

Vacuum Circuit Breakers

VCB15/25

Data sheet



Maintenance free

The switching module's robust design guarantees up to 50,000 rated current and 100 full rated short circuit CO operations with no maintenance required.



Continuous self-supervision

The whole trip and close circuit supervision come in a single package with any VCB. In the event of a malfunction, it will be indicated locally with LED and remotely via relay contacts.



Most compact dimension and weight

With a weight starting from 33 kg, Tavrída Electric's circuit breakers are the lightest in their class which significantly simplifies the installation process.



Any spatial orientation

Adjustment and mounting flexibility for the optimization of switchgear design, which allows to define how to make primary and secondary connections, saving even more space.



High operational speed

Opening and closing times as low as 12 ms and 24 ms respectively, enabling the implementation of fast transfer switching, arc flash mitigation or fault current limitation.



Single phase option

The perfect match for applications like transformers or generators with neutral earthing, server rooms and point on wave switching.

Tavrída Electric is a world-class manufacturer of medium voltage switchgear such as Vacuum Circuit Breakers & Automatic Circuit Reclosers. The VCB series circuit breaker is the result of extensive R&D efforts to provide outstanding performance for compact switchgear designs, retrofit programs, and special applications.

After 27 years on the market, the VCB series install base has reached 500,000 units worldwide continuing to resolve most ambitious customer problems.



Design and operation

- 1 Tavrída Electric manufactures compact vacuum interrupters with high interrupting performance and an extraordinarily long mechanical and electrical lifespan.
- 2 The patented design of the actuator allows it to be installed directly underneath each pole. The design is optimal in terms of reliability, dimensions, weight and ease of installation.
- 3 The use of robot welded steel discs as opposed to folded bellows eliminates the main failure point of conventional vacuum interrupter designs and maintains a high vacuum for its entire lifetime.
- 4 The actuator is not dependent on the auxiliary power supply quality. The actuator mechanism design enables both local and remote operation.
- 5 The energy for switching operations is stored in the CM16. This reduces the auxiliary power supply need to 1/10 of a conventional circuit breaker and enables significant savings on Substation UPS and auxiliary equipment.
- 6 Embedded intelligence - the CM's continuous self-supervision function monitors control switching modules, functional wiring and auxiliary power supply quality. In the event of a malfunction, a notification will be sent to the operator and indicated by inbuilt LEDs.



- 7 The CM can be conveniently installed at a distance from the circuit breaker and connected by means of flexible leads. It significantly simplifies the installation and allows the CM to be installed in the LV compartment.

Certificates

Tavrída Electric VCBs are designed and manufactured to strictly comply with the latest version of IEC 62271-100.

Each assembled VCB is subjected to routine testing in accordance with IEEE C37.60/IEC 62271-100 at the factory.

TYPE TESTS

- Dielectric tests
- Measurement of the resistance of the main circuit
- Temperature rise test
- Short-time withstand current and peak withstand current tests
- Extended mechanical operation tests
- Short-circuit current making and breaking tests
- Single and double earth fault tests
- Shortline fault tests
- EMC tests for control electronics
- Extended electrical endurance tests
- Capacitive currents switching tests

ROUTINE TESTS

- Visual check and functionality tests
- Dielectric withstand tests
- Measurement of the resistance of main circuit
- Mechanical operation tests

TEST REPORT

CESI

TEST REPORT APPROVED B202937

Client: AS Tavrída Electric Export
Address of the client: Visase 14, 11415 Tallinn - Estonia
Manufacturer: AS Tavrída Electric Export

Tested samples/items: Metal enclosed switchgear and controller 17.5M/1250A-31 S&A-50/60Hz type "S15_S&LE" fitted with a three-pole medium voltage vacuum circuit-breaker in withdrawable version type "VCB15_Shell2"

Tests carried out: Dielectric tests on main circuits:
 - Lightning impulse voltage tests (dry)
 - Power-frequency voltage tests (dry)
 Dielectric tests on auxiliary and control circuits

Standards/Specifications: IEC 62271-200 (2011-08)
 IEC 62271-1 (2011-08)

Tests date: from July 17, 2012 to August 1, 2012

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Prepared: PPR_Del Giorgio Carlo
Verified: PPR_Magistr Paolo, PPR_Capofiti Danilo
Approved: PM-The Manager - Arcidiaco Lorenzo

CESI S.p.A.
 Via Sallustiana, 31
 00100 Roma - Italy
 Tel: +39 06 512161
 Fax: +39 06 51216448
 e-mail: info@cesi.it

CESI S.p.A.
 Certificata secondo il C.I. 120/2008 (International Standard)
 C.F. e numero iscrizione Reg. Imprese di Milano: 06780880968
 P. I. 07094540968
 R. I. S.A. 420622

