



# TECHNICAL MANUAL

## MOLDED CASE

## CIRCUIT BREAKERS

## VA-99C EKF

## 1 DESCRIPTION

Molded case circuit breakers VA-99C EKF are designed for infrequent routine close/open operations and overload/short-circuit protection to be used in electrical installations at rated operating voltage up to 690V AC and 50/60 Hz under currents from 12,5 to 1600A.

Molded case circuit breakers (MCCB) comply with the requirements of IEC 60947-2:2016 and are used for protection of distribution networks.

## 2 TECHNICAL DATA

### TYPE CODE

#### VA-99C/XXX XXXA XP

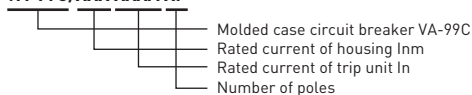


Table 1 Technical data

Characteristics	Value						
	VA-99C/100	VA-99C/160	VA-99C 250	VA-99C/400	VA-99C/630	VA-99C/1250	
Rated operating voltage $U_e$ , V	400/415/690						
Rated insulation voltage $U_i$ , V	800			1000			
Rated pulse voltage $U_{imp}$ , kV	8						
Service short-circuit breaking capacity $I_{cs}$ , kA	400/415V AC	35	35	45	45	45	50
	690V AC	8	8	8	10	10	20
Ultimate short-circuit breaking capacity $I_{cu}$ , kA	400/415V AC	35	35	45	45	45	50
	690V AC	8	8	8	10	10	20
Min. mechanical endurance, O-C cycles	without maintenance	20000	20000	20000	10000	10000	10000
Electrical endurance, O-C cycles	400/415V AC	10000	8000	8000	6000	5000	1500
	690V AC	1500	1500	1500	1000	1000	1000
Rated max. short-circuit current $I_{cm}$ , kA	2,1x $I_{cu}$						

Characteristics	Value					
	VA-99C/100	VA-99C/160	VA-99C 250	VA-99C/400	VA-99C/630	VA-99C/1250
Utilization category	A					B
Trip unit	TM <sup>1</sup> configurable (I <sub>r</sub> )	TM configurable (I <sub>r</sub> )	TM configurable (I <sub>r</sub> , I <sub>m</sub> )	Microprocessor	Microprocessor	Microprocessor
Rated current of trip unit I <sub>n</sub> , A	12,5; 16; 20; 25; 32; 40; 50; 63; 80; 100	16; 20; 25; 32; 40; 50; 63; 80; 100; 125; 160	125; 160; 200; 225; 250	200; 225; 250; 300; 315; 400	315; 400; 500; 630	800; 1000; 1250; 1600
Number of poles	3P/4P (on order)					
Power consumption, W	25	40	50	70	100	165
Degree of protection	IP30					
Operating temperature, °C	From -25 to +55			From -5 to +55		
Altitude above sea level, m	2000					
Weight, kg	1,7	1,7	1,8	5,8	5,9	13,8
Min. service life, years	10					

### <sup>1</sup> Thermomagnetic

#### TRIPPING CHARACTERISTICS

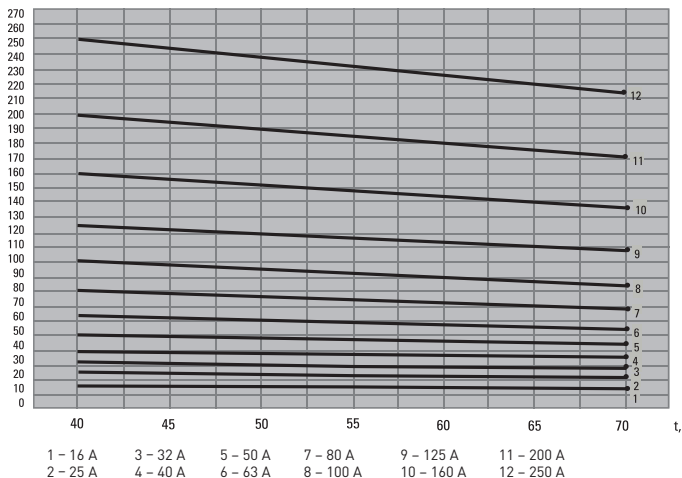
##### Ambient temperature derating factor

For thermomagnetic trip units, set temperature is 40 °C. If ambient temperature exceeds 40°C, overload protection characteristics slightly change. To define the tripping time by characteristics, use the thermal protection setpoint I<sub>r</sub> indicated on the MCCB, compensated for the ambient temperature.

