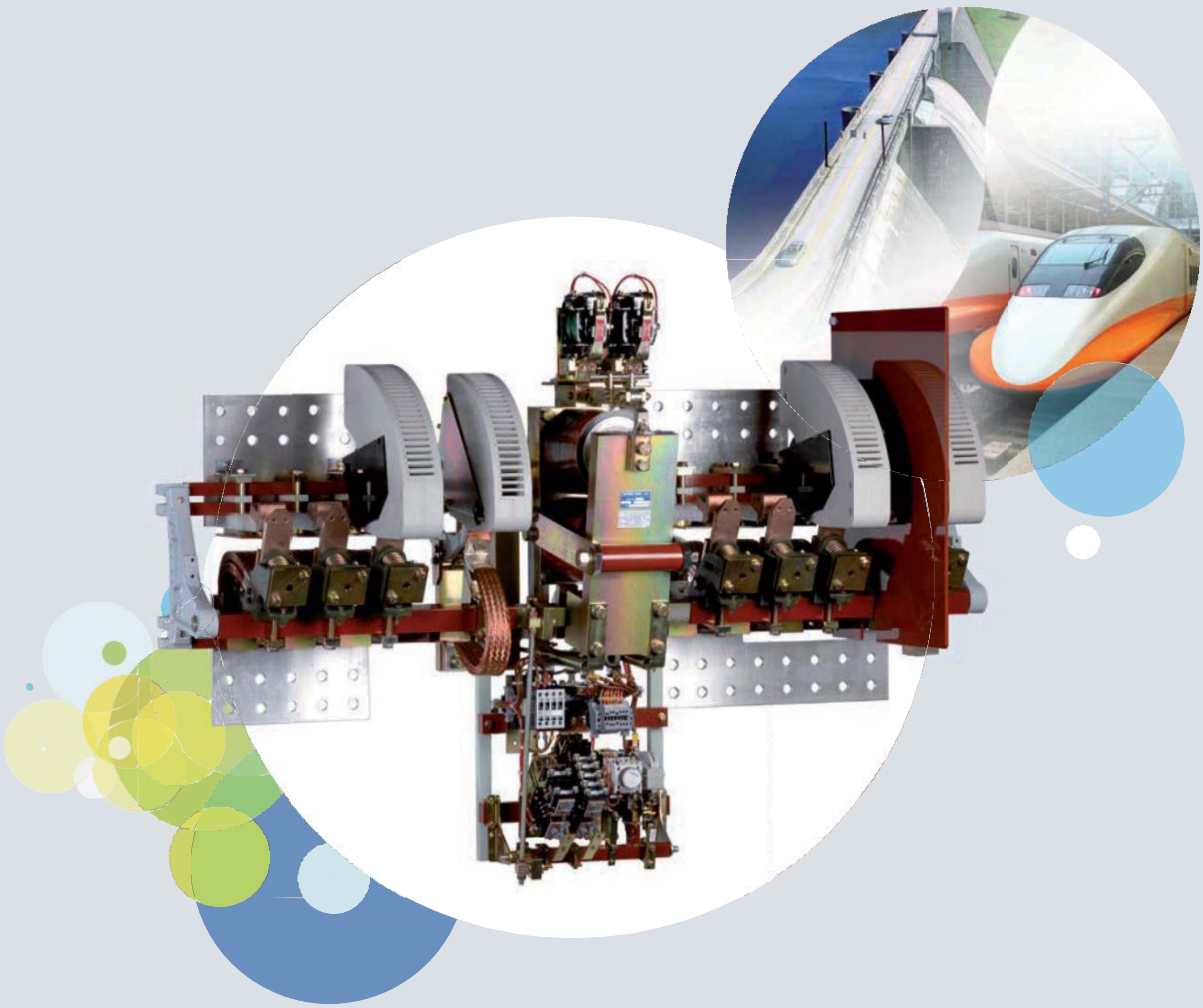
Modular contactors



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Contents

Introduction

Generaliti es on bar contactor‘s main uses

Thanks to their modular constitution, bar contactors from 80 to 6200 A can meet most of your requirements that block contactors, although easy to mount, can not meet.

It is possible on a bar contactor to:

- mount one or several poles of different or similar calibres,
  - of different currents (AC and DC),
  - of different types: closing poles or opening poles (rupturing poles),
  - with or without mechanical overlapping,
  - with or without magnetic blow-out.

- to mount a significant number of auxiliary contacts of different types,
  - instant, opening or closing, with or without overlapping, without blow-out or with magnetic blow-out (for DC inductive control circuits),
  - delayed on opening or on closing of the contactor.
- to obtain a reinforced level of insulation by increasing the distance between the poles (for high rotary voltages, for dusty or conductive atmosphere).

- to mount on the contactor a mechanical latching with single or double electrical release, with or without self-protective device for the release coil(s).

- to lock mechanically the contactor with one or several contactors of similar or different calibres in a vertical, horizontal or «back to back» position.

- to adapt the fixation centre-to-centre distance to the mounting conditions.

Below are shown a few examples of characteristic uses and possibilities of our bar contactors.

Use under direct current

Electrochemistry - Galvanoplasty

- voltage from 6 to 220 Vdc
- current from 1250 to 8000 A

The contactors with or without blow-out are designed for the supply, coupling in series, in parallel or complex coupling, for the sectioning of electrolysis vats, and for the reversion of the supply polarities.

Type of contactors adapted to these applications:
- CBC 71 - 1250 - 1600 - 2000 A,
- CBC 54 - 2500 - 3000 A,
- CBC 60 - 4000 - 5000 - 6200 A.

Handling - Heavy lifting

- voltage from 220 to 550 Vdc
- current from 80 to 2000 A

Single-pole or two-pole contactors are designed for the control, the reversion of motor running direction and to short-circuit the acceleration and braking resistance catches.

Type of contactors adapted to these applications:

- Single-pole contactors:
  - CBC 57 80 & 150, CBC 68 200, CBC 96 400 (replacing the CBC 45 320 & CBC 75 320),
  - one-pole rupturing contactors RUBC 57 B 80 - 150 - 200, RUBC 96 400 (for brake shoe).

- Two-pole contactors:
  - CBC 57 B 80 - 150 - 200 A,
  - CBFC 75 400 to 1000 A,
  - CBC 71 1250 to 2000 A.

Mining industries

- voltages from 110 to 1200 Vdc
- current from 80 to 9000 A

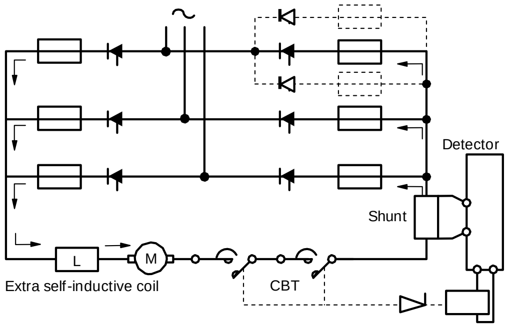
Our single-pole or multipolar contactors are designed for motor control, rolling mills accessories, «blooming», wire trains, etc...

CBC and CBFC contactors have been designed for such intensive duty cycles.

Rapid contactors (release < 10 ms) are indicaded for the thyristor's bridges and their related fuses protection, should the network voltage disappears.

Type of contactors adapted to those applications:
- CBT 75 300 - 500 - 1000

Operating diagram:



Uninterrupted Power Supply

- voltage from 110 to 550 Vdc
- current from 80 to 1000 A

DC entry contactors for the supply of UPS units.

CBC and CBFC contactors have been used and are still used for that application since the development of UPS's.

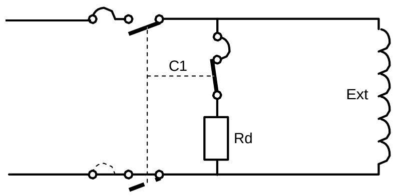
Power generation

Excitation and desexcitation of power inductors up to 900 MW and more.

- voltage from 110 to 1200 Vdc
- current from 80 to 6200 A

Our CEX contactors are used by a significant number of French and foreign alternator manufacturers. They are made up of 1, 2 or 3 magnetic arc-blow-out poles and of 1 opening pole called a «rupturing pole».

On opening, the rupturing pole closes before the main poles open.



C1: excitation contactor.
Rd: discharge resistor.
Ext: inductor.

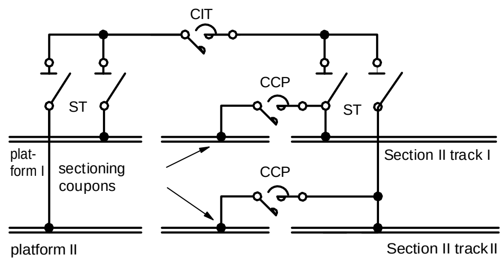
Traction networks, railways, undergrounds, and trolley buses

- voltages of 500 - 600 - 750 Vdc
- current from 25 to 6000 A

Contactors can be used for supplying and splitting up the tracks into sections, for supplying the sectioning coupons, sectioning and putting to earth the rails in the repairing workshops, coupling and insulating the tracks.

Type of contactors adapted to those applications:
- all our DC contactors, with reinforced insulation or double insulation according to the nominal operating voltage.

You will find our contactors in the undergrounds of Mexico, Cairo, Athens, Santiago, Montreal, Paris, Lyon, Marseille, etc… This range is completed by switches with «manual or electrical» energy storage control.



CIT-CCP: contactors.
ST: sectioning equipments.

Protection of equipments supplied with DC current

- voltage up to 600 Vdc and more
- current from 2 to 10000 A

It is necessary to check and control voltages, currents and the current's crossing direction, to delay or not the effects produced by variations in basic features.

Our RBC 1054 relays equipped with contacts, with or without magnetic arc-blow-out, with currents ranging from 2 to 40 A can be:

- instant voltage-triggered or delayed on opening,
- instant direct current-triggered from 1 to 10000 A or magnetically delayed on opening,
- reverse-current relays,
- synchronising relays for the start-up of synchronous motors,
- regenerative braking control relays with rectifier for slip ring motors.

Use under alternating current

Heavy industries

- voltage from 110 to 1000 V
- current from 80 to 4000 A

■ Generally used for distribution, in association with high switch-off rating fuses in case of remote control distribution with quite frequent operations.

■ High speed motor control up to 1200 V, either with direct start-up or via starters with statory resistors or autotransformers.

■ Short-circuit of slip-ring motor starting resistors up to 2000 V (for greater voltages, please consult us).

Selection and connecting mode of contactors used in the rotary circuit of asynchronous motor:

- automatic start-up without speed adjustment by variation of the rotor's resistance: contactor without arc-blow-out,
- automatic start-up with speed adjustment by variation of the rotor's resistance: contactor with magnetic arc-blow-out.

Connecting mode

■ Contactor without arc-blow-out:

- rotary voltage � 600 V, parallel connection
  - two-pole contactor, $I \text{ passing} = I \text{ rotor}$ (contactor with standard insulation)
  - three-pole contactor, $I \text{ passing} = I \text{ rotor} /1.5$ (contactor with standard insulation)
- rotary voltage between 600 and 1200 V, parallel connection
  - two-pole contactor, $I \text{ passing} = I \text{ rotor}$ (contactor with reinforced insulation)
  - three-pole contactor, $I \text{ passing} = I \text{ rotor} /1.5$ (contactor with reinforced insulation)
- rotary voltage between 1200 and 2000 V, connection in series with three-pole contactor $I \text{ passing} = I \text{ rotor}$ (contactor with reinforced insulation)

■ Contactor with magnetic blow-out

- rotary voltage � 600 V, parallel connection
  - two-pole contactor, $I \text{ passing} = I \text{ rotor}$ (contactor with standard insulation)
  - three-pole contactor, $I \text{ passing} = I \text{ rotor} / 1.5$ (contactor with standard insulation)
- rotary voltage between 600 and 1200 V, parallel connection subject to the fact that the voltage between fixed and moving contacts of each pole does not exceed 800 V; should it exceeds, adopt a connection in series.
  - two-pole contactor, connection in parallel, $I \text{ passing} = I \text{ rotor}$ (contactor with reinforced insulation)
  - three-pole contactor, connection in parallel, $I \text{ passing} = I \text{ rotor} /1.5$ (contactor with reinforced insulation)
  - three-pole contactor connection in series, $I \text{ passing} = I \text{ rotor}$ (contactor with reinforced insulation)
- rotary voltage between 1200 and 2000 V, connection in series subject to the fact that the voltage between fixed and moving contacts of each pole does not exceed 800 V.
  - three-pole contactor, $I \text{ passing} = I \text{ rotor}$ (contactor with reinforced insulation)

Calibre

■ Short-circuiting contactor: calibrated according to the rotary current.

■ Acceleration contactor

- automatic start-up: I nominal of contactors inferior or equal to I peak/6,
- semiautomatic start-up or with adjustment catches: I nominal of contactors inferior or equal to I passing,
- for stator M-T: rotary blow-out CBA contactor (slow break: 200 ms at stator's contactor).

Mining Industries

CBA contactors can meet the requirements of inductive Electrotherm as line contactors, coupling devices for capacitors or ovens.

- voltage from 220 to 690 V
- current from 80 to 2000 A

Three-pole contactors are designed for the control and the reversion of motors' running direction.

CBA contactors are adapted to these applications.

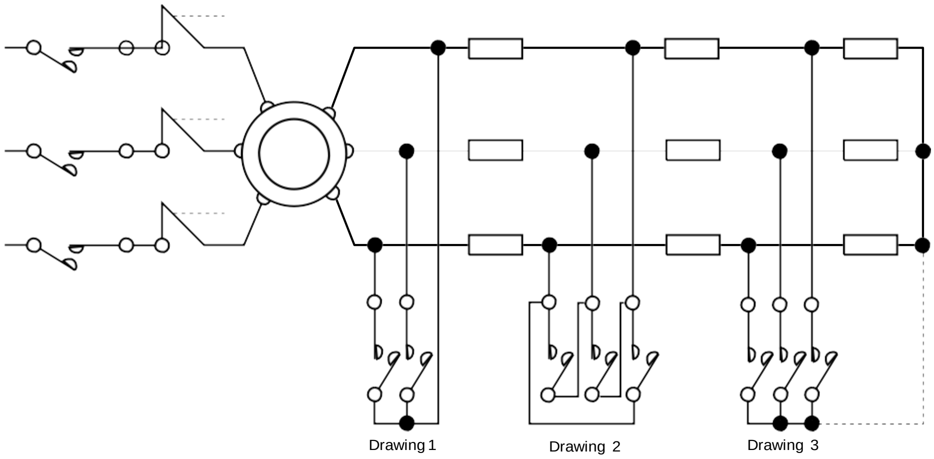
Service Industries

Medical centres, banks, shopping malls, post and telecommunication centres, etc...

- voltage from 48 to 690 V
- current from 80 to 4000 A

■ Protection of emergency generating sets
A contactor placed at the end of the alternator coupled with magnetic or thermomagnetic relays ensures the distribution of the spare current and the protection against the alternator overloads. The contactor current switch-off rating is sufficient in case of short-circuit. Thermal motors, with their loss of speed, limit the short-circuit current value.

■ UPS units
Front entry and exit of UPS.
Coupling of UPS.
Quick changeover from UPS to network supply in case of UPS failure, by using on the same contactor closing poles and overlapping opening poles.
Galvanic separation between the UPS and the network to hinder the network interference.
These functions can be ensured with CBA contactors delivered separately or as complete equipment «Normal-Spare/Emergency».



Drawing 1: two-pole contactor, parallel connection.
Drawing 2: three-pole contactor, parallel connection.
Drawing 3: three-pole contactor, series connection.

Definition of normalised duty cycles

According to IEC158-1, VDE0660, NF63-100, IEC947-4

■ Duty cycles of contactors
These ones state the current values that the contactor has to make or break.
They depend on:
- the kind of receptor controlled: cage or slip-ring motor, resistors, …
- the conditions under which the closings and the openings happen: running or stalled motor, reversion of running direction, regenerative braking.

Alternating current

Duty cycle AC_1

Is applied to all the AC receivers whose power factor equals at least 0.95 (cos 'P ?: 0.95). Closing and opening of the current normally absorbed by the receiver without risk of overcurrent on closing or opening. Example of applications: heating and distribution systems.

Duty cycle AC_2

Governs the start-up, regenerative braking and «step» running of slip-ring motors. On closing, the contactor establishes the starting current, (around 2.5 times the motor nominal current). On opening, it has to cut-off the starting current under a voltage at least equal to the network voltage.
Note: AC_2 duty cycle according to UTE standards corresponds to AC'2 according to VDC 0660.

Duty cycle AC_3

Concerns squirrel-cage motors with opening under running motor conditions. On closing, the contactor establishes the starting current which is around 5 to 7 times the motor nominal voltage. On opening, it cuts off the nominal current absorbed by the motor, at that time, the voltage at the terminals of its poles is about 20 % of the network voltage.
The opening remains easy.
Example of use: all standard squirrel-cage motors, lifts, elevators, escalators, conveyor belts, compressors, pumps, mixers, air conditioners, etc…

Duty cycle AC_4

Concerns regenerative braking and step running applications with squirrel-cage motors. The contactor closes under a peak of current that can reach a value 5 or 7 times as high as the motor nominal voltage. When it opens, it cuts off the same current under a voltage all the more high since the speed motor is low. This voltage can be the network voltage. The opening is severe.
Example of use: metallurgy, lifting systems, wiredrawing machines.

Direct current

Duty cycle DC_1

Concerns all the DC equipments (receivers) whose time constant (L/R) is inferior or equal to 1 ms.

Duty cycle DC_2

Cut-off of the «running motor» current.
Time constant is about 7.5 ms. On closing, the contactor makes the starting current, about 2.5 times as high as the motor nominal current on opening, the contactor cuts-off the motor nominal current. The voltage at its terminals depends on the electromotive force of the motor. Opening is easy.

Duty cycle DC_3

This category governs the start-up, regenerative braking and «step» running of shunt motors.
Time constant � 2 ms.
On closing, the contactor makes the starting current, around 2.5 times the motor nominal current. On opening, it must cut-off 2.5 times the starting current under a voltage at least equal to the network voltage. The lower is the speed of the motor, the higher is that voltage and then the lower is its counter-electromotive force. Opening is difficult.

Duty cycle DC_4

Control of a series motor, cut-off of «running motor» current. Time constant is about 10 ms. On closing, the contactor makes the starting current which is about 2.5 times the nominal current of the motor. On opening, it cuts off the third of the nominal current absorbed by the motor at this time. The voltage at the terminals of its poles is also around 20 % of the network voltage. In that category, the number of operations per hour can be high.

Duty cycle DC_5

Control of a series motor, cut off of «not running» motor current. This category concerns the start-up, regenerative breaking and «step» running of series motors. Time constant � 7.5 ms. The contactor closes under a peak of current that can reach 2.5 times the nominal current of the motor. When it opens, it cuts off the same current under a voltage which varies unproportionally with the speed of the motor. This voltage can equal the network voltage. Opening is severe.

Motor currents

Nominal currents for asynchronous cage motors

Three-phase 50/60 Hz motor outputs

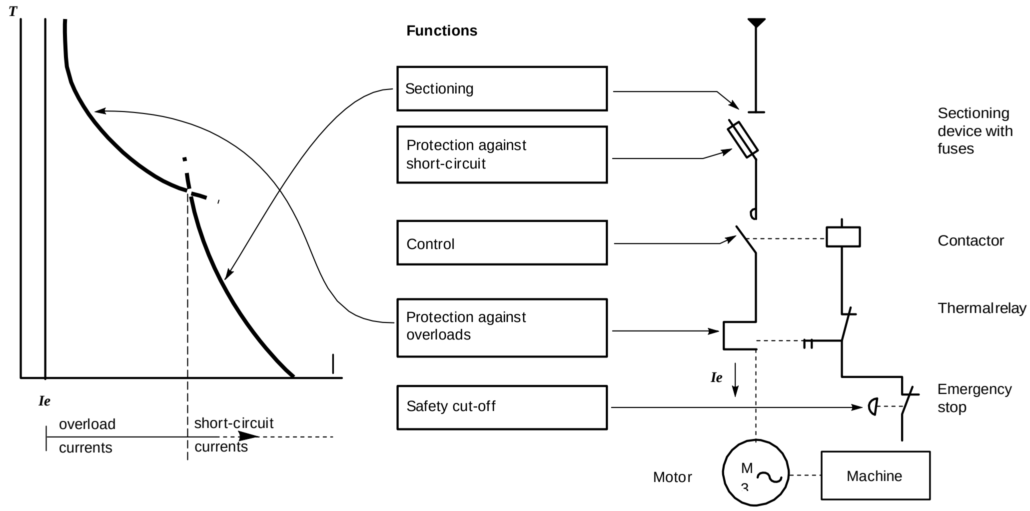
Output		Voltage												
		200/ 208 V	220 V	230 V*	380 V	400 V	415 V	433/ 440 V	460 V*	500/ 525 V	575 V*	660 V	690 V	750 V
kW	**ch or hp**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
18.5	25	70	64	68	37	35	35	32.8	34	28.5	27	21.9	20.2	18.5
22	25	84	75	80	44	42	40	39	40	33	32	25.4	24.2	22
30	40	114	103	104	60	57	55	51.5	52	45	41	54.6	33	30
37	50	138	126	130	72	69	66	64	65	55	52	42	40	36
45	60	162	150	154	85	81	80	76	77	65	62	49	46.8	42
55	75	200	182	192	105	100	100	90	96	80	77	61	58	52
75	100	270	240	248	138	131	135	125	124	105	99	82	75.7	69
90	125	330	295	312	170	162	165	146	156	129	125	98	94	85
110	150	400	356	360	205	195	200	178	180	156	144	118	113	103
132		480	425		245	233	240	215		187		140	135	123
	200	520	472	480	273	222	260	236	240	207	192	152	128	136
160		560	520		300	285	280	256		220		170	165	150
	250			600					300		240	200		
200		680	626		370	352	340	321		281		215	203	185
220	300	770	700	720	408	388	385	353	360	310	288	235	224	204
250	350	850	800	840	460	437	425	401	420	360	336	274	253	230
280					528									
315		1070	990		584	555	535	505		445		337	321	292
	450			1080					540		432			
355			1150		635	605	580	549		500		370	350	318
	500			1200					600		480			
400			1250		710	675	650	611		540		410	390	356
450	600			1440					720		576			
500			1570		900	855	820	780		680		515	494	450
560			1760		1000	950	920	870		760		575	549	500
630			1980		1100	1045	1020	965		850		645	605	550
710					1260	1200	1140	1075		960		725	694	630

These values are only indicative, they are likely to vary according to the type of motor, its polarity and its manufacturer.
* Values in conformity with the NEC (National Electrical Code).

General

The machines inserted in the supply circuit of a motor ensure different functions as scheduled in the installation rules. *Standards NFC 15-100.*

- motor start-up and stop control,
- protection against the overloads and short-circuits of the motor and supplying circuit,
- safety cut-off or emergency stop.



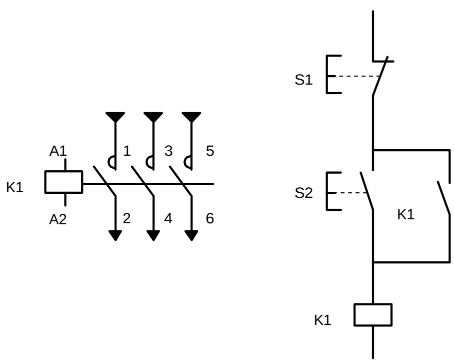
Start-up and stop of the motor

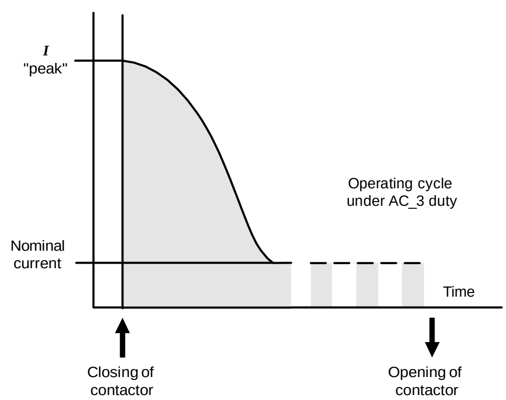
This function called control is ensured by the contactor. It is imposed by the installation rules *NFC 15-100* for all «operating machinery», notably the motors. These rules also forbid the automatic start-up after a lack of voltage when it is likely to be dangerous.

Controlled by two pulse switches and equipped with an auto-supplying contact, the contactor meets these requirements. Remote control and warning functions are also possible.

When it closes, the contactor makes the starting current of the motor, that can reach 5 to 7 times its normal voltage on load. After a few milliseconds (a few seconds at max), the motor reaches its normal speed and the peak of current from the start-up decreases up to a value corresponding to the carried load. When the contactor opens, it cuts off that current under a voltage reduced by the counter electromotive force of the running motor.

This cycle of operations, usual for a contactor, corresponds to the AC_3 duty cycle as defined by the *IEC 947-4 standards* (contactors). To other operating modes or other types of motors correspond other duty cycles with specific selection modes for contactors: definition of duty cycles.

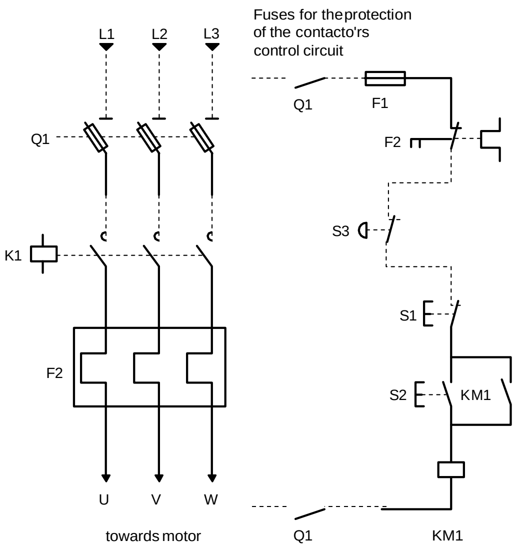


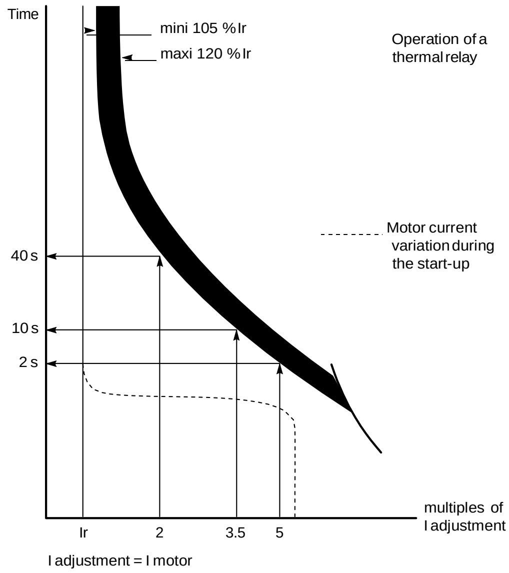


Protection against overloads

This function is ensured by thermal relays. The rules for installation highly recommend to have the motor and its supplying circuit protected against overloads.
Motor overloads are from mechanic origin and affect the equipment driven or the motor itself.
The resulting overcurrent may damage the insulation of the windings by excess of heat.

It crosses the supplying circuit that incurs the same risk. But, this circuit can also be overloaded by a current of defect.
As the circuit is normally calibrated for the motor current, the thermal relay protects both of them against overloads.





The combination «contactor + thermal relay» constitutes a direct starter complying with the *IEC 947-4 standards*.
Moreover, this one functions when the motor is in danger in case of one phase cut-off (due to the fusion of fuses for example). Such operations of the relay are called differential operations, the relay only starts to operate for a balanced overcurrent, between 105 and 120 % of the current for which it is adjusted, and provokes the opening of the contactor in a time all the more short since the overcurrent is significant.

The standard use corresponds to the category 10.
For long start-ups, we recommend to select relays of categories 20 or 30.

If the start-ups succeed one another at the rate of 30 per hour or more, the thermal relay may not be adapted to the duty for which the motor has been especially selected. In that case, the protection should be ensured by an electronic relay or by a sonde incorporated into the motor and coupled with a relay.

Protection against short-circuits

This protection is ensured by cut-outs or circuit breakers with fuses. Iq is the presumed short-circuit current value (according to *IEC 947-4*) corresponding to the short-circuit current that is likely to be reached if the Protective Device against Short-Circuits or DPCC doesn't interrupt it. This is the maximum short-circuit current value for which the manufacturer warrants the co-ordination.
Short-circuit can happen in the circuit, in the motor's terminal box or in its windings after the destruction of the insulation.

As per the *NFC 15-100 standards*, a «DPCC» must protect the circuit, the equipment it includes and eventually the environment of the motor.
The compatibility of the components associated for a «motor start-up» - contactor, thermal relay, circuit breaker or fuses - and the quality level of protection are assessed by the co-ordination class. The most current one is «co-ordination 2».

The *IEC 947-4* recommendations define 2 types of co-ordination from which no danger should result to people or installations:
Type 1: after the short-circuit, the materials shouldn't be in a position to function without repair or replacement of damaged parts.
Type 2: after the short-circuit, the materials should be in a position to function (the risk of soldering is possible).
The co-ordination tables proposed are resulting from satisfactory tests undertaken under the Iq current and the *r* current according to *IEC 947-4*.
* The testing current *r* is a conventional value of the short-circuit current that depends on the current of use AC_3.

Safety cut-offs or emergency stop

According to the installation rules *NFC 15-100* (§ 462), this function is necessary when a danger to human beings can result from a failure during the operation or an electrical defect.

It has to be possible to stop the machine, putting the circuit off-load by acting on a single, easy to access and fastly recognisable system - one or several emergency stop switches piloting the contactor(s).

Association «contactors - thermal relays - co-ordination type 2 - 50 kA fuses»

Permanent, temporary or intermittent service up to 30 cycles of operation per hour.
Ambient temperature � **55 C°**.

Motor(1)						Three-pole contactor	Adjustment zone of the three-pole differential thermal relay	Types of fuses aM Calibre	g1 or BS88 Calibre
220/230 V			380/400 V						
kW	ch	In(A)	kW	ch	In(A)	Calibre	A	A	A
30	40	103	55	75	105	CBA 55 150	80/125	125	200
40	54	134	75	100	138	CBA 55 150	100/160	160	200
45	60	150	80	110	147	CBA 55 150	100/160	160	200
55	75	182	90	125	170	CBA 55 150	125/200	200	250
63	85	203	110	150	205	CBA 55 150	160/250	250	315
75	100	240	132	180	245	CBA 55 200	200/315	315	400
80	110	260	150	205	200	CBA 55 200	200/315	315	400
110	150	356	185	250	342	CBA 75 400	250/400	400	500
			200	270	370	CBA 75 400	315/500	400	500
140	190	450	250	340	460	CBA 75 500	315/500	500	630
147	200	472				CBA 75 630	400/630	500	630
180	245	578	315	430	584	CBA 75 800	400/630	630	800
200	270	626	335	450	620	CBA 75 800	500/800	800	1000
220	300	700	400	545	710	CBA 75 800	500/800	800	1000

(1)the values given in the table are normalised outputs and average nominal voltages. The relay will be adjusted for the current indicated on the ID plate of the motor or, failing that, for the one given in the In column. For any other output, select the relay covering the nominal current with the corresponding contactor and fuses of the same calibre or immediately superior to In.

General

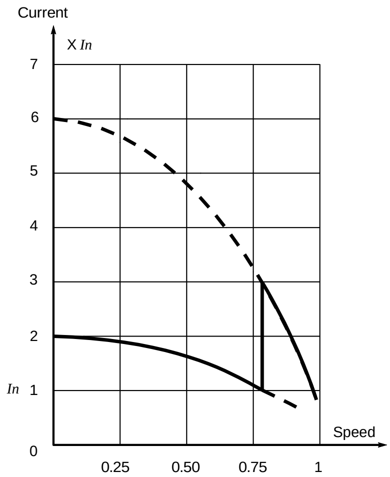
«Delta-star» start-ups are used:
- either to limit the inrush current at the start-up of a motor according to the recommendations of installation.
- or to reduce the torque and the mechanical stress on the machine.

This kind of start-up can only be applied to squirrel-cage motors equipped with 6 terminals, whose motor star connection voltage corresponds to the network voltage.

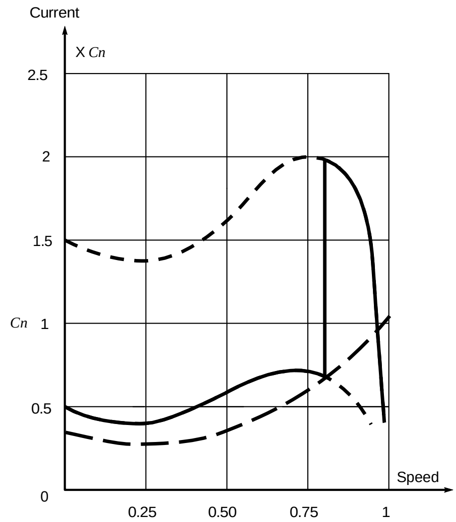
In this case of star connection motors, each winding is supplied with $0.58\ Un$ (i.e. $\frac{Un}{\sqrt{3}}$) which enables to avoid a signifiant inrush current on the line and to limit the value at the third of the one for direct start-up, i.e. ca $2\ In$.

The motor torque - star connection during start-up - is also reduced to the third of the value corresponding to a direct start-up.
Indeed, the motor torque is proportional to the square of the supply voltage.
For $0.58\ Un$, we have $(0.58)^2$ i.e. 1/3.
By admitting that, the motor torque for direct start-up is 1.5 times the nominal torque i.e. $Cd = 1.5\ Cn$, the star connection torque during is of $Cd = 0.5\ Cn$ start-up.
This kind of start-up allows the maximum motor torque for the minimum line current.
This kind of start-up is suitable for low or medium-power machines starting in neutral or with low loads, example: low-inertia machine, compressor starting in neutral, pumps starting with closed gates, small fans.

Squirrel-cage motor operation curves.



delta connection current (direct)
star connection current



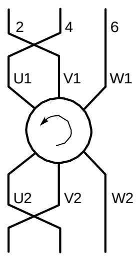
delta connection current (direct)
star torque
resistive torque of the machine

Recommendations of use

Let L1, L2 and L3 be the chronological order of succession of the phases. In order to reduce the transient current resulting from the change from star connection to delta connection, the cabling is recommended to be as follows:

motor winding	U1-U2 between L1 and L3
delta connection	V1-V2 between L2 and L1
	WI-W2 between L3 and L2.

In case of reverse rotation of the motor and in order to comply with the above conditions, it is recommended to cross two windings of the motor according to the opposite drawing.



Recommended connection to reverse the motor's rotating direction (Normalised motor, shaftend side view).

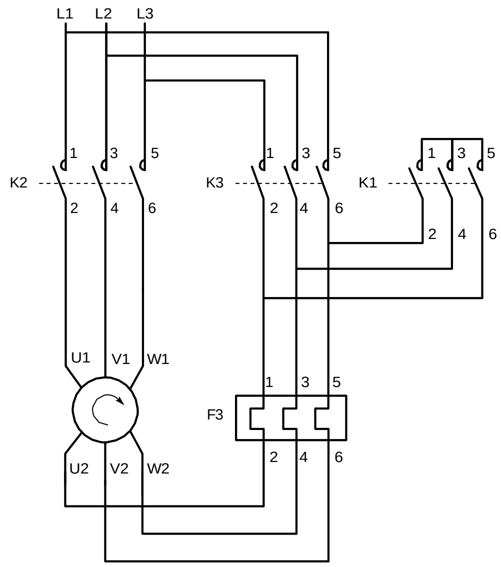
Selection of components

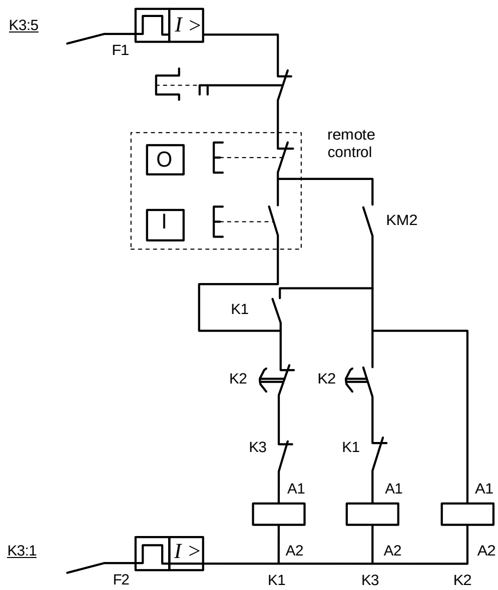
The components are placed according to the following drawing:

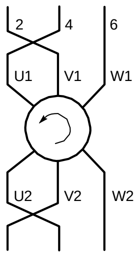
- K2 and K3 contactors are calibrated at *Ie (AC_3)* ≈ *0.58 In motor*.
- K1 is calibrated at $Ie\ (AC\_3) = \dfrac{In\ motor}{3}$

Starting current can be withstood for 20 seconds (during 2 successive start-ups of 10 sec. each).
Such contactors are equipped with a temporiser. The thermal protection relay must be adjusted at *0.58 In motor*.

Operation







Recommended connection to reverse the motor's rotating direction (Normalised motor, shaftend side view).

Starting sequence:

1st step:
Closing of K1, closing of K2, start-up of the «star» motor.
Starting temporisation adjusted to obtain 80 % of the star connection speed.

2nd step:
Opening of K1, closing of K3, «delta» connection.

«Star delta» changeover - Role of the temporisation

Make sure that the «star delta» changeover lasts long enough to enable the extinction of the arcs, in order to avoid short-circuit between phases.

General

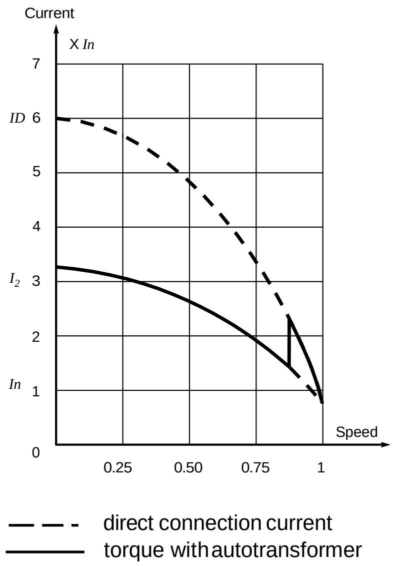
- The start-up by autotransformer has the following advantages:
- it is suitable for all cage motor start-up: at 3 terminals, 6 or 9 terminals according to the North-American technology.
- start-up occurs under reduced voltage.
- it provides the maximum torque for the minimum line current.
- it enables to adapt the starting torque $(C = f(U)^2)$ to the resistive torque of the machine, thanks to its 2 ou 3 intermediary voltage measures of which generally only one is used *(0.65 - 0.80 Un* or *0.50 - 0.65 - 0.80 Un)*.
- it is used to start high-power and/or high-inertia machines.
- the motor is never separated from its supplying source during the start-up (closed transition) and transient phenomena are suppressed.

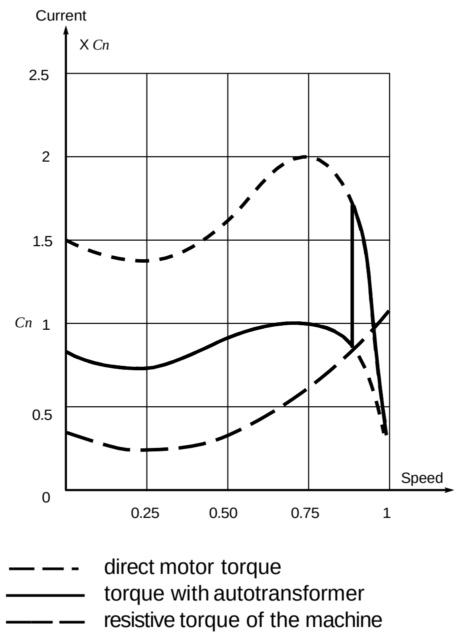
- The start-up is made of 3 steps:
- autotransformer «star» changeover by K1, then closing of the contactor K2. The motor starts under reduced voltage.
- opening of the neutral point by K1. A winding part of the autotransformer is inserted in each phase during a short time constituting a statory star inductance.
- a third contactor K3 connects the motor under full network voltage and provokes the autotransformer «OFFLOAD» by K2.

The autotransformer used generally has an air-gap (adjusted or not) so as to obtain, during the 2nd step of start-up, an inductance «series of values» compatible with a correct start-up.

Typical values for a start-up by autotransformer

- Operations curves:

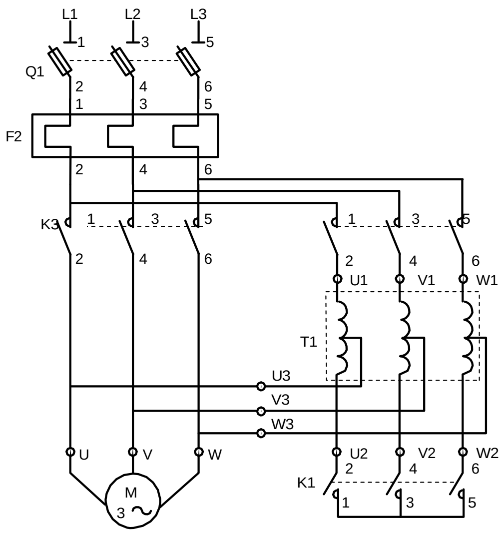




Constitution of a starter

- Operation

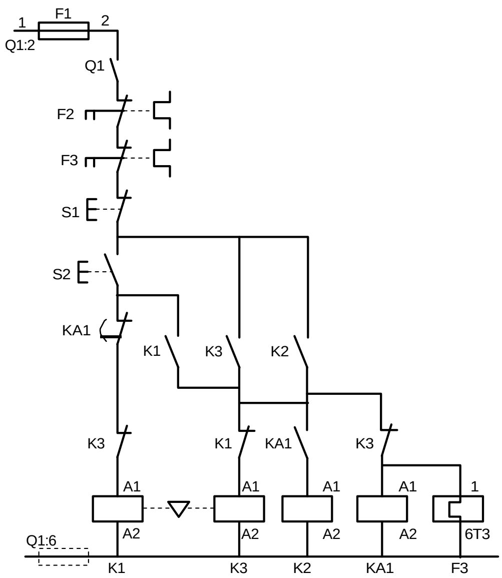
Power circuit



Operation

Manual closing of Q1.
Closing of K1: star connection of the autotransformer.
Closing of K2: supply of the autotransformer, start-up of the motor.
Opening of K1: elimination of the star connection of the autotransformer, the motor is transiently supplied through a part of the windings of the autotransformer.
Closing of K3: direct supply of the motor.
Opening of K2: elimination of the autotransformer.
Particularities: Q1: calibre In motor,
F2: calibre In motor.

Control circuit



Operation

Pulse on S2.
Closing of K1.
Locking of K3 by K1.
Closing of KA1 by K1 and supply of the thermal temporiser relay F3.
Closing of KM2 by KA1.
Self-supply of K2.
Opening of K1 by KA1.
Closing of K3 by K1.
Locking of K1 by K3.
Self-supply of K3.
Opening of KA1 by K3.
Elimination of F3 by K3.
Opening of K2 by KA1.
Stop: pulse on S1.

F3: Thermal temporiser relay ensuring the protection of the autotransformer against too frequent or incomplete start-ups.

For the control of single running direction motors.
To be mounted by the customer (on frame or in cabinet).
Selection of components:
The contactors defined in the opposite table have been determined according to the following criteria:
- starting current = $6\,In$,
- starting time: 30 sec,
- number of start-ups per hour: 3; 2 of which are consecutive,
- ambient temperature e , : : $40°C$,
- transient on closing of $K3 \leq 7\sqrt{2} \times In$.

(1) for parallel connection of the fuses, make sure to strictly respect the manufacturer's recommendations.

Normalised outputs 220/230 V	Normalised outputs 380/400 V	Contactors Line K3	Contactors Autotransformer K2	Contactors Star K1	Recommended delay of thermal relay	Fuses aM gl calibres	
kW	kW	type	type	type	calibre	A	A
40	75	CBA 55 150 3.0	CBA 55 80 3.0	CBA 55 80 3.0	100 to 160	160	200
51	90	CBA 55 150 3.0	CBA 55 150 3.0	CBA 55 80 3.0	125 to 200	200	250
63	110	CBA 55 150 3.0	CBA 55 150 3.0	CBA 55 80 3.0	160 to 250	250	315
75	132	CBA 55 200 3.0	CBA 55 150 3.0	CBA 55 150 3.0	200 to 315	250	315
90	160	CBA 75 400 3.0	CBA 55 200 3.0	CBA 55 150 3.0	250 to 400	315	400
110	200	CBA 75 400 3.0	CBA 75 400 3.0	CBA 55 150 3.0	315 to 500	400	500
140	250	CBA 75 500 3.0	CBA 75 400 3.0	CBA 55 200 3.0	400 to 630	500	630
180	315	CBA 75 630 3.0	CBA 75 400 3.0	CBA 55 200 3.0	400 to 630	630	800
200	355	CBA 75 800 3.0	CBA 75 500 3.0	CBA 75 200 3.0	500 to 800	800	1000
220	400	CBA 75 800 3.0	CBA 75 500 3.0	CBA 75 400 3.0	500 to 800	800	1000
250	450	CBA 75 1000 3.0	CBA 75 630 3.0	CBA 75 400 3.0	630 to 1000	800	1000
280	500	CBA 75 1000 3.0	CBA 75 630 3.0	CBA 75 400 3.0	630 to 1000	1000	1250
315	560	CBA 71 1250 3.0	CBA 75 630 3.0	CBA 75 500 3.0	630 to 1000	1000	1250
335	630	CBA 71 1250 3.0	CBA 75 630 3.0	CBA 75 500 3.0		1250	2 x 800(1)
400	710	CBA 71 1600 3.0	CBA 75 800 3.0	CBA 75 500 3.0		1250	2 x 800(1)
450	800	CBA 71 1600 3.0	CBA 75 800 3.0	CBA 75 500 3.0		2 x 800(1)	2 x 1000(1)
500	900	CBA 71 2000 3.0	CBA 75 1000 3.0	CBA 75 630 3.0		2 x 800(1)	2 x 1000(1)

For rotary circuits of slip-ring motors (elimination of starting resistors)

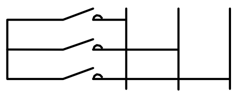
The most common application is for starters and without rotor speed adjustment: pumps, fans, conveyers, compressors, etc...

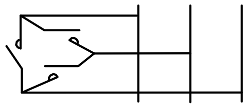
Rotary contactors are subjected to the statory contactor and only open after this one, when the rotary voltage has disappeared or nearly disappeared.

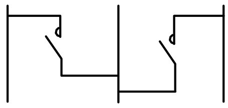
They make the current corresponding to the usual starting peak (1.5 to 2.5) of the nominal rotary current and open the circuit in neutral. This use is characterised by an easy closing and switch-off.

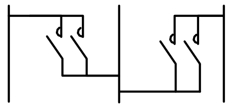
The selections below take into account:
- a ratio of 2 between the maximum rotary voltage of use (*Uer*) and the statory voltage of use (*Ues*), ratio proposed by the *IEC 947-4* standards, section «starters».
- a warranty for casual operations (current switch-on and switch-off ratings) recommended by these same standards.

The use of contactors with magnetic blow-out are recommended in case of control via manual combinative device.


"Star" connection


"Delta" connection


V connection


W connection

Current factor and rotary voltages of use according to the contactor connection

Type of connection	Factor(1) $\frac{I\ rotary}{I\ of\ use}$	Ue max. three-phase rotary voltage in Volts	Ue three-phase rotary voltage with counter-current in Volts
		Type of contactors	
		CBA with reinforced insulation	CBA with normal insulation
Star	1	2000 V	1000 V
Delta	1.5	1700 V	850 V
In V	1	1700 V	850 V
In W	1.6	1700 V	850 V

(1) factor to be applied to the values mentioned in the table below for currents of use.

Table of currents of use (ambient temperature inferior or equal to 40°C)

Calibre of CBA contactor		80	150	200	400	500	630	800	1000	1250	1600	2000	2500
	Changeover time	Current of use in Amps											
Intermediary contactor: with number of operation cycles inferior or equal to 30/hour	10 s	277	519	692	1385	1732	2182	2771	3464	4330	5542	6928	8660
	30 s	160	300	400	800	1000	1260	1600	2000	2500	3200	4000	5000
	60 s	113	212	282	565	707	890	1131	1414	1767	2262	2828	3535

Calibre of CBA contactor		80	150	200	400	500	630	800	1000	1250	1600	2000	2500
	Changeover time	Current of use in Amps											
Intermediary contactor: with number of operation cycles inferior or equal to 60/hour	5 s	277	519	692	1385	1732	2182	2771	3464	4330	5542	6928	8660
	10 s	160	300	400	800	1000	1260	1600	2000	2500	3200	4000	5000
	30 s	113	212	282	565	707	890	1131	1414	1767	2262	2828	3535

Calibre of CBA contactor		80	150	200	400	500	630	800	1000	1250	1600	2000	2500
	Changeover time	Current of use in Amps											
Intermediary contactor: with number of operation cycles inferior or equal to 120/hour	5 s	195	367	489	979	1224	1543	1959	2449	3061	3919	4898	6123
	10 s	138	259	346	692	866	1091	1385	1732	2165	2771	3464	4330

For rotary circuits of slip-ring motors

In a simple starting equipment, the contactors that short-circuit the rotary current go through a static voltage stress whose «decreasing with time value» is all the more low since they are far from the rotor's terminals. Therefore, the rotary voltage of use can be deduced from the maximum voltage of use. It is then possible to use contactors whose nominal insulating voltage is inferior to the rotary voltage. This use is characterised by an easy closing and switch-off.

The selections below take a ratio of 2 between the maximum rotary voltage of use (*Uer*) and the statory voltage of use (*Ues*) into account, ratio proposed by the *IEC 947-4* standards, section «starters».

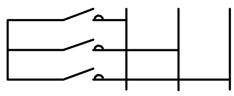
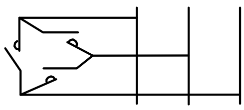
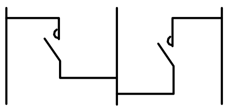
For a regenerative braking equipment, the rotary voltage of use corresponds to the insulating voltage.

For slowing down or braking equipment, the selection of related contactors will also have to take the switch-off conditions into account.

The use of contactors with magnetic blow-out are recommended in case of control via manual combinative device.

Current factor and rotary voltages of use according to the contactor's connection

The temporary allowable current according to the starting time must be taken into account for the current crossing the contactor of a rotary circuit. Only the contactor for rotor short-circuit takes the permanent current into account.

Type of connection	Drawing of the circuit	I rotary / I of use in Amps	Ue maximum three-phase rotary voltage in Volts	Ue three-phase rotary voltage with counter-current in Volts	Type of contactor
Star		1	1320	660	CBA
		1	2000	1000	CBA with reinforced insulation
Delta		1.5	1100	550	CBA
		1.5	1700	850	CBA with reinforced insulation
V		1	1100	550	CBA
		1	1700	850	CBA with reinforced insulation

Control of three phase capacitor batteries used for power factor correction

The capacitors make with the circuit at the terminals of which they are connected, oscillating circuits able to create high transient with high frequencies overcurrents as they are connected.
Generally speaking, the peak on closing is all the more low since:
- the network inductances are high,
- the power of line transformers is small,
- the transformer short-circuit voltage is high,
- the ratio between the addition of the powers of connected capacitors and the power of the capacitor to be connected is small (in case of multilevel batteries).

In compliance with the *VDE 0560*, *NFC 54 100*, *IEC 70* standards, the contactor for control must be able to withstand a permanent voltage of 1.43 times the nominal current of the level controlled.

The powers of use indicated in the tables below take this overload into account.

The protection against short-circuits is usually ensured by g1 fuses calibrated at 1.3 to 1.4 In.

Use of contactors

Connection is direct. The values of the peak current on closing shouldn't exceed the ones mentioned below.
If the peak current has to be reduced, insert an self-inductive coil or a pre-closing resistor in each of the 3 capacitor supply phases. The dimensions of the self-inductive coils will be scheduled according to the temperature chosen during operation.

Compensation by single-level capacitor battery
The insertion of a shock self-inductive coil is useless as the inductance of the network is sufficient to limit the peak to values compatible with the characteristics of contactors.

Compensation by multilevel capacitor battery
The insertion of a shock self-inductive coil in each of the 3 phases of each level is compulsory.

Nota:
Shock coils with minimum inductance of $4\ \mu H$. These can be obtained by winding 4 or 6 turns of 15 cm diameter each round the conductor of each phase.

Table of contactor's maximum powers of use
Connection with possible shock self-inductive coils. Power of use: 50/60 Hz, ambient temperature :,: 40 °C.

Battery power (kVAR)	Type of contactor	In (A)
Three phase network 220/240 V		
5	CBA 55 80SR(1) 20 A	20
7.5	CBA 55 80SR(1) 40 A	32
10	CBA 55 80SR(1) 40 A	38
12.5 - 15	CBA 55 80SR(1) 40 A	40
20	CBA 55 80	80
25	CBA 55 150	100
30 - 35	CBA 55 150	125
40 - 47.5	CBA 55 150	160
50	CBA 55 200	200
60	CBA 55 200	250
75 - 90	CBA 75 400	320
100 - 120	CBA 75 400	400
150	CBA 75 500	500
180	CBA 75 630	630
Three phase network 400/440 V		
10	CBA 55 80SR(1) 25 A	25
15	CBA 55 80SR(1) 40 A	38
20	CBA 55 80	50
25 - 30	CBA 55 80	63
45 - 50	CBA 55 150	115
65	CBA 55 150	125
70 - 75 - 80	CBA 55 150	160
90	CBA 55 200	200
100 - 125	CBA 55 200	250
150	CBA 75 400	315
180 - 200	CBA 75 400	400
240 - 250	CBA 75 500	500
300	CBA 75 630	630
350	CBA 75 800	800

(1) SR: reinforced blowout.

How to select contactors for heating circuits

General

A heating circuit is a terminal circuit supplying one or several resistant heating elements controlled by a contactor.

Rules of motor's supply circuits are also applicable for heating circuits, taking into account the fact that normally they cannot carry overcurrents. This can only protect them against short-circuits.

Heating elements features

Here are only considered heating systems with resistive elements used for industrial ovens, offices (infrared heaters, convectors, etc…). The resistance variation between "hot and cold" creates a current peak in the system that never exceeds 2 to 3 Un when the voltage is applied.

Moreover, this peak only fully appears when first energised, if the temperature variations are limited by a regulator.

The output and the nominal current are given for the duty temperature.

Protection

The current absorbed in permanent duty by a heating circuit is constant when the voltage is stable.

As in an existing system, the number of receptors are very unlikely to vary and as such a circuit is unable to create overloads, it can only be protected against short-circuits.

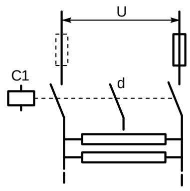
You may choose:
- g1 class fuses or,
- modular circuit breakers.

Nevertheless, it is always possible and sometimes more economical (due to the cable section) to use a protection system coupling thermal relays and aM fuses.

Connection - Control - Protection

One element (or a group of elements) with a given output can be single-phase or three-phase and supplied either by 220/127 V or by 380/220 V.
The different possible connections can be classified into 3 groups:

2 pole single-phase current connection
Circuit controlled by 2 poles of the contactor.



4 pole single-phase current connection
Circuit controlled by a tetrapolar contactor whose poles are connected 2 to 2 in parallel via suitable small junction bars. This solution allows the control of outputs more or less equivalent to the ones controlled by the same contactor in three-phase current.
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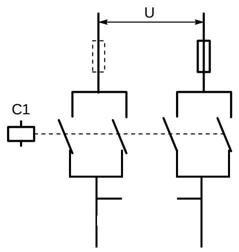
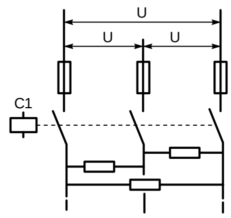


Three-phase current connection
Circuit controlled by the 3 poles of the contactor.



How to select contactors from the output controlled

The combinations proposed thereunder are given for an ambient temperature of 50°C and for outputs under nominal voltage; they still ensure the control even in case of a lasting overvoltage at 110 % of Un.

2 pole single-phase current connection

Calibre of contactor	Maximum output in kW						
	220/230V	380/400V	415V	440V	500V	660V	1000V
CBA 55 80 2.0	18	32	33	35	40	52	
CBA 55 150 2.0	46	80	83	88	100	132	200
CBA 55 200 2.0	58	102	106	112	128	168	256
CBA 75 400 2.0	73	128	132	140	160	211	320
CBA 75 500 2.0	92	160	166	176	200	264	400
CBA 75 630 2.0	110	192	199	211	240	316	480
CBA 75 800 2.0	147	256	265	281	320	422	640
CBA 75 1000 2.0	184	320	332	352	400	528	800
CBA 71 1250 2.0	230	400	415	440	500	660	1000
CBA 71 1600 2.0	294	512	531	563	640	844	1280
CBA 71 2000 2.0	368	640	664	704	800	1056	1600

4 pole single-phase current connection

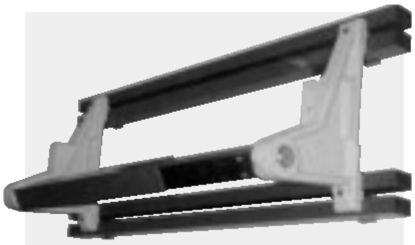
Calibre of contactor	Maximum output in kW						
	220/230V	380/400V	415V	440V	500V	660V	1000V
CBA 55 80 4.0	25	44	46	49	56	73	
CBA 55 150 4.0	64	112	116	123	140	184	280
CBA 55 200 4.0	82	143	148	157	179	236	358
CBA 75 400 4.0	103	179	185	197	224	295	448
CBA 75 500 4.0	128	224	232	246	280	369	560
CBA 75 630 4.0	154	268	278	295	336	443	672
CBA 75 800 4.0	206	358	371	394	448	591	896
CBA 75 1000 4.0	257	448	464	492	560	739	1120
CBA 71 1250 4.0	322	560	581	616	700	924	1400
CBA 71 1600 4.0	412	716	743	788	896	1182	1792
CBA 71 2000 4.0	515	896	929	985	1120	1478	2240

three-phase current connection

Calibre of contactor	Maximum output in kW						
	220/230V	380/400V	415V	440V	500V	660V	1000V
CBA 55 80 3.0	39	69	71	76	86	114	
CBA 55 150 3.0	99	173	179	190	216	285	433
CBA 55 200 3.0	127	221	230	243	277	365	554
CBA 75 400 3.0	159	277	287	304	346	457	692
CBA 75 500 3.0	199	346	359	381	433	571	866
CBA 75 630 3.0	239	415	431	457	519	685	1039
CBA 75 800 3.0	318	554	575	609	692	914	1385
CBA 75 1000 3.0	398	692	718	762	866	1143	1732
CBA 71 1250 3.0	497	866	898	952	1082	1428	2165
CBA 71 1600 3.0	637	1108	1150	1219	1385	1829	2771
CBA 71 2000 3.0	796	1385	1437	1524	1732	2286	3464

Description of contactor's components

Frame

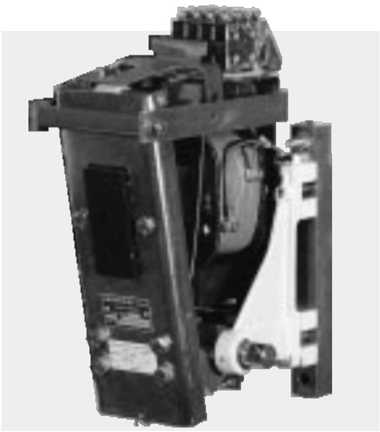


Frame CBA - CBC - 71 - 1250/2000 A type

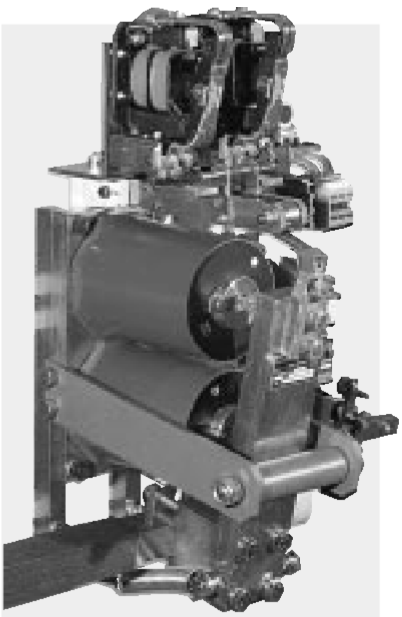
The basic frame of contactor consists of one fixed rod for the 80 to 200 A range or four fixed rods for the 400 to 5000 A range, a moving shaft, two bearings and their bushes.

The shaft and the rod(s) are coated with a high-resistance insulator. The mechanical endurance of these contactors is of several million operations.

Electromagnet



Coil for laminated magnetic circuit



Coil for solid magnetic circuit

The electromagnet consists of a "magnetic circuit + trip coil" assembly, normally located on the right side of the poles.
In compliance with international standards, voltage at coil terminals must be between 85 and 110% of the coil's nominal voltage.

Coil

The function of the coil is to produce the magnetic flux required to attract the moving armature of the electro-magnet.
It is designed to resist the mechanical shocks caused by the closings and openings of the contactors and the electromagnetic shocks caused by the current passing through its windings.

The coils used are especially resistant to overvoltages, shocks, aggressive environmental conditions and are made of reinforced enamelled copper wire; they are vacuum impregnated and some are overmoulded.

AC type magnetic circuit

Characteristics:
- silicon steel plates assembled by rivets,
- laminated circuit to reduce the eddy currents which are generated in all metallic masses subjected to alternating flux (these eddy currents reduce the effective flux for a given magnetizing current and cause unwanted heating of the magnetic circuit),
- accurate grinding of the fixed and moving parts ensuring silent operation,
- one or two phase-shift or Frager rings creating, in part of the circuit, a flux offset with respect to the main alternating flux. This feature prevents the periodic elimination of the attraction force total flux (which would cause noisy vibrations).

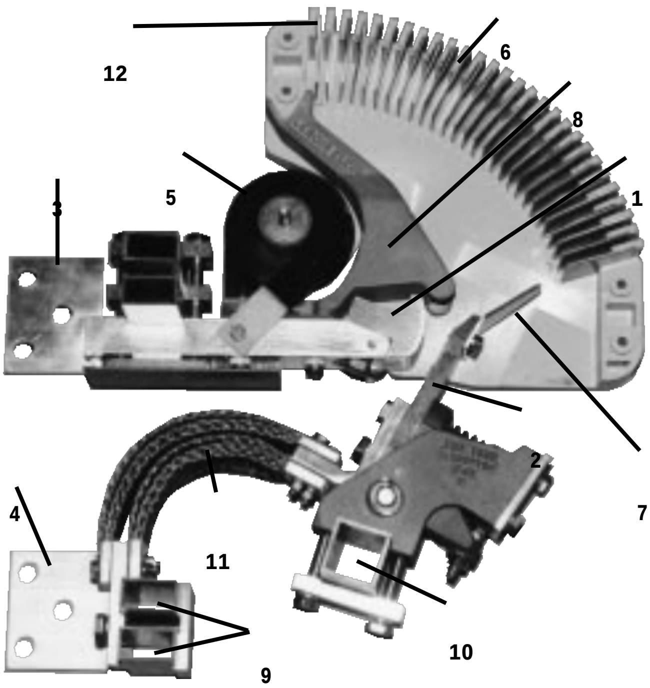
Use in DC mode:

A laminated magnetic circuit can be used in DC mode without any drawbacks. In this case, the coil used differs from the coil normally used for AC voltage of same value and requires the insertion of an economy resistor.

DC type magnetic circuit

No eddy currents are formed in the magnetic circuit of an electromagnet supplied with DC current. In some cases, it is preferable to select a solid steel electromagnet especially designed for DC current instead of the AC current type laminated magnetic circuit, requiring indispensible adaptations, as they are better suited to the conditions of use (high rates, high endurance, no peak on closing).

Main poles



These poles make and break the current in the power circuit. Consequently, they are sized to take the nominal current of the contactor, in permanent duty, without abnormal heating.
They include a fixed part and a moving part, the moving part is equipped with springs transferring a suitable pressure to the contacts.
The kinematic study of the contacts and magnetic circuits has allowed us to keep the contact bounce to a minimum which contributes to an extended electrical lifetime.
The main poles are single pin.
The current only passes through the arc-blowout pole coil during opening. It is introduced into the circuit by the arc when it passes from the fixed pin to the arc-blowout horn.
Used to solve some automatic operating problems, rupturing poles operate in the opposite way to opening poles: their contacts are “conductive” when the control electromagnet is not supplied and “nonconductive” when energized.

View of a c osing po e
CBA - CBC 71 2000 A

1: fixed contact,
2: moving contact,
3: upper connecting section,
4: lower connecting section,
5: arc blowout coil,
6: arc blowout cage,
7: moving blowout horn,
8: fixed blowout horn,
9: fixation bars,
10: moving shaft,
11: supple connection,
12: metallic wing.

Main contacts

80 to 200 A range, two types of contacts exist:
- copper contacts (C) for current use, semi-intensive and intensive duties (AC_2 - AC’2 - AC_3 - AC_4 - DC_2 - DC_3 - DC_4 - DC_5 use).
- silver or silver alloy contacts (M) for continuous, semi-intensive and intensive duties particularly recommended for low voltages and corrosive or dusty environmental conditions (AC_1 - AC_2 - AC’2 - AC_3 - DC_1 - DC_2 - DC_3 - DC_4 - DC_5 use).

400 to 1000 A range:
- silver - calcium oxide contact.

1250 to 2000 A range:
■ 1250 A poles:
- copper contact (C),
- silver cadmium oxide contact (M) on request for use with very low voltages or in corrosive or dusty environmental conditions.

Changing the contact type does not increase the nominal thermal current of the device.
■ 1600 to 2000 A poles:
- silver cadmium oxide contact only.

■ 2500 to 5000 A poles:
- copper contact (C),
- silver cadmium oxide contact (M).

Arc-blowout coil

Depending on the current, this coil is made of a flat edge conductor or round enamelled wire.
The arc-blowout coil is normally sized for the pole’s nominal thermal current.
In DC, when the current used is 50 % lower than the nominal thermal current of the device, the arc-blowout coil must be adapted to suit the current used.

Blowout cages

All arc-blowout poles are equipped with blowout cages. They are made of “compound polyester” for the 80 to 2000 A range and of micro-concrete reinforced with glass fibre for the 2500 to 6200 A range. In addition, all the blowout cages for contactors ranging from 150 to 2000 A are equipped with metallic wings that fraction the electric arc, allowing its extinction and dissipation. The easy and fast extraction of these blowout cages allows at any time the main contacts to be efficiently checked for wear and replaced if necessary.

Auxiliary contacts

There are three types:
- D block
Including 1 normally open contact and 1 normally closed contact, installed above the magnetic circuit for the 400 to 1000 A range with a maximum of 4 blocks D per magnetic circuit.

- M block
Several configurations possible.

- TP 86 pneumatic delayed block
(See technical specifications for each type).

