

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.

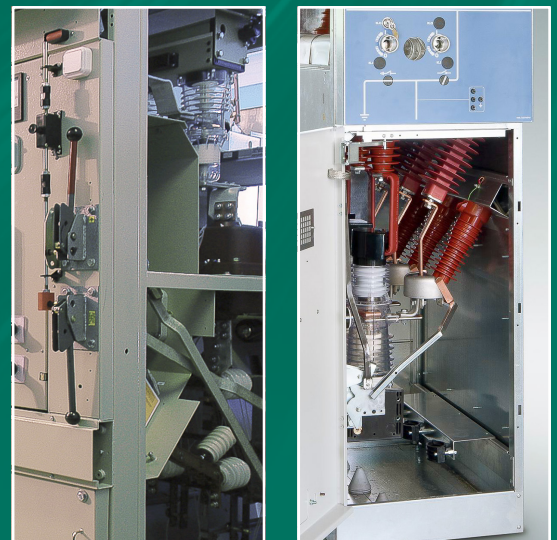


Single phase option

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

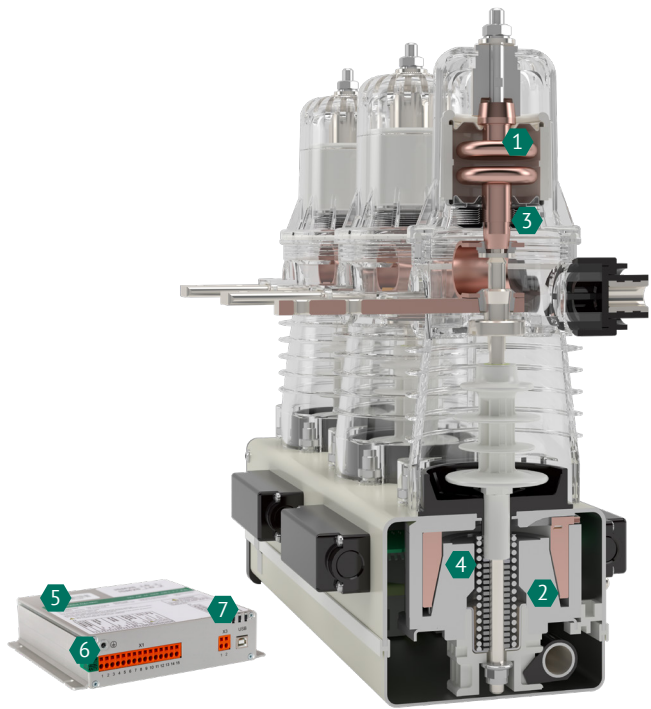
Tavrída Electric is a world-class manufacturer of medium voltage switchgear such as Vacuum Circuit Breakers & Automatic Circuit Reclosers. The VCB series circuit breaker is the result of extensive R&D efforts to provide outstanding performance for compact switchgear designs, retrofit programs, and special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

After 30 years on the market, the VCB series install base has reached 600,000 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

KEMA

CESI

TEST REPORT

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

Tested samples/items: Metal enclosed switchgear and controller 17.5M/1250A-31 S&A-50/50Hz type "5015_MILE" 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 (2011-10) IEC 62271-1 (2011-08)

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

The results reported in this document relate only to the tested sample(s). Partial reproduction of this document is permitted only with the written permission from CESI.