Electronic trip units are not sensitive to temperature variations. However, the current limit value of the circuit-breaker depends on the ambient temperature.

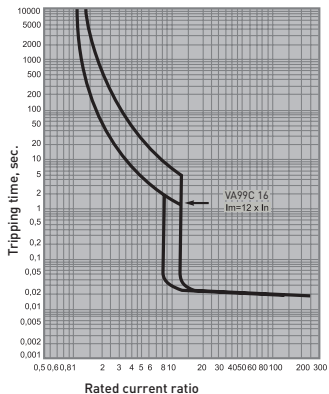
## TEMPERATURE FACTOR

Current, A

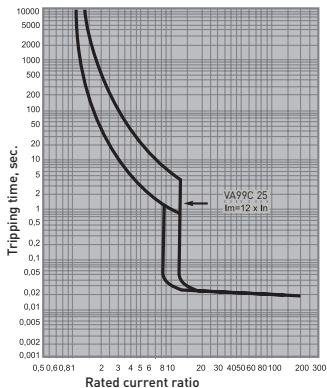


## VA-99C TRIPPING CURVES

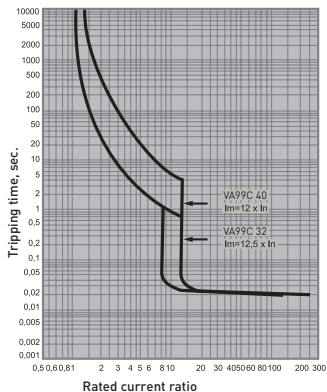
VA-99C/16



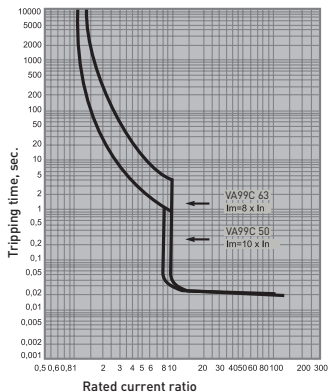
VA-99C/25



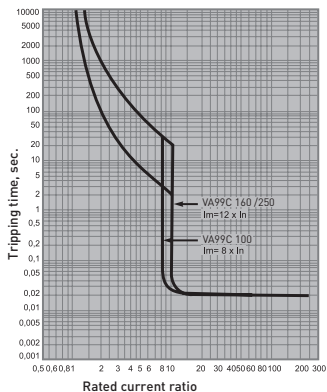
VA-99C/40



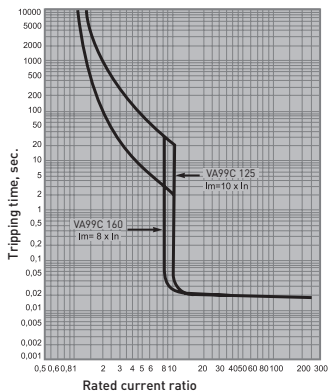
VA-99C/63



VA-99C/100

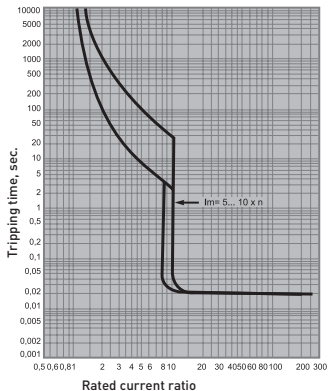


VA-99C/160

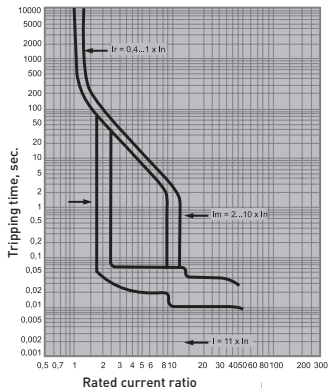


## VA-99C with electronic trip unit tripping curves

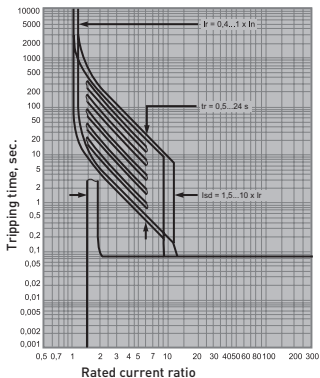
### VA-99C/250



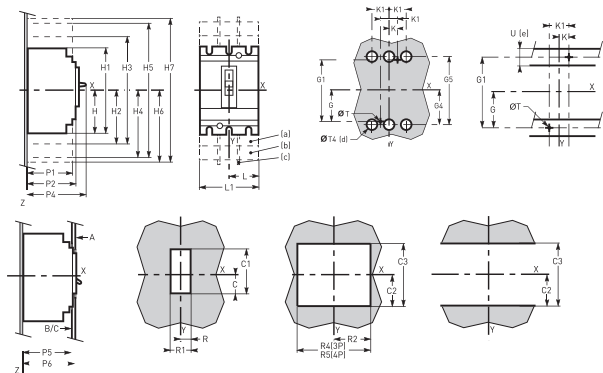
### VA-99C/400 – BA-99C/630



### VA-99C 1250 tripping curves



### 3 OVERALL AND INSTALLATION DIMENSIONS

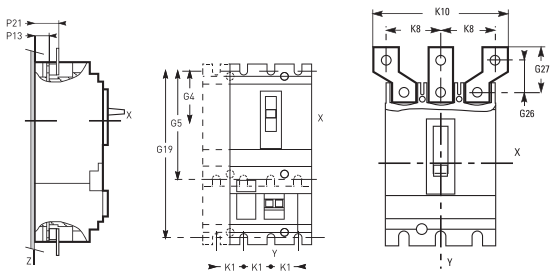


Name	C	C1	C2	C3	C6	C7	C20	C21	G	G1	G4	G5	H	H1
VA-99C/100/160/250	29	76	54	108	43	104	34	86	62,5	125	70	140	80,5	161