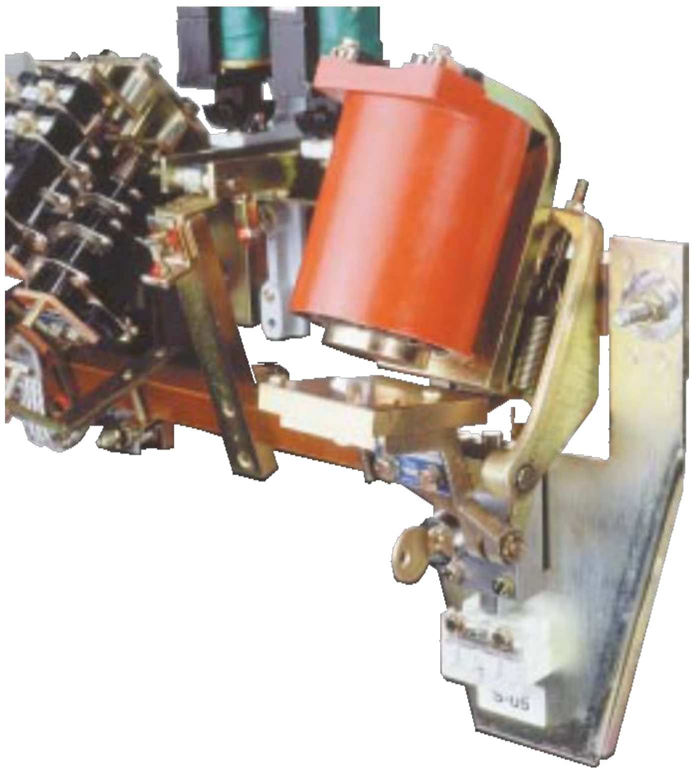
Mechanical locking between two contactors

Types of contactors allowing mutual mechanical locking of two contactors exist.
This locking is achieved by rod and requires vertical alignment of the bearings opposite the magnetic circuit on the two contactors.

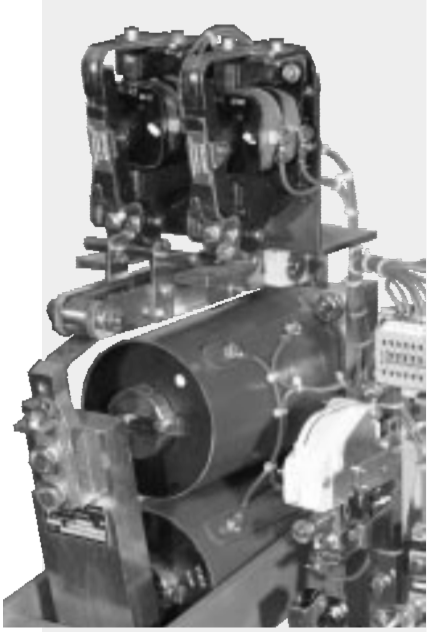
For a different center-to-center distance or for locking two contactors of different sizes, please consult our technical department.

Locking by "RONIS" type lock

Possibility to lock all types of contactors by a "RONIS" type lock.
Support manufactured on request (lock not supplied).



Mechanical latching with electrical release



General

Mechanically latched contactors are equipped with a mechanical locking facility with electrical and manual release that enables them to remain closed although the coil is no more supplied.

- Use

Specific properties of contactors with mechanical latching and electrical release make them suitable for various applications.

❑ Properties

- preservation of the sequence memory in automation equipments in case of disappearance of the control voltage.
- energy savings, as the coil's source of supply does not produce any current when the contactor is lachted.
- change of state "open"-"closed" by supplying the tripping coil.
- insensibility to the network's disruptions.
- silent contactors when latched.

❑ Applications

These contactors are suitable for:
- refineries, power stations, excitation circuits, electromagnet controls,...
- contactors remaining closed for long times, example:
  - refinery,
  - power supply,
  - low voltage distribution.
- selective opening control.
- no untimely closings or openings of the main poles.
- current conductor for applications over 1000 V.

- Operation

Such contactors are equipped with a mechanical latching facility with one or two tripping coils, supplied in direct or alternating current (in that first case, the coils are not polarised). When a short pulse is applied to the contactor (control by pulse switch, required time > 0.5 s), this one closes and remains mechanically latched. It is no more necessary to supply the closing coil, the contactor remains closed.
The opening of the contactor is obtained by exciting the tripping coil.

- Precautions of use

For 80 to 200 A range, it is necessary to foresee one automatic switch-off contact for the tripping coil(s) to avoid their destruction in case of extended command. For other ranges, this contact is directly pre-cabled on the contactor as all these coils are pulse coils.

- Manual release facility

On standard versions, for our whole range (except 80 to 200 A range) contactors are equipped with a manual release facility, useful in case of disappearance of the control voltage for example (for 80 to 200 A range, available on request).

- Options

Individual protective system for the tripping coils providing memorisation of the defect that caused the opening, one contact for its visualisation and remote or local closing facility can be supplied separately on a pre-cabled support plate.

All our contactors can be equipped with a mechanical latching with single or double release.

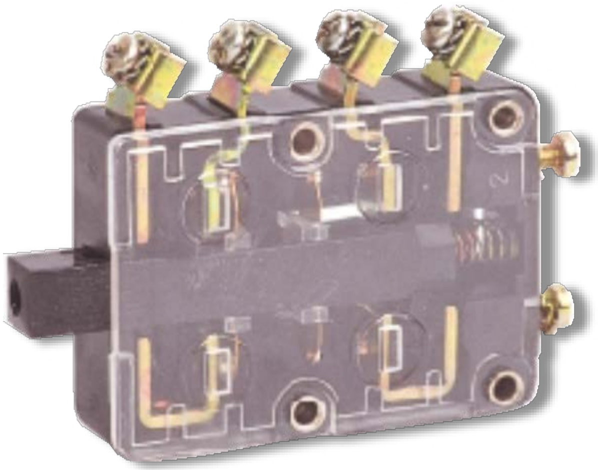
Auxiliar y contacts

As for the main poles, the number of auxiliary contacts can vary in a significant way. 3 types of auxiliary contacts blocks exist:

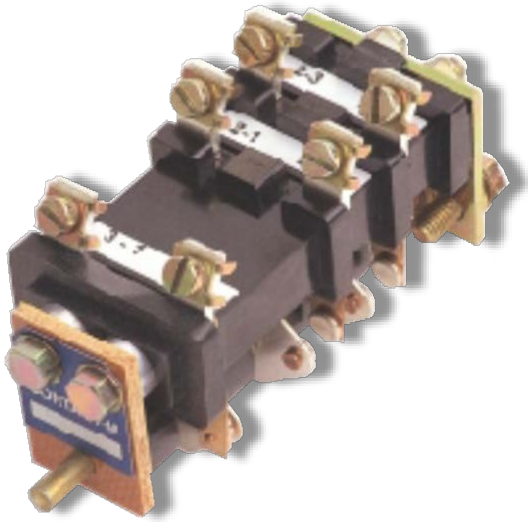
D type
Available only on the 80 to 1000 A range.

M type
Avaible on all our range of contactors; several configurations are possible to meet all the requirements.

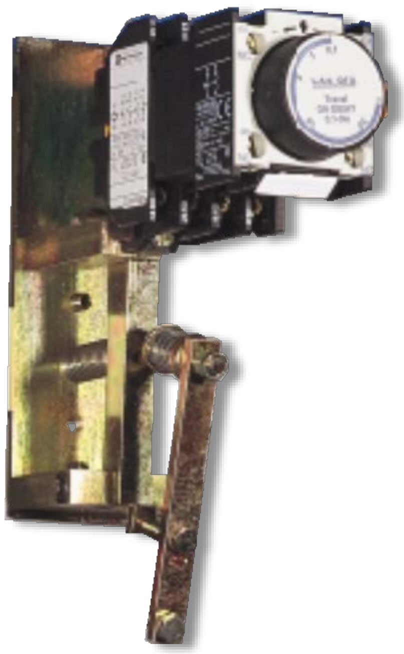
TP 86 type
Delayed blocks available on all our range of contactors:
-A: delayed at rest,
-C: delayed at work.



D type block



M type block

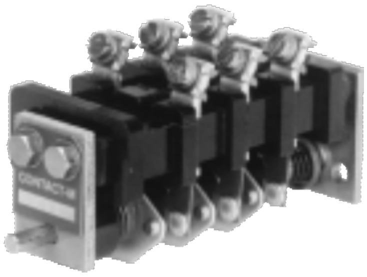


Delayed block

Technical features and overall dimensions

M type blocks

1. Instantanés Type M



Block of 5 (M5) silver pad contacts with double break on closing or opening for 1250 to 5000 A range, on request.

Use

On all modular contactors from 80 to 6200 A.

Description

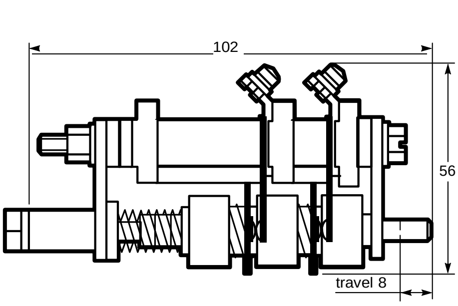
- Block of 2 (M2) or 3 (M3) silver pad contacts with double break on closing or opening.
- The flexibility of the fixed support causes a self-cleaning action on the contacts allowing use for low control voltages (24 and 48 V) without risk of failure.

Technical features

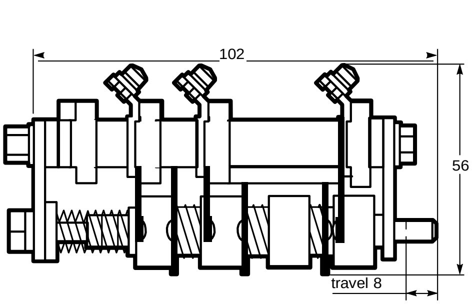
Maximum operating voltage						
AC	V	500				
DC	V	600				
Thermal nominal current	A	15				
Current switch-on rating 500 VAC or 600 VDC	A	60				
Current switch-off rating under a voltage of	V	110	220	440	500	600
AC	A	15	15	15	15	
DC						
on resistive circuit						
1 contact	A	15	5	1	0.75	0.6
2 contacts in series	A		15	3.25	3	
3 contacts in series	A			5	4.5	
on inductive circuit L/R= 15 ms						
1 contact	A	7	1	0.5	0.4	0.3
2 contacts in series	A	15	1.5	0.75	0.7	
3 contacts in series	A		8	2	1.2	
on inductive circuit L/R= 40 ms						
1 contact	A	3	0.4	0.15	0.14	
2 contacts in series	A	15	0.7	0.6	0.4	
3 contacts in series	A		2.5	0.7	0.6	
Weight						
M2	kg	0.210				
M3	kg	0.260				

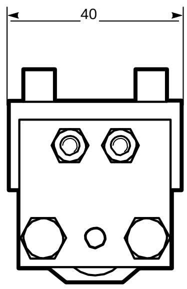
Dimensions

M2 block



M3 block



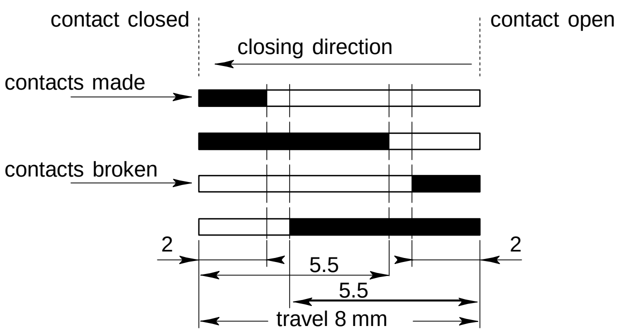


M type blocks

Operating diagrams (instant M type)

Items	Diagrams	Schematics	Items	Diagrams	Schematics
M type with 2 contacts					
O2 - Z	NO 1 NO 2	2.4 2.2 2.3 2.1	**O2 - Y**	NO 1 NO 2	4.2 2.2 4.1 2.1
F2 - Z	NC 1 NC 2	1.4 1.2 1.3 1.1	**F2 - Y**	NC 1 NC 2	1.2 3.2 1.1 3.1
F1O1 - Z	NC 1 NO 2	2.2 1.2 2.1 1.1	**F1O1 - Y**	NC 1 NO 2	2.2 3.2 2.1 3.1
F1O1 - X	NC 1 NO 2	4.2 3.2 4.1 3.1	**F1O1 - W**	NC 1 NO 2	4.2 1.2 4.1 1.1
M type with 3 contacts					
O3 - Z	NO 1 NO 2 NO 3	2.6 2.4 2.2 2.5 2.3 2.1	**O3 - Y**	NO 1 NO 2 NO 3	4.2 2.4 2.2 4.1 2.3 2.1
F3 - Z	NC 1 NC 2 NC 3	1.6 1.4 1.2 1.5 1.3 1.1	**F3 - Y**	NC 1 NC 2 NC 3	1.4 1.2 3.2 1.3 1.1 3.1
F1O2 - Z	NC 1 NO 2 NO 3	2.4 2.2 1.2 2.3 2.1 1.1	**F1O2 - Y**	NC 1 NO 2 NO 3	2.4 2.2 3.2 2.3 2.1 3.1
F2O1 - Z	NC 1 NC 2 NO 3	2.2 1.4 1.2 2.1 1.3 1.1	**F2O1 - Y**	NC 1 NC 2 NO 3	2.2 1.2 3.2 2.1 1.1 3.1
F2O1 - X	NC 1 NC 2 NO 3	4.2 1.2 3.2 4.1 1.1 3.1	**F2O1 - W**	NC 1 NC 2 NO 3	4.2 1.4 1.2 4.1 1.3 1.1
F1O2 - X	NC 1 NO 2 NO 3	4.2 2.2 3.2 4.1 2.1 3.1	**F1O2 - W**	NC 1 NO 2 NO 3	4.2 2.2 1.2 4.1 2.1 1.1

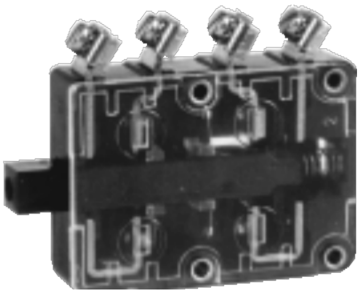
Contact representation:



Use			Marks
instant NC		locking	**1**
instant NO		hold	**2**
delayed NC		power-saving - overlap	**3**
delayed NO		overlap	**4**

D type blocks and delayed blocks

2. D type instant contacts

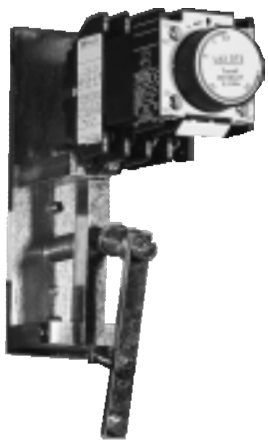


Use
On 80 to 1000 A bar contactors.

Description
Block of 2 contacts (NO + NC).

Thermal nominal current	A	10					
Under							
AC voltage of	V	24	48	127	220	380	500
DC voltage of	V	24	48	110	220		
Operating current							
AC	A	10	10	7	5	3	2.5
DC resistive circuit	A	5	3	1	0.5		
DC inductive circuit L/R = 15 ms	A	5	2	0.8	0.3		
Occasional current switch-on and switch-off rating							
AC	A	20	20	15	12	8	5
DC resistive circuit	A	20	15	4	0.8		
DC inductive circuit L/R = 15 ms	A	20	15	3	0.6		

3. TP 86 type delayed contacts



On request, TP 86 type blocks can be delivered with adjustable delay:

- from 0.1 to 3 seconds,

- from 0.1 to 180 seconds

Use
On 80 to 6200 A modular contactors

Description
Block includes:
- 4 instantaneous auxiliary contacts 3 NO + 1 NC.
- 2 auxiliary contacts, 1 NO + 1 NC delayed; delay adjustable from 0 to 30 seconds.

2 different blocks:
TP 86 A: delayed block counting from contactor closing.
TP 86 C: delayed block counting from contactor opening.

Technical features

Thermal nominal current	A	10						
Nominal voltage	V	660						
Insulating voltage	V	750						
Under								
AC voltage of	V		48	110/127	220	380	440	660
DC voltage of	V	24	48	110	220		440	600
Operating power								
1 million operations								
AC	VA		300	500	600	520	500	390
DC	W	120	90	75	68		61	58
3 million operations								
AC	VA		160	300	330	300	280	190
DC	W	70	50	38	33		28	27
10 million operations								
AC	VA		70	100	110	100	100	80
DC	W	25	18	14	12		10	9
Occasional current switch-on and switch-off rating								
AC	VA		3000	7000	12000	15000	14000	13000
DC	W	1000	700	400	260		220	170

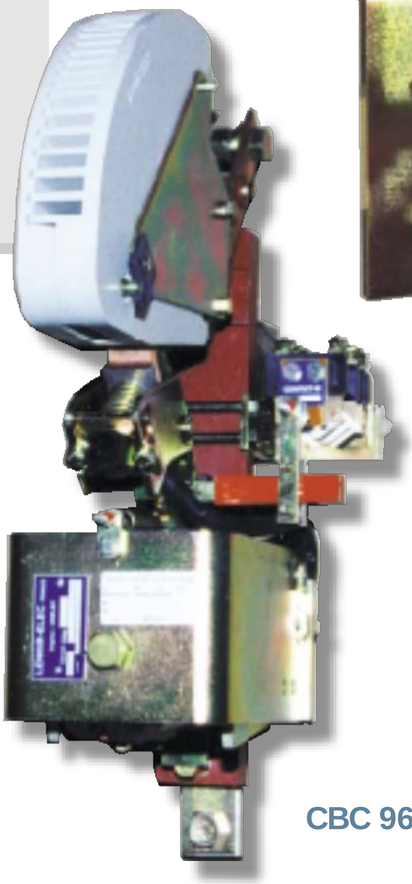
CBC 80 to 630 A,
singl e-pole versions

2 types:

With a closing pole
- **CBC 57 80,**
- **CBC 57 150,**
- **CBC 68 200,**
- **CBC 96 400,**
- **CBC 96 630.**

With an opening pole
- **RUBC 96 400,**
- **RUBC 96 630.**

CBC 57 80



CBC 96 400

Use

Switching-on and cutting-off resistive or inductive circuits. Nominal operating voltage: 500 Va.

Description

- Single pin arc-blowout main pole (reinforced magnetic blowout for adaptation to nominal current, on request).
- Silver or silver alloy contacts for all the range, for use under continuous, semi-intensive and intensive duties DC_1 to DC_5.
- Copper contacts for the calibres 150, 200, 400 and 630 A for current use under semi-intensive and intensive duties DC_2 to DC_5.
- Solid closing electromagnet in iron, direct DC supply for the coil without economy resistor, except for the RUBC 96 400 and 630 contactors.

Options

- Possible addition M type auxiliary contact blocks (2 blocks at maximum).
- Horizontal mechanical locking facility.
- Reinforced insulation.
- Tropical treatment n° 2.

Single pole DCcontactors

4. CBC 80 - 150 - 200 - 400 - 630 and RUBC 400 to 630

Standards: IEC947.4.1.
(In conformity with UTEC63-100, IEC158-1 standards and VERITASregulations.)

						CBC 57-80		CBC 57-150		CBC 68-200	
Thermal nominal current(1)					A	100		250		320	
connecting section					mm²	35		70		95	
Nominal operating voltage					V	500		500		500	
Maximum controlled powers(2) voltage					V	220/250	440/500	220/250	440/500	220/250	440/500
DC_2 - DC_4 duty cycle					kW	22	44	45	90	65	130
Current switch-off rating L/R = 15 ms, all contacts											
in open air under 500 V					A	500		1400		3500	
in cubicle voltage					V	250	500	250	500	250	500
safety perimeter for	metallic walls		insulated walls								
	M	N	M	N							
	45	25	35	20	A			300		3000	500
	50	40	40	30	A	250					
	110	80	90	65	A		150				
	125	95	105	75	A			500	165	4250	600
	140	110	120	90	A	900					
	175	125	145	105	A						700
	195	145	185	135	A			1400	600		
	245	175	225	105	A				700		1000
Arcing time at current switch-off rating					ms	60		75		88	
Magnetic blowout normal					A	100		250		320	
reinforced					A	10 - 16 - 25 - 40(4)		80(4)		150(4)	
Current switch-on rating L/R = 15 ms					A	500		1400		3500	
Control circuit											
standard voltages(3)					V	110 - 115/125 - 220/230		110/125 - 220/230		110 - 115/125 - 200/220	
consumptions					W	19		23		30	
closing time at Un					ms	125		180		220	
opening time between command and											
separation of contacts					ms	25		30		35	
complete opening of electromagnet					ms	77		85		110	
Mechanical endurance					millions of operations	5		5		10	
Number maximum of instant auxiliary contacts (M type blocks with 2 or 3 contacts).						6 NO 3 NO 1 NC		6 NO 4 NO 1 NC		6 NO 4 NO 2 NC 3 NC	

		RUBC 96		CBC 96	
		400	630	400	630
Thermal nominal current(1)	A	500	630	500	630
connecting section	mm²	240	400	240	400
Nominal operating voltage	V	600	600	600	600
Maximum operating voltage	V	700	700	700	700
DC_2 - DC_4 duty cycle	kW	200	250	200	250
Current switch-off rating L/R = 15 ms					
in open air under 500 V	A	6000	8500	6000	8500
Safety perimeter for					
metallic walls					
M	mm	80	100	80	100
N	mm	40	60	40	60
insulated walls					
M	mm	40	60	40	60
N	mm	30	40	30	40
Arcing time at current switch-off rating	ms	40	40	40	40
Magnetic blowout normal	A	400	630	400	630
Current switch-on rating L/R = 15 ms	A	6000	8500	6000	8500
Control circuit					
standard voltages(3)	V	110 - 127 - 220/230 - 250			
consumptions	W	460/60	460/60	125	125
closing time at Un	ms			160	160
opening time between command and					
separation of contacts	ms	50	50	38	38
Mechanical endurance	millions of operations	10	10	10	10
Number maximum of instant auxiliary contacts (M type blocks with 2 or 3 contacts).		6	6	6	6

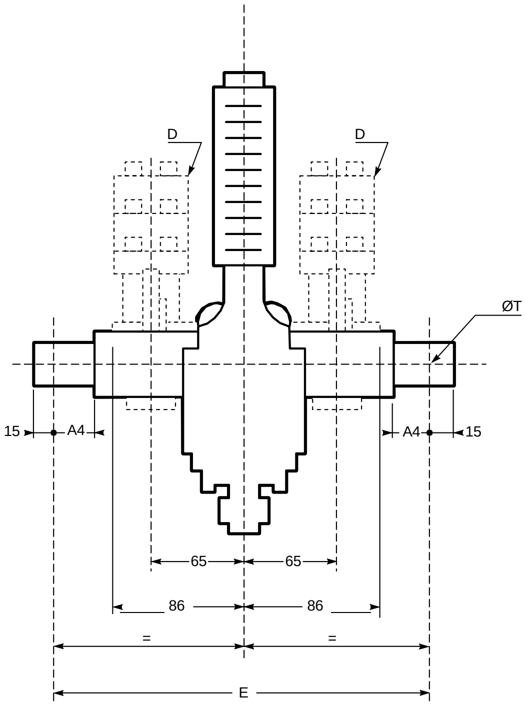
(1) in open air, DC_1 duty, silver contacts and normal blowout.
(2) 30 operations/hour, duty factor f 20 %.
(3) for other voltages, please consult us.

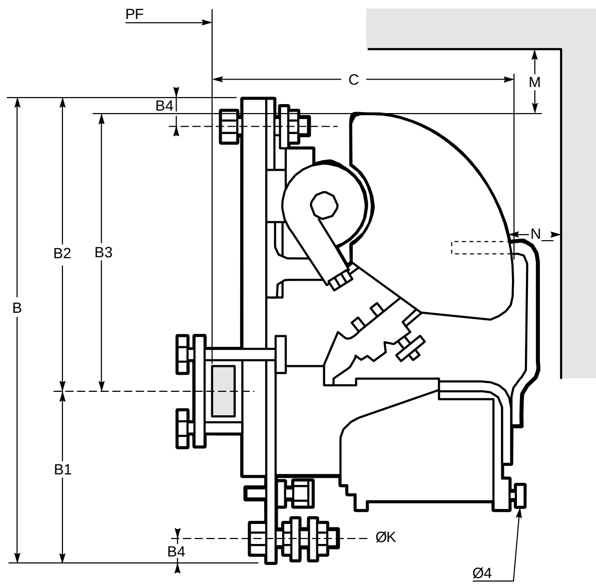
(4) possible blowout calibration:
CB80 A: 1-2-3-4-6-10-16-25-40 A.
CB150 A: 1-2-3-4-6-10-16-25-40-80 A.
CB200 A: 1-2-3-4-6-10-16-25-40-80-150 A

Overall dimensions CBC80 to 200 A

Single pole DC contactors 500 VÜ

5. CBC57 - 80 and 150 and 68 - 200





bar	80	150	200
bare	25 x 16	25 x 16	40 x 20
insulated	30 x 21	30 x 2	44 x 24
A4	17	27	22
B	204	252	302
B1	80	97	112
B2	124	155	190
B3	126	180	189
B4	7	8	12,5
C	155,5	181,5	190
ØK	6	8	10
ØT	9	9	13

D: instant contact block, form to be specifiied.

E: for CBC contactor with
- zero C block: 175,
- one C block: 200,
- two C blocks: 250.

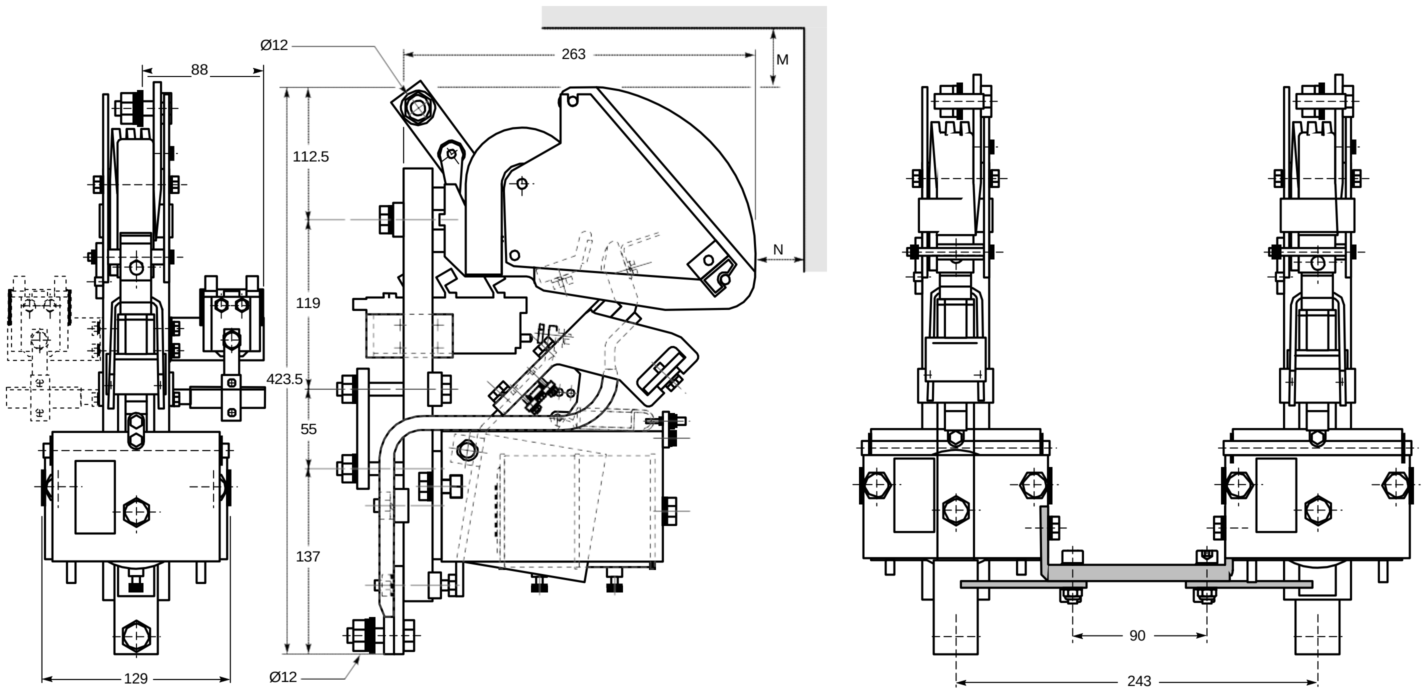
PF: attachment plane.

Example : li ft ing plane for travelling crane
for iron and steel industry

Overall dimensions CBC400 to 630 A

Single pole DC contactors 600 V⎓

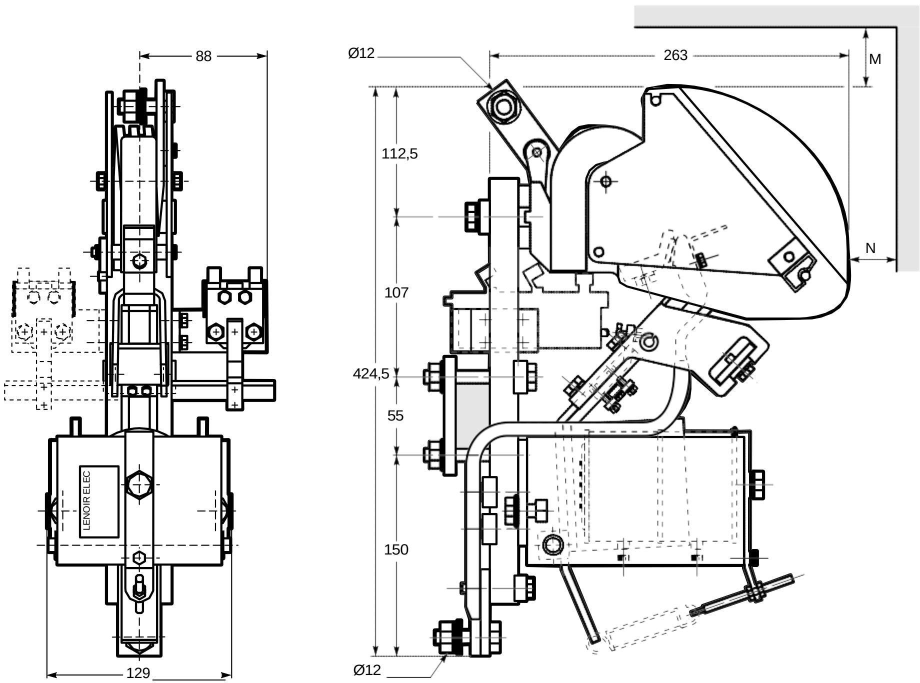
6. CBC 96 - 400 - 630



Attachment on an insulated bar 44 x 24.

Calibre	M	N
400	45	45
630	75	60

7. RUBC 96 - 400 - 630



Attachment on an insulated bar 44 x 24.

Calibre	M	N
400	45	45
630	75	60

CB 80 to 200 A, multipolar versions

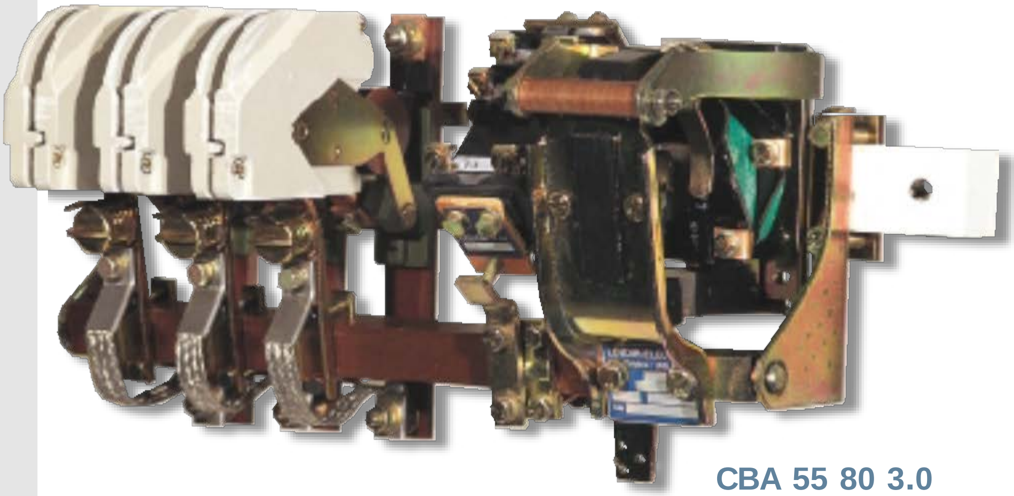
4 types for each calibre:

AC poles and control circuit
CBA 55 80,
CBA 55 150,
CBA 55 200.

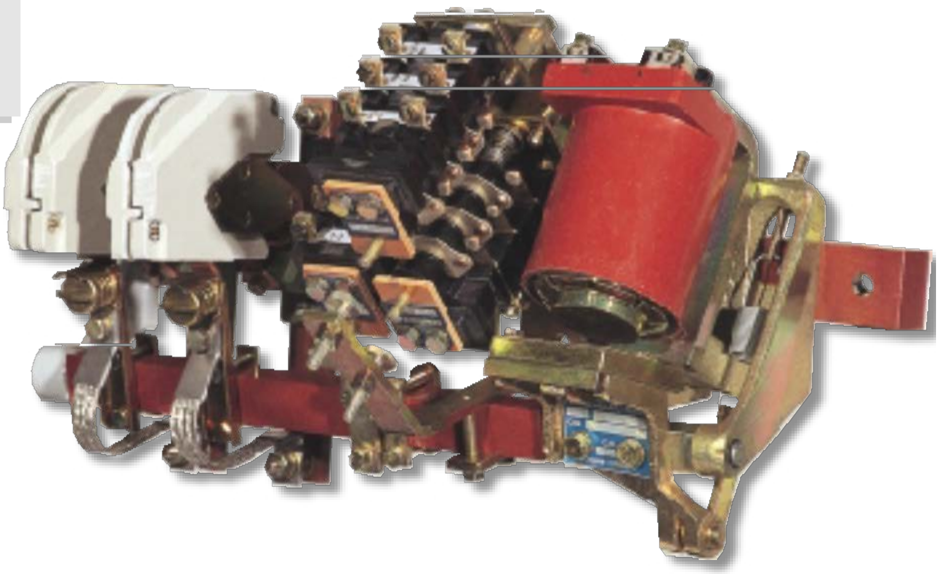
DC poles and AC control circuit
CBFC55 80,
CBFC55 150,
CBFC55 200.

AC poles and DC control circuit
CBPA 57 80,
CBPA 57 150,
CBPA 57 200.

DC poles and DC control circuit
CBC57B 80,
CBC57B 150,
CBC57B 200.



CBA 55 80 3.0



CBC 57 B 80 2.0

Calibres 80, 150 and 200 A

Single pin main poles and copper contacts (C) for current use, semi-intensive and intensive duties (AC_2-AC'2-AC_3-AC_4-DC_2-DC_3-DC_4-DC_5).

- Calibre 80 and 150: 1 to 4 poles for each type.
- Calibre 200: 1 to 2 poles for CBC and CBPA contactors, 1 to 4 poles for CBA and CBFC contactors.

On request, contactors can be equipped with:
- silver or silver alloy contacts (M) for continuous, semi-intensive and intensive duties, especially recommended for low voltages and corrosive atmospheres (AC_1-AC_2-AC'2-AC_3-DC_1-DC_2-DC_3-DC_4-DC_5 duties).
- closing electromagnet is located at the right side of the poles:
- supply from an AC source: laminated magnetic circuit;
- supply from a DC source: solid magnetic circuit, without power-saving device up to contactors 150 A, 3 poles, with power-saving device for contactors 150 A, 4 poles; and contactors 200 A, 2 poles.

Options

- For currents 50 % lower than the nominal thermal DC current, adaptation of the arc-blowout coil to the current of use.
- Mechanichal latching with single or double electrical release.
- Metallic support for «Ronis type» lock (lock not supplied).
- Opening poles without mechanical overlapping with the closing poles.
- Adaptation for mechanical locking facility for contactors of different ranges.
- Poles with different calibres and supplied with different currents.
- Closing electromagnet mounted on the left side of the poles.
- Longer attachment bars.

Technical features CBA 55 - CBPA 57 80 to 200 A

ACcontactors
Ue up to 660 V, 50/60 Hz

Standards IEC947-4-1		Unit	80 *			150 *			200 *		
Thermal nominal current(1) AC_1		A	100			250			320		
	connecting section	mm²	35			70			95		
Nominal insulation voltage		V	1000			1000			1000		
Nominal operating voltage											
	AC, 40 to 60 Hz	V	660			660			660		
Maximum controlled powers											
AC	voltage	V	220	380	500/660	220	380	500/660	220	380	500/660
(2)	AC'2 - AC_3 duties	kW	22	45	60	65	110	145	80	132	160
	AC_23 duties	kVA	33	55	70	80	132	160	100	170	220
Maximum currents of use											
	continuous duty	A	100			250			320		
Short-time current, t :,: 40°C											
	1s	kA	1			1.75			2.5		
	5s	kA	0.5			0.8			1.15		
	10s	kA	0.35			0.57			0.81		
	15s	kA	0.3			0.51			0.7		
	30s	kA	0.23			0.42			0.56		
	1 min	kA	0.19			0.31			0.43		
	3 min	kA	0.14			0.3			0.4		
	10 min	kA	0.12			0.26			0.35		
Nominal thermal current under 400 Hz		A	60			113			150		
Allowable overcurrent/time											
AC		kA eff/s	1/1			1.75/1(3)			2.5/1(3)		
Current switch-off rating											
AC	voltage	V	500			500			500		
	cos < = 0.3	kAeff	1.3(4)			1.85(4)			2.75(4)		
Current switch-on rating											
AC cos < = 0.3		kAeff	1.3(4)			1.85(4)			2.75(4)		
Mechanical endurance		millions of operations	3.5/10(5)			3.5/10(5)			3.5/10(5)		

Control circuit

			Unit	80	150	200
Nominal voltages	AC, 50 Hz		V	24-48-110-127-220-380-500		
	DC		V	12-24-48-115-220		
Maximum consumptions		inrush/hold				
	AC	1P	VA	900/120	900/120	1500/175
		2P	VA	900/120	1500/175	2000/127
		3P	VA	900/120	1500/175	2000/127
		4P	VA	1500/175	2000/127	2000/127
	DC	1P	W	36	36	36
		2P	W	36	36	43
		3P	W	36	36	
		4P	W	36	43	
L/R constant of electromagnet		open/closed	ms			
Closing time		at Un	ms	25/45	35/60	65/60
		at 0.85 Un	ms			
Opening time		at Un	ms			
	between command and					
	- separation of contacts		ms	45	45	45
	- total opening of electromagnet		ms			
	- complete opening		ms	300	300	300

(1) in open air.
(2) motor 1500 rpm:
30 operations/h: long start-up,
120 operations/h: short start-up.
(3) for C type contacts; for M type contacts values are as follows:

Calibres	kA eff
80	1
150	1.75
200	2.75

(4) for M and C type contacts, consult us.
(5) 1st figure: CBA contactor,
2nd figure: CBPA contactor.
* possible blowout calibration:
CB80 A: 1-2-3-4-6-10-16-25-40 A.
CB150 A: 1-2-3-4-6-10-16-25-40-80 A.
CB200 A: 1-2-3-4-6-10-16-25-40-80-150 A.

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t < 50°C
1.12	50 < t < 55°C
1.19	55 < t < 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
AC	I.th 1 pole x 2 x 0.7	I.th 1 pole x 3 x 0.66

•The current switch-off rating of poles connected in parallel remains the same as for a single pole.

Technical features CBC57 B - CBFC55 80 to 200 A

DC contactors
Ue up to 500 V

Standards IEC947-4-1				80 *		150 *		200 *	
Thermal nominal current(1) DC_1			A	100		250		320	
	connecting section		mm²	35		70		95	
Nominal insulation voltage			V	1000		1000		1000	
Nominal operating voltage									
	DC		V	500(2)		500(2)		500(2)	
Maximum controlled powers									
	DC	voltage	V	220/250	440/500	220/250	440/500	220/250	440/500
		DC_2 - DC_4 duties	kW	22	44	45	90	66	132
Maximum currents of use									
	continuous duty		A	100		250		320	
Short-time current, t :,: 40°C									
		1 s	kA	1		1.75		2.5	
		5 s	kA	0.5		0.8		1.15	
		10 s	kA	0.35		0.57		0.81	
		15 s	kA	0.3		0.51		0.7	
		30 s	kA	0.23		0.42		0.56	
		1 min	kA	0.19		0.31		0.43	
		3 min	kA	0.14		0.3		0.4	
		10 min	kA	0.12		0.26		0.35	
Allowable overcurrent/time									
	DC		kA/s	1/1		1.75/1		2.5/1(3)	
Current switch-off rating									
	DC	voltage	V	500		500		500	
		L/R = 15 ms	kA	0.7(4)		0.8(4)		3.5(4)	
Current switch-on rating									
	DC L/R = 15 ms		kA	0.7(4)		0.8(4)		3.5(4)	
Mechanical endurance			millions of operations	3.5/10(5)		3.5/10(5)		3.5/10(5)	

Control circuit

				80	150	200
Nominal voltages	AC, 50 Hz		V			
	DC		V			
Maximum consumptions		inrush/hold				
	AC	1P	VA	900/120	900/120	1500/175
		2P	VA	900/120	1500/175	2000/127
		3P	VA	900/120	1500/175	2000/127
		4P	VA	1500/175	2000/127	2000/127
	DC	1P	W	36	36	36
		2P	W	36	36	43
		3P	W	36	36	
		4P	W	36	43	
L/R constant of electromagnet		open/closed	ms			
Closing time		at Un	ms	25/45	35/60	35/60
		at 0.85 Un	ms			
Opening time		at Un	ms			
	between command and					
	- separation of contacts		ms	45	45	45
	- total opening of electromagnet		ms			
	- complete opening		ms	300	300	300

(1) in open air.
(2) for voltage of use greater then 500 V, consult us.
(3) for C contacts; for M type contacts values are as follows:

Calibres	kA eff
80	1
150	1.75
200	2.75

(4) for M and C type contacts, consult us.
(5) 1st figure: CBA contactor,
2nd figure: CBPA contactor.
* possible blowout calibration:
CB80 A: 1-2-3-4-6-10-16-25-40 A,
CB150 A: 1-2-3-4-6-10-16-25-40-80 A,
•CB200 A: 1-2-3-4-6-10-16-25-40-80-150 A.

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

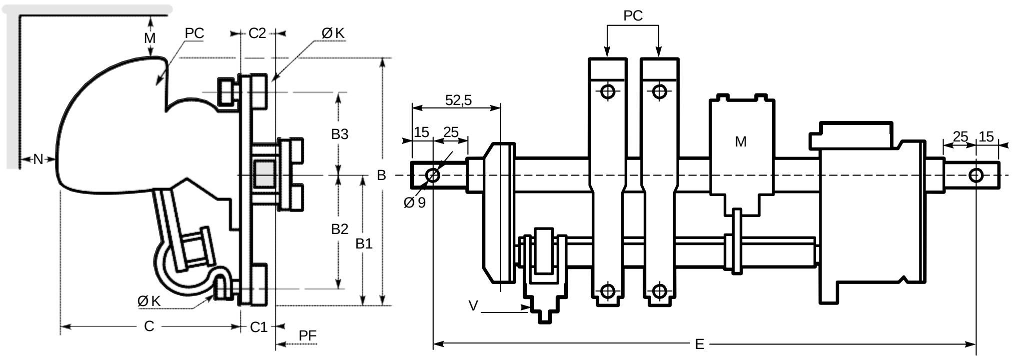
1.04	40 < t < 45°C
1.08	45 < t < 50°C
1.12	50 < t < 55°C
1.19	55 < t < 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
DC	I.th 1 pole x 2 x 0.8	I.th 1 pole x 3 x 0.75

The current switch-off rating of poles connected in parallel remains the same as for a single pole.

8. CBA 55 - CBFC 55 80



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBA	30	30	30	25
	CBFC	55	45	45	35
500 V	CBA	55	40	40	30
	CBFC	110	80	90	65

B	155.5
B1	101
B2	93
B3	48
C	122
C1	27
C2	30
ØK	M6

Pole equipped with silver contact.

M: M type auxiliary contact blocks (D blocks on request).
PC: contactor pole.

PF: attachment plane.
V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.

Number of poles	Type	Voltage of use	E distance in mm, version without locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBA	220-500	A		B-D		C	E	F															
	CBFC	220	A		B	D	C	E	F															
		500	A		B	D	C	E		F														
2	CBA	220-500		A		B	D	C	E		F													
	CBFC	220			A		B	D	C	E	F													
		500				A		B	D	C	E		F											
3	CBA	220-500				A		B	D	C	E		F											
	CBFC	220					A		B	D	C	E		F										
		500							A		B	D	C	E		F								
4	CBA	220-500					A		B	D		C-E		F										
	CBFC	220							A		B	D	C	E		F								
		500									A			B-D		C	E		F					

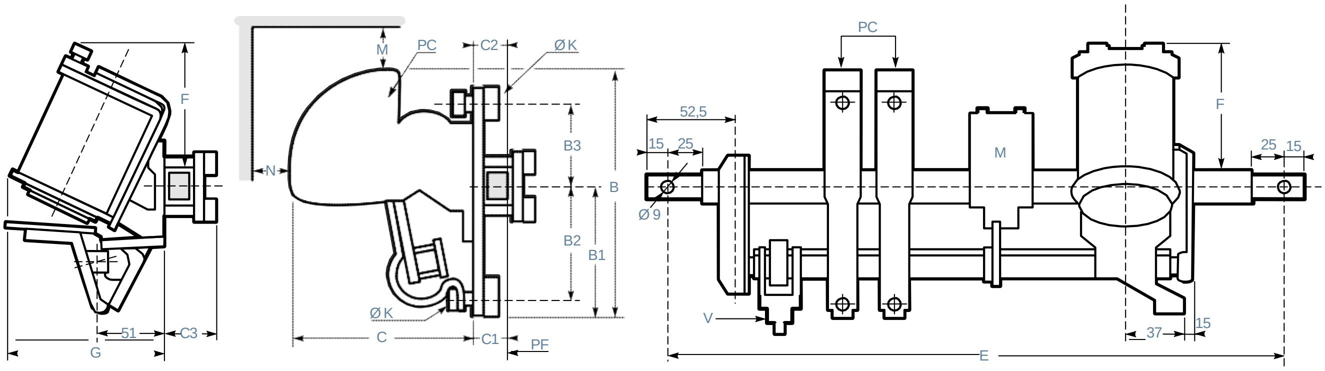
Number of poles	Type	Voltage of use	E distance in mm, version with locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBA	220-500		A		B-D		C	E	F														
	CBFC	220		A		B-D		C	E	F														
		500		A		B	D	C	E		F													
2	CBA	220-500			A		B	D	C	E		F												
	CBFC	220				A		B-D		C	E	F												
		500					A		B	D	C	E		F										
3	CBA	220-500					A		B-D		C	E		F										
	CBFC	220						A		B-D		C	E		F									
		500								A		B-D		C	E		F							
4	CBA	220-500						A		B	D		C-E		F									
	CBFC	220								A		B-D		C	E		F							
		500											A		B-D		C	E		F				

In each calibre and for each type, 6 versions are possible:

3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **F**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

9. CBPA 57 - CBC 57 B 80



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBPA	30	30	30	25
	CBC	55	45	45	35
500 V	CBPA	55	40	40	30
	CBC	110	80	90	65

	F	G
CM 62	77	108
CM 63	95	120
CM 64	110	130

Pole equipped with silver contact.

C3: attachment bar 30 x 21 = 34,
attachment bar 44 x 24 =37.

B	155,5
B1	101
B2	93
B3	48
C	122
C1	27
C2	30
ØK	M6

M: M type auxiliary contact blocks (D blocks on request).
PC: contactor pole.
PF: attachment plane.
V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.

Number of poles	Type	Voltage of use	E distance in mm, version without locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500	A		B	D	C	E		F														
	CBC	220	A		B	D	C	E		F														
		500	A			B-D		C-E		F														
2	CBPA	220-500			A		B-D		C-E		F													
	CBC	220			A		B	D	C	E		F												
		500				A		B	D		C-E		F											
3	CBPA	220-500				A		B	D	C	E		F											
	CBC	220					A		B	D	C	E		F										
		500							A		B	D	C	E		F								
4	CBPA	220-500						A		B	D	C	E		F									
	CBC	220							A		B	D	C	E		F								
		500										A		B	D	C	E		F					

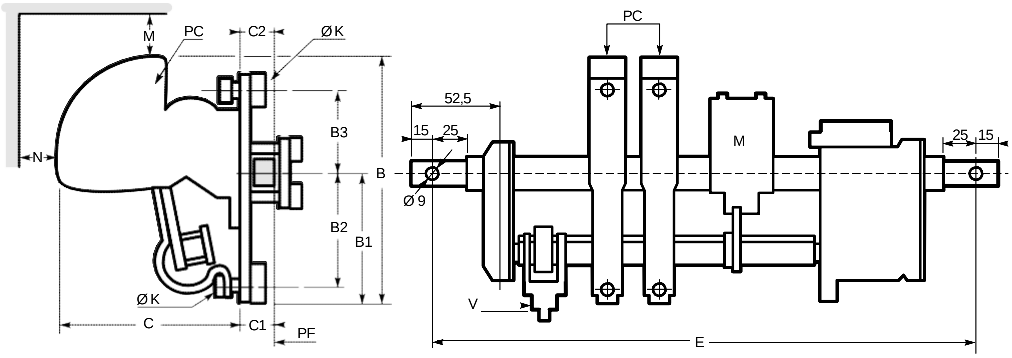
Number of poles	Type	Voltage of use	E distance in mm, version with locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500		A		B	D	C	E		F													
	CBC	220		A		B	D	C	E		F													
2	CBPA	220-500			A		B	D		C-E		F												
	CBC	220				A		B	D	C	E		F											
		500					A		B	D	C	E		F										
3	CBPA	220-500					A		B	D	C	E		F										
	CBC	220						A		B	D	C	E		F									
		500								A		B	D	C	E		F							
4	CBPA	220-500							A		B	D	C-E		F									
	CBC	220								A		B	D	C	E		F							
		500											A		B	D	C	E		F				

In each calibre and for each type, 6 versions are possible:

3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **F**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

10. CBA 55 - CBFC 55 150



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBA	35	30	20	20
	CBFC	105	75	85	60
500 V	CBA	40	30	30	25
	CBFC	125	95	105	75

B	209,5
B1	112
B2	102
B3	61
C	158
C1 (1)	29
C2 (1)	33
ØK	M8

Pole equipped with copper contact (silver on request).

M: M type auxiliary contact blocks (D blocks on request).
PC: contactor pole.
PF: attachment plane.

V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.
(1) support bar: 44 x 24.
C1 = 30.5,
C2 = 34.5.

E distance in mm, version without locking possibility

Number of poles	Type	Voltage of use	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBA	220-500	A		B	D	C	E		F														
	CBFC	220-500	A		B	D	C	E		F														
2	CBA	220			A		B	D	C	E			F											
		500			A			B-D		C-E			F											
	CBFC	220			A			B-D		C-E			F											
		500					A		B-D		C	E		F										
3	CBA	220					A		B	D	C		E		F									
		500						A		B	D	C	E		F									
	CBFC	220						A		B	D	C	E		F									
		500									A		B-D		C	E		F						
4	CBA	220							A		B	D	C		E		F							
		500									A	B	D	C		E		F						
	CBFC	220									A		B-D		C	E		F						
		500												A		B	D	C	E			F		

E distance in mm, version with locking possibility

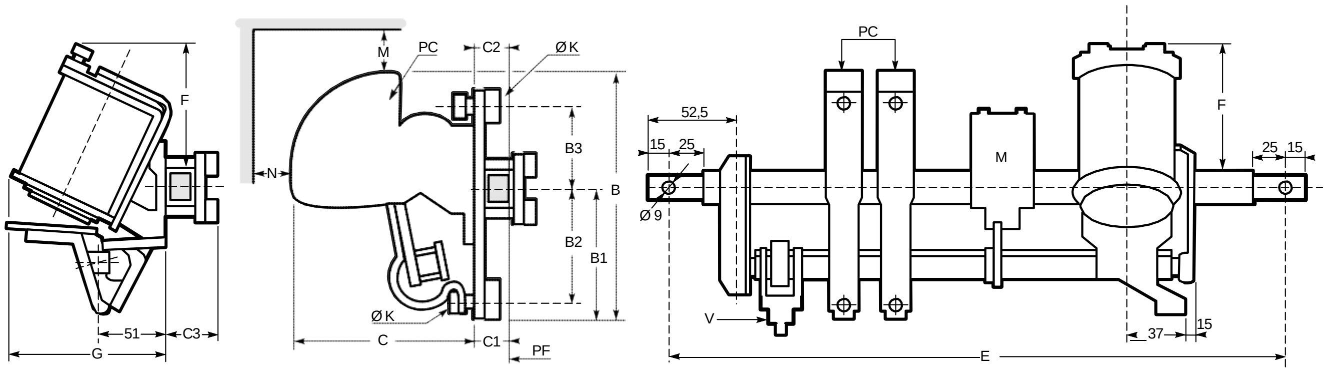
Number of poles	Type	Voltage of use	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBA	220-500		A		B	D	C	E		F													
	CBFC	220-500		A		B	D	C	E		F													
2	CBA	220				A		B	D	C	E		F											
		500				A			B-D		C-E			F										
	CBFC	220				A			B-D		C-E			F										
		500						A		B-D		C	E		F									
3	CBA	220						A		B	D	C	E			F								
		500							A		B	D	C	E		F								
	CBFC	220							A		B	D	C	E		F								
		500									A			B-D		C	E		F					
4	CBA	220								A		B	D	C		E		F						
		500									A		B	D	C		E		F					
	CBFC	220									A			B-D		C	E		F					
		500													A		B	D	C	E			F	

In each calibre and for each type, 6 versions are possible:

3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **F**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

11. CBPA 57 - CBC 57 B 150



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBPA	30	30	20	20
	CBC	105	75	85	60
500 V	CBPA	40	30	30	25
	CBC	125	95	105	75

	F	G
CM 62	77	108
CM 63	95	120
CM 64	110	130

Pole equipped with silver contact on request.

C3: attachment bar: 30 x 21 = 34,
attachment bar: 44 x 24 = 37.

B	209,5
B1	112
B2	102
B3	61
C	158
C1(1)	29
C2(1)	33
ØK	M8

M: M type auxiliary contact blocks (D blocks on request).
PC: contactor pole.
PF: attachment plane.
V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.
(1) support bar: 44 x 24.
C1 = 30.5,
C2 = 34.5.

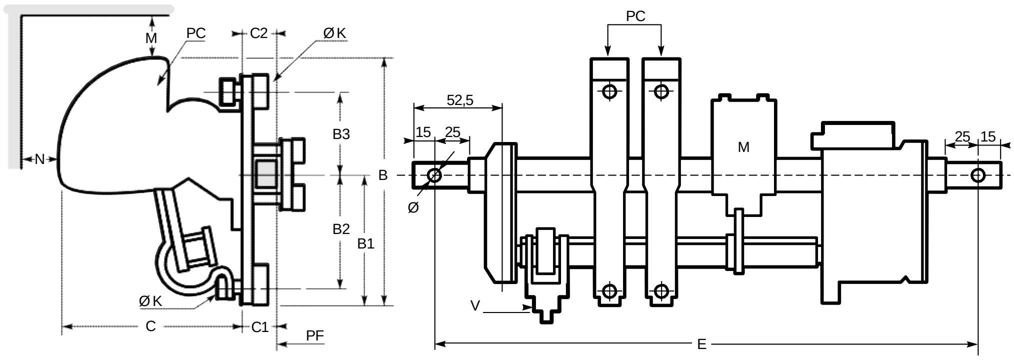
Number of poles	Type	Voltage of use	**E distance in mm, version without locking possibility** 225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500		A		B-D		C-E			F													
	CBC	220-500		A		B-D		C-E			F													
2	CBPA	220				A	B	D	C		E		F											
		500				A		B	D	C	E		F											
	CBC	220				A		B	D	C	E		F											
		500					A		B	D	C	E		F										
3	CBPA	220						A	B		C-D		E		F									
		500							A	B	D	C		E		F								
	CBC	220							A	B	D	C		E		F								
		500									A		B	D	C	E		F						
4	CBPA	220								A		B-D		C	E		F							
		500									A		B	D	C	E		F						
	CBC	220									A		B	D	C	E		F						
		500													A		B-D		C	E		F		

Number of poles	Type	Voltage of use	**E distance in mm, version with locking possibility** 225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500		A		B	D		C-E		F													
	CBC	220-500		A		B	D		C-E		F													
2	CBPA	220					A	B	D	C	E		F											
		500					A		B-D		C	E		F										
	CBC	220					A		B-D		C	E		F										
		500						A		B	D	C	E		F									
3	CBPA	220							A	B	D	C		E		F								
		500							A		B	D	C		E		F							
	CBC	220							A		B	D	C		E		F							
		500										A		B	D	C	E		F					
4	CBPA	220									A		B-D			C-E		F						
		500										A		B	D	C	E		F					
	CBC	220										A		B	D	C	E		F					
		500													A			B-D		C	E		F	

In each calibre and for each type, 6 versions are possible:
3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**(1): with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **F**(1): with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.
(1) for CBC 57 B 150 contactor, 4 poles, 1 NC contact is used for inserting the economy resistor..

12. CBA 55 - CBFC 55 200



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBA	30	25	30	20
	CBFC	165	135	130	105
500 V	CBA	65	45	50	35
	CBFC	235	175	175	145

Pole equipped with copper contact, silver on request.

M: M type auxiliary contact blocks (D blocks on request).
PC: contactor pole

B	235
B1	120
B2	107
B3	103
C	211
C1	32
C2	37
ØK	M10

PF: attachment plane.
V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.
Support bar: 44 x 24.
Ø: 13 mm for bar 44 x 24..

Number of poles	Type	Voltage of use	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
			E distance in mm, version without locking possibility																					
1	CBA	220-500	A		B	D	C		E		F													
	CBFC	220-500		A		B-D		C	E		F													
2	CBA	220				A		B	D	C		E		F										
		500				A			B-D		C	E		F										
	CBFC	220				A			B-D		C	E		F										
		500						A		B	D	C		E		F								
3	CBA	220							A		B	D	C	E		F								
		500							A			B-D		C	E		F							
	CBFC	220								A		B	D	C	E		F							
		500										A			B-D		C	E		F				
4	CBA	220										A		B-D		C-E		F						
		500											A		B-D		C	E		F				
	CBFC	220											A		B	D	C	E		F				
		500															A		B-D		C	E		F

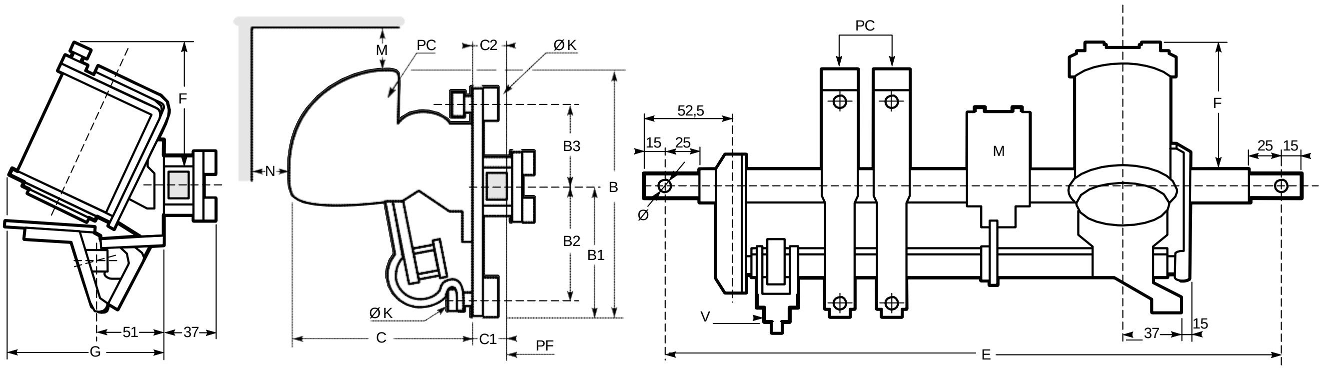
Number of poles	Type	Voltage of use	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
			E distance in mm, version with locking possibility																					
1	CBA	220-500	A		B	D	C		E		F													
	CBFC	220-500	A			B-D		C	E		F													
2	CBA	220				A		B	D	C		E	F											
		500				A		B	D		C	E		F										
	CBFC	220				A			B-D		C	E		F										
		500					A			B	D	C	E		F									
3	CBA	220							A		B	D	C	E		F								
		500							A			B-D		C	E		F							
	CBFC	220								A		B	D	C	E		F							
		500										A			B-D		C-E		F					
4	CBA	220									A		B	D	C	E		F						
		500											A		B-D		C	E		F				
	CBFC	220											A		B	D	C	E		F				
		500														A			B-D		C	E		F

In each calibre and for each type, 6 versions are possible:

3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **F**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.

13. CBPA 57 - CBC 57 B 200



		Metallic walls		Insulated walls	
		M	N	M	N
220 V	CBPA	30	25	30	20
	CBC	165	135	130	105
500 V	CBPA	65	45	50	35
	CBC	235	175	175	145

	F	G
CM 63	95	120
CM 64	110	130

Pole equipped with silver contact on request.

M: M type auxiliary contact blocks (D blocks on request).

B	235
B1	120
B2	107
B3	103
C	211
C1	32
C2	37
H	
ØK	M10

PC: contactor pole.
PF: attachment plane.
V: possible mechanical locking, attachment centre-to-centre distance between 2 superimposed contactors: 250 mm.
Support bar: 44 x 24.
Ø: 13 mm for bar 44 x 24.

Number of poles	Type	Voltage of use	E distance in mm, version without locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500		A	B		D-C		E		F													
	CBC	220-500		A		B	D	C	E		F													
2	CBPA	220					A	B	D	C	E		F											
		500					A		B-D		C	E		F										
	CBC	220					A		B	D	C	E		F										
		500						A		B	D	C	E		F									

Number of poles	Type	Voltage of use	E distance in mm, version with locking possibility																					
			225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
1	CBPA	220-500		A	B	D	C		E		F													
	CBC	220-500		A		B	D	C	E		F													
2	CBPA	220				A		B	D	C	E		F											
		500					A		B-D		C	E		F										
	CBC	220					A		B	D	C	E		F										
		500						A		B	D	C	E		F									

In each calibre and for each type, 6 versions are possible:

3 versions without TP 86 delayed auxiliary contacts.
Version **A**: without M instant auxiliary contact block.
Version **B**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC.
Version **C**: with 2 M blocks each one with 3 intant contacts, i.e. 4 NO + 2 NC.

3 versions with one TP 86 block, with 2 delayed auxiliary contacts, i.e. 1 NO + 1 NC.
Version **D**: without M instant auxiliary contact block.
Version **E**: with one M block with 3 instant contacts, i.e. 2 NO + 1 NC(1).
Version **F**: with 2 M blocks each one with 3 instant contacts, i.e. 4 NO + 2 NC.(2).

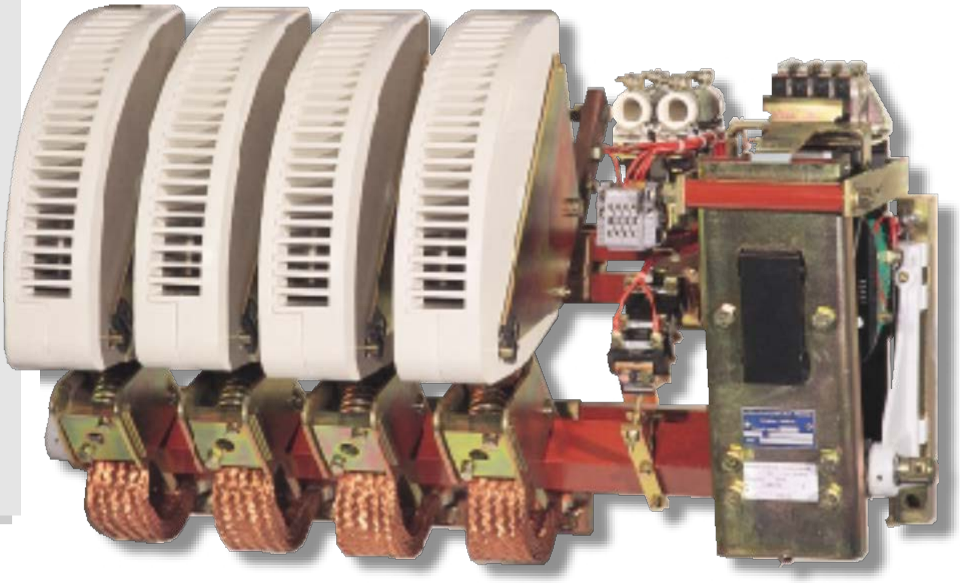
(1) for CBC 57 B 200 contactor, 2 poles: 2 NO free auxiliary contacts as 1 NC contact is used for inserting the economy resistor.
(2) CBC 57 B 200 contactor, 2 poles: 4 NO + 1 NC free auxiliary contacts as 1 NC contact is used for inserting the economy resistor.

CB 75 400 to 1000 A

2 types for each calibre:

AC poles
CBA 75 400,
CBA 75 500,
CBA 75 630,
CBA 75 800,
CBA 75 1000.

DC poles
CBFC75 400,
CBFC75 500,
CBFC75 630,
CBFC75 800,
CBFC75 1000.



CBA 75 1000 4.0
Reinforced insulation

Standard versions

- 1 to 4 single pin main poles with silver pad contacts.
- Closing electromagnet mounted on the right side of the poles, (on request, it can be mounted on the left) and laminated magnetic circuit.
  - control circuit supplied from an AC source:
    - for calibres 400 (1 to 4 poles), 500 and 630 (1 to 2 poles), without economy resistor.
    - over, rectified and power-saved current via a rectifier mounted on the contactor.
  - control circuit supplied from a DC source: power-saved circuit with economy resistor.
- Mechanical locking: vertical type.

Auxiliary contacts

- 2 NO + 2 NC available on D blocks on the whole range (2 extra D blocks can be mounted on request).
- Control circuit supplied from an AC source: one M block, form F2.01Y, on calibres 500 and 630, from 3 to 4 poles and on calibres 800 and 1000; from 1 pole as control circuit is rectified and coil power-saved via 1 NC overlap contact, 1 NO + 1 NC free auxiliary contacts.
- Control circuit supplied from a DC source: on the whole range, one block type F2.01Y with one NC overlap contact for inserting the economy resistor and 1 NO + 1 NC free auxiliary contacts.

Options

- NO or NC delayed block, TP86 type (this one also includes 4 free instant contacts, i.e. 3 NO + 1NF).
- Addition of D type and M type auxiliary contact blocks according to different versions.
- Device to hold the contactor closed in case of untimely micro-cuts for contactors that are not equipped with a mechanical latching.
- Mechanical latching with single or double electrical release.
- Self-protective device for the release coil(s).
- Metallic support for 'Ronis type' lock (lock not supplied).
- Horizontal or back-to-back mechanical locking.
- Poles of different calibres and supplied with different currents.

