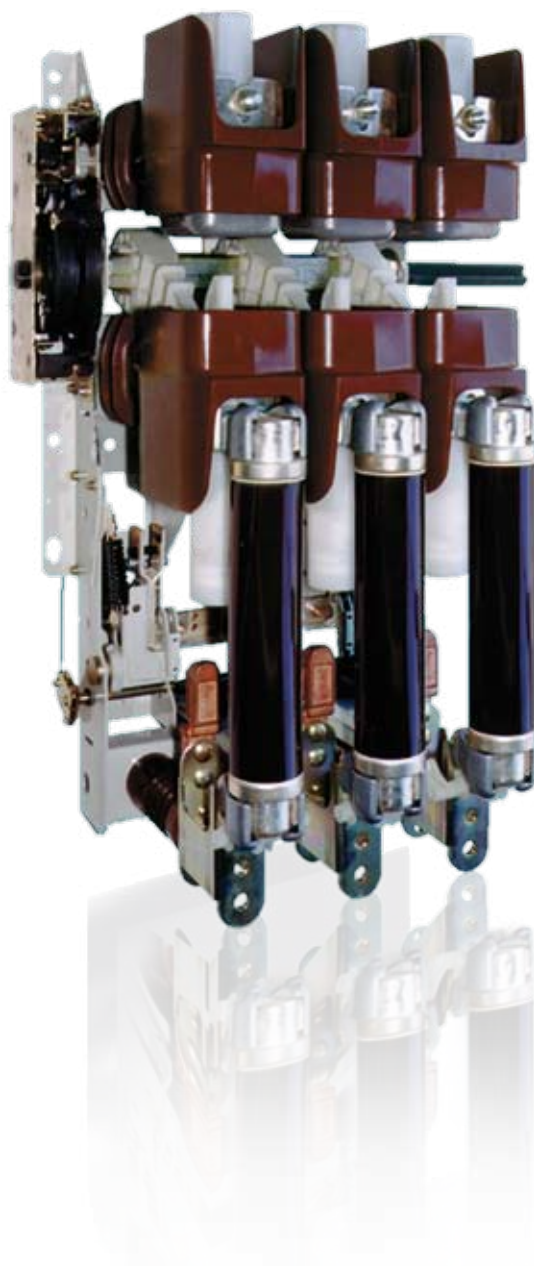


Medium Voltage Products

# Rod-type switch-disconnector C4





# Product description

## C4

### Rod-type switch-disconnector

12 kV, ... 1250 A

17.5 kV, ... 630 A

24 kV, ... 630 A

- Wide field of application as a general purpose switch in accordance with DIN VDE 0670 Part 301, VDE 0670 Part 303 and IEC Publication 60265-1
- Reliable arc quenching by combining the air blasting and the hard gas principle
- High breaking and making capacity
- Capable of switching capacitive currents under earth fault conditions
- Low maintenance
- Compact and space saving design
- Mounting possible in any Position
- Great flexibility due to modular design, allowing adding of release system, earthing switch and fuse bases at a later stage
- Suitable for service under severe climatic conditions
- Suitable for replacing older switch-disconnectors to upgrade existing systems

# Switch-disconnector C4

## C4: For every requirement

C4 rod-type switch-disconnectors are general purpose load switches for indoor use complying with standard DIN VDE 0670 Part 301, VDE 0670 Part 303 and IEC Publication 60265-1.

They are ideally suited for safe and reliable switching of all loads occurring in practice, and particularly for switching

- transformers under load and no-load conditions,
- capacitor banks,
- cables,
- overhead lines,
- tee-off and ring lines under load and no-load.

In the OFF position the C4 switch-disconnector has a visible insulating gap, thus fulfilling the requirements for disconnectors in accordance with VDE regulation 0670, Part 2.

## C4: High making currents are safely handled

Due to an optimum contact design and an operating mechanism, which permits high switching speeds, high making currents are safely mastered. Its application in high-power systems is therefore possible, too.

The C4 switch-disconnector is capable of closing onto an existing short-circuit within the limits of its rated capacity with no risk to the operator or the equipment.

