Ferraz Shawmut

HelioProtection Program

Solar solutions designed by Ferraz Shawmut

issue 5

www.helioprotection.com

Transportation | Power conversion | **Power generation & distribution** | Industrial controls | Power quality





CARBONE LORRAINE

A free, **renewable** and universal source of energy

The boom in renewable energies

Known reserves of fossil fuels – today the world's main energy resource – will be depleted by the end of this century if we don't change our ways. To combat global warming, the European Union has set up its own climate plan, in addition to signing the Kyoto Protocol. Its goals for 2020 include a 20% increase in energy efficiency, 20% reduction in greenhouse gas emissions, and 20% renewable energy . The future belongs to hydropower, biomass, wind power and solar power.

The beauties of photovoltaics

In the course of the coming decade, solar power will play a key role in reaching the climate plan's goals. That technology uses an entirely cost-free, globally available energy source to generate electricity for use on the spot, or to sell to the grid. No greenhouse gases are emitted. In residential applications, a solar project that can be paid off in 2 to 4 years, versus a lifespan of about 20 years, often merits a tax deduction. There's an argument that natural gas and oil can't make!
That's why experts believe that by 2020 there will be 5.4 GW of installed solar capacity in France - 30 times the total at the end of 2008. Finally, solar power is a mature and extremely reliable process... as long as it's protected properly. And that's where Ferraz Shawmut leads the world.

Ferraz Shawmut is committed

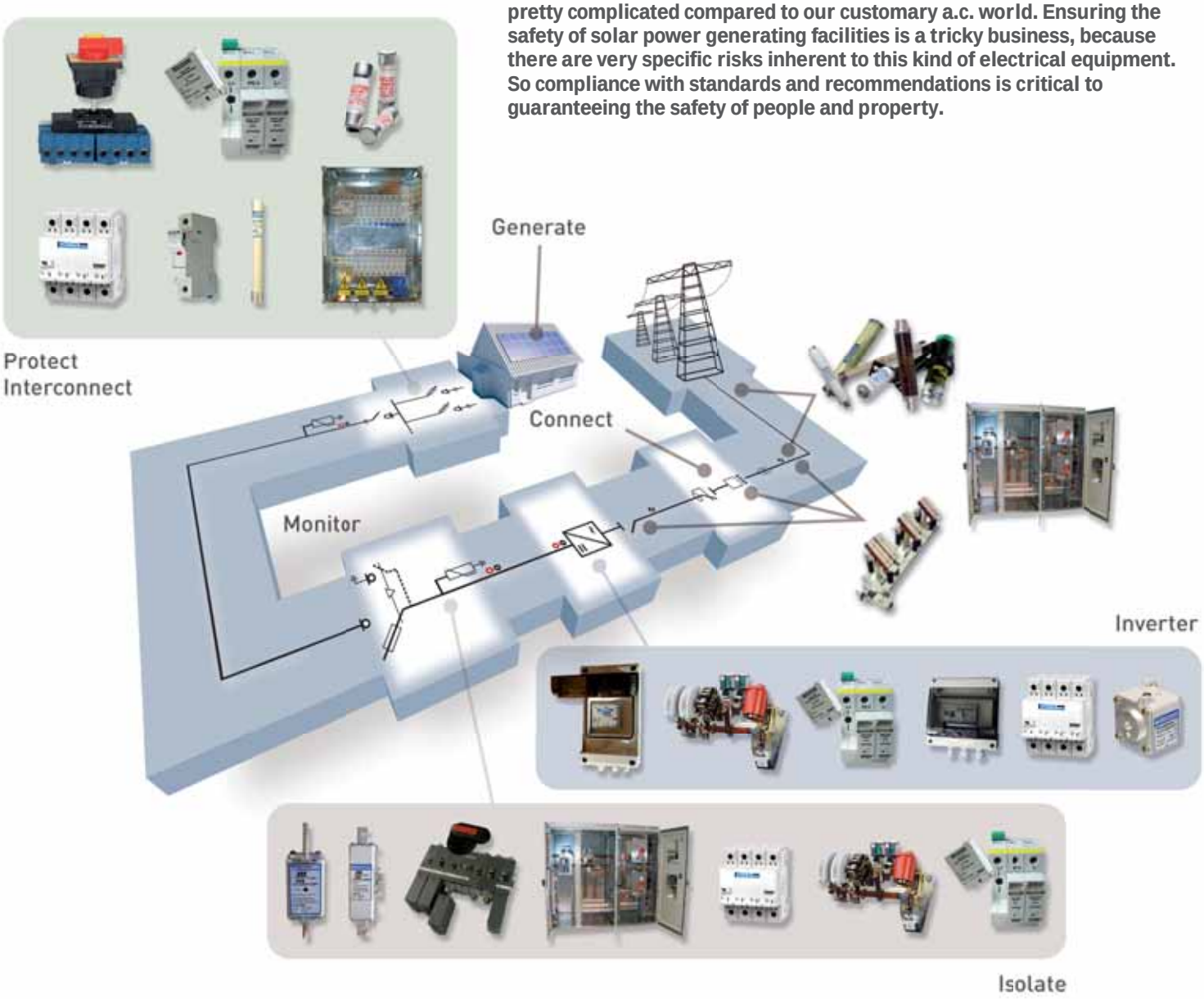
Any solar installation, whether standalone or grid-connected, is vulnerable to fault currents or shocks from lightning or switching. Today, systems combining switches, fuses and surge protective devices are the most effective ways of protecting the wiring and all the electrical equipment in a PV system. But that protection and all its components must be designed, dimensioned, tested and adapted to the specific features of solar applications, especially d.c. operating conditions, and to prevailing standards.

At Ferraz Shawmut, the specialist in protection specially designed for power generation and distribution, we are showing our commitment to the development of solar power with a dedicated range of products to disconnect, clip and isolate – whatever it takes to shield the wiring between strings of panels from damage.
Thanks to our junction boxes, main boxes and surge protection boxes, faulty circuits are isolated and the system can keep on generating power.

Ferraz Shawmut is the electrical protection activity of the global Carbone Lorraine group, which is also involved in photovoltaics through production of the graphite for the molds used to make PV cells.

Guaranteed protection, from the cell to the grid

The fact that a solar device is both a d.c. environment and a non interruptible source of current whenever the sun is shining makes things pretty complicated compared to our customary a.c. 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.



Ferraz Shawmut's contribution to standards

There are international standards to govern PV equipment and systems: IEC 60364-7-712 is devoted to solar photovoltaic power supply systems, and IEC 62548 Edition 1 covers the installation and safety requirements for PV generators. But there are also more local standards or recommendations such as the UTE C15 712 Guidelines and NF C15-100 on LV electric systems in France.

As a global business serving markets that demand high performances for both solutions and service, Ferraz Shawmut plays an active role in the development of standards. We are a member of International Electrical Commission (IEC) group 32B, working on section 6 of standard 60269 that deals with additional requirements for low voltage fuses designed to protect photovoltaic power systems (scheduled for release at the end of 2010).

Ferraz Shawmut is also attentively following the work on UL standard 2579 (Low Voltage Fuses - Fuses for photovoltaic systems).

Constant commitment **to quality and service**

Ferraz Shawmut is the world's reference in circuit protection. Our products and the services we offer with them, have a well-earned reputation for quality. The fuses, surge arresters and other products in the HelioProtection program have been specially designed and tested to serve as safety elements in solar power systems. They guarantee failure-free operation of that equipment with no secondary effects. Not only is Ferraz Shawmut constantly on top of the requirements in standards and attentive to the demands of both users and professionals in terms of reliability, maintainability, availability and safety, the company voluntarily subjects itself to strict quality monitoring backed up by extensive electrical, mechanical and climatic tests.

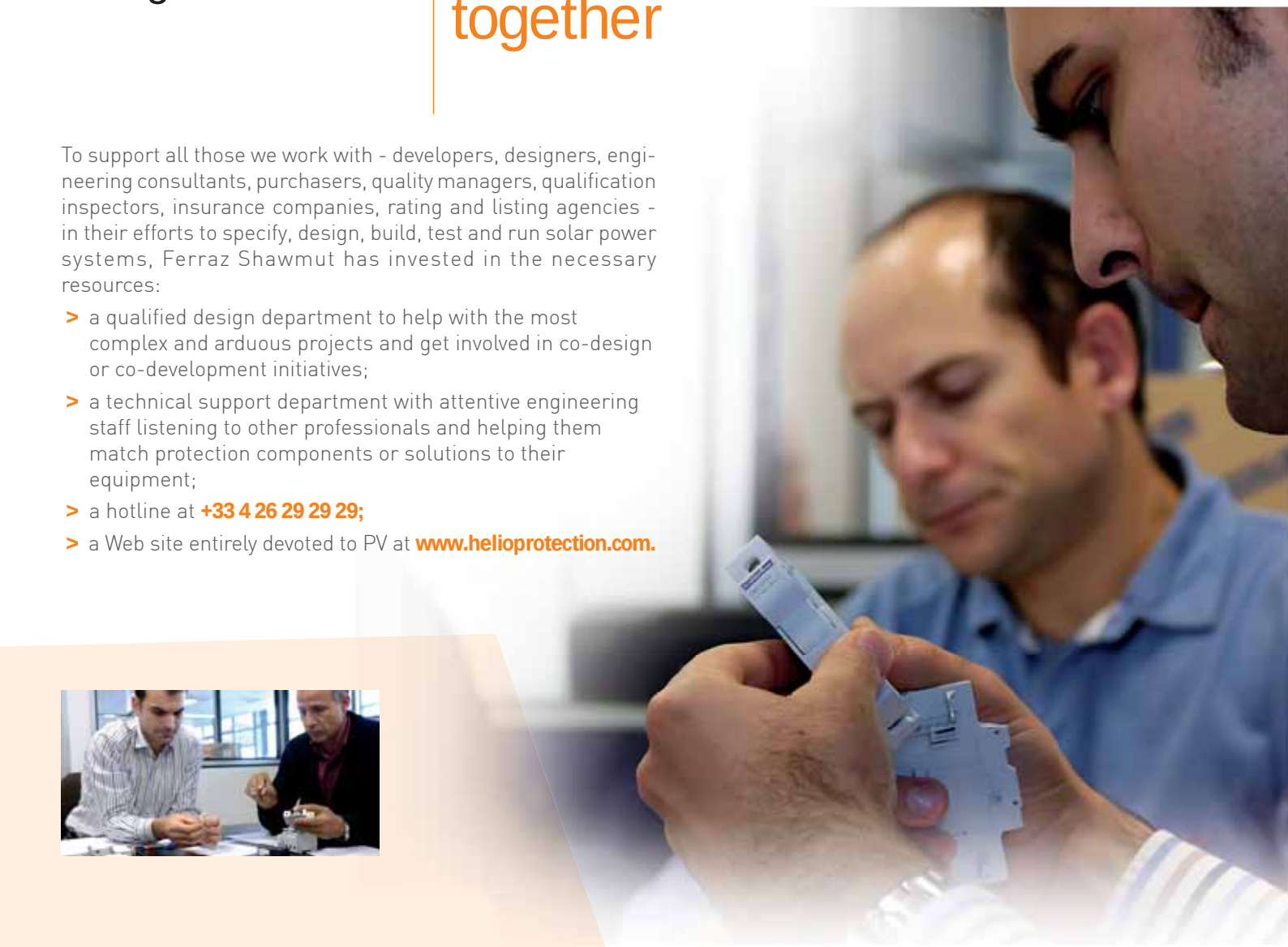
Two labs dedicated to quality

The proof of that quest for continual improvement: a total of more than a million tests in 25 years! Ferraz Shawmut 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.

Saint-Bonnet-de-Mure:

- temperature rise and strength tests on test benches with extra low voltage power supply;
- short circuit withstand tests (400MVA generator);
- d.c. tests with large time constants;
- dielectric tests at industrial frequencies;
- faraday cage impulse voltage tests;
- oven climate tests from -45°C to +150°C, plus salt mist;
- mechanical tests, pressure, vibration, acceleration - and more.

Going even farther 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, Ferraz Shawmut 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;**
- a Web site entirely devoted to PV at **www.helioprotection.com.**

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.