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Prepared: PPR_Del Giorgio Carlo

Verified: PPR - Magistis Paolo, PPR - Cignoffi Danilo

Approved: PM - The Manager - Arcidiacono Lorenzo

CESI S.p.A. Testing & Certification Division "Testing Operations Area" Via Pavesi 15, 20139 Milano, Italy Tel: +39 02 21274444 Fax: +39 02 21274449 e-mail: info@cesi.it

Technical Parameters of Fixed Type VCB

PARAMETER	VCB15							VCB25				
	LD_1	LD_3	LD_1	LD_8	MD1	MD3	SHELL2	HD1	LD1	LD3	SHELL2	
Rated Data												
Rated voltage (Ur), kV	12	17.5	17.5	17.5	17.5	17.5	17.5	24	24			
Rated normal current (Ir), A	800			1250	1250 ¹⁾ 2000	2500 ²⁾	3150	800	2500			
Rated power frequency withstand voltage (Ud), kV	28 (42) ³⁾	38 (42) ³⁾		38 (42) ³⁾	38 (42) ³⁾	38 (42) ³⁾		50	50			
Rated lightning impulse withstand voltage (peak) (Up), kV	75	95		95 ⁴⁾	95 ⁵⁾	95		125	125			
Rated short-circuit breaking current (Isc), kA	20 ⁶⁾		25 ⁷⁾	31.5 ⁶⁾	31.5 ⁶⁾	31.5 ⁶⁾		20 ⁶⁾	25 ⁶⁾			
Rated peak withstand current (Ip), kA	52		65	82	82	82		50	65			
Rated short-time withstand current (Ik), kA	20		25	31.5	31.5	31.5		20	25			
Rated duration of short circuit (tk)	4 s							3 s	4 s			
Rated frequency (fr)	50/60 Hz											
Switching Performance												
Mechanical life (CO-cycles)	50,000			30,000	50,000	30,000						
Operating cycles, rated short-circuit breaking current	100			50					25			
Closing time	≤ 70 ms ⁸⁾			≤ 60 ms ⁸⁾								
Opening time	≤ 35 ms ⁸⁾											
Break time	≤ 45 ms ⁸⁾											
Rated short-circuit breaking current operating sequence	O-0.3s-CO-15s-CO											
General Information												
	LD_1	LD_3	LD_1	LD_8	MD1	MD3	SHELL2	HD1	LD1	LD3	SHELL2	
Phase centre distance, mm	150 180 210	-	180 210	150 210	150 180 210 275	-	150 210 275	210 275	275	210 275	-	210 275
Resistance of main circuit, μOhm	≤ 40			≤ 17		≤ 18		≤ 15		≤ 40		≤ 17
Weight, kg	34-36	13	34-36	25-26	33-35	13	51-55	70-72	35-38	14	53-55	
Maximum length, L _{min} , mm	265	265	265	283.5	279	274.9	247	280	265	265	278	
Maximum length, L _{max} , mm	300	265	300	283 ¹⁾	279	274.9	343 ⁹⁾	280	265	265	383 ⁹⁾	
Minimum width, W _{min} , mm	440	318	440	440	445	182	445	570	560	318	565	
Maximum width, W _{max} , mm	560	318	560	560	565	182	695	700	690	318	695	
Minimum height, H _{min} , mm	475	474	475	426	353.5	353.5	560	632	510	510	591	
Maximum height, H _{max} , mm	475	474	475	426	353.5	353.5	560	632	549 ⁹⁾		591	
Temperature range	-25 °C ... +55 °C											
Altitude above sea level	≤ 1000 m ¹⁰⁾											
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)											

1) For VCB ISM15_Shell with Low upper terminal – up to 1250 A, with High upper terminal – up to 2000 A.

2) Rating for metal enclosed switchgear with limited ventilation. Temperature rise type test at 2500 A in Cradle was successfully passed in KEMA.

3) The information in brackets refers to the national Chinese standards GB1984-2003 at an installation altitude of 1000 m maximum.

4) Parameter valid only when ISM is used with insulation kit. For details see dimensional drawings and accessory information.

5) Parameter valid only when ISM is used with insulation caps. For details see dimensional drawings and accessory information.

6) At 40% DC component.

