---|---|---|---|---|---|---|---|---|
| NH3L | 1500VDC | 160 | gPV | HP15NH3LGPV160 | H1037859 | 15 | 36 | 1 |
| | | 200 | | HP15NH3LGPV200 | J1037860 | 18 | 44 | 1 |
| | | 250 | | HP15NH3LGPV250 | K1037861 | 20 | 50 | 1 |
| | | 315 | | HP15NH3LGPV315 | L1037862 | 23 | 57 | 1 |
| | | 350 | | HP15NH3LGPV350 | M1037863 | 25 | 63 | 1 |
| | | 400 | | HP15NH3LGPV400 | N1037864 | 28 | 71 | 1 |




### NH-fuse-links gPV 1500VDC Direct Mounting size 3L

| Catalog number | Reference number | Rated current $I_n$ | Power dissipation at 0.7x$I_n$ | Power dissipation at $I_n$ | Weight | Package |
|---|---|---|---|---|---|---|
| HP15NH3LGPV160B | T1048679 | 160 A | 15 W | 36 W | 1.66 kg | 1 |
| HP15NH3LGPV200B | V1048680 | 200 A | 18 W | 44 W | 1.66 kg | 1 |
| HP15NH3LGPV250B | W1048681 | 250 A | 20 W | 50 W | 1.66 kg | 1 |
| HP15NH3LGPV315B | X1048682 | 315 A | 23 W | 57 W | 1.66 kg | 1 |
| HP15NH3LGPV350B | Y1048683 | 350 A | 25 W | 63 W | 1.66 kg | 1 |
| HP15NH3LGPV400B | Z1048684 | 400 A | 28 W | 71 W | 1.66 kg | 1 |



# PRODUCT OFFERING

# HelioProtection® Fuse

## DC120-123 – 1000 – 1200VDC

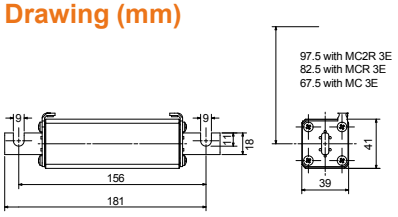


**The HelioProtection® Fuse DC120-123 series are designed for the protection of cables in a PV groups of chains when a short circuit occurs in a panel.**

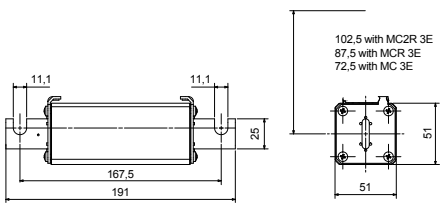
**These HelioProtection® fuse comply with the IEC 60269-1 standard and the IEC 60269-6 standard with specific mechanical dimensions. They are of the gPV type.**

| Minimum Breaking Capacity = 1.35In Maximum Breaking Capacity = 100kA | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Size | Rated Voltage | Nominal Current (A) | Class | Catalog Number EF | Reference Number EF | Catalog Number EF | Reference Number EF | Watt Losses @ In | Watt Losses @ 0.7In | Packaging |
| 120 | 1200 | 50 | gPV | DC120GPV12C050E | X1003993 | DC120GPV12C050P | A1025386 | 20.1 | 8.2 | 1 |
| 120 | 1200 | 63 | gPV | DC120GPV12C063E | Y1003994 | DC120GPV12C063P | D1025389 | 21.1 | 8.6 | |
| 120 | 1200 | 80 | gPV | DC120GPV12C080E | Z1003995 | DC120GPV12C080P | E1025390 | 26.8 | 10.9 | |
| 121 | 1200 | 100 | gPV | DC121GPV12C100E | A1003996 | DC121GPV12C100P | F1025391 | 30.9 | 12.6 | |
| 121 | 1200 | 125 | gPV | DC121GPV12C125E | B1003997 | DC121GPV12C125P | G1025392 | 36.1 | 14.7 | |
| 121 | 1200 | 160 | gPV | DC121GPV12C160E | C1003998 | DC121GPV12C160P | H1025393 | 41.2 | 16.8 | |
| 121 | 1200 | 200 | gPV | DC121GPV12C200E | D1003999 | DC121GPV12C200P | K1025395 | 48.4 | 19.8 | |
| 121 | 1200 | 250 | gPV | DC121GPV12C250E | E1004000 | DC121GPV12C250P | L1025396 | 56.7 | 23.1 | |
| 122 | 1100 | 315 | gPV | DC122GPV11C315E | F1004001 | DC122GPV11C315P | M1025397 | 63.9 | 26.1 | |
| 123 | 1100 | 400 | gPV | DC123GPV10C400E | G1004002 | DC123GPV10C400P | N1025398 | 79.3 | 32.4 | |