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

Residential

(5 to 36kW)

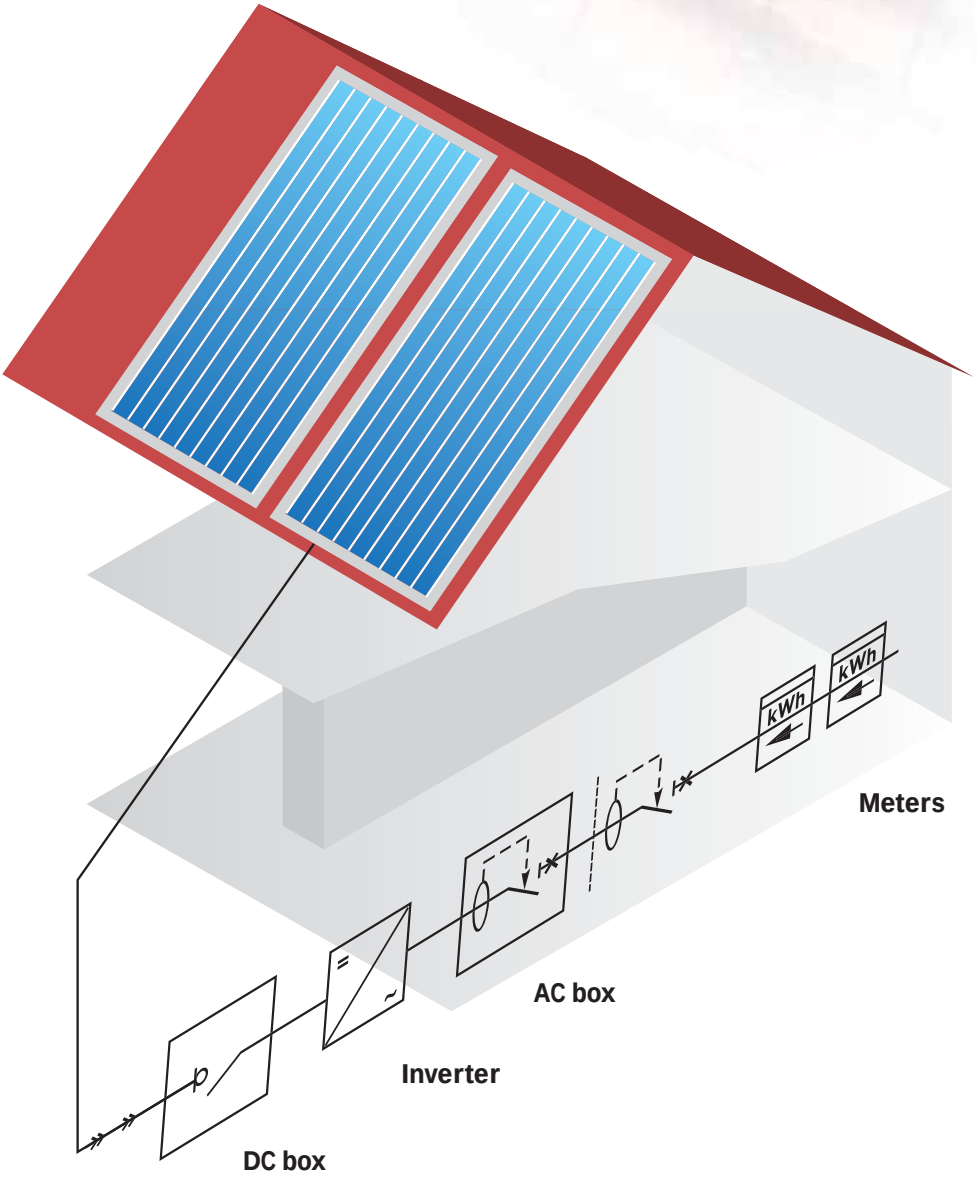
Your solar partner

Ferraz Shawmut has always been a partner for electrical equipment distributors, and has played a role ever since solar power started to boom on the residential market, i.e. for private homes, small apartment buildings and farm buildings.

Our HelioProtection range is now widely available from distributors. Electrical contractors can choose from a wide range of products designed especially for solar power. For them, our product offering is a basis in recommending a system that meets the user's needs - reliable, with a fast return on investment and sized appropriately - and obeys the very strict safety standards that are specific to photovoltaics.

Return on investment for a typical 3 kWc system

A solar panel is designed to produce for about 20 years. With enough sunshine available, it can easily pay itself off in 6 to 10 years. A 25m² solar array can generate up to 3500kWh per year, i.e. what an average household consumes. A PV system can easily be built into your residential construction project and complements measures to improve energy performance and build "zero energy homes", where power consumption is equal to power generation.



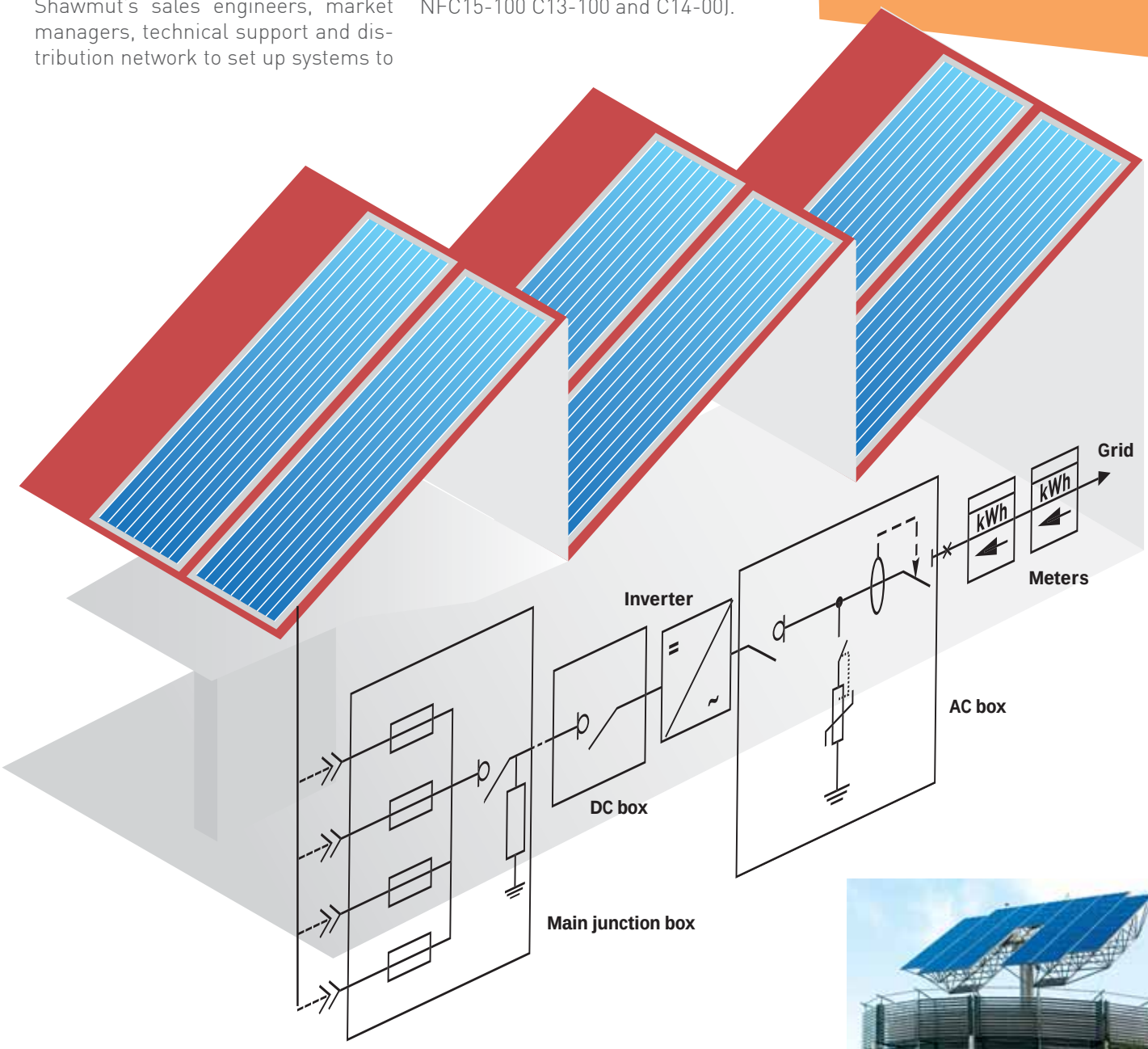
Office and **industrial buildings** (36 to 250kW)

Built to order

The walls and roofs of buildings - office towers, factories, malls and warehouses - are among the preferred supports for solar power systems. Architects, promoters and developers have grasped the importance of this energy revolution, and more and more of them are recommending such solutions.
Those specifiers, as well as major electrical contractors, can count on Ferraz Shawmut's sales engineers, market managers, technical support and distribution network to set up systems to order, with a wide variety of architectures and central control systems on offer.
For large-scale projects, our Design department can propose a package of products and services to match the customer's specifications, which often interest insurance companies directly, given the specific standards that govern solar power (UTE C15-712S guidelines, NFC15-100 C13-100 and C14-00).

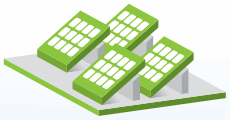
Key figures

Here's a typical basis for preliminary calculation of return on investment for a rooftop grid-connected system:
1kWc = 10m² (crystalline silicon) = 1000 kWh per year = € 7000 before tax



Ground-mounted solar arrays

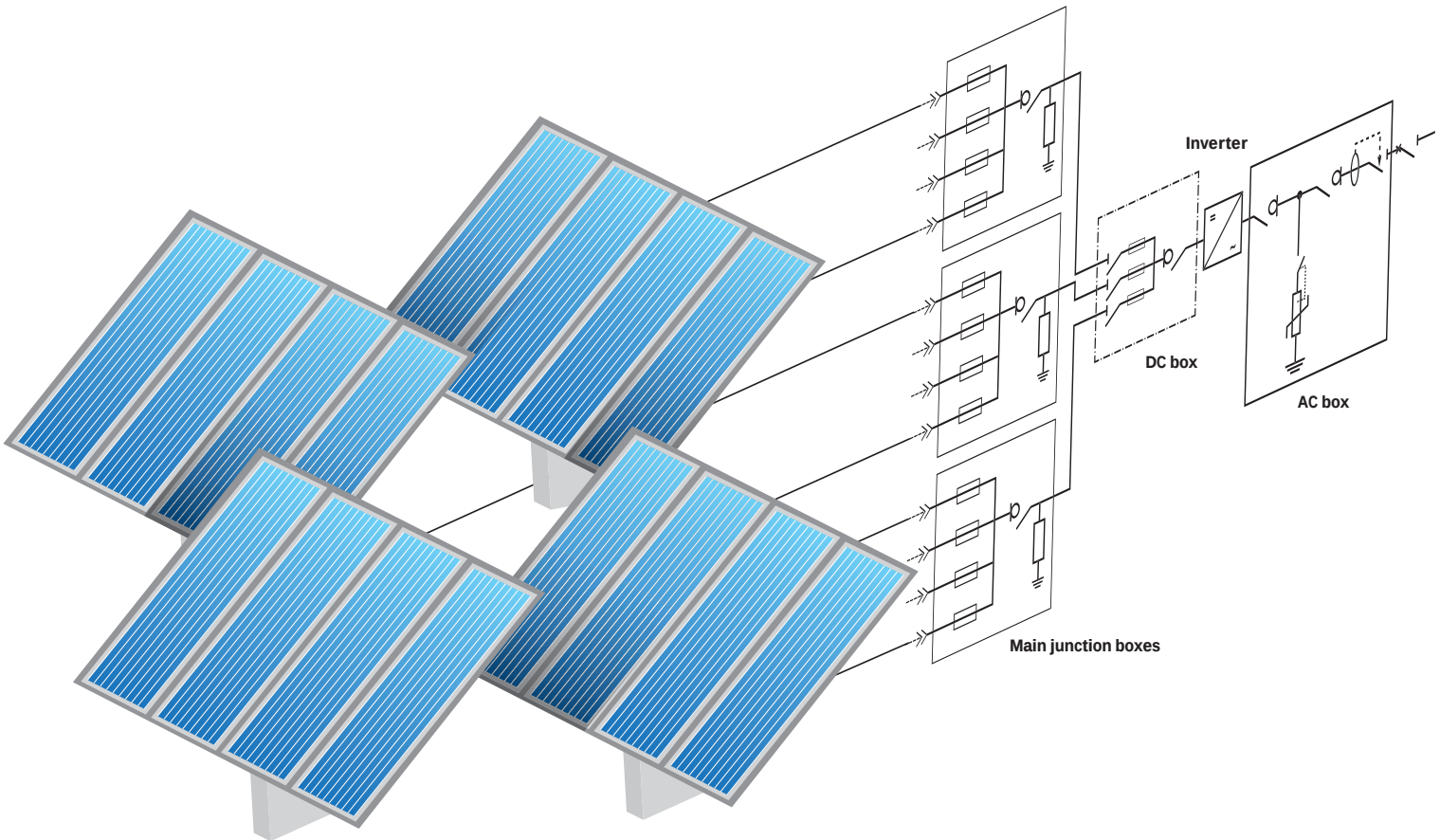
(Over 250kW)



Built to generate power

In this type of set-up the architecture is centered around an automatic monitoring and control system. Ferraz Shawmut addresses this state-of-the-art market with the assets of an international leader in circuit protection.

Our Design department answers all the engineering specifications for the system and brings unparalleled savoir-faire to choice of products, dimensioning, and compliance with the strict standards (from UTE C15-712S guidelines to NFC13-100 and C14-100) prevailing in the solar industry.



Ferraz Shawmut offers customers a technical support hotline at +33 4 26 29 29 29.

