

Variable composition contactors (or bar-mounted contactors) - 3 groups

■ Low power switching contactors:

- type CV1B●, 80 to 630 A
- type CV3B●, 80 to 500 A.

For motor control, the references of the CV1 contactors are given on page 17 and for the CV3 on page 19.

For other applications, the composition of the commercial references is described on Symbol combination table, see pages 37 and 38 or use the configuration software "bar contactor soft-customer.xls" to download on: www.se.com.

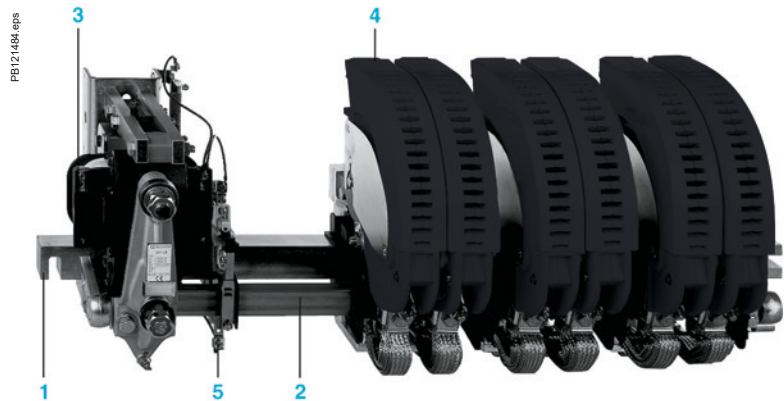
■ Increased power switching contactors:

- type LC1B●, 800 to 2750 A. References shown on page 19.

■ **Specific contactors** (large number of main poles, pole arrangement, customised fixing and dimensions, component referencing, etc.) :

- type CV1●B, 80 to 1000 A
- type CV3●B, 80 to 2750 A.

To order these contactors, complete the Order form on page 136.



- 1 Mounting bar
- 2 Rotating armature shaft
- 3 Electromagnet
- 4 Main pole
- 5 Instantaneous auxiliary contacts

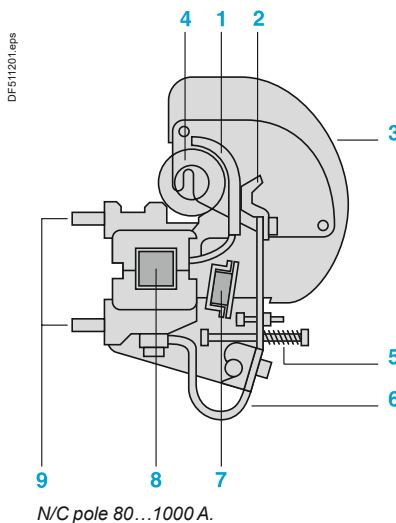
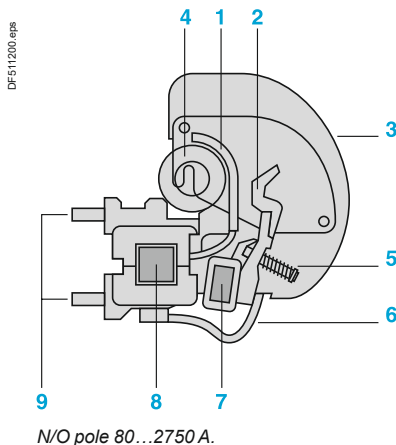
Variable composition contactors are particularly suited for switching a.c. or d.c. motors and other circuits and are capable of providing a high number of operating cycles.

Their variable composition design allows them to be built to customer specification.

Applications

These variable composition contactors are ideally suited for the most frequently encountered applications:

- Switching a.c. squirrel cage and slip-ring motors in all utilisation categories (AC-2, AC-3, AC-4).
 - Switching d.c. motors in all utilisation categories (DC-2, DC-3, DC-4, DC-5).
 - Switching a.c. resistive loads (category AC-1) and d.c. resistive loads (category DC-1).
 - Switching distribution circuits (category AC-1).
 - Short-circuiting of rotor resistors.
 - Switching capacitors, power factor correction.
 - Switching transformer primaries.
 - Switching inductive circuits with high time constant ($L/R > 15$ ms)
- Example: alternator excitation circuit.
- Severe duty requirements and main pole arrangements comprising 1 to 6 N/O and/or N/C poles.



