COMBOTRAB

Combination FLASHTRAB Lightning Protection and TVSS System Designs

Data Sheet 1567A

April 2002

Features

- Protection of AC power mains from direct lightning strike energy.
- Combination lightning arrester and TVSS. Complete coordinated hybrid over voltage protection system.
- Discharges 50 kA of surge current as tested by the only lightning protection test standard-IEC 61024 10 x 350 µS waveform. Similar to energy of 1 million amps 8 x 20 µS waveform.
- Utilizes the revolutionary Arc Chopping Spark Gap technology. Discharges complete lightning surge currents while extinguishing up to 50 kA of follow current.
- Residual voltage below 900 volts during full surge current discharge.
- Systems are flexible to meet any user requirement.
- Systems include 200 kA IC surge rated fusing with disconnect.
- 10 year "No-Nonsense" warranty. Free replacements of any failed components.
- UL 1449, 2nd Edition. 6D52.

The FLASHTRAB Advantage

Proven Technology and Experience

Phoenix Contact FLASHTRAB technology has been successfully used to protect electrical and electronic equipment in over 1 million installations throughout the world. Phoenix Contact has been successfully solving surge and lightning problems for industrial, commercial, telecommunication, and residential customers for over 20 years.

Tested to the Only Lightning Protection Test Waveform

FLASHTRAB technology can handle up to 50 kA / mode of surge current based on the only standardized

Figure 1. COMBOTRAB with NEMA 4 enclosure and diagnostic light indication

lightning test waveform (IEC 61024). MOV and SAD technologies are NOT designed to address the energy of a direct lightning discharge event.

Lightning Protection with Pluggable Transient Voltage Surge Suppression (TVSS)

For installations where transient surge voltage from utility and other sources are a concern, COMBOTRAB systems are integrated with additional TVSS protection eliminating the need for downstream distribution panel protection. As an added feature, the TVSS protection modules can be hot-swapped in the unlikely case of failure.

Simple and Cost Effective

While MOV arrays, Selenium-Enhanced Suppression, and Diode Arrays sound impressive, FLASHTRAB technology has been proven effective worldwide and typically for much less cost.

The FLASHTRAB Advantage

High Surge Current and Low Protection Level.
While FLASHTRAB + CTRL is robust enough to handle 50 kA of a long duration test waveform (10 x 350 µS), the control circuit provides low voltage protection level as low as 900 volts, even at such high currents. Other technology sacrifices protection voltage at high discharge current.

Lifetime Testing
Because FLASHTRAB technology was designed specifically to handle the long duration lightning impulse events, the lifetime testing has proven it to be many times more robust than MOV and SAD technology. In fact, independent laboratory testing of the units with lightning impulse testing proved the units capable of handling over 7000 events before testing was stopped with no visible failures evident.

Technology Breakthrough
The FLASHTRAB + CTRL components utilized in COMBOTRAB use a lightning arresting technique referred to as *arc chopping* to arrest lightning surge currents while self-extinguishing follow-current. The addition of the *control* circuit allows protection levels as low as 900 volts independent of current level. This combination makes the FLASHTRAB + CTRL devices very unique technology in the surge protection marketplace.