VA-99C/400/630	41,5	116	92,5	184	53	146	46,5	126	100	200	113,5	227	127,5	255

Name	H2	H3	H4	H5	H6	H7	K	K1	L	L1	L2	P1	P2	P4
VA-99C/100/160/250	94	188	160,5	321	178,5	357	17,5	35	52,5	105	140	81	86	111
VA-99C/400/630	142,5	285	240	480	237	474	22,5	45	70	140	185	95,5	110	168

Name	P5	P6	R	R1	R2	R4	R5	R6	R7	R12	R13	T	T4	H1
VA-99C/100/160/250	83	88	14,5	29	54	108	143	29	58	43	86	6	22	€32
VA-99C/400/630	83	88	31,5	63	71,5	143	188	46,5	93	63	126	6	32	€32

## Connection sizes

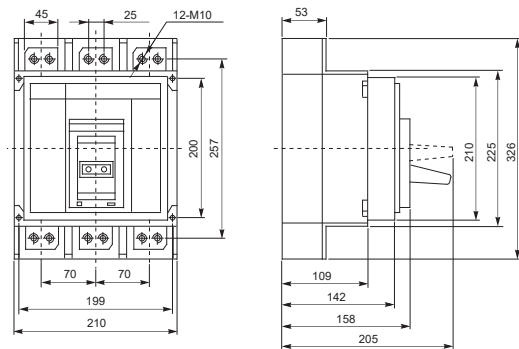


Name	C11	C13	C16	C17	C22	C23	G26	G27	H20	H21	H22	H23	K8	K10
VA-99C/100/160/250	54	108	143	29	58	43	30	41	86	6	22	32	45	114
VA-99C/400/630	71,5	143	188	46,5	93	63	39	54	126	6	32	32	52,5	135

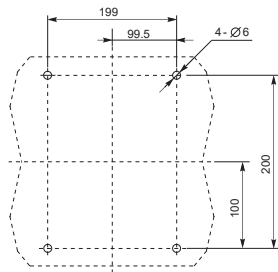
Name	L	L1	L2	L11	L12	P13	P21	P32	P33	P45	R8	R9	R14	R15	R33	R34
VA-99C/100/160/250	52,5	105	140	91	45,5	19,5*	44	178	143	145	74	148	48,5	97	74	148
VA-99C/400/630	70	140	185	123	61,5	26	44	250	215	217	90	180	64,5	129	74	148

\* P13 = 21,5 mm for VA-99C/250.