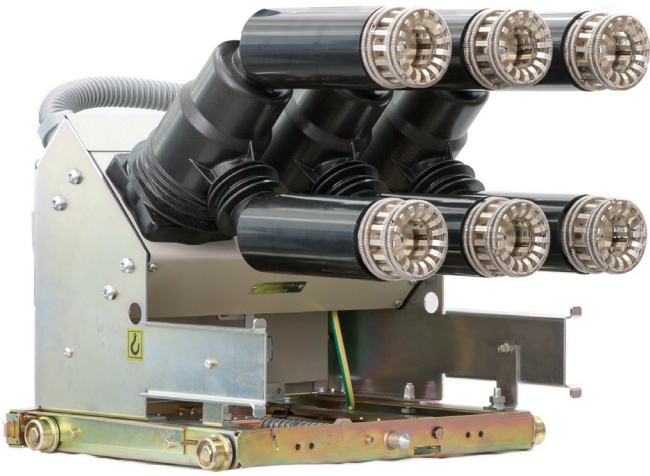
7) At 34% DC component.

8) Smaller timing on request.

9) Maximum value with CBkit_Shell15_1(Par1) for VCB15_Shell2 or CBkit_Ins_3 for VCB25_LD1 or CBkit_Shell25_1 for VCB25_Shell2. Not included in the delivery package.

10) Up to an installation altitude of 1000 m above sea level. Above 1000m, the external insulation measurement of the ISM must be increased by the atmospheric correction factor Ka according to IEC 62271-1 compared to the insulation measurement at sea level. The maximum allowed altitude is 2000 m above sea level.

Draw-Out Units



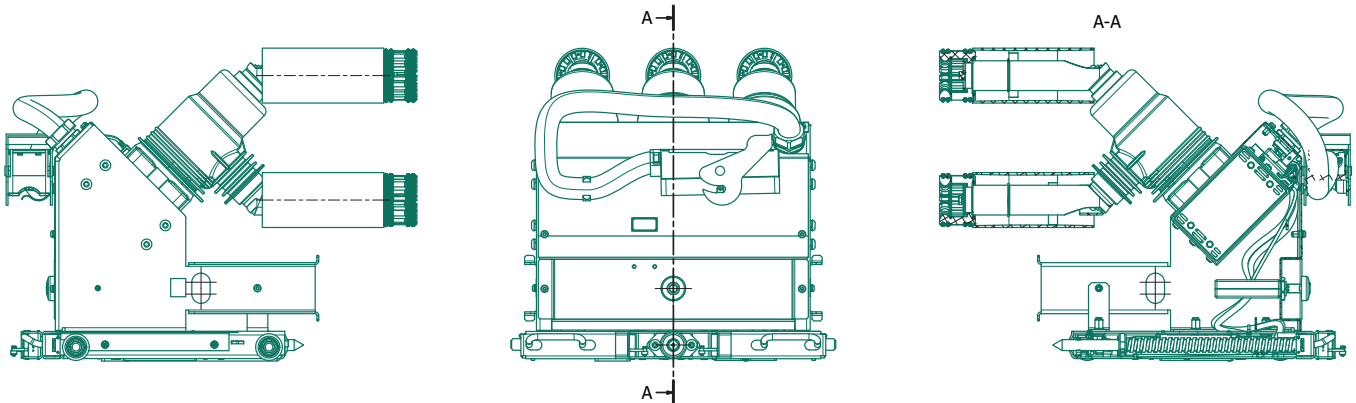
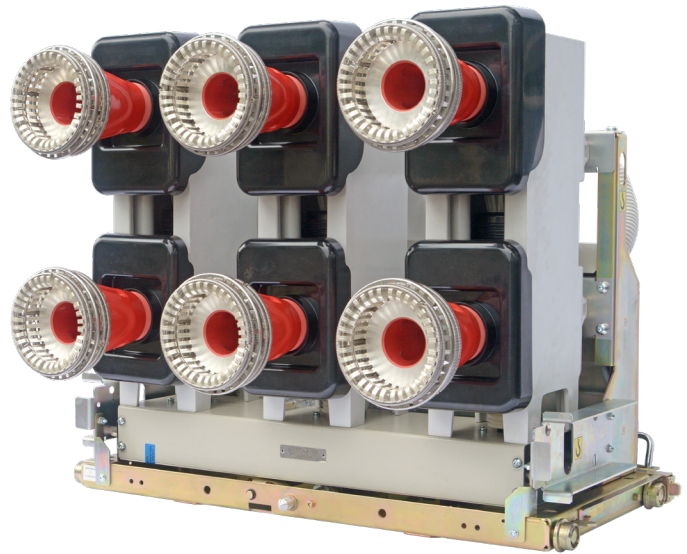
Tavrída Electric VCBs are also available in a withdrawable execution. Complete with the rack-in cassette, guide-arms, tulip contacts and misoperation protection interlocks, withdrawable Tavrída Electric VCBs are perfectly suited for newly designed and manufactured switchgear and retrofit projects.

