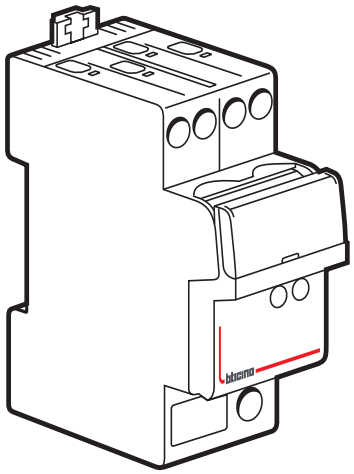
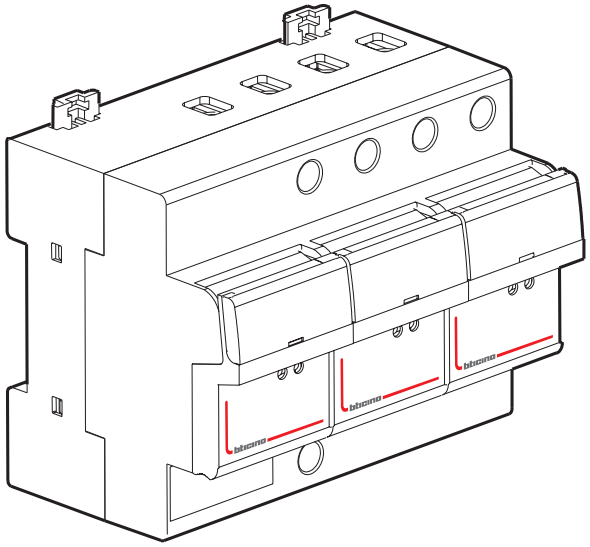
Modular surge protective devices (SPDs)

Cat. Nos : F10AP2 - F10HP4





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Product information : IDP000018EN_05 Update : 03/12/2019 First release : 10/09/2015

1. GENERAL CHARACTERISTICS

1.1 Brief description

Self-protected SPDs Type 2 (In 5kA, Imax 10kA) and Type 3 (Uoc = 20kV) for single-phase 230 V~ networks (Cat. No. F10AP2) and three-phase + neutral 230/400V~ networks (Cat. No. F10HP4).

SPDs with spark gap technology on neutral branch, suitable for all network with neutral (TT and TNS), especially in case of a RCD present upstream of the SPD (no leackage current towards earth).

F10AP2 can be installed upstream the main RCD but F10HP4 has to be implemented with a RCD on his upstream side (RCD already present in the installation or a specific RCD on the branch of SPD).

This SPD include all the required protections thanks to the special fuse inside (Isccr 6kA for F10AP2 and Isccr 10 kA for F10HP4).

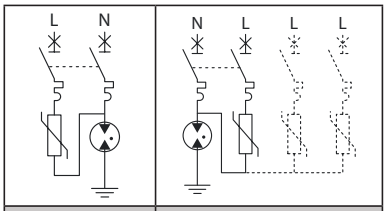
Isccr : Short circuit current rating

Equipped with plug-in replacement module and indicator LEDS:

- Green: SPD operational.
- Red: module needs replacing.

1.2 Protection modes

SPDs 1P+N / 3P+N
TT, TNS systems



1P+N	3P+N
F10AP2	F10HP4

Surge protective devices with L/N-PE and L-N protection modes (common and differential protection modes)

The N-PE branch is built by a special encapsulated spark gaps with high capacity protection and the internal configurationof the SPD is called mode "1+1" or "connection type 2" (CT2) according to standards HD/IEC 60364 clause 534.

SPDs not suitable for two-phase or bi-phase network : use SPD 1Px2 or 2P.

SPDs not suitable for IT earthing systems : use SPD 1P/3P/4P with Uc 440V~.

1.3 Applications

1.3.1 Installation standards

1.3.1.1 CEI 64-8

According to part 443, SPDs are mandatory in many cases and applications. For other cases, in order not to be implemented, a risk analysis based on 443-5 or EN/IEC62305-2 (CEI 81-10/2) has to be carried out to prove it is not usefull.

1.3.1.2 European (HD) ans International standard (IEC)

SPDs are dealt with by standards HD/IEC 60364-4-443 (selection of SPDs ans mandatory aspects) ans HD/IEC 60364-5-534 (installation).