## Overall and installation dimensions of VA-99C 1250







## 4 DELIVERY SCOPE

Molded case circuit breakers VA-99C EKF are supplied in an individual package. For all available documentation, scan the QR-code on the insert or on the inside of the package.

## 5 INSTALLATION AND OPERATION

### 5.1 Storage and operation

**WARNING!** Test accessories only with the front panel securely fastened.

The MCCBs have been tested for electromagnetic compatibility and do not interfere with other electronic equipment. For MCCBs with microprocessor units, their operation is protected even for switching disturbances and surge overvoltages.

Copper and aluminum wire connections are supported. Do not connect copper and aluminum wires to one terminal concurrently.

Degree of ingress protection (according to IEC 60529:2013):

- IP30 - for MCCB housing;
- IP00 - for outer wires.

The MCCB VA-99C shall be stored in the original package at the temperature between  $-60$  and  $+85$  °C.

By protection method against electric shock, molded case circuit breakers belong to protection class "0" according to IEC 61140.

Installation up to 2000 m above sea level has no effect on the MCCB performance. When installed at the altitude above 2000 meters, consider the derating in dielectric strength and air cooling behavior.

For influence of the ambient temperature, refer to the table below.

VA-99C/100/160/250 with thermomagnetic trip unit

Altitude above sea level, m	2000	3000	4000	5000
Insulation dielectric strength, V	3000	2500	2100	1800
Rated insulation voltage, V	750	700	600	500
Maximum operating voltage, V	690	550	480	420
Average thermal resistance current at 40 °C, A	1 x In	0,96 x In	0,93 x In	0,9 x In

## 5.2. TRIP UNIT OPERATION

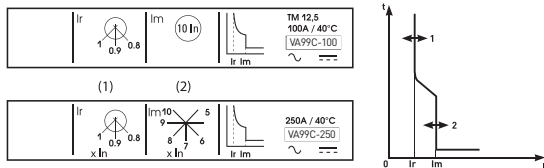
### 5.2.1 Thermomagnetic trip unit (TM) implements:

- Overload protection:

Configurable current setpoint  $I_r = (0,8 - 1,0) I_n$ .

- Short-circuit current protection:

Configurable current setpoint  $I_m = (5 - 10) I_n$  (for VA-99C250).

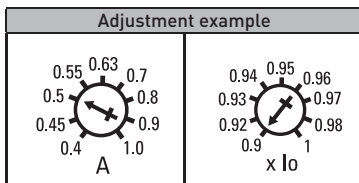


### 5.2.2 Electronic trip unit implements:

- Overload protection with adjustable current setpoint and constant time setpoint: for VA-99C/400-630:

- gross adjustment  $I_o = (0,4 - 1,0) I_n$  (9 positions)
- fine adjustment  $I_r = (0,9 - 1,0) I_o$  (9 positions)
- short-circuit current protection (9 positions).

Selective adjustable current setpoint  $I_{sd} = (1,5 - 10) I_r$ .

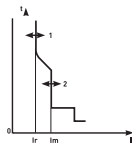
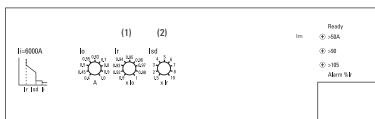


Trip unit setpoint for VA-99C 400A at  $I_o = 0,5$  and  $I_r = 0,9$  is as follows:

$$400 \times 0,5 \times 0,9 = 180 \text{ A.}$$

Trip unit setpoint for VA-99C 630A at the same  $I_o$  and  $I_r$  is as follows:

$$630 \times 0,5 \times 0,9 = 283,5 \text{ A}$$

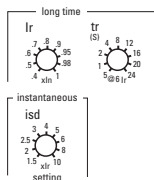


For VA-99C/1250:

$I_r$  – overload tripping setpoint adjustment  $I_r = [0,4 - 1,0] I_n$   
(9 positions)

$t_r$  – overload current tripping delay time  $t_r = (0,5 - 24)$  sec.  
(9 positions)

$I_{sd}$  – short-circuit current setpoint adjustment  $I_{sd} = [1,5 - 10] \times I_r$   
(9 positions).