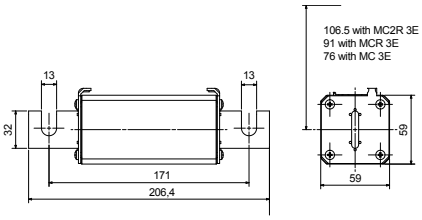
## Drawing (mm)




120



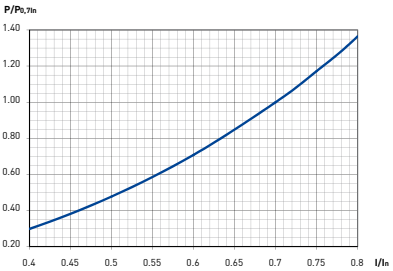

121

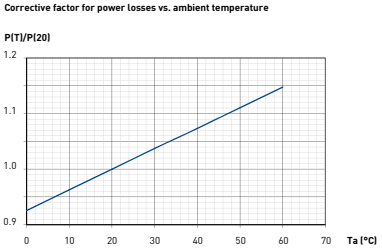



122

## Fuse bases

| Cat. Number | Nb of poles | Packaging | Insulation Voltage |
|---|---|---|---|
| SP43-120 | 1 | 1 | 2 500VDC |
| SE43-121 | 1 | 1 | |
| SE43-122 | 1 | 1 | |
| SF50-123 | 1 | 1 | |



# PRODUCT OFFERING
# Photovoltaic Fuse-holders
# 1000VDC



*HPBB11PPR*

## NH fuse-bases for NH fuse-links gPV 1000VDC, size 1, 250A, single pole

UL LISTED

| Catalog Number | Reference Number | Power acceptance | Rated impulse withstand voltage $U_{imp}$ | Design | Package |
|---|---|---|---|---|---|
| HPBB11PPR | A1030607 | 32 W | 8 kV | open design, for DIN-rail or screw mounting, for NH fuse links size 1 | 3 |
| HPBB11PPRFS | K1032916 | 32 W | 8 kV | with touch protection, for DIN-rail or screw mounting, for NH fuse links size 1 | 3 |



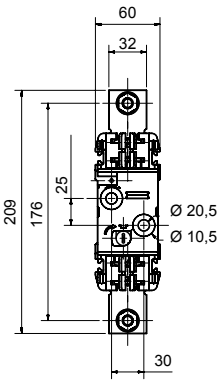
*HPBB21PPR*

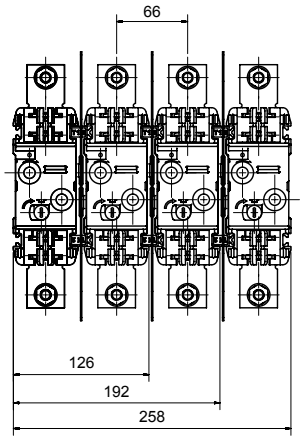
## NH fuse-bases for NH fuse-links gPV 1000VDC, size 2, 315A, single pole

