

VOLTAGE LIMITING DEVICES

ESTRA-**V**GUARD



ESTRA

DC SWITCHGEAR & DISTRIBUTION BOARD



With a leading expertise in DC traction power substations, Sécheron is your major partner for the electrification of DC traction networks, covering all activities from network design, calculation and engineering, to the production of the DC systems.

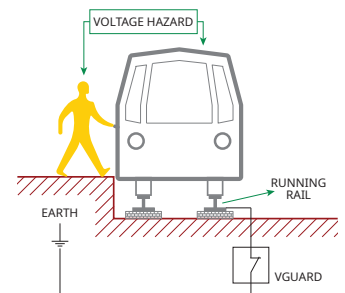
The ESTRA product category covers all key equipment applied in DC distribution, integrating DC high-speed circuit breakers, disconnect switches, load break switches, control & protection relays, measuring amplifiers, etc. We can offer tailor made solutions based on modular concepts and standard products. Our equipment is developed on world leading technology and proven worldwide design and acceptance. Our customers and partners benefit through this offer of all our system skills and experience.

GENERAL INFORMATION

During normal operation of railway systems, impermissible touch voltage can occur between accessible points of the return circuit and earth due to traction currents. Insulation fault may also lead to dangerous voltage.

In order to limit these voltages below the admissible values defined in EN 50122-1 standard, a voltage limiting device must be used as a short-circuiter between negative rail and earth.

Sécheron's VGUARD is providing this protection feature and is fully type tested accordingly.



MAIN BENEFITS

- ✓ Fast response time
- ✓ Combined protection of personnel, passengers and installation, preventing from dangerous voltage
- ✓ Low residual voltage guaranteed
- ✓ High short-circuit levels withstanding
- ✓ Automatically recoverable
- ✓ Bidirectional operation and protection
- ✓ Continuous monitoring of the potential of the return circuit
- ✓ Manually operable on site
- ✓ Movable connections allowing to by-pass and isolate the equipment in safe way during test or maintenance task on the system
- ✓ Compatible with Sécheron's stray current monitoring system (SCMS)
- ✓ Safe and reliable

MAIN CHARACTERISTICS

	Symbol	Unit	Values	
			VGUARD-B	VGUARD-H
Rated voltage	U_{Ne}	[VDC]	900 to 3 600	900 to 3 600
Instantaneous triggering voltage	U_{Ti}	[V]	N/A	300
Tolerance on instantaneous triggering voltage	-	[%]	N/A	10
Instantaneous response time	T_{Ri}	[ms]	N/A	< 5
Nominal triggering voltage	U_{Tn}	[V]	60 to 175	60 to 175
Non-triggering voltage	U_W	[%]	$U_{Tn} - 10$	$U_{Tn} - 10$
Residual voltage at rated current	-	[V]	< 50	< 50
Leakage current	I_L	[mA]	N/A	≤ 50
Rated insulation voltage	U_{Nm}	[kV]	4.8	4.8
Impulse withstand voltage	U_{Ni}	[kV]	40	40
Power frequency withstand voltage (50 Hz, 1 min)	U_a	[kV]	18.5	18.5

	Symbol	Unit	Values		
Rated voltage	U_{Ne}	[V]	900	1 800	3 600
MTA 50 (with 1+1 anti-parallel thyristors)					
Rated current	I_r	[A]	1 000	1 000	1 000
Making capacity and Short time withstand current (0.1 s)	I_{Nss}/I_W	[kA]	Up to 50	Up to 40	Up to 35
MTA 100 (with 2+2 anti-parallel thyristors)					
Rated current	I_r	[A]	1 200	1 200	1 200
Making capacity and Short time withstand current (0.1 s)	I_{Nss}/I_W	[kA]	50 to 100	40 to 80	35 to 85

STANDARDS

Sécheron's voltage limiting devices VGUARD are recoverable devices which are compliant with the railway standards:

- **EN 50526-2** | Railway applications – Fixed installations – DC surge arresters and voltage limiting devices – Part 2: Voltage limiting devices
- **IEC 62128-1 (EN 50122-1)** | Railway applications – Fixed installations – Electrical safety, earthing and the return circuit – Part 1: Protective provisions against electric shock
- **IEC 62128-3 (EN 50122-3)** | Railway applications – Fixed installations – Electrical safety, earthing and the return circuit – Part 3: Mutual interaction of a.c. and d.c. traction systems