#### ADDITIONAL FUNCTIONS

Front panel LED for voltage indication:

- steady ON: 90% of  $I_r$  setpoint
- flashing: over 105% of  $I_r$  setpoint

#### 5.3. SELECTIVITY CHART (UP TO 630A)

Inputs	In	VA-99C/250					VA-99C/400					VA-99C/630			
		160	180	200	225	250	200	225	250	315	400	200	225	250	300
VA-99C/100	12,5-100	•	•	•	•	•	•	•	•	•	•	•	•	•	•
VA-99C/160	16-160			•	•	•	•	•	•	•	•	•	•	•	•
VA-99C/250	160-250									•	•	•	•	•	•
VA-99C/400	200-400												•	•	•

#### 5.4. ENCLOSURE INSTALLATION

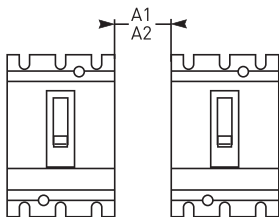
Keep the minimum clearances (safety distance) between the circuit-breaker and panels, busbars or other protective devices installed nearby for the MCCB installation. The safety radius depends on the MCCB ultimate breaking capacity and is measured by tests pursuant to IEC 60947-2.

If the electrical installation is not subject to type testing:

- connect the circuit breaker using insulated busbars;
- insulate busbars with screens.

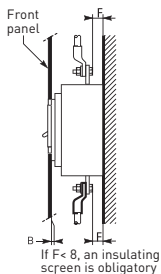
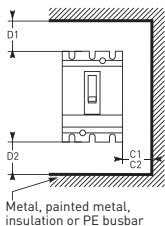
Either recommended or mandatory use of terminal covers, pole dividers or insulating kits depends on the operating voltage and type of the MCCB.

MIN. DISTANCE BETWEEN ADJACENT MCCBs:



Min.distance between MCCB and top/  
bottom/side panel.

Min. distance between MCCB and  
front/rear panel.



Dimensions, mm	Insulation, insulated busbars or painted metal sheet				Unpainted metal sheet					
		C1	D1	D2	C2	D1	D2	A1 <sup>[2]</sup>	A2 <sup>[3]</sup>	B
VA-99C/100/250	U < 440 V	0	30	30	5	35	35	0	10	0
	U < 600 V	0	30	30	10 <sup>[1]</sup>	35	35	0	20	0
	U > 600 V	0	30	30	20 <sup>[1]</sup>	35	35	0	40	0
VA-99C/400/630	U < 440 V	0	30	30	5	60	60	0	10	0
	U < 600 V	0	30	30	10 <sup>[1]</sup>	60	60	0	20	0
	U > 600 V	0	30	30	20 <sup>[1]</sup>	100	100	0	40	0

<sup>1</sup> For MCCB with short/long screw shields.



<sup>2</sup> For MCCB with short/long screw shields.

<sup>3</sup> For MCCB without screw shields.




The minimum distances for VA-99C are relative to the MCCB housing; screw shields and pole dividers are not included.

## 5.5. CONNECTION

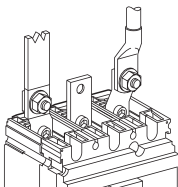
### Wiring diagrams

Thermomagnetic trip unit	Microprocessor trip unit
	

### Connections

Power busbar	Outer wire (ordered separately)	Wire with JG-type lug
		

Output terminals of MCCB VA-99C/100-630A are terminated with snapped nuts and clamp screws (VA-99C/100-250A: M8, VA-99C/400-630A: M10) to connect insulated busbars and terminated cables directly to the MCCB. Extra contact plates enable all connection types.