According to the latest version of 2015 and 2016, SPDs are now mandatory in building :

- where people are at risk (installations providing a security service, medical services, hospitals, etc...)
- offering a public or cultural service (public service, communication exchanges, museums, religious buildings, etc...)
- in the service sector and industry (hotels, banks, industries, shops, farms, etc...)
- equipped with a lightning Protection System (LPS, lightning conductor) or designed in accordance with EN/IEC 62305
- likely to hold a large number of people in Europe (apartment buildings, office buildings, schools, etc...)

In the case of smaller installations (small shops, private houses, etc...), a risk analysis should be conducted (article 443-5).

Failing this, SPDs must be installed.

However, SPDs are not mandatory in private homes if the cost of installing it is more than a fifth of the cost of installation (exception not include in CEI 64-8 for italian market).

1.3.2 BTicino recommandations

To ensure correct protection, an SPD is recommended:
- at the origin of each installation
- at secondary distribution board feeding sensitive equipment
- on all outdoor electrical circuit outgoing lines (power supply for secondary buildings, outdoor lighting or outdoor distribution boards, etc).

Although not compulsory according to the installation standards, an SPD should always be installed for communication networks to protect the communication equipment when there is an SPD on the low voltage power network.

1.3.3 CEI 81-10/2, EN 62305, IEC 62305

An external lightning protection system (LPS) protects buildings against direct lightning strikes. It is generally based on the use of lightning conductors (single rods, with ESE, meshed cage, etc.) and/or the metal structure of the building.
If there is an LPS or a lightning risk assessment has been carried out in accordance with standards EN/IEC 62305 or CEI 81-10/2, SPDs are generally required in the main distribution board (T1 SPDs) and distribution boards (T2 SPDs).

Determination of SPDs in the main distribution board according to EN/IEC 62305 and TS/IEC 61643-12 :

Buildings with an external LPS

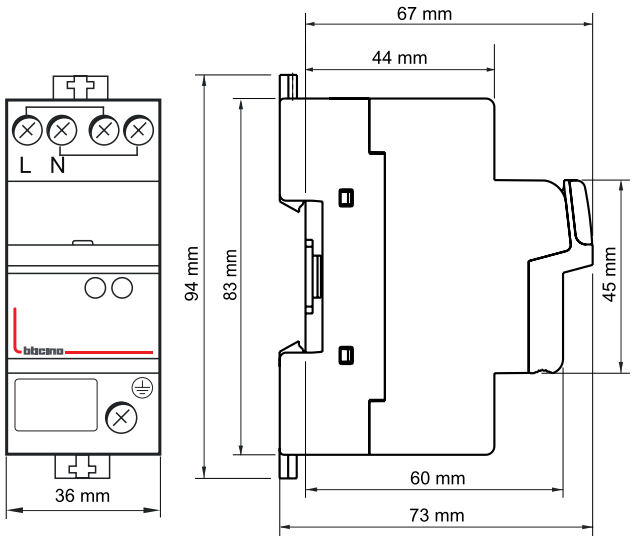
LPL(1): Lightning protection level	LPS total lightning current	Min. value of the SPD limp current (T1)	Usage practices
I	200 kA	25 kA/pole (IT: 35 kA min.)	Power installations
II	150 kA	18.5 kA/pole	Rarely used
III/IV	100 kA	12.5 kA/pole	Small installations

(1): LPL (Lightning Protection Level)