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.

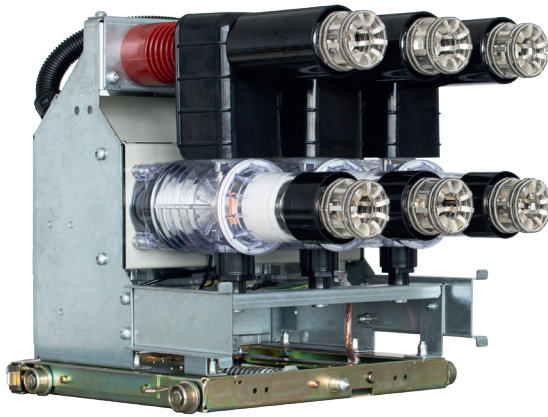
The need for opening high voltage compartment doors and thus violating switchgear IAC classification is completely avoided when traditional draw-out breakers require that in case of auxiliary power supply loss, manual spring charging is performed in the high-voltage compartment, which subjects switchgear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

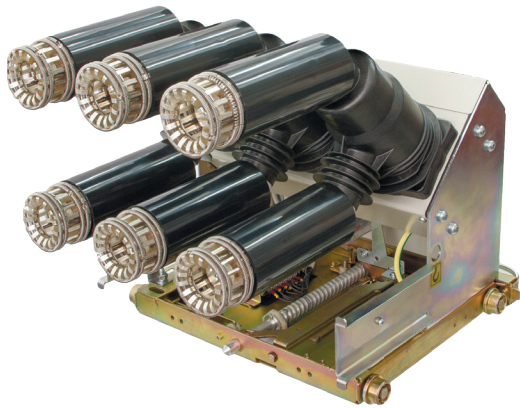


Design Draw-Out Units

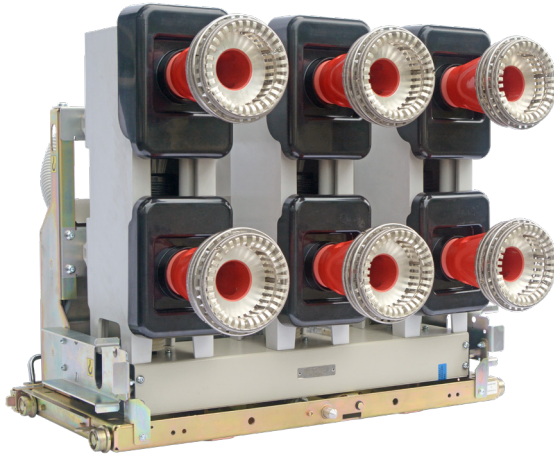
VCB15_LD8_16D



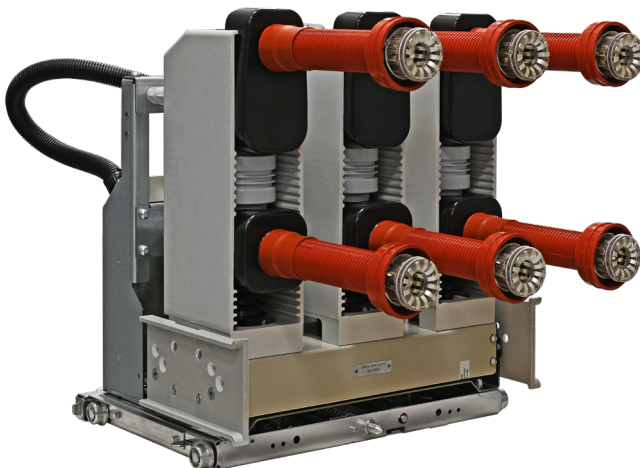
VCB15_MD1_16D



VCB15_HD1_16D



VCB25_SHELL2_16D



Technical Parameters of Withdrawable Type VCB

PARAMETER	VCB15				VCB25			
	LD8_16D	MD1_16D	HD1_16D		SHELL2_16D			
Rated Data								
Rated voltage (Ur)	17.5 kV	17.5 kV	17.5 kV		24 kV			
Rated normal current (Ir)	800 A	1250 A	2500 A ³⁾	3150 A	630 A 1250 A	2500 A		
Rated power frequency withstand voltage (Ud)	38 (42) kV ²⁾	38 (42) kV ²⁾	38 (42) kV ²⁾		50 (60) kV ²⁾			
Rated lightning impulse withstand voltage (peak) (Up)	95 kV	95 kV	95 kV		125 kV			
Rated short-circuit breaking current (Isc)	25 kA ³⁾	31.5 kA ⁴⁾	31.5 kA ⁴⁾		25 kA ³⁾			
Rated peak withstand current (Ip)	65 kA	82 kA	82 kA		65 kA			
Rated short-time withstand current (Ik)	25 kA	31.5 kA	31.5 kA		25 kA			
Rated duration of short circuit (tk)	4 s							
Rated frequency (fr)	50/60 Hz							
Switching Performance								
Mechanical life (CO-cycles)	30,000							