## 6 ACCESSORIES

Molded case circuit breakers VA-99C EKF can be complemented with various accessories:

- Connection plates
- Shunt release MX
- Undervoltage release MN
- Auxiliary contact OF/SD
- Motor mechanism CD/2.


Accessories are not included in the VA-99C delivery scope and shall be ordered separately. Install the releases and contacts in the housing slots behind the front panel.

The releases and contacts are universal and compatible with most MCCBs. (except VA-99C 1250).

### Accessories - MCCB compatibility

Housing design	Accessories
VA-99C/100A	Auxiliary contacts 100-630A Shunt release MX 100-630A Undervoltage release MN 100-630A Connection plates 100-160A (6pcs.) Motor mechanism VA-99C CD/2-250
VA-99C/160A	Auxiliary contacts 100-630A Shunt release MX 100-630A Undervoltage release MN 100-630A Connection plates 100-160A (6pcs.) Motor mechanism VA-99C CD/2-250
VA-99C/250A	Auxiliary contacts 100-630A Shunt release MX 100-630A Undervoltage release MN 100-630A Connection plates 250A (6 pcs.) Motor mechanism VA-99C CD/2-250
VA-99C/400A	Auxiliary contacts 100-630A Shunt release MX 100-630A Undervoltage release MN 100-630A Connection plates 400-630A (6 pcs.) Motor mechanism VA-99C CD/2-630
VA-99C/630A	Auxiliary contacts 100-630A Shunt release MX 100-630A Undervoltage release MN 100-630A Connection plates 400-630A (6 pcs.) Motor mechanism VA-99C CD/2-630
VA-99C/1250A	Auxiliary contacts 100-1250A Shunt release MX 1250A Undervoltage release MN 1250A Motor mechanism VA-99C CD/2-1250

## Connection plates (outer wires) for VA-99C

Picture	Name	Tightening torque, N·m	Connection dimensions, mm			Net weight, kg	
			Delivery scope		Width		Thickness
2			4				
	Connection plates VA-99C 100-160A (6pcs.)	9	18	3	10	0,113	
	Connection plates VA-99C 250A (6pcs.)	9	18	4	10	0,130	
	Connection plates VA-99C 400-630A (6pcs.)	18	30	6	12	0,200	

## Undervoltage release MN

The main purpose of the undervoltage release is to disconnect electrical equipment in case of invalid undervoltage.

Characteristics	Value
Rated operating voltage $U_e$ , V	230
Rated frequency, Hz	50 / 60
Operate voltage	(0,85–1,1) $U_e$
Hold voltage	(0,7–1,1) $U_e$
Breaking voltage	(0,35–0,7) $U_e$

## Shunt release MX

The shunt release remotely trips MCCB. The trip signal may be pulse (20 ms) and continuous. Its endurance is 50% of the MCCB mechanical endurance.

Characteristics	Value
Rated operating voltage $U_e$ , V	230
Rated frequency, Hz	50 / 60
Operate voltage	(0,7–1,1) $U_e$
Max. operate time, ms	50

## Auxiliary contacts

Switching contacts with a common point serve to signal the MCCB operation and are used for signalling, electrical interlocking, relay protection, etc. They correspond to IEC 60947-5.

Functions:

«OF» (ON/OFF): indicates power contacts status.

«SD» (TRIP): indicates tripping by:

- Overload
- Short circuit
- Shunt release, TEST button (push to trip).

The auxiliary contacts return to their initial state after the MCCB resets.

A single model of auxiliary contact fulfils functions of «OF» & «SD» contacts depending on the location in the device. The auxiliary contacts shall be installed behind the MCCB front panel.