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Draw-out units



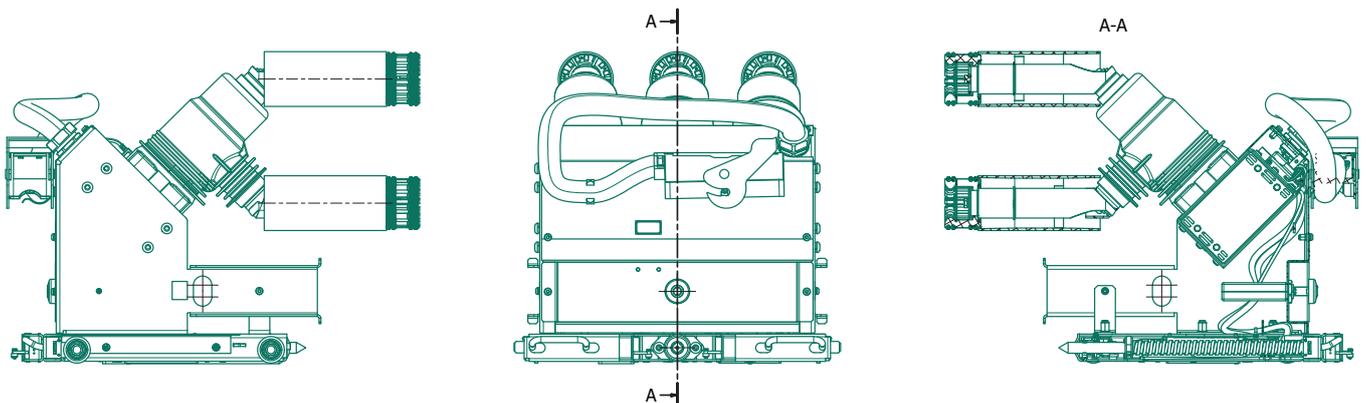
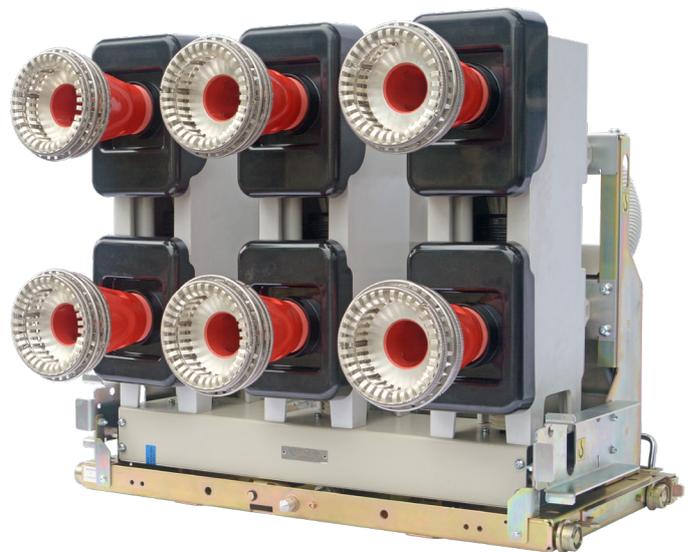
Tavrida Electric VCBs are also available in a withdrawable execution. Complete with the rack-in cassette, guide-arms, tulip contacts and misoperation protection interlocks, withdrawable Tavrida Electric VCBs are perfectly suited for newly designed and manufactured switchgear and retrofit projects.

Contrast Draw-out solution allows to create visible disconnection of bus bars from incomer feeder or outgoing feeder from bus bars that provides safety for service personnel.

VCB MD based draw-out unit can be closed without auxiliary power supply without the need of accessing high voltage compartment. To do this, switchgear operator shall connect a manual generator device included in a package to the control module in low-voltage compartment, manually charge the control module and close the circuit breaker.

The need for opening high voltage compartment doors and thus violating switchgear IAC classification is completely avoided when traditional draw-out breakers require that in case of auxiliary power supply loss, manual spring charging is performed in the high-voltage compartment, which subjects switchgear operators to significant injury or death risks.

Design of the draw-out unit allows visible air gap and closed shutters to be observed through switchgear inspection window when draw-out circuit breaker is in disconnected position to provide even more personnel safety.