Junction boxes for every use

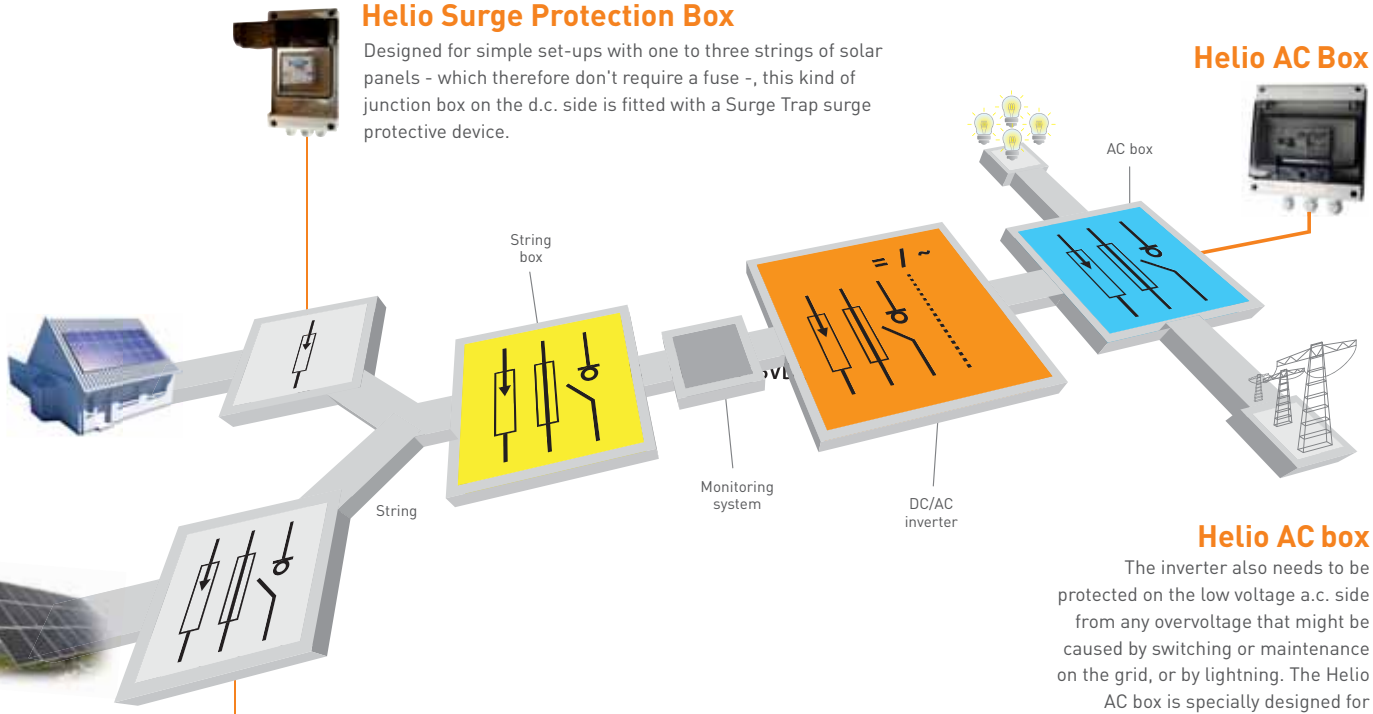
At the heart of the circuit to transmit solar power to the grid, an inverter converts the d.c. signal from the array into a.c. before sending it on to the grid, and keeps the supply running continuously. But the system is still vulnerable to lightning, fault currents and overvoltage, before or after the inverter.
Ferraz Shawmut has developed solutions with three types of junction boxes.

Overall view of a solar power system

1, 2 or 3 strings
No fuse needed, just a surge protective device

Helio Surge Protection Box

Designed for simple set-ups with one to three strings of solar panels - which therefore don't require a fuse -, this kind of junction box on the d.c. side is fitted with a Surge Trap surge protective device.



Helio AC Box

Helio AC box

The inverter also needs to be protected on the low voltage a.c. side from any overvoltage that might be caused by switching or maintenance on the grid, or by lightning. The Helio AC box is specially designed for this function and contains both a Surge-Trap SPD and a differential circuit breaker.

Helio Junction Box

This d.c. side junction box, designed for set-ups with more than three strings of solar panels, is fitted with both fuses and a Surge-Trap surge protective device.
A switch is also provided so that maintenance technicians can work on the equipment safely.

4 strings or more
Fuse and SPD

Systems made to measure for your **solar application**
(grid-connected)

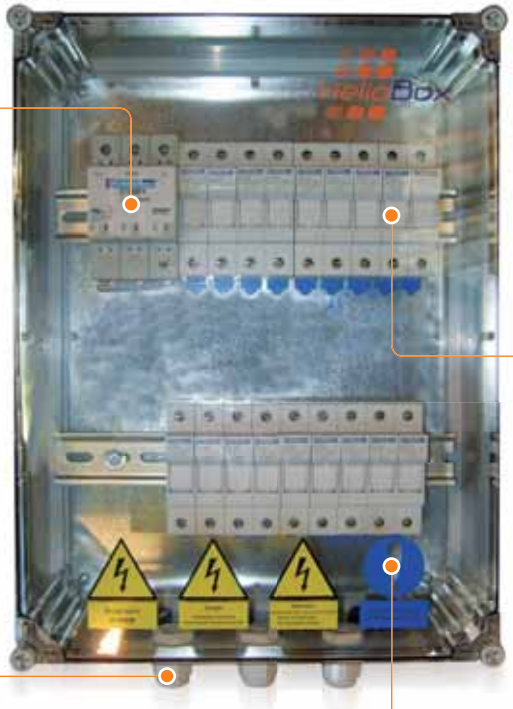
Specialist in interruption of electrical current for a long time,
Ferraz Shawmut has designed a wide offering of protections dedicated to solar photovoltaic application market: solar farm, installation for residential, commercial and industrial buildings.

Be your own designer of system

HelioBox

Ferraz Shawmut's product offering is based on meeting three vital functions:
clipping, switching/disconnecting, and isolating/protecting.

Clipping
with our fail-safe Surge-Trap SPD's with the patented TPMOV technology inside.
These AC or DC devices comply with the IEC 61643-1 standard



Isolating/Protecting
the photovoltaic chains with our HelioFuse designed to this need and tested on our test platforms.

Switching/Disconnecting
with our HelioSwitch range especially designed for the DC conditions of the PV application.

Connecting

We market a standard offering of HelioBox. When the volume is enough high we are able to design HelioBox systems as per your specifications.

These functional solutions enable to package systems totally fitted to your installation: in our HelioBox program encompassing junction box (on DC side), main box (on DC side), surge protection box (on DC side) and AC box (on AC side). The photovoltaic application requires DC protection components especially designed and tested. To benefit from a full protection of your installation, we strongly recommend to use our HelioFuses which have been especially designed to meet the very demanding requirements of this specific application.

Determine how to protect your own solar array

Offering the system meeting precisely your needs is our concern.
Ferraz Shawmut introduces a 5-point information form on your solar PV installation (connected to the low voltage utility grid).
This form can be downloaded on our web site dedicated to solar PV www.helioprotection.com

1 - Determination and total capacity

Precise if it's a ground-mounted or a roof-mounted solar array and its total capacity.

2 - Wiring diagram

Make a simplified diagram showing:

- the number of strings (rows of modules connected in series);
- the number of strings connected of all the junction boxes (Helio Junction Box);
- number of inlets of all the main boxes (Helio Main Box);
- locations and descriptions of any switches (HelioSwitch);
- locations and descriptions of the surge protective devices (Surge-Trap).

Precise:

- the cross sectional areas of cables into and out of the boxes;
- the outside diameter of those cables to check dimensions and choose adequate glands.

3 - Type of solar panel used

Precise:

- the panel model;
- what is the module's Voc STC[1] ? (open circuit voltage);
- what is the module's Isc STC[1] ? (short circuit current).

4 - Equipment

Precise:

- the number of modules connected in series per string;
- the number of strings connected in parallel per type of junction box;
- the ambient temperature around the junction boxes and main boxes.

5 - Optional functions

Your needs for current monitoring:

- blown-fuse indicator light on each fuse holder on the + and - polarities at the outlets from strings.

Your needs of surge protective devices monitoring[2]:

- Surge-Trap Pluggable;
- Surge-Trap non Pluggable (Modular).

1) STC = Standard Test Conditions irradiance 1000W/m²
air mass = 1.5
cell temperature 25°C

2) Surge-Traps all have a visual end-of-life indicator; a built-in microswitch transmitting end-of-life data remotely is one option.

HelioFuse

Fuses designed for solar photovoltaic

Designed to clear low fault currents

PV cells and panels are d.c. generators. Fuses used to protect loads powered by the alternating current in large grids react to very high fault currents, but the ones used in photovoltaics are very different. Ferraz Shawmut has taken a position on this fast-growing market with specific products that can clear fault currents as small as 2 to 3 times rated current – and that takes cutting edge design and expertise.
Ferraz Shawmut has designed an offering dedicated to this booming market with specific components and systems including the HelioFuse range.

Tried and tested in real-life conditions

Operating conditions for fuses are actually more severe when fault currents are low than when they are high, in a circuit where breaking is required under direct voltage. Ferraz Shawmut has made that effort through extensive work at our labs in Newburyport (USA) and Saint-Bonnet-de-Mure (France).

Essential to know...

When a fault occurs in a DC circuit, the absence of natural voltage zero makes the interruption of DC faults more difficult than the interruption of AC faults as only the fuse arc will force the current to decrease to zero.The correct interruption depends on three parameters: the value of the DC voltage, the value of the ratio L/R (time constant) of the fault path and the value of the fault current. The possible low level of overload to be eliminated in photovoltaic equipment is a very arduous condition for a fuse! Consequently, special photovoltaic fuses – HelioFuses – are designed by Ferraz Shawmut in order to ensure people safety and photovoltaic circuit protection.

1 to 3 strings of modules: no fuse needed!

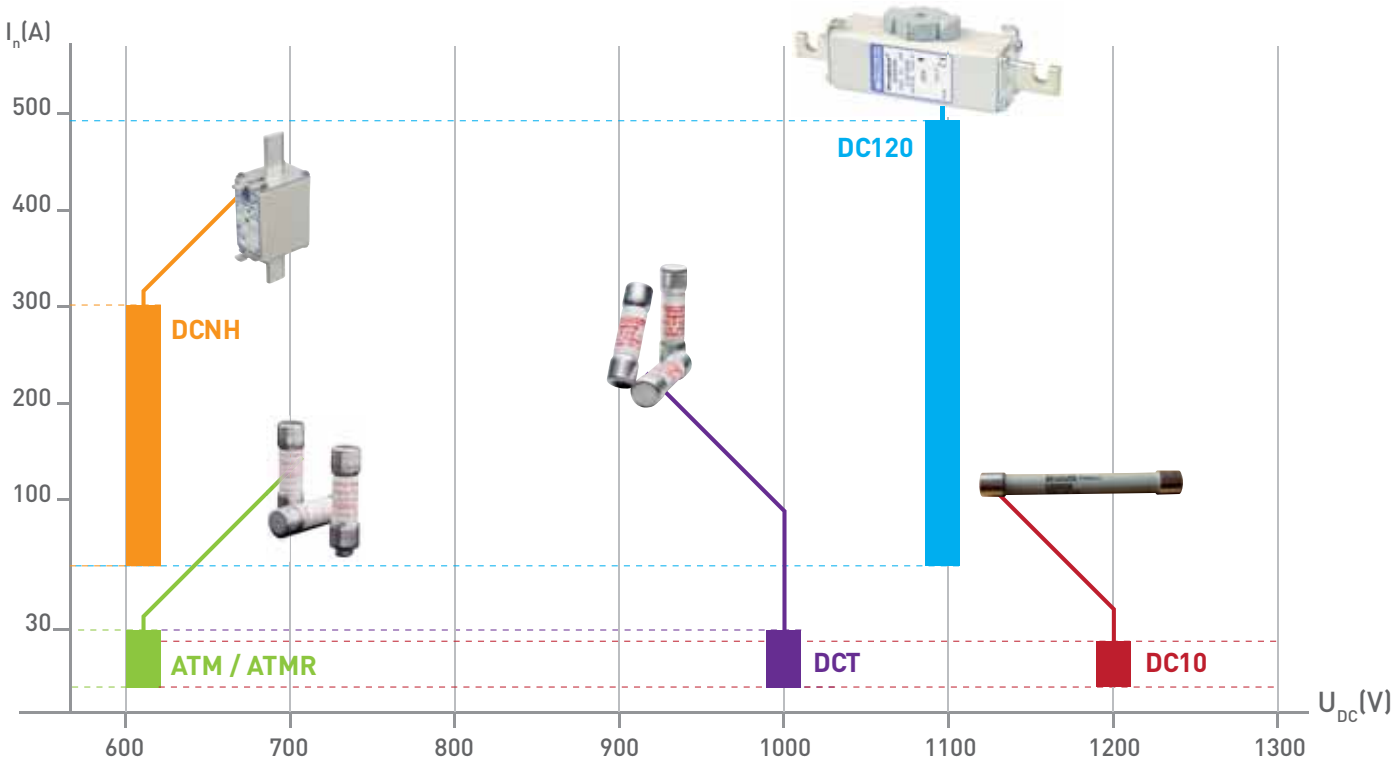
In this kind of system, fault current is barely higher than operating current.
Dimensioning the wiring between the strings of panels to withstand the maximum fault current is enough to avoid any fire hazard.
But a fuse is never necessary with this type of set-up.

Installation with at least 4 strings of modules

In this configuration the fault current - in any case largely lower than the short circuit currents in conventional power sources - can reach a level capable of heating and damaging the insulators. In a photovoltaic equipment neither the polarities + nor the polarities - are grounded. Each + and - polarities must be equipped with a fuse for ensuring the best protection of people servicing the panels and the equipment as well.

Which fuse range? Which rating?

Each photovoltaic installation has its own specific constraints with regards to the number of strings of modules, the characteristics of cells, the hours of sunshine. In order to be sure to offer you the fuse (size & rating) the most fitted to your equipment please contact us.



Product offering

FSPDB

Finger Safe Power Distribution Blocks bring extra safety to solar power systems.
They can be snapped onto DIN rails and are IP20 finger safe (as per IEC standard 529).
Starting from a primary pole, each FSPDB can distribute power to several secondary ones: 1, 4 or 8 depending on the model. Several FSPDBs can be combined to form a multipole distribution point.
With the 175A to 800A FSPDB line, wiring from 2.5 to 300mm² (aluminum or copper) can be used for connections.