Characteristics	Value			
Contacts	Standard version			
Conventional thermal current, A	6			
Min. load	100 mA at 24 V			
Utilization category (IEC 60947-5-1)	AC-12	AC-15	DC-12	DC-14
Operating current (A): 24 V	6	6	6	1
48 V	6	6	2,5	0,2
110 V	6	5	0,6	0,05
220/240 V	6	4	-	-
250 V	-	-	0,3	0,03
380/440 V	6	2	-	-
480 V	6	1,5	-	-
660/690 V	6	0,1	-	-



## Motor mechanism CD/2

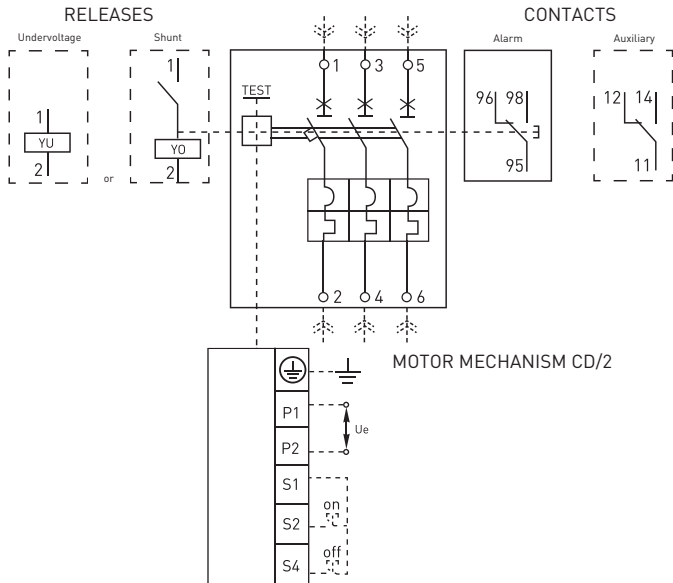
The motor mechanism CD/2 EKF is designed for remote control of molded case circuit breakers (MCCB) VA-99C up to 630A: to facilitate the MCCB close/open operations and to reclose it after auto tripping. Circuit breakers equipped with a motor mechanism feature high reliability and user-friendly operation to be used for local and remote control, automation of distribution networks, automatic transfer system (ATS), simultaneous tripping.

### Specifications

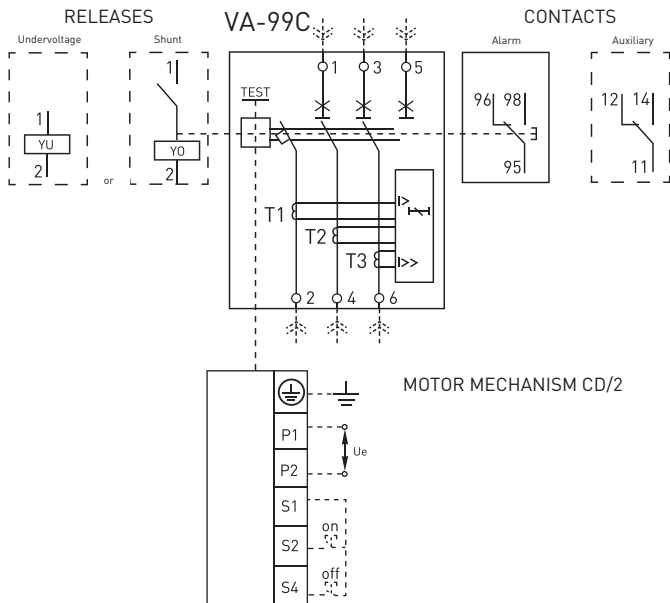
Characteristics	Value	
	CD/2-250	CD/2-400-630
Rated voltage $U_n$ , V	230	
Rated operating voltage $U_e$ , % $U_n$	85...110	
Max. operating current, A	0,5	2
Power, W	35	35
Mechanical endurance, O-C cycles	10 000	5000
Degree of protection	IP 30	IP 30

## Wiring diagrams

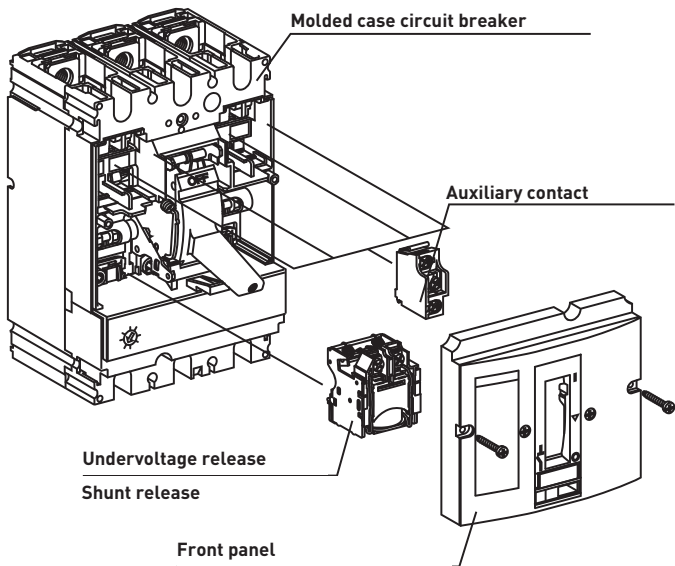
Molded case circuit breaker with thermomagnetic trip unit and accessories