Technical parameters of withdrawable type VCB

PARAMETER	VCB15_MD1_16D	VCB15_HD1_16D
Rated data		
Rated voltage (Ur)	≤ 17.5 kV	≤ 17.5 kV
Rated normal current (Ir)	≤ 1250 A	≤ 3150 A
Rated power frequency withstand voltage (Ud)	38 (42) kV*	38 (42) kV*
Rated lightning impulse withstand voltage (peak) (Up)	95 kV	95 kV
Rated short-circuit breaking current (Isc)	≤ 31.5 kA	≤ 31.5 kA
Rated peak withstand current (Ip)	≤ 82 kA	≤ 82 kA
Rated short-time withstand current (Ik)	≤ 31.5 kA	≤ 31.5 kA
Rated duration of short circuit (tk)		4 s
Rated frequency (fr)		50/60 Hz
Switching performance		
Mechanical life (CO-cycles)	30,000	30,000
Operating cycles, rated breaking current (CO-cycles)	50	50
Closing time	≤ 60 ms**	≤ 60 ms**
Opening time	≤ 35 ms**	≤ 35 ms**
Break time	≤ 45 ms**	≤ 45 ms**
Rated breaking current operating sequence		O-0.3s-CO-15s-CO
General information		
Overall dimensions H/W/D	516/535/674 mm	709/685/641 mm
Phase centre distance	150/210 mm	210/275 mm
Terminal centre distance	205 mm	310 mm
Lower terminal height	260 mm	280 mm
Resistance of main circuit	≤ 30 μOhm	≤ 20 μOhm
Weight	73-75 kg	128-130 kg
Weight of single phase ISM	-	-
Temperature range	-25°C ... +55 °C	-25°C ... +55 °C
Altitude above sea level		≤ 1000 m
Relative humidity in 24 hours		≤ 95 %
Relative humidity over 1 month		≤ 90 %
Degree of protection according to IEC 60529		IP 40
Type of driving mechanism		Monostable magnetic actuator
Number of available auxiliary contacts		6 NO + 6 NC

* Value in brackets - tested in accordance with GB1984-2003

** Special configuration available with opening times of 12 ms, closing times of 24 ms (29 ms for VCB15_HD circuit breakers) and breaking time of 22 ms.

Technical parameters of fixed type VCB

PARAMETER	VCB15_LD	VCB15_MD	VCB15_SHELL	VCB15_HD	VCB25_LD
Rated data					
Rated voltage (Ur)	≤ 12 kV	≤ 17.5 kV	≤ 17.5 kV	≤ 17.5 kV	≤ 24 kV
Rated normal current (Ir)	≤ 800 A	≤ 1250 A	≤ 2000 A	≤ 3150 A	≤ 800 A
Rated power frequency withstand voltage (Ud)	28 (42) kV*	38 (42) kV*	38 (42) kV*	38 (42) kV*	50 kV
Rated lightning impulse withstand voltage (peak) (Up)	75 kV	95 kV	95 kV	95 kV	125 kV
Rated short-circuit breaking current (Isc)	≤ 20 kA	≤ 31.5 kA	≤ 31.5 kA	≤ 31.5 kA	≤ 16 kA
Rated peak withstand current (Ip)	≤ 50 kA	≤ 82 kA	≤ 82 kA	≤ 82 kA	≤ 40 kA
Rated short-time withstand current (Ik)	≤ 20 kA	≤ 31.5 kA	≤ 31.5 kA	≤ 31.5 kA	≤ 16 kA
Rated duration of short circuit (tk)	4 s				
Rated frequency (fr)	50/60 Hz				
Switching performance					
Mechanical life (CO-cycles)	50,000	30,000	30,000	30,000	30,000
Operating cycles, rated breaking current (CO-cycles)	100	50	50	50	100
Closing time	≤ 70 ms	≤ 60 ms**	≤ 60 ms**	≤ 60 ms**	≤ 70 ms
Opening time	≤ 35 ms	≤ 35 ms**	≤ 35 ms**	≤ 35 ms**	≤ 35 ms
Break time	≤ 45 ms	≤ 45 ms**	≤ 45 ms**	≤ 45 ms**	≤ 45 ms
Rated breaking current operating sequence	O-0.3s-CO-15s-CO				
General information					
Overall dimensions H/W/D in mm	475/440/265	353.5/445/279	560/445/247	632/570/280	510/560/265
Resistance of main circuit	≤ 40 μOhm	≤ 17 μOhm	≤ 18 μOhm	≤ 15 μOhm	≤ 40 μOhm
Weight	34-36 kg	33-35 kg	51-55 kg	70-72 kg	35-38 kg
Weight of single phase ISM	13 kg	13 kg	-	-	14 kg
Temperature range	-25 °C ... +55 °C	-25 °C ... +55 °C	-25 °C ... +55 °C	-25 °C ... +55 °C	-25 °C ... +55 °C
Altitude above sea level	≤ 1000 m				
Relative humidity in 24 hours	≤ 95 %				
Relative humidity over 1 month	≤ 90 %				
Degree of protection according to IEC 60529	IP 40				
Type of driving mechanism	Monostable magnetic actuator				
Number of available auxiliary contacts	6 NO + 6 NC (2 NO + 2 NC for single-phase ISM)				
Control module					
Weight of CM	1 kg				
Overall dimensions of CM	190x165x45 mm				
Rated range of supply voltage of CM_16_1(x_60.1_x_x_x)	24V to 60V DC				
Rated range of supply voltage of CM_16_1(x_220.1_x_x_x)	110V to 220V AC/DC				
Operating range (80-120%) of CM_16_1(x_60.1_x_x_x)	19V to 72V DC				
Operating range (80-120%) of CM_16_1(x_220.1_x_x_x)	85V to 265V AC/DC				
Charging the close/trip capacitors of CM_16_1(x_60.1_x_x_x)	≤ 25 W				
Charging the close/trip capacitors of CM_16_1(x_220.1_x_x_x)	≤ 42 W AC / ≤ 37 W DC				
Standby power consumption of CM_16_1(x_60.1_x_x_x)	≤ 5 W				
Standby power consumption of CM_16_1(x_220.1_x_x_x)	≤ 7 W AC / ≤ 5 W DC				