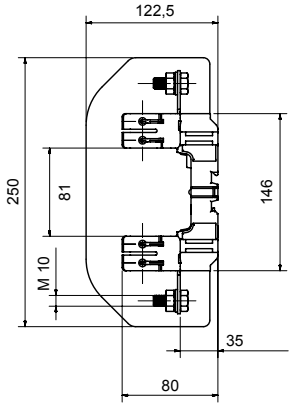
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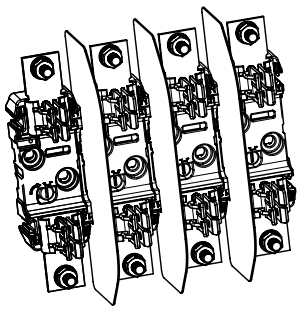
| Catalog Number | Reference Number | Power acceptance | Rated impulse withstand voltage $U_{imp}$ | Design | Package |
|---|---|---|---|---|---|
| HPBB21PPR | C1037509 | 45 W | 8 kV | open design, for DIN-rail or screw mounting, for NH fuse links size 1 and 2 | 3 |
| HPBB21PPRFS | D1037510 | 45 W | 8 kV | with touch protection, for DIN-rail or screw mounting, for NH fuse links size 1 and 2 | 3 |

## NH fuse-base for short NH fuse-links gPV, sizes 1, type PP, open design (dimensions in mm)



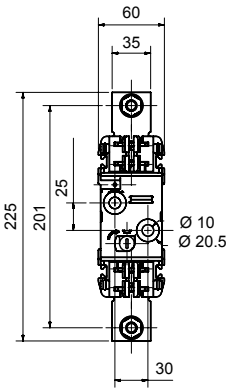



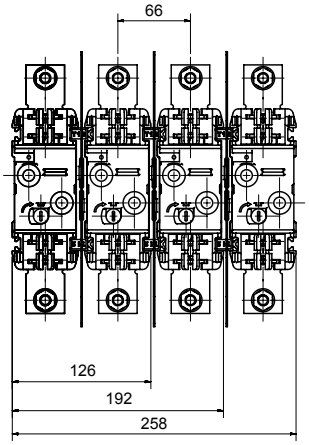



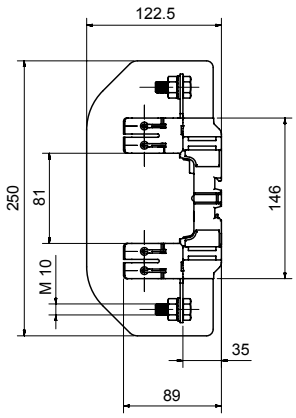



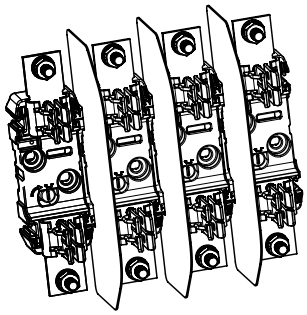
*In case of multipole units in parallel without barriers a distance of 8mm must be considered between the live parts of the fuses.*