2. OVERALL DIMENSIONS

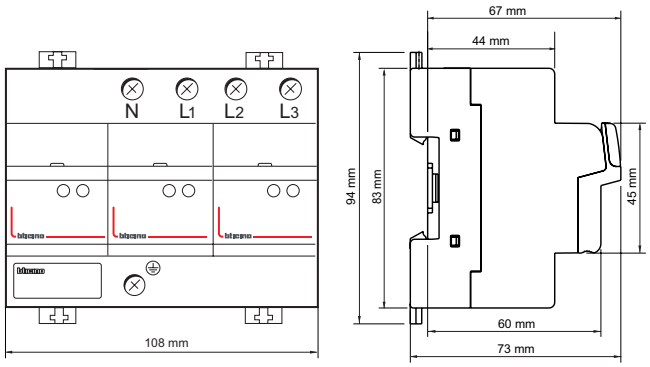
SPD for single-phase network

Cat. No. F10AP2



SPD for three-phase plus neutral network

Cat. No. F10HP4



3. TECHNICAL CHARACTERISTICS

Cat. No.	F10AP2	F10HP4
Number of poles	2	4
Mains network	230 V~ +10%	230/400 V ~
Earthing system	TT, TNS	
Protection modes	L-N, L/N-PE	
Max. continuous operating voltage (Uc)	L-N, L-PE : 275 V~ N-PE : 255 V~	
Frequency	50/60 Hz	
Type	Type 2 (T2) - Type 3 (T3)	
Nominal current (In)	5 kA	5 kA
Maximum discharge current (Imax)	10 kA	10 kA
Protection level (Up)	L/N-PE = 1,3 kV L-N = 1 kV	L/N-PE = 1,2 kV L-N = 1kV
Combined wave resistance (Uoc)	20 kV	
Temporary overvoltages (LV supply faults)	L-N : 336 V / 5s (withstand mode) L-PE : 440 V / 5s (withstand mode) L-N : 440 V / 2h (failure mode)	
Temporary overvoltages (HV supply faults)	1200 V (withstand mode)	
Associated disconnector	Built-in	
Short-circuit current withstand (Icc)	6 kA	10 kA
Follow current suppression capacity Ifi (N-PE)	100 A	
Residual current (Ipe)	zero	
Max. line current (I_L)	63 A	-
Voltage drop under I_L	< 1 %	-
Response time	L-N : 25 ns N-PE : 100 ns	
Number of port	1	
Location category	Indoor	
Installation method	Fixed	
Pollution level	IP 20 (installed in enclosure)	
Number of modules	2	6
Operating temperature	-10°C à +40°C	
Storage temperature	-20°C à +70°C	
Humidity range	HR : 5 - 95 %	

4. CONFORMITY

Compliant to standards EN 61643-11:2012 and IEC 61643-11 edition 1: 2011.
These SPDs ensure compliance with the installation obligations and recommendations of standards HD/IEC 60364 and CEI 64-8 part 534, standards IEC/EN 62305 and guide TS/IEC 61643-12.
Compliant to LVD (Low Voltage Directives), 2014/35/EU and on electromagnetic compatibility (EMC) N°2014/30.

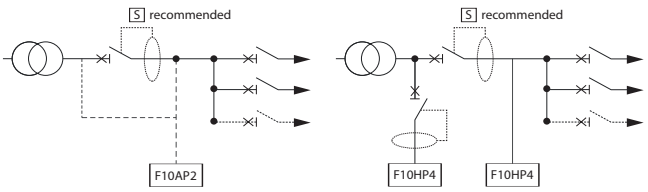
5. MOUNTING

5.1 General principle

Surge protective devices must not be installed in locations where there is a risk of fire or explosion without special provisions. They must be disconnected before checking the insulation resistance of the installation.

5.2 Basic principle

TT or TNS neutral earthing systems :



F10AP2 can be implemented before or after main RCD.

F10HP4 has to be implemented with an RCD on his upstream side.

Residual current devices and service continuity : if the panel general protection located upstream of the SPD features a residual current device, this residual current device must be either type S or delayed at installation head (residual current device immune from lightning current up to 3 kA according to standard IEC 60364). Also recommended for line distribution panels.

5.3 Connections

Check that the ground system to which the installation's exposed conductive parts are linked complies with standard HD/IEC 60364, section 54 and CEI 64-8 february 2019.

SPD connected to the mains supply and to the protective conductor (PE) using as short a connection as possible, X+Z ≤ 50 cm recommended.

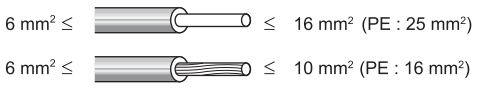
Compulsory connection of the earth terminal on the surge protective device to the protective conductor (PE) on the distribution board.

Equipotentiality rules: interconnection of the exposed conductive parts of the equipment and the protective conductor (PE) on the distribution board, which is itself connected to the earth terminal of the surge protective device.

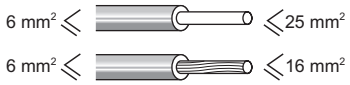
Electromagnetic compatibility rules: avoid loops, fix the cables firmly against the exposed metal conductive parts.

Recommended connection cross-sections and lengths to be stripped :