Technical features CBA 75 400 to 1000 A

AC contactors
Ue up to 1000 V, 50/60 Hz

Standards: IEC947-4-1

Alternating current

		CBA Type 75														
		400			500			630			800			1000		
Thermal nominal current(1) AC_1	A	500/500			500/500			630/630			800/800			1000/1000		
Current of use frequency limitations	Hz	50 - 60			50 - 60			50 - 60			50 - 60			50 - 60		
Nominal insulating voltage	V	1000			1000			1000			1000			1000		
connecting section	mm²	240			300			400			500			600		
Nominal operating voltage, 40 to 60 Hz(4)	V	660	**1000(6)**		660	**1000(6)**		660	**1000(6)**		660	**1000(6)**		660	**1000(6)**	
Maximum controlled powers																
voltage	V	220	380	500/660	220	380	500/660	220	380	500/660	220	380	500/660	220	380	500/660
AC'2 - AC_3 duty cycle	kW	110	220	220	150	250	250	160	250	250	220	440	440	220	440	440
AC_23 duty cycle	kVA	170	290	350	170	290	350	210	360	490	275	475	620	340	590	780
Short-time current, t ::: 40°C																
1 s	kA	10			12			14			24			26		
5 s	kA	4.5			5.75			6.5			11			12.5		
10 s	kA	3.25			4			4.5			7.8			8.5		
15 s	kA	2.7			3.4			3.8			6.5			7		
30 s	kA	1.9			2.4			2.7			4.6			5		
1 min	kA	1.4			1.78			2			3.3			3.65		
3 min	kA	0.88			1.1			1.3			2			2.3		
10 min	kA	0.62			0.79			0.92			1.38			1.6		
Nominal thermal current under 400 Hz	A	380			380			480			640			800		
Allowable overcurrent time	kAeff/s	4.5/5			5.75/5			6.5/5			11/5			12.5/5		
Current switch-off rating																
operating voltage	V	500	660	**1000**	500	660	**1000**	500	660	**1000**	500	660	**1000**	500	660	**1000**
cos φ = 0.3	kA eff	6.5	6	**2.5**	8.5	8	**3.3**	8.5	8	**3.3**	12	12	**7.5**	12	12	**7.5**
Current switch-on rating cos φ = 0.3	kA eff	6.5			8.5			8.5			12			12		
Mechanical endurance	millions of operations	3			3			3			3			3		

Control circuit

Nominal voltage	AC, 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500				
	DC	V	24 - 48 - 115 - 220 - 440 - 500				
Maximum consumptions	inrush/hold						
AC(2)	1P	VA	2000/175	2000/175	2000/175	**500/30**	**500/30**
	2P	VA	2000/175	2000/225	2500/225	**500/30**	**500/30**
	3P	VA	2000/175	**525/30**	**525/30**	**750/66**	**750/66**
	4P	VA	2000/175	**525/30**	**525/30**	**750/66**	**750/66**
DC	1P	W	**400/26**	**400/26**	**400/26**	**500/30**	**500/30**
	2P	W	**400/26**	**525/30**	**525/30**	**500/30**	**500/30**
	3P	W	**400/26**	**525/30**	**525/30**	**750/66**	**750/66**
	4P	W	**525/30**	**525/30**	**525/30**	**750/66**	**750/66**

Average time of operation at nominal voltage(5)

Constant L/R rate of electromagnet open/closed							
Closing time at Un	AC	ms	40	40	40		
	DC	ms	90	90	90	120	120
Opening time at Un between command and separation of contacts							
	AC	ms	20	20	20		
	DC	ms	25	25	25	38	38

(1) in open air.
(2) bold type ratings: rectified and power-saved control circuit voltage.
(3) diodes are warranted up to a network overload of 3 Un efficient.
(4) if nominal operation voltage > 1000 V, please consult us.
(5) closing time is measured from the supply of the closing coil until the contact of main poles. Opening time is measured from the supply of the tripping coil until the separation of main poles.
(6) reinforced insulation for use under 1000 V, please specify it when you order.

Temperature factor to be applied to the poles or the current (controlled according to the ambient temparature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t ::: 50°C
1.12	50 < t ::: 55°C
1.19	55 < t ::: 60°C

- Arcing time depends on the circuit controlled by the main contacts. In three-phase current, arcing time is normally inferior to 15 ms. The receiver is insulated from the network after a time corresponding to the opening time plus the arcing time.

- Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
AC	I.th 1 pole x 2 x 0.7	I.th 1 pole x 3 x 0.66

- The current switch-off rating of poles connected in parallel remains the same as for a single pole.

- Maximum consumptions:
  Bold type ratings:
  - AC: control circuit is supplied with rectified and power-saved current via a rectifier mounted on the contactor(3).
  - DC: control circuit is power-saved.

For technical features of opening poles, see p. 70.

Technical features CBFC75 400 to 1000 A

DC contactors

Ue up to 2000 V

Standards: IEC947-4-1

Direct current

		CBFC Type 75														
		400			500			630			800			1000		
Thermal nominal current(1) DC_1	A	500/500			500/500			630/630			800/800			1000/1000		
Nominal insulating voltage	V	1000			1000			1000			1000			1000		
connecting section	mm²	240			300			400			500			600		
Nominal operating voltage	V	500		1000(6)	500		1000(6)	500		1000(6)	500		1000(6)	500		1000(6)
Maximum controlled powers																
voltage	V	220/250		440/500	220/250		440/500	220/250		440/500	220/250		440/500	220/250		440/500
DC'2 - DC_4 duty cycle	kW	90		180	110		220	110		220	175		350	175		350
Short-time current, t ≤ 40°C																
1s	kA	10			12			14			24			26		
5s	kA	4.5			5.75			6.5			11			12.5		
10s	kA	3.25			4			4.5			7.8			8.5		
15s	kA	2.7			3.4			3.8			6.5			7		
30s	kA	1.9			2.4			2.7			4.6			5		
1 min	kA	1.4			1.78			2			3.3			3.65		
3 min	kA	0.88			1.1			1.3			2			2.3		
10 min	kA	0.62			0.79			0.92			1.38			1.6		
Allowable overcurrent / time	kAeff/s	4.5/5			5.75/5			6.5/5			11/5			12.5/5		
Current switch-off rating L/R = 15 ms																
voltage applied	V	500	700	1000	500	700	1000	500	700	1000	500	700	1000	500	700	1000
single-pole	kA	6			8			8			19			19		
two-pole(6)	kA		6	5		10	7		10	7		17	10		17	10
voltage applied	V	1500	1800	2000	1500	1800	2000	1500	1800	2000	1500	1800	2000	1500	1800	2000
three-pole(6)	kA	5	2	1.5	7	2.5	2.5	7	2.5	2.5	10	8	6	10	8	6
four-pole(6)	kA			5			7			7			10			10
Current switch-on rating L/R = 15 ms	kA	6/500 V			10.5/500 V			10.5/500 V			19/500 V			19/500 V		
Mechanical endurance	millions of operations	3			3			3			3			3		

Control circuit

			400	500	630	800	1000
Nominal voltage	AC, 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500				
	DC	V	24 - 48 - 115 - 220 - 440 - 500				
Maximum consumptions	inrush/hold						
AC(2)	1P	VA	2000/175	2000/175	2000/175	**500/30**	**500/30**
	2P	VA	2000/175	2000/225	2500/225	**500/30**	**500/30**
	3P	VA	2000/175	**525/30**	**525/30**	**750/66**	**750/66**
	4P	VA	2000/175	**525/30**	**525/30**	**750/66**	**750/66**
DC	1P	W	**400/26**	**400/26**	**400/26**	**500/30**	**500/30**
	2P	W	**400/26**	**525/30**	**525/30**	**500/30**	**500/30**
	3P	W	**400/26**	**525/30**	**525/30**	**750/66**	**750/66**
	4P	W	**525/30**	**525/30**	**525/30**	**750/66**	**750/66**

Average time of operation at nominal voltage(4)

			400	500	630	800	1000
Constant L/R rate of electromagnet open/closed							
Closing time at Un	AC	ms	40	40	40		
	DC	ms	90	90	90	120	120
Opening time at Un between command and separation of contacts							
	AC	ms	20	20	20		
	DC	ms	25	25	25	38	38

(1) in open air.
(2) bold type ratings: rectified and power-saved control circuit voltage.
(3) diodes are warranted up to a network overload of 3 Un efficient.
(4) closing time is measured from the time of supply of the closing coil until the time of contact of the main poles. Opening time is measured from the time of supply of the tripping coil until the time of separation of the main poles.
(5) dielectric testing voltage according to insulation voltage can reach 8 kV for specific applications.
(6) for applications with Ue > 500 V, please consult our technical department to select the contactor (specific dimensions and insulation).

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
DC	I.th 1 pole x 2 x 0.8	I.th 1 pole x 3 x 0.75

•The current switch-off rating of poles connected in parallel remains the same as for a single pole.

• Maximum consumptions:
Bold type ratings:
- AC: control circuit is supplied with rectified and power-saved current via a rectifier mounted on the contactor(3).
- DC: control circuit is power-saved.

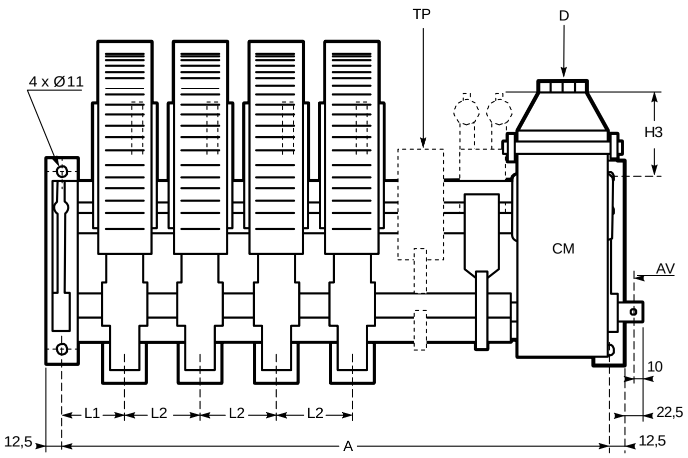
For technical features of opening poles, see p. 70.

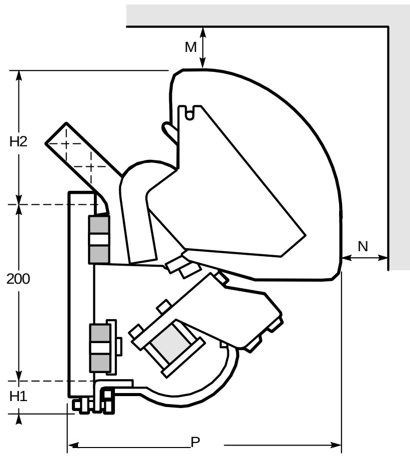
Overall dimensions CBA & CBFC75 400 to 1000 A

Standard AC & DC contactors

CBA: Ue up to 1000 V, 50-60 Hz - CBFC: Ue 500 V

14. CBA - CBFC75 400 to 1000





AV: mechanical locking axis, attachment center-to-center distance between 2 superimposed contactors:
- 400 mm with below contactor of 400, 500 and 600 A calibre,
- 575 mm with below contactor of 800 or 1000 A calibre.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it

CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
TP: delayed auxiliary contact block.

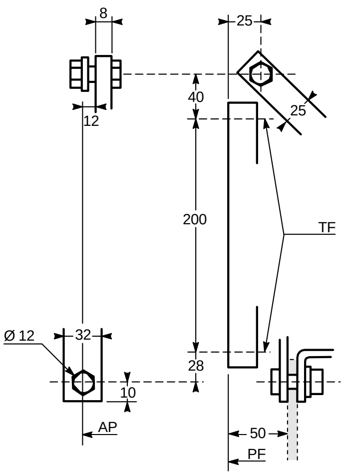
Dimensions

Calibres	H1	H2	H3(1)	A								L1	L2	P	Safety perimeter(2)	
				without delayed contact				with delayed contact								
				1 P	2 P	3 P	4 P	1 P	2 P	3 P	4 P				M	N
400	38	75	105	250	325	400	450	325	400	475	525	43.5	68	278	45	45
500/630	38	75	105	250	350	425	500	325	425	500	575	45	80	278	75	60
800/1000	33	149	112	325	400	500	600	400	475	575	675	66	92	315	185	85

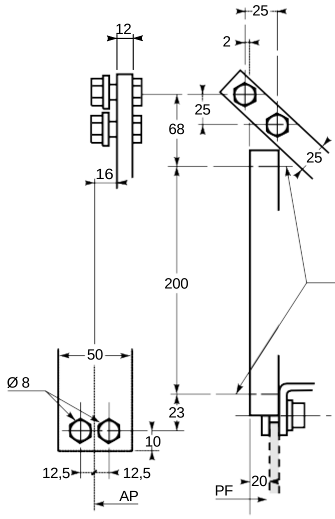
(1) for equipment with DC supplied or rectified AC supplied coil.
(2) with metallic walls.

Connecting sections

- Calibres 400 and 500/630

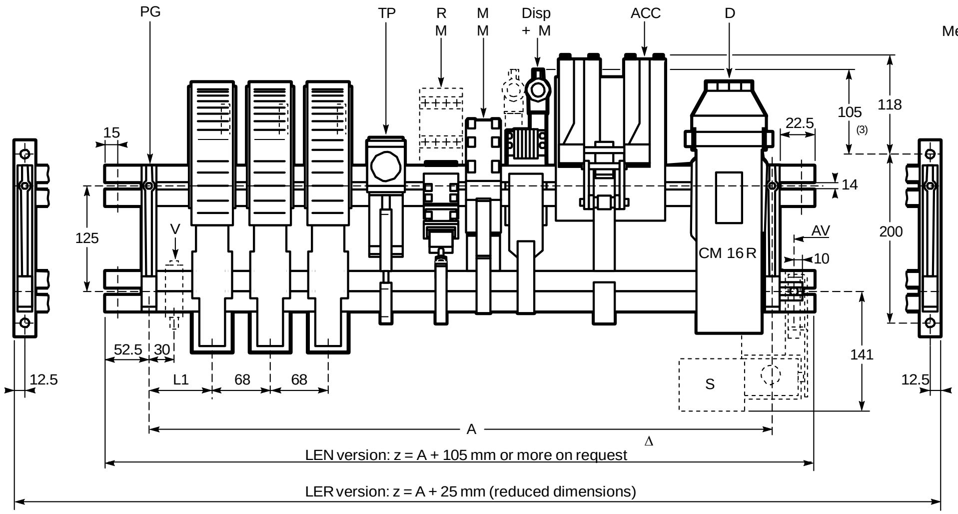


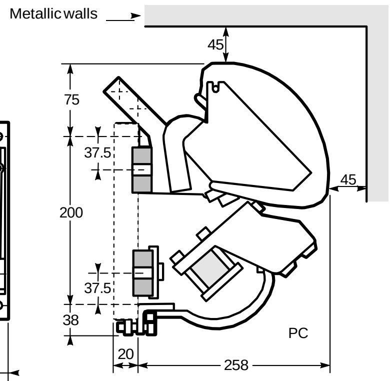
- Calibres 800/1000



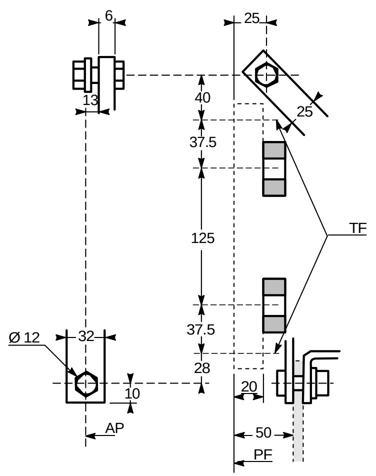
AP: pole axis.
PF: attachment plane.
TF: fixation holes.

For control circuit, see P. 144





PC connecting sections



Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	250	300	300	350	350	400	325	375	375	425	425	475	300	350	350	400	400	450	375	425	425	475	475	525
	2	325	375	375	425	425	475	400	450	450	500	500	550	375	425	425	475	475	525	450	500	500	550	550	600
	3	400	450	450	500	500	550	475	525	525	575	575	625	450	475	475	525	525	575	500	550	550	600	600	650
	4	450	500	500	550	550	600	525	575	575	625	625	675	500	550	550	600	600	650	575	625	625	675	675	725

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	350	375	375	425	425	475	400	450	450	500	500	550	375	425	425	475	475	525	450	500	500	550	550	600
	2	400	450	450	500	500	550	475	525	525	575	575	625	450	500	500	550	550	600	525	575	575	625	625	675
	3	475	525	525	575	575	625	550	600	600	650	650	700	525	575	575	625	625	675	600	650	650	700	700	750

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	425	450	450	500	500	550	475	525	525	575	575	625	450	500	500	550	550	600	525	575	575	625	625	675
	2	475	525	525	575	575	625	550	600	600	650	650	700	525	575	575	575	575	675	600	650	650	700	700	750
	3	550	600	600	650	650	700	625	675	675	725	725	775	600	650	650	700	700	750	675	725	725	775	775	825
	4	625	675	675	725	725	775	700	750	750	800	800	850	675	700	700	750	750	800	725	775	775	825	825	875

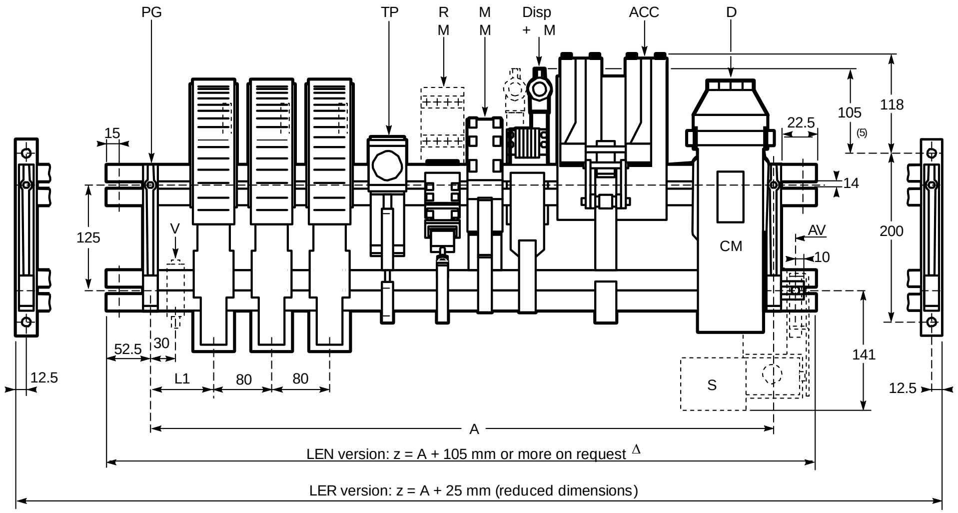
(1) form to be specified.
(2) X is the number of closing poles.
(3) for contactor equipped with DC or rectified AC supplied coil.
Δ for LEN version, please advise the position of the contactor on the bar.
Control circuit: for connection drawings, **see p. 144**

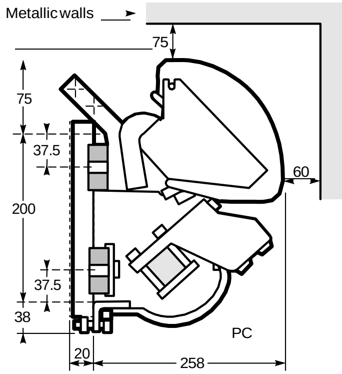
Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500 and 630 A,
- 575 mm with below contactor of calibre 800 or 1000 A.

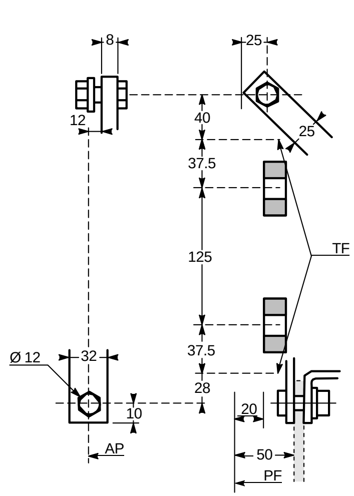
CM 16 R: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
L1: - without locking possibility on the left extremity: 45 mm,
- with locking possibility on the left extremity: 90 mm.

M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachment plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TF: attachment holes.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.





PC connecting sections



Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (**AV**)												locking possibility on the left extremity (**V**)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	275(2)	300(2)	300(2)	350(2)	350(2)	400(2)	325(2)	375(2)	375(2)	425(2)	425(2)	475(2)	300(2)	350(2)	350(2)	400(2)	400(2)	450(2)	375(2)	425(2)	425(2)	475(2)	475(2)	525(2)
	2	350(2)	400(2)	400(2)	450(2)	450(2)	500(2)	400(2)	450(2)	450(2)	500(2)	500(2)	550(2)	400(2)	425(2)	425(2)	475(2)	475(2)	525(2)	450(2)	500(2)	500(2)	550(2)	550(2)	600(2)
	3	425(2)	475(2)	475(2)	525(2)	525(2)	575(2)	500(2)	550(2)	550(2)	600(2)	600(2)	650(3)	475(2)	525(2)	525(2)	575(2)	575(2)	625(2)	525(2)	575(2)	575(2)	625(2)	625(2)	675(2)
	4	500(2)	550(2)	575(3)	625(3)	625(3)	675(3)	600(3)	650(3)	650(3)	700(3)	700(3)	750(3)	550(2)	600(2)	625(3)	675(3)	675(3)	725(3)	650(3)	700(3)	700(3)	750(3)	750(3)	800(3)

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (**AV**)												locking possibility on the left extremity (**V**)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	350(2)	400(2)	400(2)	450(2)	450(2)	500(2)	400(2)	450(2)	450(2)	500(2)	500(2)	550(2)	400(2)	425(2)	425(2)	475(2)	475(2)	525(2)	450(2)	500(2)	500(2)	550(2)	550(2)	600(2)
	2	425(2)	475(2)	475(2)	525(2)	525(2)	575(2)	500(2)	550(2)	550(2)	600(2)	600(2)	650(2)	475(2)	525(2)	525(2)	575(2)	575(2)	625(2)	525(2)	575(2)	575(2)	625(2)	625(2)	675(2)
	3	500(2)	550(2)	550(2)	600(2)	600(2)	650(2)	575(2)	625(2)	625(2)	675(2)	675(2)	725(2)	550(2)	600(2)	600(2)	650(2)	650(2)	700(2)	625(2)	675(2)	675(2)	725(2)	725(2)	775(2)
	4	575(2)	650(3)	650(3)	700(3)	700(3)	750(2)	675(3)	725(3)	725(3)	775(3)	775(3)	825(2)	625(2)	700(3)	700(3)	750(3)	750(3)	800(3)	700(3)	750(3)	750(3)	800(3)	800(3)	850(3)

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (**AV**)												locking possibility on the left extremity (**V**)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	425(2)	475(2)	475(2)	525(2)	525(2)	575(2)	475(2)	525(2)	525(2)	575(2)	575(2)	625(2)	475(2)	500(2)	500(2)	550(2)	550(2)	600(2)	525(2)	575(2)	575(2)	625(2)	625(2)	675(2)
	2	500(2)	550(2)	550(2)	600(2)	600(2)	650(2)	575(2)	625(2)	625(2)	675(2)	675(2)	725(2)	550(2)	600(2)	600(2)	650(2)	650(2)	700(2)	600(2)	650(2)	650(2)	700(2)	700(2)	750(2)
	3	575(2)	625(2)	625(2)	675(2)	675(2)	725(2)	650(2)	700(2)	700(2)	750(2)	750(2)	800(2)	625(2)	675(2)	675(2)	725(2)	725(2)	775(2)	700(2)	750(2)	750(2)	800(2)	800(2)	850(2)
	4	650(2)	725(3)	725(3)	775(3)	775(3)	825(3)	750(3)	800(3)	800(3)	850(3)	850(3)	900(3)	700(2)	775(3)	775(3)	825(3)	825(3)	875(3)	775(3)	825(3)	825(3)	875(3)	875(3)	925(3)

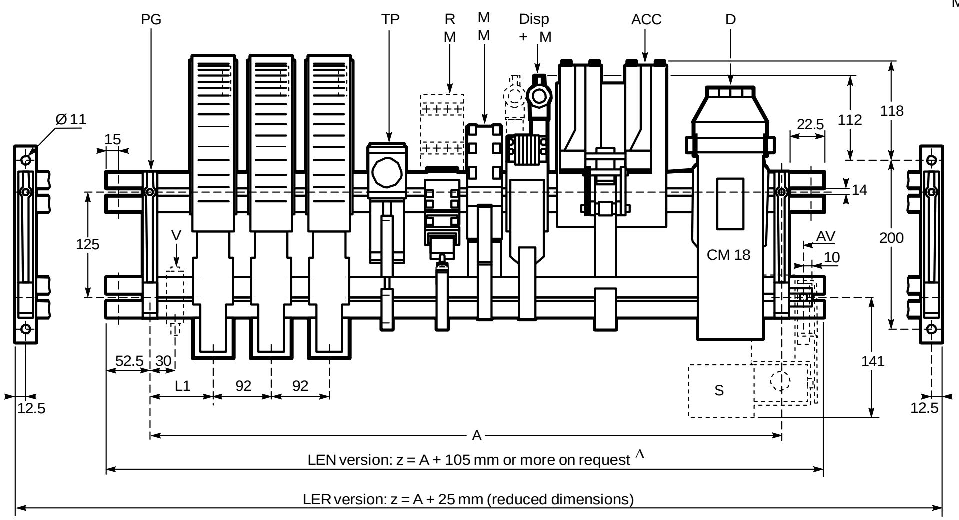
(1) form to be specified.
(2) magnetic circuit n° 16 R.
(3) magnetic circuit n° 18.
(4) X is the number of closing poles.
(5) for contactor equipped with DC or rectified AC supplied coil.
Δ for LEN version, please advise the position of the contactor on the bar.
Control circuit: for connection drawings, see p. 144.

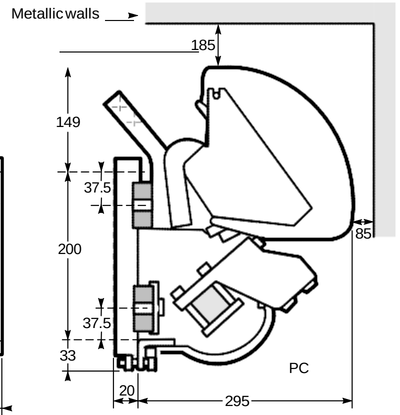
Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500 and 630 A,
- 575 mm with below contactor of calibre 800 or 1000 A.

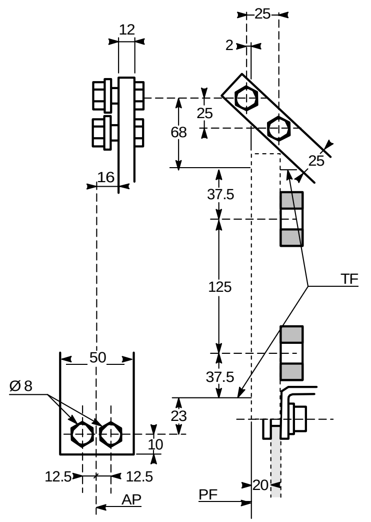
CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
L1: - without locking possibility on the left extremity: 45 mm,
- with locking possibility on the left extremity: 90 mm.

M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachment plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TF: attachment holes.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.





PC connecting sections



Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	325	375	375	425	425	475	375	425	425	475	475	525	350	400	400	450	450	500	425	475	475	525	525	575
	2	400	450	450	500	500	550	475	525	525	575	575	625	450	475	475	525	525	575	500	550	550	600	600	650
	3	500	550	550	600	600	650	575	625	625	675	675	725	525	575	575	625	625	675	600	650	650	700	700	750
	4	600	650	•	•	•	•	650	•	•	•	•	•	625	675	•	•	•	•	700	•	•	•	•	•

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	400	425	425	475	475	525	450	500	500	550	550	600	425	475	475	525	525	575	475	525	525	575	575	625
	2	475	525	525	575	575	625	550	600	600	650	650	700	525	550	550	600	600	650	575	625	625	675	675	725
	3	575	625	625	675	675	725	650	700	700	750	750	800	600	650	650	700	700	750	675	725	725	775	775	825
	4	675	725	•	•	•	•	725	•	•	•	•	•	700	750	•	•	•	•	750	•	•	•	•	•

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)		locking possibility on the right extremity (AV)												locking possibility on the left extremity (V)											
		without delayed contact						with delayed contact						without delayed contact						with delayed contact					
Number of M type blocks		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Number of poles	1	475	525	525	575	575	625	525	575	575	625	625	675	500	550	550	600	600	650	550	600	600	650	650	700
	2	550	600	600	650	650	700	625	675	675	725	725	775	600	625	625	675	675	725	650	700	700	750	750	800
	3	650	700	700	750	750	800	725	775	775	825	825	875	675	725	725	775	775	825	750	800	800	850	850	900
	4	750	800	•	•	•	•	800	•	•	•	•	•	775	825	•	•	•	•	825	•	•	•	•	•

• consult us.
(1) form to be specified.
(2) X is the number of closing poles.
Δ for LEN version, please advise the position of the contactor on the bar.
Control circuit: for connection drawings, see p. 144.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500 and 630 A,
- 575 mm with below contactor of calibre 800 or 1000 A.

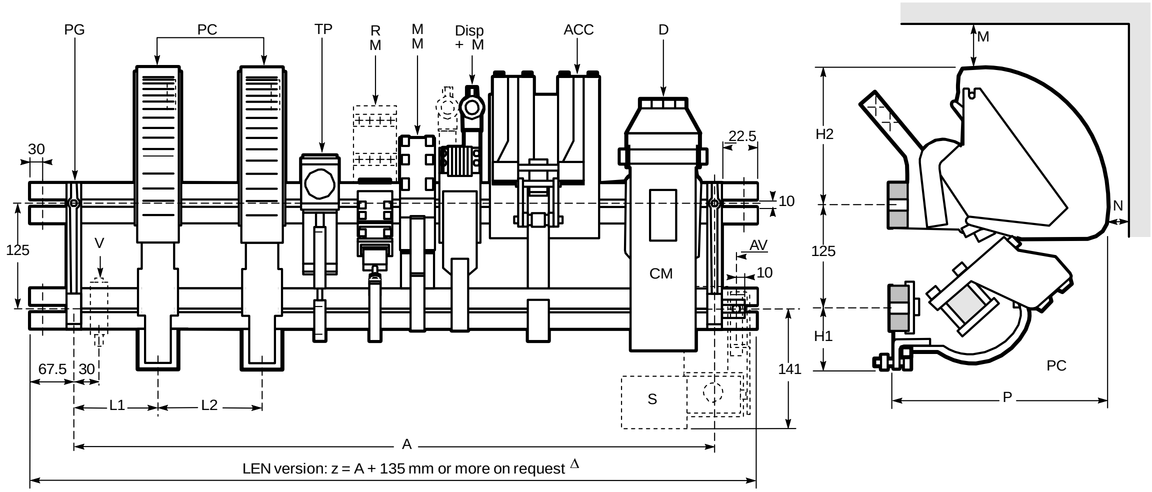
CM 18: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
L1: - without locking possibility on the left extremity: 45 mm,
- with locking possibility on the left extremity: 90 mm.

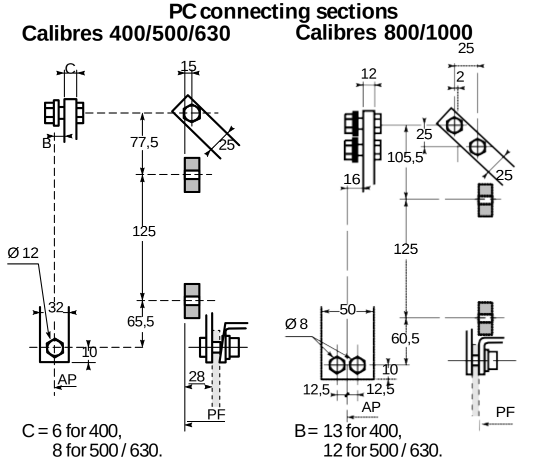
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachment plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TF: attachment holes.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

Overall dimensions CBFC75 400 to 1000 A

Modular DC contactors, 2 poles, double insulation

Ue: 1000 V





Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series																			
Calibre 400 A	400	450	450	500	500	475	525	525	575	575	450	475	475	525	525	500	550	550	600	600
Calibres 500 & 630 A	425	475	475	525	525	500	550	550	600	600	475	525	525	575	575	525	575	575	625	625
Calibres 800 & 1000 A	500*	550*	550*	600*	600*	575*	625*	625*	675*	675*	525*	575*	575*	625*	625*	600*	650*	650*	700*	700*

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series																			
Calibre 400 A	475	525	525	575	575	550	600	600	650	650	525	575	575	625	625	600	650	650	700	700
Calibres 500 & 630 A	500	550	550	600	600	575	625	625	675	675	550	600	600	650	650	625	675	675	725	725
Calibres 800 & 1000 A	575*	625*	625*	675*	675*	650*	700*	700*	750*	750*	600*	650*	650*	700*	700*	675*	725*	725*	775*	775*

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series																			
Calibre 400 A	550	600	600	650	650	625	675	675	725	725	600	650	650	700	700	675	725	725	775	775
Calibres 500 & 630 A	575	625	625	675	675	650	700	700	750	750	625	675	675	725	725	700	750	750	800	800
Calibres 800 & 1000 A	650*	700*	700*	750*	750*	725*	775*	775*	825*	825*	675*	725*	725*	775*	775*	750*	800*	800*	850*	850*

Δ for LEN version, please advise the position of the contactor on the bar.
* magnetic circuit n° 18.
(1) form to be specified.
(2) with metallic walls.
Control circuit: for connection drawings, see p. 144.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.

Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500, and 630 A.
- 575 mm with below contactor of calibre 800 or 1000 A.

CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachement plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

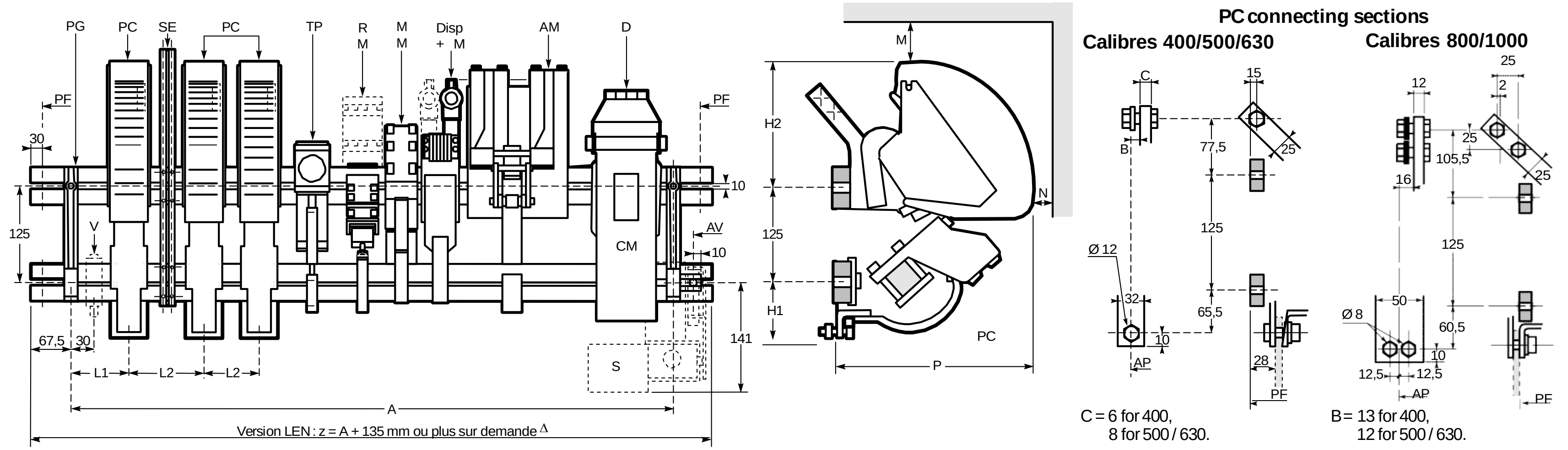
Calibre	L1 mechanical locking possibility V		L2	Safety perimeter(2)	
	without	with		M	N
400	62	107	102	45	45
500/630	65	110	120	75	60
800/1000	89	118	138	185	85

Calibre	H1	H2	P
400	75.5	112.5	258
500/630	75.5	112.5	258
800/1000	70.5	186.5	295

Overall dimensions CBFC75 400 to 1000 A

Modular DC contactors, 3 poles, double insulation.

Ue : 1000 V⎓



Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles on the positive polarity to be connected in series and 1 closing pole on the negative polarity																			
Calibre 400 A	500	550	550	600	600						550	575	575	625	625	600	650	650	700	700
Calibres 500 & 630 A	550	600	600	650	650	600	650	650	700	700	600	625	625	675	675	650	700	700	750	750
Calibres 800 & 1000 A	650*	675*	675*	725*	725*	700*	750*	750*	800*	800*	675*	725*	725*	775*	775	725*	775*	775*	825*	825*

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles on the positive polarity to be connected in series and 1 closing pole on the negative polarity																			
Calibre 400 A	575	625	625	675	675	650	700	700	750	750	625	675	675	725	725	700	750	750	800	800
Calibres 500 & 630 A	625	675	675	725	725	700	750	750	800	800	675	725	725	775	775	725	775	775	825	825
Calibres 800 & 1000 A	725*	750*	750*	800*	800*	775*	825*	825*	875*	875*	750*	800	800	850	850	800*	850*	850*	900*	900*

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles on the positive polarity to be connected in series and 1 closing pole on the negative polarity																			
Calibre 400 A	650	700	700	750	750	725	775	775	825	825	700	750	750	800	800	775	825	825	875	875
Calibres 500 & 630 A	700	750	750	800	800	775	825	825	875	875	750	800	800	850	850	800	850	850	900	900
Calibres 800 & 1000 A	800*	825*	825*	875*	875*	850*	900*	900*			825*	875*	875*			875*				

Δ for LEN version, please advise the position of the contactor on the bar.
* magnetic circuit n° 18.
(1) form to be specified.
(2) with metallic walls.
Control circuit: for connection drawings, see p. 144.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500, and 630 A.
- 575 mm with below contactor of calibre 800 or 1000 A.

CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachement plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

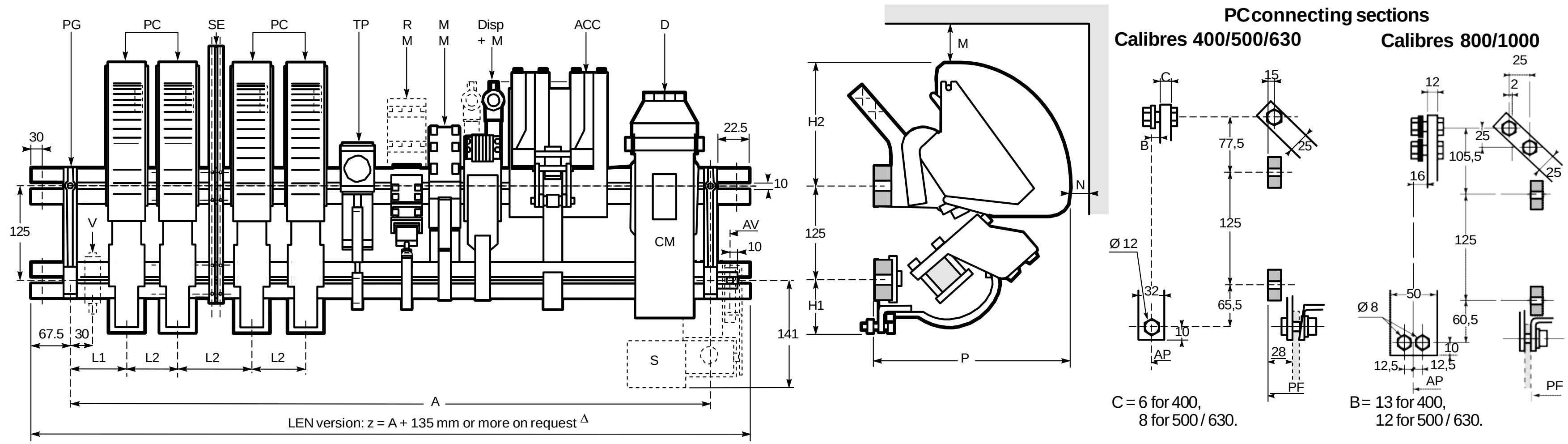
Calibre	**L1** mechanical locking possibility V		**L2**	**Safety perimeter**(2)	
	without	**with**		**M**	**N**
400	62	107	102	45	45
500/630	65	110	120	75	60
800/1000	89	118	138	185	85

Calibre	**H1**	**H2**	**P**
400	75.5	112.5	258
500/630	75.5	112.5	258
800/1000	70.5	186.5	295

CB75 400 to 1000 A

Overall dimensions CBFC75 400 to 1000 A

Modular 1000 V DC contactors, 4 pole, double isolation, Ue : 1000 V



Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 poles to be connected in series on the positive polarity and 2 poles to be connected in series on the negative polarity																			
Calibre 400 A	600	650	650	700	700	675	725	725	775	775	650	700	700	750	750	725	775	775	825	825
Calibres 500 & 630 A	675	700	725*	775*	775*	750*	800*	800*	850*	850*	700	750	775*	825	825	800	850	850	900	900
Calibres 800 & 1000 A	775*	825*									800*	850*								

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 poles to be connected in series on the positive polarity and 2 poles to be connected in series on the negative polarity																			
Calibre 400 A	675	725	725	775	775	750	800	800	850	850	725	775	775	825	825	800	850	850	900	900
Calibres 500 & 630 A	750	800*	800*	850*	850*	825*	875*	875*			800	850*	850*	900*	900*	875*				
Calibres 800 & 1000 A	850*	900*									875*									
A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (**AV**)										locking possibility on the left extremity (**V**)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 poles to be connected in series on the positive polarity and 2 poles to be connected in series on the negative polarity																			
Calibre 400 A	750	800	800	850	850	825	875	875	925	925	800	850	850	800	900	875	925	925		
Calibres 500 & 630 A	825	875*	875*			900*					875*	925*	925*							
Calibres 800 & 1000 A	925*																			

Δ for LEN version, please advise the position of the contactor on the bar.
* magnetic circuit n° 18.
(1) form to be specified.
(2) with metallic walls.
Control circuit: for connection drawings, see p. 144.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500, and 630 A.
- 575 mm with below contactor of calibre 800 or 1000 A.

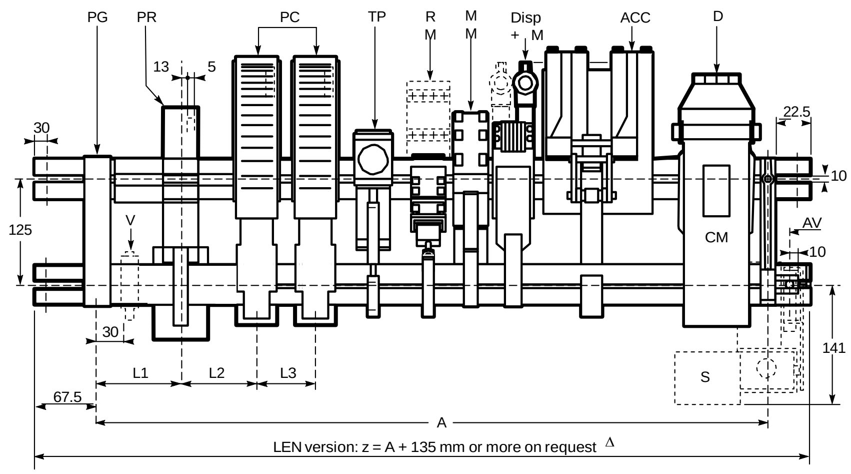
CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachement plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

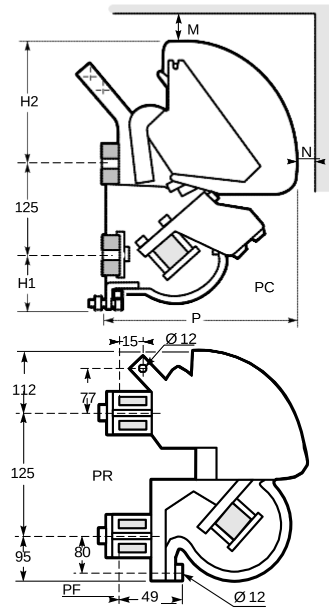
Calibre	**L1** mechanical locking possibility V without	with	**L2**	**Safety perimeter**(2) M	N
400	62	67	102	45	45
500/630	65	110	120	75	60
800/1000	89	118	138	185	85

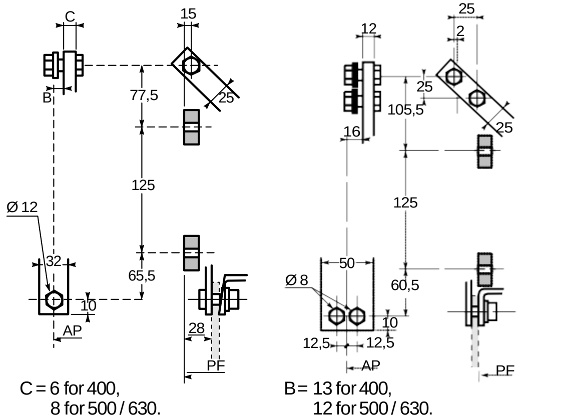
Calibre	**H1**	**H2**	**P**
400	75.5	112.5	258
500/630	75.5	112.5	258
800/1000	70.5	186.5	295

Overall dimensions CBFC75 400 to 1000 A

Modular DC contactors, 2 main poles and 1 opening pole, double isulation. Ue: 1000







Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series and one opening pole 400 A without mechanical overlapping																			
Calibre 400 A	525	550	550	600	600	575	625	625	675	675	550	600	600	650	650	625	675	675	725	725
Calibre 500 & 630 A	550	600	600	650	650	625	675	700*	750*	750*	575	625	625	675	675	650	700	725*	775*	775*
Calibre 800 & 1000 A	625*	675*	675*	725*	725*	700*	750*	750*	800*	800*	650*	700*	700*	750*	750*	725*	775*	775*	825*	825*

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series and one opening pole 400 A without mechanical overlapping																			
Calibre 400 A	600	650	650	700	700	675	725	725	775	775	625	675	675	725	725	700	750	750	800	800
Calibre 500 & 630 A	625	675	675	725	725	700	750	750*	800*	800*	650	700	700	750	750	725	775	800*	850*	850*
Calibre 800 & 1000 A	700*	750*	750*	800*	800*	775*	825*	825*	875*	875*	725*	775*	775*	825*	825*	800*	850*	850*	900*	900*

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series and one opening pole 400 A without mechanical overlapping																			
Calibre 400 A	675	725	725	775	775	750	800	800	850	850	700	750	750	800	800	775	825	825	875	875
Calibre 500 & 630 A	700	750	750	800	800	775	825	825*	875*	875*	725	775	775	825	825	800	850	875*	925*	925*
Calibre 800 & 1000 A	775*	825*	825*	875*	875*	850*	900*	900*			800*	850*	850*	900*	900*	875*	925*	925*		

Δ for LEN version, please advise the position of the contactor on the bar.
* magnetic circuit n° 18.
(1) form to be specified.
(2) with metallic walls.
Control circuit: for connection drawings, **see p. 144.**

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500, and 630 A.
- 575 mm with below contactor of calibre 800 or 1000 A.

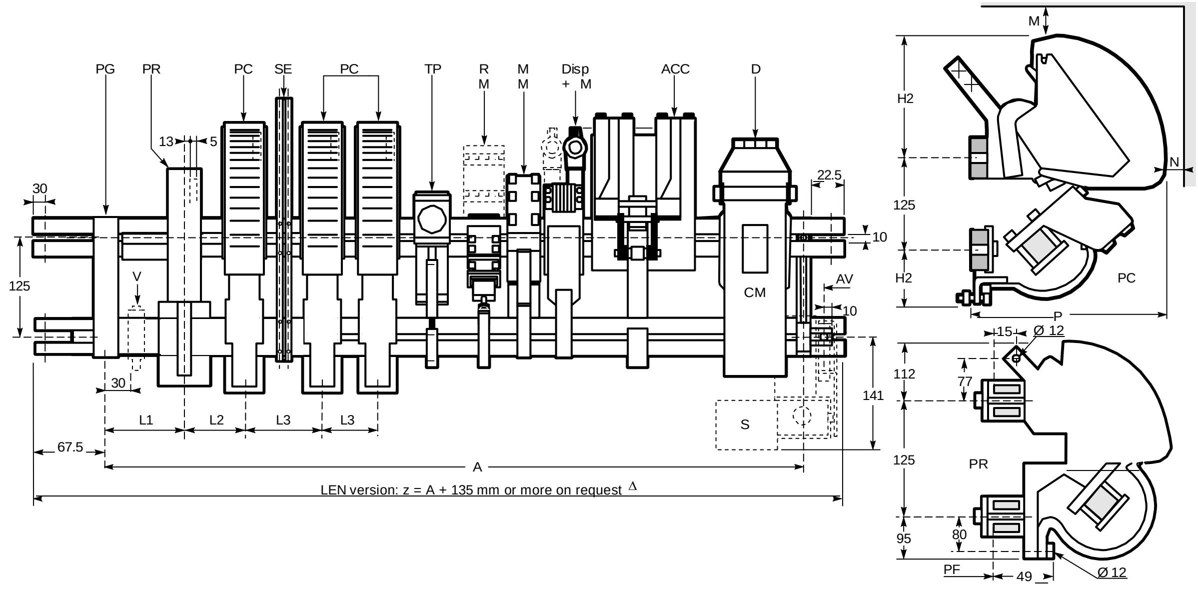
CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachement plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

Calibre	L1 mechanical locking possibility V		L2	L3	Safety perimeter(2)	
	with - out	with			M	N
400	77.5	107.5	105	102	45	45
500/630	77.5	107.5	112.5	120	75	60
800/1000	77.5	107.5	135	138	185	85

Calibre	H1	H2	P
400	75.5	112.5	258
500/630	75.5	112.5	258
800/1000	70.5	186.5	295

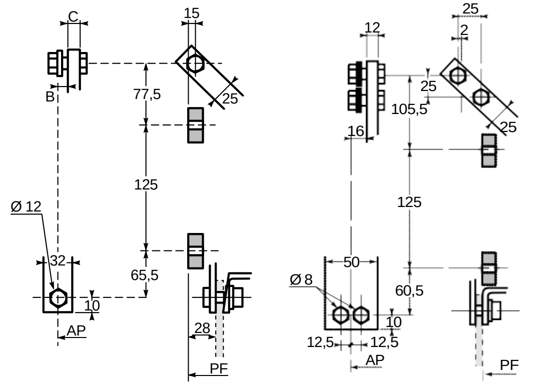
Overall dimensions CBFC75 400 to 1000 A

Modular DC contactors, 3 main poles and 1 opening pole, double insulation. Ue: 1000 V⎓



PC connecting sections

Calibres 400/500/630 | **Calibres 800/1000**



C = 6 for 400, 8 for 500 / 630.

B = 13 for 400, 12 for 500 / 630.

Contactor without «mechanical latching with electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series on the positive polarity 1 pole on the negative polarity and 1 opening pole 400 A without mechanical overlapping for connection to earth																			
Calibre 400 A	625	650	650	700	700	675	725	725	775	775	650	700	700	750	750	725	775	775	825	825
Calibre 500 & 630 A	700*	750*	750*	800*	800*	750*	800*	800*	850*	850*	725*	775*	775*	825*	825*	800*	850*	850*	900*	900*
Calibre 800 & 1000 A	750*	800*	800*	850*	850*	825*	875*	875*	925*	925*	800*	850*	850*	900*	900*	850*	900*	900*		

Contactor with «mechanical latching with single electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series on the positive polarity 1 pole on the negative polarity and 1 opening pole 400 A without mechanical overlapping for connection to earth																			
Calibre 400 A	700	750	750	800	800	775	825	825	875	875	725	775	775	825	825	800	850	850	900	900
Calibre 500 & 630 A	775*	800*	800*	850*	850*	825*	875*	875*	925*	925*	800*	850*	850*	900*	900*	850*	900*	900*		
Calibre 800 & 1000 A	850*	875*	875*			900*					875*	925*	925*							

Contactor with «mechanical latching with double electrical and manual release»

A dimension (mm)	locking possibility on the right extremity (AV)										locking possibility on the left extremity (V)									
	without delayed contact					with delayed contact					without delayed contact					with delayed contact				
Number of M type blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Number of poles	2 closing poles to be connected in series on the positive polarity 1 pole on the negative polarity and 1 opening pole 400 A without mechanical overlapping for connection to earth																			
Calibre 400 A	775	825	825	875	875	850	900	900			800	850	850	900	900	875	925	925		
Calibre 500 & 630 A	850*	875*	875*			900*					875*	925*	925*							
Calibre 800 & 1000 A	925*																			

Δ for LEN version, please advise the position of the contactor on the bar.
* magnetic circuit n° 18.
(1) form to be specified.
(2) with metallic walls.
Control circuit: for connection drawings, see p. 144.

Please advise when you order whether the contactor has to be equipped with the «shaft end» - necessary to adapt a possible mechanical locking device.
Without information, the contactor will be delivered without it.

ACC: mechanical latching with single or double release.
AP: pole axis.
AV: mechanical locking axis, attachment centre-to-centre distance between two superimposed contactors:
- 400 mm with below contactor of calibre 400, 500, and 630 A.
- 575 mm with below contactor of calibre 800 or 1000 A.

CM: magnetic circuit can be mounted on the left side of the contactor. Without any information, it will always be mounted on the right.
D: D type auxiliary contact blocks.
Disp + M: device used for DC or rectified AC control circuit. Standard contents: one support with terminal box, economy resistor(s), rectifier for alternating current and one M type auxiliary contact block.
M: M type auxiliary contact blocks(1).
PC: closing pole.
PF: attachement plane, LER version.
PG: left bearing.
R: possible auxiliary relays.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: delayed auxiliary contact block.
V: possible mechanical locking facility with a 80, 150, 200 and 1250 to 5000 A contactor or with CBA-CBFC 55 400 to 1000 A old generation contactors.

Calibre	**L1** mechanical locking possibility V		**L2**	**L3**	**Safety perimeter**(2)	
	without	**with**			**M**	**N**
400	77.5	107.5	105	102	45	45
500/630	77.5	107.5	112.5	120	75	60
800/1000	77.5	107.5	135	138	185	85

Calibre	**H1**	**H2**	**P**
400	75.5	112.5	258
500/630	75.5	112.5	258
800/1000	70.5	186.5	295

CB 71 1250 to 2000 A

2 types for each calibre:

AC poles
CBA 71 1250,
CBA 71 1600,
CBA 71 2000.

DC poles
CBC 71 1250,
CBC 71 1600,
CBC 71 2000.

CBA 71 2000 4.0

Standard versions

- 1 to 4 single pin main poles with copper contacts for calibre 1250 A (silver pad contact on request) and silver contacts for calibres 1600 and 2000 A.
  Arc-blowout coil operates only during opening.

- Closing electromagnet mounted on the right side of the poles (on request, it can be mounted on the left), solid iron magnetic circuit with 2 coils.
  - control circuit supplied from an AC source via a rectifier and power-saved coils (device mounted and cabled on the contactor).
  - control circuit supplied from a DC source with power-saved coils (device mounted and cabled on the contactor).

- Auxiliary contacts
  - two M type contact blocks with 3 contacts 3 NO + 3 NC, instant contacts or form to be specified when you order.
  - number of M type contact blocks can be increased to reach 6 blocks.

- Mechanical locking
  - vertical type.

Options

- Silver pad contact pins for calibre 1250 A.
- NO or NC delayed block TP86 type(this one also includes 4 free instant contacts, i.e. 3 NO + 1 NF).
- More than 6 M type contact blocks can be mounted on the contactor by mounting them below the contactor to reduce its total dimensions.
- Device to hold the contactor closed in case of untimely micro-cuts for contactors that are not equipped with a mechanical latching.
- Mechanical latching with single or double electrical release (does not change the total dimensions of the contactor).
- Self-protective device for the release coil(s).
- Metallic support for «Ronis type» lock (lock not supplied).
- Horizontal or back-to-back mechanical locking.
- Poles of different calibres and supplied with different currents.
- Poles without magnetic blowout.
- Reinforced insulation.
- Double insulation for specific applications.
- Tropical treatment n° 2.

Technical features CBA 71 1250 to 2000 A

AC contactors
Ue up to 1000 V 50/60 Hz

Alternating current			CBA Type 71								
			1250			1600			2000		
Thermal nominal current(1) AC_1		A	1250			1600			2000		
	connecting section	mm²	1000			1400			1600		
Nominal insulating voltage		V	1000			1000			1000		
Nominal operating voltage 40 to 60 Hz(5)		V	660	1000		660	1000		660	1000	
Maximum controlled powers											
	voltage	V	220	380	500	220	380	500	220	380	500
	AC'2 - AC_3 duty cycles	kW	370	630	630	470	700	700	600	1000	1000
	AC_23 duty cycles	kVA	490	840		620	930		800	1330	
Maximum operating current											
	continuous duty	A	1250			1600			2000		
Short-time current t ≤ 40°C											
	1 s	kA	41			30			65		
	5 s	kA	20			15			30		
	10 s	kA	13.5			10.9			21		
	15 s	kA	11.8			8.7			17.9		
	30 s	kA	7.9			6			12		
	1 min	kA	5.5			4.5			8.5		
	3 min	kA	3.3			3			5		
	10 min	kA	2			2.2			3.2		
Thermal nominal current under 400 Hz		A	938			1200			1500		
Allowable overcurrent / time		kAeff/s	25/3			25/1.6			25/7		
Current switch-off rating(2)	voltage	V	220/380/440		**1100**	220/380/440		**1100**	220/380/440		**1100**
	$\cos\varphi = 0.3$	kA eff	25		**12**	25		**12**	25		**12**
Current-switch-on rating	$\cos\varphi = 0.3$	kA eff	23		**12**	23		**12**	23		**12**
CBA poles inductance		H	$2.94 \cdot 10^{-7}$			$2.38 \cdot 10^{-7}$			$2.82 \cdot 10^{-7}$		
CBA poles resistance	cold	Ω	$5.25 \cdot 10^{-5}$			$7.19 \cdot 10^{-5}$			$4.01 \cdot 10^{-5}$		
	hot	Ω	$5.96 \cdot 10^{-5}$			$7.55 \cdot 10^{-5}$			$4.72 \cdot 10^{-5}$		
Number of openings on load at nominal current			50000			100000			50000		
Number of openings on load under 380 V before contact replacement:	for I = 1250 A		50000			150000			150000		
	for I = 1600 A		35000			100000			100000		
	for I = 2000 A					50000			50000		
Mechanical endurance		millions of operations	1			1			1		

Control circuit			1250	1600	2000
Nominal voltage	AC 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500(4)		
	DC	V	24 - 48 - 110 - 127 - 220 - 380 - 500(4)		
Maximum consumptions	inrush/hold				
AC*	1P	VA	180/14	180/14	180/14
	2P	VA	380/24	380/24	380/24
	3P	VA	860/50	860/50	860/50
	4P	VA	1700/88	1700/88	1700/88
DC	1P	W	165/17.5	165/17.5	165/17.5
	2P	W	360/35	360/35	360/35
	3P	W	836/55	836/55	836/55
	4P	W	1600/110	1600/110	1600/110
Constant L/R rate of electromagnet open/closed		ms	118/41	118/41	118/41
Closing time(6)	at Un	ms	180	180	180
	at 0.85 Un	ms	215	215	215
Opening time(6)	at Un	ms			
between command and					
- separation of contacts		ms	60	60	60
- total opening of electromagnet		ms	82	82	82
- complete opening		ms	300	300	300

(1) in open air.
(2) arcing time < 15 ms.
(3) diodes are warranted up to an overload of 3 Un efficient.
(4) for other voltages, please consult us.
(5) if nominal operation voltage >1000 V, please consult us.
(6) closing time is measured from the supply of the closing coil until contact of main poles. Opening time is measured from the supply of the tripping coil until the separation of main poles.
* control circuit:
Equipments commanded with alternating current are rectified(3) and power-saved.

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
AC	I.th 1 pole x 2 x 0.7	I.th 1 pole x 3 x 0.66

•The current switch-off rating of poles connected in parallel remains the same as for a single pole.

Technical features CBC71 1250 to 2000 A

DC contactors

Ue: 600 and up to 2000 V

Direct current			CBC Type 71								
			1250			1600			2000		
Thermal nominal current(1) DC_1		A	1250			1600			2000		
connecting section		mm^2	1000			1400			1600		
Nominal insulating voltage(7)		V	1000			1000			1000		
Nominal operating voltage(5)		V	600	700(2)	**1000(2)**	600	700(2)	**1000(2)**	600	700(2)	**1000(2)**
Maximum operating current											
permanent duty		A	1250			1600			2000		
8 hours duty		A	1250			1600			2000		
temporary duty without openings on load	10 minutes	A	2000			2400			3500		
	30 minutes	A	1400			1700			2500		
	60 minutes	A	1250			1600			2000		
temporary duty with openings on load	10 minutes	A	2400			2400			3500		
	30 minutes	A	1700			1700			2500		
	60 minutes	A	1500			1600			2000		
continuous duty		A	1250			1600			2000		
Short-time current t ≤ 40°C											
	1 s	kA	41			30			65		
	5 s	kA	20			15			30		
	10 s	kA	13.5			10.9			21		
	15 s	kA	11.8			8.7			17.9		
	30 s	kA	7.9			6			12		
	1 min	kA	5.5			4.5			8.5		
	3 min	kA	3.3			3			5		
	10 min	kA	2			2.2			3.2		
Allowable overcurrent / time		kA /s	25/3			25/1.6			25/7		
Current switch-off rating	voltage	V	550	700	**1000**	550	700	**1000**	550	700	**1000**
	one-pole	kA	23	18		23	18		23	18	
	bipolar(2)	kA		23	19		23	19		23	19
	voltage	V	1500		2000	1500		2000	1500		2000
	tripolar(2)	kA	19		8	19		8	19		8
	tetrapolar(2)	kA			19			19			19
Current switch-on rating	L/R= 15ms	kA	25/550 V			25/550 V			25/550 V		
Poles inductance		H	$2.94\ 10^{-7}$			$2.38\ 10^{-7}$			$2.82\ 10^{-7}$		
Poles resistance	cold	Ω	$5.25\ 10^{-5}$			$7.19\ 10^{-5}$			$4.01\ 10^{-5}$		
	hot	Ω	$5.96\ 10^{-5}$			$7.55\ 10^{-5}$			$4.72\ 10^{-5}$		
Number of openings on load at nominal current			50000			100000			50000		
Number of openings on load under	for I = 1250 A		50000			150000			150000		
	for I = 1600 A		35000			100000			100000		
	for I = 2000 A					50000			50000		
Mechanical endurance		millions of operations	1			1			1		

Control circuit					
Nominal voltage	AC 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500(4)		
	DC	V	24 - 48 - 110 - 127 - 220 - 440 - 500(4)		
Maximum consumptions	inrush/hold				
AC*	1P	VA	180/14	180/14	180/14
	2P	VA	380/24	380/24	380/24
	3P	VA	860/50	860/50	860/50
	4P	VA	1700/88	1700/88	1700/88
DC	1P	W	165/17.5	165/17.5	165/17.5
	2P	W	360/35	360/35	360/35
	3P	W	836/55	836/55	836/55
	4P	W	1600/110	1600/110	1600/110
Constant L/R rate of electromagnet open/closed		ms	118/41	118/41	118/41
Closing time(6)	at Un	ms	180	180	180
	at 0.85Un	ms	215	215	215
Opening time(6)	at Un	ms			
between command and					
- separation of contacts		ms	60	60	60
- total opening of electromagnet		ms	82	82	82
- complete opening		ms	300	300	300

(1) in open air.
(2) for applications under voltages > 600 Vdc, please consult our technical department.
(3) diodes are warranted up to an overload of 3 Un efficient.
(4) for other voltages, please consult us.
(5) if nominal operating voltage > 1000 V, please consult us.
(6) closing time is measured from the supply of the closing until the contact of main poles. Opening time is measured from the supply of the tripping coil until the separation of main poles.
(7) dielectric testing voltage related to a given insulation voltage can reach 8 kV for specific applications.
* control circuit:
Equipments commanded with alternating current are rectified(3) and power-saved.

- The current switch-off rating of poles connected in parallel remains the same as for a single pole.
- Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

- Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
DC	I.th 1 pole x 2 x 0.8	I.th 1 pole x 3 x 0.75

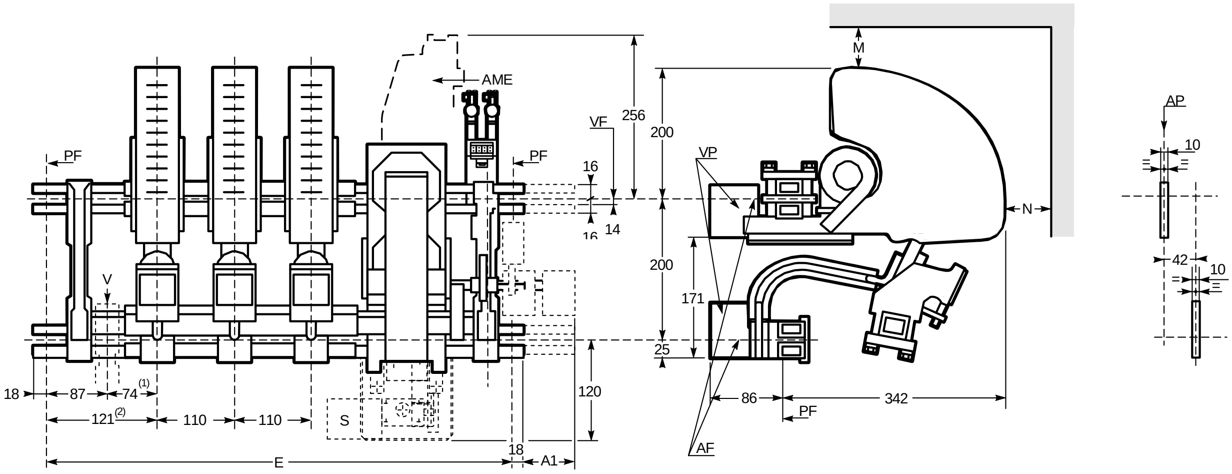
For technical features of opening poles, see p. 70.

Overall dimensions CBA & CBC71 1250 to 2000 A

AC & DC contactors

CBC: Ue up to 600 V⎓ CBA: Ue up to 1000 V 50/60 Hz

23. CBA - CBC 71 - 1250 to 2000 x.0(4)



1) E attachment centre-to-centre distance

Number of poles	Locking possibility without	with
1	419 mm	459 mm
2	529 mm	569 mm
3	639 mm	679 mm
4	749 mm	789 mm

2) Protrusion A1

Number of TR delayed blocks	Number of M blocks(3)	
0	2	10 mm
0	3	48 mm
0	4	60 mm
0	5	100 mm
0	6	100 mm
1	1	21 mm
1	2	48 mm
1	3	70 mm
1	4	110 mm
1	5	110 mm

AF: attachment axis.
AME: mechanical latching with single electrical release (option: double electrical release).
AP: pole axis.
PF: attachment plane.
S: metallic support for "Ronis type" lock for locking the contactor at rest (lock not supplied).
V: possible mechanical locking, attachment centre-to-centre distance between two superimposed contactors: 625 mm
VF: attachment screws.
VP: see connecting sections.

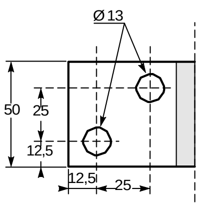
(1) with mechanical locking.
(2) dimension without locking device.
(3) block with 2 or 3 contacts.
(4) x is the number of closing poles.

3) Insulation distance (safety perimeter)

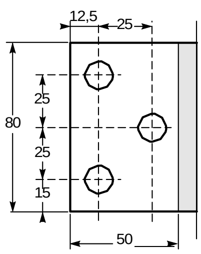
	DC								AC			
	� 220V				< 220V				� 220V		> 220V	
	Currents to switch-off				Currents to switch-off							
	� 15kA		� 25kA		� 15kA		� 25kA					
	1P	2P	1P	2P	1P	2P	1P	2P				
	M = N	**M = N**	**M = N**	**M = N**	**M = N**	**M = N**	**M = N**	**M = N**	**M**	**N**	**M**	**N**
Metallic walls	250		400		400				150	150	180	200
Insulated walls	120	200	120	250	120	250	120	80	80	90	100	

Connecting sections

- CBA - CBC1250



- CBA - CBC1600/2000

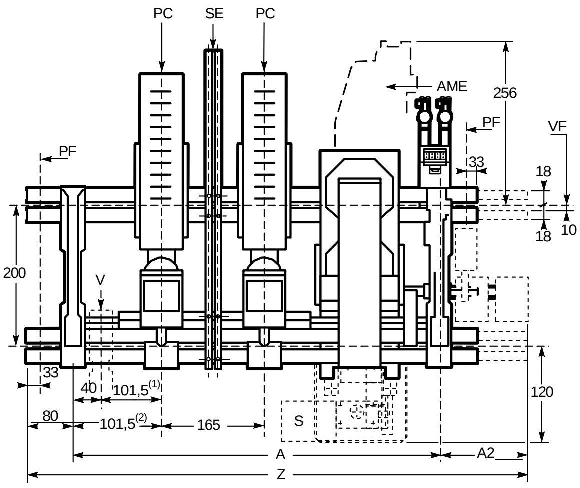


Control circuit: for connection drawings, see p. 144.