Operating cycles, rated short-circuit breaking current	50							
Closing time	≤ 60 ms ⁵⁾							
Opening time	≤ 35 ms ⁵⁾							
Break time	≤ 45 ms ⁵⁾							
Rated short-circuit breaking current operating sequence	O-0.3s-CO-15s-CO							
General Information								
Phase centre distance, mm	150	210	150	210	210/275	275	210/275	275
Terminal centre distance, mm	205		205		310		310	
Lower terminal height, mm	260		260		280		325	345
Resistance of main circuit, μOhm	≤ 55		≤ 31		≤ 25	≤ 20	≤ 35 ⁶⁾	≤ 22
Weight	70-81 kg		72-88 kg		128-165 kg		101-190 kg	
Weight of single phase ISM	-		-		-		-	
Temperature range	-25°C ... +55°C							
Altitude above sea level	≤ 1000 m ⁷⁾							
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 of ISM	6 NO + 6 NC							
Number of available auxiliary contacts of DOU	5 NO + 5 NC							
Overall Dimensions								
Minimum and maximum length, L _{min} /L _{max} , mm	677/687		677		656.5		803.5/813.5	
Minimum and maximum width, W _{min} /W _{max} , mm	535/682		535/682		682/882		682/882	
Minimum and maximum height, H _{min} /H _{max} ⁸⁾ , mm	528/633		515/630		704/742		692/817	

1) The rating depends on the metal-enclosed switchgear ventilation. Temperature rise type test at 2500 A in Cradle was successfully passed in KEMA.

2) The information in brackets refers to the national Chinese standards GB1984-2003 at an installation altitude of 1000 m maximum.

3) At 34% DC component.

4) At 40% DC component.

5) Smaller timing on request.

6) ≤ 35 μOhm (for Ir 630 A); ≤ 30 μOhm (for Ir 1250 A).

