

## ETITEC-WENT Class I and II Double-stage Over-voltage Limiters

ETITEC WENT double stage surge limiters distinguish themselves from others with innovative solution in arrangement of varistor - spark system of premising double stage surge protection, class I and II (B + C) in architectural facilities.



Obligatory now in Poland regulations and norms, especially expressed in European Norms IEC, impose an obligation for usages of surge protection devices in architectural facilities. These norms recommend also the usage of multistage protective systems. Two-stage protection system must be connected to the protected installation of class I (B) limiters and limiters of the class II (C) simultaneously. Especially, if with the protection have to be embraced installations and devices having the endurance of the percussive isolation on level between 1, 5 - 2, 5 kV, working in facilities equipped with external lighting rod installation or especially subject exposed to atmospheric discharges. The multistage protective system should be also practical in the facilities without the external protection lighting rod, but supplied by the open wire line, or when in this systems are working devices with low endurance of the percussive isolation - below 1, 5 kV. In case of usage the multistage surge protection systems, the mutual co-ordination of the cooperation between limiters of the class I and limiters of the class II or III is required. The correct cooperation between disjunctive limiters of the class I and II is properly assured, if these devices are separated by the line of the active installation in length at least of 10 m. In case, when there is no technical possibility to assure the require section of the line between limiters of different classes, one switch box side by side have to be installed, then should have to be used between them the intermediary element- the inductor (unharnessing). In presented herein article, four-module ETITEC - BAZAARS joint surge limiter assures the two-grade protection without necessities of the usage of no matter which intermediary inductors. This solution does not have any defects with the usage of inductors such as: the limitation of the load current installation (up to 63 A) and additional

module elements, what let to expand the system. How mentioned above, all ETITEC-WENT limiters and especially one intended to the TT power network systems, have the internal varistor - spark structure. (Fig. 1 ).The spark device consist out of completely closed thanks, and device works without the wind-swept of the electric arc and there is no need to insulate the set from other devices. Those limiters are installed in the joint behind the main protection and nearest main compensatory bus (rail) of the building and before the differential-current protection.

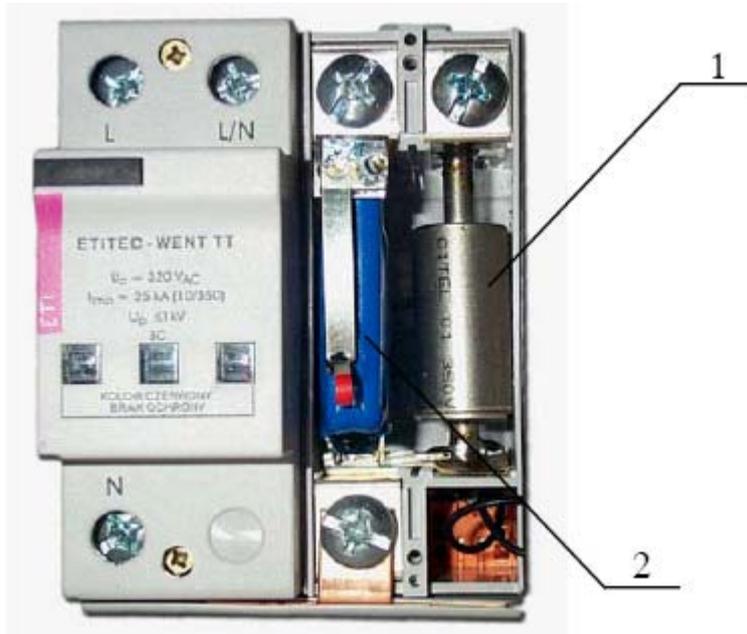


Fig. 1 1 - sparking device, 2 – varistor

During the normal work, varistor elements of the limiter stay constantly live under the permanent working voltage  $U_c$  of the power network. Thanks of their large resistance (approx. 1 GW ) the transfluent current in these varistors is very small and as a rule does not exceeds 0,3 - 0,5 mA.

The protective function of such element is the conduction of the discharge current down to the ground after the success by the voltage on varistor clamps is equal ti the terminal conductivity voltage. Such situation succeeds to the attainment of surge wave to the place of the limiter installation. The supplementary system schema of the power supply network sees then the form shown on the Fig. 2.

After starting letting pass up of the discharge current, the limiter in the very short time (tens nanoseconds) comes back to the isolating state not allowing to pass secondary current. All ETITEC-WENT limiters are available in four-polar version for three-phase-networks - TNC-S, TNC, TT, IT, and in the bipolar version for single-phase power networks. Every limiter on his casing have printed detailed connection system suitable for one or three-phase-connections.