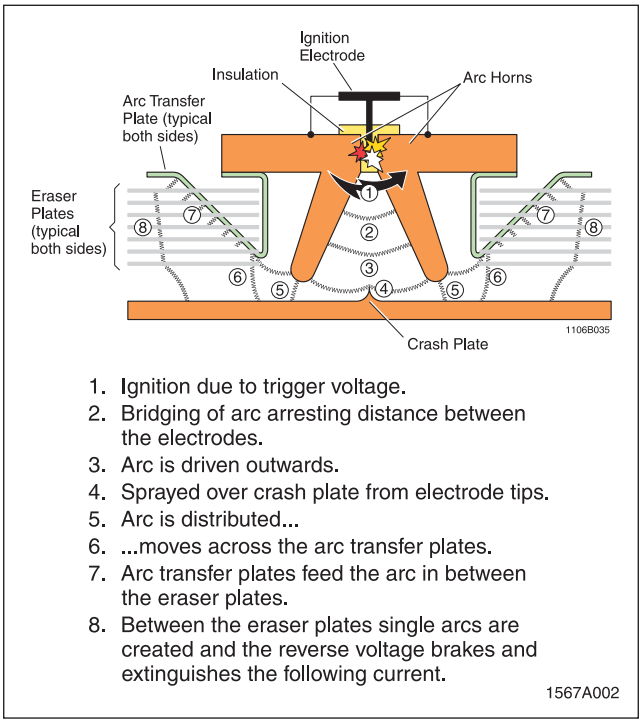

Figure 2. Diagram of Arc Chopping Technique

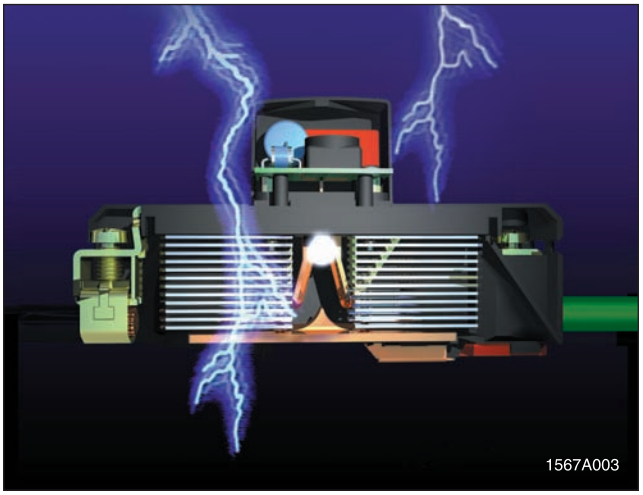

Figure 3. FLASHTRAB Lightning Arrestor

Superior Energy Handling
Traditional TVSS solutions used for lightning protection often make use of multiple stacks of electronic grade silicon components (MOV and / or SAD) to increase their robustness against lightning strikes. The result is often theoretical ratings of surge current in the hundreds of thousands of amps. The problem with this approach is the components used in this way were never designed to handle the energy of the typical lightning event. FLASHTRAB technology is designed to handle the high currents AND long duration events typical of a lightning strike. The following diagrams show the dramatic difference in testing standards. The 10/350 µS test contains 15-20 times the charge of a 8/20 µS test.

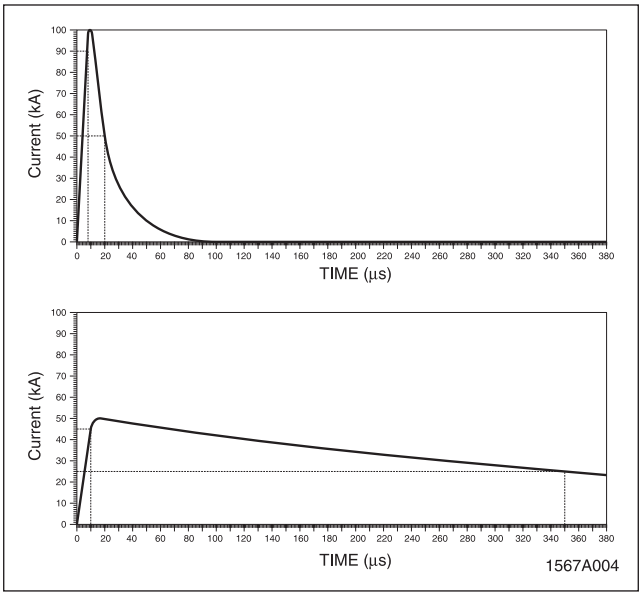

Figure 4. Energy of a lightning strike is more accurately represted by the IEC 10/350 µS waveform

Product Selection

The modular DIN-rail approach of the COMBOTRAB lightning arrestor and TVSS systems provide the flexibility to mount indoors or outdoors in OEM applications or even in user equipment such as MCCs and control cabinets. Options such as diagnostic light indication and remote contacts are also available.