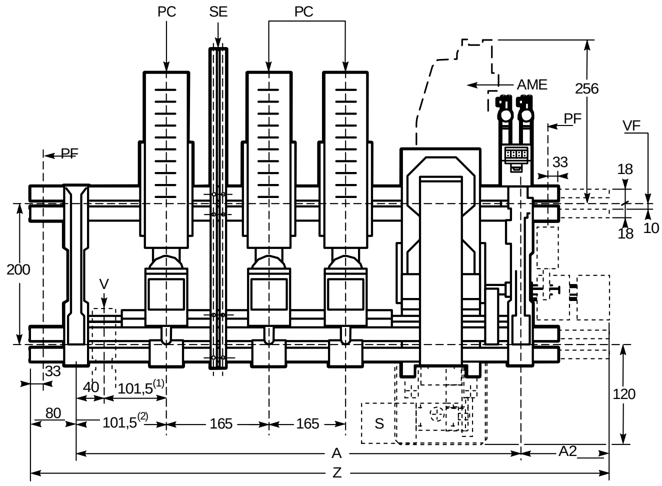
Overall dimensions CBC71 1250 to 2000 A

DC contactors CBC Ue: 1000 V
Double insulation

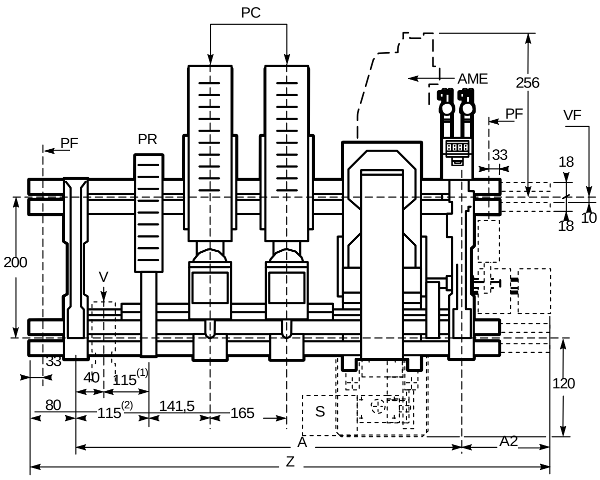
CBC 71 - 1250 to 2000 2.0



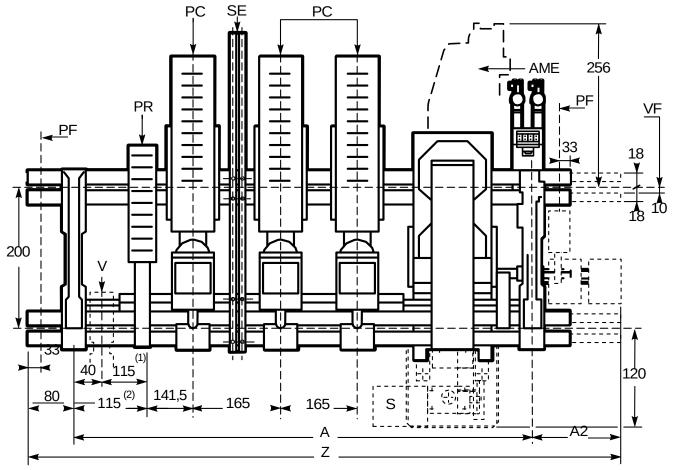
CBC 71 - 1250 to 2000 3.0



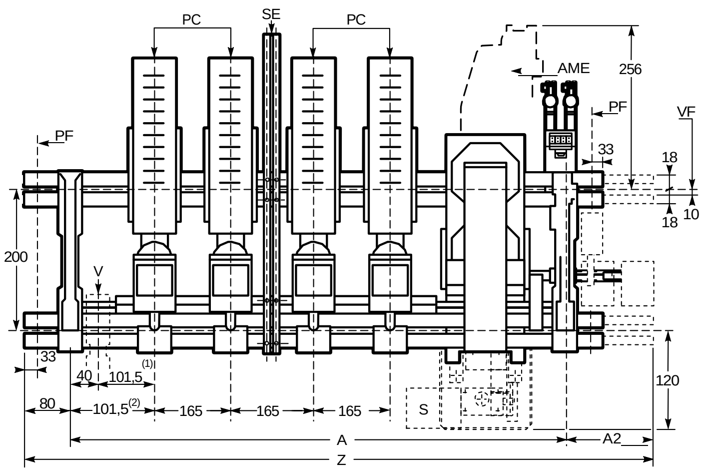
CBC 71 - 1250 to 2000 2.1



CBC 71 - 1250 to 2000 3.1



CBC 71 - 1250 to 2000 4.0



AME: mechanical latching with single electrical release (option: double electrical release).
PC: closing pole.
PR: rupturing pole 500 A, for calibre 800 and 1000, please consult us.
S: metallic support for "Ronis type" lock for locking the contactor at rest (lock not supplied).
SE: separator.
V: possible mechanical locking, attachment centre-to-centre distance between two superimposed contactors: 625 mm.
VF: attachment screws.
Z: total length of attachment bars Z = A + A2 + 80 mm. On request, lenght can be increased, in that case, please advise the position of the contactor on the bars.

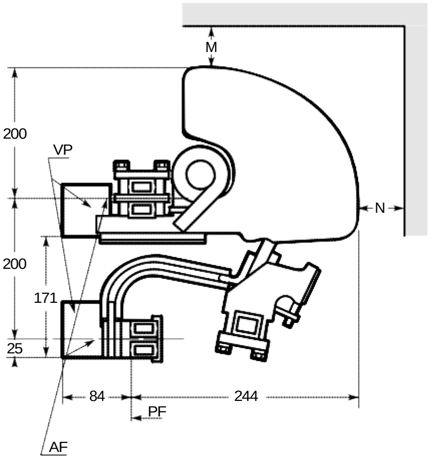
(1) with possibility of mechanical latching.
(2) without possibility of mechanical latching.

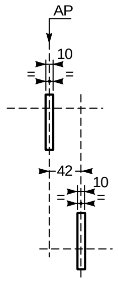
Control circuit: for connection drawings, see p. 144.

Overall dimensions CBC71 1250 to 2000 A

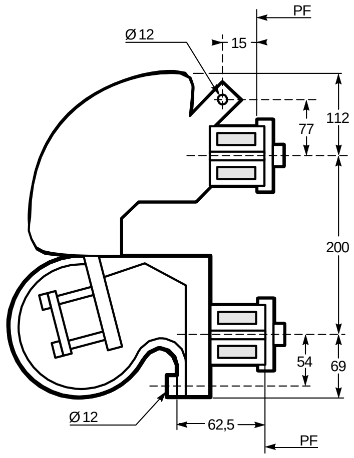
DC contactors Ue: 1000 V
Double insulation

PC pole





PR pole



AF: attachment axis.
AP: pole axis.
PC: closing pole.
PF: attachment plane.
PR: rupturing pole 500 A, for calibre 800 and 1000, please consult us.
VP: see connecting sections.

Number of TR delayed blocks	Number of M blocks(3)	A2
0	2	85
0	3	128
0	4	140
0	5	180
0	6	180
1	1	101
1	2	128
1	3	150
1	4	190
1	5	190

(3) block with 2 or 3 contacts.

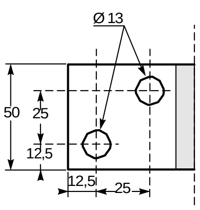
Safety perimeter

	M	N
Metallic walls	180	200
Insulated walls	120	120

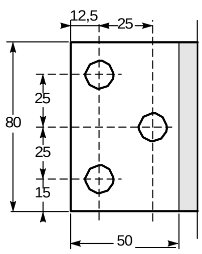
Type of contactor	A Locking possibility without	with
CBC 71 - 1250/1600/2000 2.0	545	585
CBC 71 - 1250/1600/2000 3.0	710	750
CBC 71 - 1250/1600/2000 4.0	875	915
CBC 71 - 1250/1600/2000 2.1	700	740
CBC 71 - 1250/1600/2000 3.1	865	905

Connecting sections

- CBC 1250



- CBC 1600/2000



Nota: All these contactors have a double insulation, dielectric testing voltage: 80 kV, 50 Hz for 1 min (for other ratings, consult us).

CBC 71 1250 to 2000 x.x

x.x: 1st figure represents the number of closing poles and 2nd figure the number of opening poles.
2.0: two-pole break.
3.0: two-pole break in series on the positive polarity and single-pole break on the negative polarity.
4.0: two-pole break in series on the positive and negative polarities.
2.1: two-pole break and rupturing pole 500 A without overlapping between the poles.
3.1: two-pole break in series on the positive polarity, single-pole break on negative polarity and rupturing pole 500 A without overlapping between poles.

Poles to be connected in series by the customer.

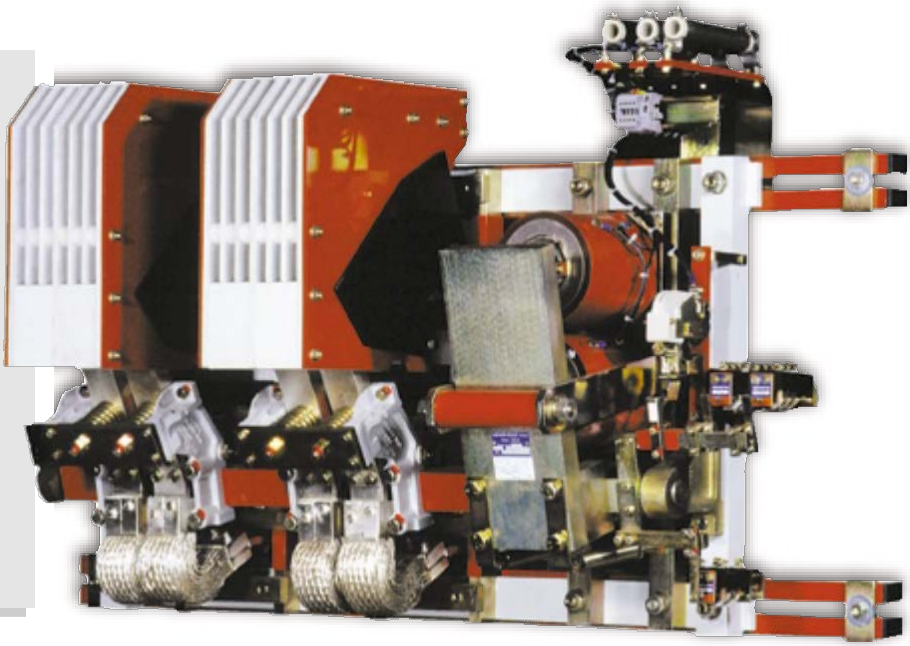
Control circuit: for connection drawings, see p 144.

CB 2500 to 5000 A and more

2 types for each calibre:

AC Poles
CBA 54 2500,
CBA 60 4000.

DC Poles
CBC54 3000,
CBC60 5000,
CBC60 5500,
CBC60 6200,
CBC60 8000.



CBC 60 5000 2.0

Standard versions

- 1 to 4 single pin main poles (2 pins for calibres 4000 and 5000) with copper contact (silver pad contact on request or for specific applications).
  Arc-blowout coil operates only during opening.

- Closing electromagnet mounted on the right side of the poles (on request, it can be mounted on the left), solid iron magnetic circuit with 2 coils.
  - control circuit supplied from an AC source via a rectifier and power-saved coils (device mounted and cabled on the contactor).
  - control circuit supplied from a DC source with power-saved coils (device mounted and cabled on the contactor).

Auxiliary contacts

- Two type M contact blocks with 3 contacts 3 NO + 3 NC, instant contacts or form to be specified when you order.

- Number of M type contact blocks can be increased to reach 6 blocks.

Mechanical locking

- vertical type.

Options

- Silver pad contact pins.

- NO or NC delayed block TP86 type (this one also includes 4 free instant contacts, i.e. 3 NO + 1 NC).

- More than 6 M type contact blocks can be mounted on the contactor by mounting them below the contactor to reduce its total dimensions.

- Device to hold the contactor closed in case of untimely micro-cuts for contactors that are not equipped with a mechanical latching.

- Mechanical latching with single or double electrical release (does not change the total dimensions of the contactor).

- Self-protective device for the release coil(s).

- Metallic support for «Ronis type» lock (lock not supplied).

- Horizontal or back-to-back mechanical locking.

- Poles of different calibres and supplied with different currents.

- Poles without magnetic blowout.

- Reinforced insulation.

- Double insulation for specific applications.

- Tropical treatment n° 2.

Technical featuresCBA - CBC2500 to 6200 A

CBA: AC contactors
CBC: DC contactors

		CBA		CBC			
		2500	**4000**	**3000**	**5000**	**5500** [2]	**6200** [2]
Thermal nominal current[1] **AC_1 - DC_1**	A	2500	4000	3000	5000	5500	6200
connecting section	mm^2	2000	5000	2000	5000	6000	7000
Nominal operating voltage							
AC 40 to 60 Hz	V	660	660				
DC	V			600/1000[1]	600/1000[1]	600/1000[1]	600/1000[1]
Maximum controlled powers							
AC voltage	V	220 | 380 | 500/660	220 | 380 | 500/660				
AC'2 - AC_3 duty cycles	kW	750 | 1250 | 1250	1150 | 2000 | 2000				
AC_23 duty cycles	kVA	| 1600 | 1875	| 2600 | 3000				
DC voltage	V						
DC_2 - DC_4 duty cycles	kW						
Maximum operating current							
permanent service	A	2500	4000	3000	5000	5500[2]	6200[2]
short-time service with t :,; 40°C							
1 s	kA	30	45	36	56	61	69
5 s	kA	14	20.5	16	25	27	31
10 s	kA	9.7	16.2	11.5	20	22	24.5
15 s	kA	8	12	9.5	15	16.5	18.5
30 s	kA	5.95	9	7	11	12	13.5
1 min	kA	4.5	7	5.4	8.5	9	10.5
3 min	kA	3.3	5.2	4	6.5	7	8
10 min	kA	2.8	4.5	3.3	5.6	6	6.9
Allowable overcurrent / time							
AC	kA eff/s	30/1	45/1				
DC	kA/s			36/1	56/1	61/1	69/1
Current swith-off rating							
AC voltage	V	220 | 380 | 500	220 | 380 | 500				
cos φ = 0.3	kA eff	93 | 50 | 37	93 | 50 | 37				
DC voltage	V			250 | 500 | 1000[1]	250 | 500 | 1000[1]	250 | 500 | 1000[1]	250 | 500 | 1000[1]
L/R = 15 ms	kA			55 | 35 | 35	55 | 35 | 35	55 | 35 | 35	55 | 35 | 35
Current switch-on rating							
AC cos φ = 0.3	kA eff	132 | 70 | 55	132 | 70 | 55				
DC L/R = 15 ms	kA			55 | 35 | 35	55 | 35 | 35	55 | 35 | 35	55 | 35 | 35
CBA poles inductance	H	$4.48\ 10^{-7}$	$2.24\ 10^{-7}$				
Poles resitance cold	Ω	$1.68\ 10^{-5}$	$0.838\ 10^{-5}$				
hot	Ω						
Number of openings under load at nominal current		50000	50000	50000	50000	50000	50000
Mechanical endurance	millions of operations	1	1	1	1	1	1

Control circuit

		CBA 2500	CBA 4000	CBC 3000	CBC 5000	CBC 5500	CBC 6200
Nominal voltage AC 50 Hz	V	110 - 127 - 220 - 380 - 500					
DC	V	110 - 220 - 400 - 500					
Maximum consumptions inrush/hold							
AC* 1P	VA	760/75	750/75	760/75	750/75	750/75	750/75
2P	VA	760/75	1950/127	760/75	1950/127	1950/127	1950/127
3P	VA	1440/127	5250/220	1440/127	5250/220	5250/220	5250/220
4P	VA	1950/127		1950/127			
DC 1P	W	610/35	610/46	610/35	610/46	610/46	610/46
2P	W	610/35	960/72	610/35	960/72	960/72	960/72
3P	W	1000/66	2600/145	1000/66	2600/145	2600/145	2600/145
4P	W	1100/72		1100/72			
Constant L/Rate of electromagnet open/closed	ms						
Closing time at Un	ms	350	350	350	350	350	350
at 0.85 Un	ms						
Opening time at Un	ms						
between commandand							
- separation of contacts	ms	60	60	60	60	60	60
- total opening of electromagnet	ms	85	85	85	85	85	85
- complete opening	ms	300	300	300	300	300	300
		CBA		**CBC**			

(1) in open air
(2) CBC 5000 A, direct current:
to reach 5500 A: usual connecting section + 20 %,
to reach 6200 A: usual connecting section + 40 %.
(3) diodes are warranted up to an overload of 3 Un efficient.
* control circuit:
Equipments controlled with alternating current are rectified and power-saved.
(4) for two-pole break, please consult us.

•Factor to be applied to the contactor in case of poles connected in parallel (this factor already includes a safety margin).

	2 poles in parallel	3 poles in parallel
AC	I.th x 0.7	I.th x 0.66
DC	I.th x 0.8	I.th x 0.75

•The current switch-off rating of poles connected in parallel remains the same as the one for a single pole.

For technical features of opening poles, see p. 78.

Technical features CBA - CBC 98 2560 to 5000 A

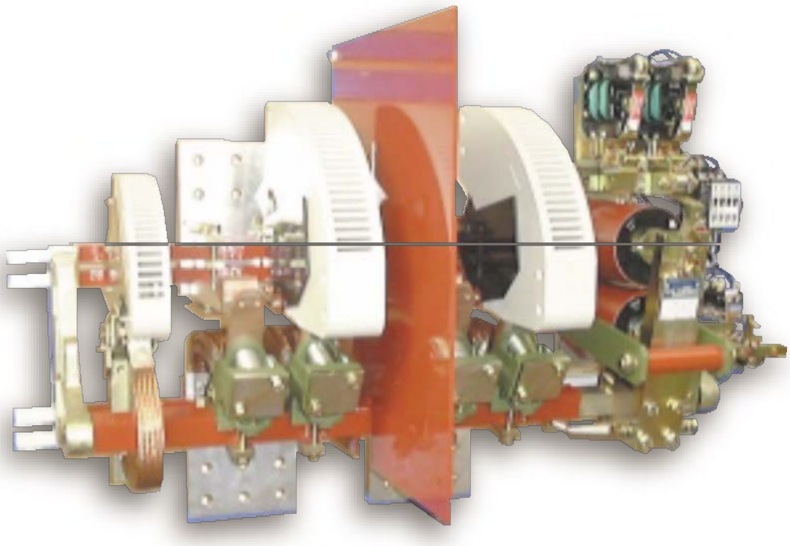
CBC: DC contactor
CBA : AC contactor (consult us)

DC current

			2560				3200				5000(8)			
Generation			98				98				98			
Thermal nominal current(1)		A	2560				3200				5000			
connecting section		mm²	2500				3000				5000			
Nominal insulating voltage(7)		V	1000				1000				1000			
Nominal operating voltage(5)		V	600	700(2)	**1000(2)**		600	700(2)	**1000(2)**		600	700(2)	**1000(2)**	
Short-time current														
	1 s	kA	43											
	5 s	kA	21,6				43				50			
	10 s	kA	15,7				30				40			
	15 s	kA	12,5				25,7				36			
	30 s	kA	8,6				17,3				24			
	1 min	kA	6,5				12,2				17			
	3 min	kA	4,3				7,2				10			
	10 min	kA	3,1				4,6				6,5			
Current switch-off rating	voltage	V	**1000**				**1000**				**1000**			
L/R = 5 ms	single pole	kA	10				10				10			
Current switch-off rating	voltage	V	550	700	**1000**	**1500**	550	700	**1000**	**1500**	550	700	**1000**	**1500**
L/R = 15 ms	single pole	kA	23	18			23	18			23	18		
	two pole(2)	kA	32	23	19	6,6	32	23	19	6,6	32	23	19	6,6
	voltage	V	**1000**	**1500**	**1800**	**2000**	**1000**	**1500**	**1800**	**2000**	**1000**	**1500**	**1800**	**2000**
	three pole(2)	kA	23	19	14	8	23	19	14	8	23	19	14	8
	voltage	V	**1000**		**2000**	**3000**	**1000**		**2000**	**3000**	**1000**		**2000**	**3000**
	Four pole(2)	kA	30		19	5	30		19	5	30		19	5
Current switch-on rating	L/R= 15ms	kA	30/550 V				30/550 V				30/550 V			
Mechanical endurance	millions of operations		1				1				1			

Control circuit

Nominal voltages	AC 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500(4)		
	DC	V	24 - 48 - 110 - 127 - 220 - 440 - 500(4)		
Maximum consumptions s	inrush/hold				
AC*	1P	VA	380/24	380/24	380/24
	1P1500 V(8)	VA	860/50	860/50	860/50
	2P	VA	1700/88	1700/88	1700/88
	2P3000 V(9)	VA	3000/180	3000/180	3000/180
DC	1P	W	360/35	360/35	360/35
	1P1500 V(8)	W	836/55	836/55	836/55
	2P	W	1600/110	1600/110	1600/110
	2P3000 V(9)	W	2900/250	2900/250	2900/250
Constant L/R of electromagnet	open/close	ms	118/41	118/41	118/41
Closing time(6)	at Un	ms	180	180	180
	at 0,85 Un	ms	215	215	215
Opening time at on(6)	at Un	ms			
between command and					
- separation of contact		ms	90	90	90
- complete opening		ms	< 300	< 300	< 300



CBC 98 3200 2.1, 1000V

(1) in open air.
(2) for applications under voltages > 600 Vdc, please consult our technical departement.
(3) diodes are warranted up to an overload of 3 Un efficient.
(4) for other voltages , please consult us.
(5) if nominal operating voltage > 1000 V, please consult us.
(6) closing time is measured from the supply of closing until the contact of main poles. Opening time is measured from the supply of the tripping coil until the separation of main poles.
(7) dielectric testing voltage related to a given insulation voltage can reach 8 KV for specific applications.
* control circuit :
Equipements commanded with alternating currrent are rectified(3) and power-saved.

•The current switch-off rating of poles connected in parallel remains the same as for a single pole.

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1,04	40 < t < 45°C
1,08	45 < t ≤ 50°C
1,12	50 < t ≤ 55°C
1,19	55 < t ≤ 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
DC	I.th 1 pole x 2 x 0,8	I.th 1 pole x 3 x 0,75

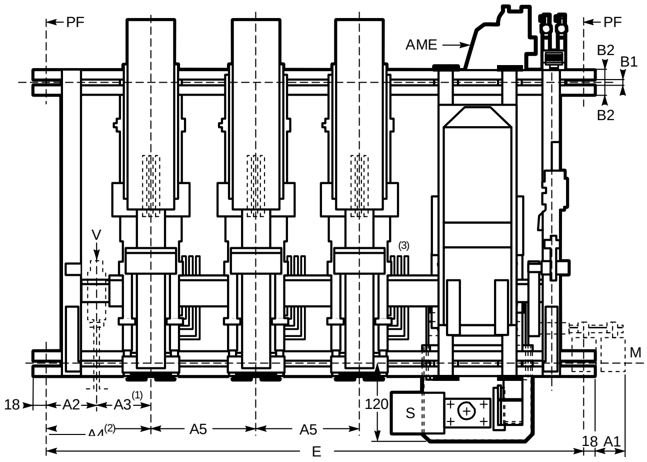
(8) calibre 5500 A : lower section C = 15 mm.
(9) 2 x 2 blowout poles with separator.

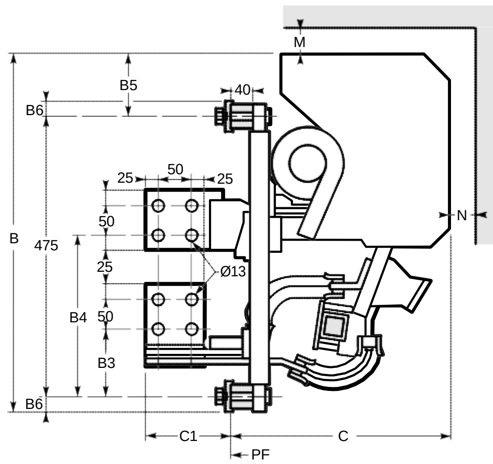
For technical features of opening poles, see p. 78.

Overall dimensions CBA - CBC2500 to 6200 A

CBA : Ue 660 V 50/60 Hz
CBC : Ue 600 V

24.CBA CBC 2500 - 5000





(1) with locking possibility.
(2) dimension without locking possibility.
(3) connecting section can face the bottom, to be specified in that case when you order.

AME: possible mechanical latching (with single or double release).
M: M type auxiliary contact block, form to be specified.
PF: attachment plane.
S: metallic support for "Ronis type lock" for locking the contactor at rest (lock not supplied).
V: possible mechanical locking, attachment center-to-center distance between two superimposed contactors: 700 mm.

Calibre	A2	A3	A4	A5	B	B1	B2	B3	B4	B5	B6	C	C1
2500/3000	97	100	154	180	613	14.5	16	118	275	110.5	27.5	408	146
4000/5000(1)	112	143	212	228	622	16	20	127	277	115	32	427	130

1) Attachment centre-to-centre distance E

Number of poles	2500/3000		4000/5000(1)	
	locking possibility		locking possibility	
	with	without	with	without
1	536	579	628	671
2	716	759	856	899
3	896	939	1084	1127
4	1116	1139	consult us	

2) Protrusion A1

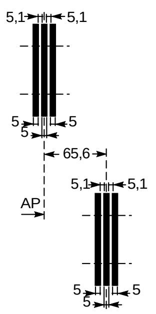
Position of contacts compared with moving shaft		2500/3000	4000/5000(1)
above	below		
1 M block	1 M block	5	0
2 M blocks	2 M blocks	69	41
1 delayed block	1 or 2 M blocks	69	41

3) Insulating distance (safety perimeter)

	2500/3000				4000/5000(1)					
	AC and DC current				AC current		DC current			
	< 300 V		300 to 600 V		≤ 600 V		< 300 V		300 to 600 V	
	M	N	M	N	M	N	M	N	M	N
Metallic walls	200	100	400	300	160	160	400	400	do not use	
Insulated walls	100	65	200	150	120	120	250	250	250	250

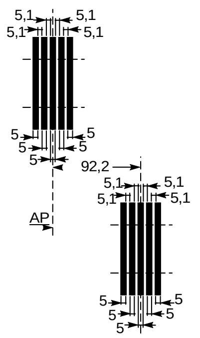
Connecting sections

2500/3000



AP: pole axis.
(1) CBC 5000 A, direct current:
to reach 5500 A: usual connecting section + 20 %,
to reach 6200 A: usual connecting section + 40 %.
6200 A : usual connecting section + 40 %.

4000/5000(1)

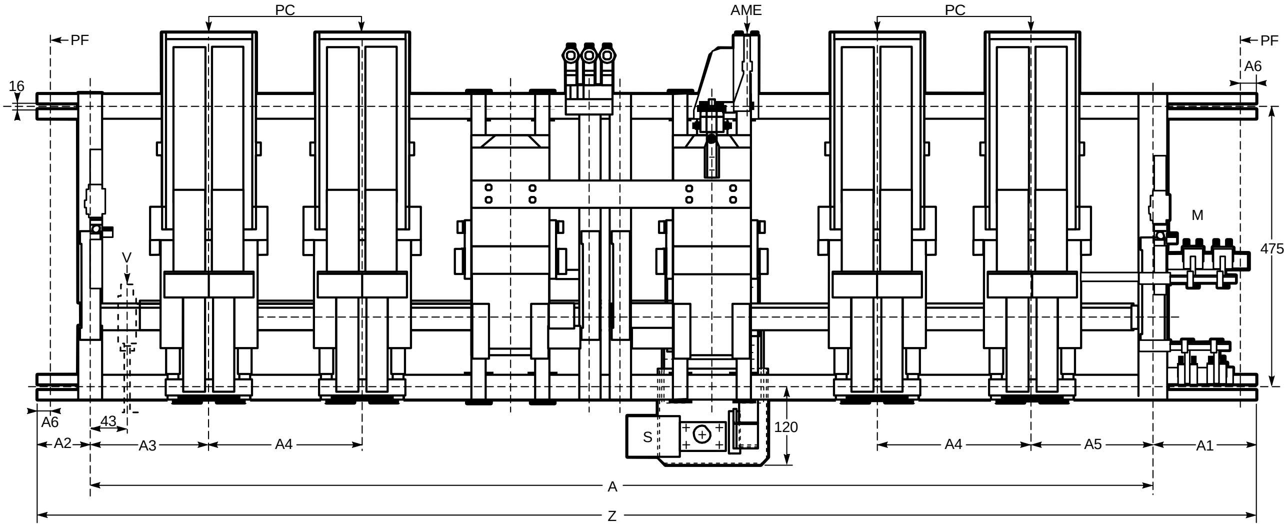


Control circuit: for connection drawings, see p. 144.

Overall dimensions CBA - CBC4000 to 8000 A

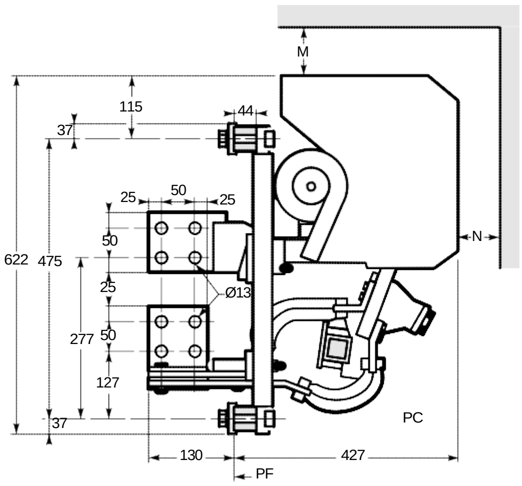
CBA : Ue up to 660 V 50/60 Hz
CBC: Ue up to 1000 V

25. CBA - CBC 4000 to 8000

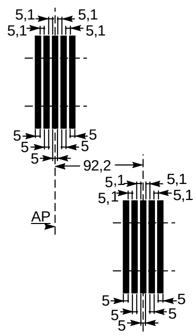


AME: possible mechanical latching (with single or double release).
AP: pole axis.
M: M type auxiliary contact block.
PC: closing pole.

PF: attachment plane.
S: metallic support for «Ronis type lock» for locking the contactor at rest (lock not supplied).
V: possible mechanical coupling, attachment centre-to-centre distance between two superimposed contactors: 700 mm.
Z: total length of the attachment bars: Z = A + A1 + A2



Connecting sections



Type and calibre of contactor	Nominal voltage of poles	Type of insulation	A	A2	A3 locking possibility without	A3 locking possibility with	A4	A5	A6
CBA 60 4000 4.0	660 Vac	normal	1339 + A3	90	140	183	228	140	18
CBC60 8000 2.0	600 Vcc	normal	1339 + A3	90	140	183	228	140	18
CBC60 8800 2.0	600 Vcc	normal	1339 + A3	90	140	183	228	140	18
CBC60 9920 2.0	600 Vcc	normal	1339 + A3	90	140	183	228	140	18
CBC60 5000 2.0	1200 Vcc	double	1580 + A3	105	175	218	270	175	33
CBC60 5500 2.0	1200 Vcc	double	1580 + A3	105	175	218	270	175	33
CBC60 6200 2.0	1200 Vcc	double	1580 + A3	105	175	218	270	175	33

Insulating distance (safety perimeter)

	AC current		DC current					
	600 V		300 V		300 to 600 V		600 to 1200 V	
	M	N	M	N	M	N	M	N
Metallic walls	160	160	400	400	450	450	500	500
Insulated walls	120	120	250	250	250	250	350	350

Protrusion A1(1)

Above position	**Below position** Caution: in that case, block functions are reversed	**Type of insulation** normal	double
1 M type block	1 M type block	120	135
2 M type blocks	2 M type blocks	155	170
3 M type blocks	3 M type blocks	220	235

(1) dimensions can be reduced by mounting the auxiliary contact below the contactor (consult us).

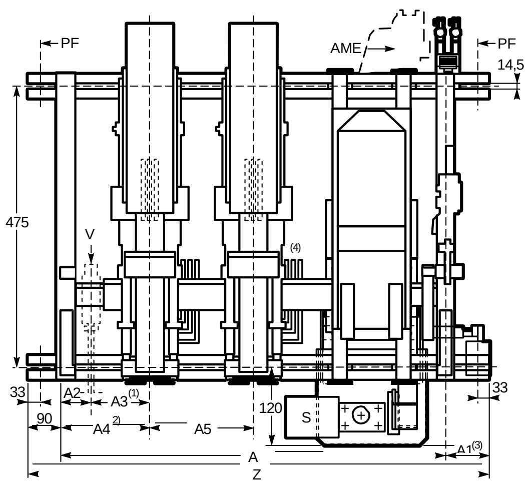
Control circuit: for connection drawings, see p. 144.

Overall dimensions CBC54 3000 A

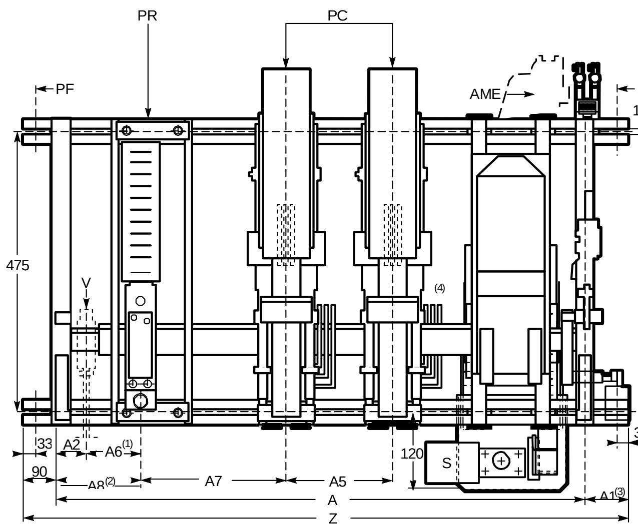
DC contactor Ue: 1000 VÜ

26. CBC 54 3000

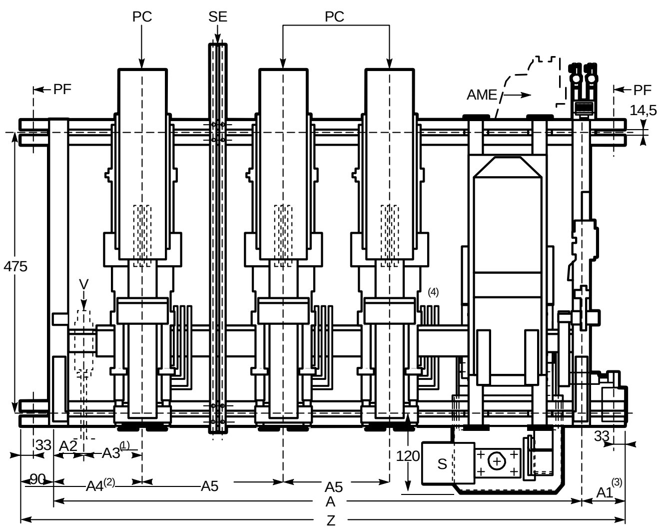
CBC 54 3000 2.0

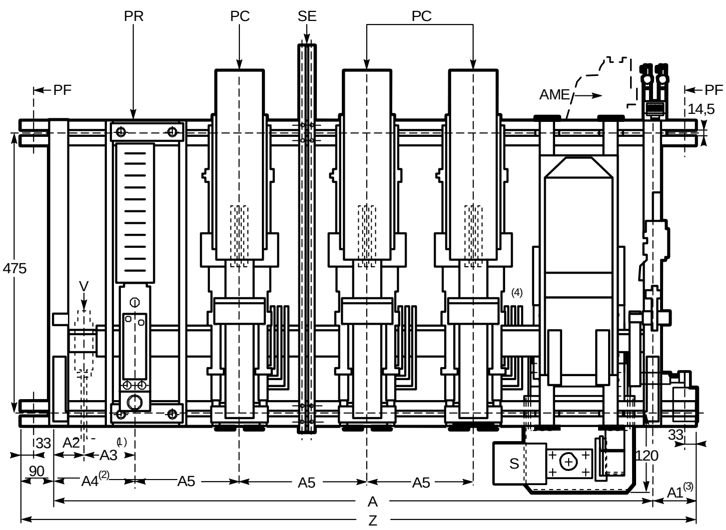


CBC 54 3000 2.1

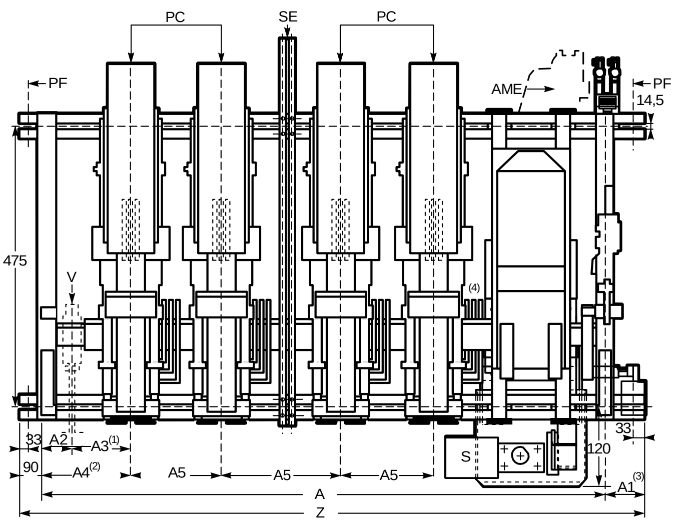


CBC 54 3000 3.0





CBC 54 3000 4.0



CBC 54 3000 3.1

AME: possible mechanical latching (with single or double release).
PC: closing pole.
PR: opening pole 800 or 1000 A, for poles 400, 500 and 630 A, consult us.
S: metallic support for "Ronis type" lock for locking the contactor at rest (lock not supplied).
SE: separator.
Z: total length of the attachment bars: Z = A + A1 + 90 mm.
V: possible mechanical coupling, attachment centre-to-centre distance between two superimposed contactors: 700 mm.

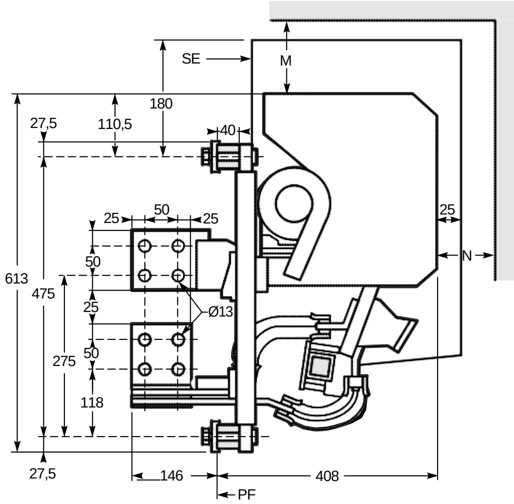
(1) with locking possibility.
(2) dimension without locking possibility.
(3) dimensions can be reduced by mounting the auxiliary contacts below the contactor (consult us).
(4) connecting sections can face the bottom, in that case, specify it when you order.
.

Control circuit: for connection drawings, see p. 144.

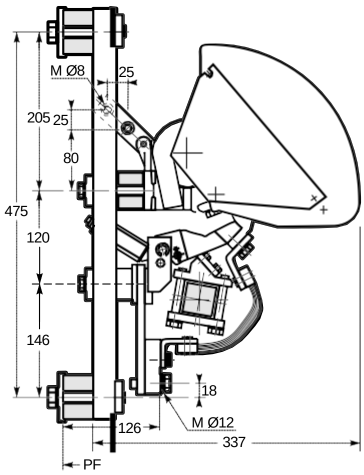
Overall dimensions CBC54 3000 A

DC contactor Ue: 1000 V

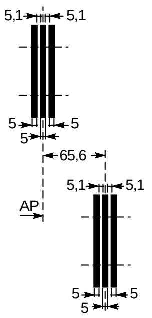
PC pole



PR pole



Connecting sections



AP: pole axis.
PC: closing pole.
PF: attachment plane.
PR: opening pole 800 or 1000 A, for poles 400, 500 and 630 A, consult us.
SE: separator.

Calibre	A2	A3	A4(1)	A5	A6	A7	A8(1)
3000	40	145	142	270	143	240	140

(1) dimension without locking possibility.

Protrusion A1

Above position	Below position Caution: in that case, block functions are reversed	A1
1 M type block	1 M type block	109
2 M type blocks	2 M type blocks	159

Type of contactor	A Locking possibility without	 with
CBC 54 3000 2.0	782	825
CBC 54 3000 3.0	1052	1095
CBC 54 3000 4.0	1322	1365
CBC 54 3000 2.1	1020	1063
CBC 54 3000 3.1	1290	1333

Insulating distance (safety perimeter)

	M	N
Metallic walls	400	400
Insulated walls	350	350

Nota:

CBC 54 3000 2.0: two-pole break.
CBC 54 3000 3.0: two-pole break in series on the positive polarity and single-pole break on the negative polarity.
CBC 54 3000 4.0: two-pole break in series on the negative and positive polarity.
CBC 54 3000 2.1: two-pole break and rupturing pole 800 or 1000 A without overlapping with the poles.
CBC 54 3000 3.1: two-pole break in series on the positive polarity, single-pole break on the negative polarity and rupturing pole 800 or 1000 A without overlapping with the poles.

All these contactors have a double insulation, dielectric testing voltage: 80 kV, 50 Hz for 1 min.

Poles to be connected in series by the customer.

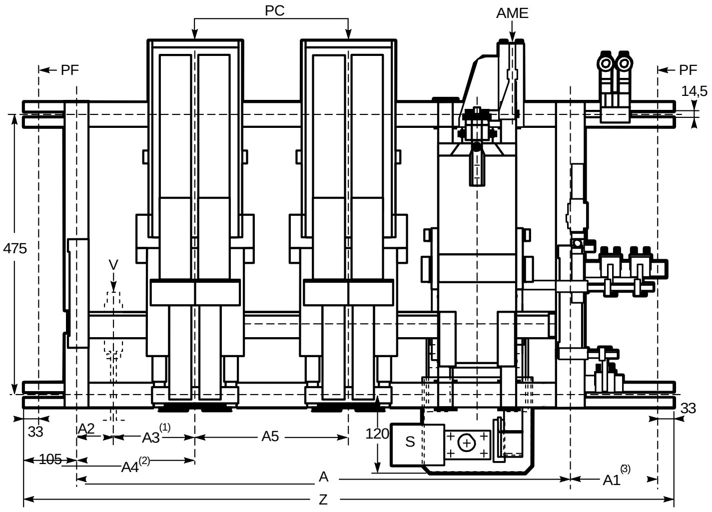
Control circuit: for connection drawings, see p. 144.

Overall dimensions CBC60 5000 A

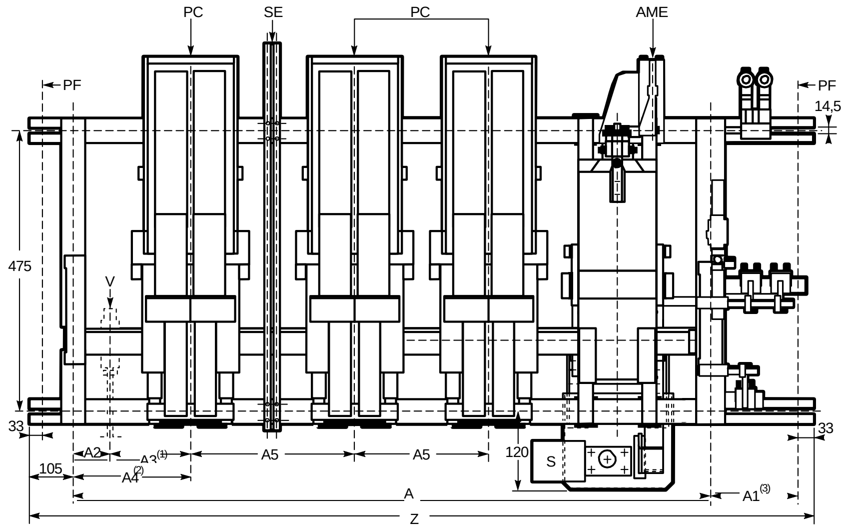
Ue : 1000 VÜ

27. CBC 60 5000

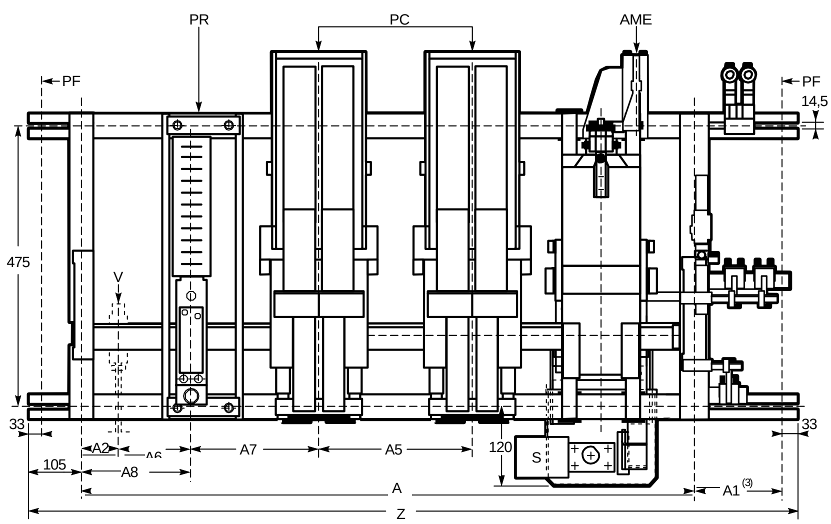
CBC 60 5000 2.0



CBC 60 5000 3.0



CBC 60 5000 2.1

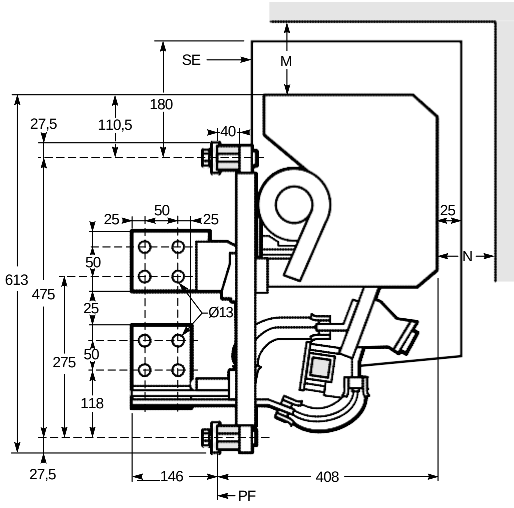


Control circuit: for connection drawings, see p. 144.

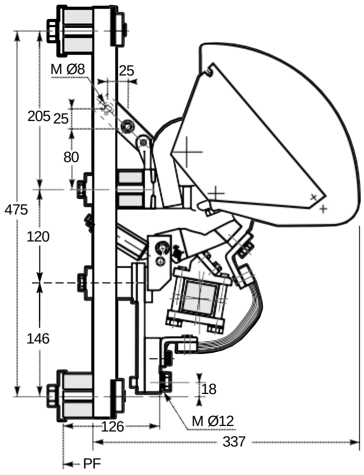
Overall dimensions CBC60 5000 A

Ue : 1000 V⎓

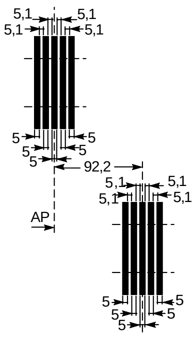
PC pole



PR pole



Connecting sections



Type of contactor	A Locking possibility without	 with
CBC54 5000 2.0	850	893
CBC54 5000 3.0	1130	1173
CBC54 5000 4.0	1095	1138

Insulating distance (safety perimeter)

	M	N
Metallic walls	500	500
Insulated walls	350	350

Nota:

CBC 60 5000 2.0: two-pole break.
CBC 60 5000 3.0: two-pole break in series on the positive polarity and single-pole break on the negative polarity.
CBC 60 5000 2.1: two-pole break and rupturing pole 800 or 1000 A without overlapping with the poles.

All these contactors have a double insulation, dielectric testing voltage: 80 kV, 50 Hz for 1 min.

Poles to be connected in series by the customer.

AME: possible mechanical latching (with single or double release).
AP: pole axis.
PC: closing pole 5000 A.
PF: attachment plane.
PR: opening pole 800 or 1000 A, for pole 500 A, consult us.
S: metallic support for "Ronis type" lock for locking the contactor at rest (lock not supplied).
SE: separator.
V: possible mechanical coupling, attachment centre-to-centre distance between two superimposed contactors: 700 mm.
Z: total length of the attachment bars: Z = A + A1 + 90 mm.

(1) with locking possibility.
(2) dimension without locking possibility.
(3) dimensions can be reduced by mounting the auxiliary contacts below the contactor (consult us)

Calibre	A2	A3	A4(2)	A5	A6	A7	A8(2)
5000	40	178	175	280	143	280	140

Protrusion A1

Above position	Below position Caution: in that case, block functions are reversed.	A1
1 M type block	1 M type block	135
2 M type blocks	2 M type blocks	170
3 M type blocks	3 M type blocks	235

Control circuit: for connection drawings, see p. 144.

Overall dimensions CBC 98 2560 to 5000 A

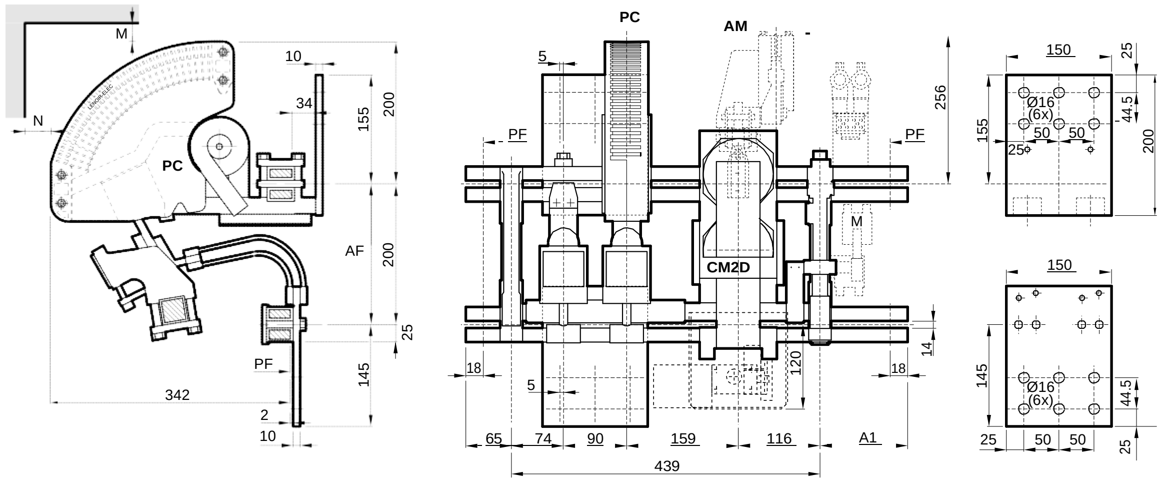
CBC 98 2560 to 5000 A and more
Overall dimensions CBC 98 2560 to 5000 A

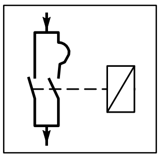
CBC : DC contactor

28. CBC 98 2560 and 3200

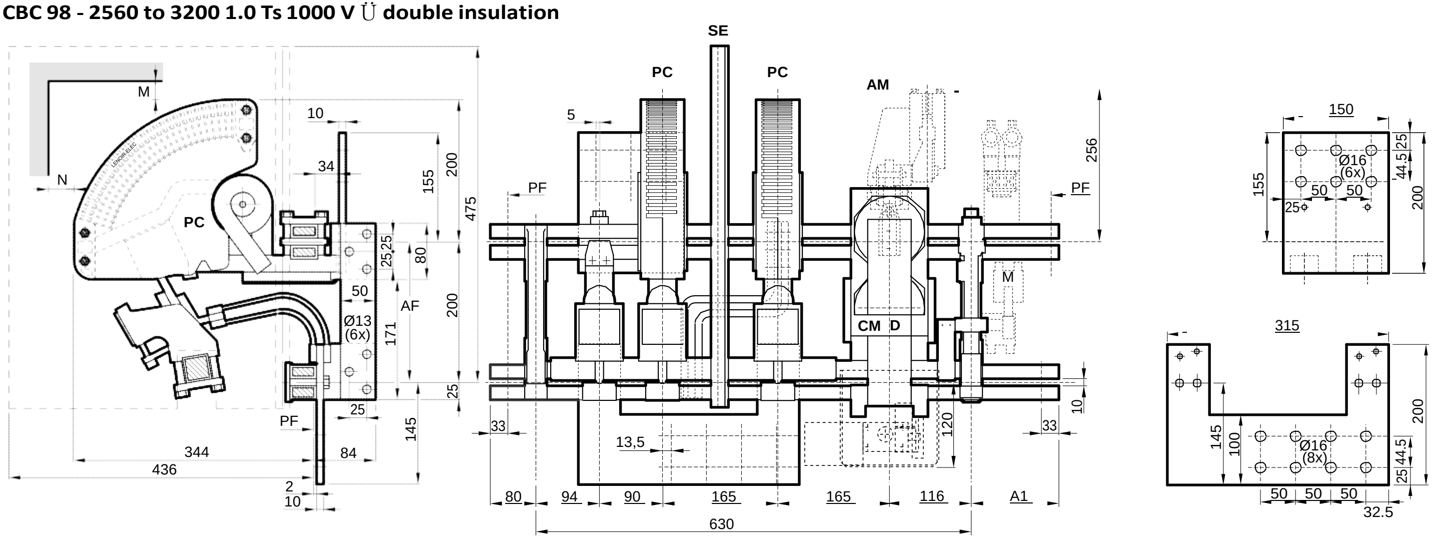
28. CBC 98 2560 and 3200

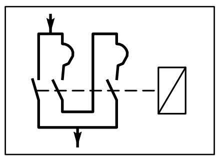
CBC 98 - 2560 to 3200 1.0 Ts 600 V Ü





CBC 98 - 2560 to 3200 1.0 Ts 1000 V Ü double insulation





Insulation distance

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

Protusion A1

Number of delayed blocks	Number of M(1) type blocks		Double insulation
0	2	75 mm	90 mm
0	3	125 mm	140 mm
0	4	125mm	140 mm
0	5	190 mm	205 mm
0	6	190 mm	205 mm
1	1	86 mm	101 mm
1	2	125 mm	140 mm
1	3	125 mm	140 mm
1	4	190 mm	205 mm
1	5	190 mm	205 mm

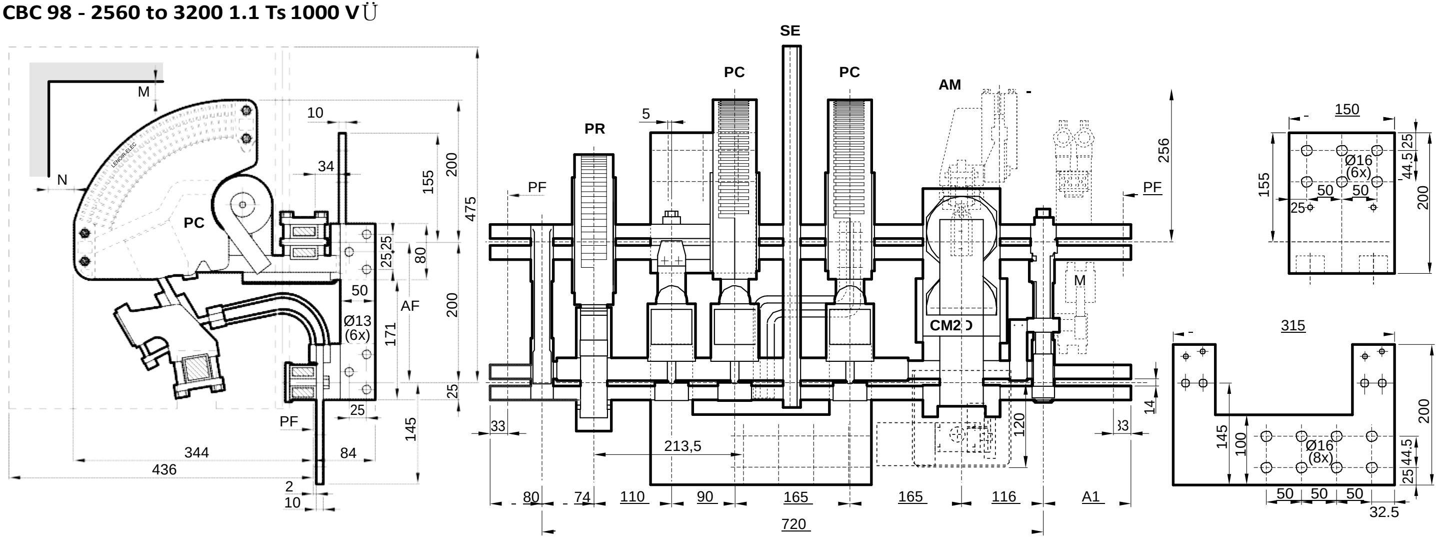
AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
SE : separator.

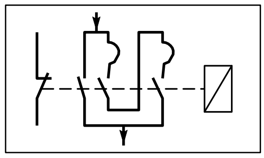
Overall dimensions CBC 98 2560 to 5000 A

CBC : DC contactor

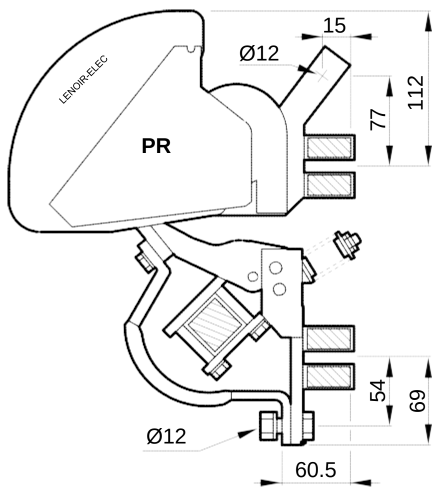
28. CBC 98 2560 and 3200

CBC 98 - 2560 to 3200 1.1 Ts 1000 V Ü





Rupturing pole 500 A (without overlapping)



Insulation distance

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

Protusion A1

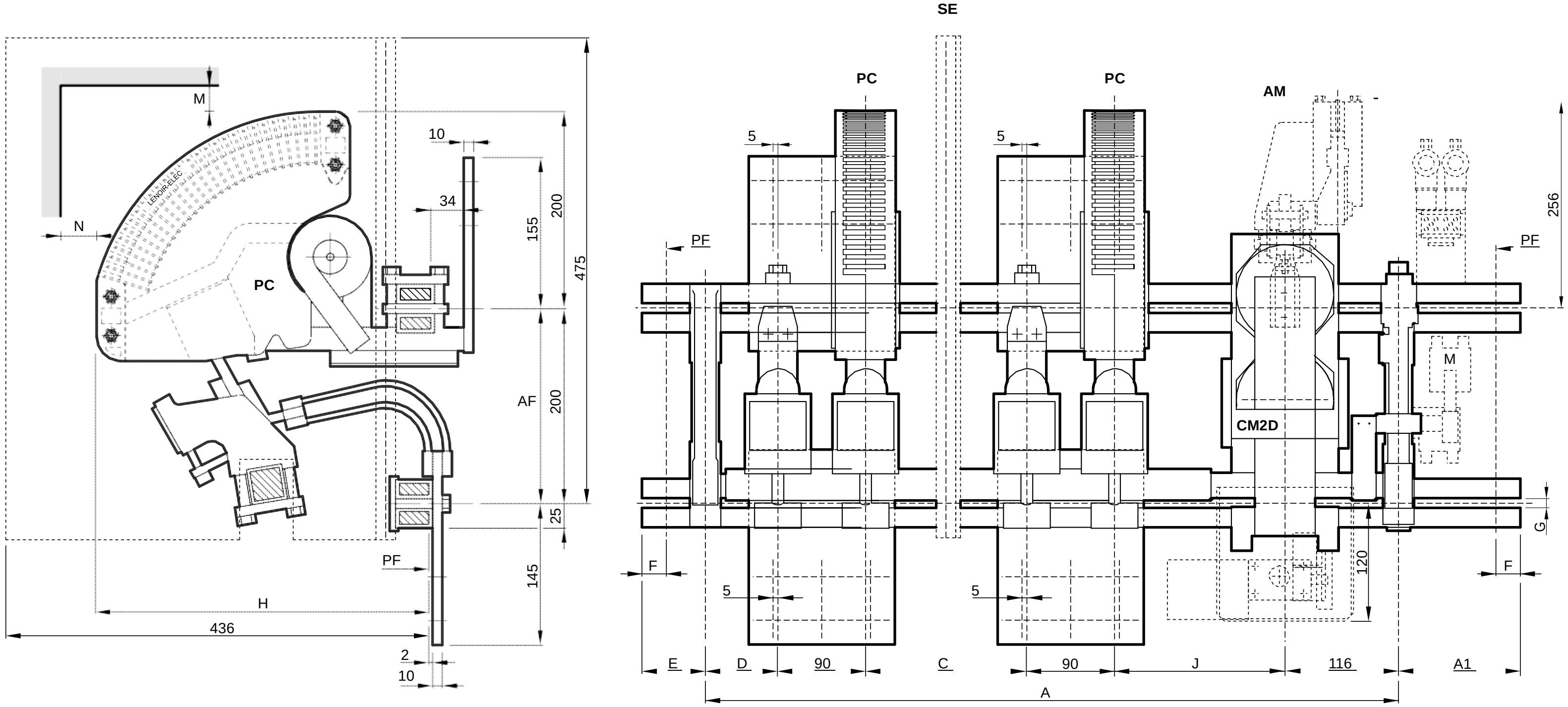
Number of delayed blocks	Number of M[1] type blocks	
0	2	90 mm
0	3	140 mm
0	4	140mm
0	5	205 mm
0	6	205 mm
1	1	101 mm
1	2	140 mm
1	3	140 mm
1	4	205 mm
1	5	205 mm

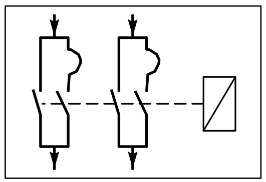
AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
PR : rupturing pole 500 A without overlapping
SE : separator.
.

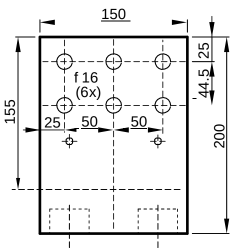
Overall dimensions CBC 98 2560 to 5000 A

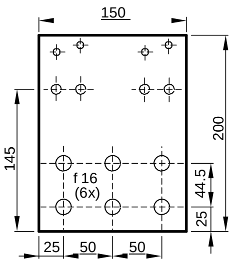
CBC : DC contactor

CBC 98 - 2560 to 3200 2.0 Ts 600 and 1000 V









	Dimensions (mm)							
	A	C	D	E	F	G	H	J
Standard	615	110	74	65	18	14	342	135
Double insulation with separator	730	165	94	80	33	10	344	175

Insulation distance (safety perimeter

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

Protusion A1

Number of delayed blocks	Number of M(1) type blocks		Double insulation
0	2	75 mm	90 mm
0	3	125 mm	140 mm
0	4	125mm	140 mm
0	5	190 mm	205 mm
0	6	190 mm	205 mm
1	1	86 mm	101 mm
1	2	125 mm	140 mm
1	3	125 mm	140 mm
1	4	190 mm	205 mm
1	5	190 mm	205 mm

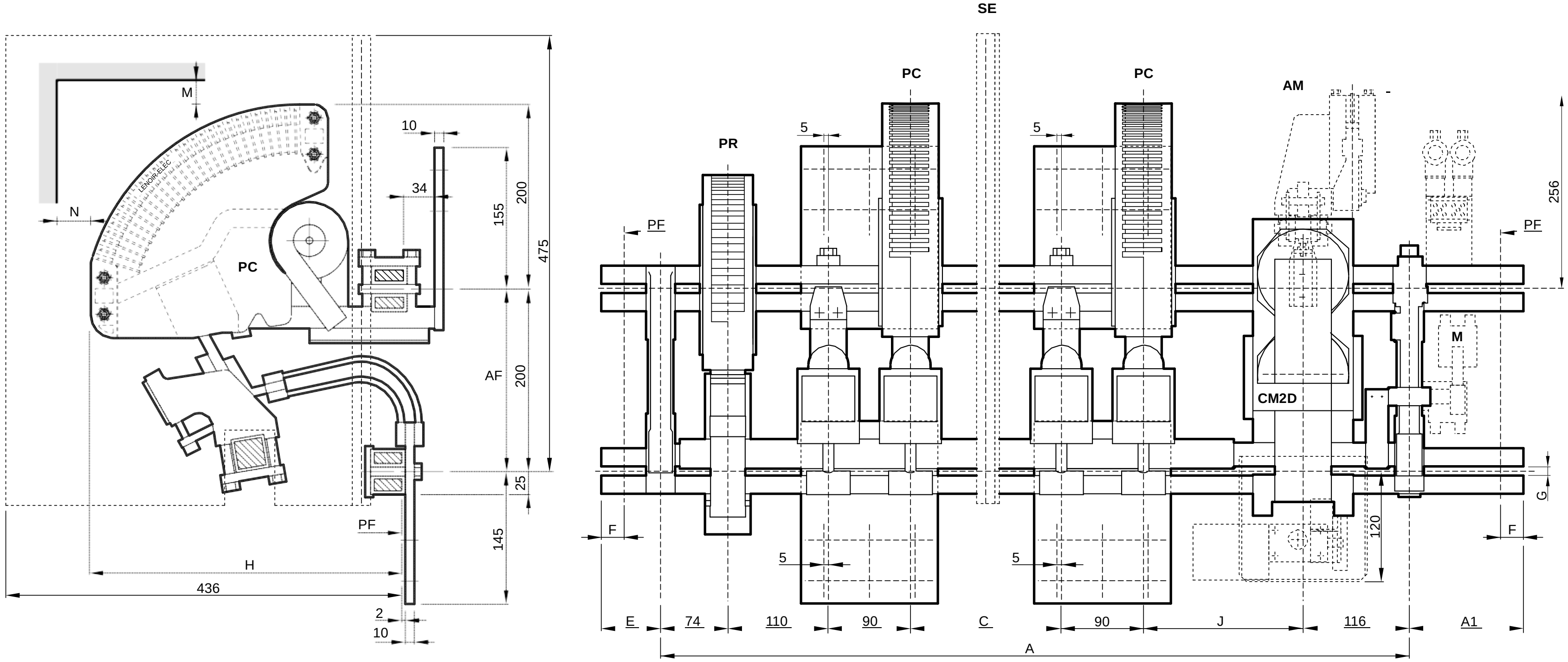
AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
SE : separator.