VARIANTS

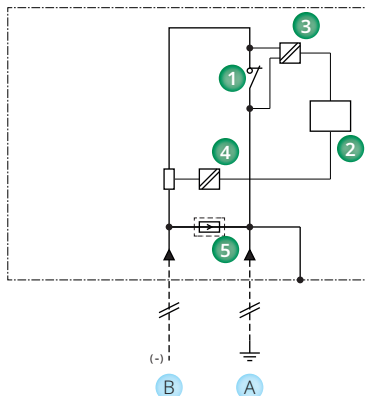
VGUARD-B

- Basic VGUARD with contactor
- Class 3 according to EN 50526-2 standard
- Parameterization through the display
- Simple installation through compact design
- No commissioning required as the system is supplied ready for operation

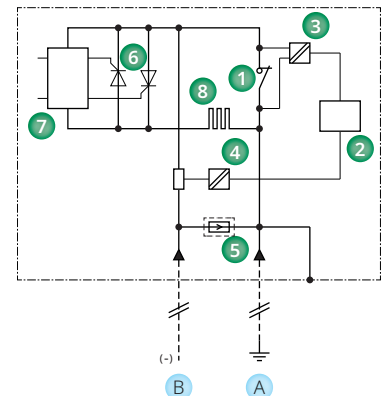


VGUARD-H

- Hybrid VGUARD with contactor and thyristors
- Class 4 according to EN 50526-2 standard
- Maximum protection for personnel and equipment thanks to short reaction time
- High short-time current withstand
- Ensure VLD-F protection
- Compliant with Clause 9 (Limits for touch voltage and protection against the danger of rail potential) of EN 50122-1 standard



- 1 Earthing contactor
 - 2 SEPCOS
Sécheron control & protection relay
 - 3 VM
Sécheron voltage measuring amplifier
 - 4 MIU
Sécheron current measuring amplifier
 - 5 Surge arrester
(optional)
 - 6 Anti-parallel thyristors
 - 7 Thyristor command board
 - 8 Limiting resistor
- A To earth
B To negative return



APPLICATIONS

Both VGUARD variants are available for indoor (IP42) or outdoor (IP55) application.

	Unit	Values		
		Indoor	Outdoor (metallic type)	Outdoor (polyester type)
Protection degree	-	IP42	IP55	IP55
Mechanical impact protection	-	IK09		IK08
Width	[mm]	800	825	875
Depth	[mm]	800	825	850
Height	[mm]	1 600	1 700	1 730
Typical weight	[kg]	VGuard-B = Up to 220 / VGuard-H = Up to 290		
Material	-	Welded frame Steel external plates	Welded frame Steel external plates with PC window	Fiberglass – 4 mm Halogen Free Fire Retardant resin Self-extinguishing PC window
Treatment	-	RAL - priming powder + UV-light and solvent resistant coating system Anti-graffiti upon request		RAL - Fire Retardant spray Gelcoat + UV stabilizer Anti-graffiti upon request

Certification	-			
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OPTION



Steel based stand upon request.

PROTECTION PRINCIPLE

To ensure the safety of people and equipment, Sécheron's VGUARD ensures the following combined protection functions:

VLD-O PROTECTION FUNCTION

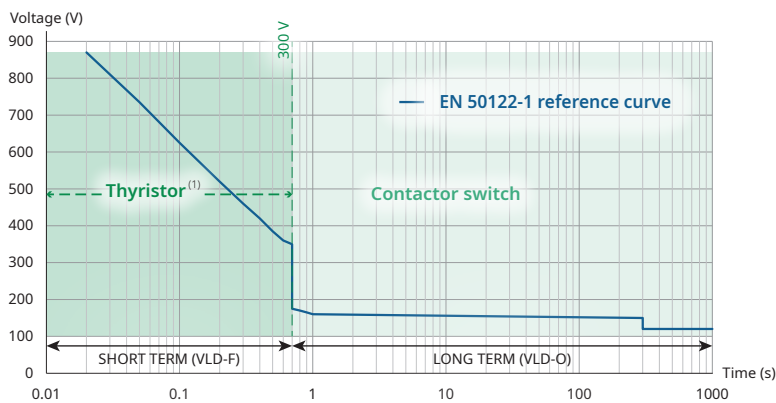
In normal operation, the origin of the overvoltage is the train traffic and to the fact that permanent equipotential bonding should not be provided because of the risks from damage to assets by stray current, as described in EN 50122-2 standard. The VGUARD monitors the voltage between the return circuit and earth and prevents that the voltage does not exceed the admissible values by short-circuiting both potentials temporarily and opening automatically in order to minimize stray currents.