Catalog Number		Rating (A)	Pole (line)			Load			Nominal short circuit current
Aluminum Connector for Cu/Al 90°C wiring	**Copper** Connector for Cu/Al 75°C wiring		**Wiring cross-sectional**	**area**	**Number of poles**	**Wiring cross-sectional**	**area**	**Number of secondaries**	
FSPDB1A	FSPDB1C	175	-	70-2.5	1	-	70-2.5	1	*100kA
FSPDB2A	FSPDB2C	175	-	70-2.5	1	-	35-2.5	4	*100kA
FSPDB3A	FSPDB3C	310	- -	185-16 -	1	-	35-2.5	8	*100kA
FSPDB4A	FSPDB4C	335	-	185-16	1	-	185-16	1	*100kA
FSPDB5A	FSPDB5C	840	-	300-25	2	-	300-25	2	*100kA

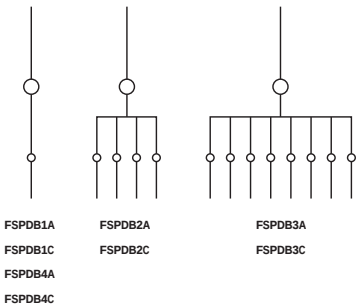
Multiple wire ratings (same size & type wires only)			
2/0 openings		**#2 openings**	
(2) #4 AWG	(2) #10 AWG	(2) #6 AWG	(2-4) #12 AWG
(2) #6 AWG	(2) #12 AWG	(2) #8 AWG	(2-4) #14 AWG
(2) #8 AWG	(2) #14 AWG	(2-4) #10 AWG	

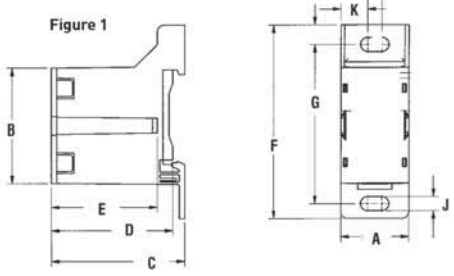
Accessory

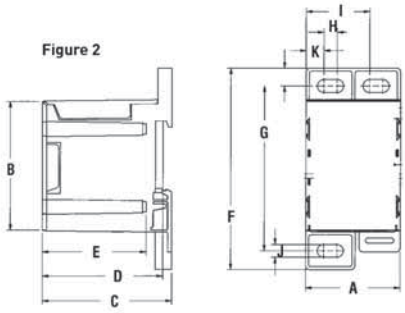
Catalog Number	Description
FSPIN1	Multipole assembly pin

Dimensions

Dimension	FSPDB1A FSPDB1C Figure 1 mm	FSPDB2A FSPDB2C Figure 1 mm	FSPDB3A FSPDB3C Figure 2 mm	FSPDB4A FSPDB4C Figure 1 mm	FSPDB5A FSPDB5C Figure 2 mm
A	25.4	28.4	46.9	39	72
B	43.3	57.8	64.3	108	91
C	49.5	56.0	64.3	80	80
D	45.1	51.6	59.8	75.5	-
E	39.4	39.4	51.5	50.1	50.1
F	72.6	87.7	100.8	145.5	145
G	59.6	74.6	82.4	120.6	127.5
H	5.3	5.1	6.5	7	3
I	-	-	31.5	-	52
J	5.3	6.4	6.5	6.5	6.5
K	10	11.7	8.9	16	8.5







Product offering

Surge-Trap®
DC

Surge Protective Device (Thermally Protected) for PV applications. The Surge-Trap PV provides advanced overvoltage protection to photovoltaic systems by utilizing Ferraz Shawmut's patented TPMOV design, which does not require additional over-current protection due to its high short circuit withstand. The Surge-Trap PV is designed to be mounted on 35mm DIN-rail while featuring individual mode visual indication and optional remote indication, providing status to critical control circuits.

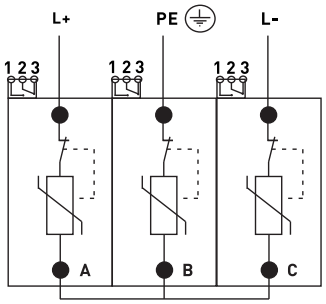
Technical Features	Part Number		
	STP600YPVM *	STP1000YPVM *	STP1200YPVM *
Test Class According to IEC61643-1 and EN61643-11	Type 2		
Poles	3	3	3
Technology	TPMOV®		
Type of Network	Photovoltaic L/R <= 1ms		
Nominal Voltage / U_n	600VDC	1000VDC	1200VDC
Voltage Protection Level / U_p	< 2 000	< 4 000	< 4 000
Short-circuit current (PV) withstand / IscwPV	10 kA		
Degree of Protection	IP20		
Mounting On	35mm DIN Rail		
Wire Range	#6 to #14 AWG Wire / 16mm² to 2.5mm² Wire 65 / 70°C Copper Wire Only		
Terminal Torque	14.75 lb – in / 1.67 N – m		
Response Time / t_A	< 25ns		
Operating Temperature	-40°C à +80°C		
Over-current Protection	Built-in protection (TPMOV® technology)		

* Built-in microswitch for remote indication

Pluggable SPD type 2 (base + removal plug)	Nominal Voltage	No of Poles	System Type	Nominal Discharge Current (In, 8/20,kA)	Max. Discharge Current (Imax, 8/20, kA)	Replacement Plug Part No
STP600YPVM	600VDC	3	DC	20	50	SP350PV
STP1000YPVM	1000VDC	3	DC	10	50	SP560PV
STP1200YPVM	1200VDC	3	DC	10	50	SP670PV

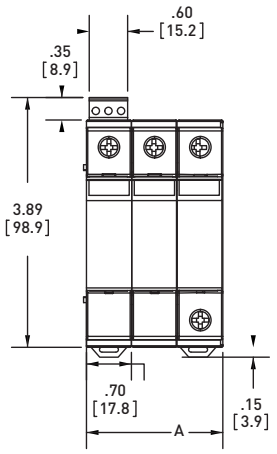
Wiring diagram

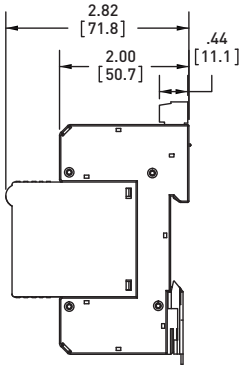
STP600YPVM
STP1000YPVM
STP1200YPVM

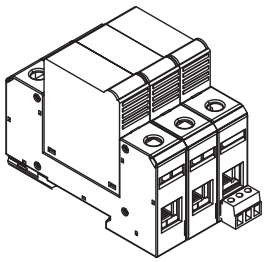


Dimensions

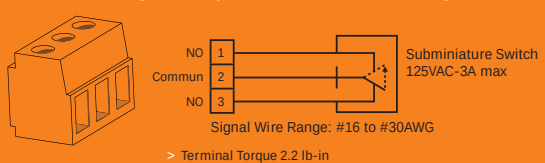
STP600YPVM
STP1000YPVM
STP1200YPVM







Surge-Trap® Microswitch Diagram



> Terminal Torque 2.2 lb-in
> Cont. between Comm + NO = Product Offline, Not Protected
> Cont. between Comm + NC = Product Offline, Protected

Product offering

Surge-Trap®
AC

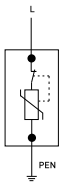
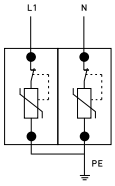
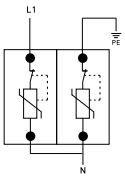
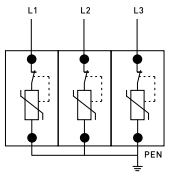
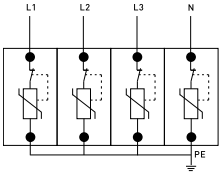
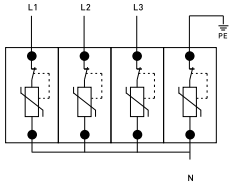
Pluggable and Modular SPD Ordering Information

Catalog Number Type 2 Surge-Trap® Pluggable System (Includes Base & Plugs)	Nominal Voltage (VAC)	MCOV (Uc) L-PE(N)	No of Poles	System Type	Nominal Discharge Current (In, kA)	Max. Discharge Current (Imax, 8/20, kA)	Short Circuit Current Rating (SCCR/kA)[1]	Short Circuit Withstand Rating (Isc/kA)[2]	Replacement Plug Part No
STP230TNM	230	275	1	TN	20	50	200	25	SP275E
STP400ITM	400	510	1	IT	10	50	200	25	SP510E
STP230TN1M	230	275	2	TN (1 Ph + N)	20	50	200	25	SP275E, SP180E (N to PE)
STP230TT1M	230	425	2	TT (1Ph + N)	20	50	200	25	SP275E, SP180E (N to PE)
STP230TNCM	230	275	3	TNC (3 Ph + PEN)	20	50	200	25	SP275E
STP230TNSM	230	275	4	TNS (3 Ph + N)	20	50	200	25	SP275E, SP180E (N to PE)
STP230TT3M	230	425	4	TT (3 Ph + N)	20	50	200	25	SP275E, SP180E (N to PE)

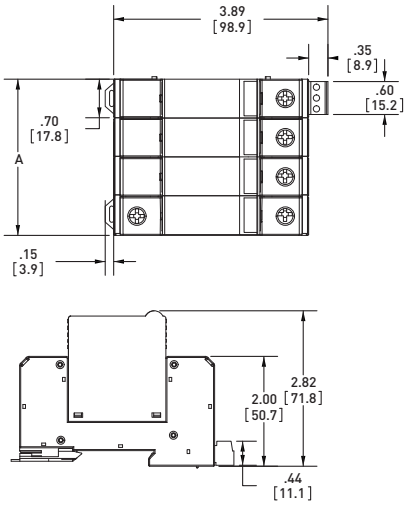
Catalog Number Type 2 Surge-Trap® Modular System	Nominal Voltage (VAC)	MCOV (Uc) L-PE(N)	No of Poles	System Type	Nominal Discharge Current (In, kA)	Max. Discharge Current (Imax, 8/20, kA)	Short Circuit Current Rating (SCCR/kA)[1]	Short Circuit Withstand Rating (Isc/kA)[2]	Replacement Plug Part No
ST230TN	230	270	1	TN	20	50	200	25	NA
ST400IT	400	510	1	IT	10	50	200	25	NA
ST230TN1	230	270	2	TN (1 Ph + N)	20	50	200	25	NA
ST230TT1	230	450	2	TT (1Ph + N)	20	50	200	25	NA
ST230TNC	230	270	3	TNC (3 Ph + PEN)	20	50	200	25	NA
ST230TNS	230	270	4	TNS (3 Ph + N)	20	50	200	25	NA
ST230TT3	230	450	4	TT (3 Ph + N)	20	50	200	25	NA

[1] per UL 1449 Third Edition
[2] per IEC 61643-1 Standard

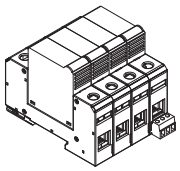
Surge-Trap® Circuit Connection Wiring Diagrams

TN/IT	TN (1 Ph + N)	TT (1 Ph + N)	TNC (3 Ph + PEN)	TNS (3 Ph + N)	TT (3 Ph + N)
					

Surge-Trap® Pluggable Dimensional Diagrams

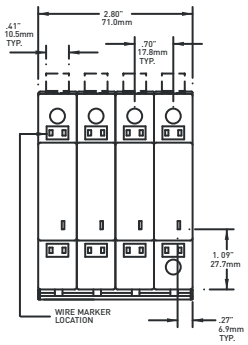


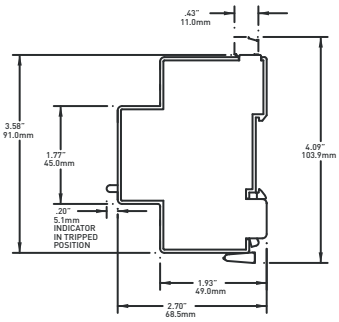
Poles	A
1 Pole	18.03mm
2 Pole	36.06mm
3 Pole	54.10mm
4 Pole	72.13mm



** Wire Size: 6-14 AWG
** Torque: 17lbs-in
** Use 35mm DIN-rail

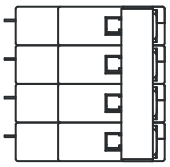
Surge-Trap® Modular Dimensional Diagrams



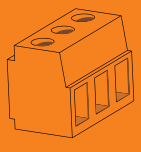


Poles	A
1 Pole	17.8mm
2 Pole	35.5mm
3 Pole	53.3mm
4 Pole	71.0mm

** Wire Size: 6-14 AWG
** Torque: 17lbs-in
** Use 35mm DIN-rail



Surge-Trap® Microswitch Diagram



Subminiature Switch
125VAC-3A max

Signal Wire Range: #16 to #30AWG

> Terminal Torque 2.2 lb-in
> Cont. between Comm + NO = Product Offline, Not Protected
> Cont. between Comm + NC = Product Offline, Protected

Approvals/Standards

> IEC 61643-1 Type 2
> CE
> RoHS compliant
> UTE C61740-51 compliant

Ratings

> 50kA 8/20 µs surge capacity (per mode)
> 25kA short circuit withstand capability
> Operating and storage temperature: -40°C to +85°C
> Wiring range: #6 to #14 AWG
> Recommend gG 160A fuse for IEC applications (contact us)