Cat. No. F10AP2



Cat. No. F10HP4



Tightening torques

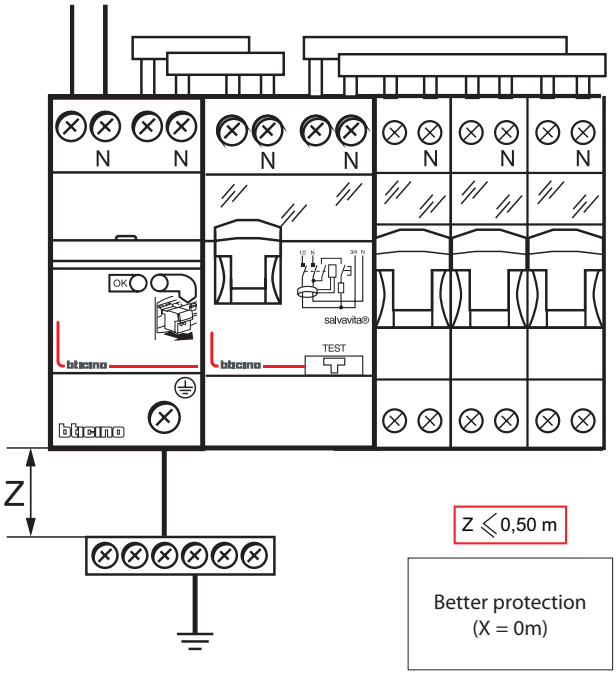
F10AP2	Recommended	Max
L-N	1,5 Nm	2 Nm
PE	2,5 Nm	3 Nm

F10HP4	Recommended	Max
L-N/PE	2,5 Nm	3 Nm

5.3.1 Series connections

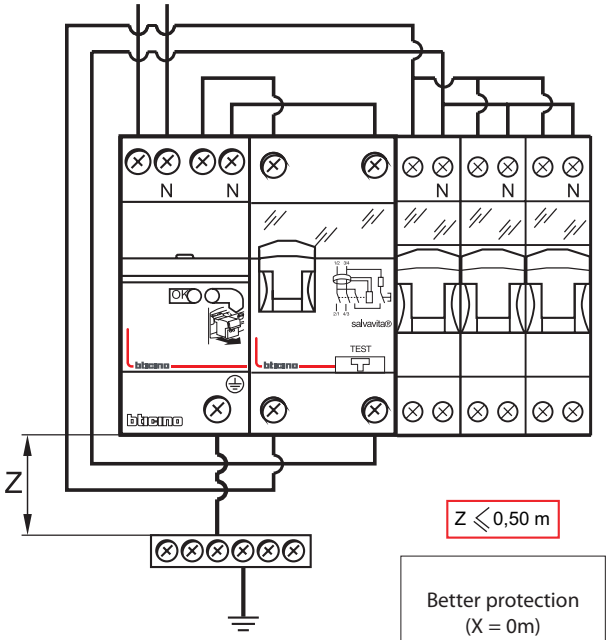
5.3.1.1 Installation with supply busbars up to 63 A

Only for Cat. No. F10AP2



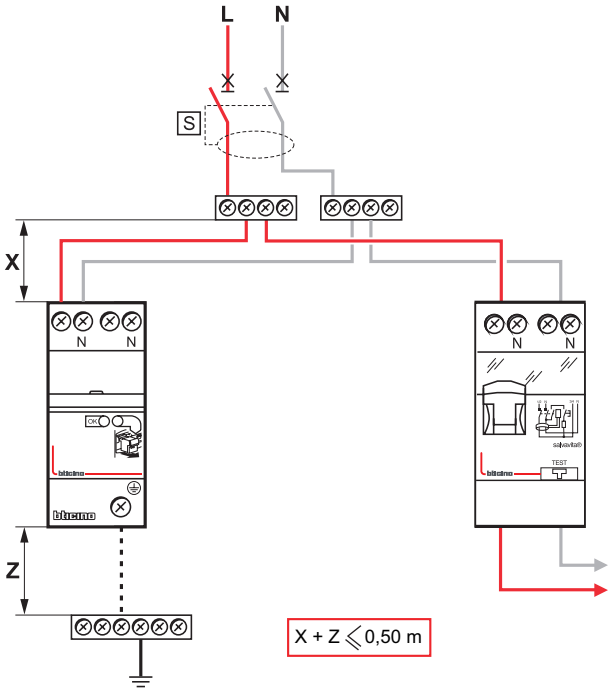
5.3.1.2 Installation with cables up to 63 A