## NH fuse-base for short NH fuse-links gPV, sizes 2, type PP, open design (dimensions in mm)



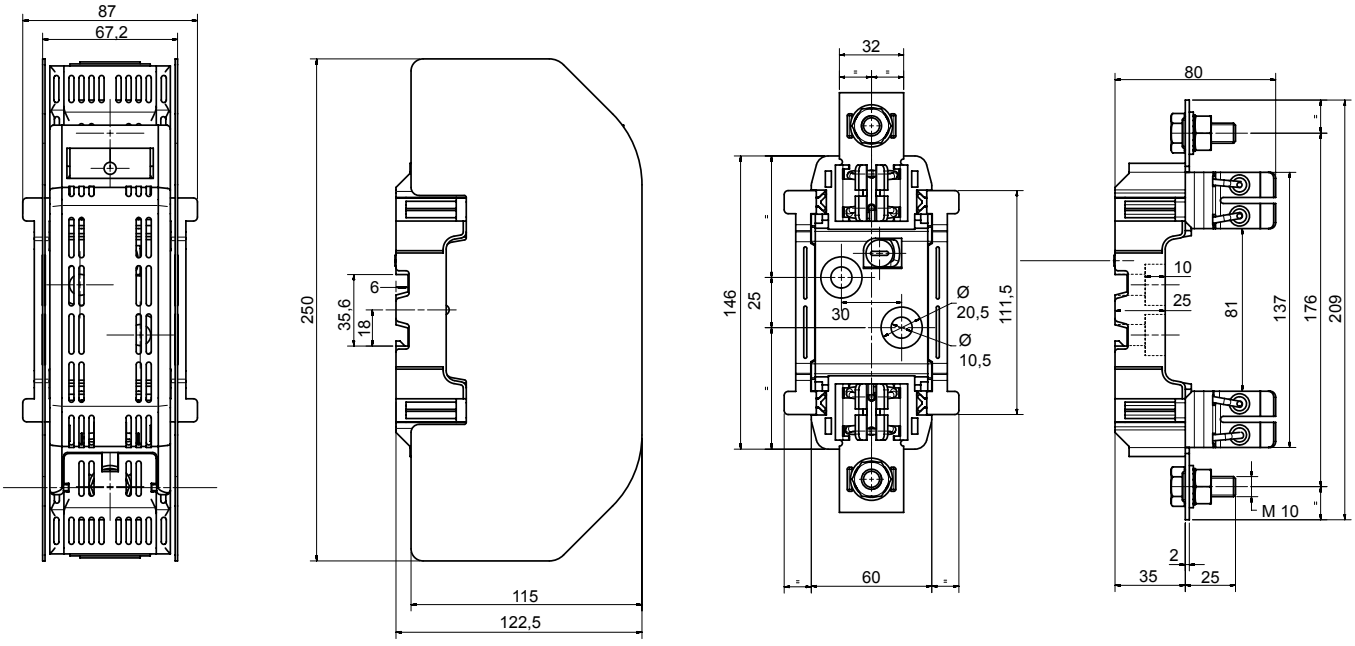



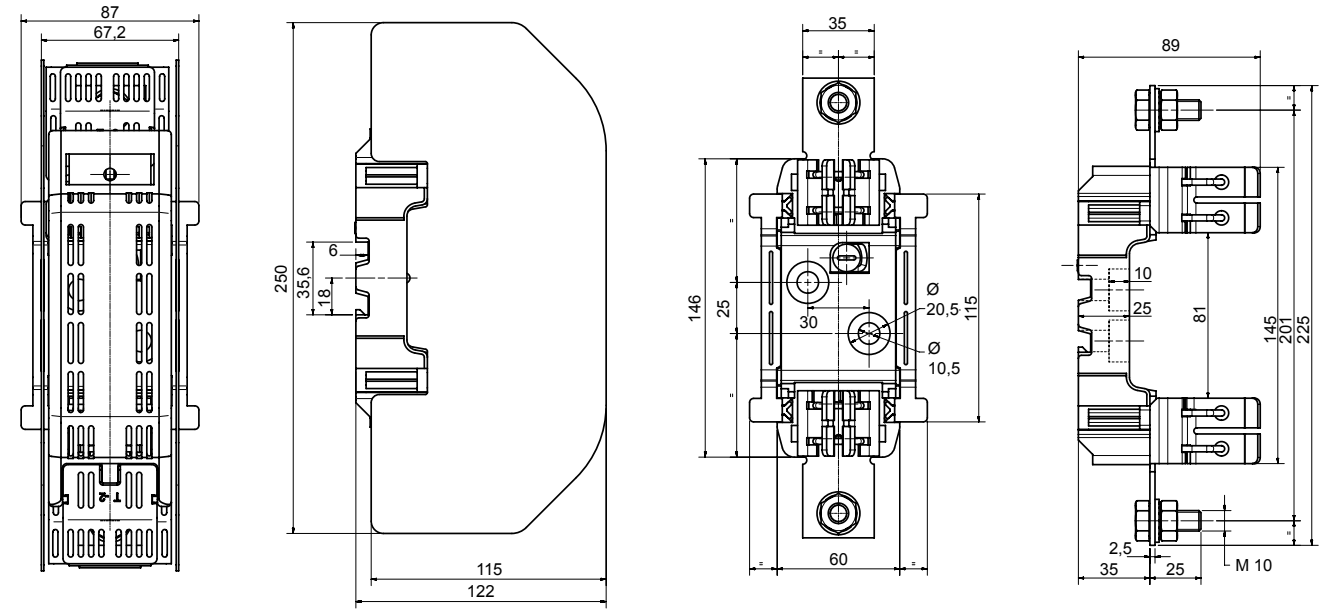



*In case of multipole units in parallel without barriers a distance of 8mm must be considered between the live parts of the fuses*

## NH fuse-base for short NH fuse-links gPV, sizes 1, type PP with touch protection (dimensions in mm)




## NH fuse-base for short NH fuse-links gPV, sizes 2, type PP with touch protection (dimensions in mm)




## NH Fuse handle for NH fuse links size 00-4



*NHHANDLE*