Product offering

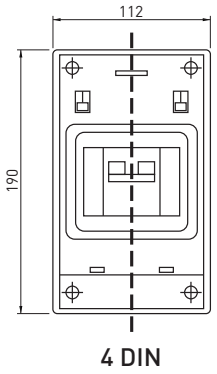
Helio Surge Protection Box

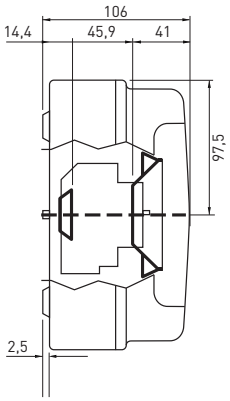
Technical specification	For 1 string
Color	RAL 7035
Degree of protection	IP66
Impact strength	6 Joule
Material base	Self-extinguishing thermoplastic
Cover	Smoked with key locking
Operating temperature	-25°C/+85°C
Size LxlxH (mm)	190x112x106
Standard	IEC 23-48 & 23-49 & 60670

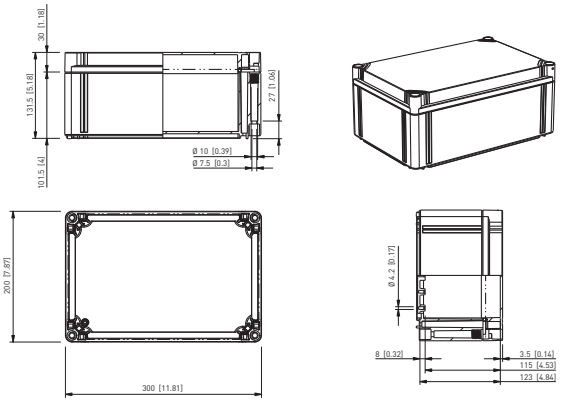
Technical specification	For 2 to 3 strings
Color	RAL 7035
Content	Enclosure base, cover, cover screws, mounting screws
Degree of protection	IP66, IP67
Impact strength	IK 07/IK 06
Inner depth (mm)	115,0
Material base	ABS
Material, cover	Polycarbonate
Material, cover screws	Polyamide
Material, gasket	Polyurethane
Operating temperature	-40°C/+90°C
Outer cover height (mm)	30
Size LxlxH (mm)	200x300x132
Standard	EN 62208, GOST
Volume cm³	792,00
Weight (kg)	1,218

Connections

Standard cable gland
Optional MC4 connector







Define your catalog number

	Box		Strings
	HSPD	**Surge Protective Devices (SPD)**	**XX**
	Helio Surge Protection Box	S if SPD Modular	Number of strings
		SP if SPD Pluggable	01 = 1 string
		6 = 600VDC	02 = 2 strings
		10 = 1000VDC	03 = 3 strings
		M = microswitch	
ex: HSPDSP10M02	**HSPD**	**SP10M**	**02**
	Helio Surge Protection Box	Surge-Trap Pluggable 1000V DC with microswitch	2 strings

Product offering

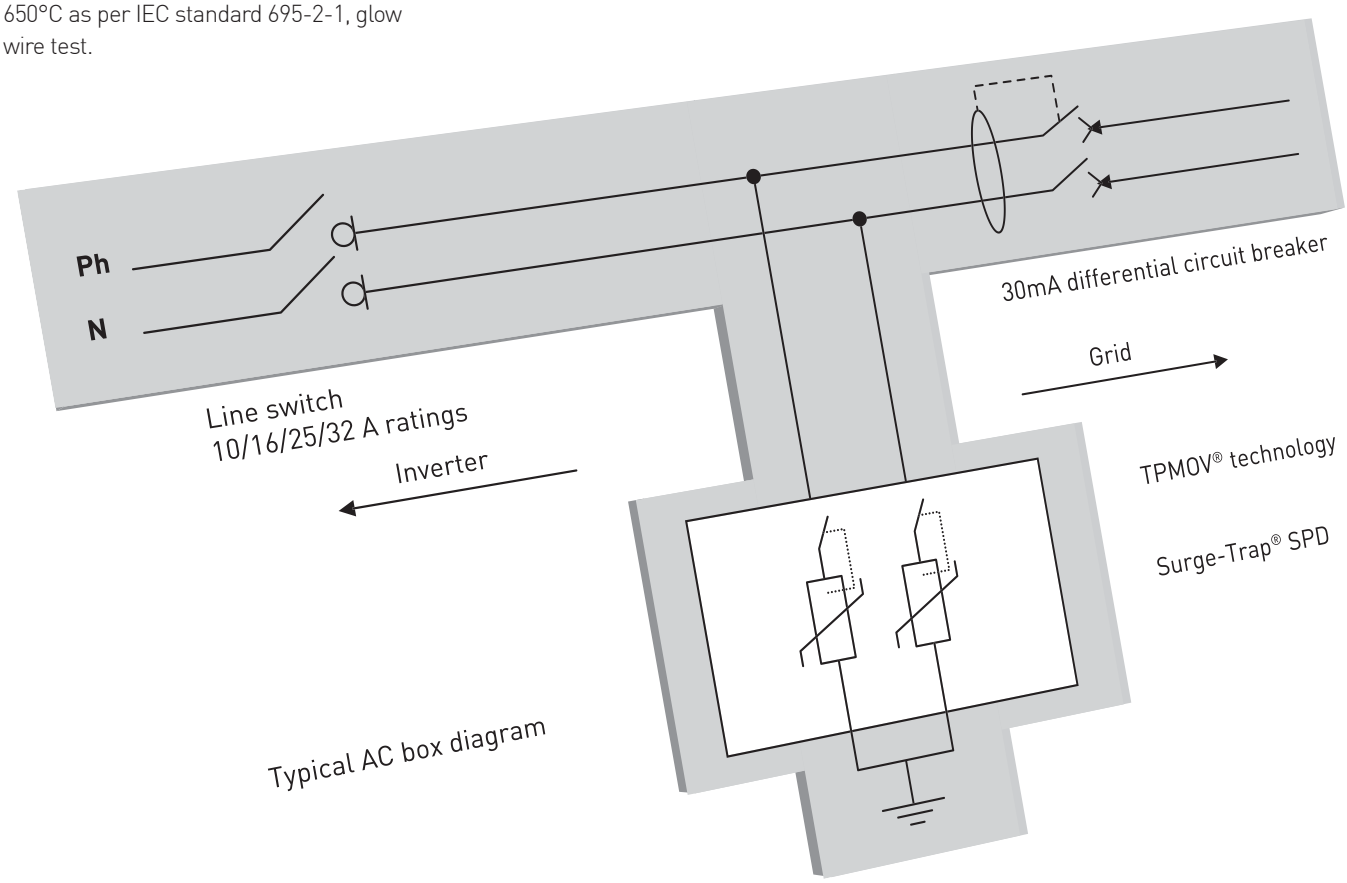
AC box

The AC box should be installed downstream from the PV inverter to protect it from backfeed from the grid due to overvoltage, switching or lightning. The box must be installed in compliance with UTE Guidelines C15-712 **“Photovoltaic solar power generating equipment”** and C15-100 **“Low voltage electrical equipment”.**

Characteristics

Box:

- Box of 8 DIN modules (17.5mm).
- Dimensions 190mm x 184mm x 106mm.
- IP55 degree protection.
- Thermoplastic material, color RAL 7035.
- Abnormal heat and fire resistance up to 650°C as per IEC standard 695-2-1, glow wire test.



Typical AC box diagram

Product offering

HelioFuse

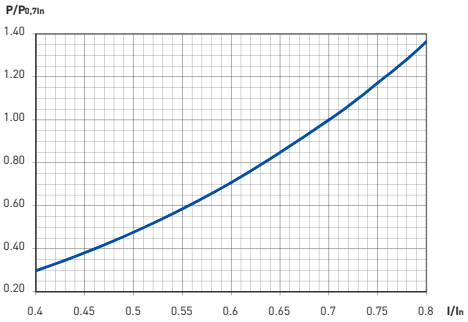
HelioFuse ATM - 600VDC

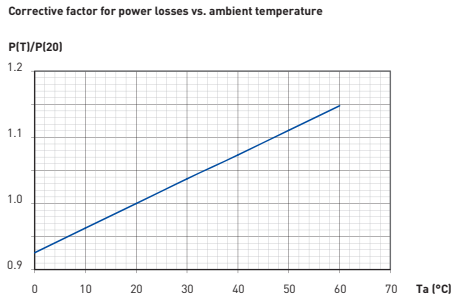
Minimum Breaking Capacity = 1.35In ; Maximum Breaking Capacity = 100kA			
Max.Operating Voltage = Rated Voltage	Rated Current	Cat. Number	Packaging
600VDC UL/CSA L/R = 10ms	5	ATM5	10
	8	ATM8	10
	10	ATM10	10
	15	ATM15	10
	20	ATM20	10
	25	ATM25	10
	30	ATM30	10
	5	PCF5-H	10
	8	PCF8-H	10
	10	PCF10-H	10
	15	PCF15-H	10
	20	PCF20-H	10
	25	PCF25-H	10
	30	PCF30-H	10

For UL fuses, the maximum operating voltage is equal to the rated voltage.
Other ratings are available (consult us).

Electrical characteristics

Cat. Number	Watt Losses @ 0.7In & 20°C
ATM5	0.6
ATM8	0.7
ATM10	0.75
ATM15	0.8
ATM20	1
ATM25	1.1
ATM30	1.2



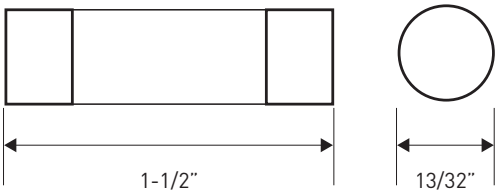


Fuse holders

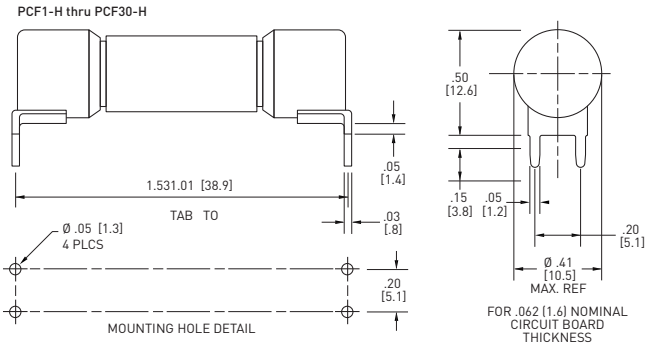
Nb of poles	Cat. Number	Ref. Number	Nb of Modules (17.5mm)	Pack	Indicator
1	US101HEL	D1009979K	1	12	Without Ind.
1	US101IHEL	Q1009461K	1	12	With Ind.

Drawing

ATM



PCF Double Hole Mount (Round Holes)



Product offering

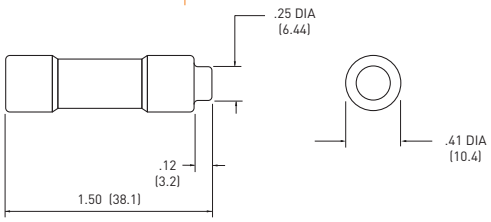
HelioFuse

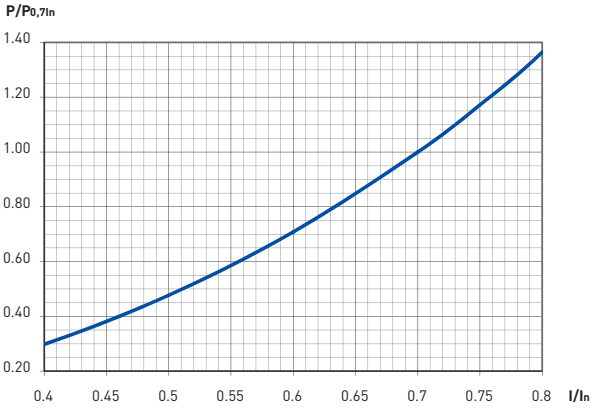
HelioFuse ATMR - 600VDC

Minimum Breaking Capacity = 1.35In ; Maximum Breaking Capacity = 100kA			
Max.Operating Voltage = Rated Voltage	Rated Current	Cat. Number	Packaging
600VDC @ L/R = 10ms	5	ATMR5	10
	8	ATMR8	10
	10	ATMR10	10
	15	ATMR15	10
	20	ATMR20	10
	25	ATMR25	10
	30	ATMR30	10

For UL fuses, the maximum operating voltage is equal to the rated voltage.