Listed on the next page are part numbers for the most popular voltage and packaging configurations. Enclosure systems are designed for indoor or outdoor installations. NEMA 4X versions use 316 Stainless Steel enclosures for corrosive environments.

DIN-rail assembly kits are also available for each voltage configuration to be mounted in user or OEM equipment. Other voltage and packaging are available upon request. Contact Phoenix Contact Technical Service Department for more details at 1-800-322-3225.

Common Applications:

- Water/Wastewater treatment facilities
- Pumping and lift stations
- Gas pipeline compressor and gate stations
- Mobile phone base stations
- Petrochemical facilities
- Commercial buildings
- Medical facilities
- Data centers

Figure 6. Water pumping station protected by COMBOTRAB

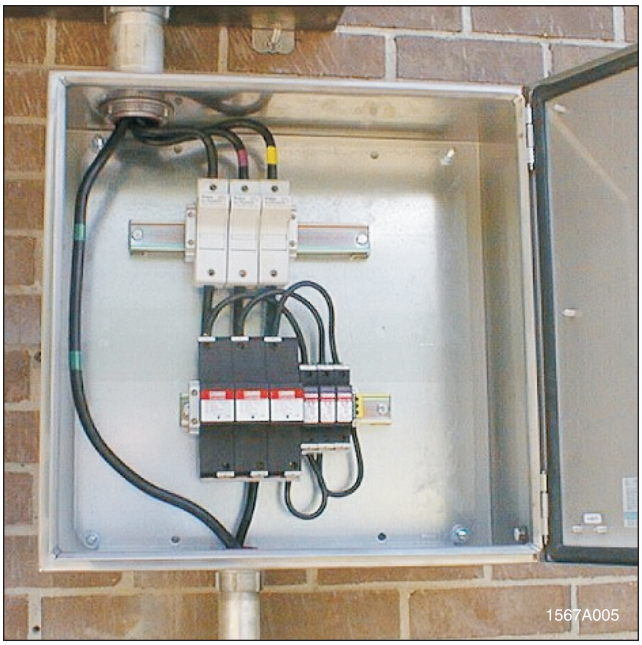

Figure 5. The COMBOTRAB protects facilities from lightning strikes and switching transients