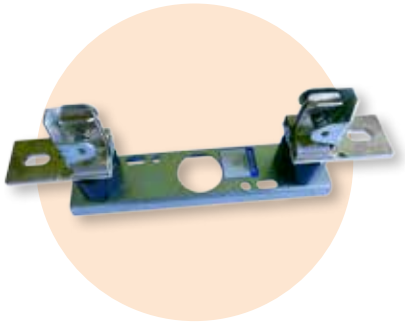
| Catalog Number | Reference Number | Size | Design | Weight | Package |
|---|---|---|---|---|---|
| NHHANDLE | P215592 | 00 to 4 | without arm protection to DIN VDE 0636-2, DIN VDE 608-4 | 279 g | 5 |
| 08024.000000 | X216105 | 00 to 4 | with fire proof arm protection to DIN VDE 0636-2, DIN VDE 608-4 | 627 g | 1 |



*08024.000000*

# PRODUCT OFFERING

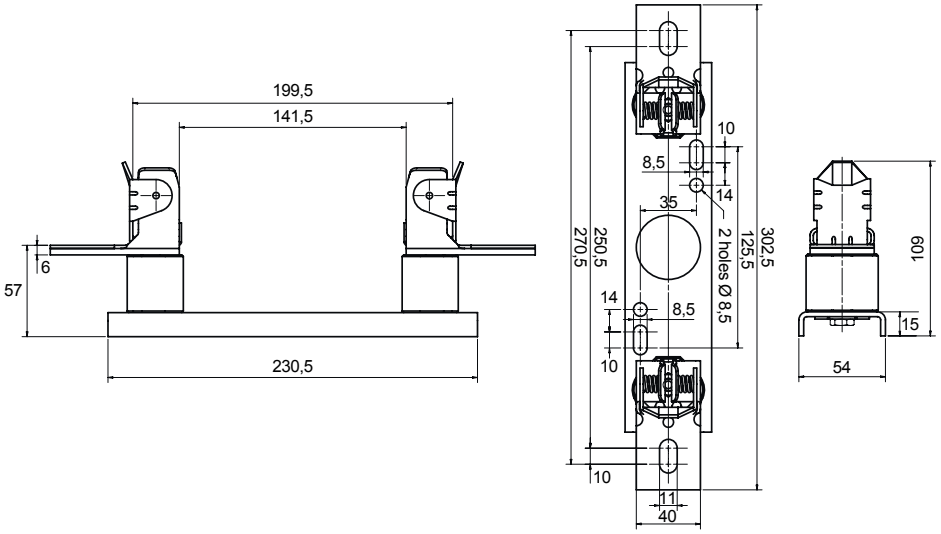
# Photovoltaic Fuse-holders 1500VDC - open version