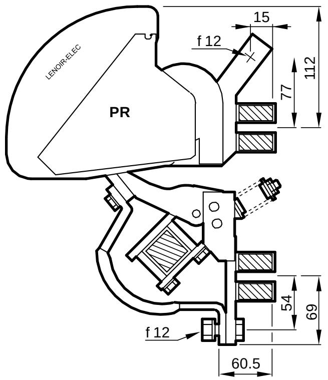
Overall dimensions CBC 98 2560 to 5000 A

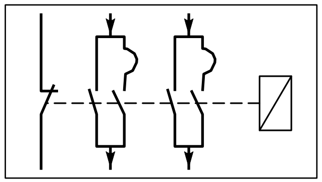
CBC : DC contactor

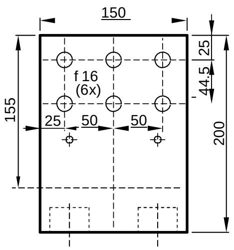
28. CBC 98 2560 and 3200

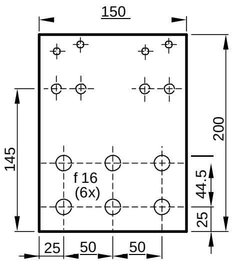
CBC 98 - 2560 to 3200 2.1 Ts 600 and 1000 V











	Dimensions (mm)						
	A	C	E	F	G	H	J
Standard	725	110	65	18	14	342	135
Double insulation with separator	820	165	80	33	10	344	175

insulation distance

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

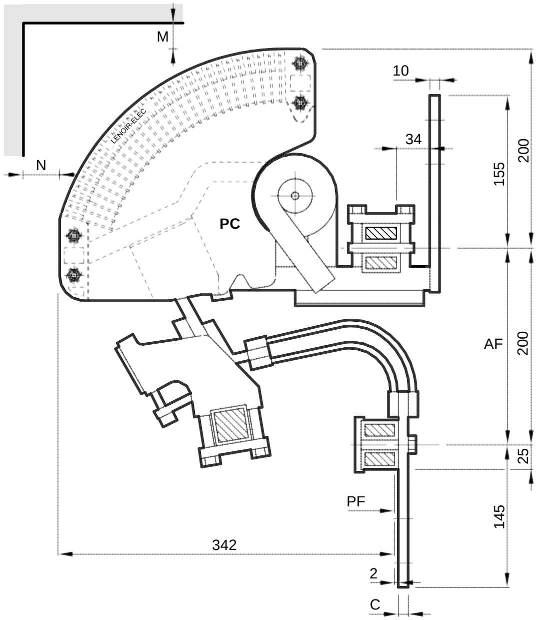
Protusion A1

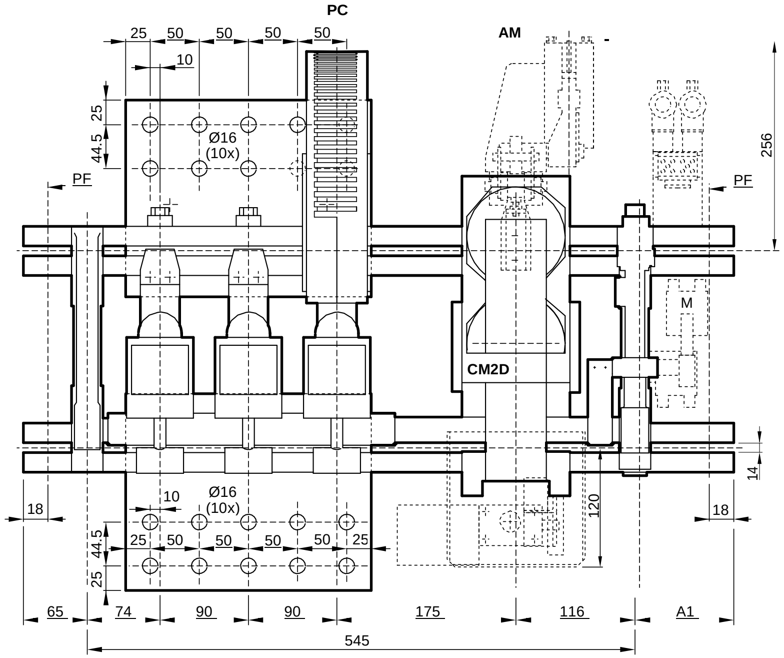
Number of delayed blocks	Number of M(1) type blocks		Double insulation
0	2	75 mm	90 mm
0	3	125 mm	140 mm
0	4	125mm	140 mm
0	5	190 mm	205 mm
0	6	190 mm	205 mm
1	1	86 mm	101 mm
1	2	125 mm	140 mm
1	3	125 mm	140 mm
1	4	190 mm	205 mm
1	5	190 mm	205 mm

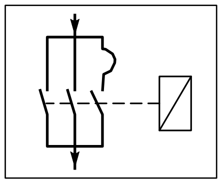
AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
PR : rupturing pole 500 A without overlapping
SE : separator.

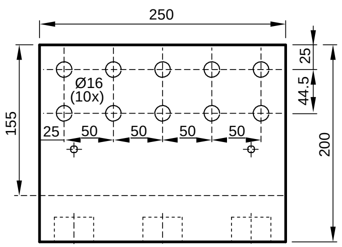
Overall dimensions CBC 98 2560 to 5000 A

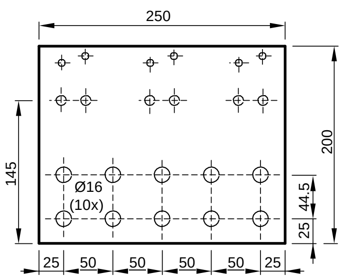
CBC : DC contactor











Distance C

Calibre 5000	mm	10
Calibre 5500	mm	15

Dinsulation distance

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

Protusion A1

Number of delayed blocks	Number of M[1] type blocks	
0	2	75 mm
0	3	125 mm
0	4	125mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

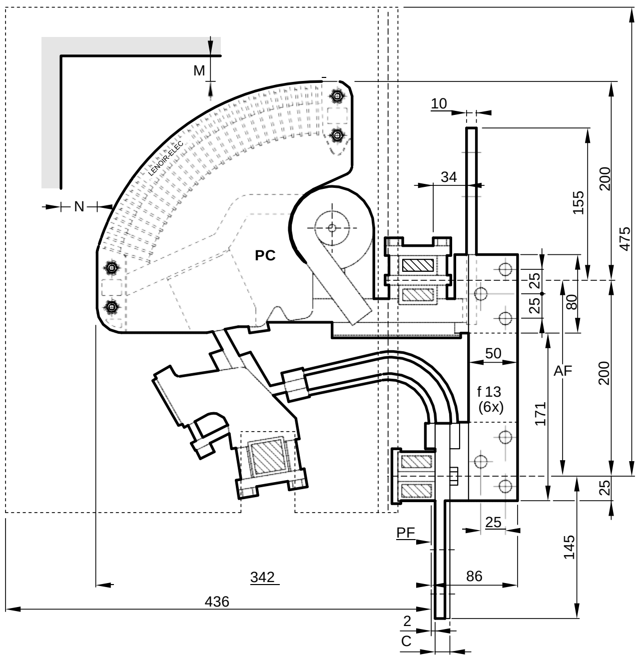
AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
SE : separator.

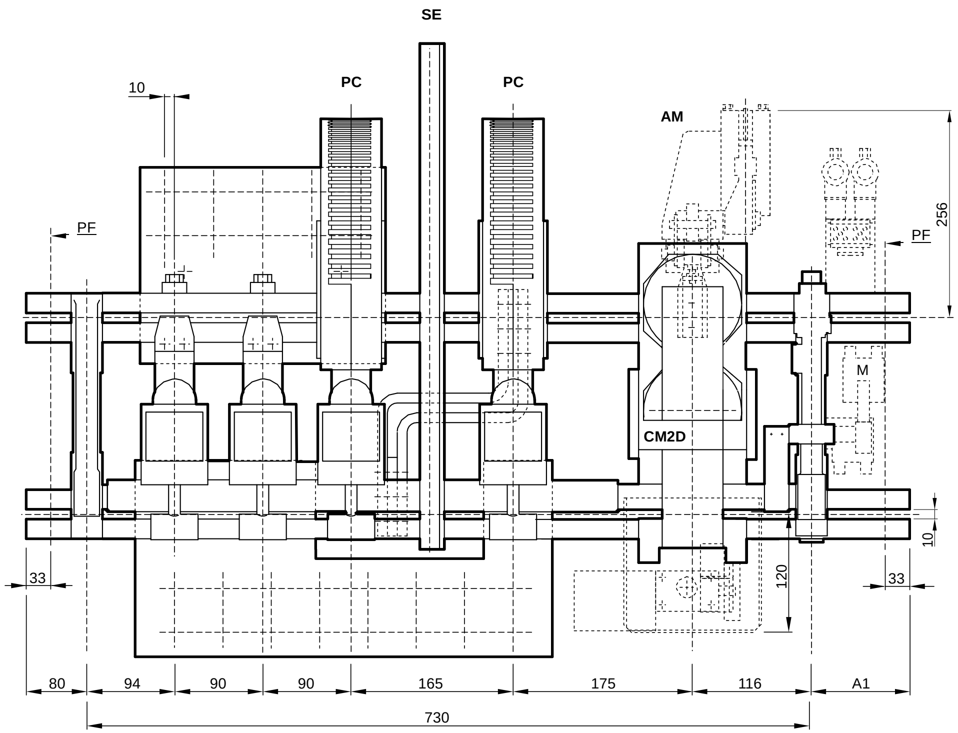
Overall dimensions CBC 98 2560 to 5000 A

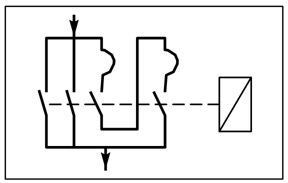
CBC 98 2560 to 5000 A and more

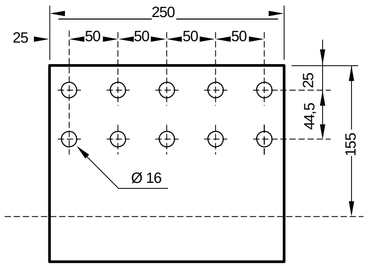
29_CBC 98 5000

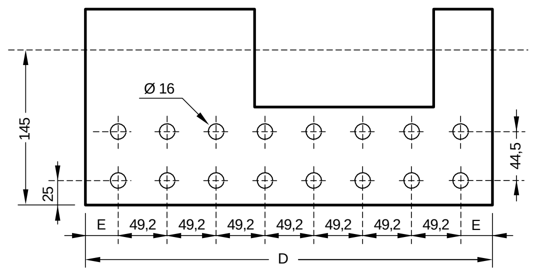
CBC 98 - 5000 1.0 Ts 1000 V











Distance		C	D	E
Calibre 5000	mm	10	405	30,3
Calibre 5500	mm	10	425	40,3

Insulation distance

voltage	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

Protusion A1

Number of delayed blocks	Number of M(1) type blocks	
0	2	90 mm
0	3	140 mm
0	4	140mm
0	5	205 mm
0	6	205 mm
1	1	101 mm
1	2	140 mm
1	3	140 mm
1	4	205 mm
1	5	205 mm

AF : attachement axis.
AM : mechanical latching with electrical release.
CM2D : magnetic circuit
M : auxiliary contact blocks, form to specify.
PC : contactor pole.
PF : attachment plane.
SE : separator

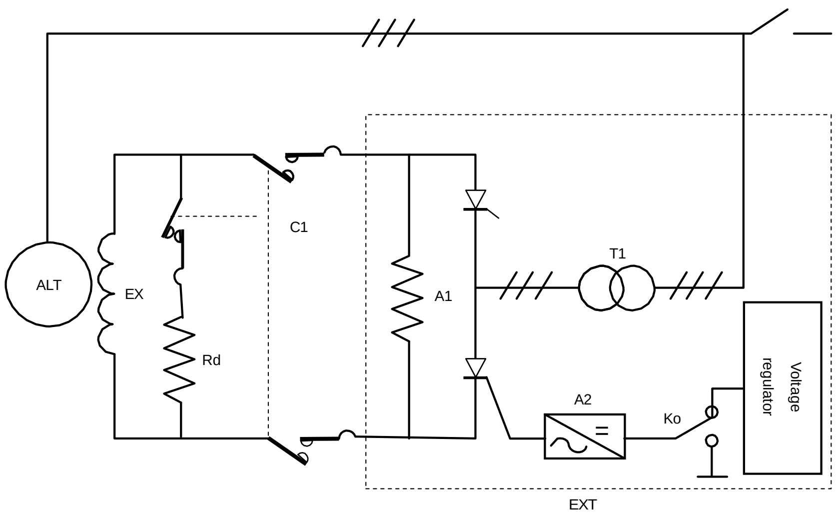
Field circuit breaker s (excitation contactors) from 80 to 6200 A

CEX 57 80,
CEX 57 150,
CEX 57 200,
CEX 75 400,
CEX 75 500,
CEX 75 630,
CEX 75 800,
CEX 75 1000,
CEX 71 1250,
CEX 71 1600,
CEX 71 2000,
CEX 98 2560,
CEX 54 3000,
CEX 98 3000,
CEX 98 5000,
CEX 60 5000,
CEX 60 5500,
CEX 60 6200.

CEX 71 1250 2.1
Reinforced insulation

Field circuit breakers - CEX 80 to 6200 A

A1 : complete thyristor bridge.
A2 : thyristor starter.
ALT : alternator.
C1 : contactor for field supply.
EX : inductor.
EXT : static excitation.
Ko : relay for regulation and release.
Rd : discharge resistor.
T1 : excitation transformer.



Use

Switching on and cutting off the excitation circuit of a machine, inserting a discharge resistor at the terminals of the inductor at the time of the break.
The drawing below represents the static excitation circuit of an alternator.

Description

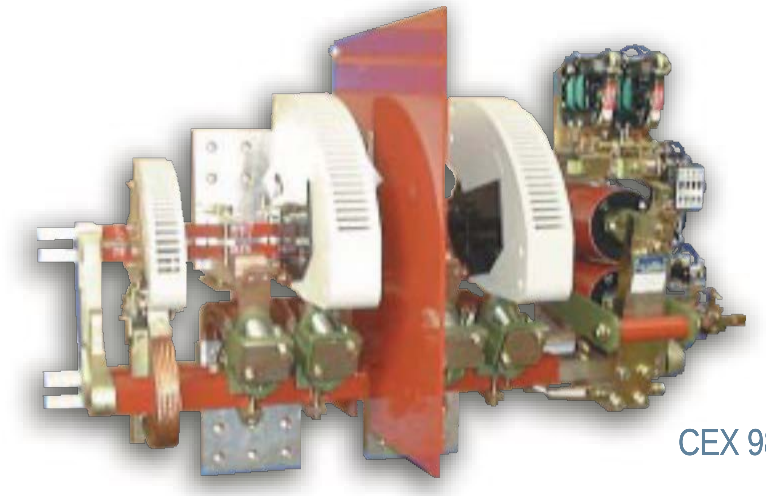
- 1, 2 or 3 magnetic arc-blow-out contactor poles:
  - silver alloy contacts for calibre 80 to 5000 A.
  - copper contacts (on request).
- One magnetic arc-blow-out dosing pole with overlapping with the contactor poles.
- One mechanical latching with single or double electrical release.
- Magnetic circuit for over-excited coil supplied with DC current:
  - closing: economy resistor for calibre 80 to 200 A, delivered separately.
  - opening: one NO contact connected in series with the coil opens at the same time as the contactor.
- Auxiliary contacts:
  - range 80 to 200 A: 1 one M3 block type F102-Y with one NC overlap contact inserting the resistor, one NO contact switching off the tripping coil and one NO contact available.
  - range 400 to 1000 A: two D-blocks, that is 2 NO + 2 NC contacts available and one M3 block type F102-Z with one overlap NC contact inserting the resistor, one NO contact switching off the tripping coil and one contact available.
  - range 1250 to 5000 A: one NC arc-blow-out contact inserting the resistor, one M3 block type F102-Z with one NO contact switching off the tripping coil, 1 NO + 1 NC contacts available.

Double CEX

Double CEX contactors (contactors for field supply) ranging from 80 to 1000 A are equipped with a mechanical coupling whereas double CEX contactors ranging from 1250 to 5000 A are equipped with a manual release system.

For a maximum pole switch-off voltage of:
2000 V for range 80 to 200 A,
2200 V for range 400 to 1000 A,
2400 V for range1250 to 6200 A.

Technical features



CEX 98 3200 2.1

Contactor pole		80	150	200	400	500	630	800	1000	1250	1600	2000	2560	3200	3000	5000[10]	5000	5500	6200
Génération		55/57	55/57	55/57	75	75	75	75	75	71	71	71	98	98	54	98	60	60	60
Thermal nominal current	A	80	150	200	400	500	630	800	1000	1250	1600	2000	2560	3200	3000	5000	5000	5500	6200
connecting section	mm^2	35	70	95	240	300	400	500	600	1000	1400	1600	1900	3000	3000	5000	5000	6000	7000
Operating voltage																			
two-pole or single-pole break	V	500	500	500	550	550	550	550	550	600	600	600	600	600	600	600	600	600	600
three-pole break	V	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000			
2 two-pole breaks in series	V	1400	1400	1400	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Insulating voltage																			
two-pole or single-pole break	V	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
three-pole break	V	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250			
2 two-pole breaks in series	V	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Short-time current, t ≤ 40°C																			
1 s	kA	1	1.75	2.5	10	12	14	24	26	41	30	65	43		36				
5 s	kA	0.5	0.8	1.15	4.5	5.75	6.5	11	12.5	20	15	30	21.6	43	16	50	25	27	31
10 s	kA	0.35	0.57	0.81	3.25	4	4.5	7.8	8.5	13.5	10.9	21	15.7	30	11.5	40	20	22	24.5
15 s	kA	0,3	0.51	0.7	2.7	3.4	3.8	6.5	7	11.8	8.7	17.9	12.5	25.7	9.5	36	15	16.5	18.5
30 s	kA	0.23	0.42	0.56	1.9	2.4	2.7	4.6	5	7.9	6	12	8.6	17.3	7	24	11	12	13.5
1 min	kA	0.19	0.31	0.43	1.4	1.78	2	3.3	3.65	5.5	4.5	8.5	6.5	12.2	5.4	17	8.5	9	10.5
3 min	kA	0.14	0.3	0.4	0.88	1.1	1.3	2	2.3	3.3	3	5	4.3	7.2	4	10	6.5	7	8
10 min	kA	0.12	0.26	0.35	0.62	0.79	0.92	1.38	1.6	2	2.2	3.2	3.1	4.6	3.3	6.5	5.6	6	6.9
Maximum switch-off voltage																			
single-pole break	V	550	550	550	550	550	550	550	550	700	700	700	700	700	600	700	600	600	600
two-pole break	V	1000	1000	1000	1100	1100	1100	1100	1100	1200/ 1500[3]	1200/ 1500[3]	1200/ 1500[3]	1500	1500	1200	1500	1200	1200	1200
three-pole break[1]	V	1500	1500	1500	1500/ 2000	1500/ 2000	1500/ 2000	1500/ 2000	1500/ 2000	1500/ 2100	1500/ 2100	1500/ 2100	1500/ 2100	1500/ 2100	1500/ 1800	1500/ 2100			
four-pole break (2 two-pole breaks in series)[1]	V	2000	2000	2000	2200	2200	2200	2200	2200	3000	3000	3000	3000	3000	2400	3000	2400	2400	2400

Current switch-off rating under a given voltage, with L/R=15 ms[1]

			80	150	200	400	500	630	800	1000	1250	1600	2000	2560	3200	3000	5000[10]	5000	5500	6200
single-pole break under	500 V	kA	0.5	1.4	3.5		8	8												
	550 V	kA				6	7	7	18	18	23	23	23	23	23	35	23	35	35	35
	700 V	kA									15	15	15	15	15		15			
two-pole break under	500 V	kA									32	32	32	32	32	55	32	55	55	55
	700 V	kA	0.5	1.4	3.5	6	10	10	17	17	23	23	23	23	23	35	23	35	35	35
	1000 V	kA	0.25	0.7	1.75	5	7	7	10	10	19	19	19	19	19	35	19	35	35	35
	1500 V[3]	kA									6.6	6.6	6.6	6.6	6.6		6.6			
three-pole break under	1000 V	kA				6	10	10	17	17	23	23	23	23	23	35	23	35	35	35
	1500 V	kA				5	7	7	10	10	19	19	19	19	19	24	19	24	24	24
	1800 V	kA				2	2.5	2.5	8	8	14	14	14	14	14	20	14	20	20	20
	2000 V	kA				1.5	2	2	6	6	8	8	8	8	8		8			
four-pole break (2 two-pole breaks in series)	1000 V	kA									30	30	30	30	30	55	30	55	55	55
	2000 V	kA	0.25	0.7	1.75	5	7	7	10	10	19	19	19	19	19	35	19	35	35	35
	3000 V	kA									5	5	5	5	5		5			

(1) maximum switch-off voltage is directly linked to the current to cut off, as well as to the different configurations (single-pole, two-pole, three-pole breaks, 2 two-pole break in series).
In order to choose the best contactor, please consult our technical department.
(2) 500 A and 1000 A, on request.
(3) dimensions given with separator between the poles.
(4) one single control circuit.
(5) standard ratings for rupturing pole:

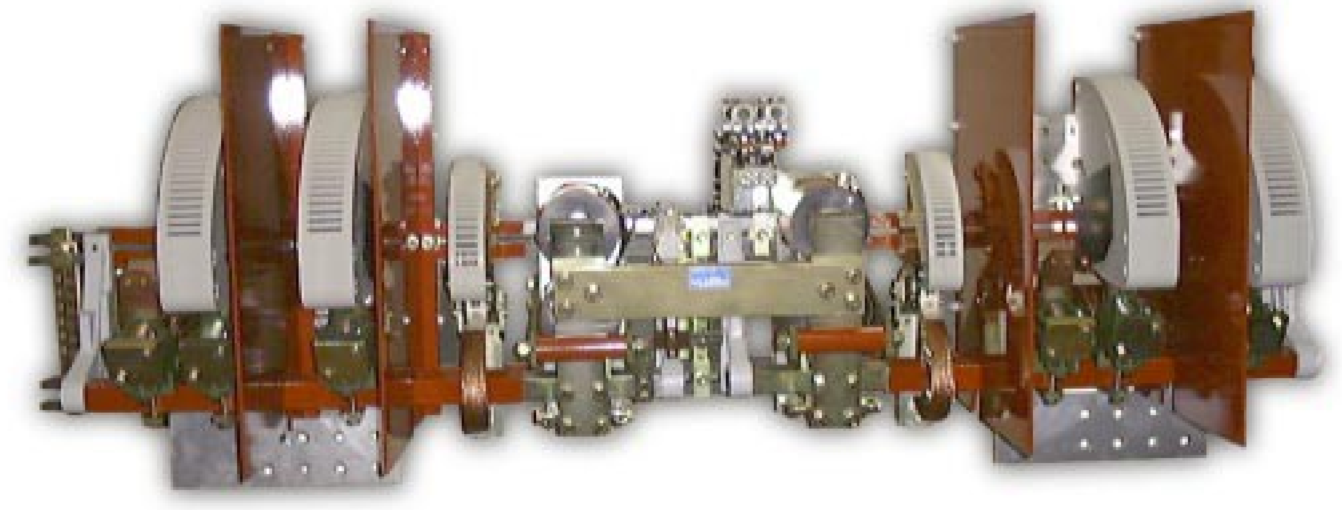
rupturing pole rating	CEX 98 2560/3000 type of break (number of blow-out poles)	CEX 98 5000 type of break (number od blow-out poles)	Maximum switch-off voltage (V)
500[7]	1	1	700
500[7]	2	2	1500
800		2[6]	1500
500[7]	3	3	2100
800	4	4	3000

(6) two pole break: one break on each line.
(7) 800 A, on request.
(8) average consumption under 220 V.
For other voltages, consult us.
(9) average consumption under 220 V with single pole or two-pole break on a single line only.
For other voltages, consult us.
(10) for 5500 A, lower section C = 15 mm.

• Temperature factor to apply to the power or to the current controlled according to the ambient temperature (around the contactor).
For ranges 80 to 2000 A, 54-3000, 60-5000, 60-5500 and 60-6200 A, no derating up to 55° C.

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

Technical features



CEX 98 3200 4.2

Contactor pole		80	150	200	400	500	630	800	1000	1250	1600	2000	2560	3200	3000	5000[10]	5000	5500	6200
Génération		55/57	55/57	55/57	75	75	75	75	75	71	71	71	98	98	54	98	60	60	60
Rupturing pole																			
Thermal nominal current	A	80	80	150	400	400	400	400	400	500	500	500	500/ 800[5]	500/ 800[5]	800[2]	500/ 800[5]	800[2]	800[2]	800[2]
Current-switch-on rating	kA	0.5	0.5	1.4	6	6	6	6	6	8	8	8	8/10	8/10	10	8/10	10	10	10
Allowable curent for 15 s	kA	0.35	0.35	0.8	3.5	3.5	3.5	3.5	3.5	5	5	5	5/9.5	5/9.5	9.5	5/9.5	9.5	9.5	9.5
Allowable curent for 0.5 s	kA	1	1	1.75	4.5	4.5	4.5	4.5	4.5	6.5	6.5	6.5	6.5/12	6.5/12	12	6.5/12	12	12	12
Resistive current switch-off rating	kA	0.25	0.25	0.7	6	6	6	6	6	8	8	8	8/10	8/10	10	8/10	10	10	10
Control circuit																			
Standard voltages	V	24 - 48 - 110 125/127 - 220 - 440																	
Average consumption																			
on closing																			
single-pole or two-pole break																			
inrush	W	43	43	77	500	500	500	800	800	500	500	500	3145[8]	3145[8]	1000	3145[9]	2600	2600	2600
hold	W	43	43	43	30	30	30	70	70	42	42	42	225[8]	225[8]	66	225[9]	145	145	145
three-pole break																			
inrush	W	43	195	195	525	525	525	850	850	1600[8]	1600[8]	1600[8]			1100	3370[8]			
hold	W	43	74	74	35	35	35	75	75	110[8]	110[8]	110[8]			72	350[8]			
2 two-pole breaks in series																			
inrush	W	43[4]	86	154	1000	1000	1000	1600	1600	1000	1000	1000	3370[8]	3370[8]	2000		5200	5200	5200
hold	W	43[4]	86	86	60	60	60	140	140	84	84	84	350[8]	350[8]	132		290	290	290
on opening																			
single-pole, two-pole or three-pole break	W	220	220	220	220	220	220	220	220	220	220	220			220		220	220	220
2 two-pole breaks in series	W	220[4]	440	440	440	440	440	440	440	440	440	440			440		440	440	440
Opening time	ms	25	25	25	50	50	50	50	50	60	60	60	90	90	60	70	60	60	60
Closing time	ms	180	180	180	125	125	125	125	125	300	300	300	300	300	300	300	300	300	300
Constant L/R rate of closed electromagnet	ms	140	140	40	40	40	40	40	40	40	40	40			50		50	50	50
Total break time	ms	50	50	50	70	70	70	70	70	85	85	85	90	90	85	90	85	85	85

(1) maximum switch-off voltage is directly linked to the current to cut off, as well as to the different configurations (single-pole, two-pole, three-pole breaks, 2 two-pole break in series).
In onder to choose the best contactor, please consult our technical department.
(2) 500 A and 1000 A, on request.
(3) dimensions given with separator between the poles.
(4) one single control circuit.
(5) standard ratings for rupturing pole :

rupturing pole rating	CEX 98 2560/3000 type of break (number of blow-out poles)	CEX 98 5000 type of break (number od blow-out poles)	Maximum switch-off voltage (V)
500[7]	1	1	700
500[7]	2	2	1500
800		2[6]	1500
500[7]	3	3	2100
800	4	4	3000

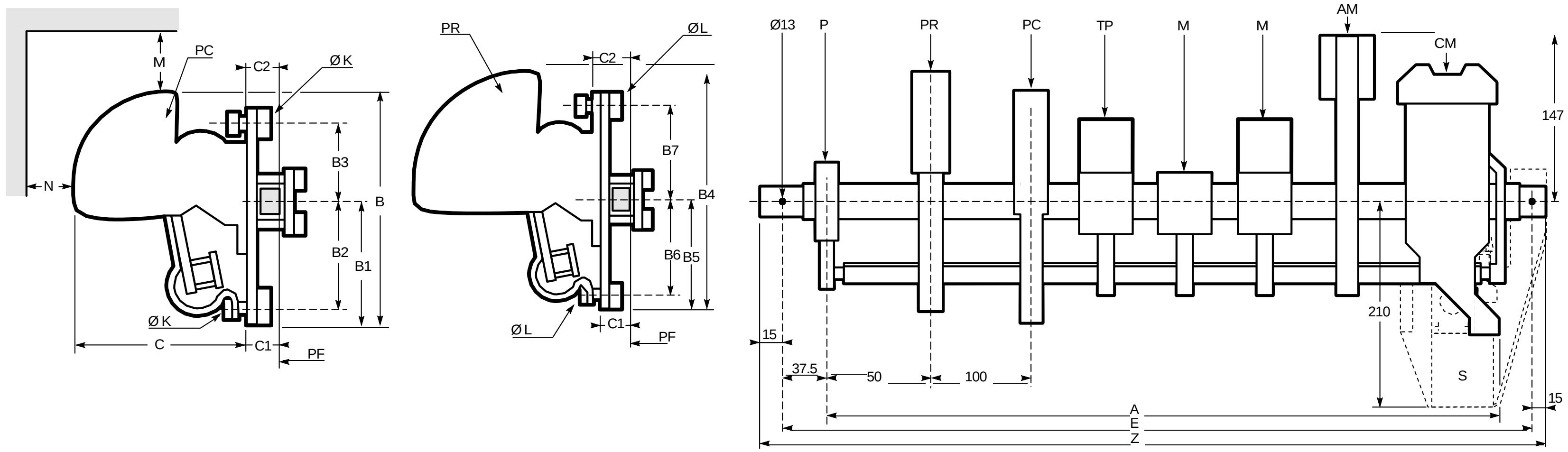
(6) two pole break: one break on each line.
(7) 800 A, on request.
(8) average consumption under 220 V.
For other voltages, consult us.
(9) average consumption under 220 V with single pole or two-pole break on a single line only.
For other voltages, consult us.
(10) for 5500 A, lower section C = 15 mm.

•Temperature factor to apply to the power or to the current controlled according to the ambient temperature (around the contactor).
For ranges 80 to 2000 A, 54-3000, 60-5000, 60-5500 and 60-6200 A, no derating up to 55° C.

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

Overall dimensions CEX 57 80 to 200 A

Single-pole break
Ue : 500 V⎓



	B	B1	B2	B3	B4	B5	B6	B7	C	C1	C2	ØK	ØL
80	155,5	101	93	48	190	101	93	82	122	27	30	6	6
150	209,5	112	102	61	190	101	93	82	158	29	33	8	6
200	235	120	107	103	146	114	104	99	211	32	36	10	8

1 closing pole and 1 opening pole

M type auxiliary contacts		Distance between the bearings : A																	
		Without mechanical latching						With mechanical latching with single electrical release (foresee 1 NO contact for switching off the release coil)						With mechanical latching with single electrical release (2 NO contacts for switching off the release coils)					
		Without delayed block			With a delayed block			Without delayed block			With a delayed block			Without delayed block			With a delayed block		
NO	**NC**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**
1	1	325 (2)	325 (2)	325 (3)	400 (3)	400 (3)	400 (4)	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)						
2	1	325 (2)	325 (2)	325 (3)	400 (3)	400 (3)	400 (4)	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (2)	425 (3)	500 (3)	500 (3)	500 (4)
2	2	325 (2)	325 (2)	325 (3)	400 (3)	400 (3)	400 (4)	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (2)	425 (3)	500 (3)	500 (3)	500 (4)
3	2	325 (2)	325 (2)	325 (3)	400 (3)	400 (3)	400 (4)	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (2)	425 (3)	500 (3)	500 (3)	500 (4)
3	3	325 (2)	325 (2)	325 (3)	400 (3)	400 (3)	400 (4)	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (2)	425 (3)	500 (3)	500 (3)	500 (4)
4	3	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (2)	425 (3)	500 (3)	500 (3)	500 (4)	475 (2)	475 (2)	475 (3)	550 (3)	550 (3)	550 (4)
4	4	375 (2)	375 (2)	375 (3)	450 (3)	450 (3)	450 (4)	425 (2)	425 (3)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (3)	475 (4)	550 (3)	550 (3)	550 (4)
5	4	375 (2)	375 (2)	375 (4)	450 (3)	450 (3)	450 (4)	425 (2)	425 (3)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (3)	475 (4)	550 (3)	550 (3)	550 (4)
5	5	375 (2)	375 (3)	375 (4)	450 (3)	450 (3)	450 (4)	425 (3)	425 (3)	425 (4)	500 (3)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)
6	5	375 (2)	375 (3)	375 (4)	450 (3)	450 (4)	450 (4)	425 (3)	425 (3)	425 (4)	500 (3)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)
6	6	375 (3)	375 (3)	375 (4)	450 (3)	450 (4)	450 (4)	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)
7	6	425 (3)	425 (3)	425 (4)	500 (3)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)
7	7	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)
8	7	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)
8	8	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)
9	8	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)
9	9	425 (3)	425 (3)	425 (4)	500 (4)	500 (4)	500 (4)	475 (3)	475 (4)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (4)	525 (4)	600 (4)	600 (4)	600 (4)

AM: mechanical latching with electrical release.
CM: magnetic circuit.
E: attachment centre distance (L = A + 75 mm).
M: M type auxiliary contact block(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: block with 2 delayed contacts(1).
Z: total length of the fixation bar (Z = A + 105 mm). Length increased on simple request, in that case, please advise the position of the contactor on the bar.

Insulating distance (safety perimeter)

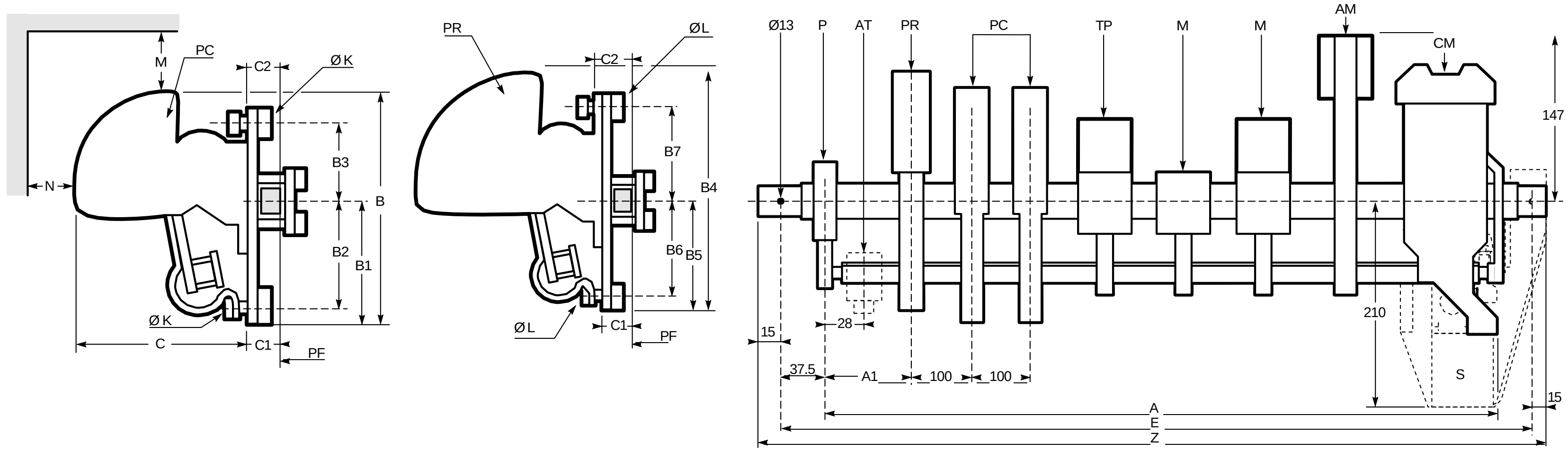
Calibre	metallic walls				insulated walls			
	≤ 250 V		> 250 V		≤ 250 V		> 250 V	
	M	**N**	**M**	**N**	**M**	**N**	**M**	**N**
80	55	45	110	80	45	35	90	65
150	105	75	125	95	85	60	105	75
200	165	135	235	185	130	105	185	145

(1) form to be specified.
(2) magnetic circuit n°63 (power-saved version available on request).
(3) magnetic circuit n°64.
(4) magnetic circuit n°64, power-saved version (Foresee one NC contact for inserting the economy resistor).

Control circuit: for connection drawings, **see p. 144.**

Overall dimensions CEX 57 80 to 200 A

Two-pole break
Ue : 500 V⎓



	A1	B	B1	B2	B3	B4	B5	B6	B7	C	C1	C2	ØK	ØL
80	(1) (6)	155,5	101	93	48	190	101	93	82	122	27	30	6	6
150	(1)	209,5	112	102	61	190	101	93	82	158	29	33	8	6
200	(1)	235	120	107	103	146	114	104	99	211	32	36	10	8

2 closing poles and one rupturing pole

M type auxiliary contacts		Cote entre paliers : A																	
		Without mechanical latching						With mechanical latching with single electrical release (foresee 1 NO contact for switching off the release coil)						With mechanical latching with single electrical release (2 NO contacts for switching off the release coils)					
		Without delayed block			With a delayed block			Without delayed block			With a delayed block			Without delayed block			With a delayed block		
NO	**NC**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**	**80 A**	**150 A**	**200 A**
1	1	425 (2)	425 (2)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (2)	475 (4)	550 (3)	550 (3)	550 (4)						
2	1	425 (2)	425 (2)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (2)	475 (4)	550 (3)	550 (3)	500 (4)	525 (2)	525 (2)	525 (4)	600 (3)	600 (3)	600 (4)
2	2	425 (2)	425 (2)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (3)	475 (4)	550 (3)	550 (3)	550 (4)	525 (2)	525 (3)	525 (4)	600 (3)	600 (3)	600 (4)
3	2	425 (2)	425 (2)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (3)	475 (4)	550 (3)	550 (3)	550 (4)	525 (2)	525 (3)	525 (4)	600 (3)	600 (3)	600 (4)
3	3	425 (2)	425 (3)	425 (4)	500 (3)	500 (3)	500 (4)	475 (2)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)	525 (2)	525 (3)	525 (4)	600 (3)	600 (4)	600 (4)
4	3	475 (2)	475 (3)	475 (4)	550 (3)	550 (3)	550 (4)	525 (2)	525 (3)	525 (4)	600 (3)	600 (4)	600 (4)	575 (2)	575 (3)	575 (4)	650 (3)	650 (4)	650 (4)
4	4	475 (2)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)	525 (2)	525 (3)	525 (4)	600 (3)	600 (4)	600 (4)	575 (2)	575 (3)	575 (4)	650 (3)	650 (4)	650 (4)
5	4	475 (2)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (3)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (3)	650 (4)	650 (4)
5	5	475 (2)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (3)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (3)	650 (4)	650 (4)
6	5	475 (2)	475 (3)	475 (4)	550 (3)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (4)	650 (4)	650 (4)
6	6	475 (3)	475 (3)	475 (4)	550 (4)	550 (4)	550 (4)	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (4)	650 (4)	650 (4)
7	6	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (4)	650 (4)	650 (4)	625 (3)	625 (3)	625 (4)	700 (4)	700 (4)	700 (4)
7	7	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)	575 (3)	575 (3)	575 (4)	650 (4)	650 (4)	650 (4)	625 (3)	625 (3)	625 (4)	700 (4)	700 (4)	700 (4)
8	7	525 (3)	525 (3)	525 (4)	600 (4)	600 (4)	600 (4)	575 (3)	575 (4)	575 (4)	650 (4)	650 (4)		625 (3)	625 (4)	625 (4)	700 (4)	700 (4)	
8	8	525 (3)	525 (4)	525 (4)	600 (4)	600 (4)		575 (3)	575 (4)	575 (4)	650 (4)	650 (4)		625 (3)	625 (4)	625 (4)	700 (4)	700 (4)	
9	8	525 (3)	525 (4)	525 (4)	600 (4)	600 (4)		575 (3)	575 (4)	575 (4)	650 (4)	650 (4)		625 (3)	625 (4)	625 (4)	700 (4)	700 (4)	
9	9	525 (3)	525 (4)	525 (4)	600 (4)	600 (4)		575 (3)	575 (4)	575 (4)	650 (4)	650 (4)		625 (3)	625 (4)	625 (4)	700 (4)	700 (4)	

AM: mechanical latching with electrical release.
AT: mechanical coupling for connecting in series 2 equipments with 2 contactor poles, for use under voltages > 500 V and � 1000 V.
Superimposed contactors, centre distance: 400 mm.
CM: magnetic circuit.
E: attachment centre distance (L = A + 75 mm).
M: M type auxiliary contact block[5].
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: block with 2 delayed contacts[5].
Z: total length of the fixation bar (Z = A + 105 mm).
Length increased on simple request, in that case, please advise the position of the contactor on the bar.

Insulating distance (safety perimeter)

Calibre	metallic walls				insulated walls			
	� 250 V		> 250 V		� 250 V		> 250 V	
	M	N	M	N	M	N	M	N
80	55	45	110	80	45	35	90	65
150	105	75	125	95	85	60	105	75
200	165	135	235	185	130	105	185	145

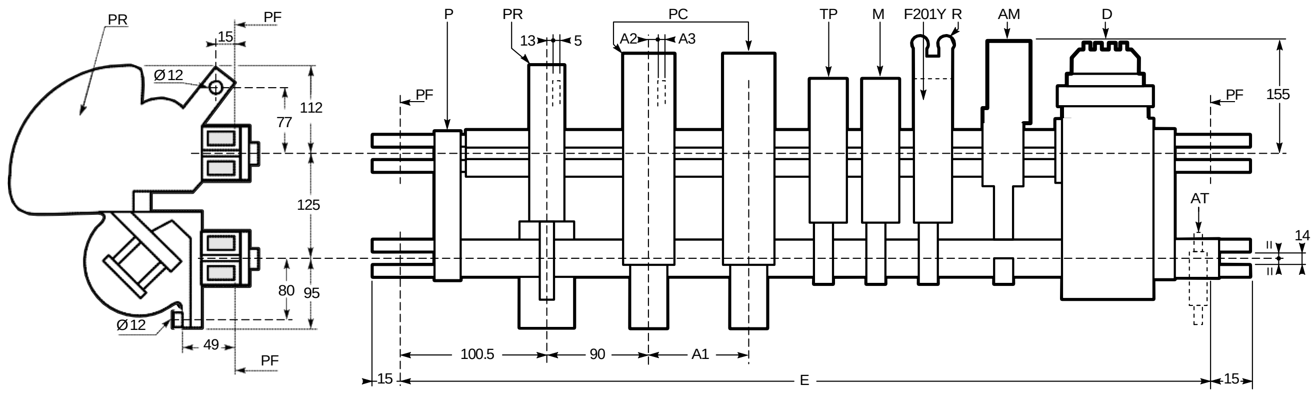
(1) U � 500 V: **A1** = 50 mm (without AT)
U > 500 V and � 1000 V: **A1** = 78 mm
(space available for AT), PLEASE CONSULT US for total overall dimensions.
(2) magnetic circuit n° 63 (power-saved version available on request).
(3) magnetic circuit n° 64.
(4) magnetic circuit n° 64, power-saved version (Foresee one NC contact for inserting the economy resistor).
(5) forme to be specified.
(6) for contactor mounted on a single bar, PLEASE CONSULT US for a total overall dimensions: A1 = 50 mm.

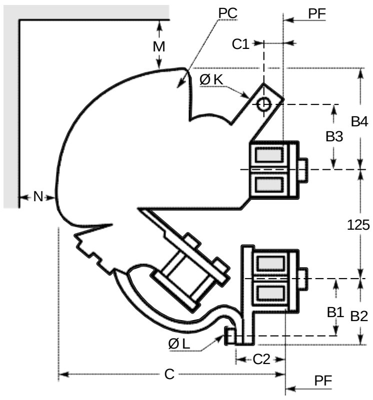
Control circuit: for connection drawings, see p. 144.

Overall dimensions CEX 75 400 to 1000 A

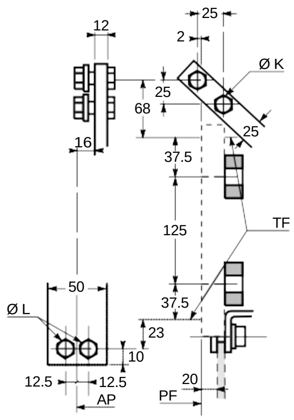
Single-pole break and two-pole break
Ue : 500 VŬ

32. CEX 75 400 - 500 - 630 - 800 - 1000





Connecting section for closing pole 800 and 1000 A



AM: mechanical latching with electrical release.
AT: mechanical coupling for connecting in series 2 equipements with 2 contactor poles, for use under voltages > 500 V and ≤ 1000 V.
Superimposed contactors, centre distance: 500 mm.
D: block with two instant contacts (1NO + 1NF).

M: M type auxiliary contact block(1) with 2 or 3 instant contacts(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole.
R: economy resistor.
TP: block with 2 delayed contacts(1).

	A1	A2	A3	B1	B2	B3	B4	C	C1	C2	ØK	ØL
400	90	13	5	65	80	77	112	256	15	30	12	12
500/630	100	12	8	65	80	77	112	256	15	30	12	12
800/1000	110	16	12	60	70	(2)	186	291	(2)	0	8	8

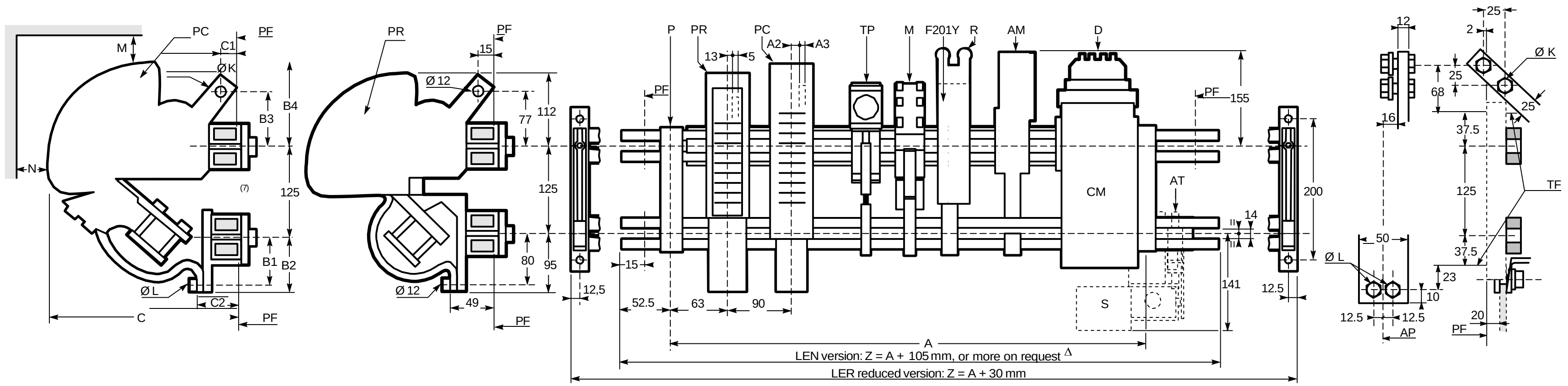
	Attachment centre distance E				**Insulating distance** (safety perimeter)							
	1 pole		2 poles		metallic walls				insulated walls			
	1M	1M+1TP	1M	1M+1TP	≤ 300 V		> 300 V		≤ 300 V		> 300 V	
					M	**N**	**M**	**N**	**M**	**N**	**M**	**N**
400	575	650	650	725	100	30	100	40	40	30	40	30
500/630	575	650	675	750	150	50	150	70	60	40	70	60
800/1000	600	675	700	775	75	75	155	75	75	75	155	75

(1) form to be specified.
(2) see connecting section.

Control circuit: for connection drawings, see p. 144.

Overall dimensions CEX 75 400 to 1000 A

Single-pole break
Ue : 500 V⎓



	A2	A3	B1	B2	B3	B4	C	C1	C2	ØK	ØL
400	13	5	65	80	77	112	256	15	30	12	12
500/630	12	8	65	80	77	112	256	15	30	12	12
800/1000	16	12	60	70	(7)	186	291	(7)	0	8	8

1 closing pole and 1 openig pole

M type auxiliary contacts(8)		Distance between the bearings: A														
		Without mechanical latching(4)			With mechanical latching with single electrical release without delayed block(5)			With mechanical latching with double electrical release without delayed block(6)			With mechanical latching with single electrical release with delayed block(5)			With mechanical latching with double electrical release with delayed block(6)		
NO	NC	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000
1	2	375 (2)	375 (2)	400 (3)	450 (2)	450 (2)	475 (3)				525 (2)	525 (2)	550 (3)			
2	1	375 (2)	375 (2)	400 (3)	450 (2)	450 (2)	475 (3)	525 (2)	525 (2)	550 (3)	525 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)
3	2	400 (2)	425 (2)	450 (3)	500 (2)	500 (2)	525 (3)	575 (2)	575 (2)	600 (3)	575 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)
3	3	400 (2)	425 (2)	450 (3)	500 (2)	500 (2)	525 (3)	575 (2)	575 (2)	600 (3)	575 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)
4	3	400 (2)	425 (2)	450 (3)	500 (2)	500 (2)	525 (3)	575 (2)	575 (2)	600 (3)	575 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)
4	4	400 (2)	425 (2)	450 (3)	500 (2)	500 (2)	525 (3)	575 (2)	575 (2)	600 (3)	575 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)
5	4	400 (2)	425 (2)	450 (3)	500 (2)	500 (2)	525 (3)	575 (2)	575 (2)	600 (3)	575 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)
5	5	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
6	5	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
6	6	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
7	6	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
7	7	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
8	7	450 (2)	475 (2)	500 (3)	550 (2)	550 (2)	575 (3)	625 (2)	625 (2)	650 (3)	625 (2)	625 (2)	650 (3)	700 (2)	700 (2)	725 (3)
8	8	500 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
9	8	500 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
9	9	500 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
10	9	500 (2)	525 (2)	500 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
10	10	500 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
11	10	500 (2)	525 (2)	550 (3)	600 (2)	600 (2)	625 (3)	675 (2)	675 (2)	700 (3)	675 (2)	675 (2)	700 (3)	750 (2)	750 (2)	775 (3)
11	11	550 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)	725 (2)	725 (2)	750 (3)	725 (2)	725 (2)	750 (3)	800 (2)	800 (2)	825 (3)
12	11	550 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)	725 (2)	725 (2)	750 (3)	725 (2)	725 (2)	750 (3)	800 (2)	800 (2)	825 (3)
12	12	550 (2)	575 (2)	600 (3)	650 (2)	650 (2)	675 (3)	725 (2)	725 (2)	750 (3)	725 (2)	725 (2)	750 (3)	800 (2)	800 (2)	825 (3)

AM: mechanical latching with single or double electrical release.
AT: mechanical coupling for connecting in series 2 equipments with 2 contactor poles, for use under voltages > 500 V and ≤ 1000 V. Superimposed contactors, centre distance: 500 mm.
CM: magnetic circuit. This one can be mounted on the left side of the contactor without any information, it is always mounted on the right side of the contactor.
D: block with 2 instant contacts on standard version; 2 additional blocks can be added on request.
M: M type auxiliary contact block(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 400
A.**R**: economy resistor.
TP: block with 2 delayed contacts(1).
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
Δ in that case, please advise the position of the contactor on the bars.

Insulating distance (safety perimeter)

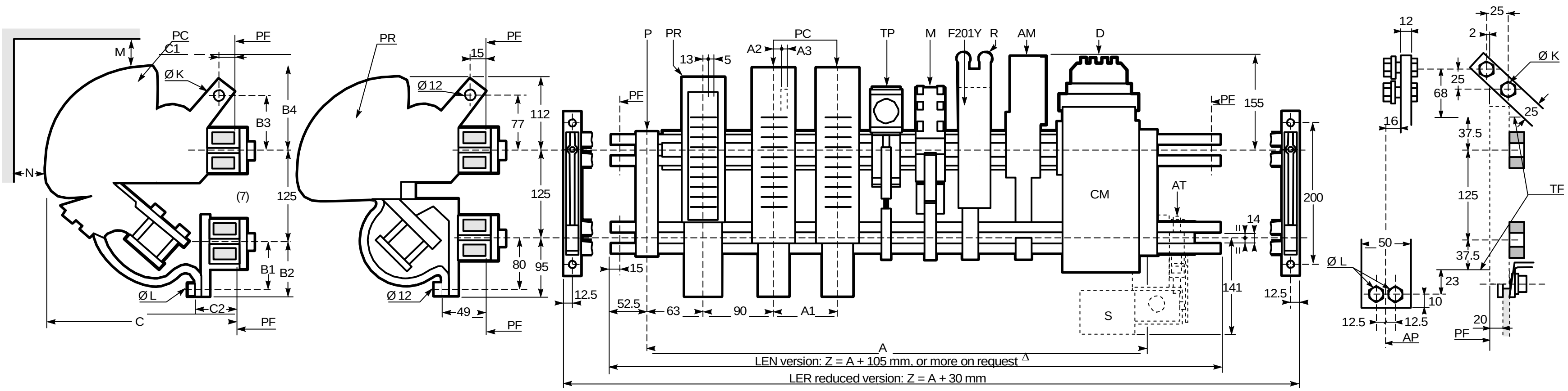
Calibre	metallic walls				insulated walls			
	≤ 300 V		> 300 V		≤ 300 V		> 300 V	
	M	N	M	N	M	N	M	N
400	100	30	100	40	40	30	40	30
500/630	150	50	150	70	60	40	70	60
800/1000	75	75	155	75	75	75	155	75

(1) form to be specified.
(2) magnetic circuit n° 16 R, power-saved version.
(3) magnetic circuit n° 18, power-saved version.
(4) foresee 1 overlapping NC for inserting the economy resistor(s).
(5) foresee 1 overlapping NC for inserting the economy resistor(s) and 1 NO for switching off the release coil
(6) foresee 1 overlapping NC for inserting the economy resistor(s) and 2 NO for switching off the release coil.
(7) detailed connections for pole 800 and 1000 A.
(8) should you require other versions, please consult our technical department.
Control circuit: for connecting drawings, see p. 144.

Field circuit breakers (excitation contactors) from 80 to 6200 A

Overall dimensions CEX 75 400 to 1000 A

Two-pole break
Ue : 500 V



	A1	A2	A3	B1	B2	B3	B4	C	C1	C2	ØK	ØL
400	90	13	5	65	80	77	112	256	15	30	12	12
500/630	100	12	8	65	80	77	112	256	15	30	12	12
800/1000	110	16	12	60	70	(7)	186	291	(7)	0	8	8

2 closing poles and 1 opening pole

M type auxiliary contact(8)		Distance between the bearings: A: Without mechanical latching(4)			With mechanical latching with single electrical release without delayed block(5)			With mechanical latching with double electrical release without delayed block(6)			With mechanical latching with single electrical release with delayed block(5)			With mechanical latching with double electrical release with delayed block(6)		
NO	**NC**	**400**	**500/630**	**800/1000**	**400**	**500/630**	**800/1000**	**400**	**500/630**	**800/1000**	**400**	**500/630**	**800/1000**	**400**	**500/630**	**800/1000**
1	2	450 (2)	475 (2)	550 (3)	550 (2)	550 (2)	600 (3)				600 (2)	625 (2)	650 (3)			
2	1	450 (2)	475 (2)	550 (3)	550 (2)	550 (2)	600 (3)	625 (2)	625 (2)	675 (3)	600 (2)	625 (2)	650 (3)	675 (2)	700 (2)	725 (3)
3	2	500 (2)	525 (2)	550 (3)	575 (2)	600 (2)	625 (3)	650 (2)	675 (2)	700 (3)	650 (2)	675 (2)	700 (3)	725 (2)	750 (2)	775 (3)
3	3	500 (2)	525 (2)	550 (3)	575 (2)	600 (2)	625 (3)	650 (2)	675 (2)	700 (3)	650 (2)	675 (2)	700 (3)	725 (2)	750 (2)	775 (3)
4	3	500 (2)	525 (2)	550 (3)	575 (2)	600 (2)	625 (3)	650 (2)	675 (2)	700 (3)	650 (2)	675 (2)	700 (3)	725 (2)	750 (2)	775 (3)
4	4	500 (2)	525 (2)	550 (3)	575 (2)	600 (2)	625 (3)	650 (2)	675 (2)	700 (3)	650 (2)	675 (3)	700 (3)	725 (2)	750 (3)	775 (3)
5	4	500 (2)	525 (2)	550 (3)	575 (2)	600 (2)	625 (3)	650 (2)	675 (2)	700 (3)	650 (2)	675 (3)	700 (3)	725 (2)	750 (3)	775 (3)
5	5	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
6	5	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
6	6	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
7	6	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
7	7	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
8	7	550 (2)	575 (2)	600 (3)	625 (2)	650 (2)	675 (3)	700 (2)	725 (2)	750 (3)	700 (2)	725 (3)	750 (3)	775 (2)	800 (3)	825 (3)
8	8	600 (2)	625 (2)	650 (3)	675 (2)	700 (2)	725 (3)	750 (2)	775 (2)	800 (3)	750 (2)	775 (3)	800 (3)	825 (2)	850 (3)	875 (3)
9	8	600 (2)	625 (2)	650 (3)	675 (2)	700 (2)	725 (3)	750 (2)	775 (2)	800 (3)	750 (2)	775 (3)	800 (3)	825 (2)	850 (3)	875 (3)
9	9	600 (2)	625 (2)	650 (3)	675 (2)	725 (3)	725 (3)	750 (2)	800 (3)	800 (3)	750 (2)	775 (3)	800 (3)	825 (2)	850 (3)	875 (3)
10	9	600 (2)	650 (3)	650 (3)	675 (2)	725 (3)	725 (3)	750 (2)	800 (3)	800 (3)	750 (2)	775 (3)	800 (3)	825 (2)	850 (3)	875 (3)
10	10	600 (2)	650 (3)	650 (3)	675 (2)	725 (3)	725 (3)	750 (2)	800 (3)	800 (3)	750 (2)	775 (2)	800 (3)	825 (2)	850 (3)	875 (3)
11	10	600 (2)	650 (3)	650 (3)	675 (2)	725 (3)	725 (3)	750 (2)	800 (3)	800 (3)	750 (2)	775 (3)	800 (3)	825 (2)	850 (3)	875 (3)
11	11	650 (2)	700 (3)	700 (3)	725 (2)	775 (3)	775 (3)	800 (2)	850 (3)	850 (3)	800 (2)	825 (3)	850 (3)	875 (2)	900 (3)	925 (3)
12	11	650 (2)	700 (3)	700 (3)	725 (2)	775 (3)	775 (3)	800 (2)	850 (3)	850 (3)	800 (2)	825 (3)	850 (3)	875 (2)	900 (3)	925 (3)
12	12	650 (2)	700 (3)	700 (3)	725 (2)	775 (3)	775 (3)	800 (2)	850 (3)	850 (3)	800 (2)	825 (3)	850 (3)	875 (2)	900 (3)	925 (3)

AM: mechanical latching with single or double electrical release.
AT: mechanical coupling for connecting in series 2 equipments with 2 contactor poles, for use under voltages > 500 V and ≤ 1000 V. Superimposed contactors, centre distance: 500 mm.
CM: magnetic circuit. This one can be mounted on the left side of the contactor without any information, it is always mounted on the right side of the contactor.
D: block with 2 instant contacts on standard version; 2 additional blocks can be added on request.
M: M type auxiliary contact block(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 400 A.
R: economy resistor.
TP: block with 2 delayed contacts(1).
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
Δ in that case, please advise the position of the contactor on the bars.

Insulating distance (safety perimeter)

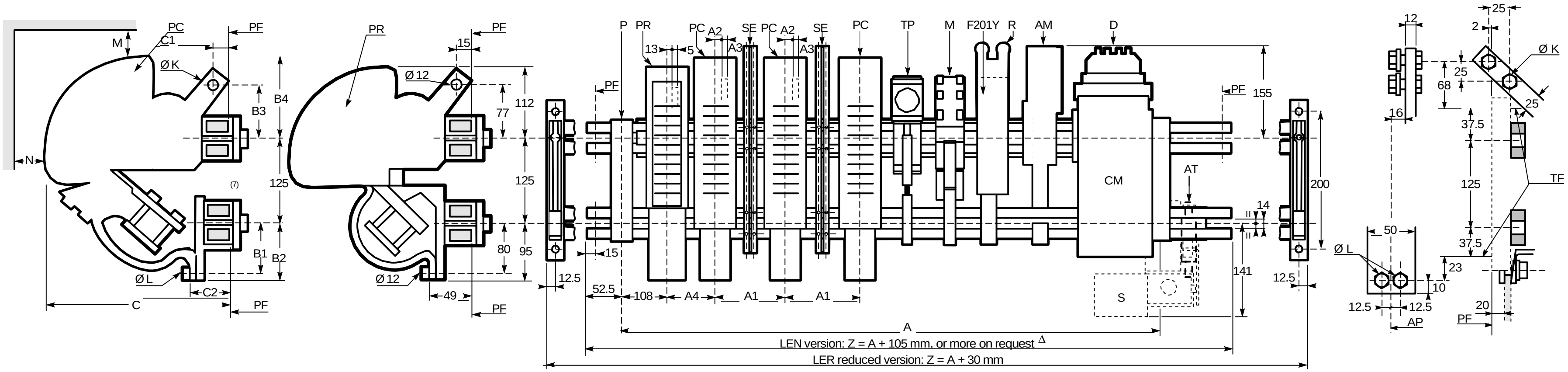
Calibre	metallic walls ≤ 300 V M	N	> 300 V M	N	insulated walls ≤ 300 V M	N	> 300 V M	N
400	100	30	100	40	40	30	40	30
500/630	150	50	150	70	60	40	70	60
800/1000	75	75	155	75	75	75	155	75

(1) form to be specified.
(2) magnetic circuit n° 16 R, power-saved version.
(3) magnetic circuit n° 18, power-saved version.
(4) foresee 1 overlapping NC for inserting the economy resistor(s).
(5) foresee 1 overlapping NC for inserting the economy resistor(s) and 1 NO for switching off the release coil
(6) foresee 1 overlapping NC for inserting the economy resistor(s) and 2 NO for switching off the release coil.
(7) detailed connections for pole 800 and 1000 A.
(8) should you require other versions, please consult our technical department.

Control circuit: for connecting drawings, **see p. 144.**

Overall dimensions CEX 75 400 to 1000 A

Three-pole break
Ue : 1000 V⎓



	A1	A2	A3	A4	B1	B2	B3	B4	C	C1	C2	ØK	ØL
400	102	13	5	110	65	80	77	112	256	15	30	12	12
500/630	120	12	8	110	65	80	77	112	256	15	30	12	12
800/1000	138	16	12	135	60	70	(7)	186	291	(7)	0	8	8

1 closing pole on the positive polarity, 1 closing pole on the negative polarity and 1 opening pole

M type auxiliary contacts(8)		Distance between the bearings: A														
		Without mechanical latching(4)			With mechanical latching with single electrical release without delayed block(5)			With mechanical latching with double electrical release without delayed block(6)			With mechanical latching with single electrical release with delayed block(5)			With mechanical latching with double electrical release with delayed block(6)		
NO	NC	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000	400	500/630	800/1000
1	2	650 (2)	725 (3)	800 (3)	725 (2)	800 (3)	875 (3)				800 (2)	850 (3)	925 (3)			
2	1	650 (2)	725 (3)	800 (3)	725 (2)	800 (3)	875 (3)	800 (2)	875 (3)	950 (3)	800 (2)	850 (3)	925 (3)	875 (2)	925 (3)	
3	2	700 (2)	775 (3)	850 (3)	775 (2)	850 (3)	925 (3)	850 (2)	925 (3)		850 (2)	900 (3)		925 (2)		
3	3	700 (2)	775 (3)	850 (3)	775 (2)	850 (3)	925 (3)	850 (2)	925 (3)		850 (2)	900 (3)		925 (2)		
4	3	700 (2)	775 (3)	850 (3)	775 (2)	850 (3)	925 (3)	850 (2)	925 (3)		850 (2)	900 (3)		925 (2)		
4	4	700 (2)	775 (3)	850 (3)	775 (2)	850 (3)	925 (3)	850 (2)	925 (3)		850 (2)	900 (3)		925 (2)		
5	4	700 (2)	775 (3)	850 (3)	775 (2)	850 (3)	925 (3)	850 (2)	925 (3)		850 (2)	900 (3)		925 (2)		
5	5	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
6	5	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
6	6	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
7	6	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
7	7	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
8	7	750 (2)	825 (3)	900 (3)	825 (2)	900 (3)		900 (2)			900 (2)	950 (3)				
8	8	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
9	8	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
9	9	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
10	9	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
10	10	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
11	10	800 (2)	875 (3)	950 (3)	875 (2)	950 (3)		950 (2)			950 (2)					
11	11	850 (2)	925 (3)		925 (2)											
12	11	850 (2)	925 (3)		925 (2)											
12	12	850 (2)	925 (3)		925 (2)											

AM: mechanical latching with single or double electrical release.
AT: mechanical coupling for connecting in series 2 equipments with 2 contactor poles, for use under voltages > 500 V and � 1000 V. Superimposed contactors, centre distance: 500 mm.
CM: magnetic circuit. This one can be mounted on the left side of the contactor without any information, it is always mounted on the right side of the contactor.
D: block with 2 instant contacts on standard version; 2 additional blocks can be added on request.
M: M type auxiliary contact block(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 400
A.**R**: economy resistor.
TP: block with 2 delayed contacts(1).
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
Δ in that case, please advise the position of the contactor on the bars.

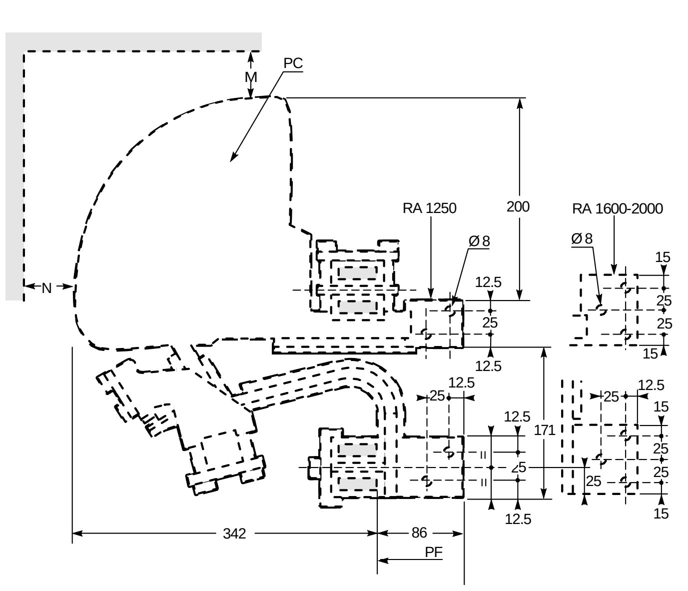
Insulating distance (safety perimeter)

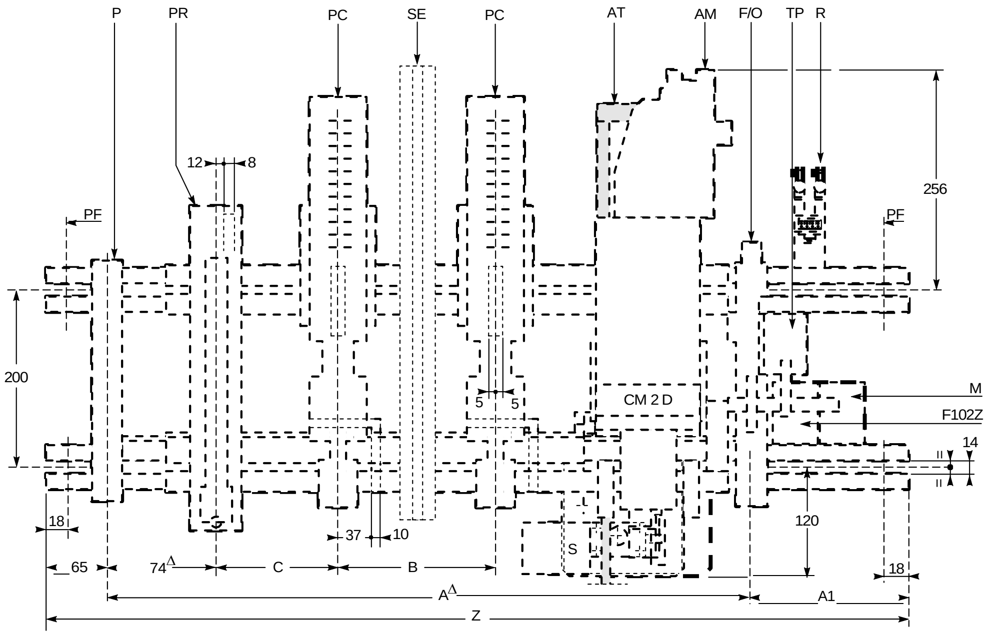
Calibre	metallic walls > 300 V M	metallic walls > 300 V N	insulated walls > 300 V M	insulated walls > 300 V N
400	100	40	40	30
500/630	150	70	70	60
800/1000	155	75	155	75

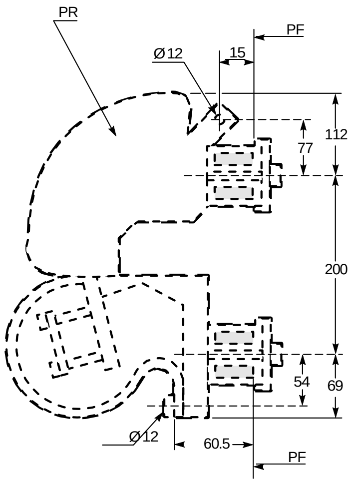
(1) form to be specified.
(2) magnetic circuit n° 16 R, power-saved version.
(3) magnetic circuit n° 18, power-saved version.
(4) foresee 1 overlapping NC for inserting the economy resistor(s).
(5) foresee 1 overlapping NC for inserting the economy resistor(s) and 1 NO for switching off the release coil
(6) foresee 1 overlapping NC for inserting the economy resistor(s) and 2 NO for switching off the release coil.
(7) detailed connections for pole 800 and 1000 A.
(8) should you require other versions, please consult our technical department.
Control circuit: for connecting drawings, see p. 144.