## C4: Operable under severe climatic conditions

The materials and tolerances of the moving parts have been selected in such a way as to make the disconnectors fully suitable for indoor climatic conditions between  $-5^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$  in accordance with VDE 0670 Part 1000; IEC 60694 and 60265-1. At ambient temperatures exceeding  $+40^{\circ}\text{C}$  and depending of its application it may be necessary to reduce the service current. At a relative humidity up to 95% the disconnecting switch works perfectly. It can therefore be regarded as tropic proof.

If the switches are used at altitudes exceeding 1000 m above sea level, the compensation factors set down in the relevant standards must be observed.

With their special contact design (self-cleaning), C4 switch-disconnectors are also suitable for service in heavily dust and sand, polluted areas.

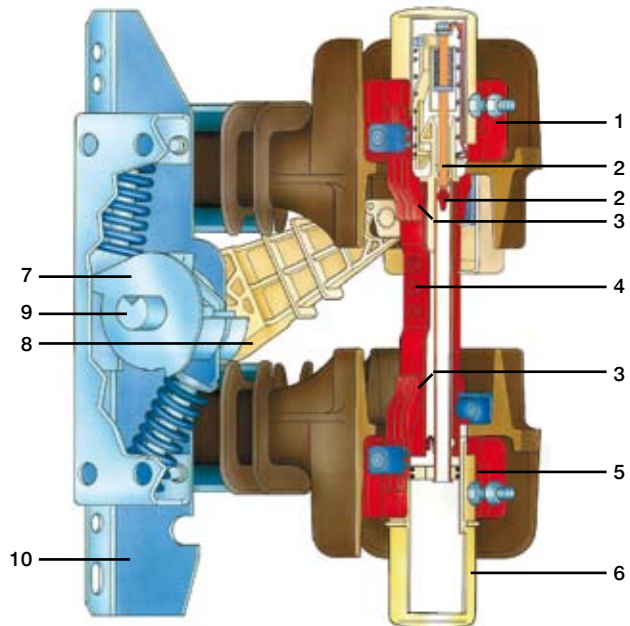
## C4: Operational in any mounting position

Because of appropriately dimensioned spring forces, the disconnectors can also be mounted in positions other than the vertical (standard) position.

The desired position should be specified in the enquiry and/or order.

## C4: Extremely long maintenance intervals

A mechanism drive and piston system based on the latest developments in kinematics ensures low wear and thus also longer maintenance intervals. The electrical life of the C4 rod-type switch-disconnector depends on magnitudes of the breaking current.



Section of a C4 rod-type switch-disconnector (12 kV)

- 1 Upper fixed contact
- 2 Secondary current path
- 3 Contact fingers
- 4 U-section contact
- 5 Lower fixed contact
- 6 Insulating cylinder
- 7 Snap-action mechanism
- 8 Insulating arm
- 9 Actuating shaft
- 10 Switch frame

## C4: Compact design and reliable arcquenching principle

The 3 pole units are fixed at the corrosion proof disconnector base frame with 2 epoxy resin insulators each. The components of the disconnector are shaped in a way as to ensure an optimum electrical field distribution, resulting in a extremely compact switch.

With the rod-type design a small depth has been achieved. Therefore the C4 type switch-disconnectors facilitate the construction of switchgear panels with space saving dimensions.

In the closed condition the upper and lower terminal contacts of each pole are connected by a silver-plated copper U-section serving as the main current path. These sections are moved by the operating mechanism via insulating link rods of glass fibre reinforced polyamide.

Irrespective of the kind of operation of the switch the driving mechanism ensures a defined speed for both opening and closing. Inside of each contact, section and parallel to the main current path there is a secondary current path and arcquenching system. Three quenching principles are combined in the C4 disconnector to optimize the switching performance:

Compressed air is flowing onto the foot-point of the arc, cooling it. Simultaneously the insulating nozzle is heated up by the arc resulting in the production of a quenching gas which flows into the isolating gap. This gap is increased by rapid contact separation, ensuring fast and reliable quenching of the arc and preventing restriking in all cases of application. The inevitable pre-arcing during closing of the switch only occurs in the main current path. The quenching system is not affected. Therefore an inadvertent closing onto a short-circuit is safely mastered with no damage to the quenching system.

#### C4: Optimized variants for every application

Depending on the operating mechanism used, two basic versions are possible:

##### Series CK4

with snap-action closing mechanism and snap-action opening mechanism.