- 1 Fixed contact
- 2 Moving contact
- 3 Arc chamber
- 4 Blow-out coil
- 5 Pole pressure spring
- 6 Braided conductor
- 7 Rotating armature shaft (moving contact actuator)
- 8 Mounting bar
- 9 Terminal lugs

Power circuit

The principal function of a main pole is to make and break the supply current. It is designed to continuously carry its nominal operational current.

Making the current

On energisation of the electromagnet coil, the armature shaft rotates and the moving contact makes with the fixed contact. The contact pressure, maintained by the pole pressure spring, is sufficient to overcome the electrodynamic forces of transient current peaks (e.g.: switching a transformer, starting a motor, etc.).

Breaking the current

On de-energisation of the electromagnet coil, the contacts separate and electrical arcing is dissipated by the blow-out coil and arc chamber. To optimise the performance of the magnetic blow-out, the blow-out coil can be selected to suit the operational current, which is particularly important when switching d.c. The N/C pole operates in a reverse manner to the N/O pole, i.e. the contacts are closed whilst the electromagnet coil is de-energised and open during energisation.

Main pole types

CV1 contactors

- 690 V ~, 220 V ≡ / pole
- N/O poles 80...630 A (PN1)
- N/C poles 80...630 A (PR1).

■ Variants:

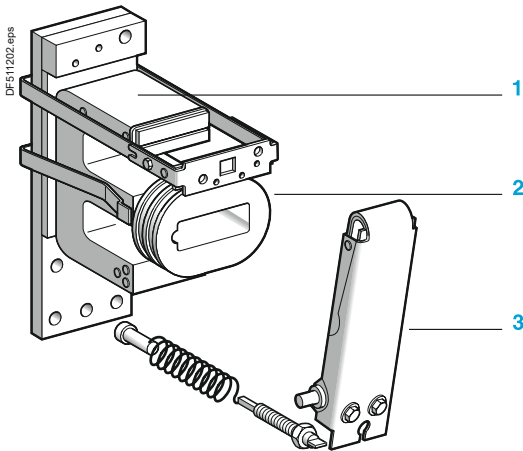
- no-load breaking poles
 - N/O poles 80...630 A (PN5)
 - N/C poles 80...630 A (PR5).
- arc chambers with splitters for dispersing the electric arc: 1000 V ~ / 440 V ≡ per pole
 - N/O poles 80...630 A (PN3)
 - N/C poles 500...630 A (PR3).

CV3 contactors

- 1000 V ~, 440 V ≡ / pole
- N/O poles 0...300 A (PA3)
- N/C poles 80...300 A (PR3)
- N/O poles 750...2750 A (PA1).

■ Variants:

- high making capacity poles 750...2750 A (PA2)
- high breaking capacity poles and poles with reduced safety clearances (arc chambers with closed splitters) 750...2750 A (PA1PX8)
- no-load breaking poles
 - N/O poles 750...2750 A (PA5).



Electromagnet EB1

- 1 Electromagnet core
- 2 Coil
- 3 Electromagnet armature

Control circuit

- 2 types of electromagnet: E shaped core and U shaped core.
- 2 types of coil: type WB1 and type WB2.

E-shaped electromagnet and coil type WB1 for AC / DC network

- **Electromagnet with E shaped laminated iron core, type EB ⁽¹⁾**
 - with central air gap machined in armature,
 - with single coil type **WB1** fitted on centre limb of core.
- The upper limb incorporates a shading ring, the armature rotates.

- **Coil - direct a.c. 50 or 60 Hz supply**

- 20 to 500 V
- 1200 operations/hour.

