Surge protection for double-fed turbine

Surge Protective Devices (SPDs), intended to afford protection from electrical surges and spikes, including those caused directly and indirectly by lightning, are utilized as both complete devices and as components within electrical equipment installed in AC and DC power applications.

Wind turbine converts the wind's kinetic energy into electrical energy. Arrays of large turbines, known as wind farms, are becoming an increasingly important source of renewable energy and are used by many countries as part of a strategy to reduce their reliance on fossil fuels.

Wind turbines are tall, isolated towers composed of sensitive electronics, all of which are factors that make lightning a persistent and real threat. A properly installed lightning protection system, however, will intercept the lightning and effectively and safely conduct it to the earth without risking physical destruction to the wind turbine. This issue has become increasingly critical as wind turbine systems become more sophisticated and vulnerable to lightning, and that lightning dangers will increase with turbine height.

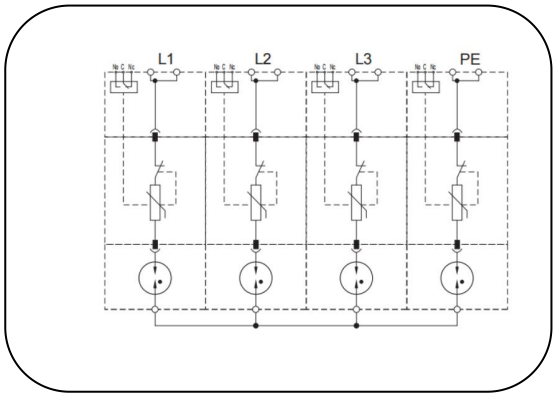
According to the updated National Fire Protection Association (NFPA) handbook:“While physical blade damage is the most expensive and disruptive damage caused by lightning, by far the most common is damage to the control system”. In Wind turbine system, there are many vulnerable electronics equipments which be damaged by lightning strikes or and transient over-voltages, such as:

- The control system, include sensors, actuators, and the motors for steering the equipment into the wind etc.
- The electronics, include transformer, frequency converter, switchgear elements, and other expensive, sensitive equipment.
- And Generators, battery subsystem etc.

Properly installed surge protective devices (SPDs) will minimize the potential impact of lightning events.

690Vac Power system, Class I + Class II (T1+T2) SPD

- BP25VT/960-S/3PI-WD



Basic circuit diagram

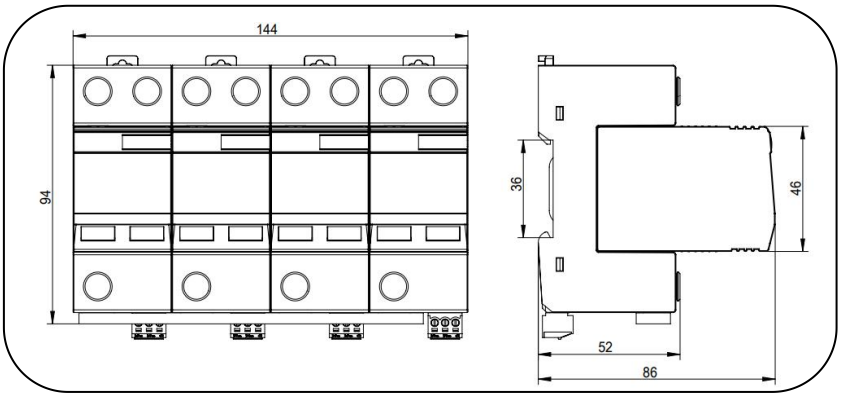
The BP25VT/950-S/3PI-WD is class I & class II (or T1+T2) prewired four poles combined SPD designed for high voltage power system lightning current & surge protection, especially for location of high risk exposure or LPZ 0-2 building entrances (IEC 62305-4) to against the damage from direct or close lightning strikes.

With built in PROSURGE VT technology, BP25VT WD ensures remarkable lightning current discharge capacity up to 22kA 10/350μs and No leakage current & No follow current. It can be applied in most electrical installation and provide better reliability and safety protection, and fulfill the specific requirement of wind turbine industrial.

A notable feature of BP25VT is dual module redundancy design, two individual MOV protection modules in parallel in one pole SPD with two indication windows, so that the SPD could keep on working in spite of one protection module fault or one indication window turns to red. That will help to realize the uninterrupted surge protection, since user can replace the failure models according to the timing and the conditions.

- T1+ T2 SPD per IEC/EN 61643-11 standard.
- Prewired four poles TUV certificated SPDs for use in three phase 690Vac TN-C / IT systems.
- Unique thermal disconnector design provides quick thermal response and secure disconnection
- Dual module redundancy for one pole SPD and dual fault indication windows, with optional remote signal contact.
- Lightning current capacity up to 22 kA10/350μs, surge current capability up to 100kA 8/20μs
- Low voltage protection level due to Prosurge's VT technology.
- High short-circuit current rating up to 50kArms, suitable for application in most AC power system.
- Long service life because of no leakage current and follow current
- Better reliability and robustness, Higher TOV (Temporary Over-Voltage) withstanding performance
- Pluggable module for easy replacement without the need to remove system wiring.
- Comply with UL1449 5th, IEEE C62.41,CSA C22.2 standards

Dimension drawing



Technical data

Part No.	**BP25VT/960-S/3PI-WD**
In accordance with	IEC/EN 61643-11:2011; UL1449 5th; EN50539-22
Category IEC/EU/VDE	I+ II /1+2/ B+C
Protection mode	L-PE, L-L
Nominal Voltage (AC) Un	690V, 3-Phase TN-C/IT
Power frequency	50/60Hz
Max. continuous operating voltage(AC) Uc	960V
Nominal discharge current (8/20) In	25kA
Max. discharge current (8/20) Imax	100kA
Lightning impulse current (10/350) Iimp	22kA
Voltage protection level Up	4.0kV (L-L, L-PE)
Response time tA	≤25ns
Temporary overvoltage TOV U_T Withstand mode 120min	1350Vac
Follow current & interrupt rating Ifi	No
Leakage current Ipe	0mA
Short-circuit current rating Isscr	50kArms
Backup fuse(only required if not already provided in mains)	≤250A gL/gG
Operating temperature range	-40ºC ~ +85ºC
Altitude	-500m ~ +4000m
Cross-section of connection wire (max)	Single-strand 35mm^2; multi-strand 25mm^2
Mounting	35mm DIN-rail in accordance with EN 50022/DIN46277-3
Enclosure material	Thermoplastic; extinguishing degree UL94 V-0
Degree of protection	IP20
Installation width	8 modules, DIN 43880
Thermal disconnector	Internal Green – normal ; red - failure
Remote alarm contact	Optional
Approvals, Certifications	TUV (Single pole), CE
Additional data for Remote Alarm Contacts	
Remote alarm contact type	Isolated Form C
Switching capability Un/In	AC: 250V/0.5A DC: 250V/0.1A; 125V/0.2A; 75V/0.5A
Cross-section of remote signaling wire	Max. 1.5mm^2(or # 16AWG)