Overall dimensions CEX 71 1250 to 2000 A

Single-pole and two-pole break







AM: mechanical latching with single or double electrical release.
AT: mechanical coupling for connecting in series 2 equipments of 2 contactor poles, for use under voltages > 500 V and ≤ 1000 V.
Superimposed contactors, centre distance: 625 mm.
CM2D: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block(1).
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A.
R: economy resistor.
RA: connecting sections.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: block with 2 delayed contacts(1).
Z: total length of the fixation bars (Z = E + A1 + 65 mm). Length increased on simple request.

(1) form to be specified.
(2) for use under voltages > 550 and ≤ 1100 V, manual release system AT has to be mounted.
(3) dimensions with separator.

Δ: add 40 mm for an old coupling system.

	Voltage V	A	B	C
1 pole	≤ 550	435	110	110
2 poles	≤ 550(2)	545(2)	110	110
2 poles(3)	> 550	655	165	138

Insulating distance (safety perimeter)

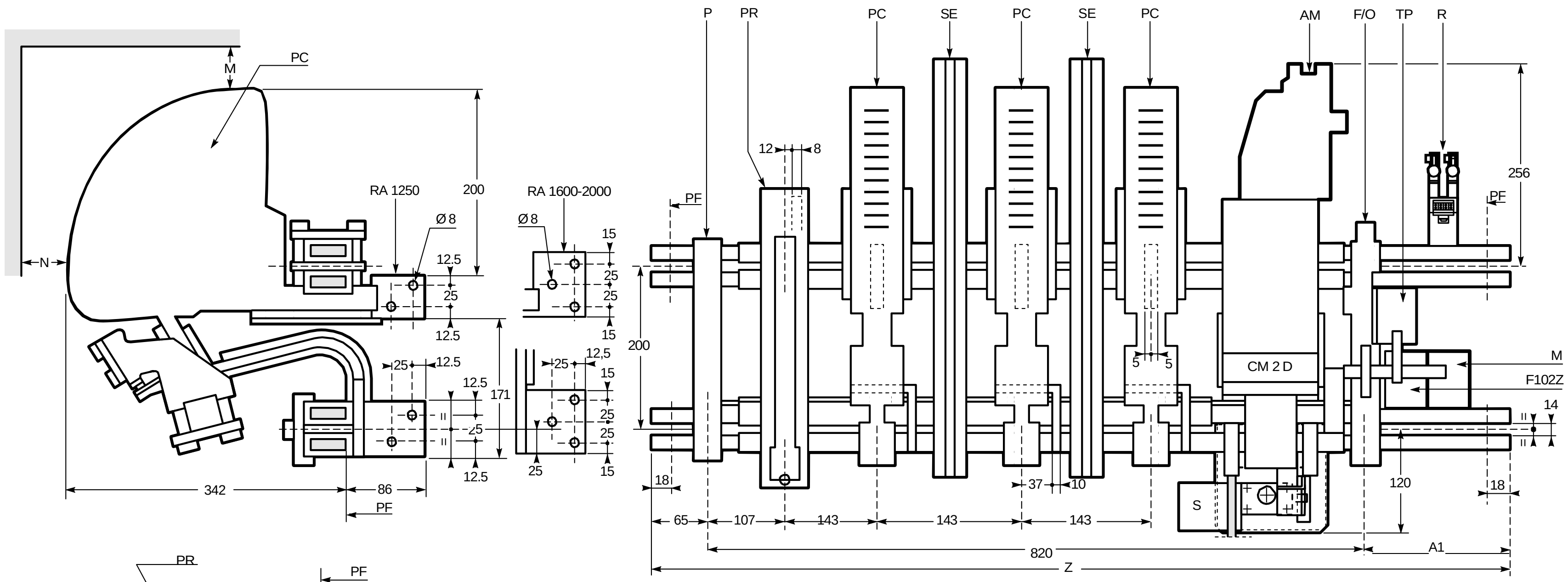
Voltage V	metallic walls		insulated walls	
	M	**N**	**M**	**N**
≤ 220	150	200	120	160
> 220	200	240	150	200

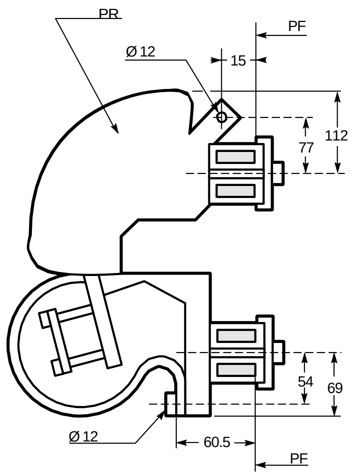
Protrusion A1

Number of delayed blocks	Number of M blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

Overall dimensions CEX 71 1250 and 2000 A

Three-pole break
Ue : 1000 V⎓





AM: mechanical latching with single or double electrical release.
CM2D: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block[(1)].
P: left bearing.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A.
R: economy resistor.
RA: connecting sections.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
Z: total length of the fixation bars (Z = 885 + A1).
(1) form to be specified.

Insulating distance (safety perimeter)

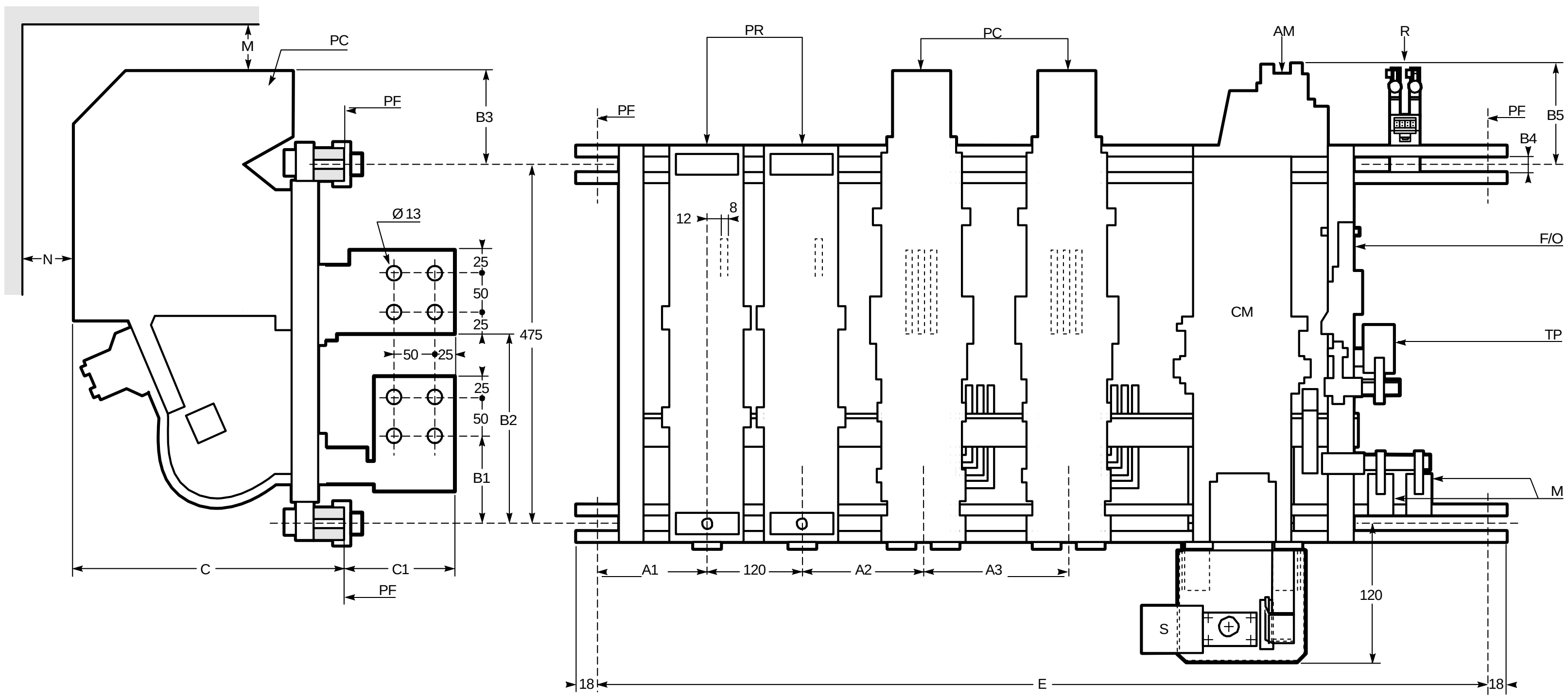
	M	N
metallic walls	200	240
insulated walls	150	200

Protrusion A1

Number of M blocks[(1)]	
1	75 mm
2	75 mm
3	125 mm
4	125 mm
5	175 mm
6	175 mm

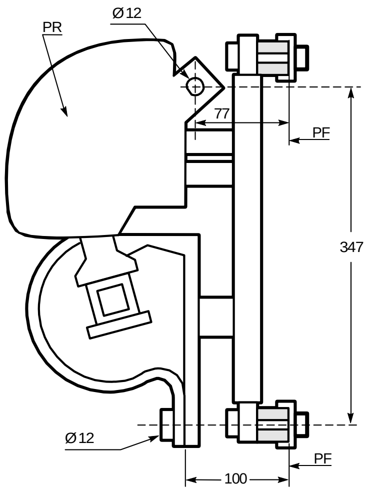
Overall dimensions CEX 54 3000 to 60 5000 A

Single-pole and two-pole break
Ue : 600 V⎓



AM: mechanical latching with single or double electrical release.
AP: pole axis.
CM: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block[(1)].
PC: contactor pole.
PF: attachment plane.
PR: 2 rupturing poles 500 A.
R: economy resistor.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: block with 2 delayed contacts[(1)].
(1) form to be specified.

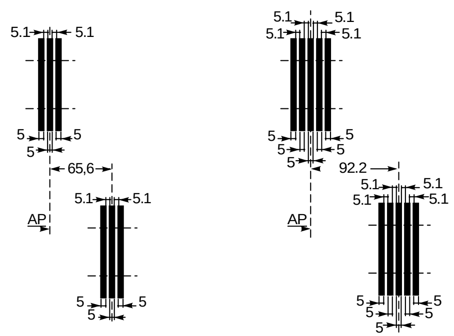
	E 1pole	E 2 poles	A1	A2	A3	B1	B2	B3	B4	B5	C	C1
3000	930	1110	149	144	180	118	250	110.5	14.5	136	408	146
5000	1000	1230	164	169	230	127	252	119.5	16	141	427	130



Insulating distance (safety perimeter)

	Voltage V	metallic walls M	metallic walls N	insulated walls M	insulated walls N
3000	≤ 300	200	100	100	65
	> 300	400	300	200	100
5000	≤ 300	400	400	250	250
	> 300	-	-	250	250

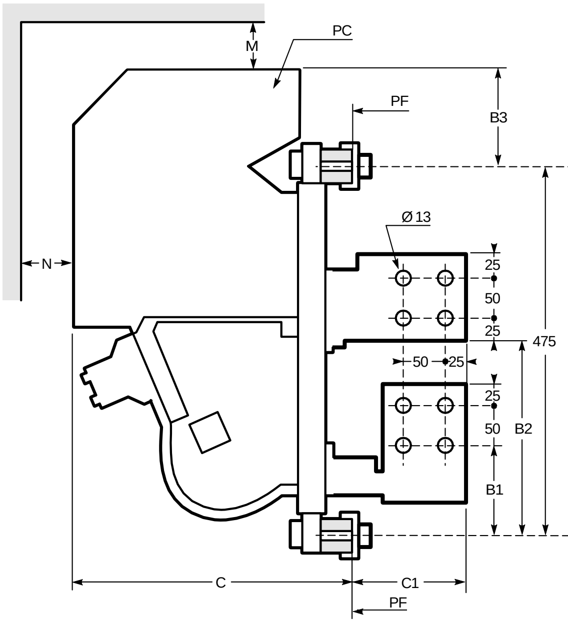
Connecting sections

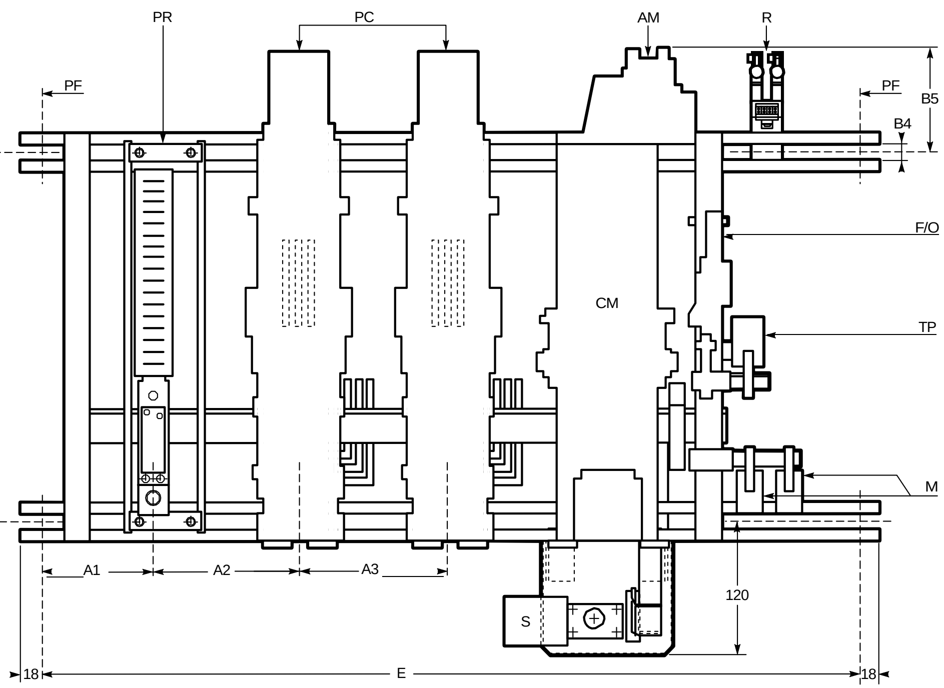


Field circuit breakers (excitation contactors) from 80 to 6200 A

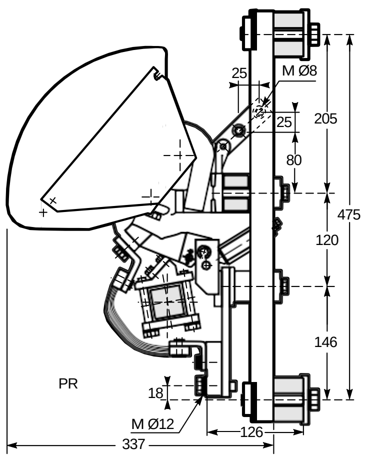
Overall dimensions CEX 54 3000 to 60 5000 A

Single-pole and two-pole break
Ue : 600 V





AM: mechanical latching with single or double electrical release.
AP: pole axis.
CM: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block(1).
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 800 A or 1000 A.
R: economy resistor.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
TP: block with 2 delayed contacts(1).
(1) form to be specified.

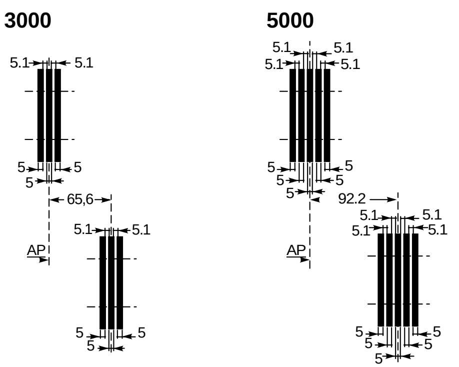


	E 1 pole	E 2 poles	A1	A2	A3	B1	B2	B3	B4	B5	C	C1
3000	815	995	165	190	180	118	250	110.5	14.5	136	408	146
5000	885	1115	180	215	230	127	252	119.5	16	141	427	130

Insulating distance (safety perimeter)

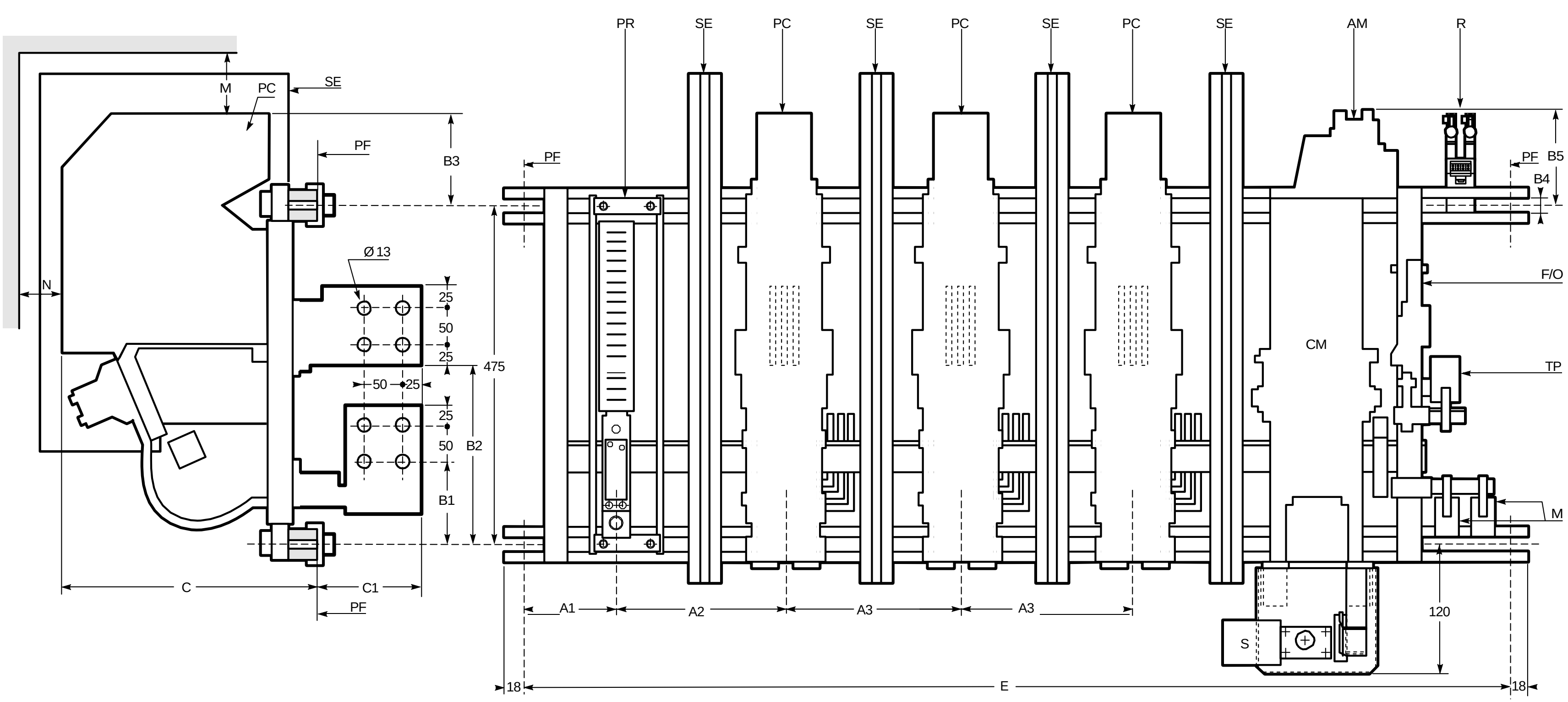
	Voltage V	metallic walls M	metallic walls N	insulated walls M	insulated walls N
3000	≤ 300	200	100	100	65
	> 300	400	300	200	100
5000	≤ 300	400	400	250	250
	> 300	-	-	250	250

Connecting sections



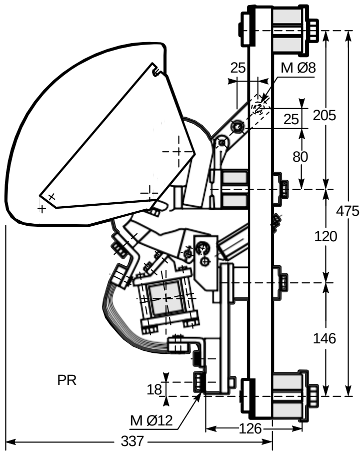
Overall dimensions CEX 54 3000 A

Three-pole break
Ue : 1000 V⎓



AM: mechanical latching with single or double electrical release.
AP: pole axis.
CM: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block(1).
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 800 A or 1000 A.
R: economy resistor.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: block with 2 delayed contacts(1).
(1) form to be specified.

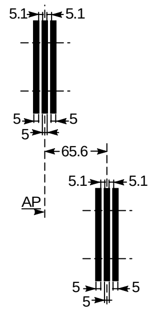
	E	A1	A2	A3	B1	B2	B3	B4	B5	C	C1
3000	1474	201	226	216	118	250	110.5	14.5	136	408	146



Insulating distance (safety perimeter)

	M	N
metallic walls	400	300
insulated walls	250	150

Connecting sections

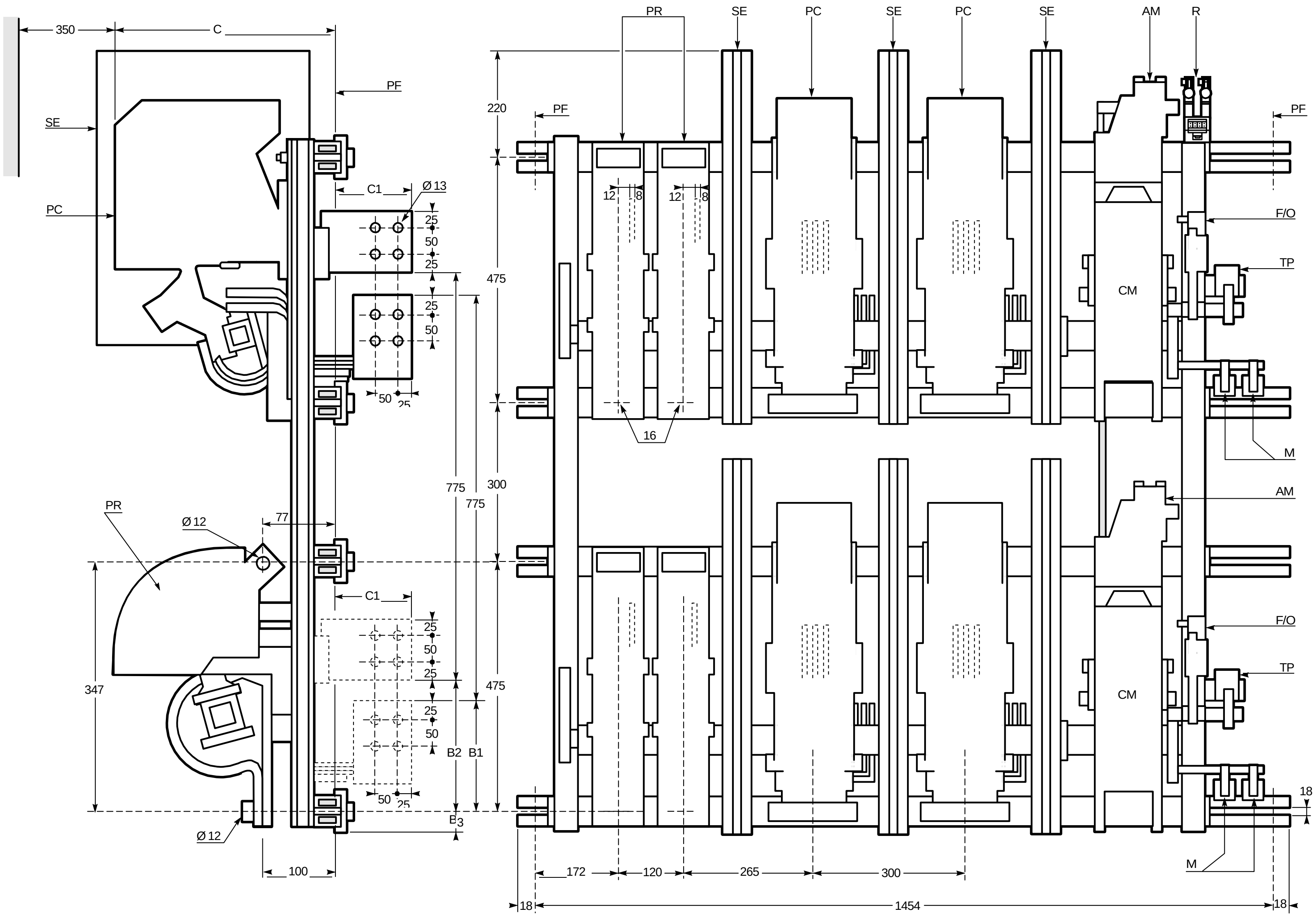


Overall dimensions CEX 3000 to 5000 A

2 two-pole break in series

Ue : 1500 V⎓

41. Double CEX 54 3000 - 60 5000



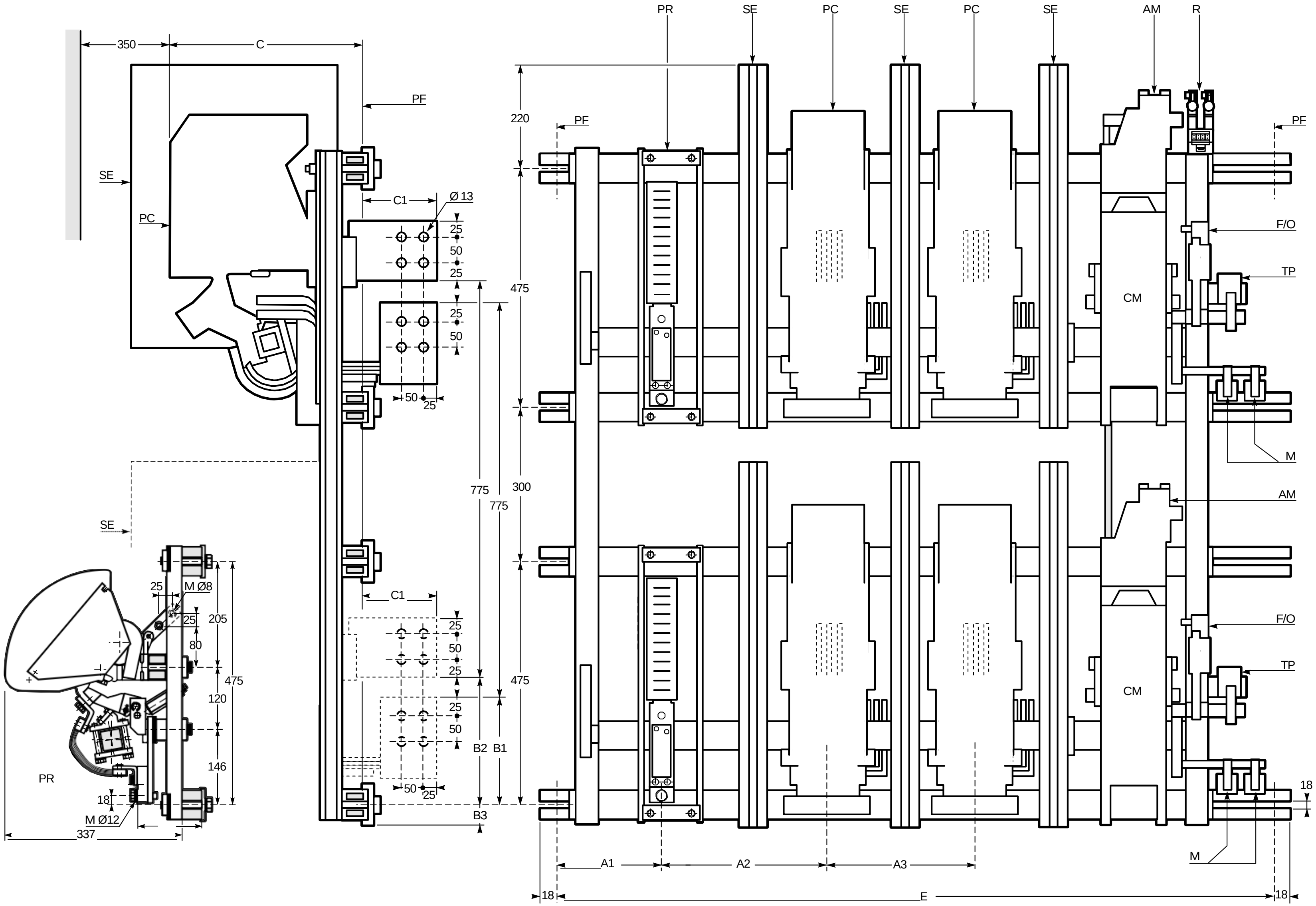
AM: mechanical latching with single or double electrical release.
AP: pole axis.
CM: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block(1).
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 800 A or 1000 A.
R: economy resistor.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: block with 2 delayed contacts(1).
(1) form to be specified.

	B1	B2	B3	C	C1
3000	193	250	26.5	426.5	146
5000	202	252	31	430	130

Overall dimensions CEX 54 3000 to 60 5000 A

Four-pole break Ue : 1500 V⎓

42. Double CEX 54 3000 - 60 5000

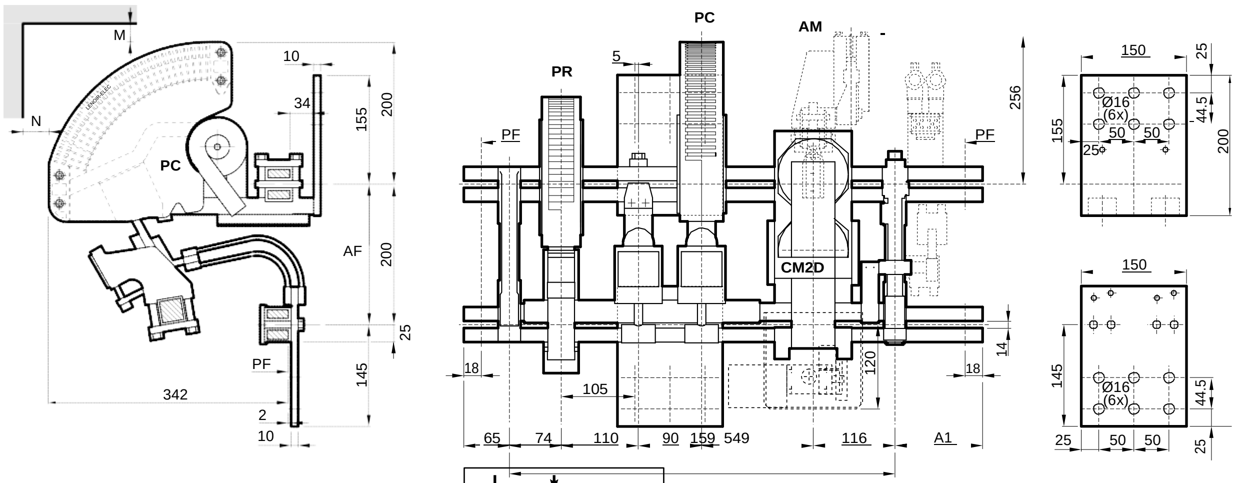


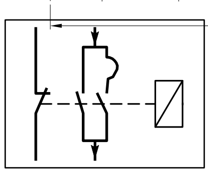
AM: mechanical latching with single or double electrical release.
AP: pole axis.
CM: magnetic circuit.
F/O: insertion contact for the economy resistor.
M: M type auxiliary contact block(1).
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 800 A or 1000 A.
R: economy resistor.
S: metallic support for «Ronis type» lock for locking the contactor at rest (lock not supplied).
SE: separator.
TP: block with 2 delayed contacts(1).
(1) form to be specified.

	E	A1	A2	A3	B1	B2	B3	C	C1
3000	1292	180	265	250	193	250	26.5	426.5	146
5000	1386	180	311	300	202	252	31	430	130

Overall dimensions CEX 98 2560 to 5000 A

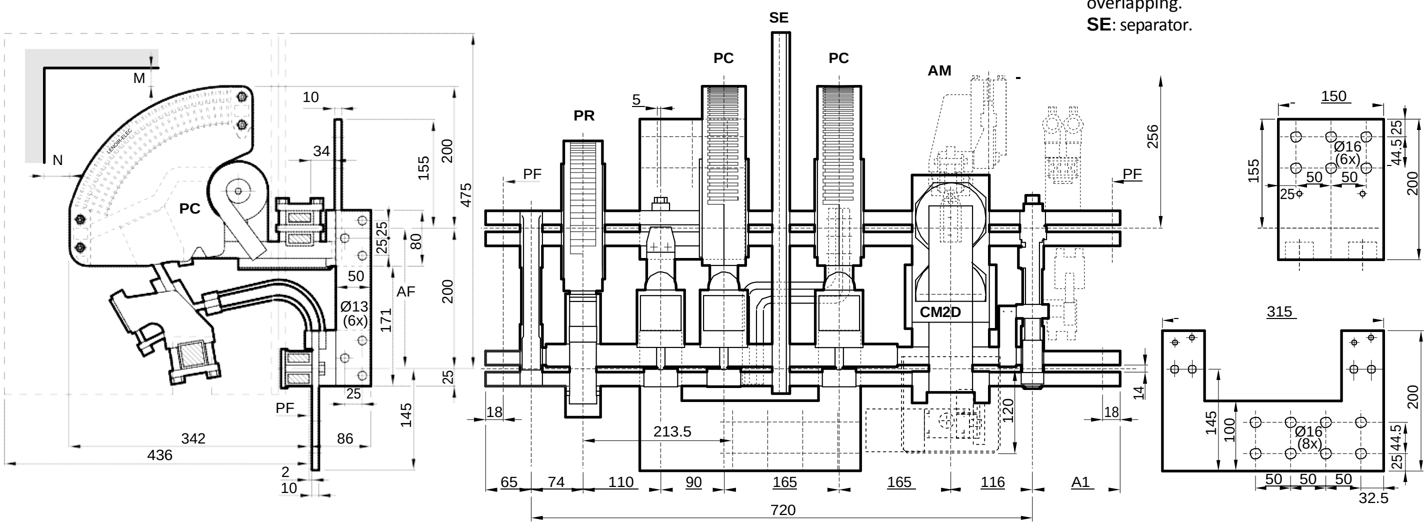
43. CEX 98 2560-3200 1.1 Ts 600 V

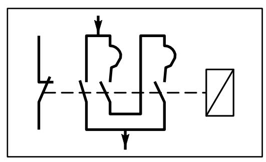




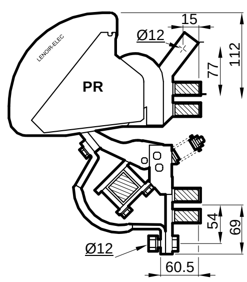
AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.

44. CEX 98 2560 -3200 1.1 Ts 1000 V





45. Rupturing pole 500 A with overlapping



Insulating distance (safety perimeter)

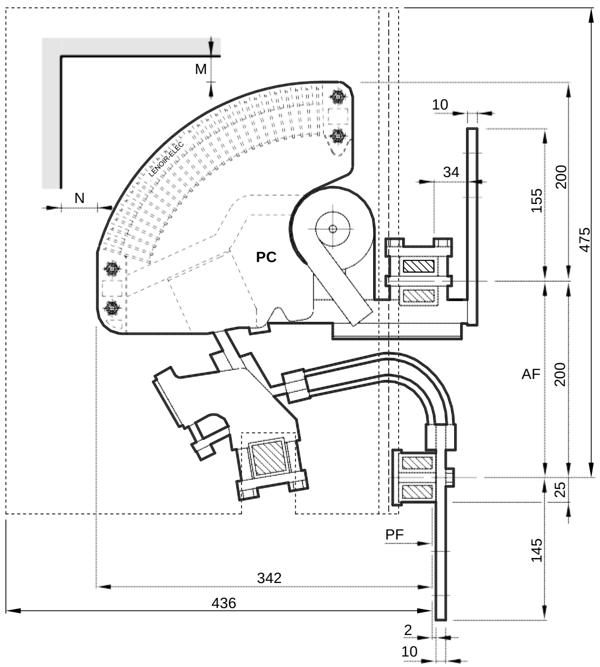
voltage V	metallic walls M	metallic walls N	insulated walls M	insulated walls N
≤ 220	150	200	120	160
> 220	200	240	150	200

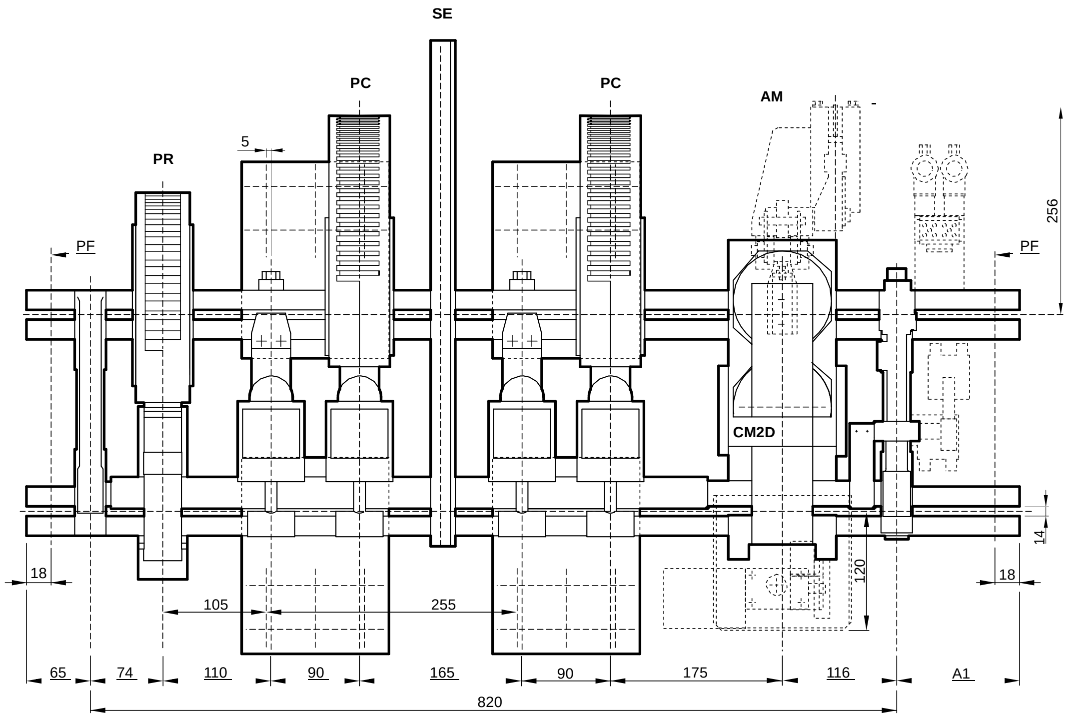
Protrusion A1

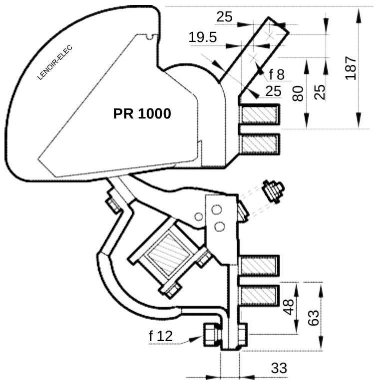
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

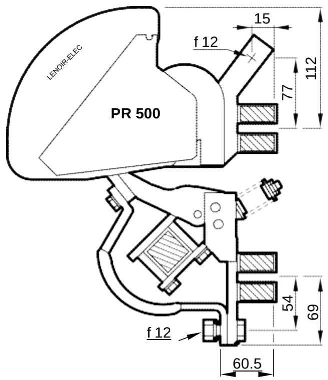
Field circuit breakers (excitation contactors) from 80 to 6200 A

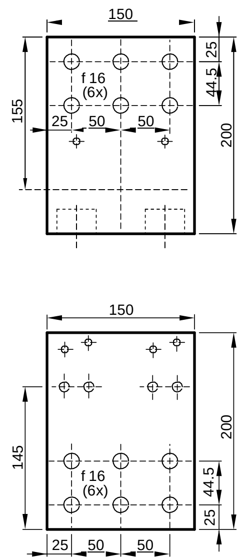
Overall dimensions CEX 98 2560 to 5000 A











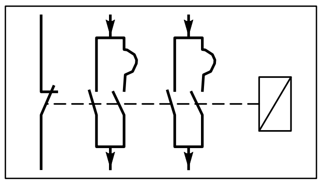
AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.

Insulating distance (safety perimeter)

voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

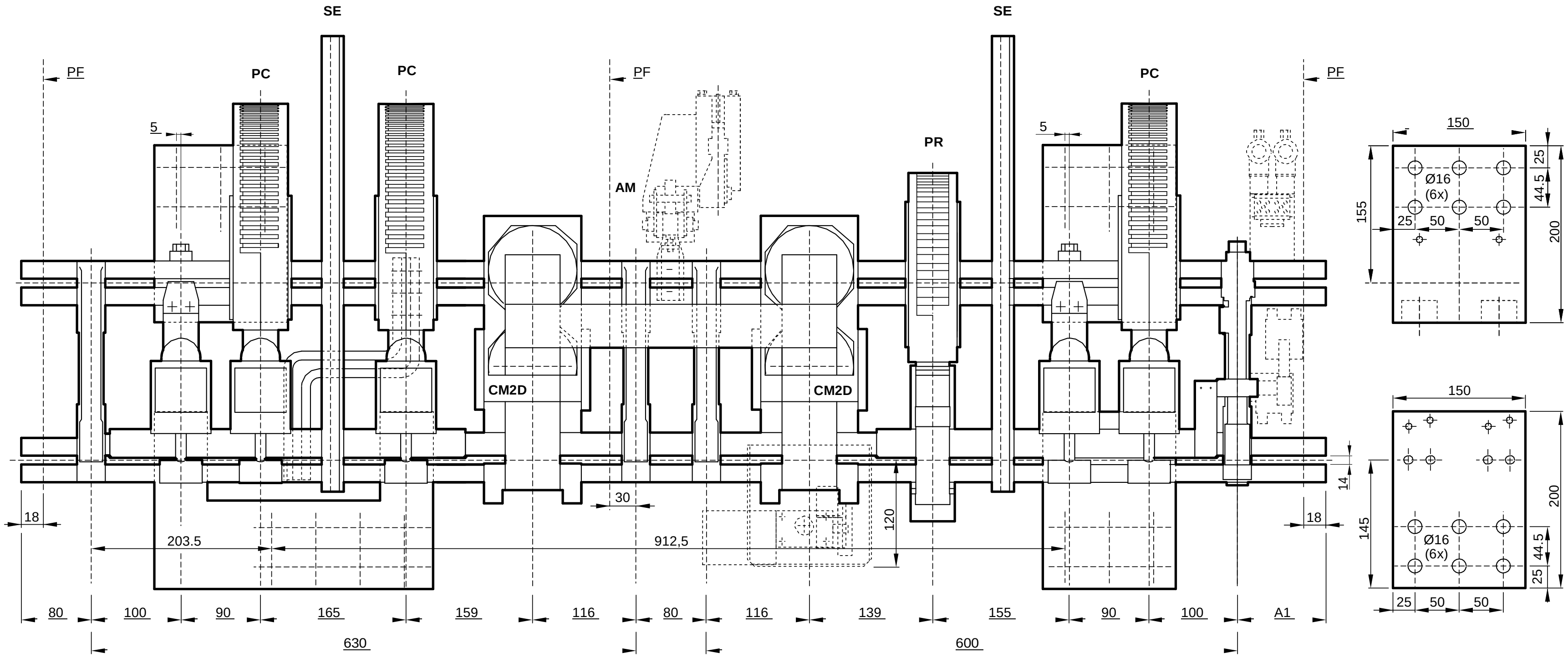
Protrusion A1

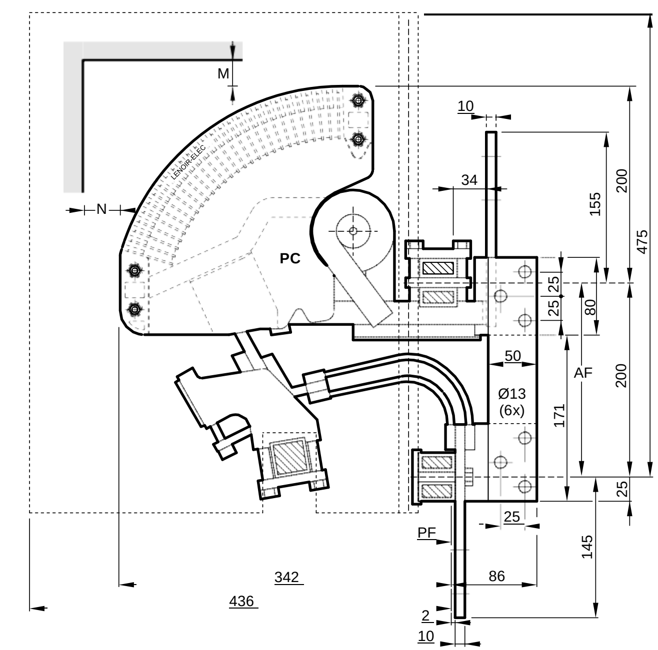
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm



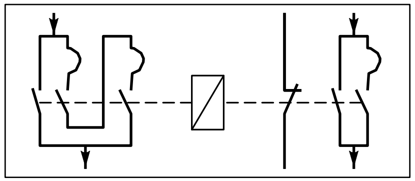
Overall dimensions CEX 98 2560 to 5000 A

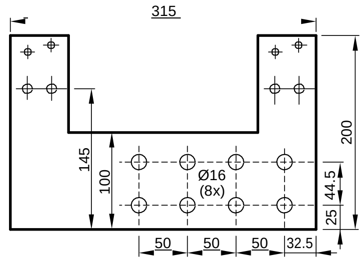
47. CEX 98 2560-3200 2.1 Ts 1500 V





AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.



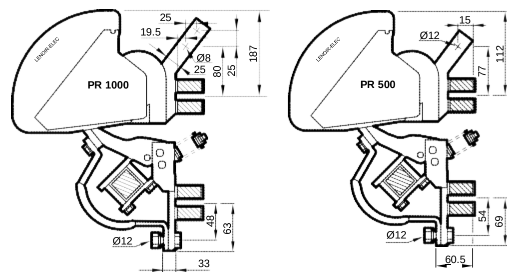


Insulating distance (safety perimeter)

voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

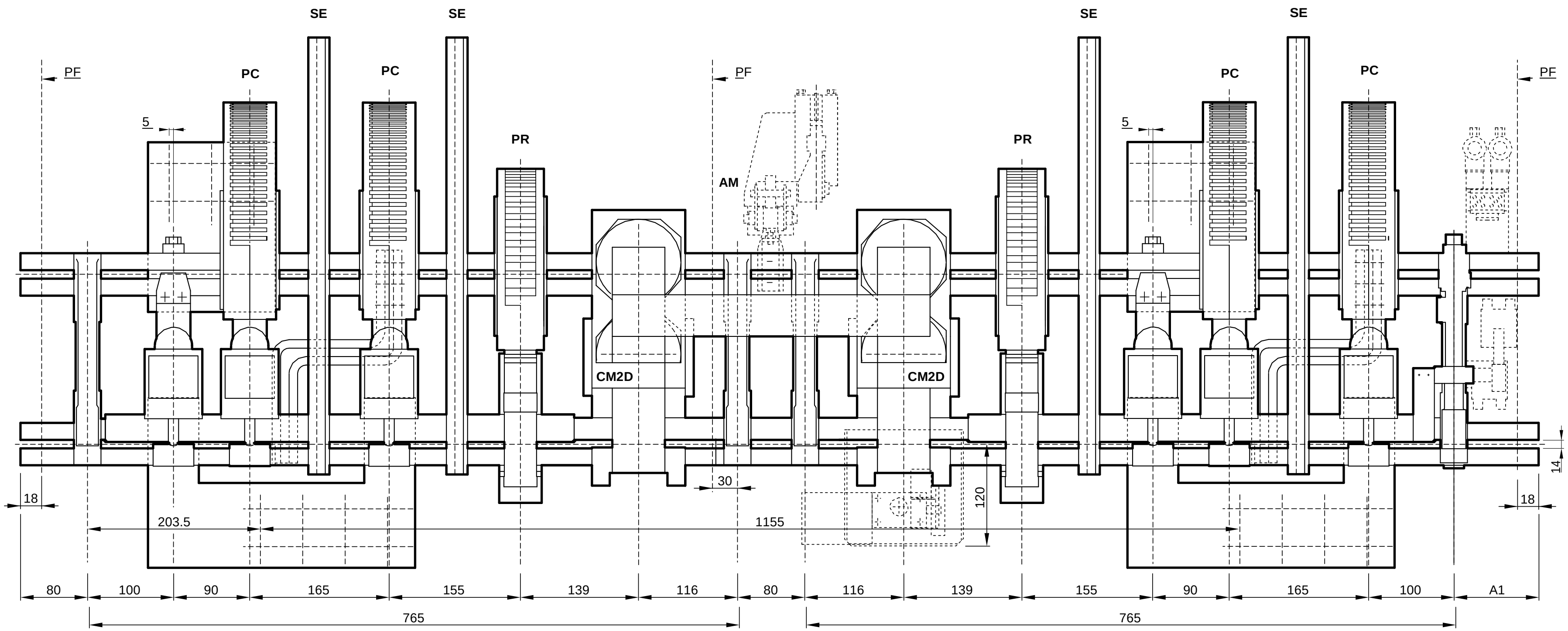
Protrusion A1

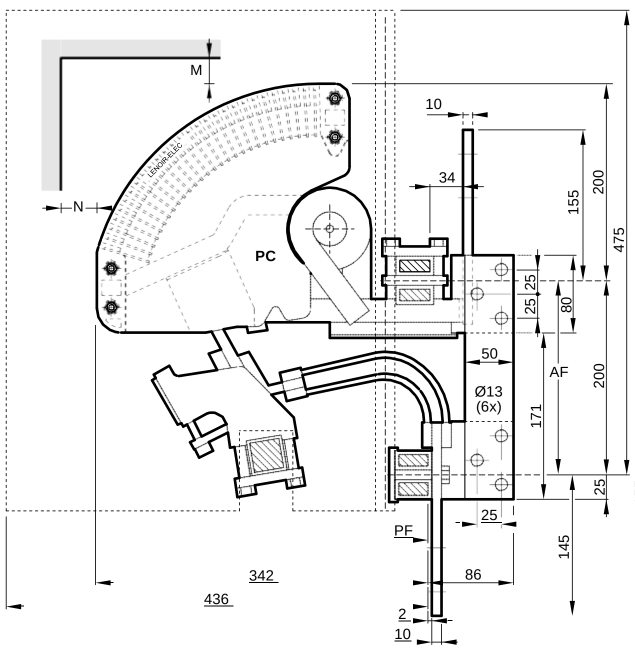
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm



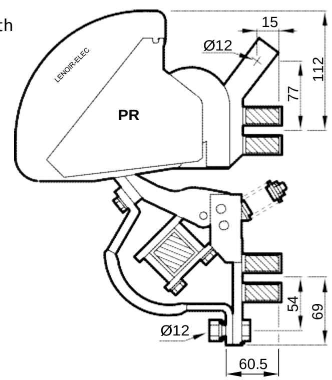
Overall dimensions CEX 98 2560 to 5000 A

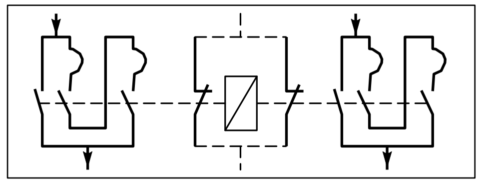
48. CEX 98 2560-3200 4.1 Ts 2000 V

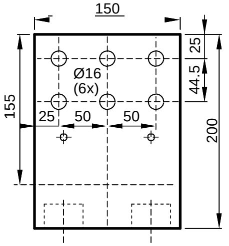


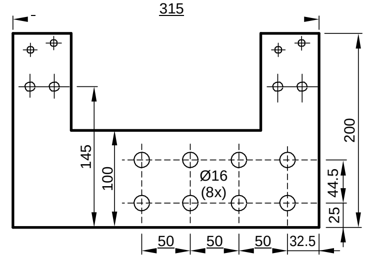


AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.









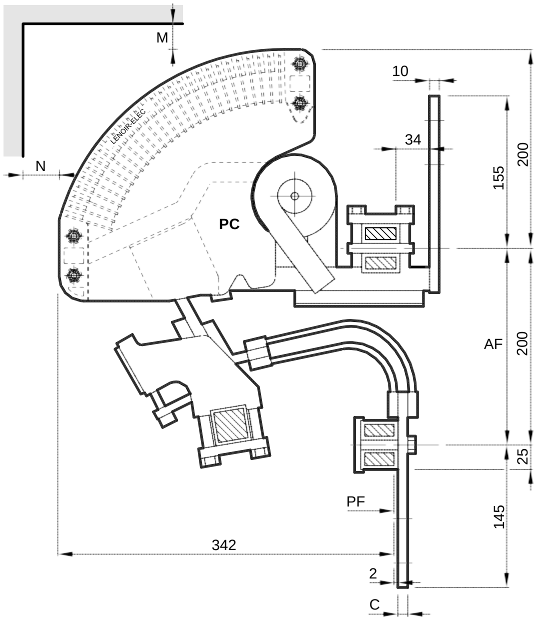
Insulating distance (safety perimeter)

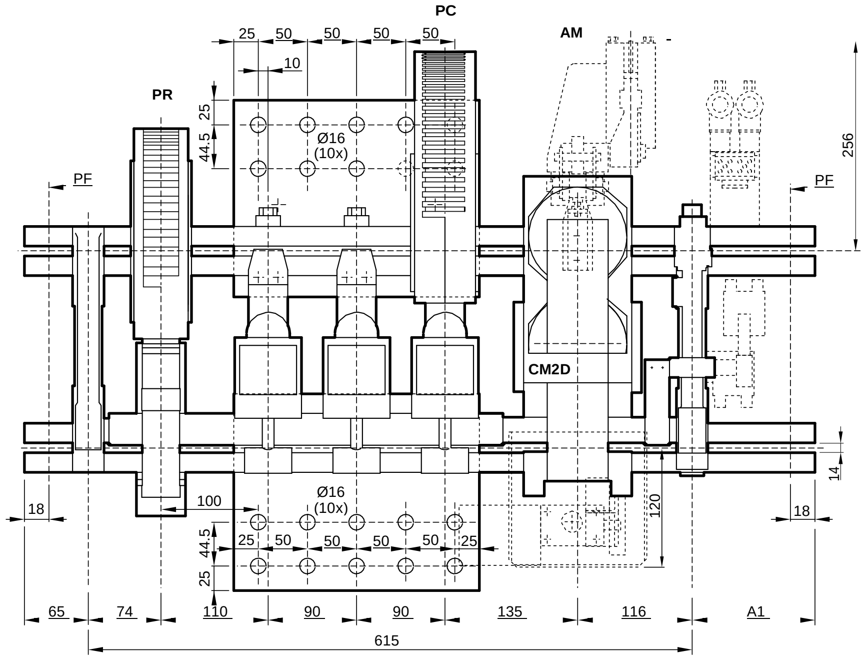
voltage V	metallic walls M	metallic walls N	insulated walls M	insulated walls N
≤ 220	150	200	120	160
> 220	200	240	150	200

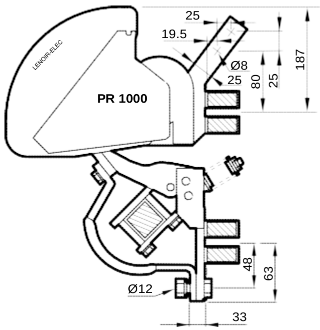
Protrusion A1

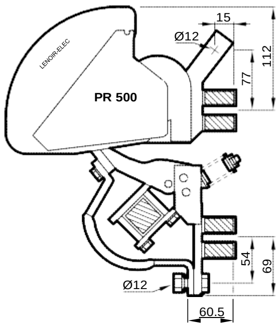
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

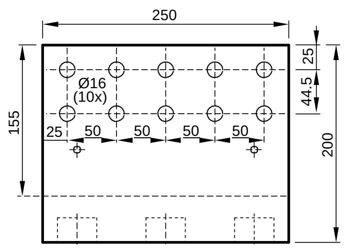
Overall dimensions CEX 98 2560 to 5000 A

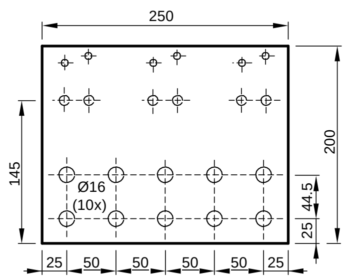


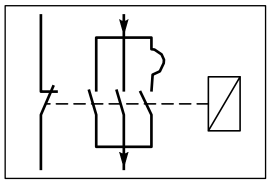












AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.

Distance C

Rating 5000	mm	10
Rating 5500	mm	15

Insulating distance (safety perimeter)

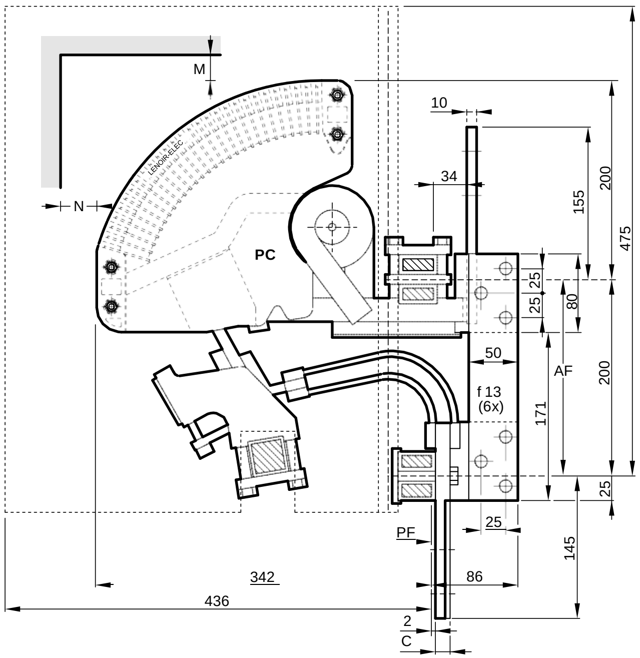
voltage V	metallic walls		insulated walls	
	M	**N**	**M**	**N**
≤ 220	150	200	120	160
> 220	200	240	150	200

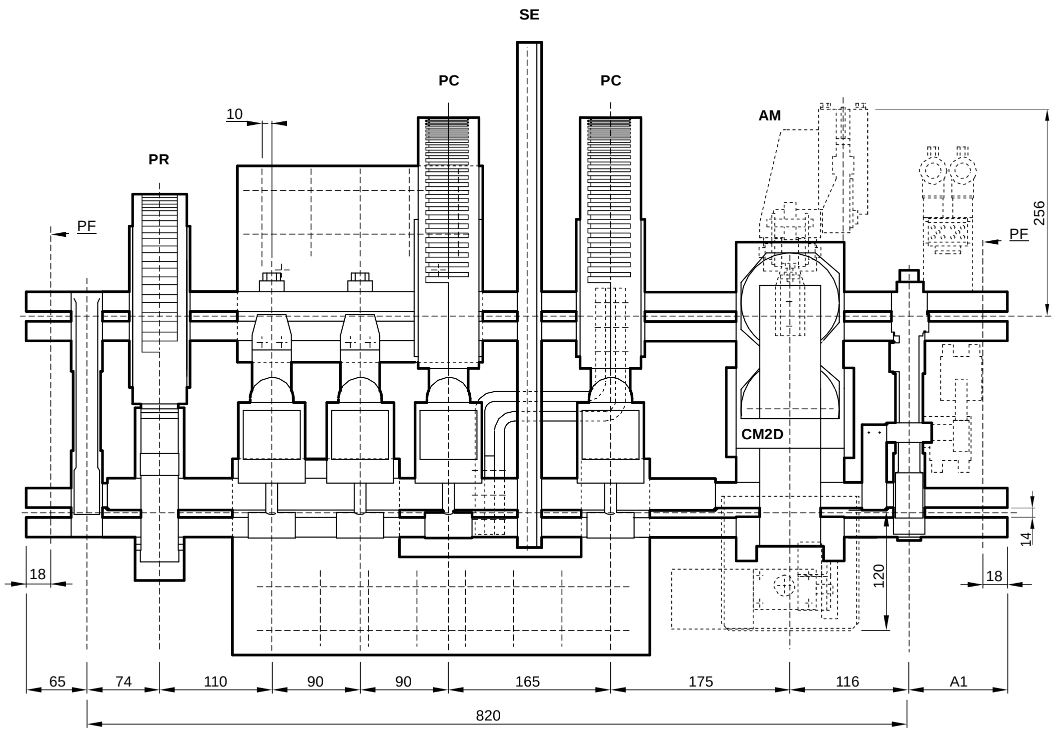
Protrusion A1

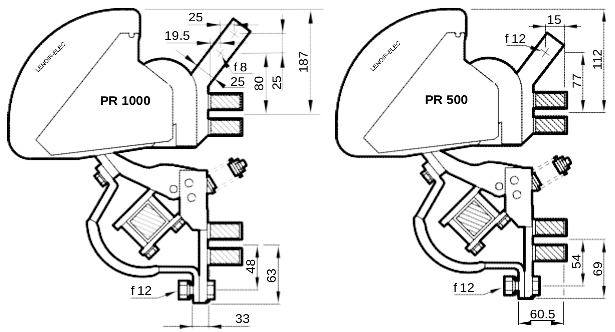
Number of delayed blocks	Number of M type blocks[1]	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

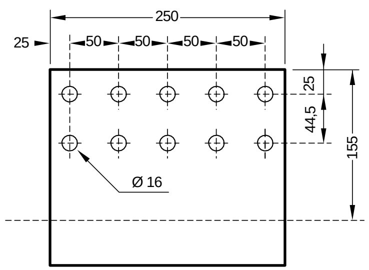
Overall dimensions CEX 98 2560 to 5000 A

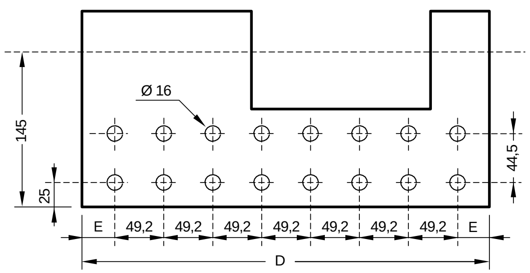
50. CEX 98 5000 1.1 1000 V



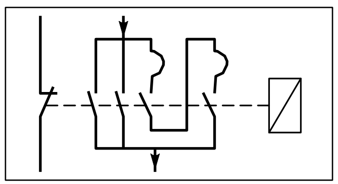








AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.



Distance		C	D	E
Calibre 5000	mm	10	405	30,3
Calibre 5500	mm	10	425	40,3

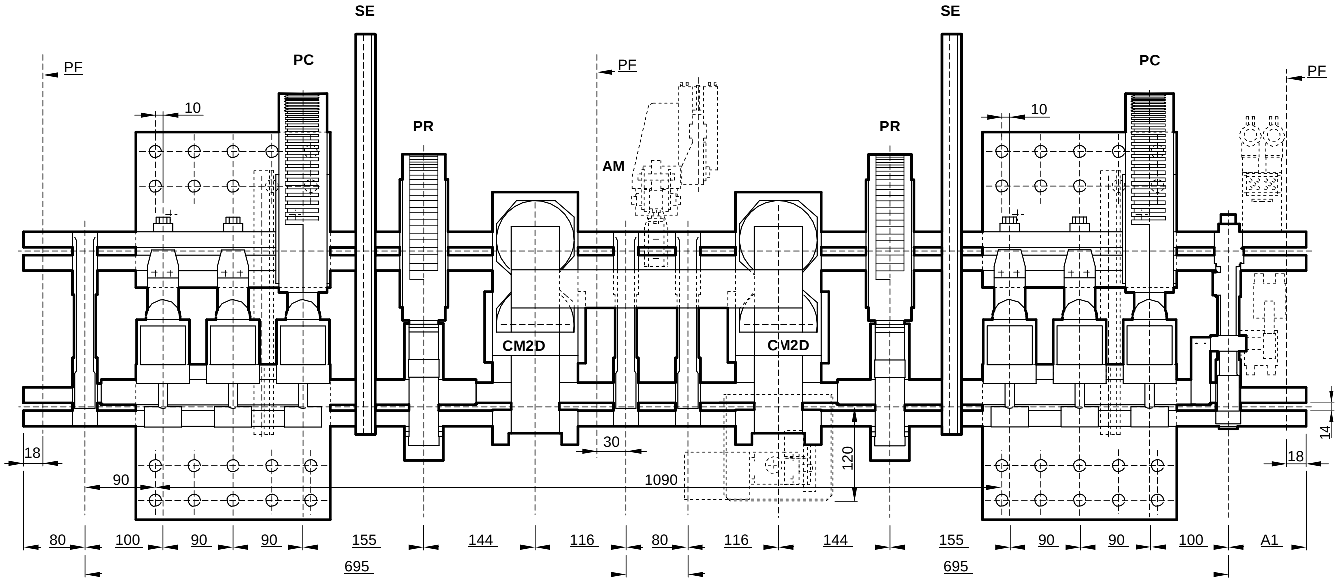
Insulating distance (safety perimeter)

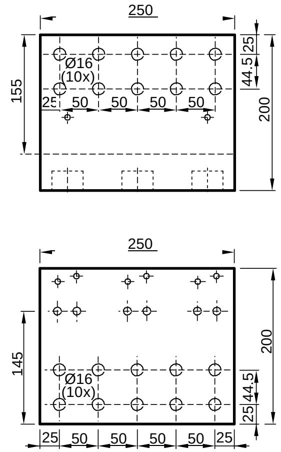
voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

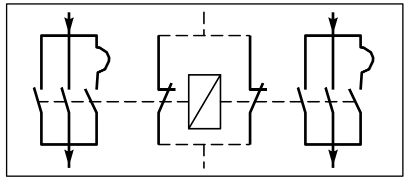
Protrusion A1

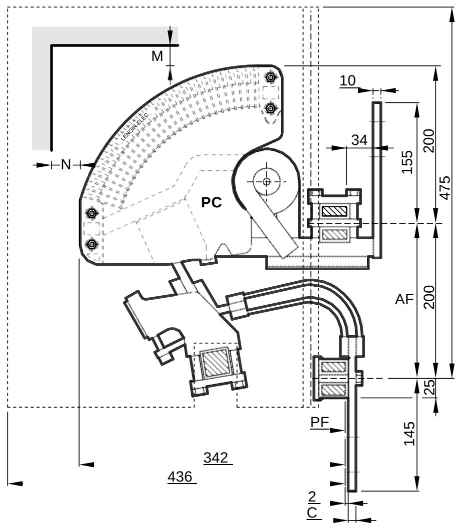
Number of delayed blocks	Number of M type blocks[1]	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

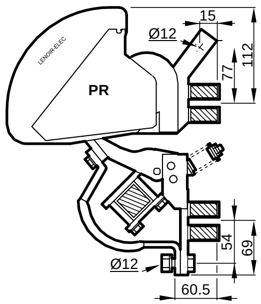
Overall dimensions CEX 98 2560 to 5000 A











AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.