* Value in brackets - tested in accordance with GB1984-2003

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Control module Electromagnetic Compatibility (EMC)

PARAMETER	APPLICABLE STANDARD	RATED VALUE
EMC parameters		
Electrostatic discharge	IEC 60255-26 IEC 61000-4-2	8 kV contact 15 kV air
Radiated EM field immunity	IEC 60255-26 IEC 61000-4-3	80 MHz – 3 GHz Sweep & spot AM 1 kHz 80% 10 V/m
Fast transient burst immunity	IEC 60255-26 IEC62271-1 IEC 61000-4-4	4 kV common mode
Surge immunity	IEC 60255-26 IEC 61000-4-5	4 kV common mode 2 kV differential mode
Conducted disturbance induced by radio frequency fields	IEC 60255-26 IEC 61000-4-6	150 kHz – 80 MHz AM 1 kHz 80% 10 V
Power frequency magnetic field	IEC 60255-26 IEC 61000-4-8	100 A/m continuously 1000 A/m 1 sec
Pulse magnetic field	IEC 61000-4-9	1000 A/m
100 kHz damped oscillatory magnetic field	IEC 61000-4-10	100 A/m
1 MHz damped oscillatory magnetic field	IEC 61000-4-10	100 A/m
AC voltage dips and interruptions	IEC 60255-26 IEC 61000-4-11	ΔU 30% 1 period ΔU 60% 50 periods ΔU 100% 5 periods ΔU 100% 50 periods
Power frequency disturbance voltage	IEC 60255-26 IEC 61000-4-16	300 V common mode 150 V differential mode
100 kHz and 1 MHz damped oscillatory wave immunity	IEC 60255-26 IEC 62271-1 IEC 61000-4-18	2.5 kV common mode 1 kV differential mode
Ripple on DC power supply	IEC 60255-26 IEC 61000-4-27	10% of supply voltage, 100 Hz
DC voltage dips and interruptions	IEC 60255-26 IEC 62271-100 IEC 61000-4-29	ΔU 30% 2 sec ΔU 60% 2 sec ΔU 100% 0,3 sec $\pm 20\%$ 10 sec

EUROPE

Tavrída Electric GmbH
 Im Leimen 14, 88069
 Tettnang, Germany
 Phone: +49 7542 94 678 51
 E-mail: info@tavrída.de

BRAZIL

Tavrída Electric do Brasil
 Av. Ireno da Silva Venâncio, 199
 GP04A - Protestantes
 18111-100, Votorantim / SP, Brazil
 Phone: +55 (15) 3243-2555
 E-Mail: info@tavrída.com.br

NORTH AMERICA

Tavrída Electric North America Inc.
 1105 Cliveden Ave.
 Delta, BC V3M 6G9 Canada
 Phone: +1 (866) 551-8362
 E-Mail: info@tavrída-na.com

SOUTH AMERICA

Tavrída Electric Argentina
 Av. Hipólito Yrigoyen 9183/5, 9 piso dpto.
 B. Lomas de Zamora,
 1832, Provincia de Buenos Aires, Argentina
 Phone: +54 (11) 4243-9373
 E-Mail: info@tavrída.com.ar

SOUTH AFRICA

Tavrída Electric Africa (Pty) Ltd.
 Unit 8, N12 Industrial Park,
 188 Dr Vosloo Road, Bartlett,
 Boksburg, 1459 South Africa
 Phone: +27 (11) 9142-199
 E-Mail: support@tavrída.co.za

REST OF THE WORLD

Tavrída Electric AG.
 Bahnhofstrasse 27, 6300
 Zug, Switzerland
 Phone: + 49 7542 9467851
 E-mail: TES_SM@tavrída.ch