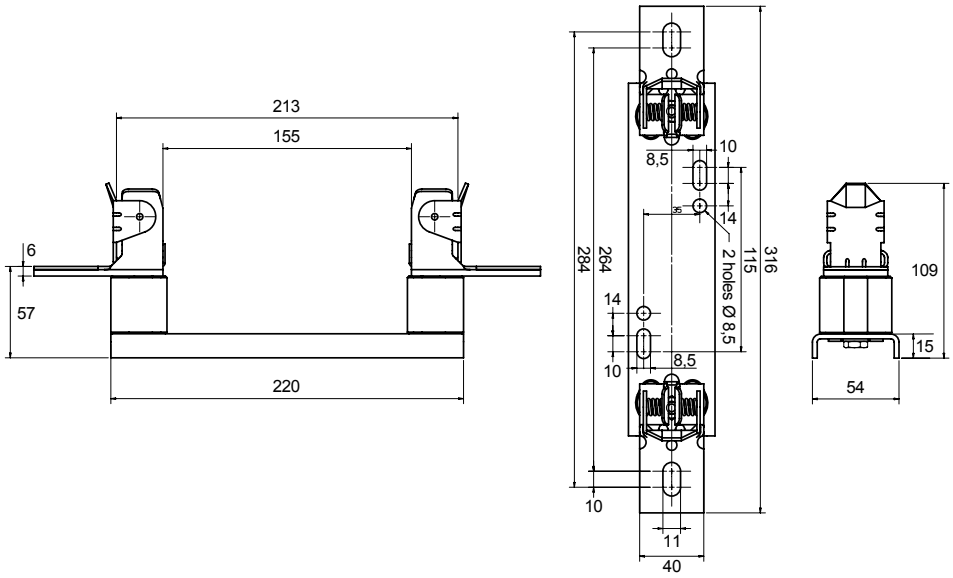
## Open Fuse bases for NH long fuse-links gPV up to 1500VDC, 1 pole, SCCR 50kA

| Catalog Number | Reference Number | Power acceptance | Rated impulse withstand voltage $U_{imp}$ | Rating | Design | Package |
|---|---|---|---|---|---|---|
| SP36121 | B1026353 | 59 | 8kV | 250 | open design, screw mounting, for NH1XI fuse link | 1 |
| SP36122-123 | P1025054 | 95 | 8kV | 630 | open design screw mounting, for NH2XI and NH3L fuse links | 1 |

## Dimensions SP36121

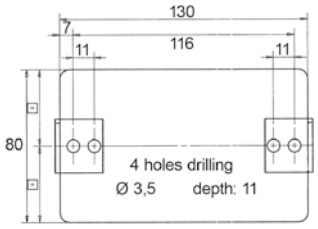


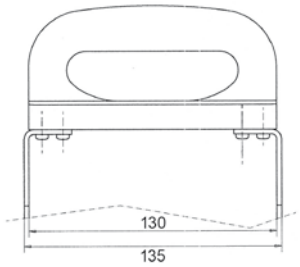

## Dimensions SP36122-123

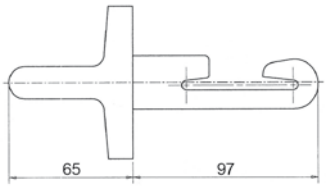



## NH Fusehandle for long fuses

| Catalog Number | Reference Number |
|---|---|
| POIGNEEPM12 | Y210402A |



# PRODUCT OFFERING

## Photovoltaic Fuse-holders 1500VDC - protected version

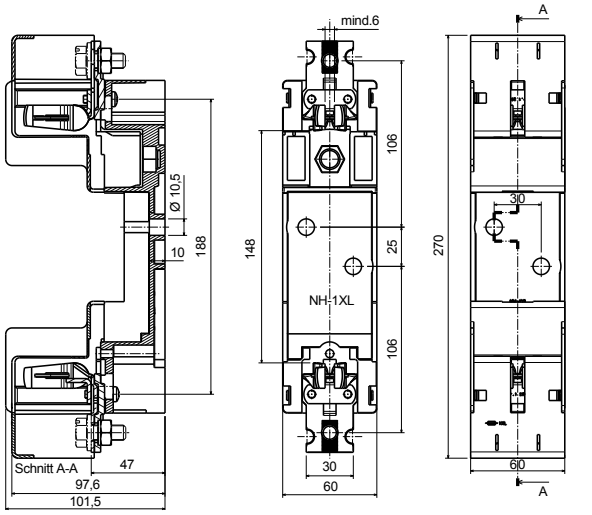
### Protected fuse-bases for NH long fuse-links gPV up to 1500VDC, one pole, SCCR 15kA