VLD-F PROTECTION FUNCTION ⁽¹⁾

In case of contact fault (i.e. fall of a broken contact wire) between a live part of the traction supply and a conductive part not intentionally connected to the return circuit in the overhead contact line zone (OCLZ). The VGUARD protects against an impermissible voltage by becoming conductive and causing a short-circuit of the line which immediately triggers the release of the DC high-speed circuit breaker.

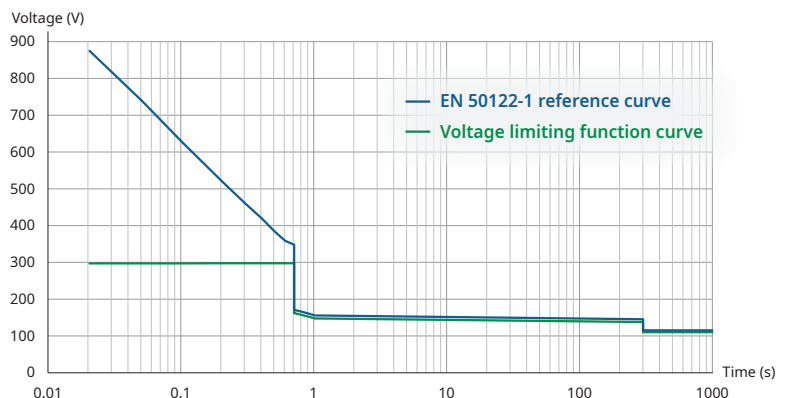
LIGHTNING PROTECTION OF INSTALLATION

It prevents equipment installed between negative and earth against overvoltage issued from lightning strikes/ overvoltages.



The combination of thyristors and switching contactor allows Sécheron's VGUARD-H to fulfil and cover the requirements of both protection function types: VLD-F and VLD-O.

The VGUARD integrates a new voltage limiting function which adapts automatically the maximum permissible time in function of the measured voltage, according to the admissible limits defined in Clause 9 of EN 50122-1 standard.



⁽¹⁾ Only applicable for VGUARD-H variant.

RELATED PRODUCTS

SCMS

STRAY CURRENT MONITORING SYSTEMS

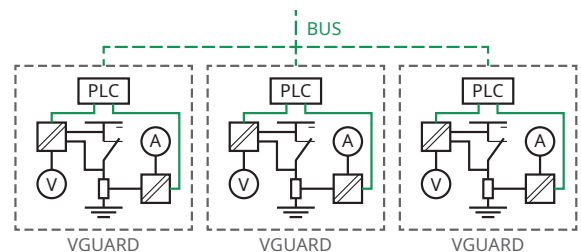
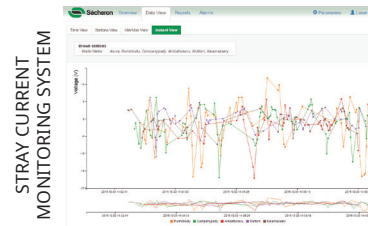
SCMS is a straightforward and efficient method of stray current monitoring avoiding manual repetitive measurement and any interference with the stray current collecting system.

The system measures continuously the rail-to-earth potential under operational conditions, complete with central analysis, visualization, signalling and archiving capacities.

Already compatible with SCMS, the VGUARD collects following measurement along the line and transmits data via possible communication protocol:

- Voltage between the return circuit and the earth structure through a high accuracy dedicated sensor
- Current flowing through the VGUARD.
- VGUARD status

Refer to **Brochure SCMS** · SG825868BEN



SEPCOS integrated in VGUARD

SEPCOS

CONTROL & PROTECTION RELAYS

Available communication options:

- IEC 60870-5-104 (-5-101)
- IEC 61850 Ed2 server/client level A, incl. GOOSE
- IEC 62439-3 PRP/HSR
- DNP 3.0 (Serial/Ethernet)
- Modbus-TCP

Refer to **Brochure SEPCOS** · SG825866BEN

SEPCOS PRISM

CONTROL & PROTECTION RELAYS

- Compact product
- Door mounting
- Increase space in the low-voltage compartment

Refer to **Brochure SEPCOS-PRISM** · SG847023BEN





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