At the moment of inrush, with the armature open, the coil impedance is low and power consumption is high.
In the sealed state the armature is closed, the coil impedance increases and power consumption is low.
The inrush current is 6 to 10 times higher than the sealed current.

- **Electromagnet directly DC powered or via individual rectifier (50-400 Hz):**

- the electromagnet is mounted with the reduction in consumption
- 12 to 500 V
- 120 operations/hour.

- **Electromagnet powered via individual rectifier (50-400 Hz):**

- the electromagnet is mounted with the reduction in consumption
- 12 to 500 V
- 120 operations/hour.

At the moment of inrush, the full actuating voltage is applied to the coil and the inrush current is determined by the coil resistance.
In the sealed state an additional resistor is switched automatically in series with the coil, so as to reduce power consumption.
This economy resistor is switched by a N/C auxiliary contact which is adjusted to open only when the armature is fully closed.
The inrush current is 15 to 40 times higher than the sealed current.

Coils type WB1, used in conjunction with laminated iron cores, have a much higher inrush current than sealed current, whatever the nature of the supply current.

When establishing the current and selecting the supply voltage rating, it is important to take into account the line voltage drop due to the inrush current.

Electromagnet with U shaped core and coil type WB2 for d.c. supply

- **Electromagnet with U shaped solid iron core, type EK:**
 - 2 similar coils type **WB2** connected in series, one coil being fitted to each limb of the core
 - the armature rotates.

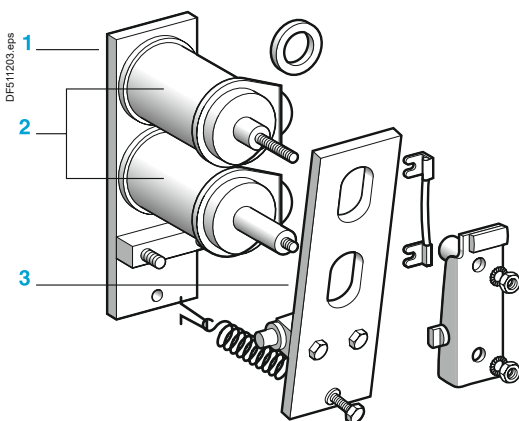
- **Electromagnet for d.c. supply**

- 12 to 500 V
- 1200 operations/hour.

The coils for this type of electromagnet have a considerable number of turns so as to obtain sufficient magnetic flux to attract the armature.

Due to its simplicity and relatively slow movements the assembly is very robust and, therefore, has increased mechanical durability.

⁽¹⁾ CRX, CVXB legacy size 'G', 'J'. Please consult us.



Electromagnet EK

- 1 Electromagnet core
- 2 Coil
- 3 Electromagnet armature

Instantaneous and time delay auxiliary contacts

Signalling, electrical interlocking and slave functions can be achieved by using auxiliary contacts.

Instantaneous auxiliary contacts suitable for use with all contactor types:

- 1 block of 3 instantaneous N/O contacts and 2 N/C instantaneous contacts, reference LA1BN32A.

Delayed auxiliary contacts can be mounted onto contactors CV1 and CV3:

- On the block LA1BN32A, 1 block of N/O ON-delayed contact + 1 N/C ON-delayed contact, references LADT0 (delay from 0.1 to 3 s), LADT2 (0.1 to 30 s), LADT4 (10 to 180 s)
- On the block ref. LA1BN32A: 1 block of N/O OFF-delayed contact + 1 N/C OFF-delayed contact, references LADR0 (delay from 0.1 to 3 s), LADR4 (10 to 180 s).

The delayed contacts are established or separate some time after the closing or opening of the contactor which operates them. This time is adjustable.

On the block LA1BN32A all TeSys D contactors additives can be mounted, with the exception of LA6DK, LAD6K, LADN01, LADN10 and LAD8N.

Assembling reversing/changeover contactor pairs

Mounting accessories

For applications involving the switching of reversing motors or changeover circuits, contactors of different ratings can easily be mounted vertically and interlocked. Mechanical interlock kits are available and auxiliary contacts can be used for electrical interlocking.