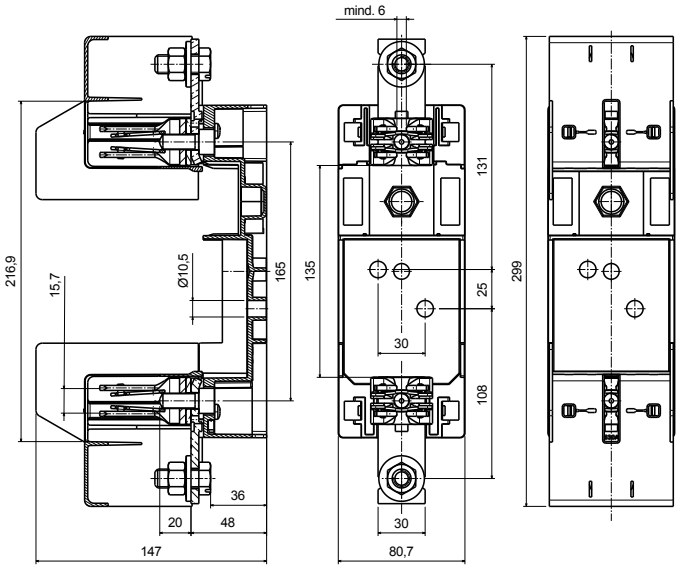
| Catalog Number | Reference Number | Power acceptance | Rated impulse withstand voltage $U_{imp}$ | Rating | Design | Package |
|---|---|---|---|---|---|---|
| HPBB1XL1PPFS | Y1039598 | 40 | 8kV | 250A | With touch protection, screwmounting, for NH1XL fuse-links* | 3 |
| HPBB2XL3L1PPFS | Z1039599 | 70 | 8kV | 500A | With touch protection, screwmounting, for NH2XL and NH3L fuselinks** | 3 |
| HPBB2XL3L1PBFS | A1039600 | 70 | 8kV | 500A | With touch protection, screwmounting, busbar output, for NH2XL and NH3L fuselinks | 3 |

** can accept Mersen gPV fuse-links size 121 and NH2XL rated 250A with derating.*
*** can accept NH3L fuses up to 630A with derating.*



**HPBB1XL1PPFS**



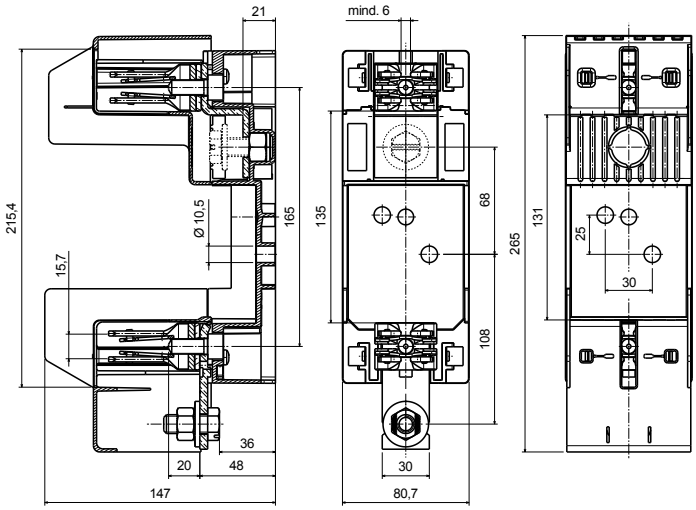




**HPBB2XL3LPPFS**





**HPBB2XL3LPBFS**






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