Distance C

Rating 5000	mm	10
Rating 5500	mm	15

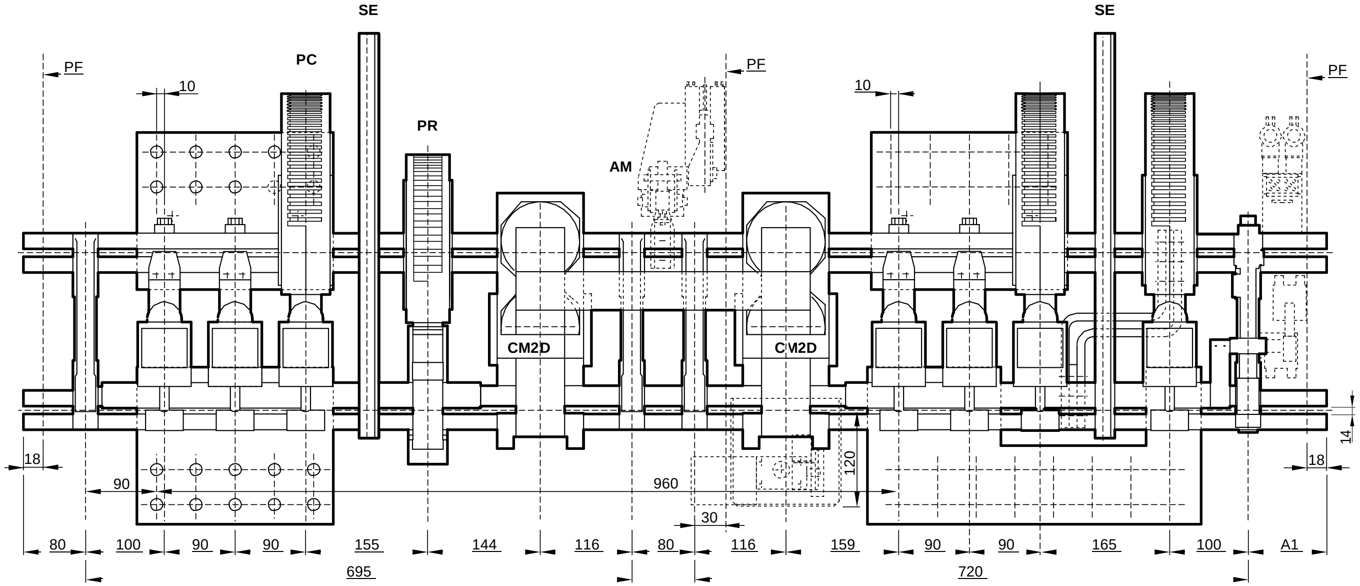
Insulating distance (safety perimeter)

voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

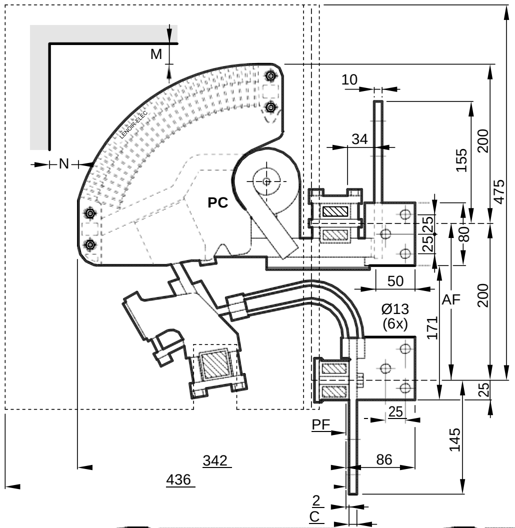
Protrusion A1

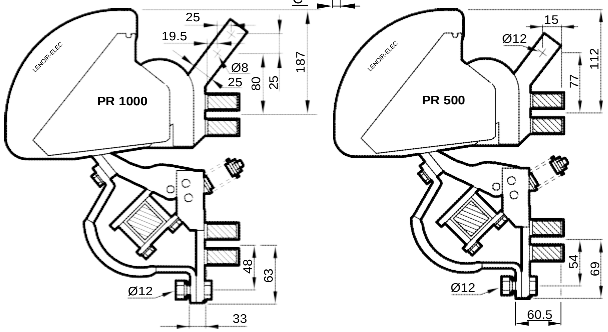
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

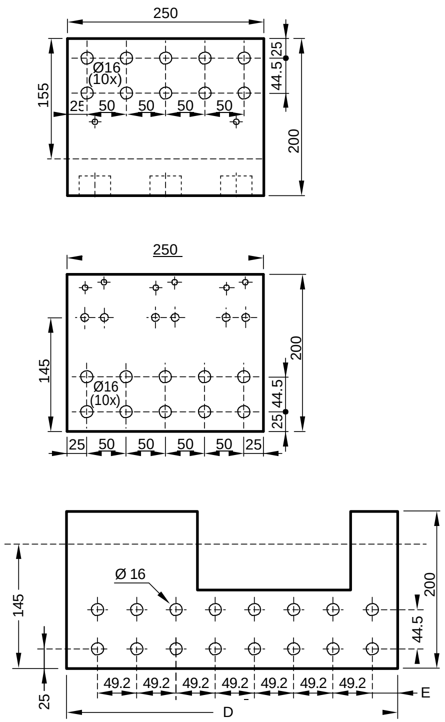
Overall dimensions CEX 98 2560 to 5000 A

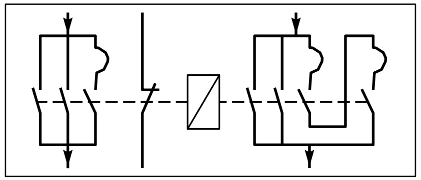


AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.









Distance		C	D	E
Calibre 5000	mm	10	405	30,3
Calibre 5500	mm	10	425	40,3

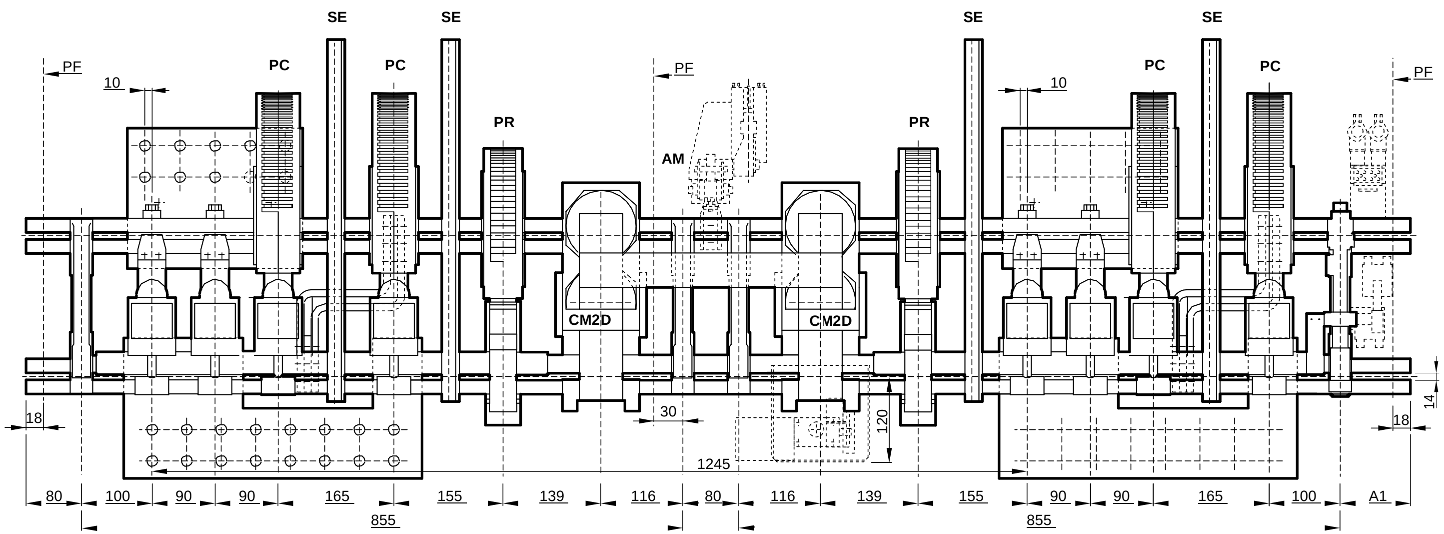
Insulating distance (safety perimeter)

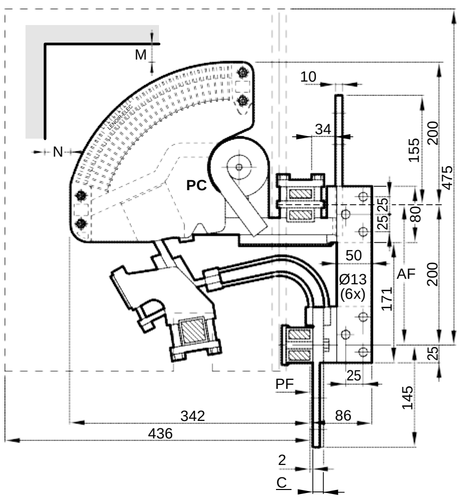
voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

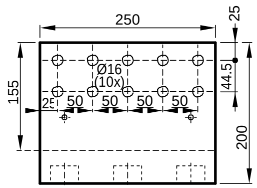
Protrusion A1

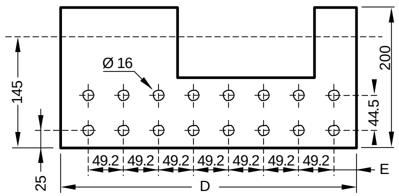
Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

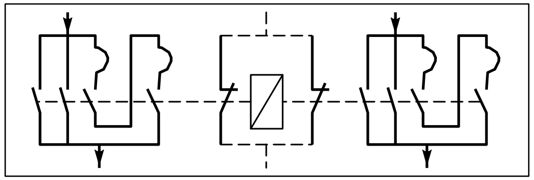
Overall dimensions CEX 98 2560 to 5000 A

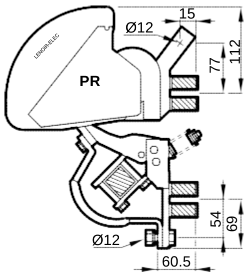












Distance		C	D	E
Calibre 5000	mm	10	405	30,3
Calibre 5500	mm	10	425	40,3

Insulating distance (safety perimeter)

voltage V	metallic walls		insulated walls	
	M	N	M	N
≤ 220	150	200	120	160
> 220	200	240	150	200

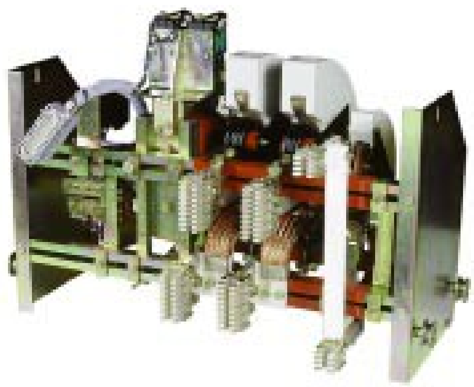
Protrusion A1

Number of delayed blocks	Number of M type blocks(1)	
0	2	75 mm
0	3	125 mm
0	4	125 mm
0	5	190 mm
0	6	190 mm
1	1	86 mm
1	2	125 mm
1	3	125 mm
1	4	190 mm
1	5	190 mm

AF: attachment axis.
AM: mechanical latching with electrical release.
CM2D: magnetic circuit.
PC: contactor pole.
PF: attachment plane.
PR: rupturing pole 500 A with overlapping.
SE: separator.

54. DRAW-OUT EXCITATION CONTACTORS

Draw-out version provided
for generation 71 from 1250 to 2000 and for generation 98 from 2560 to 5500 A

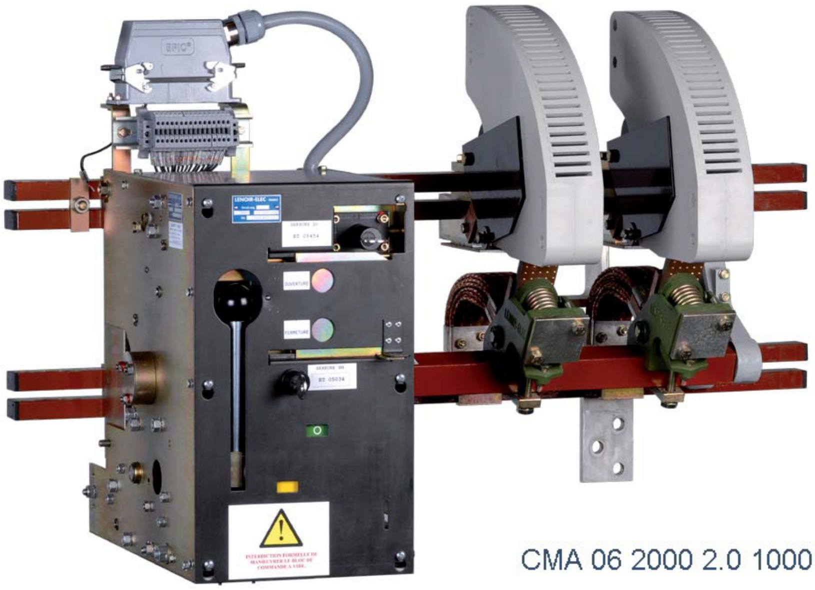


CEX 71 1250 to 2000 2. 1 in draw-out version

CMA 06 1250 to 5500 A

DC Poles
CMA 06 1250,
CMA 06 1600,
CMA 06 2000,
CMA 06 2560
CMA 06 3000
CMA 06 5000
CMA 06 5500.

AC Poles,
consult us



CMA 06 2000 2.0 1000 V

Purpose

Ensuring the division into sections of a track portion by opening a bi-stable motorised energy-storing contactor on DC distribution circuits, line tracks for trolley buses, tramways, protection coupons for metros, and so on,... Lifting and handling: insulation of a travelling crane supplied with DC current,...

CMA front cover

- Mechanical signalling light gives the position of the contactor (opened/closed).
- Mechanical light signals the status of the spring.
- Lever for stretching the spring for manual control.
- Mechanical push-buttons (closing and opening).

Options

- Motorization of the stretching of the spring.
- Mechanical locking in opened position by a RONIS, TRAYVOU, PROFALUX, etc., type lock
  Equipment locked in opened position:
  - Key is free,
  - No electrical control allowed.
- Padlocking system (padlock not provided).
- Locking of the Local/Remote control by a RONIS, TRAYVOU, PROFALUX, etc. type lock and shutter preventing the access to the local push button.
  - Manual control locked: key is free.
  - Manual control freed: Key is trapped,
    No electrical control allowed.
- Opening of the contactor by a "lacking voltage" coil. This one provokes the opening of the contactor when the supplied voltage is reduced to 35% to 70% of its nominal value.
- Instant action, or delayed on request.
- Draw-out energy-storing control.
- Possible combination of poles of different ratings on the same contactor.
- Possible placement in panels:
  - metallic,
  - in polyester.

* number of keys provided: 2

Shunt contactor and protect ion coupon

Energy-storing control with abrupt closing, independent from the operating speed of the operator

Description of the operating mode

Energy-storing control with abrupt closing, independent from the operating speed of the operator

Manual version only

These contactors have a control lever to stretch the energy-storing spring and an anti-pumping device. When the energy is stored by the spring, there are two possibilities for closing the contactor.

Closing by push-button

Once the energy is accumulated by the spring, a local action on the push-button is sufficient to close the contactor.
This one closes and remains mechanically latched. Should you wish so, the spring can be re-stretched after that closing which allows successively and without bringing any energy:
- to open,
- to close,
- and to open again the contactor.

Opening

Since the contactor is closed, only a local action on the opening push-button is sufficient to open the contactor. This one opens under the pressure of the contacts and return springs.

Automatic closing

Once the energy is accumulated by the spring, the contactor closes. In this specific case, the system won't provide any local push-button. Moreover, there won't be any possibility to stretch again the spring in order to make, as in the previous case:
- to open,
- to close,
- an opening.

As for the opening, this one remains unchanged (by a local push-button).

Manual and electri cal version

Adapting an electrical control device on a manual control equipment is easy since the needed space is already integrated into the CMA dimensions. (However, this adaptation has to be done in our workshops.)

The energy-storage of the spring is achieved by the adjunction of a universal motor and of a reducer device with gearing with mechanical anti-pumping system, in case of maintained order.
Once the energy is stored by the spring there are 2 possibilities to close the contactor.

Closing by PB and Closing Electromagnet EE

Remote closing with a closing electromagnet with current emission.
Local closing with the closing push button located on the panel board.

The spring is again automatically stretched after the closingof the CMA which allows successively and without bringing any energy:
- to open,
- to close,
- to open again the contactor.

Opening by PB and EA

Remote opening by a voltage-triggered releaser EA.
Local opening with the opening push-button located on the board panel.

Automatic closing

As soon as the energy is stored by the spring, the contactor closes. In this specific case, the system will provide neither a local closing push-button nor a closing electromagnet EE(the supply of the motor is switched-off by a limit switch) and there is no possibility to stretch again the spring in order to make, as in the previous case:
- an opening,
- a closing,
- an opening.

As for the opening, this one remains unchanged (by a local push-button or by the opening electromagnet).

Optical signalling of the board panel

Status of the spring:
- Yellow: not stretched,
- Blue: stretched (energy is stored).

Position indicator of the CMA:
- Red: closed,
- Green: opened.

Description of the operating mode

Energy-storing control with abrupt closing, independent from the operating speed of the operator

Options

Motorization of the stretching of the energy-storing spring

Padlocking of the CMA in opened position

- by a RONIS, PROFALUX,...type lock and with the adder of auxiliary contacts (1NO + 1NC).
- by a padlock (not supplied).

Condemnation of the PB of the board panel

- by a shutter that can be padlocked (padlock not supplied).
- by a RONIS, PROFALUX,... type lock with auxiliary contacts (1 NO + 1 NC) in order to inhibit the remote orders and shutter preventing the access to the PB.

Stopped closing FE

Only for “manual control” or “electrical without automatic closing“ versions of CMA.
Operating voltage from 0.35 to 0.85 Un.

Remote release mechanism

Two types of release mechanisms allow the remote opening of the CMA.
- A release mechanism in case of current emission EA provokes the instant opening of the CMA.
- A release mechanism at minimum voltage MV or MVR provokes the opening of the CMA when its supplied voltage decreases to a value between 35 and 70% of its nominal value.

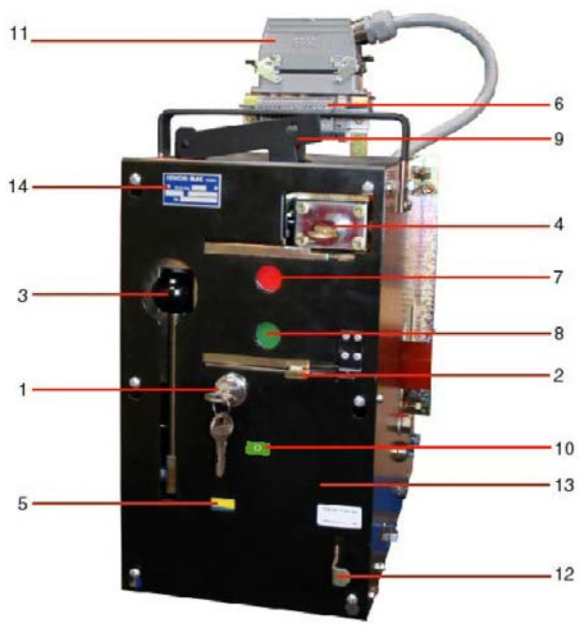
MV : instant action.
MVR : delayed action of 250 ms or 0.6 s (AC supply).

Other delaying devices on request.

Draw-out control

(Manual or electrical) draw-out energy-storing control.

Board panel functions



1 LOCAL/REMOTE lock (locking of the local controls: free key) related contacts: 1NO+1NC
2 Cover prohibiting use of the push-buttons (padlock and/or lock) related contacts: 1NO+1NC
3 Control handle for stretching the energy-storing spring
4 Lock for locking the contactor in OPEN position (free key: equipment lock)
5 Spring position indicator:
yellow = not stretched spring
blue = stretched spring
6 Connecting block (information on the position contacts)
7 Push-button for local opening
8 Push-button for local closing
9 Padlocking facility in OPEN position
10 Status indication of the equipment
green = equipment OPEN
red = equipment CLOSED
11 Sectioning plug for the accumulation control block
12 Lever for inhibiting the lacking voltage coil (MV or MVR) in manual mode
13 Front plastron
14 ID label (reference to be mentioned in any correspondence)

Power circuit

Particularities for currents greater than 2000 A, the power circuit is made of 2 separated parts assembled on the same axis and linked to a same mechanism.

- A “ thermal” part:
  Composed of blow-out poles mounted in parallel on a single section where the nominal current passes.
- A “break” part:
  Composed of magnetic blow-out poles and blow-out cages with metallic plates.

At the time of the opening , the thermal poles open before the blow-out poles and the break is ensured by these magnetic blow-out poles.

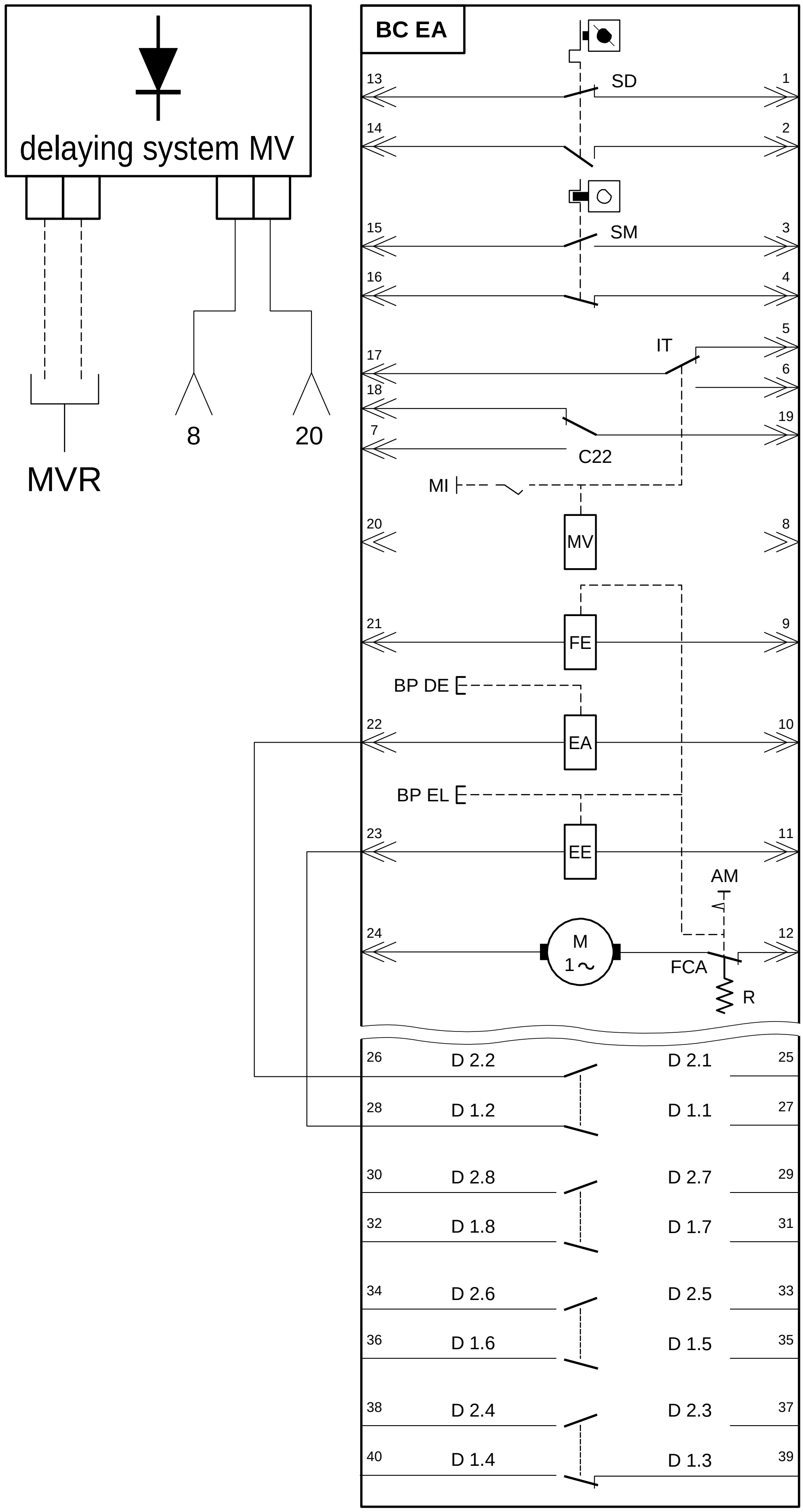
All the contacts are in copper with special silver pad for currents from 1250 to 6000 A.

- Possibility to have opening poles without overlapping.

Description of the operating mode

Control circuit of the energy-storing motorised contactor

Drawing representing all the possible optio ns for non-draw-out versions in AC current



BC AE	Draw-out energy accumulation control block
M	Motor
EE	Closing electromagnet
EA	Opening electromagnet
FE	Stopped closing
MV	Release mechanism at minimum voltage
MVR	Lacking voltage delayed coil
MI	Inhibi tion pull MV or MVR in manual mode
C22	Spring stretching contact
SM	Lock Local/Remote
SD	Lock for padlocking in opened position
D1.1 to D2.2	Auto-switching contacts
D1.3 to D2.8	Free auxiliary contacts
BP EL	Local closing push butt on
BP DE	Local opening push butt on
AM	Manuel stretching
R	Energy storing spring
IT	Signalling contact inhibi tion pull MV

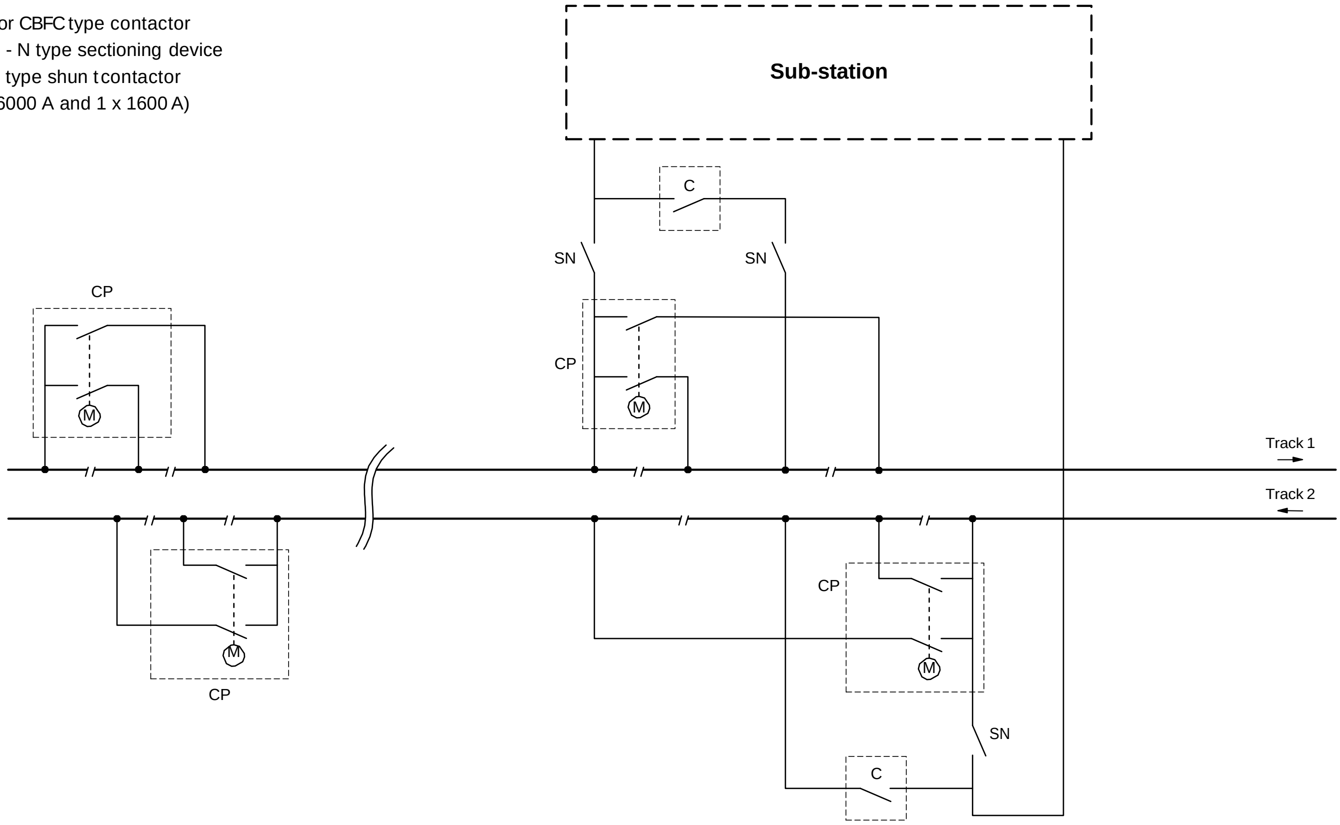
DRAW-OUT PART

FIXED PART

Examples of simplified applications

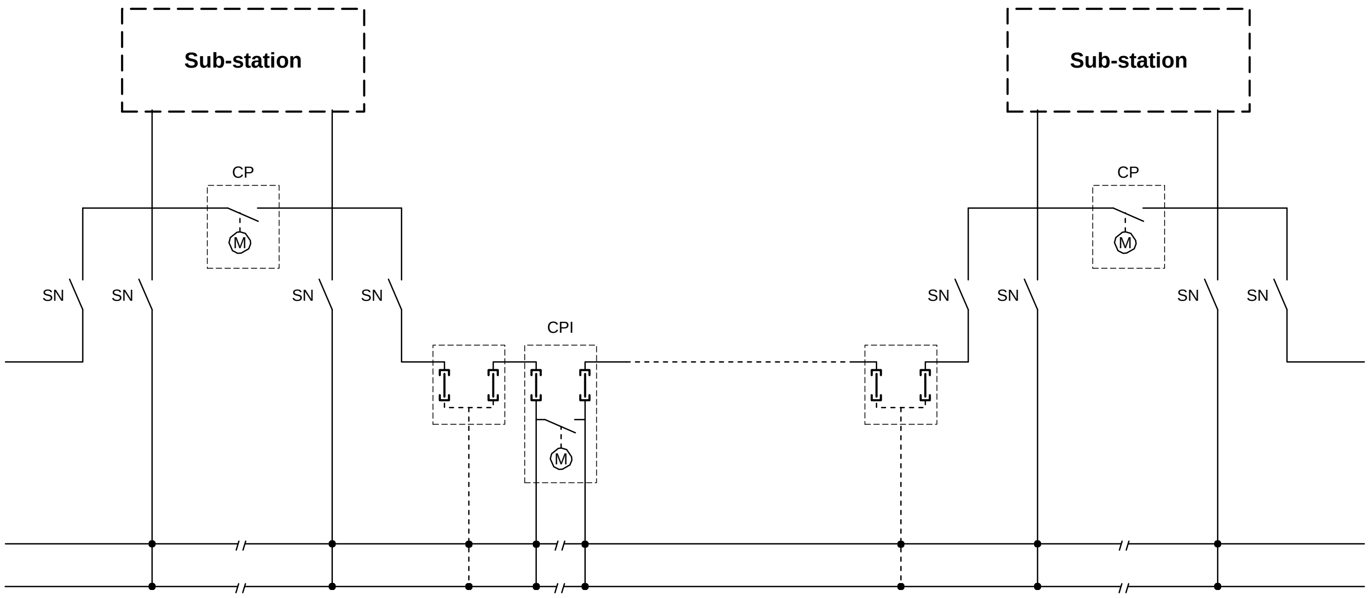
"HEAVY" Metro

C CBC or CBFC type contactor
SN CMA - N type sectioning device
CP CMA type shun tcontactor
(1 x 6000 A and 1 x 1600 A)



Tramway

CP CMA type shun tcontactor
CPI CMA type shun tcontactor
SN CMA - N type manual sectioning device



MERSEN

Characteristics of CMA 06 1250 to 2000 A

Energy-storing motorised contactor
Ue : 750 and upto 1200 V U

Power Circuit			CMA Type 06		
			1250	1600	2000
Thermal nominal current (1) DC_1		A	1250	1600	2000
Nominal voltage of use		Vcc	1000	1000	1000
Duty voltage		Vcc	750	750	750
Short-time current t ≤ 40°C					
	5 s	kA	20	15	30
	10 s	kA	13	11	21
	15 s	kA	11	8	17
	30 s	kA	8	6	12
	1 min	kA	5	4	8
	3 min	kA	3	3	5
	10 min	kA	2	2,2	3
Unipolar current switch-off rating	voltage	V	900	900	900
	5 ms	kA	10	10	10

			1250				1600				2000			
Bipolar current switch-off rating(5)	voltage	V	500	700	1000	1500	500	700	1000	1500	500	700	1000	1500
	L/R=15 ms	kA	30	23	18	6.6	30	23	18	6.6	30	23	18	6.6
	L/R=20 ms	kA			18				18				18	
Tetrapolar current switch-off rating(6)	voltage	V	1000	2000	3000		1000	2000	3000		1000	2000	3000	
	L/R=15 ms	kA	30	19	5		30	19	5		30	19	5	

			1250	1600	2000
Current switch-on rating	L/R= 5 ms	kA	40	40	40
Dielectric voltage			8 kV - 50 Hz - 1 mn	8 kV - 50 Hz - 1 mn	8 kV - 50 Hz - 1 mn

Control circuit					
Nominal voltages	AC 50 - 60 Hz	V	48 - 127 - 220/230 - 380(3)		
	DC	V	24 - 48 - 110 - 220 (3)		
Power absorbed by the motor					
AC		VA	175	175	175
DC		W	150	150	150
Closing electromagnet					
AC	inrush	VA	320	320	320
	duty	VA	50	50	50
DC	inrush	W	300	300	300
	duty	W	50	50	50
Opening electromagnet					
AC 50-60 Hz	inrush	VA	100	100	100
DC	inrush ≤ 220 V	W	30	30	30
	500 V	W	275	275	275
Electrical insulation/earth			2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn

Stopped closing FE					
Operating voltage		V	from 0.35 to 0.85 Un		
Assigned voltages	AC 50 Hz	V	24 - 48 - 127 - 220 - 380 - 415 - 500(3)		
	AC 60 Hz	V	24 - 48 - 127 - 220 - 380 - 415 - 500(3)		
	DC	V	24 - 48 - 110 - 120 - 220 - 440 - 500(3)		
Consumption					
AC	inrush	VA	23	23	23
	duty	VA	10	10	10
DC	± 220 V	W	6	6	6
	440 - 550 V	W	21	21	21
	500 V	W	21	21	21

Release mechanism at minimum voltage					
Assigned voltages Un					
	AC 50 Hz	V	24 - 48 - 110/127 - 220 - 380 - 415 - 500(3)		
	AC 60 Hz	V	24 - 48 - 110/127 - 220 - 380(3)		
	DC	V	24 - 48 - 110 - 120 - 220 - 440 - 500 (3)		
Operating voltage			from 0.35 to 0.7 Un(2)		
Absorbed power					
AC	inrush	VA	23	23	23
	duty	VA	10	10	10
DC	inrush ≤ 220 V	W	6	6	6
	440 - 500 V	W	21	21	21

Average time of operation				
Closing time of the contactor (4) at Un	ms	50	50	50
Opening time of the contactor at Un	ms	50	50	50

Auxiliary contacts 3 NO + 3 NC					
Thermal current ith		A	20	20	20
Current switch-off rating					
AC cos φ = 0.3 / 500 V		A	6	6	6
DC	110 V	A	2.5	2.5	2.5
L/R ≤ 0.01s	250 V	A	0.8	0.8	0.8
Electrical insulation/earth			2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn

MERSEN

Characteristics of CMA 06 2560 to 5500 A

Energy-storing motorised contactor
Ue : 750 and upto 1200 V ⎓

Power circuit			CMA Type 06											
			2560 (*)				3200 (*)				5000 (7) (*)			
Thermal nominal current (1) DC_1		A	2560				3200				5000			
Nominal voltage of use		Vcc	1000				1000				1000			
Duty voltage		Vcc	750				750				750			
Short-time current t ≤ 40°C														
	5 s	kA	24				48				68			
	10 s	kA	18				34				47			
	15 s	kA	15				27				38			
	30 s	kA	10				19				27			
	1 min	kA	8				14				19			
	3 min	kA	5				8				12			
	10 min	kA	4				5				7			
Bipolar current switch-off rating(5)	voltage	V	500	700	1000	1500	500	700	1000	1500	500	700	1000	1500
	L/R=15 ms	kA	30	23	18	6.6	30	23	18	6.6	30	23	18	6.6
	L/R=20 ms	kA			18				18				18	
Tetrapolar current switch-off rating(6)	voltage	V	1000	2000	3000		1000	2000	3000		1000	2000	3000	
	L/R=15 ms	kA	30	19	5		30	19	5		30	19	5	
Current switch-on rating	L/R= 5 ms	kA	60				60				100			
Dielectric voltage			8 kV - 50 Hz - 1 mn				8 kV - 50 Hz - 1 mn				8 kV - 50 Hz - 1 mn			

Control circuit						
Nominal voltages	AC 50 - 60 Hz		V	48 - 127 - 220/230 - 380(3)		
	DC		V	24 - 48 - 110 - 220 (3)		
Power absorbed by the motor						
AC		VA 175		175	175	
DC		W 150		150	150	
Closing electromagnet						
AC	inrush		VA	320	320	320
	duty		VA	50	50	50
DC	inrush		W	300	300	300
	duty		W	50	50	50
Opening electromagnet						
AC50-60Hz	inrush		VA	100	100	100
DC	inrush ≤ 220 V		W	30	30	30
	500 V		W	275	275	275
Electrical insulation/earth				2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn

Stopped closing FE					
Operating voltage		V	from 0.35 to 0.85 Un		
Assigned voltages	AC 50 Hz	V	24 - 48 - 127 - 220 - 380 - 415 - 500(3)		
	AC 60 Hz	V	24 - 48 - 127 - 220 - 380 - 415 - 500(3)		
	DC	V	24 - 48 - 110 - 120 - 220 - 440 - 500(3)		
Consumption					
AC	inrush	VA	23	23	23
	duty	VA	10	10	10
DC	± 220 V	W	6	6	6
	440 - 550 V	W	21	21	21
	500 V	W	21	21	21

Release mechanism at minimum voltage					
Assigned voltages Un					
	AC 50 Hz	V	24 - 48 - 110/127 - 220 - 380 - 415 - 500(3)		
	AC 60 Hz	V	24 - 48 - 110/127 - 220 - 380(3)		
	DC	V	24 - 48 - 110 - 120 - 220 - 440 - 500 (3)		
Operating voltage			from 0.35 to 0.7 Un(2)		
Absorbed power					
AC	inrush	VA	23	23	23
	duty	VA	10	10	10
DC	inrush ≤ 220 V	W	6	6	6
	440 - 500 V	W	21	21	21

Average time of operation				
Closing time of the contactor (4) at Un	ms	50	50	50
Opening time of the contactor at Un	ms	50	50	50

Auxiliary contacts 3 NO + 3 NC					
Thermal current ith		A	20	20	20
Current switch-off rating					
AC cos φ = 0.3 / 500 V		A	6	6	6
DC	110 V	A	2.5	2.5	2.5
L/R ≤ 0.01s	250 V	A	0.8	0.8	0.8
Electrical insulation/earth			2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn	2.5 kV - 50 Hz - 1 mn

(1) in open air.
(2) closing of the contactor is ensured from 0.85 Un.
(3) for other voltages, consult us.
(4) opening time is measured from the supply of the closing coil until the separation of the main contacts.
(5) 2 blow-out poles.

(6) 4 blow-out poles (2 on the positive line and 2 on the negative line).
(7) 5500 A; lower section C = 15 mm..

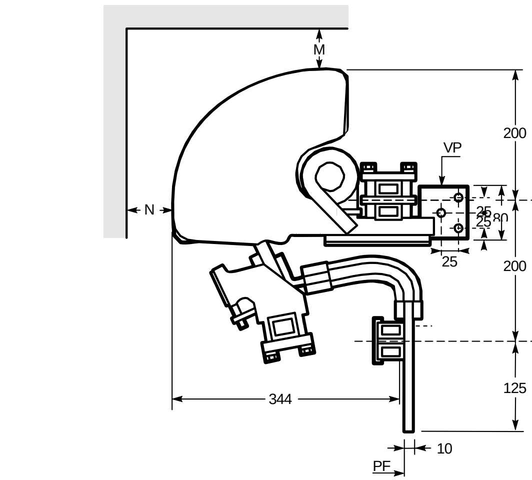
* Association of thermal poles and magnetic blow-out poles.

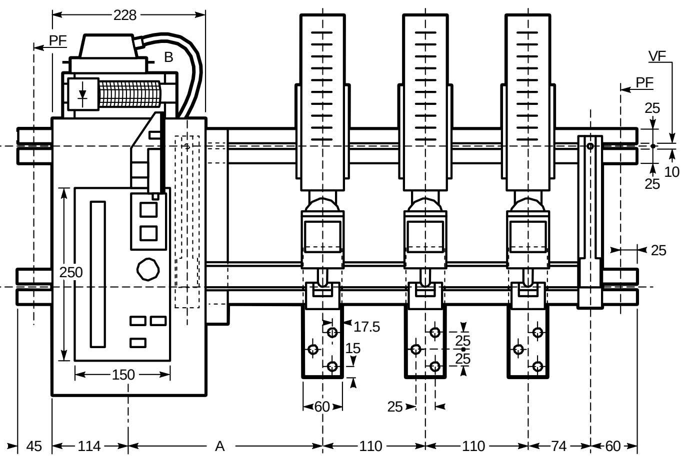
•Temperature factor to be applied to the poles or to the current controlled according to the ambient temperature (around the contactor):

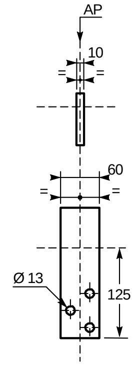
1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

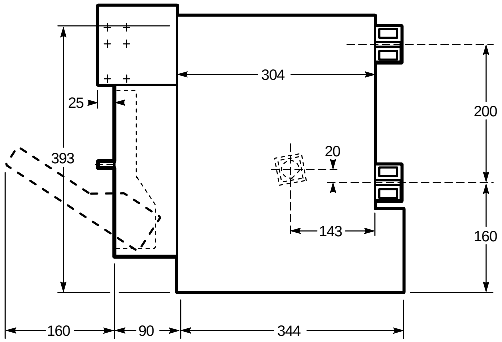
Overall dimensions CMA 06 1250 to 5500 A

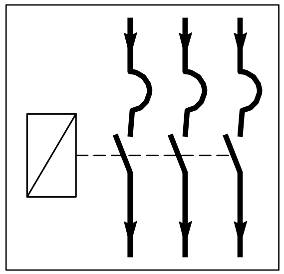
54. CMA 06 1250 - 1600 - 2000 3.0





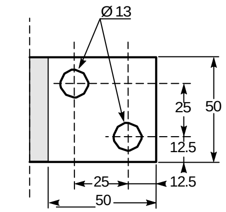




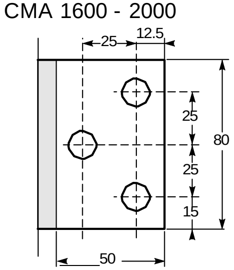


Upper connecting sections

■ CMA 1250



■ CMA 1600 - 2000



AF : attachment axis
AP : pole axis
PF : attachment plane
VF : attachment screw
VP : see connecting sections
B : connecting box

Isulating distance (safety perimeter)

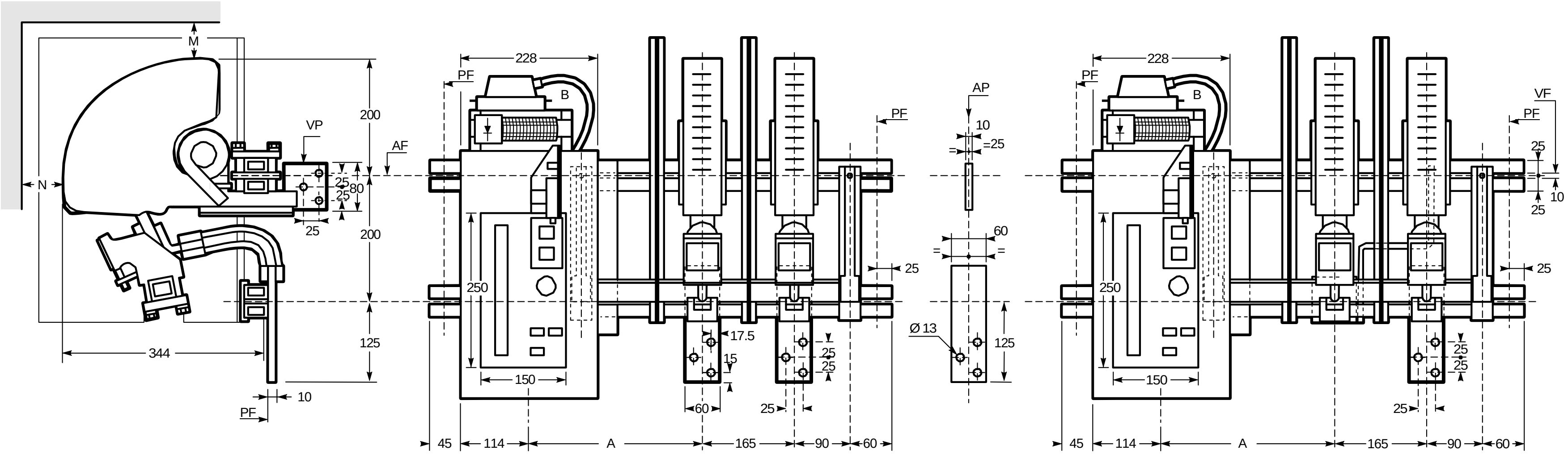
	M	N
Insulated walls	120	120

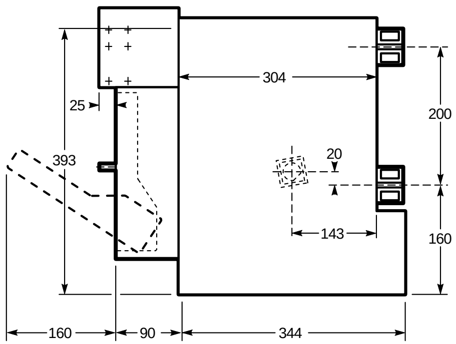
Distance A

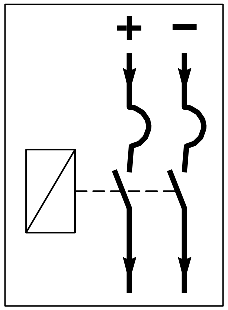
Standard	21
Reduced	226

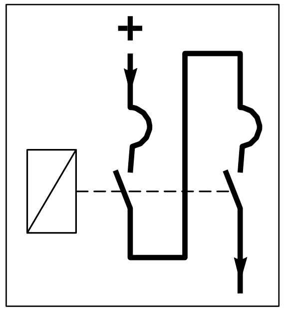
Overall dimensions CMA 06 1250 to 5500 A

55. CMA 06 1250 - 1600 - 2000 2.0



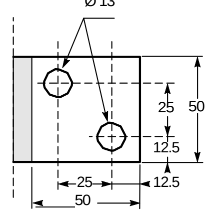




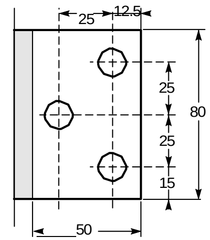


Upper connecting sections

■ CMA 1250



■ CMA 1600 - 2000



AF : attachment axis
AP : pole axis
PF : attachment plane
VF : attachment screw
VP : see connecting sections
B : connecting box

Isulating distance (safety perimeter)

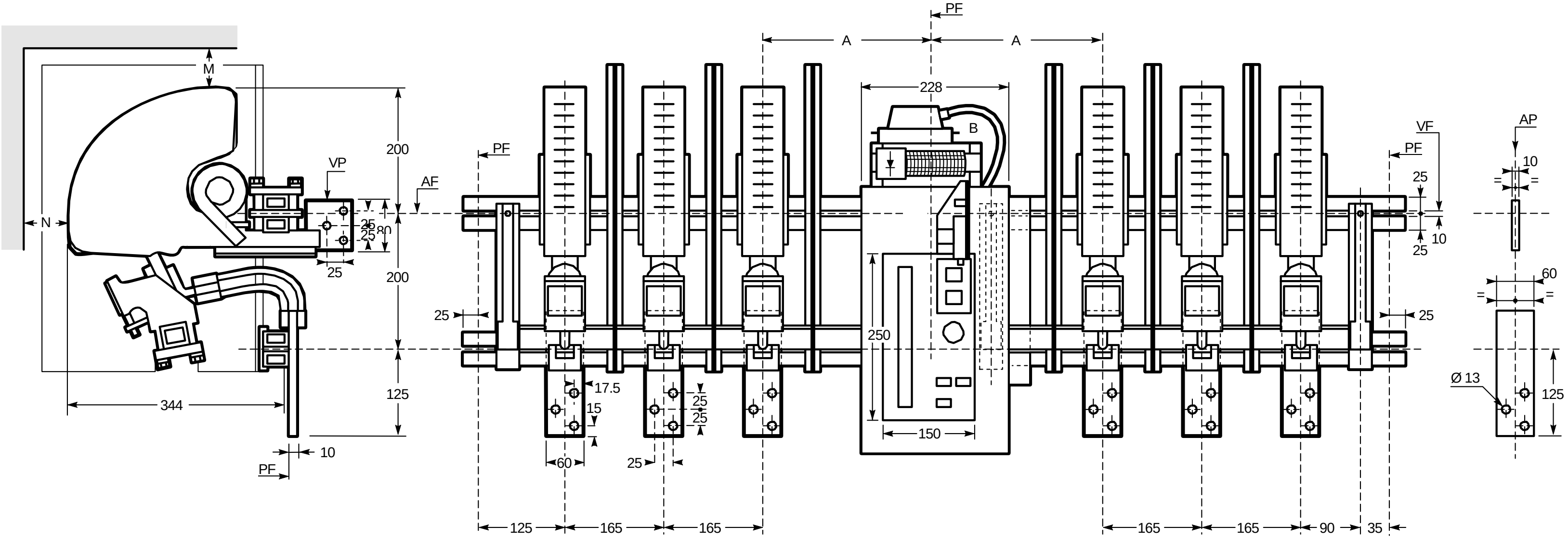
	M	N
Insulated walls	120	120

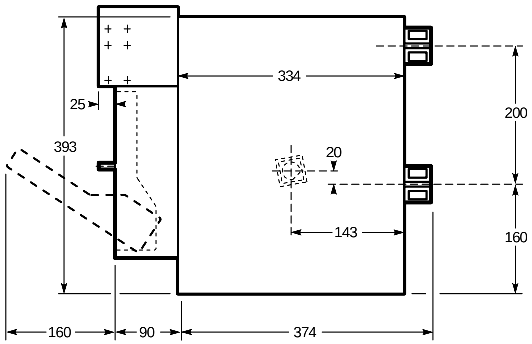
Distance A

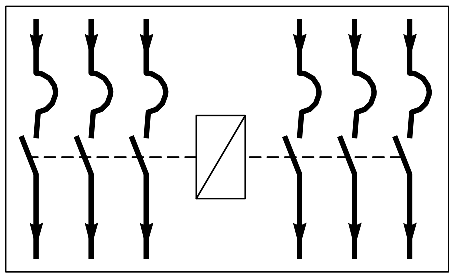
Standard	316
Reduced	226

Overall dimensions CMA 06 1250 to 5500 A

56. CMA 06 1250 - 1600 - 2000 6.0

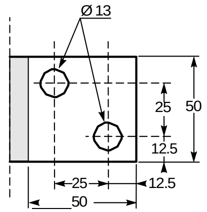




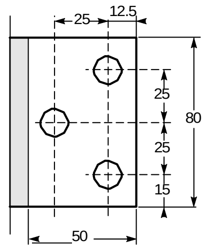


Upper connecting sections

■ CMA 1250



■ CMA 1600 - 2000



AF : attachment axis
AP : pole axis
PF : attachment plane
VF : attachment screw
VP : see connecting sections
B : connecting box

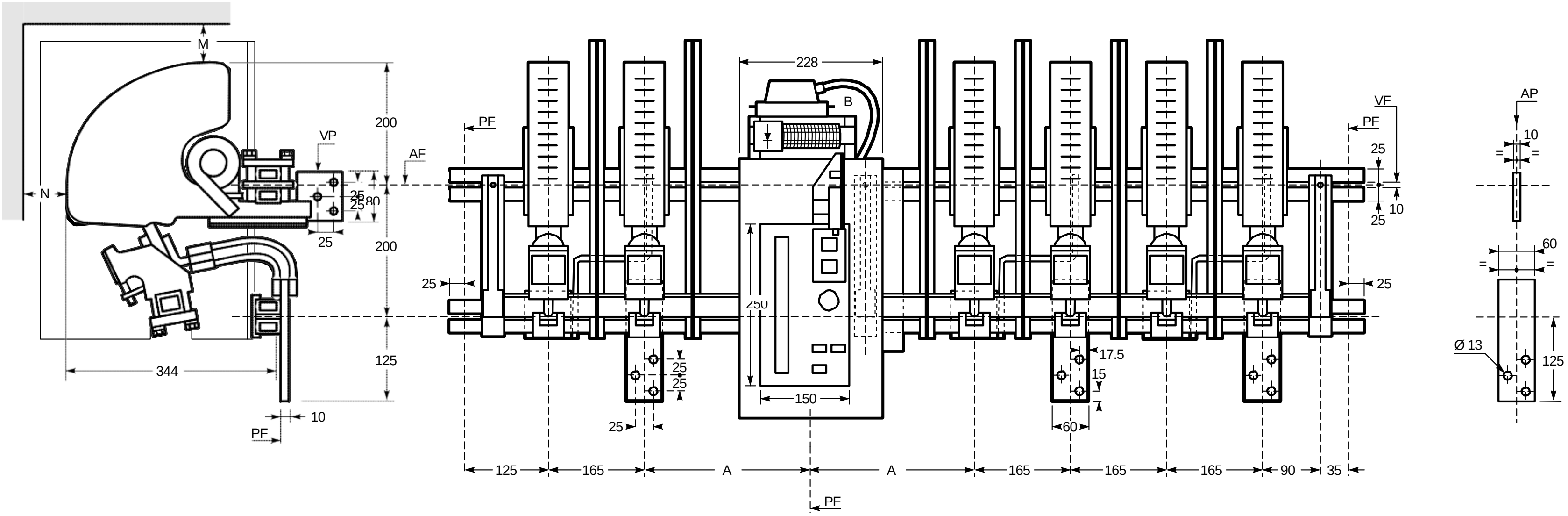
Isulating distance (safety perimeter)

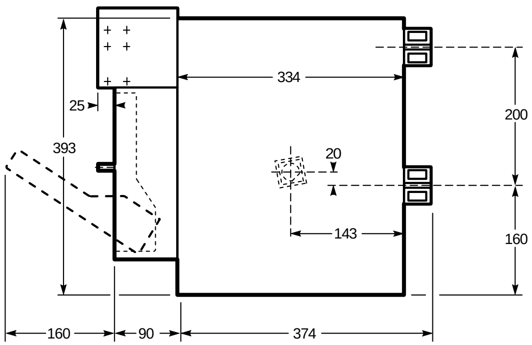
	M	N
Insulated walls	120	120

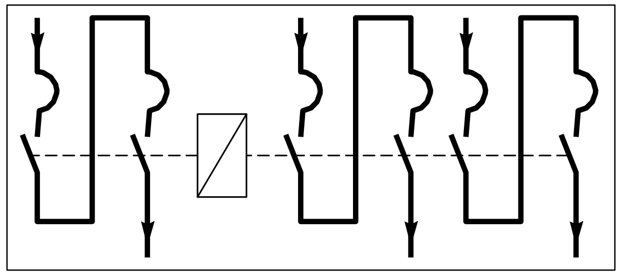
Distance A

Standard	316
Reduced	226

Overall dimensions CMA 06 1250 to 5500 A

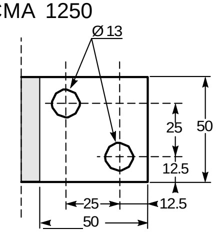




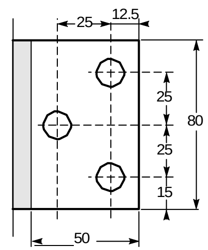


Upper connecting sections

■ CMA 1250



■ CMA 1600 - 2000



AF : attachment axis
AP : pole axis
PF : attachment plane
VF : attachment screw
VP : see connecting sections
B : connecting box

Isulating distance (safety perimeter)

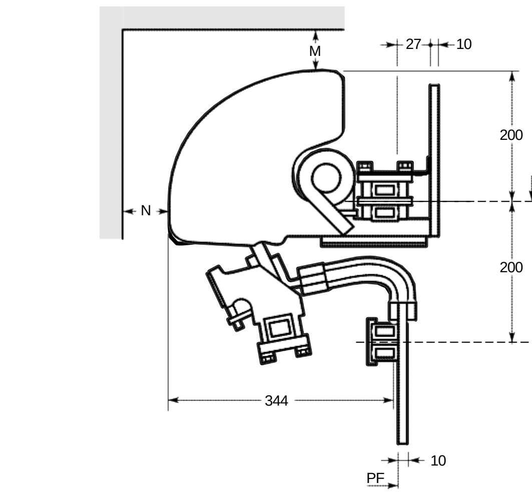
	M	N
Insulated walls	120	120

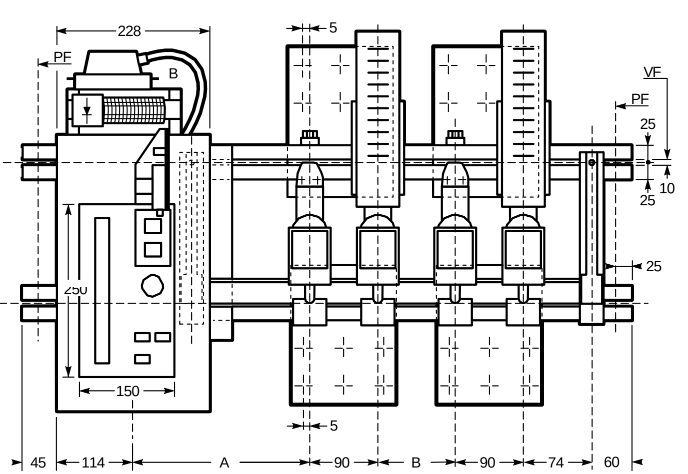
Distance A

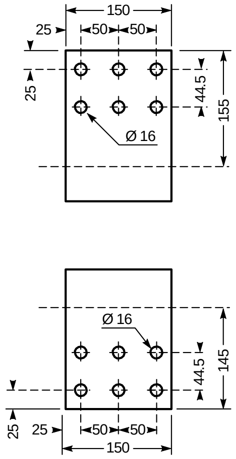
Standard	366
Reduced	276

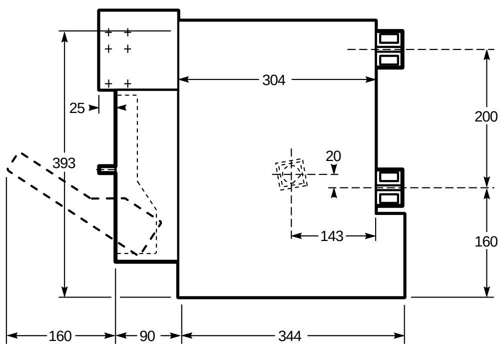
Overall dimensions CMA 06 1250 to 5500 A

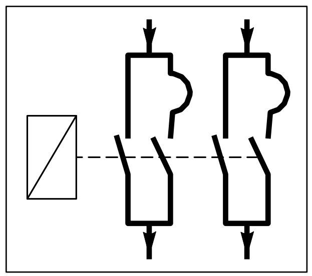
58. CMA 06 2560 2.0 - 3200 2.0











AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

Isulating distance (safety perimeter)

	M	N
Insulated walls	120	120

Distance A

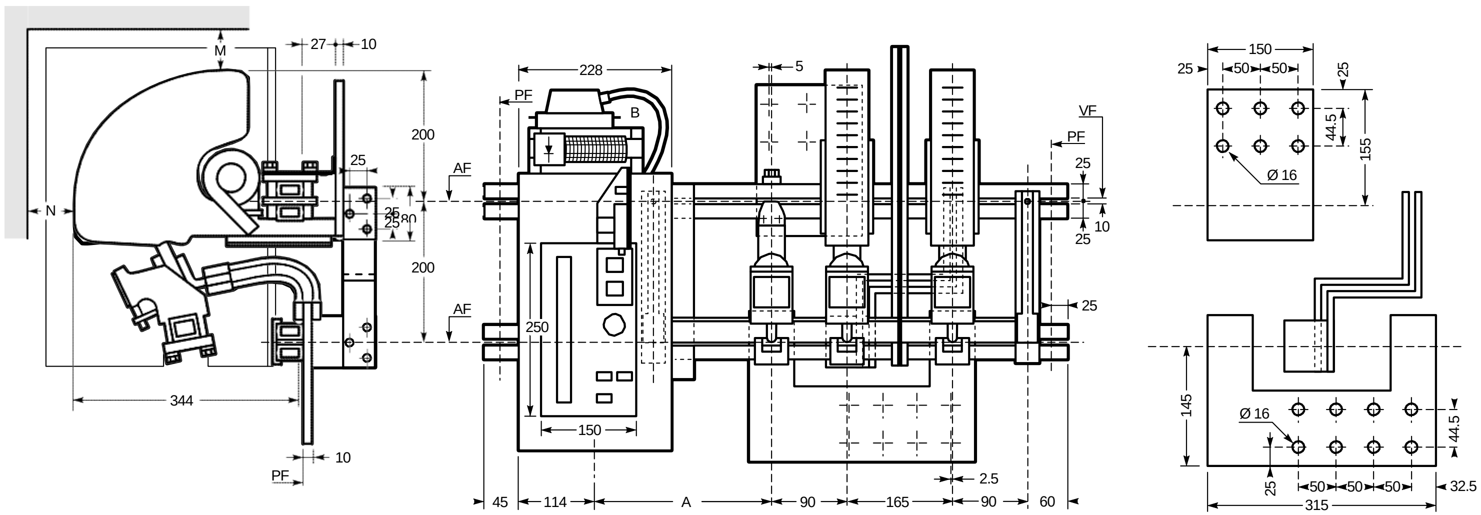
Standard	316
Reduced	226

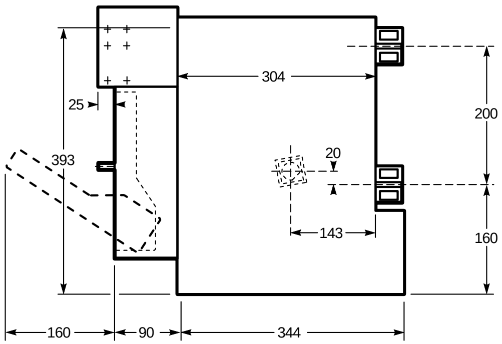
Distance B

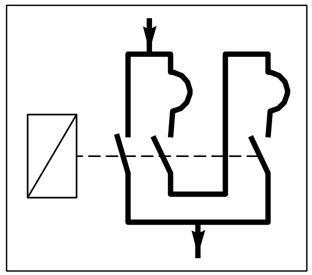
Without separator	110
With separator	165

Overall dimensions CMA 06 1250 to 5500 A

59. CMA 06 2560 - 3000 1.0







AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

Isulating distance (safety perimeter)

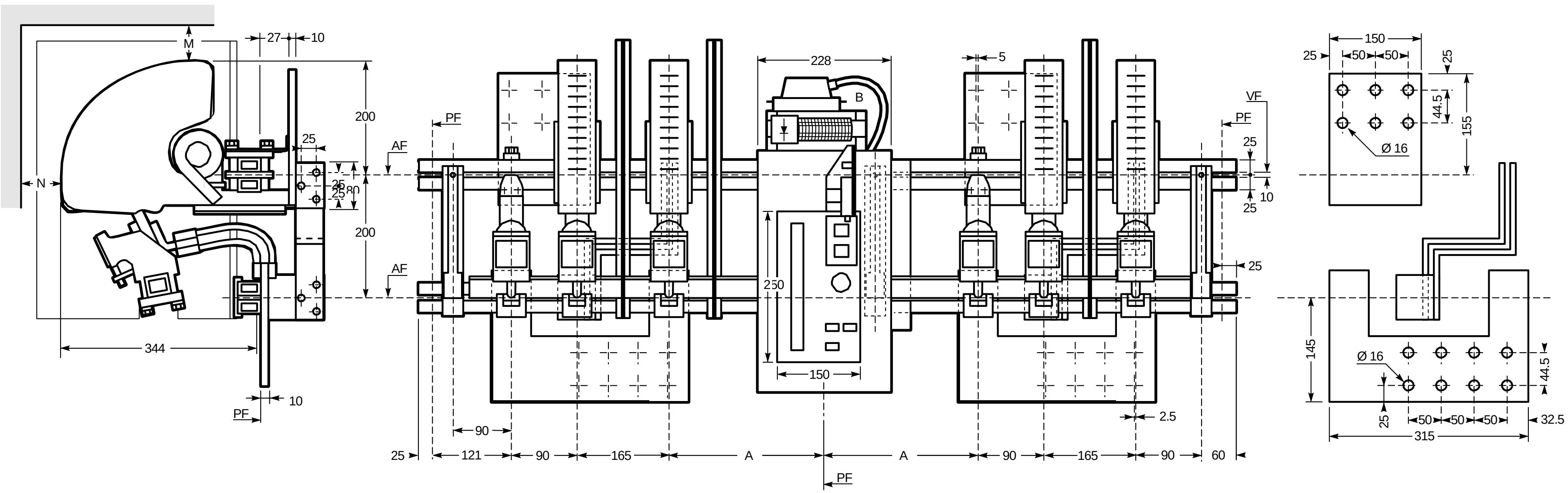
	M	N
Insulated walls	120	120

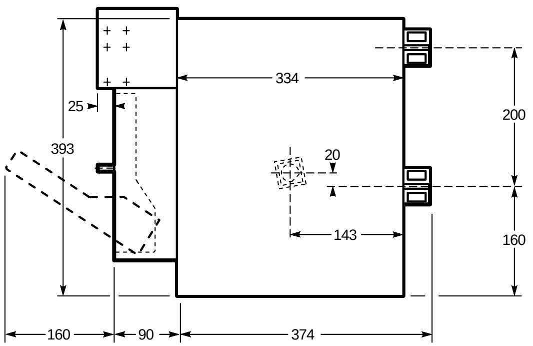
Distance A

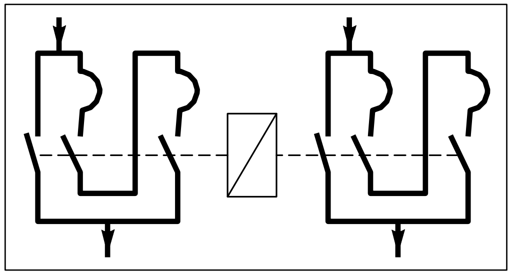
Standard	316
Reduced	226

Overall dimensions CMA 06 1250 to 5500 A

60. CMA 06 2560 - 3000 2.0







AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

Isulating distance (safety perimeter)