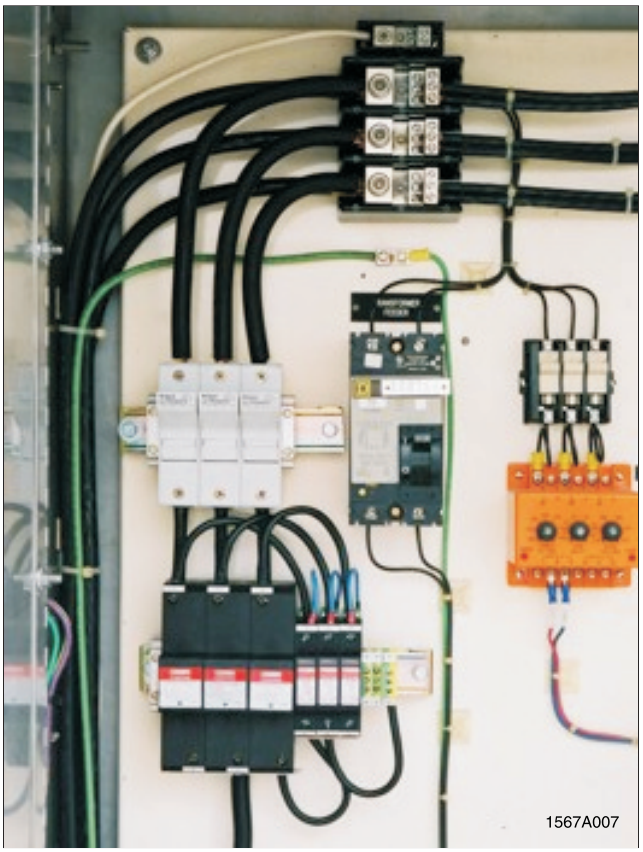

Figure 7. COMBOTRAB Rail Assembly installed in user panel

Table 1. Typical COMBOTRAB Specifications

	480/277 Vac WYE	208/120 Vac WYE 240 Vac DELTA 120/240 HL DELTA	120/240 Split Single Phase
Maximum continuous operating voltage	305 Vac (L-N and L-GND)	275 Vac (L-N and L-GND)	275 Vac (L-N and L-GND)
Protection mode (installed on main service entrance with N-GND bond)	L-L/L-N/L-GND	L-L/L-N/L-GND	L-L/L-N/L-GND
UL 1449, 2nd edition SVR (500 A, 6 kV combination wave) (L-GND)	1.2 Kv	800 V	800 V
ANSI/EEE C62.41 Category C3 combination wave (10 kA, 20 kV)	<1.5 kV	<900 V	<900 V
50 kA 8 x 20 µS	<1.5 kV	<900 V	<900 V
50 kA 10 x 350 µS	<1.5 kV	<900 V	<900 V
Surge current capacity (10 x 350 µS)	50,000 amps*	50,000 amps*	50,000 amps*
Follow current interrupting capacity	>50,000 amps**	>50,000 amps**	>50,000 amps**
Repetitive surge event 20 kV/10 kA (ANSI/EEE C62.41 Category C3 surge event)	>7,000 impulses	>7,000 impulses	>7,000 impulses
Repetitive surge event 50 kA 10 x 350 IEC 61312	>7,000 impulses	>7,000 impulses	>7,000 impulses

*50,000 amps 10 x 350 µS similar to charge of 1 million amps 8 x 20 µS
**Evaluated by UL Duty Cycle Testing. FLASHTRAB interrupted 50,000 amps without damage of the FLASHTRAB or series fusing

Note: Repetitive Surge Current Testing was conducted with 20 kV/10 kA IEEE Category C3 combination wave at one minute intervals <5 kA available follow current. Testing stopped with no failure characteristics at 7,000 impulses.

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Ordering Information

COMBOTRAB - Combination Lightning Arrestor and Integrated TVSS

Power System/Configration

3 Phase 480/277 VAC WYE connected

NEMA 4 Enclosure	**56 02 74 4**
NEMA 4X Enclosure	**56 02 73 2**
NEMA 4 Enclosure with light indication	**56 02 20 1**
NEMA 4X Enclosure with light indication	**56 02 74 6**
Rail Assembly Kit	**56 02 79 4**

3 Phase 208/120 VAC WYE

NEMA 4 Enclosure	**56 02 74 5**
NEMA 4X Enclosure	**56 02 73 3**
NEMA 4 Enclosure with light indication	**56 02 20 2**
NEMA 4X Enclosure with light indication	**56 02 74 7**
Rail Assembly Kit	**56 03 41 5**

3 Phase 240 VAC High Leg DELTA connected

NEMA 4 Enclosure	**56 02 74 5**
NEMA 4X Enclosure	**56 02 73 3**
NEMA 4 Enclosure with light indication	**56 03 46 3**
NEMA 4X Enclosure with light indication	**56 03 46 4**
Rail Assembly Kit	**56 03 41 5**

Split Single Phase 240/120 VAC connected

NEMA 4 Enclosure	**56 02 85 6**
NEMA 4X Enclosure	**56 03 16 7**
NEMA 4 Enclosure with light indication	**56 03 41 6**
NEMA 4X Enclosure with light indication	**56 03 41 7**
Rail Assembly Kit	**56 03 03 0**

Ordering Information

FLASHTRAB + CTRL - Lightning Arrestor Only (for use in applications with downstream TVSS already installed)

Power System/Configration

Voltages <385 VAC L to Ground

NEMA 4 Enclosure - 3 Phase	**56 03 41 4**
NEMA 4 Enclosure - Split Single Phase	**56 03 41 3**