Drawing

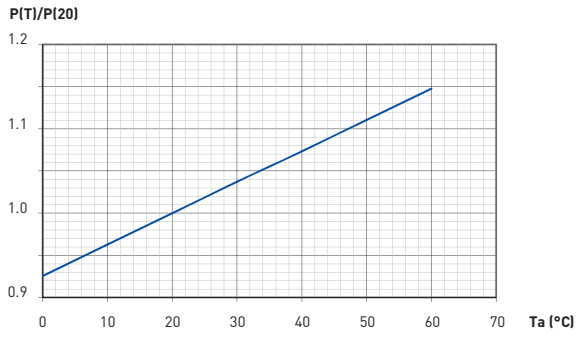




Electrical characteristics

Cat. Number	Watt Losses @ 0.7In & 20°C
ATMR5	0.6
ATMR8	0.7
ATMR10	0.75
ATMR15	0.8
ATMR20	1
ATMR25	1.1
ATMR30	1.2

Corrective factor for power losses vs. ambient temperature



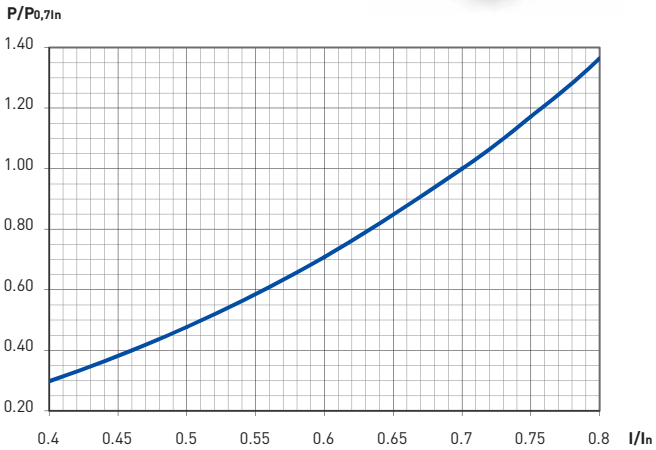
Fuse holders

Cat. Number	Number of poles	Indicator	Packaging	Udc maxi operating
USBCC101	1	No	12	600V
USBCC101I	1	Yes	12	600V

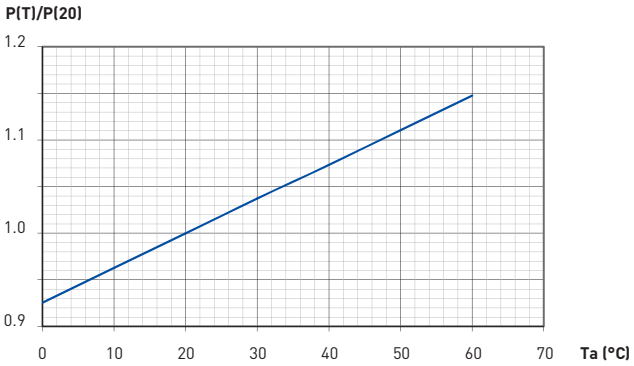
Product offering

HelioFuse
DCT - 1000VDC - (10x38mm)

Minimum breaking capacity = 1.3 In for DCT models from 2 to 5A and 2 In for DCT models from 8 to 30A. Maximum breaking capacity = 10 kA			
Maximum operating voltage	Rated Current	Cat. Number	Packaging
1 000VDC @L/R = 2ms	1	DCT1-2	10
	2	DCT2-2	10
	3	DCT3-2	10
	4	DCT4-2	10
	5	DCT5-2	10
	8	DCT8-2	10
	10	DCT10-2	10
	12	DCT12-2	10
	15	DCT15-2	10
	20	DCT20-2	10
	25	DCT25-2	10
	30	DCT30-2	10

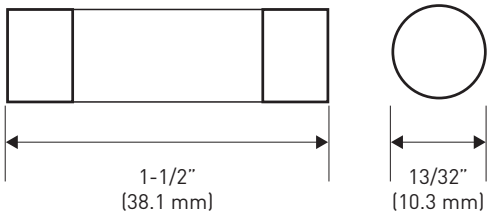


Corrective factor for power losses vs. ambient temperature



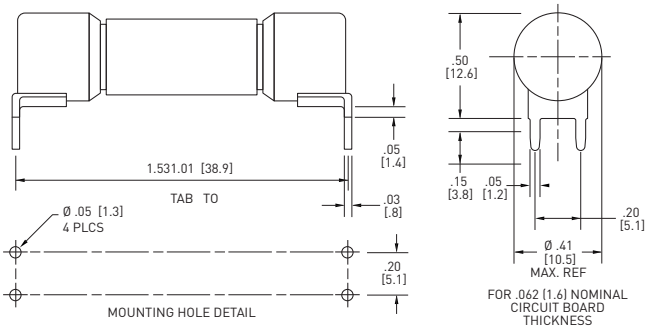
Drawing

DCT



Double Hole Mount (Round Holes)

PCF1-H thru PCF30-H



PC-mount version as per this drawing is also available (consult us).

Electrical characteristics

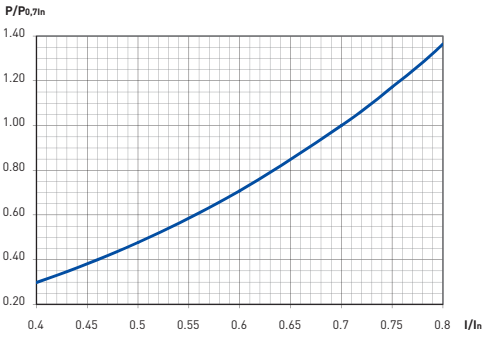
Cat. Number	Losses 70% Rated (Watts)
DCT1-2	0.1
DCT2-2	0.15
DCT3-2	0.35
DCT4-2	0.4
DCT5-2	0.5
DCT8-2	0.52
DCT10-2	0.7
DCT12-2	0.75
DCT15-2	1
DCT20-2	1.5
DCT25-2	1.5
DCT30-2	1.8

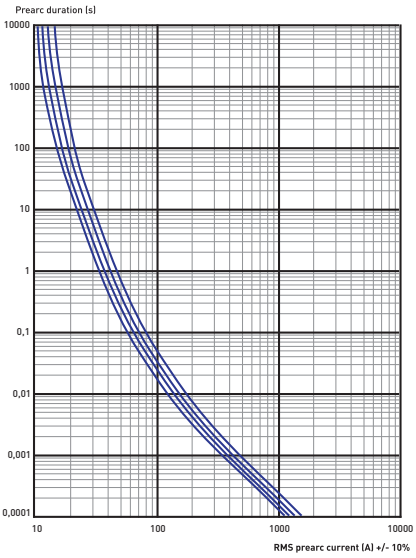
Product offering

HelioFuse DC10 - 1200VDC

Feature

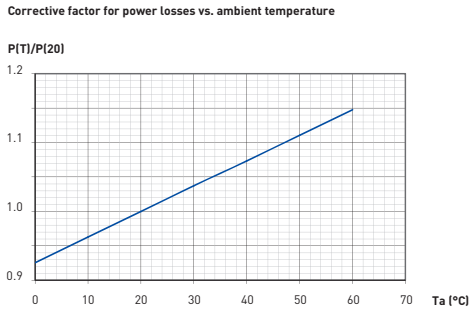
- Fast Acting
- Highly current limiting
- High breaking capacities
- Very low I²t
- Superior cycling ability
- Withstanding in overloads





Application

- Fuse for photovoltaic string protection in accordance with UTE 15 712.



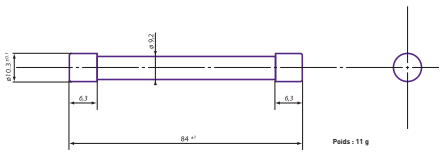
Complying

- IEC 60269-1 & IEC 60269-4

Basics characteristics										
Size	Maximum operating voltage for L/R ≤ 0,5ms	Rated Current	Operation	Minimum value of the breaking capacity	Breaking Capacity @ Un	Prearcing I²t @ 1ms	Total I²t @ Un	Power losses End contacts		Catalog number
								0.7In	0.8In	
mm	V	A		A	kA	A²s	A²s	W	W	
D10xL85	1 200	8	"g" type	10,4	11	180	210	1,3	1,7	DC10HEL12C8
		10		13		400	310	1,3	1,7	DC10HEL12C10
		12,5		16,5		180	310	1,3	1,9	DC10HEL12C12,5
		16		21		370	680	1,5	2,1	DC10HEL12C16
		20		26		630	1080	1,8	2,5	DC10HEL12C20
	900	25		32,5		990	1680	2,2	3	DC10HEL9C25

Other ratings available on request.

Drawing



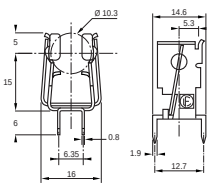
Packaging

- Box: 45 pieces
- Pack: 95 x 82 x 70
- Weight : 520 g

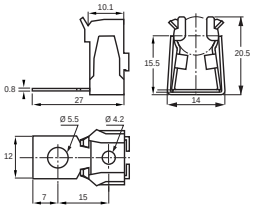
Fuse clips

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

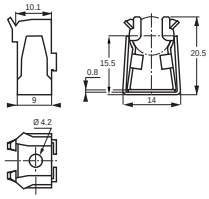
MR10 CI



MR10



MR10 without compressor



Modulostar®

Helio

Advantages

- Modulostar® fuse holder, with or without blown fuse indicator.
- Specially designed for photovoltaics and D.C., applications in general.
- Built to UL 512 and IEC 60947-3 standards.
- For fuses up to 32A 10x38.
- Blown fuses indication from 350VDC to 1000VDC.
- Plastic parts are UL94 V0 to V2 (yellow card).
- RoHS compliant (indicator light on when fuse open).

Nb of pole	Cat. Number	Ref. Number	Nb of Mode (17.5mm)	Pack	Indicator
1	US101HEL	D1009979K	1	12	Without Ind.
1	US101IHEL	Q1009461K	1	12	With Ind.

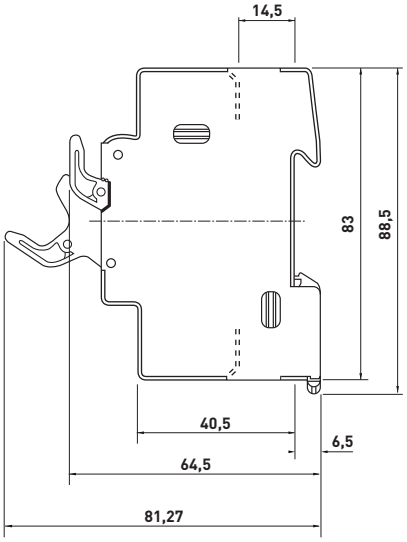
Characteristics

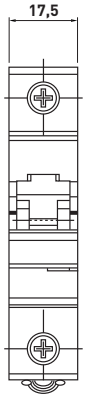
- **Wiring:** rigid wire = 1 - 16mm² (18-6AWG), flexible wire = 0.75 - 10mm² (18-8AWG) use 75°C wire CO only.
- **Screw driver heads:** Ferraz Shawmut recommends use of PZ 2 or flat 5.5x1mm heads (maximum diameter 6mm).
- **Maximum tightening torque:** 2.2Nm
- DC20B-IP2X.

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

Recommendations

- Do not operate under load.
- **The PV source** must be connected to the upstream terminal.
- **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).





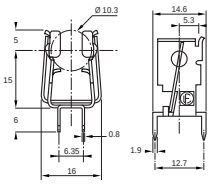
Accessories

Same as the entire Modulostar® range.

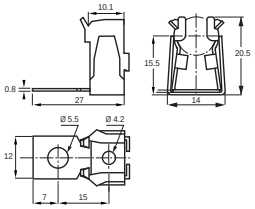
Fuse clips

Cat. Number	Designation	Weight	Pack
MR10RESSORTCI	MR10 CI	4.5	200
MR10RESSORT	MR10	7.0	20
MR10RESSORTSP	MR10 without connecting lug	5.7	20

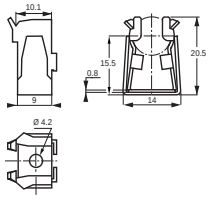
MR10 CI



MR10



MR10 without connecting lug



Product offering

HelioSwitch

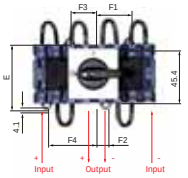
These disconnect switches comply with IEC 60947-3 and VDE 0660 part 107 standards.

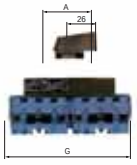
- These are real d.c. switches, specially designed for PV applications.
- The rated insulating voltage of our HelioSwitches is 1000VDC as per IEC 60367-7-712 published in 2002 and UTE Technical Guidelines C15-712.
- Their category of use is DC-2xA type as per IEC standard 60947-3.