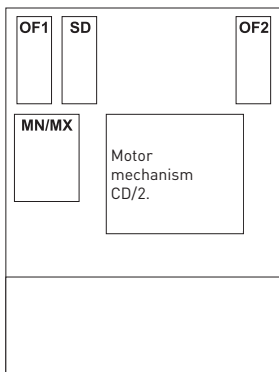
# Molded case circuit breaker with electronic trip unit and accessories



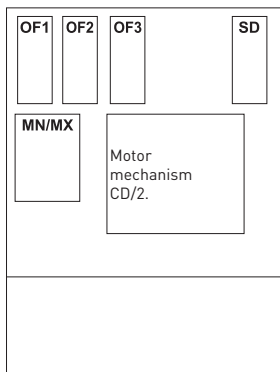
## Wiring diagram of VA-99C accessories



## Arrangement options

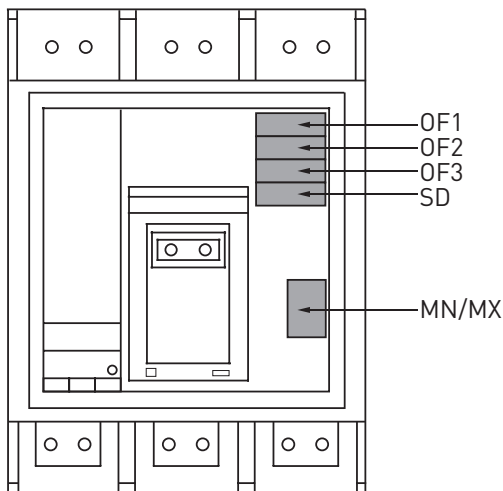


VA-99C/100-250



VA-99C/400-630

## Arrangement options for VA-99C/1250



## **7 SAFETY REQUIREMENTS**

By protection method against electric shock, molded case circuit breakers belong to protection class «0» according to IEC 61140 and shall be installed in distribution enclosures with protection class «1» and higher.

Degree of protection for distribution equipment shall be at least IP30 in compliance with IEC 60529:2013.

## **8 DISPOSAL**

Life-expired and failed products shall be disposed of in compliance with the national and local laws and regulations in force. To dispose of the product, send it to an authorized company for recycling in compliance with the national and local laws and regulations in force.

## **9 MANUFACTURER'S WARRANTY**

The manufacturer guarantees the products comply with the declared characteristics, provided that consumers follow operation, transportation and storage conditions.

Warranty period: 7 years from the date of sale.

Shelf life: 7 years.

Service life: 10 years.

**Manufacturer: For information, refer to the product package.**

**Importer and EKF trademark service representative:** EKF ELECTRICAL SOLUTION – FZCO, Dubai Silicon Oasis, DDP, Building A2, Dubai, United Arab Emirates.

**Importer and EKF trademark service representative on the territory of the Russian Federation:** OOO «Electroresheniya», Otradnaya st., 2b bld. 9, 5th floor, 127273, Moscow, Russia. Tel.: +7 (495) 788-88-15.

**Importer and EKF trademark service representative on the territory of the Republic of Kazakhstan:** TOO «Energoresheniya Kazakhstan», Kazakhstan, Almaty, Bostandyk district, Turgut Ozal st., 247, apt 4.

## 10 CERTIFICATE OF ACCEPTANCE

The molded case circuit breaker VA-99C EKF has been approved for operation.

Date of manufacture:  
for information, refer to the product package.

Quality control stamp



**EAC**

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