##### Series CS4

with torsion spring closing mechanism and spring-storage opening mechanism.

CK4 disconnectors have a quick-acting opening and closing system independent of the kind of operation.

On the CS4 disconnector the closing and opening spring are tensioned in succession. When the opening spring has been charged, the fast closing operation is automatically released by a dog.

The energy for opening remains stored in the opening spring. For an opening operation the stored energy is released through rotation of the driving shaft, the blowing of an HRC fuse or through a shunt release. Thus only one switching movement is required for closing and opening the CS4 switch-disconnector.

#### C4: Great flexibility due to modular design

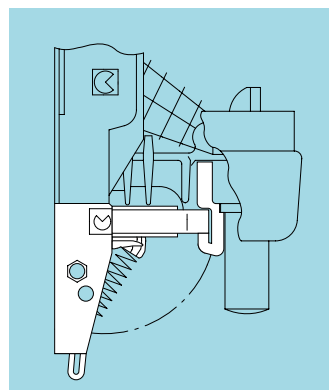
The basic versions of the C4 rod-type switch-disconnector can be fitted (or retrofitted) with fuse bases for HRC fuses in accordance with VDE 0670 Part 4 and DIN 43625.

The overall height is only slightly increased, and the mounting dimensions remain the same. The blowing of a fuse can be signaled by an auxiliary switch. In CS4 disconnectors, the striker pin of the blown fuse also acts via a link rod on the release system of the disconnector operating mechanism resulting in three-phase interruption.

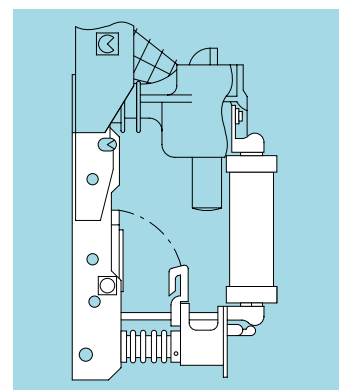
All versions of the disconnector can be supplied with earthing switches. The earthing switches constitute a separate assembly and can be located optionally at the bottom and/or top, or below the fuse base.

The outside and mounting dimensions of the equipment remain unchanged. Retrofitting to all C4 disconnector types is possible without problems.

As a snap-action mechanism is used, the making capacity of the earthing switch is the same as that of the switch-disconnector. Disconnectors and earthing switches are mechanically interlocked as standard. This is a safety feature. If required, the interlock can be omitted.

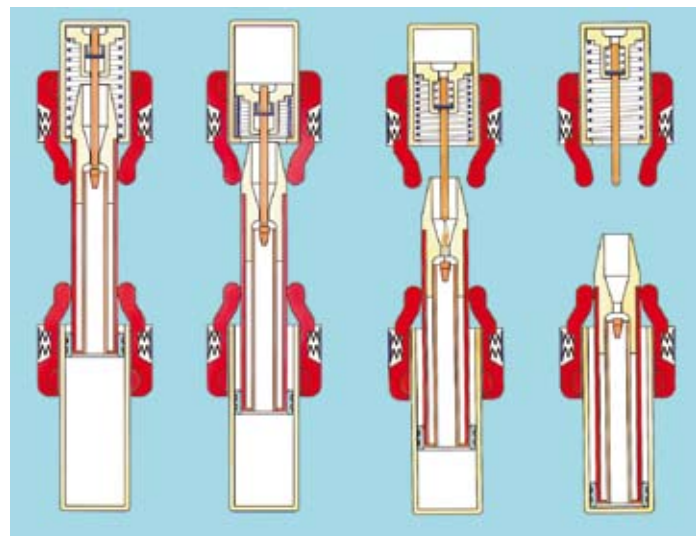


CK4 with earthing switch



CS4 with fuses bases and earthing switch

#### Opening operation of a C4 rod-type switch-disconnector



Closed position    Commutation to the arc quenching system    Arc extinction    Open position

# Switch-disconnector C4

## C4: Large variety of operating options

The operating systems for the rod-type switch-disconnectors can be mounted on the right or the left as required. The simplest method of control is by an operating lever, optionally out of steel or insulating material.