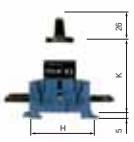
  So they have to do 1,500 cycle tests (versus 300 for DC-2xB type products) at 1.5 In for DC21A and 4 In for DC22A switches. UTE C15-712 guidelines recommend DC22A category of use models, because of the inductive load effects of PV inverters.
- Helio Switches are complete compact products, and are delivered already assembled with their shunts (so there's only one catalog number for the whole unit!).
- Connections are IP20 rated finger safe. Helio 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 - Maximum open circuit voltage	520V	575V	750V	920V	Insulation voltage
	Un – Nominal Voltage	450V	500V	650V	800V	
	Catalog Number	Rated current (A)				
DC21A	IT20HEL10CCF				20	1000VDC
	IT32HEL10CCF				32	
	IT40HEL10CCF				40	
	IT70HEL10CCF			90	70	
	IT20HEL6CCF			20		
	IT32HEL6CCF			32		
	IT40HEL6CCF			40		
	IT70HEL6CCF		90	80		
DC22A	IT20HEL10CCF			20	16	
	IT32HEL10CCF			32	25	
	IT40HEL10CCF			40	32	
	IT70HEL10CCF		90	80	64	
	IT20HEL6CCF		20	16	12	
	IT32HEL6CCF		32	25		
	IT40HEL6CCF		40	32		
	IT70HEL6CCF			70		

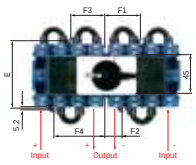
IT20HEL10CCF
IT32HEL10CCF
IT40HEL10CCF

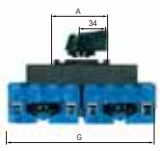


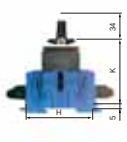




IT70HEL10CCF







Wiring diagram

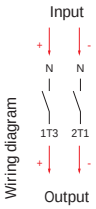
Dimensions

	IT20HEL10CCF 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

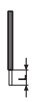
Recommended tightening torque

IT32HELI0CCF	1,25 Nm
IT32HELI0CCF	1,80 Nm

Wiring diagram



Peeling Lenght



Maximum cable cross section (copper wires)

	IT25HEL10CCF	IT32HEL10CCF	IT40HEL10CCF	IT70HEL10CCF
Single-core or stranded wire	6mm²	6mm²	16mm²	50mm²
Flexible wire	4mm²	4mm²	10mm²	35mm²
Recommended torque values	1.25 Nm	1.25 Nm	1.8 Nm	3 Nm

Product offering

Helio Junction Box

Helio Junction Box ABS, polycarbonate transparent cover	Number of strings	4 to 6	8 to 12
	Nominal Voltage	1000VDC	
	Wire section for the strings	4mm² reinforced isolation	
	Closed stuffing box size	PG9 (6 to 10mm)	
	Finger safe protection (IEC 60529)	IP65 (Outdoor installation)	
	Isolation Class (IEC 60364)	Class II	
	Fire and fumes class (UL94 - NFC 20-455)	V2	
	Dimensions (HxLxD)	see next page	
	Color	RAL 7035	
	Wire recommended for output	10mm² (PGxxx)	25mm² (PGxxx)
	Maximum usage temperature	- 20°C to + 50°C	
	Maximum storage temperature	- 20°C to + 70°C	
	Relative Humidity	95% Maxi	
	Maximum current	72A	100A
	Labelling	**WARNING: VOLTAGE OVER 50V** Disconnection and protection of live DC equipment **Do not open when live** **Wire output first** **Insert fuses and close fuse holders before wiring input**	
Wiring & connecting recommendations (Use only Helio Modulostar fuse holders designed for PV DC application in our Helio Junction Box)	All connections must be made by personnel qualified to work at voltages over 50V		
	We recommend wiring the output from the box before the input to the box		
	Max tightening torque = 2.2Nm on output terminals		
	We recommend inserting fuses and closing the handles of the disconnects before wiring input to the Helio Junction box		
	Max tightening torque = 2.2Nm on input terminals		
	All connections must be made under stable weather conditions (no rain or lightning)		

	Box		Strings	Fuse holders	Surge Protective Devices	Switch-disconnectors
	HJB	**M**	**XX**			
	Helio Junction Box	Blank if input/output for fuse holders and SPD's all together		Blank if no indicator	Blank if no SPD	Blank if no switch
		M if	Number of strings		S if SPD Modular	1000V switch
		one input/output per string for fuse holder and SPD	04		SP if SPD Pluggable	IT25
			06	I (INDICATOR)	6 = 600VDC	IT32
			08		10 = 1000VDC	IT40
			10		M = microswitch	IT70 (70A for 1000V insulating voltage)
			12			IT70 (80A for 600V insulating voltage)
ex: HJB10S6V	**HJB**		**10**		**6V**	
	Helio Junction Box	input/output all together	10 strings		Surge-Trap SPD	
					600V	
ex: HJB12IS10MIT64	**HJB**		**12**	**I**	**S10M**	**IT64**
	Helio Junction Box	input/output all together	12 strings	Fuse holder with indicator	S10M Surge-Trap SPD	64A switch
					1000V with microswitch	
ex: HJBM12IS10M	**HJB**	**M**	**12**	**I**	**S10M**	
		input/output per string	12 strings	Fuse holder with indicator	Surge-Trap SPD	
					1000V with microswitch	

Helio Junction Box with switch-disconnector

Our Helio Junction Box can be equipped with switch-disconnectors (see on the right).
Please contact our Technical Support (+33 4 26292929) for further questions.

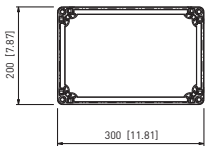
e-mail: ts@fr.ferrazshawmut.com

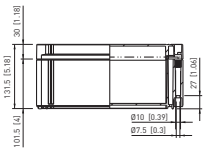
Product offering

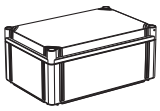
Helio Junction Box

Strings	4	6	8	10	12
Modulostar					
Modulostar + Surge-Trap	200x300x132mm		400x300x132mm		
Modulostar + HelioSwitch					
Modulostar + HelioSwitch + Surge-Trap	400x300x132mm		600x300x132mm		

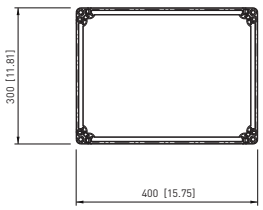
200x300x132mm

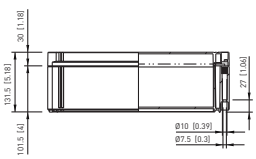


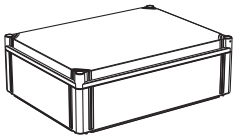




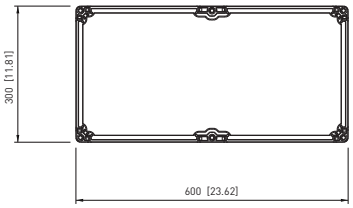
400x300x132mm

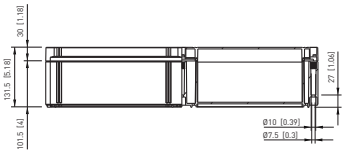


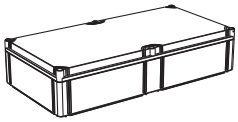




600x300x132mm







Custom HelioBox

When the quantity is large we have the capacity to design custom HelioBox as per your specifications.

- Metal boxes available on request.
- Wiring via MC4 connectors in option.
- Larger boxes can be provided for applications with over 12 strings.

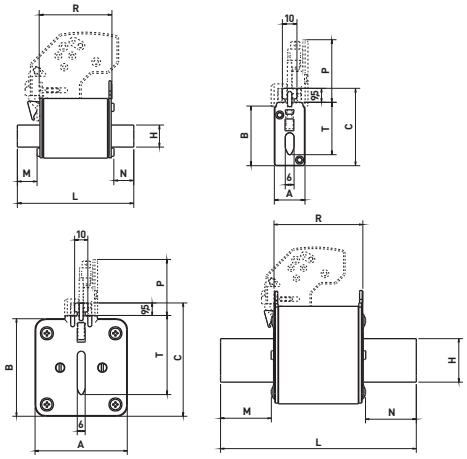
Product offering

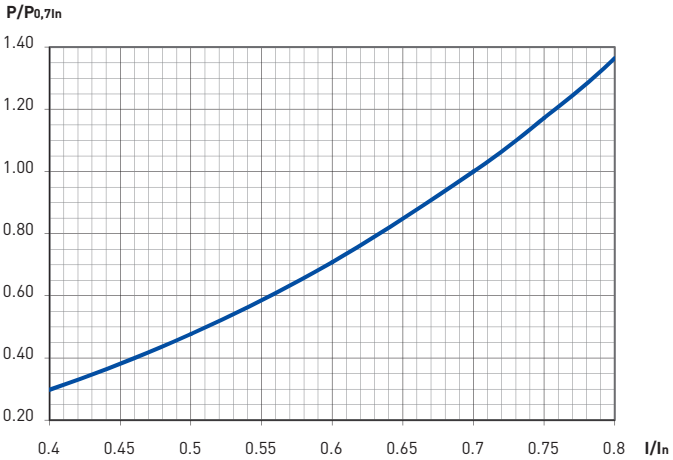
HelioFuse DCNH - 600VDC

Minimum Breaking Capacity = 2In ; Maximum Breaking Capacity = 50 KA				
Maximum operating voltage	Rated Current	Size	Cat. Number	Packaging
600VDC @ L/R = 2ms	50A	00	DC00GS60V050PV	3
	63A	00	DC00GS60V063PV	3
	80A	00	DC00GS60V080PV	3
	100A	00	DC00GS60V100PV	3
600VDC @ L/R = 2ms	125A	1	DC1GS60V125PV	3
	160A	1	DC1GS60V160PV	3
	200A	1	DC1GS60V200PV	3
	250A	1	DC1GS60V250PV	3
	280A	1	DC1GS60V280PV	3

Dimensions	A	B	C	H	L	M	N	P	R	T
Size 00 (mm)	29.5	47.5	59.5	15	79	13.1	13.1	43.4	50	35
Size 00	1.16"	1.87"	2.34"	0.59"	3.11"	0.52"	0.52"	1.71"	1.97"	1.38"
Size 1 (mm)	39.5	52.5	64.5	20	135	32.1	32.1	43.4	68	40
Size 1	1.56"	2.07"	2.54"	0.79"	5.32"	1.26"	1.26"	1.71"	2.68"	1.57"

Drawing

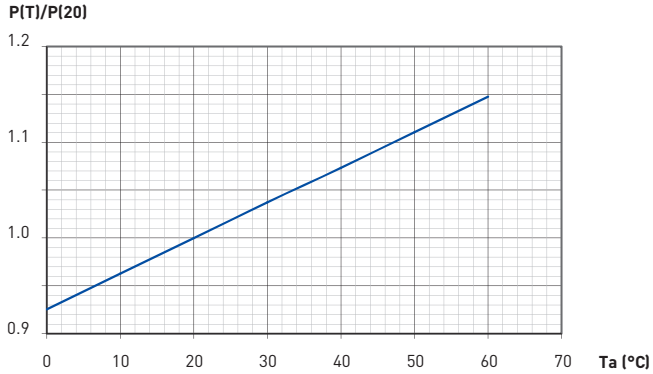




Electrical characteristics

Cat. Number	Watt Losses @ 0.7In & 20°C
DC00GS60V050PV	4.35
DC00GS60V063PV	4.85
DC00GS60V080PV	5.65
DC00GS60V100PV	6.35
DC1GS60V125PV	9.0
DC1GS60V160PV	10
DC1GS60V200PV	11

Corrective factor for power losses vs. ambient temperature



Accessories

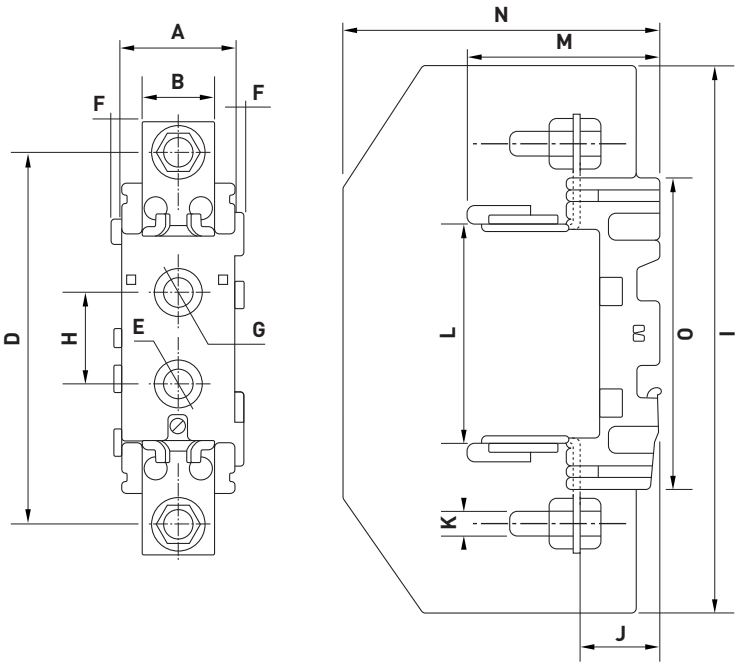
Cat. Number	Contact	Qty of NO-NC separated circuits	Packaging
MSNH2-B6PRES	Mini = 20V 50mA • Maxi = 10A	1	3
MSNH2-B2PRES	Mini = 20V 100mA • Maxi = 5A	1	3

Remote signalling system for fitting on fuses equipped with micro-switch support.