Only for Cat. No. F10AP2

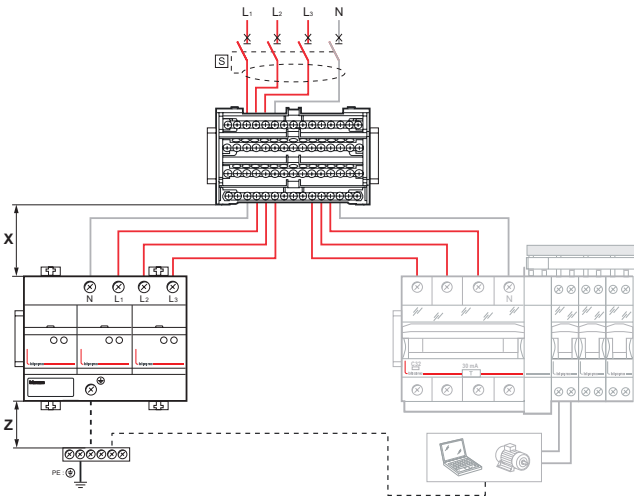


5.3.2 Parallel connection above 63 A

Cat. No. F10AP2



Cat. No. F10HP4



5.5 Coordinating upstream/downstream SPDs

Consists of ensuring that any downstream SPD (in distribution enclosures or proximity SPDs) is correctly coordinated in energy terms with any SPD located upstream (TS 61643-12).

Minimum distances between SPDs (m)

Upstream SPD	Downstream SPD	Minimum distance (m)	
		With LPS*	Without LPS*
T1+T2 Iimp 35 and T1+T2 Iimp 25	T2 Imax 40 (Uc 440V)	0	0
	T2 Imax40 (Uc 320V)	1	0
T1+T2 Iimp 12.5 and T1+T2 Iimp 8	T2 Imax 40	5	0
	T2 Imax 20 or T2 Imax 12	8	0
T2 Imax 40	T2 Imax 20 or T2 Imax 12	-	1
T2 Imax 20	T2 Imax 12	-	0.5
T2 Imax 20 and T2+T3 Imax 12	Proximity SPDs T3	-	2

* LPS : Lightning Protection System

6. ACCESSORIES

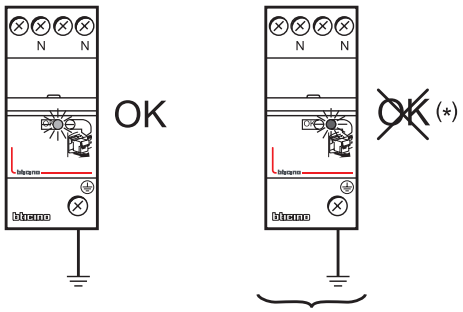
Plug-in replacement modules

With indicator LEDs :

- Green : SPD operational
- Red : module needs replacing (*)

Cat. Nos	For SPD
F10APS	F10AP2
F10HPS	F10HP4

SPD for single-phase network Cat. No. F10AP2

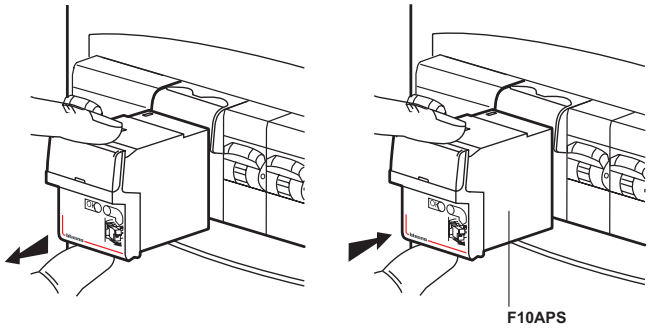


Replace the module

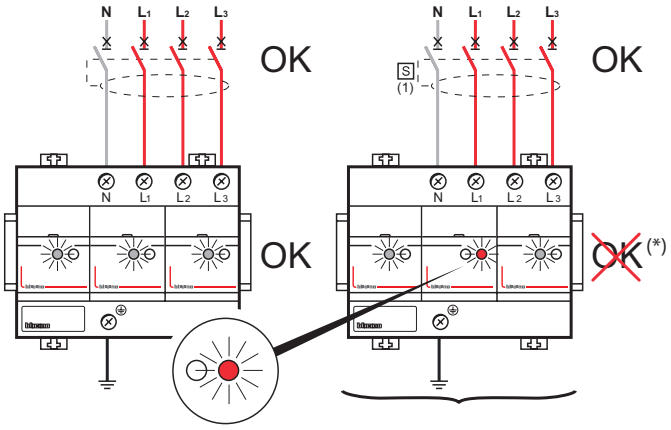
(*) Special situations requiring the SPD module to be changed :

- Voltage present, but module's indicator lights are off
- The circuit-breaker located upstream can only be reset when the module has been removed.

Replacing the module



SPDs for three-phase plus neutral network Cat. No. F10HP4



(*) Special situations requiring the SPD module to be changed :

- Voltage present, but module's indicator lights are off
- The circuit-breaker located upstream can only be reset when the module has been removed.

Replacing the modules