The bevel gear mechanism has established itself as one of the easiest to mount and most reliable drives for switch-disconnectors.

The bevel gear operating mechanism – for both the disconnector and the earthing switch – is available in two versions. In the version for slim switchgear panels the bevel gear mechanism is mounted directly on the disconnector frame. In the version for wider panels the mechanism is fastened to a separate fixed bearing on the rear wall of the panel.

For replacement of older disconnectors with C4 disconnectors in existing installations, special bevel gear operating mechanisms are also available. Bevel gear mechanisms are available optionally for manual or motor operation.

Individual switch position indicators and indicators for the relevant operating mechanism position can be supplied for all types of mechanism.

## C4: Practice oriented accessories

Shunt releases for DC or AC voltage are available for opening the CS4 switch-disconnector.

For interlock purposes, blocking solenoids can be fitted to the bevel gear operating mechanism. C4 disconnectors can be fitted with a wide range of auxiliary switches for control, annunciation and interlock purposes.

All cable types used can be connected to C4 switches. Suitability tested connector fittings are available as accessories.

## C4: High quality

At ABB Calor Emag, all activities such as development, purchasing, production, final testing and so on are incorporated in a well organized quality assurance system in accordance with DIN EN ISO 9001. This ensures that the quality of C4 disconnectors complies with the relevant specifications or even exceeds them.

## Tests are not everything

where the quality of C4 rod-type switch-disconnectors is concerned.

Meticulous manufacture makes the C4 what it is.



C4 quality assurance

# Technical data

## General Data

Rated voltage	[kV]	12	17.5	24
Rated insulation level				
– Rated power frequency withstand voltage	[kV]	28/32	38/45	50/60
– Rated lightning impulse withstand voltage	[kV]	75/85	95/100	125/145
– VDE-list		2	2	2
Rated frequency	[Hz]	50/60	50/60	50/60
Switch-disconnector				
Rated current	[A]	400/630/1250	400/630	400/630
Rated short-circuit making current				
– Switch-disconnector	[kA]	63	50	40
– Earthing switch	[kA]	63	50	40
Rated short-time current				
– Switch-disconnector	[kA]	25	20	16
– Earthing switch	[kA]	25	20	16
Rated short circuit duration	[s]	3	3	3
Rated load breaking current	[A]	400/630/1250	400/630	400/630
Rated ring breaking current	[A]	400/630/1250	400/630	400/630
Rated cable breaking current	[A]	25	25	25
Rated earth fault breaking current				
– $I_{CE}$	[A]	100	100	100
– $\sqrt{3} I_{CL}$	[A]	43	43	43
Switch-disconnector fuse combination				
Max. rated normal current with fuses	[A]	63	40	40
Fuse striker	Energy output	Medium	Medium	Medium
Dimensions, forques and weights				
Pole centre distance	[mm]	125 <sup>1)</sup> /150/210	150/210	150 <sup>2)</sup> /210/275
Closing torque				
– CK4 switch-disconnector	[Nm]	150	150	150
– CS4 switch-disconnector	[Nm]	190	190	190
– Earthing switch	[Nm]	100	100	100
Weight				
– CK4 switch-disconnector	[kg]	41	49	49
– CS4 switch-disconnector	[kg]	41	49	49
– Earthing switch	[kg]	11	13	13

<sup>1)</sup> Rated current up to 630 A

<sup>2)</sup> List 2 with additional insulation

## Main dimensions

Switch type	Rated voltage	Pole centre distance	Height						Depth		Width
	[kV]	[mm]	[mm]	[mm]	[mm]						
			A	B	C	D	E	F	A-D	E-F	G
CK4 and CS4	12	125	580	641	744	805	845	1009	349	406	537...643
		150	580	641	744	805	845	1009	349	406	587...773
		210	580	641	744	805	845	1009	349	406	707...893
	17.5/24	150	667	709	804	847	1064	1202	398	451	587...773
		210	667	709	804	847	1064	1202	398	451	707...893
		275	667	709	804	847	1064	1202	398	451	837...1023

A without earthing switch, without fuse-base

B with earthing switch at bottom

C with earthing switch at top

D with earthing switch at bottom and at top

E with fuse base, with and without earthing switch at bottom

F with fuse base and earthing switch at top

G depending on shaft code



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