Fig. 3 Connecting schema in TNC-S power network

Fig. 4 Connecting schema in TNC power network

Fig. 5 Connecting schema in TT power network

Fig. 6 Connecting schema in IT power network

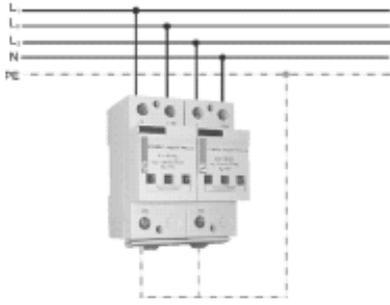


Fig. 3

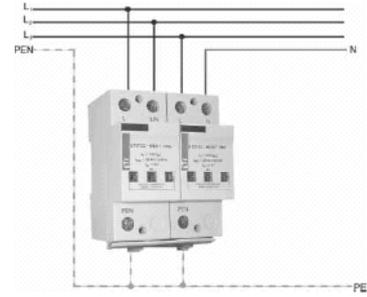


Fig. 4

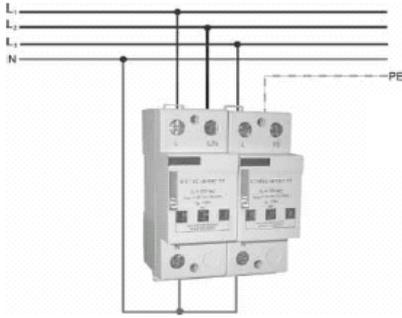


Fig. 5

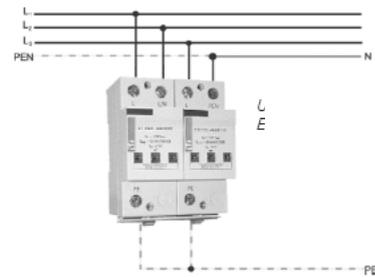


Fig. 6

On introduced schemes it is easily to notice, that for construction of the two-stage protection system in the three-phase- power network for the facility is needed one limiter with the width of four modules ( 4 modules x 17, 5 mm = 70 mm).

In past solution we were used :

- class I limiter - width 2 modules
- uniting coil - width 2 modules
- class II limiter - width 1 module

total width for TNC-S system - width of 5 modules x 4 phases = 20 modules x 17, 5 mm = 350 mm.

The comparison shows, that during the usage of ETITEC-WENT joint limiters, instead of former two-stage protection, it is more convenient to use five times less room what also gives the considerably smaller costs of over-voltage protection.

Technical parameters of ETITEC-WENT limiters are shown in Table 1.

Table 1.

ETITEC-WENT		TNC-S	TNC	TT	IT
Maximum workng voltage	$U_c$	320 V/50 Hz			
Protection class		B i C			
Piorunowy prąd Udarowy (10/350) Na 1bieg./całkowity	$I_{imp}$ (kA)	12,5/50	12,5/37,5	12,5/50	12,5/50

Protection level by $I_{imp}$	$U_p$	$\leq 1 \text{ kV}$
Starting time	$t_A$	$\leq 25 \text{ ns}$
Admissible working temperature range	T	$-40^\circ\text{C} - +80^\circ\text{C}$
Assembly		Szyna TH 35
Protection degree		IP 20
Module width		4 moduły ( 70 mm )
Short-circuit endurance		50 kA
Connectors capacity		$25 \text{ mm}^2$

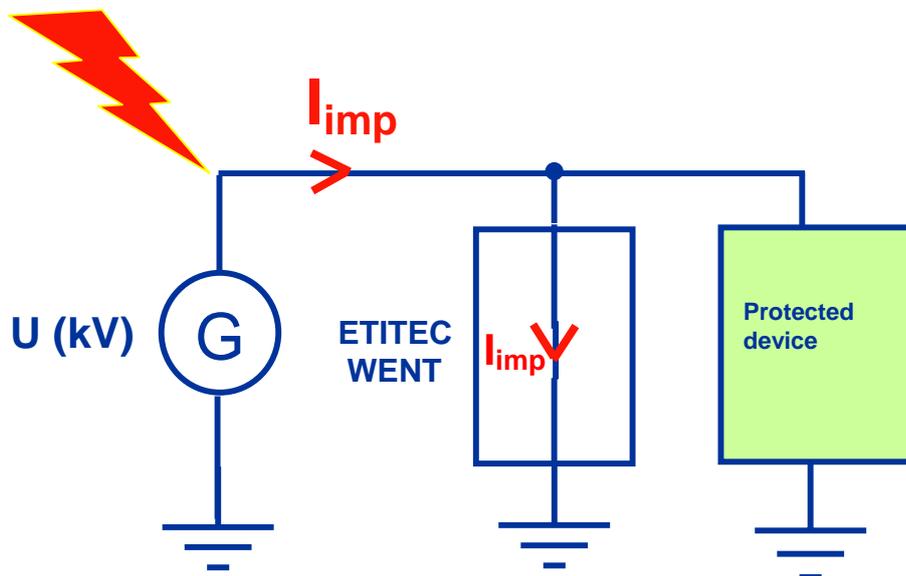


Fig. 2