7) Up to an installation altitude of 1000 m above sea level. Above 1000m, the external insulation measurement of the ISM must be increased by the atmospheric correction factor Ka according to IEC 62271-1 compared to the insulation measurement at sea level. The maximum allowed altitude is 2000 m above sea level.

8) Maximum size with IP2X front cover.

Control Module Technical Parameters

PARAMETER	VALUE
CM Reaction Times	
Preparation time for the operation of the CM after switching on the auxiliary power supply	≤ 15 s
Preparation time for the close operation of the CM after a previous close operation	≤ 10 s
Preparation time for the trip operation of the CM after switching on the auxiliary power supply	≤ 0.1 s
Trip capability after failure of the auxiliary power supply	≥ 60 s ¹⁾
CM Supply Voltage	
Rated range of supply voltage of CM_16_1(Par1_60.2_Par2Par3_Par4_Par5) ⁴⁾	24 V to 60 V DC
Rated range of supply voltage of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾	110 V to 220 V AC/DC
Operating range (80-120%) of CM_16_1(Par1_60.2_Par3_Par4_Par5) ⁴⁾	19 V to 72 V DC
Operating range (80-120%) of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾	85 V to 265 V AC/DC
Power Consumption of CM	
Charging the close and trip capacitors of CM_16_1(Par1_60.2_Par3_Par4_Par5) ⁴⁾	≤ 25 W
Charging the close and trip capacitors of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾	≤ 42 W AC ²⁾ ≤ 37 W DC
Permanent power consumption (standby) of CM_16_1(Par1_60.2_Par3_Par4_Par5) ⁴⁾	≤ 5 W
Permanent power consumption (standby) of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾	≤ 7 W AC ³⁾ ≤ 5 W DC
Inrush current of CM_16_1(Par1_60.2_Par3_Par4_Par5) ⁴⁾ with discharged capacitors	≤ 120 A
Inrush current of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾ with discharged capacitors	≤ 18 A
Inrush time constant of CM_16_1(Par1_60.2_Par3_Par4_Par5) ⁴⁾ with discharged capacitors	≤ 0.5 ms
Inrush time constant of CM_16_1(Par1_220.2_Par3_Par4_Par5) ⁴⁾ with discharged capacitors	≤ 4 ms
Design, Switching Capacity of CM Inbuilt Relays	
Number of relays in CM	3
Number of available contacts for one relay	1 NO + 1 NC with common point
Rated voltage	240 V
Rated current AC	16 A
Maximum breaking power AC	4000 VA
Maximum switching current 250V DC	0.35 A
Maximum switching current 125V DC	0.45 A
Maximum switching current 48V DC	1.3 A
Maximum switching current 24V DC	12 A
Switching time	5 ms
“Close” and “Trip” Dry Contacts Inputs of CM	
Output voltage	≥ 30 V
Contacts closed current	≥ 50 mA
Steady state current	≥ 5 mA
General Information	
Weight of CM	1 kg
Overall dimensions of CM (LxWxH)	165x190x45 mm

1) In case of Dry contacts “Close” and “Trip” are open.

2) At Cos j > 0.66.

3) At Cos j > 0.33.

4) More information on request.

Control Module Electromagnetic Compatibility (EMC)

PARAMETER	APPLICABLE STANDARD	RATED VALUE
Electromagnetic Compatibility (EMC) Requirements ¹⁾		
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 ²⁾
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 ± 20 % 10 sec

1) Cable from electronic relay to connector block should be shielded and the case grounded near the connector. The total length of unshielded wires from connector block to CM WAGO connector should not exceed 200 mm. Electromagnetic compatibility requirements are not applicable for the CM USB port as this port is used only for CM programming during production and not used under service conditions.

2) Test influence is not applicable for CM "Close" and "Trip" dry contacts.

EUROPE

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

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

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

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

REST OF THE WORLD

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