Fuse bases

Cat. Number	Fuse size	Nb of poles	Packaging	Model	Udc maxi operating
BB001RFS	00	1	3	IP2X Finger Safe including cover	690V
BB11PPRFS	1	1	3		690V

Dimensions (mm)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Size 00	32	20	117	100	8	2	14	25	145	21.5	8	56	52	85	84
Size 1	60	32	209	176	10,5	30	20,5	25	250	35	M10	81	71	122,5	146



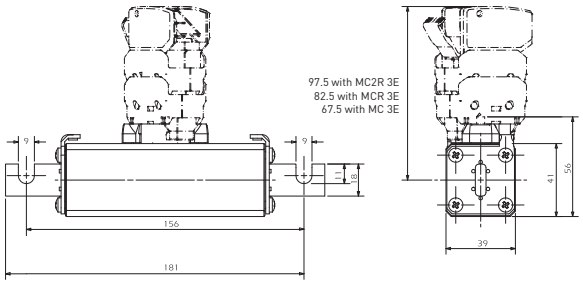
Product offering

HelioFuse

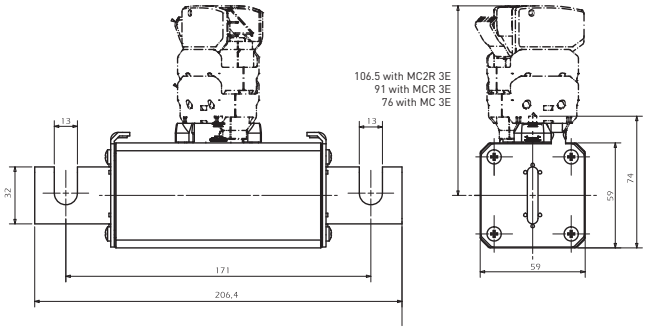
HelioFuse
DC120-123
1100VDC

Minimum Breaking Capacity = 2In; Maximum Breaking Capacity = 100kA				
Rated voltage	Rated Current	Size	Cat. Number	Packaging
1 200VDC IEC @ L/R = 1ms	50A	120	DC120GC12C050EF	1
	63A	120	DC120GC12C063EF	1
	80A	120	DC120GC12C080EF	1
	100A	121	DC121GC12C100EF	1
	125A	121	DC121GC12C125EF	1
	160A	121	DC121GC12C160EF	1
	200A	121	DC121GC12C200EF	1
	250A	121	DC121GC12C250EF	1
1 100VDC IEC @ L/R = 1ms	315A	122	DC122GC11C315EF	1

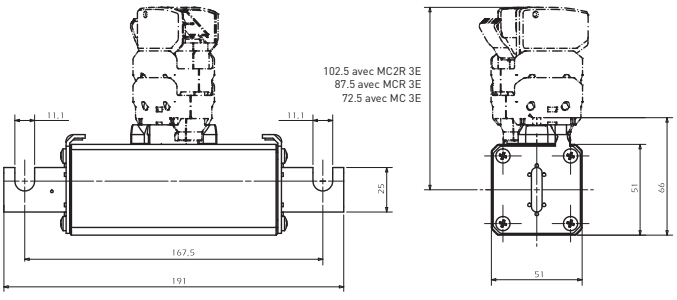
Drawing
(mm)



120



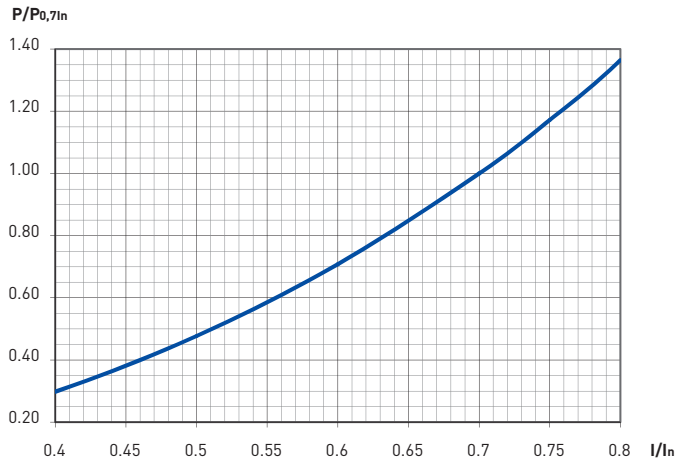
122



121

Electrical characteristics

Cat. Number	Watt Losses @ 0.7In & 20°C
DC120GC12C050EF	3.4
DC120GC12C063EF	4.4
DC120GC12C080EF	5.6
DC121GC12C100EF	7.0
DC121GC12C125EF	8.8
DC121GC12C160EF	11.3
DC121GC12C200EF	15.7
DC121GC12C250EF	19.6
DC122GC11C315EF	24.3

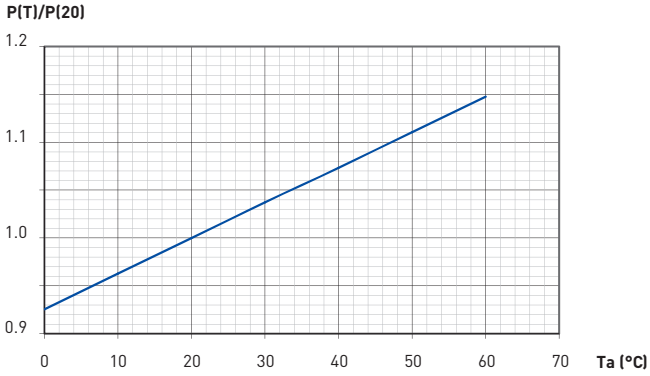


Accessories

Cat. Number	Contact	Qty of NO-NC separated circuits	Packaging
MC3E1-5N	Mini = 20V 50mA Maxi = 5A	1	1 & 3
MC3E1-5NBS	Mini = 10V 10mA Maxi = 3A	1	1 & 3
MC3E1-9NBS		2	1 & 3

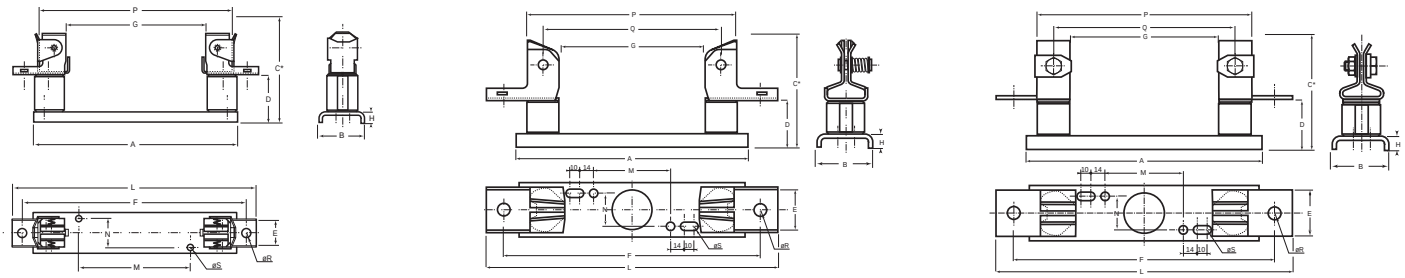
Remote signalling system for fitting on fuses equipped with micro-switch support.

Corrective factor for power losses vs. ambient temperature



Fuse bases

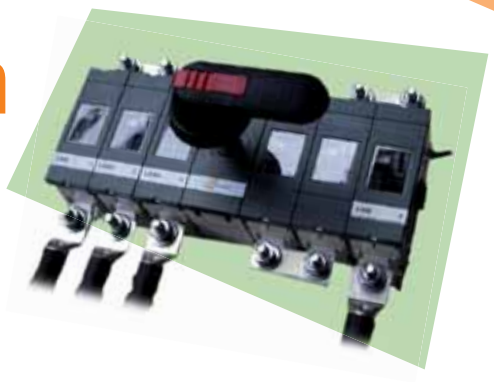
Cat. Number	Nb of poles	Packaging	Insulation Voltage
SP43-120	1	1	2 500VDC
SE43-121	1	1	
SE43-122	1	1	



Cat. Number	Drawing (mm)	A	B	C*	D	E	F	G	H	L	M	N	P	Q	ØR	ØS
SP43-120	1	194.5	42	125	54.5	26	214.5	134.5	10	234.5	106.5	28	184		8.5	5.5
SE43-121	2	204.5	42	130	54	32	238.5	141.5	10	270.5	116.5	28	191.5	166.5	10.5	5.5
SE43-122	2	230.5	54	140	60	42	260.5	136.5	15	296.5	77.5	35	206.5	171.5	12.5	8.5

Product offering

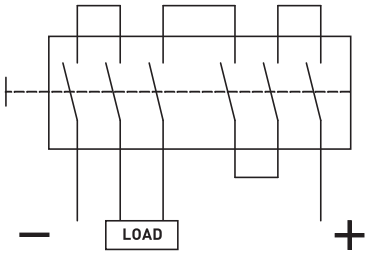
HelioSwitch



Benefits

Our products are typically used as switch of isolation on a chain group of solar panels, or as main switch on a system of solar panels arriving at the inverter. They are compact, the poles are already in series and they are delivered with padlockable handle and accessories for isolation of upstream and downstream connections.

To allow to cut the tension of 1000VDC it is indispensable to put 6 poles in series in the installation. The upstream and downstream connections are downward to facilitate the connecting, and avoid the exits upward the cubicle (waterproofness problem).



Rating	Catalog Number	pre-connected	Operational voltage (V)	Open-circuit maximum voltage (V)	Rated insulation voltage (V)	Use category
160A	IT 160 HEL 750V VCF	yes	750	750	800	DC21B
200A	IT200HEL10CCF	yes	1000	1000	1000	
250A	IT250HEL10CCF	yes				
315A	IT315HEL10CCF	yes				
400A	IT400HEL10CCF	yes				

* For PV application and interrupting DC

All our HelioSwitch are equipped with guaranteed shunts providing time savings in the mounting process.

Features: Switch-disconnectors technical data according to IEC 60 947-3

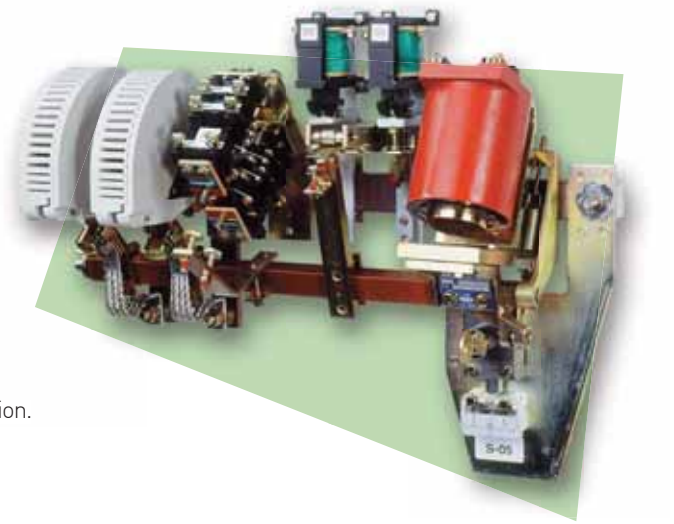
Technical Data According to IEC 60947 for IT Switch-Disconnectors

Switch size		A	IT160	IT200	IT250	IT315	IT400
Poles in series			4	6	6	6	6
Rated insulation voltage	Pollution degree 2	V	1000	1000	1000	1000	1000
	Pollution degree 3	V	800	1000	1000	1000	1000
Dielectric strength	50 Hz 1min.	kV	10 [1]	10	10	10	10
Rated impulse with stand voltage		kV	12 [1]	12	12	12	12
Rated thermal current, DC-20	In open air, normal conditions[2]	A	200	200	250	315	400
	In enclosure 40°C	A	160	200	250	315	400
	In enclosure 60°C	A	125	180	200	280	320
...with minimum cable or bar cross section	Cu	mm²	70	95	120	185	240
Rated operational current / poles in series	750V	A	160 / 4 [A]				
DC-21B	1000V	A		200 / 6	250 / 6	315 / 6	400 / 6
Rated short-time withstand current, 1 000V, 1s	R.M.S. - value Icw	kA	4	8	8	15	15
Power loss / pole	At rated current	W	6.5	4	6.5	6.5	10
Mechanical endurance (number of operations)	Divide by 2 for operation cycles		20 000	20 000	20 000	16 000	16 000

A) Category A - 1) Pollution Degree 2 - 2) Normal conditions defined in IEC 60947-1-6.1

Product offering

DC contactors



In solar farms for power generation many inverters can operate, simultaneously or not. Connecting different solar panels to different inverters should be useful (commute from one inverter to an other, optimize power generation especially in case of low shine level).
Commuting DC voltages in the range 500V up to 1500V is necessary.
The Lenoir-Elec branded modular contactors of Ferraz Shawmut are part of our HelioProtection program. They are particularly well fitted to this application.

	Contactor	CBC57-80A	CBC57-150A	CBC57-200A	CBFC55-80A	CBFC55-80A	CBFC55-80A
Maximum switch-off voltage	Pole	NO/NC	NO/NC	NO/NC	NO/NC	NO/NC	NO/NC
	Single pole	500VDC	500VDC	500VDC	500VDC	500VDC	500VDC
	2-pole	1000VDC	1000VDC	1000VDC	1000VDC	1000VDC	1000VDC
Control		**DC**				**AC**	

	Contactor	CBFC75-400A	CBFC75-500A	CBFC75-630A	CBFC75-800A	CBFC75-1000A
Maximum switch-off voltage	Single Pole	500VDC	500VDC	500VDC	500VDC	NO/NC
	2-pole	1000VDC	1000VDC	1000VDC	1000VDC	1000VDC
	3-pole	2000VDC	2000VDC	2000VDC	2000VDC	2000VDC
Control		**AC (DC consult us)**				

For rating higher than 1000A up to 8000A consult us.

Custom enclosures Main boxes

For large solar power applications at Ferraz Shawmut's we have the abilities to design and manufacture custom enclosures as per customer specifications.
Supplying traction, utilities, power conversion markets, the company has the resources to design and manufacture high-power cubicles.

MV fuses 55 x 520 - UTE/EDF standard

Voltage (V)	Current (A)	Packaging	Set of 3 fuses	EDF part number	Ref. number w/o striker	Cat. Number w/o striker	Ref. number with striker	Cat. Number with striker
24	6,3	3	1	73.02.132	A210798A	LOT-FR240V6,3	G227430A	LOT-FR240V6,3P
24	16	3	1	73.02.133	B210796A	LOT-FR240V16	H227431A	LOT-FR240V16P
24	32	3	1	-	G226234A	LOT-FR240V32	J227432A	LOT-FR240V32P
24	43	3	1	73.02.134	C210797A	LOT-FR240V43	K227433A	LOT-FR240V43P
24	63	3	1	73.02.135	D210798A	LOT-FR240V63	L227434A	LOT-FR240V63P

To contact us
visit “Countries” at www.ferrazshawmut.com

To know more
on our HelioProtection Program
go to www.helioprotection.com

www.helioprotection.com

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