CV1B, CV3B, LC1B Selection guide

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CV1B for control of motors ≤ 690 V in AC-3

Selection guide for utilisation category AC-3 according to required electrical durability

Rated operational current in A at $\theta \leq 55$ °C

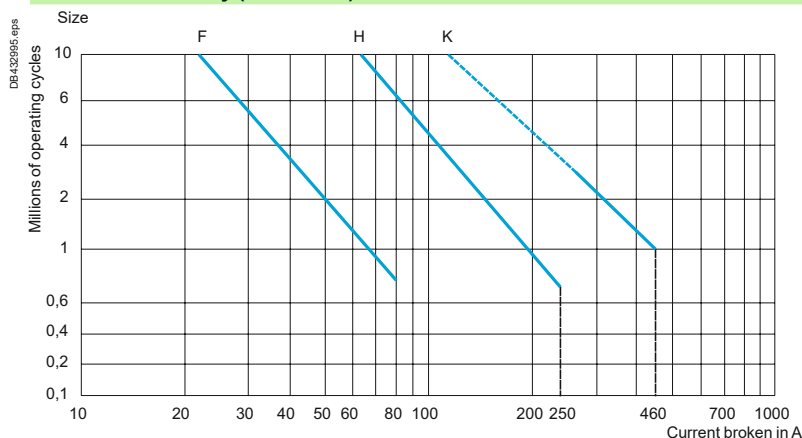
CV1 contactors	Size					
	F	G ⁽¹⁾	H	J ⁽¹⁾	K	L ⁽¹⁾
Maximum operating rate in operating cycles/hour	1200		1200		1200	
≤ 440 V	80		250		460	
500 V	50		200		450	
690 V	35		150		400	

Nominal operational power at $\theta \leq 55$ °C

CV1 contactors	Size					
	F	G ⁽¹⁾	H	J ⁽¹⁾	K	L ⁽¹⁾
Maximum operating rate in operating cycles/hour	1200		1200		1200	
220/230 V	22		75		140	
380/400 V	37		132		250	
415/440 V	37		140		260	
500 V	30		110		315	
660/690 V	22		110		315	

⁽¹⁾ CV1B legacy size 'G', 'J', 'L', please consult us.

Electrical durability ($U_e \leq 440$ V)





CV1B contactors - references according to motor power ratings in category AC-3

References												
3-pole contactors for motor control												
Standard power ratings of 3-phase motors 50-60 Hz in category AC-3						Maximum rated operational current, category AC-3	Instantaneous auxiliary contacts per contactor	Basic reference, to be completed by adding the voltage code ^{(1) (2)}	Frequently used voltage codes	Weight		
220 V	380 V	415 V	440 V	500 V	660/690 V						A	kg
kW	kW	kW	kW	kW	kW	A						
22	37	37	37	30	22	80	3	2	CV1BF3F0Z●●A	E5 F5 M5 Q5	4.000	
75	132	140	140	110	110	250	3	2	CV1BH3H0Z●●A	E5 F5 M5 Q5	11.000	
140	250	260	260	315	315	460	1	1	CV1BK3K0Z●●11	F5 M5 Q5	40.000	

(1) For other compositions, make up the contactor reference as explained on page 36.

(2) Standard control circuit voltages (variable delivery, please contact us):

Volts	48	110	120	127	208	220	230	240	380	400	440
50 Hz	E5	F5	–	G5	–	M5	P5	U5	Q5	V5	R5
60 Hz	E6	–	K6	–	L6	M6	P6	U6	Q6	V6	R6
50/60 Hz	E7	F7	K7	G7	L7	M7	P7	U7	Q7	V7	R7
---	ED	FD	KD	GD	–	MD	PD	UD	QD	VD	–
--- + Econ.R. ⁽³⁾	ER	FR	KR	GR	–	MR	PR	UR	QR	VR	–

For other voltages: please consult your Regional Sales Office.

(3) Econ.R.: Economy resistor.