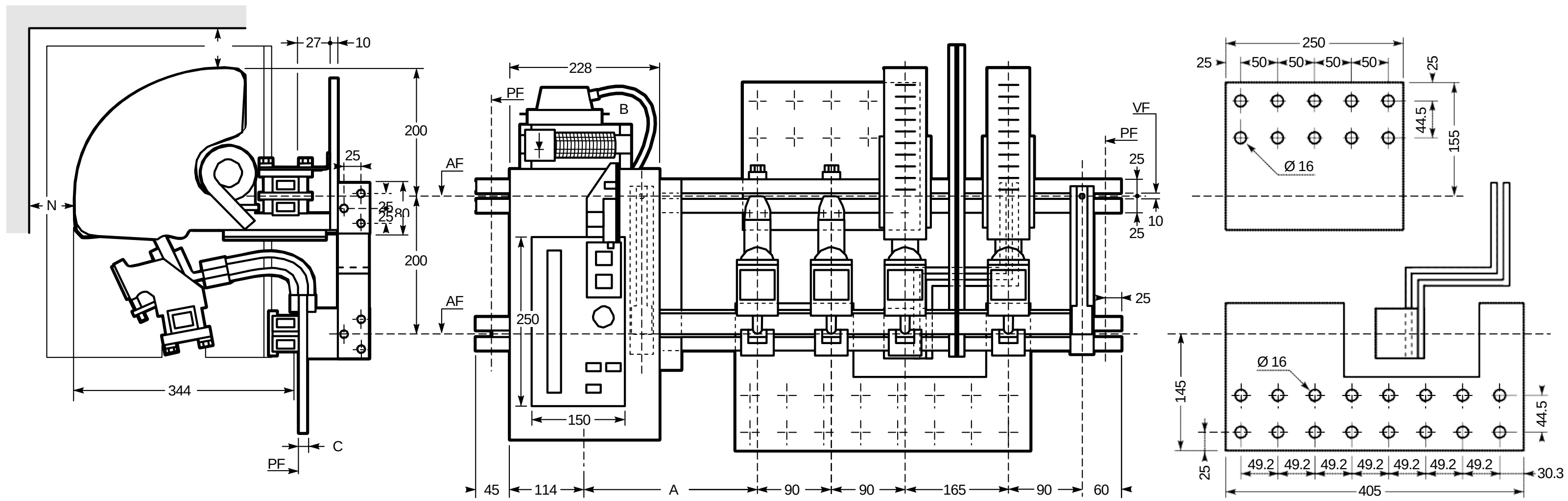
	M	N
Insulated walls	120	120

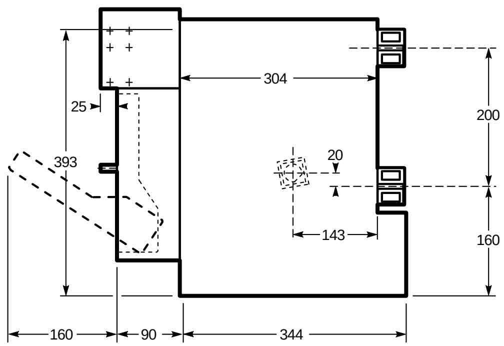
Distance A

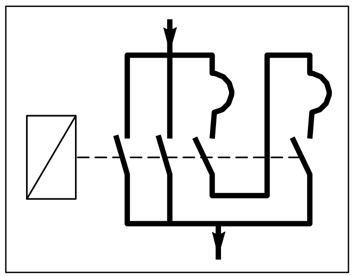
Standard	316
Reduced	226

Overall dimensions CMA 06 1250 to 5500 A

61. CMA 06 5000 - 5500 1.0







AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

Isulating distance (safety perimeter)

	M	N
Insulated walls	120	120

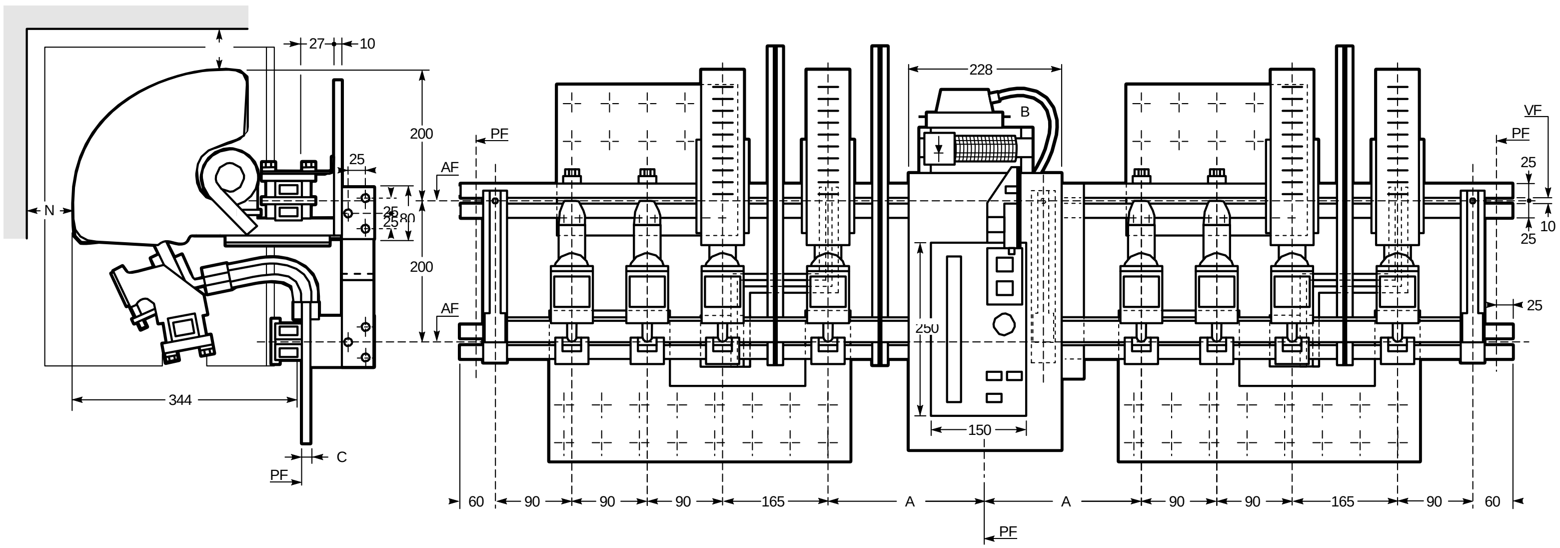
Distance A

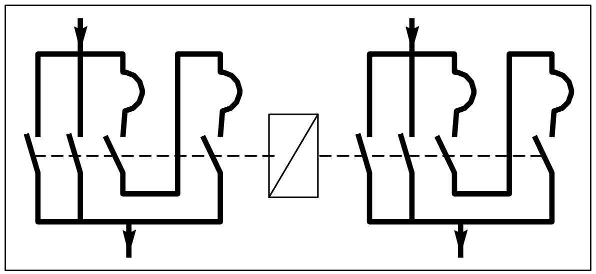
Standard	316
Reduced	226

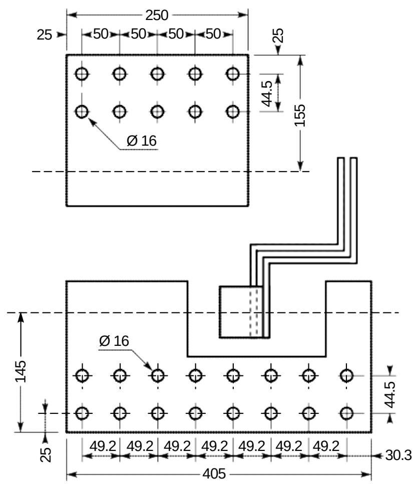
Distance C

Calibre 5000	10
Calibre 5500	15

Overall dimensions CMA 06 1250 to 5500 A





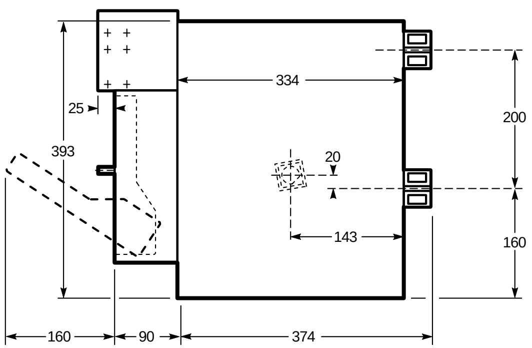


Isulating distance (safety perimeter)	Distance A	Distance C

AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

M 27 10

228



	M	N
Insulated walls	120	120

Isulating distance (safety perimeter)

Standard	366
Reduced	276

Distance A

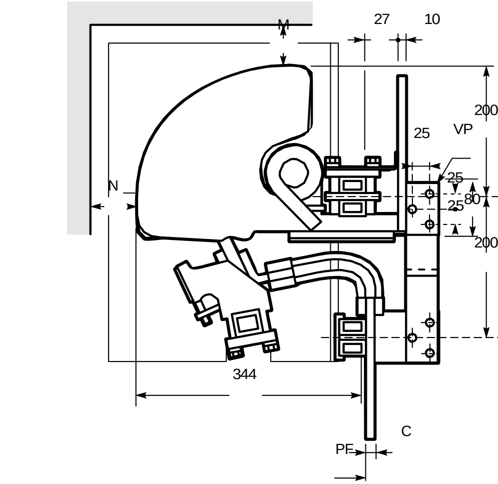
Calibre 5000	10
Calibre 5500	15

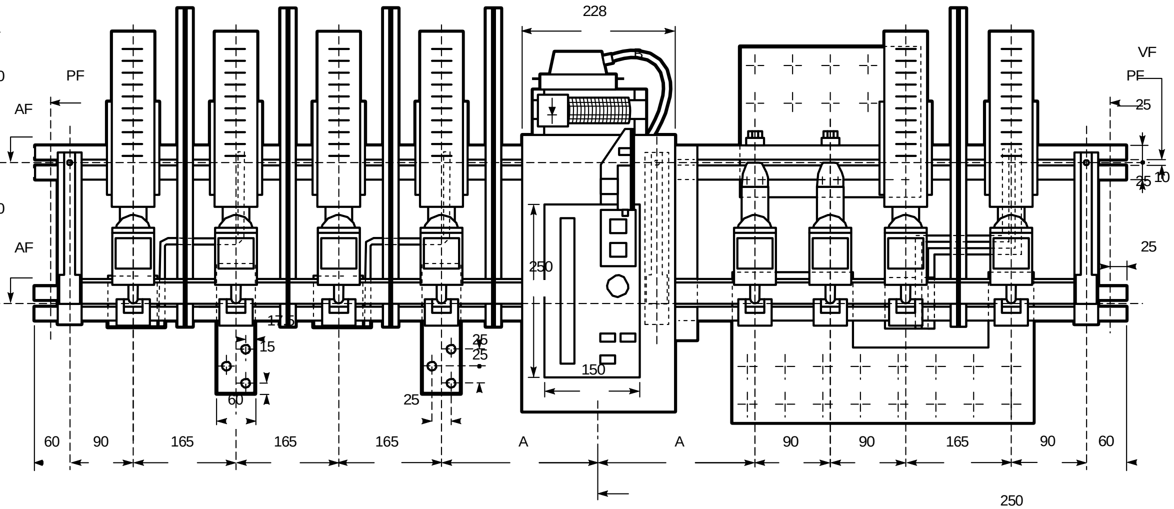
Distance C

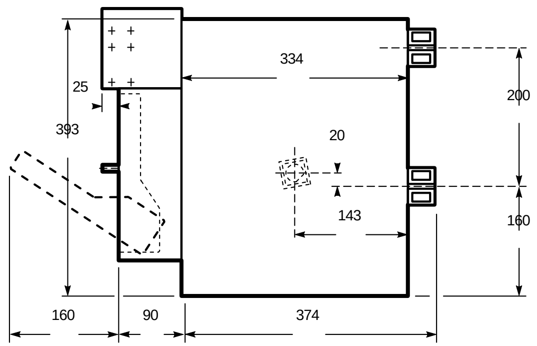
AF : attachment axis
PF : attachment plane
VF : attachment screw
B : connecting box

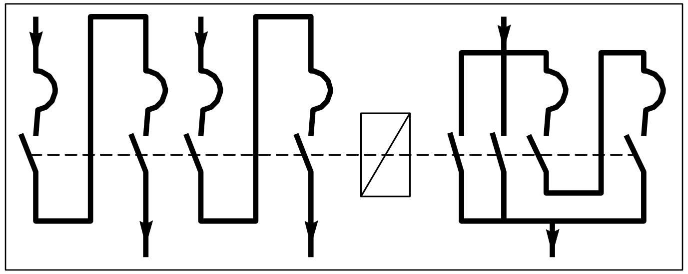
Overall dimensions CMA 06 1250 to 5500 A

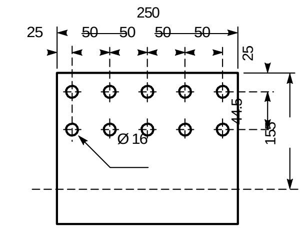
63. CMA 06 5000(1) + 2 x 1250(2)

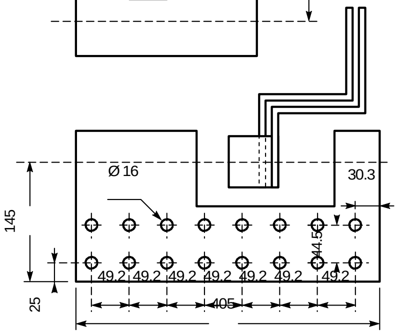






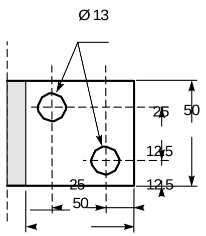




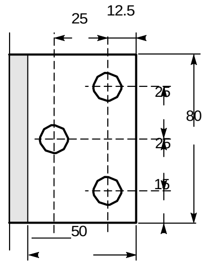


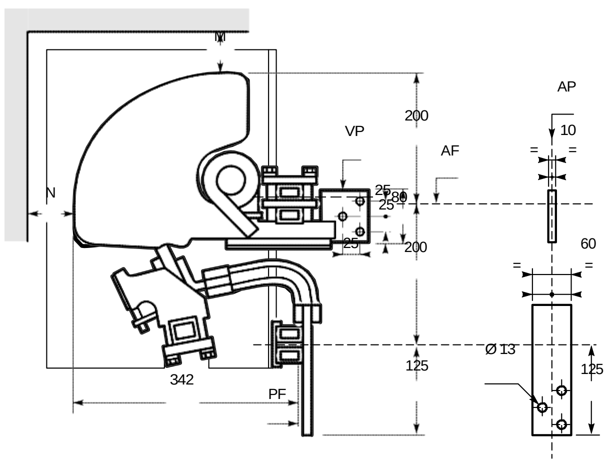
Upper connecting sections of auxiliary poles

- 1250



- 1600 - 2000





AF : attachment axis
AP : pole axis
PF : attachment plane
VF : attachment screw
VP : see connecting sections
B : connecting box

Isulating distance (safety perimeter)

	M	N
Insulated walls	120	120

Distance A

Standard	366
Reduced	276

Distance C

Calibre 5000	10
Calibre 5500	15

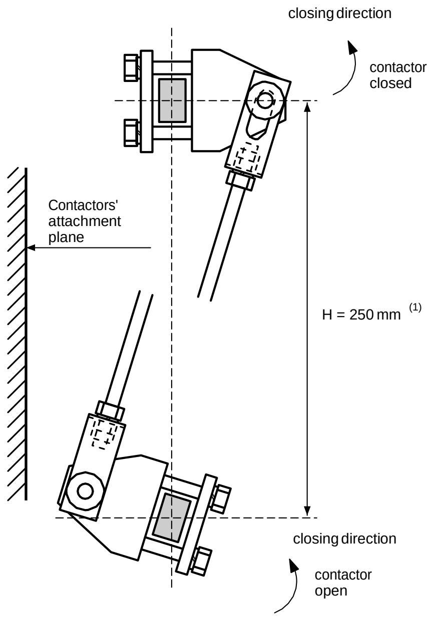
(1) 5500 possible.
(2) 1600 or 2000 possible.

Vertical mechanical locking

80 to 200 A range

- CBA 55,
- CBPA 57,
- CBFC 55,
- CBC 57B 80 - 150 - 200.

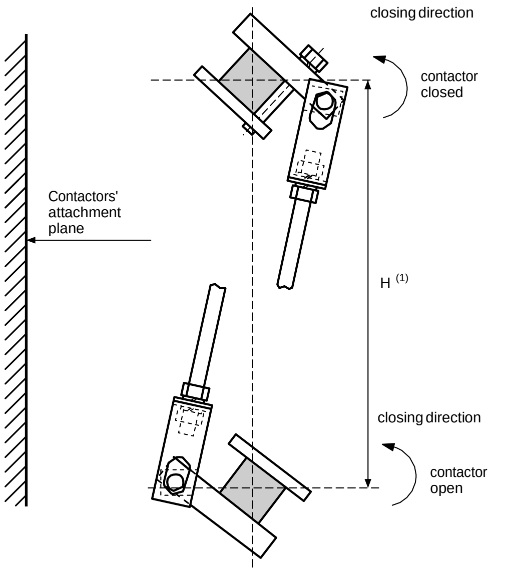
Horizontal or «vis-à-vis» mechanical locking available on request.



400 to 1000 A range

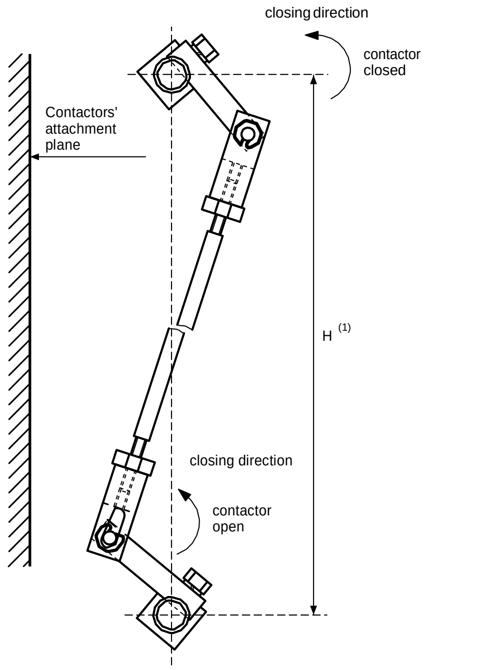
- CBA 75,
- CBFC 75 400 - 500 - 630 - 800 - 1000.

Locking on the hold generaytion moving shaft or for 1250 to 5000 A range.



Calibre (A)	H (mm)
400	400
500	400
630	400
800	575
1000	575

Standard locking at the end of the moving shaft.



(1)for other lenght, consultus
Horizontal or «vis à vis» mechanical locking available and request.

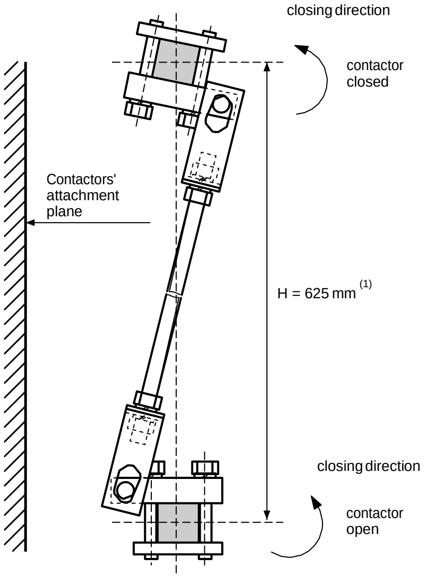
Vertical mechanical locking

1250 to 5000 A range

- CBA 75, CBFC75
- CBA - CBC 71 1250 - 1600 - 2000.

Horizontal or «vis à vis» mechanical locking available on request.

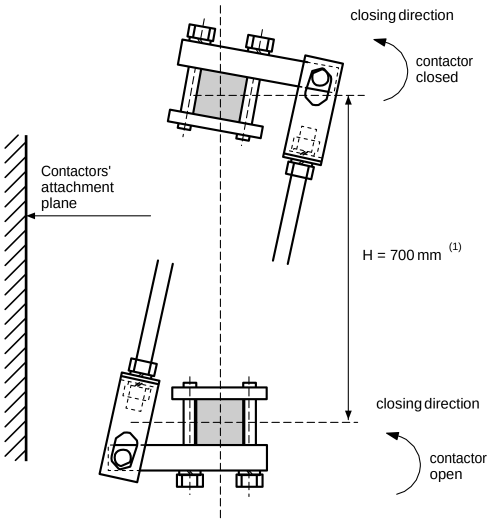
- CBA - CBC 98 2560 à 5000.



2500 to 5000 A range

- CBA 54 2500,
- CBC 54 3000,

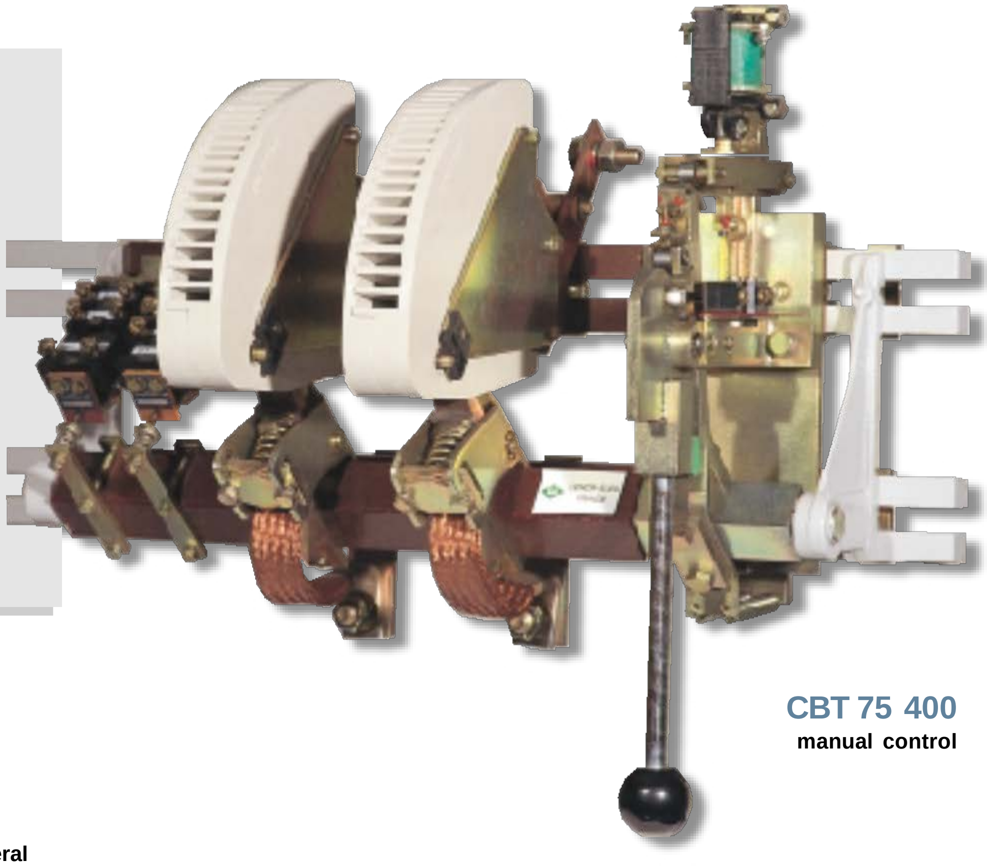
- CBA 60 4000,
- CBC 60 5000.



(1) for other lenght, consult us.
Horizontal or «vis à vis» mechanical locking available on request.

CBT rapid contactors

CBT 200,
CBT 400,
CBT 800.



CBT 75 400
manual control

General

The equipment composed of the fast opening system DS1 + rapid opening contactor CBT may be used for other applications than the ones described in the present chapter. However, the general rules of application remain the same.
We know that some commanded rectifier bridges, of «all thyristor» type may restore the energy to the network by operating as UPS units. This is the case for example of a GRAETZ bridge connected to a driving load motor.
This type of operation is also found in case of motors connected to rectifier bridges (constituted of two GRAETZ bridges assembled opposite) capable of ensuring the operation during the four quadrants of the «speed torque» diagram.
During the UPS operation, if the network voltage suddenly abnormally drops, the electromotive force of the load is no more opposed to the one of the network.
Moreover, as the control pulses of the thyristors‘ UPS bridge generally, go on energizing then, this short-circuit closes very fast directly in one or several vertical branches of the bridge.
Ultra-rapid fuses, playing their normal part of protection melt in more or less significant number. If there are no fuses in the branches of the bridges, the thyristors will be the ones, by being put off load, to stop the output of the load on that short-circuit, but only after the current had reached high ratings.

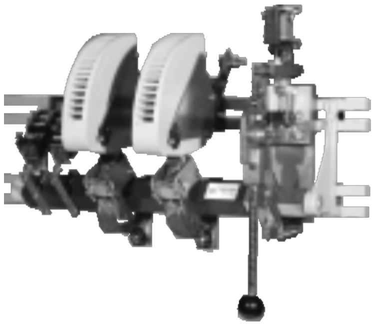
For rectifier bridges that:
- are to operate on networks subject to frequent voltage disruptions or,
- have to ensure significant duty factors as UPS units.

The probability of defect is high enough to make it interesting to foresee an additional selective protection, capable of opening the connection between the load and the bridge before the energy created in the fuses generates their fusion or partial degradation.
All the more so, the thyristors are also protected by this protective system.
This last one should include:
- a rapid switch off device - the «rapid CBT contactor» and,
- a CBT contactor instant control device in case the current would exceed a pre-fixed value - the fast opening system DS1.

Those elements and eventually the outer circuit must be scheduled and adjusted so that at the end of the cut off, the energy dissipated in the fuses and thyristors shouldn‘t cause any damage.
We know that for the fuses, this limit is defined by the manufacturers by the integral $\int i^2 dt$ of pre-arc.

Same thing for the thyristors, an integral $\int i^2 dt$ of fusion, not to reach or exceed, has to be defined

41. CBT 200 - 400 - 800



CBT 400 Manual closing

Use

Such a contactor is used to complete the protection of thyristors bridges supplying the DC motors in case of dis-appearance of the AC supply voltage. Coupled with an electronic current detector, the CBT contactor opens fast enough to:

- avoid the fusion of the ultra-rapid fuses.
- limit the current to a value inferior to the one that would create a clash to the motor's commutator.
- limit the $\int i^2 dt$ value to a doorstep very inferior to the present possibilities of thyristors.

Description

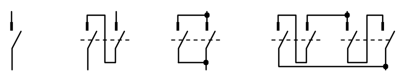
- 1 or 2 magnetic arc-blowout closing poles.
- Closing
  - CBT 200: electrical closing thanks to a solid magnetic circuit controlled by an auxiliary contactor,
  - CBT 400 and 800: manual closing with handle or electrical closing with a separated laminated magnetic circuit controlled by an auxiliary contactor or manual & electrical closing.
- Mechanical latching with electrical release on CBT 200 (manual release on request), mechanical latching with electrical and manual releases on CBT 400 and 800 A.
- Instant M type auxiliary contacts (the contacts for switching-off the closing and tripping coils are mounted and cabled).
  Free auxiliary contacts: 1 NO + 1 NC on CBT200 and CBT 400 & 800 with electrical control, 1 NO + 2 NC on CBT 400 & 800 with manual control.
- Possible addition of 1 or 2 extra M3 blocks, (increases the overall dimensions of the CBT).

Contactors with manual control are equipped with:
- a safety contact (opened during the operation of the handle),
- a padlocking facility, on request.

Technical features

				CBT 200	CBT 400	CBT 800
Insulating voltage			V	1000	1000	1000
Nominal DC voltage						
	single-pole break		V	250	300	300
	two-pole break		V	500	600	600
Current of use			A	300	500	1000
	minimum section to connect		mm^2	185	240	500
Current switch-off rating L/R= 15 ms, U re-established-550 V continuous			A	4000	8000	16000
Arcing voltage			V	1200	1900	1900
Time of rise of arcing voltage (7 ms < L/R < 37 ms)			ms	< 5	< 5	< 5
Arcing time (L/R= 15 ms)			ms	14	14	14
Control circuit						
	closing (direct or rectified current(2))	standard voltages	V	110 - 200	110 - 127 - 220 - 380	110 - 127 - 220 - 380
		absorbed power	W	660	2300	2300
		closing time at Un	ms	95	80	80
	opening(3)	current	A	27	27	27
		quantity of electricity	coulomb	0.1	0.1	0.1
		allowable permanent current	A	1.1	1.1	1.1
		pulse time	ms	18	18	18
Opening time between command and separation of contacts			ms	8 - 9	8 - 9	8 - 9
Mechanical endurance			operations	75000	15000	15000

Use



Current of use (A)	Voltage of use (V)	connection(1): 1 contactor, 1P	1 contactor, 2P in series	1 contactor, 2P in parallel	2 contactors, 2P in parallel	CBT 200	CBT 400	CBT 800
300	250	•	-	-	-	•	-	-
	500	-	•	-	-	•	-	-
500	300	•	-	-	-	-	•	-
	600	-	•	-	-	-	•	-
600	300	-	-	•	-	•	-	-
	600	-	-	-	•	•	-	-
1000	300	•	-	-	-	-	-	•
		-	-	•	-	-	•	-
	600	-	•	-	-	-	-	•
2000	300	-	-	•	-	-	-	•
	600	-	-	-	•	-	-	•

(1) from the current of use and the voltage of use depend the connection of contactors.
(2) exclusively via a rectifier (not supplied).
(3) either in 220 V dc or via a capacitors' discharge of 1300 µF (Voltage of charge: 250 V).

42. Co-ordination of thyristor's protections

The DC supplies via thyristors generally have already an internal protection system by circuit breakers and an external protection system by a limiting rapid equipment such as a CBT contactor. It is necessary to check the good co-ordination of both protection systems to avoid the fusion of the circuit breakers on only external defect that should be deleted by the limiting equipment.
Therefore, it is necessary to compare the integral of Joule $\int i^2 dt$ that the protection equipment allows to the integral of Joule $\int i^2 dt$ required to obtain the fusion of the circuit breakers. This last value is one of the main characteristics of the circuit breakers and can be easily calculated from the manufacturer's ratings, the number of connections in parallel and the drawing achieved.
This sheet aims at giving a calculation method of the integral of Joule allowed by the limiting rapid equipment and the extra self induction coil to schedule whether the co-ordination is not ensured by the design characteristics of the circuit.

Operation of the protection equipment

The characteristic oscillogram is represented on page 128. The value of the network voltage U and the value of the total resistance R determine the asymptotic value of the supposed short-circuit current Icc. The value of the self-induction of the circuit L and the value of that resistance R determine the time constant $t = L/R$. The operation of the limiting protection equipment for that circuit can be schematised as follows:
After a certain time TD, the adjustment limit doorstep iD of the current detector DXT is reached. This one, through an electro-mechanical device, provokes the opening of the contacts after a certain time DM. The arcing voltage appears but a certain time is necessary for the value of the arc to be sufficient to provoke the limitation of the short-circuit voltage to a value il. This arc will last until the extinction of the current during a total time ta.
For a precise calculation of the integral of Joule, the full knowledge of the function $i = f(t)$ during the whole phenomenon is necessary. This can only be undertaken by using an oscillogram corresponding to all the characteristics of the circuit.
Experience shows that a good approximation could be obtained under normal operating conditions by formulating the following simplifying hypotheses (the drawing page 128 represents the allure of the phenomenon):

- the value of the limited current iL will be taken from the curve of the supposed current Icc for a time TL corresponding to the summa of $TG + DM + Tma$ (Tma corresponds to the average time of rise of the arcing voltage for different values of current).
- the growth of the current will be supposed as linear from 0 to IL.
- the decrease in the current will be supposed as linear from IL to 0.
- the duration of that decrease will be considered as equal to a value TA corresponding to the difference between the average value of the arcing time DA and the time of rise of the arcing voltage Tma for the corresponding equipment $(TA = DA—Tma)$.
- the integral of Joule can then be calculated from the formula:

$$\int i^2 dt = \frac{IL^2 (TL + TA)}{3}$$

The elements required for applying this formula can be obtained from 2 different methods:

- graphic method,
- «set of curves» method.

Both methods will be presented in the next pages with a corresponding example. Each method will be divided in 2 parts:

- the calculation of $\int i^2 dt$,
- the calculation of the extra self-induction coil.

Graphic method

During the course of the calculation leading to IL and TL, it will be necessary to pass from a value of the time to a value of the current and vice versa; as the function $i = f(t)$ is $i = Icc\left(1 - \xi^{-\frac{t}{\tau}}\right)$, in shape we have looked for a graph that would allow us to obtain a linear representation of such a function.
We can write:

$$i = Icc\left(1 - \xi^{-\frac{t}{\tau}}\right)$$

in which $\frac{i}{Icc} = 1 - \xi^{-\frac{t}{\tau}}$ and $1 - \frac{i}{Icc} = \xi^{-\frac{t}{\tau}}$

so $Log\left(1 - \frac{i}{Icc}\right) = -\frac{t}{\tau}$

expression which is linear on a semi-logarithmic paper.
To draw the lines corresponding to different T, you will only have to notice that for $t = \tau$, $1 - \frac{i}{Icc} = 0.367$ (see figure page 126).
To make it clearer, we will take as example:

- the switching-off a supposed current Icc of 8400 A,
- protection doorstep ID adjusted at 600 A,
- time constant $\tau = 15ms$,
- equipment used: CBT400 whose design features are:
  - $DM = 9$ ms,
  - $Tma = 2$ ms,
  - $DA = 10$ ms.

Circuit breakers can only admit $(\int i^2 dt)a$ as integral of Joule of pre-arc value. We will calculate the extra self-inductive coil required in the circuit not to exceed this restraint value. In the example chosen, this value will be fixed at $100000\ A^2S$.

Operation and graphic method

Method (figure page 126)

- calculation of $\int i^2\,dt$

- representation of the supposed current:

D from the abscissa, draw T on the line 0.367.

D draw the line representative of $\log\left(1 - \frac{i}{Icc}\right) = -\frac{t}{\tau}$

from the point 1 of the ordinate 0 – 1 and passing through the point T drawn on the line 0.367

- determination of TD on that line:

D the ordinate of TD is defined by $1 - \frac{ID}{Icc}$

D the abscissa corresponds to the time TD

calculation of TL from the formula $TL = TD + DM + Tma$

- determination of IL on the characteristic line for:

D the abscissa TL corresponds to the ordinate whose expression is $1 - \frac{IL}{Icc}$

calculation of $\int i^2\,dt$, by using of the approaching formula:

$$\int i^2 dt = IL^2 \frac{(TL + TA)}{3}$$

- calculation of the extra-self:

- value of the limited current IL not to exceed:

The change in the time constant will slightly modify the value of TD but to go on with the calculation, we suppose the total time constant and

$$IL2 = IL1 \sqrt{\frac{(\int i^2 dt)a}{(\int i^2 dt)1}}$$

- value of the new time constant T 2

A line of operation for which $TL - TD = DM + Tma$ and $IL = IL2$ has to be found. The slope of such line that enables to pass from ID to IL in $(DM + Tma)\ ms$ can be obtained from the following points:

D A on the ordinate is defined by $1 - \frac{ID}{Icc}$

D B projected from:

- the ordinate $1 - \frac{IL2}{Icc}$
- the abscissa $(DM + Tma)ms$

D draw the line passing by A and B

D its intersection point C with the horizontal 0.367 projected on the abscissa axis gives the new value of the circuit time constant.

D as we know the existing characteristics, it is now possible to determine the characteristics of the extraself (L and R) to obtain that new total time constant of the circuit.

Exemple (figure page 126)

D from the abscissa, draw τ

D draw the line representative of $\log\left(1 - \frac{i}{Icc}\right) = -\frac{t}{\tau}$

D the ordinate of TD is:

$$\left(1 - \frac{600}{8400}\right) = 1 - (0.071) = 0.929$$

D the abscissa gives 1.13 ms as time TD

$TL = 1.13 + 9 + 2 = 12.13\,ms$

D abscissa $TL = 12.13\ ms$

D ordinate $1 - \frac{IL}{Icc} = 0.445$

so, $\frac{IL}{Icc} = 1 - (0.445) = 0.555$

so, $IL = 0.555 \times Icc$, i.e. $0.555 \times 8400 = 4660\,A$

$IL = 4660$, $TL = 12.13$

$TA = DA - Tma = 10 - 2 = 8$

$$\int i^2 dt = 4660^2 \times \frac{(12,13 + 8)}{3} = 145000\ A^2 S$$

The corresponding oscillogram gives the following result:

$IL = 4400\ A$ and $\int i^2 dt = 134000\ A^2 S$

$$IL2 = 4660 \times \sqrt{\frac{100000}{145000}} = 3860A$$

-

points:

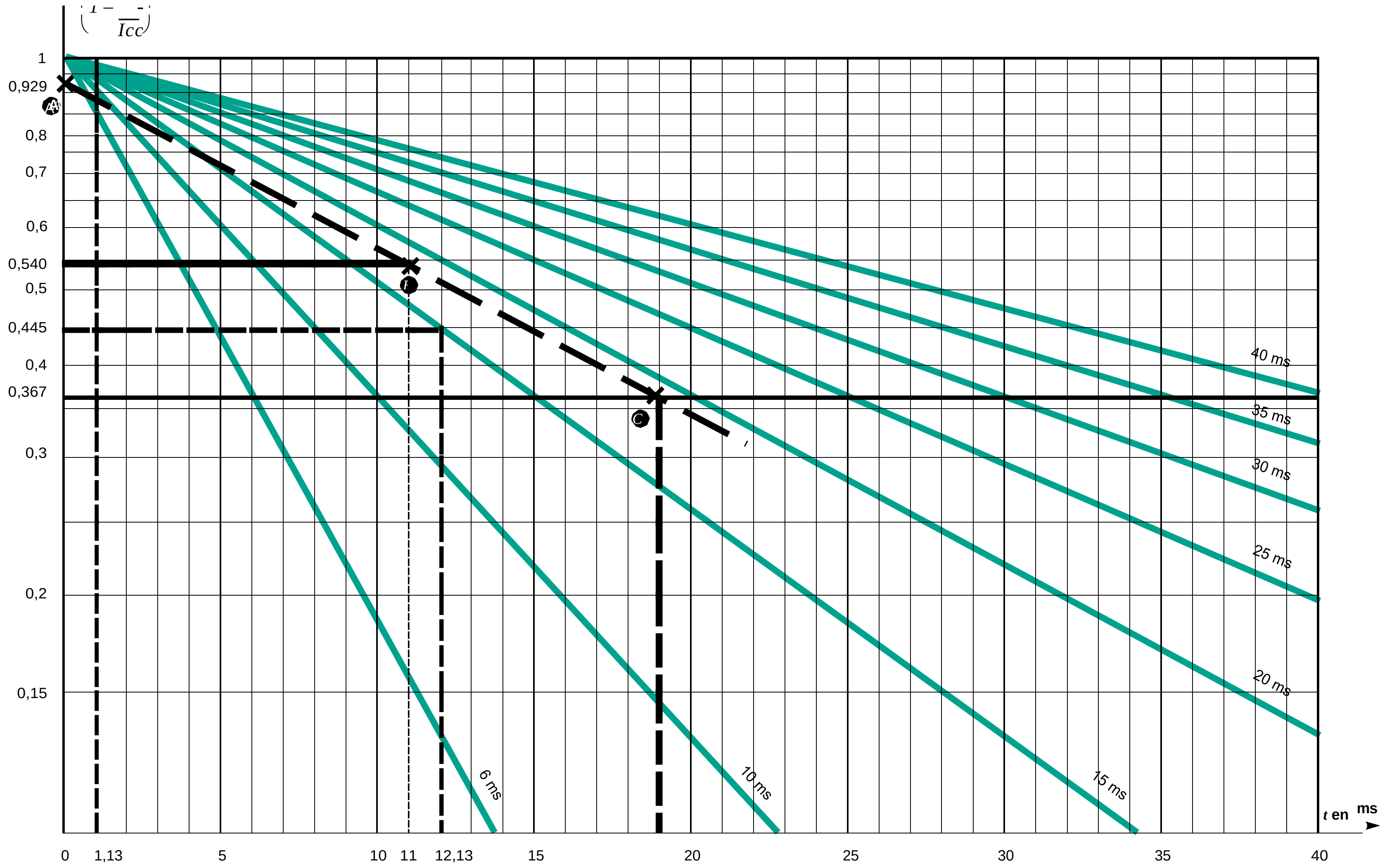
D $A = 1 - \frac{ID}{Icc} = 1 - \frac{600}{8400} = 1 - (0.071) = 0.929$

D B from:

- the ordinate $1 - \frac{3860}{8400} = 1 - (0.46) = 0.54$
- the abscissa $9 + 2 = 11ms$

D the intersection point C projected on the abscissa gives 20.5 ms.

D the extra self combined with the present characteristics of the network should allow to obtain that time constant of 20.5 ms.

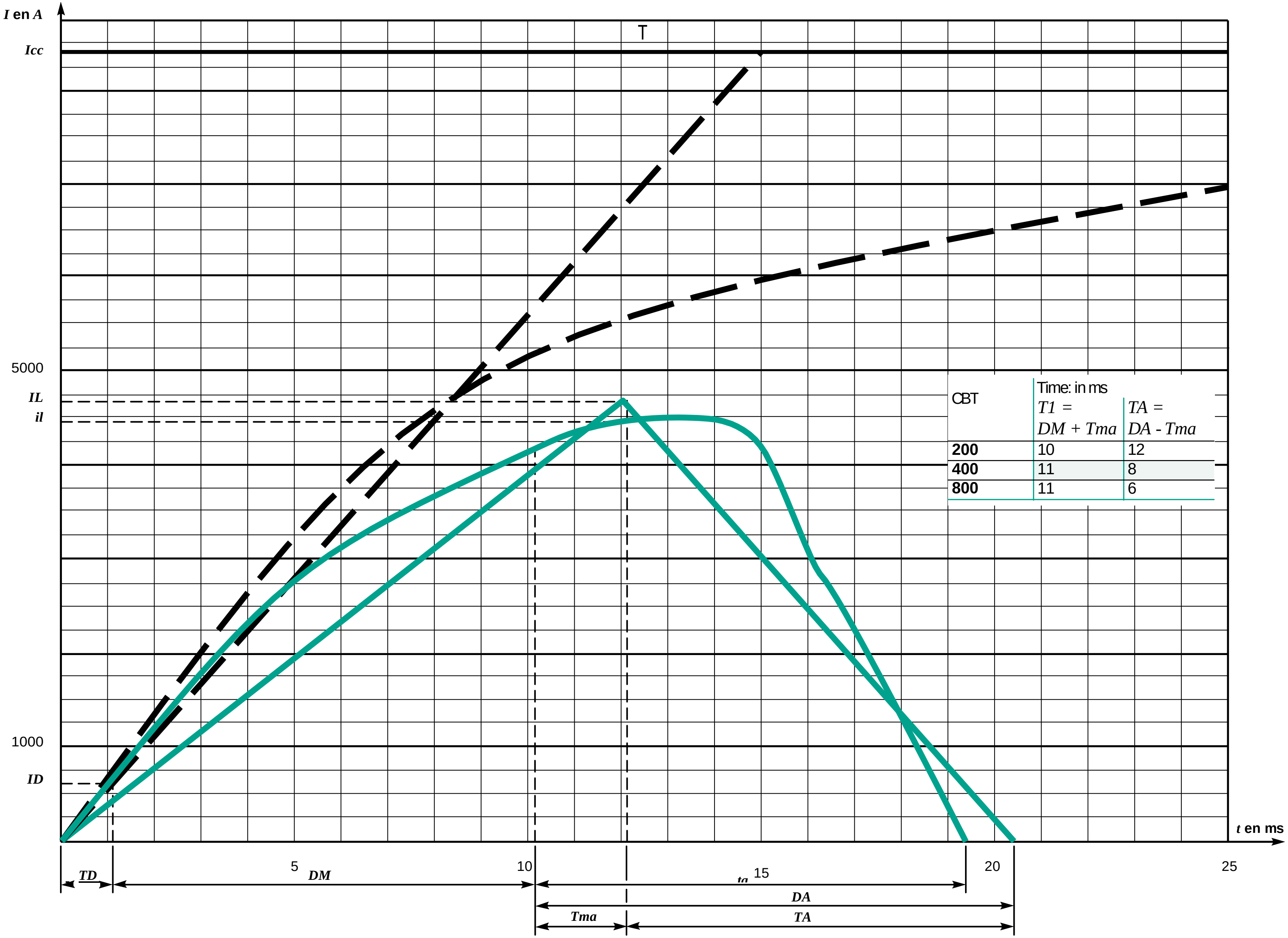

$\frac{I}{Icc}$
1
0,929
A
0,8
0,7
0,6
0,540
0,5
B
0,445
0,4
0,367
C
0,3
0,2
0,15
6 ms
10 ms
15 ms
20 ms
25 ms
30 ms
35 ms
40 ms
t en ms
0
1,13
5
10
11
12,13
15
20
25
30
35
40

Graphic method by set of curves

To make the calculation of IL and $\int i^2 dt$ easier, you can pre-determine per equipment a network of curves that would enable you to obtain quickly the values looked for form the characteristic parameters of the circuits. According to the adjustment of the protection ID, you can define a current of use $Ie = \frac{ID}{2}$ withstanding normal operation overloads. To characterise this method, we will take the same example as in the graphic method, i.e. switch-off of a supposed current $Icc = 8400\ A$, protection doorstep ID set on 600A, time constant τ equipment used CBT 400 whose design features are: $DM = 9ms$, $Tma = 2ms$ and $DA = 10ms$.

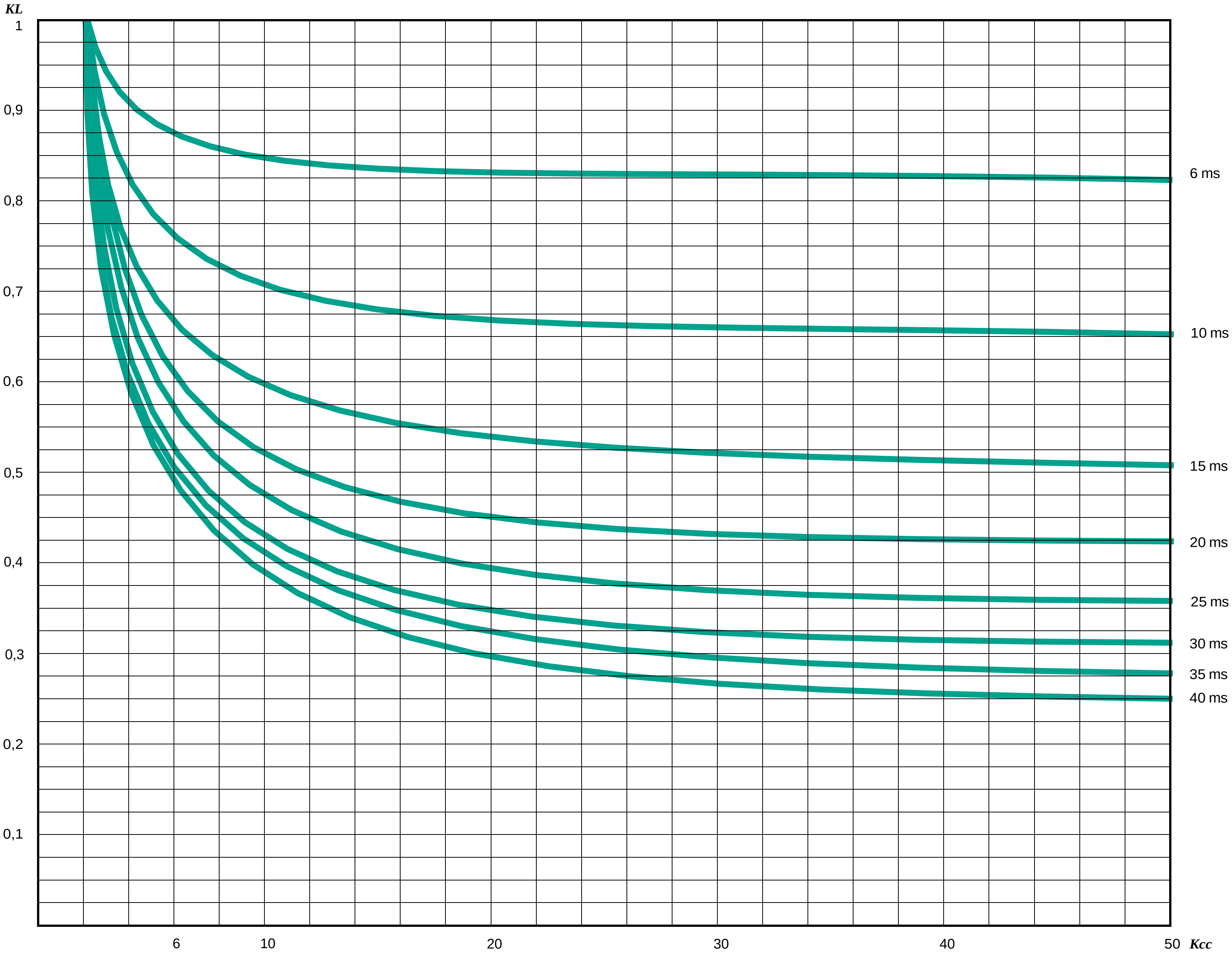
If the value of the integral of Joule $\int i^2 dt$ is superior to the pre-arc one for short-circuits $(\int i^2 dt)\ a$, a new time constant has to be looked for in the circuit. In the example chosen: $(\int i^2 dt)a = 100000\ A^2 S$

Method	Example
▪ calculation of $\int i^2 dt$ - calculation of $Ie = \frac{TD}{2}$	$Ie = \frac{ID}{2} = \frac{600}{2} = 300A$
- TD time to reach ID from the parameters: - $\frac{Icc}{Ie} = Kcc$ short-circuit factor - and T, you can determine the value of the TD time to reach the adjustment doorstep for the protection $TD = \tau\log\left[1 - \frac{2}{Kcc}\right]$ time TL to reach the limit current IL for a type of protection equipment, the values DM and Tma are known and by applying the rule $TL = TD + DM + Tma$, you obtain a set of values determinig TL	$Kcc = \frac{Icc}{Ie} = \frac{8400}{300} = 28$ - τ
limitation factor $KL = \frac{IL}{icc}$ from the parameters Kcc and T, you can determine the value of the limitation factor KL by using the formula $KL = 1 - \xi - \frac{t}{\tau}$ and plot the corresponding curves: - figure page 129 for CBT200, - figure page 131 for CBT400 and 800 allowing the determination of IL:	for CBT400 - 800, page 131, τ $Kcc = 28$ on the abscissa, $KL = 0.555$ is obtained on the ordinate
$IL = KL \times Icc$ - overcurrent factor: $KS = \frac{IL}{Ie}$ from the parameters Kcc and T and the formula $\frac{IL}{Ie} = \frac{IL}{Icc} \times \frac{Icc}{Ie}$ and $KS = KL \times Kcc$, you can determine the values of the overcurrent factor KS for different combinations of parameters. - integral of Joule $\int i^2 dt$ for a given equipment, the value of the time $TA = DA - Tma$ is also a known feature and the approaching value of the integral of Joule $\int i^2 dt$ can be written: $\int i^2 dt \# IL^2 \frac{(TL + TA)}{3}$ that can be expressed in reduced magnitude by $\frac{1}{3}\left(\frac{IL}{Ie}\right)^2 (TL + TA)Ie^2$ or $\int i^2 dt \# \frac{1}{3}(KS)^2$ by considering TT as the total current time and $K = \frac{1}{3}(KS)^2$	$IL = KL \times Icc = 0.555 \times 8400 = 4660\ A$
As K is a factor expressed according to $Kcc = \frac{Icc}{Ie}$ and T, the set of curves page 130 for the CBT200, page 132 for the CBT400, page 133 for the CBT800 gives the factor K according to Kcc and T	for CBT400 page 132 on the set of curves, τ $Kcc = 28$ on the abscissa, and $K = 1.6$ is obtained on the ordinate
$\int i^2 dt = KIe^2$ ▪ calculation of the extra self. You determine a new factor	$\int i^2 dt = Kle^2 = 1.6 \times 300^2 = 144000\ A^2S$
$K2 = K1 \frac{\int i^2 dt}{(\int i^2 dt)1}$	$K2 = 1.6 \times \frac{100000}{144000} = 1.11$
The point $K = f(\tau - Kcc)$ in the set of curves, page 130 for CBT200, page 132 for CBT400, page 133 for CBT800, determines the value of the circuit total time constant to achieve.	- for CBT400 on the curves page 132, for $Kcc = 28$ on the abscissa, $K = 1.11$ on the ordinate, we obtain τ

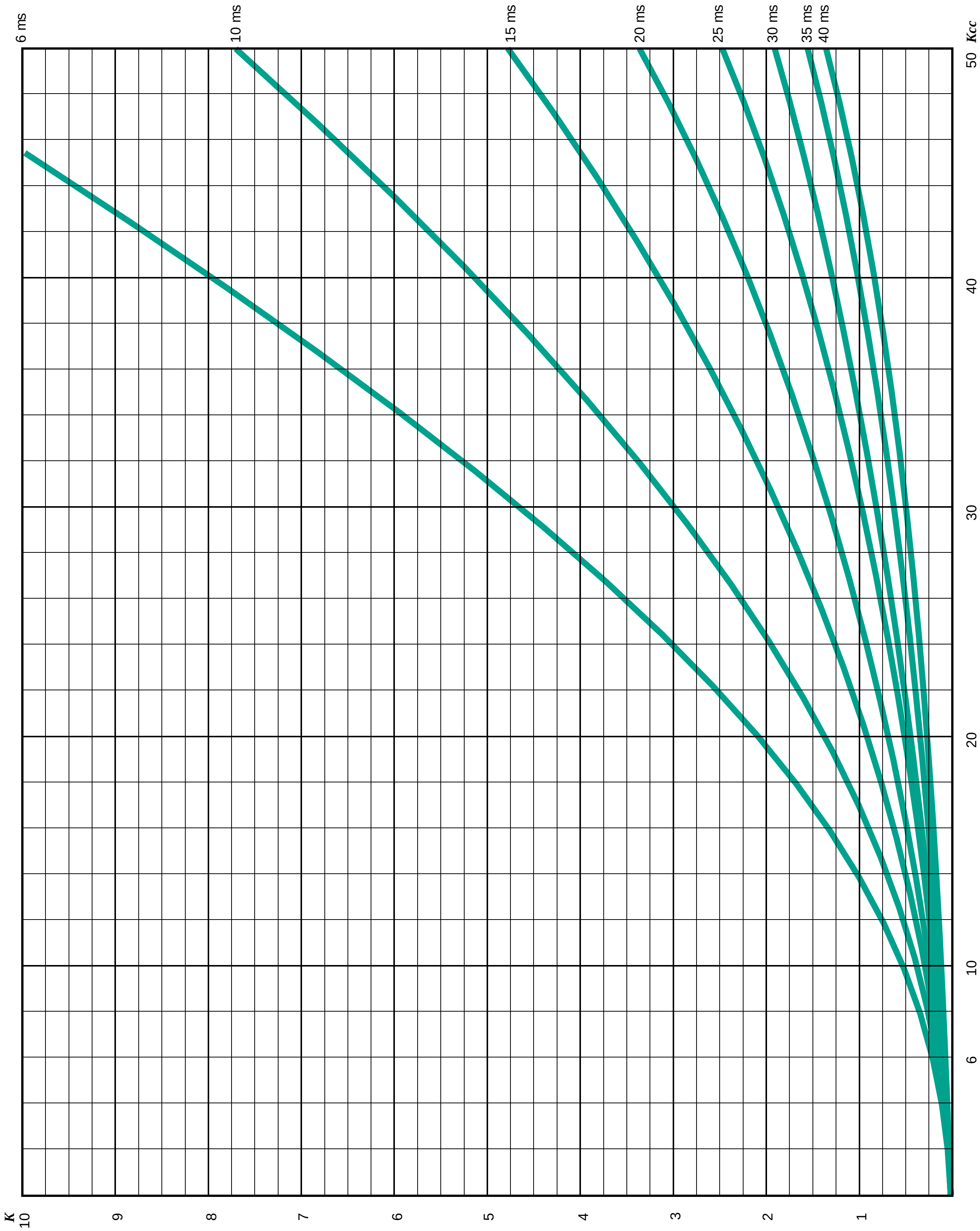


CBT	Time: in ms	
	T1 = *DM* + *Tma*	*TA* = *DA* - *Tma*
200	10	12
400	11	8
800	11	6

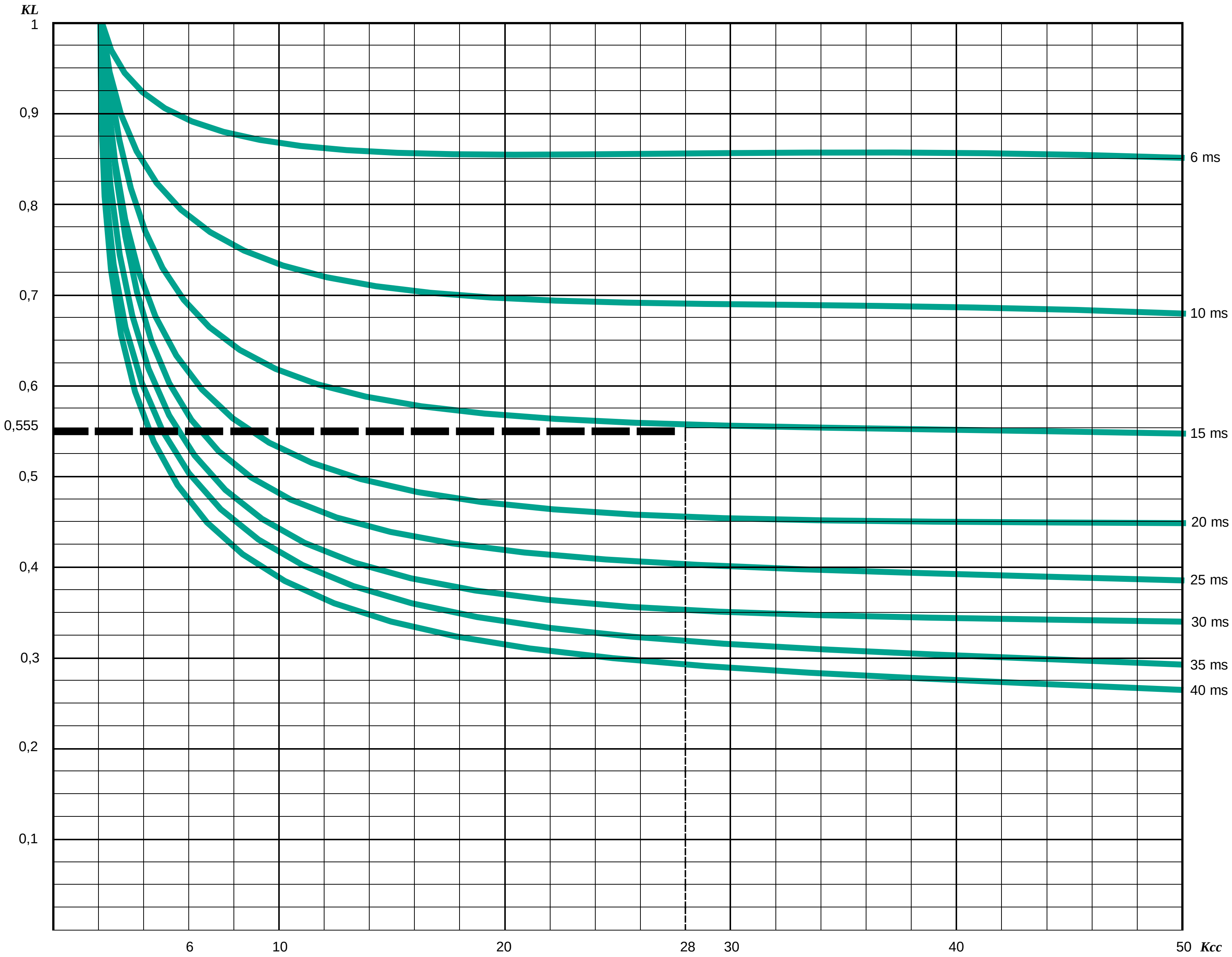
66. Definition of KL according to Kcc and T



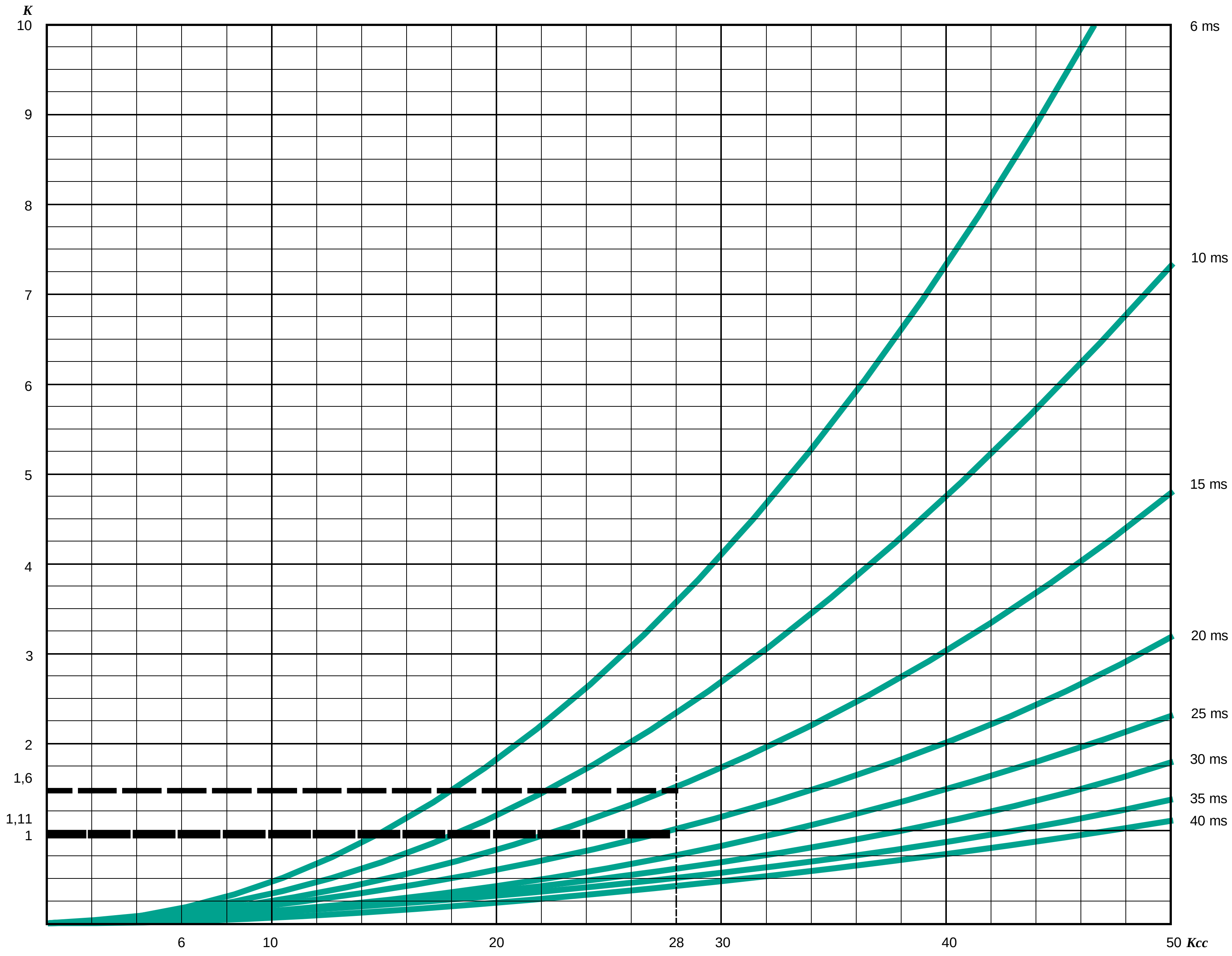
67. Definition of K according to Kcc and T



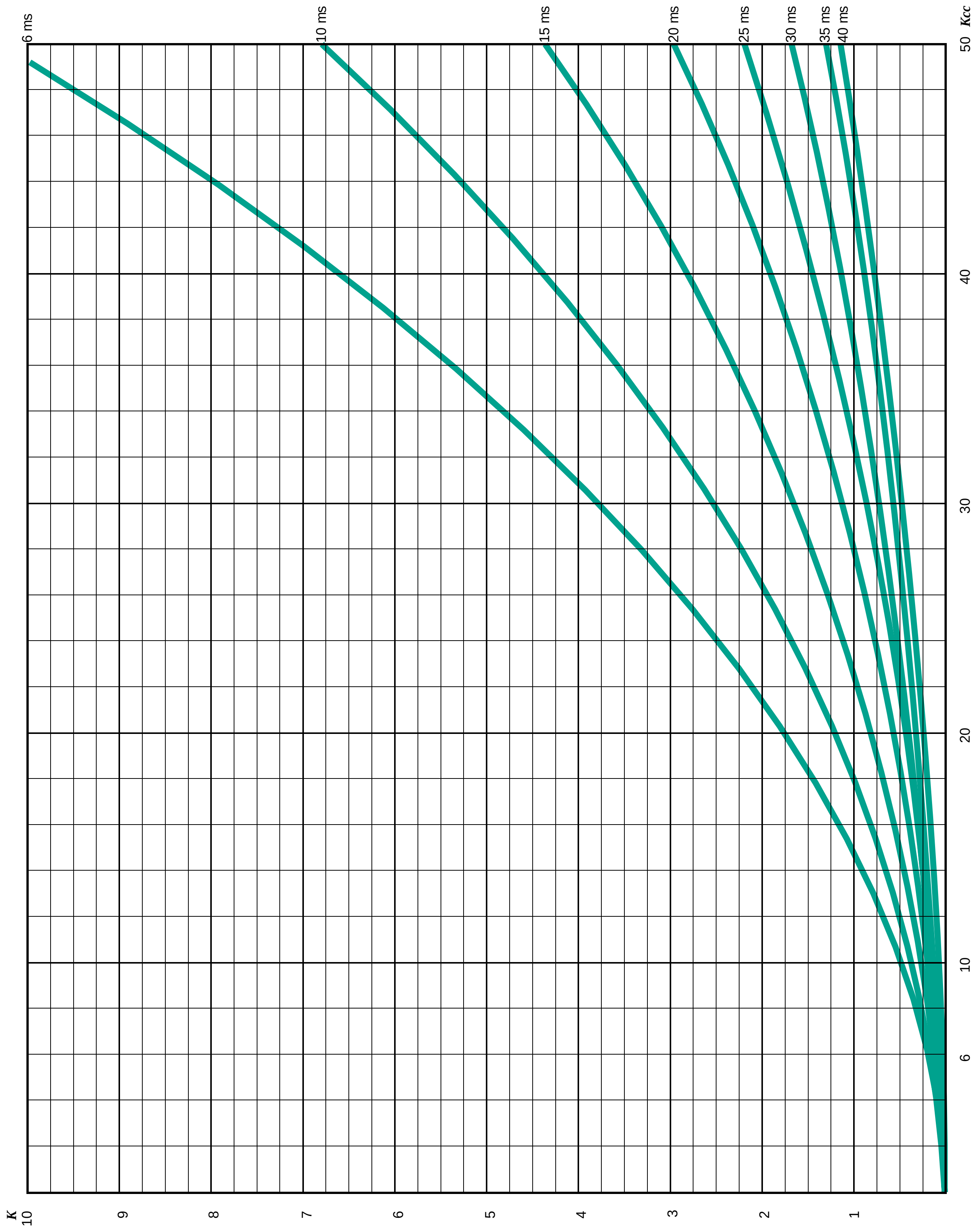
68. Definition of KL according toKcc and T



69. Definition of K according to Kcc and T

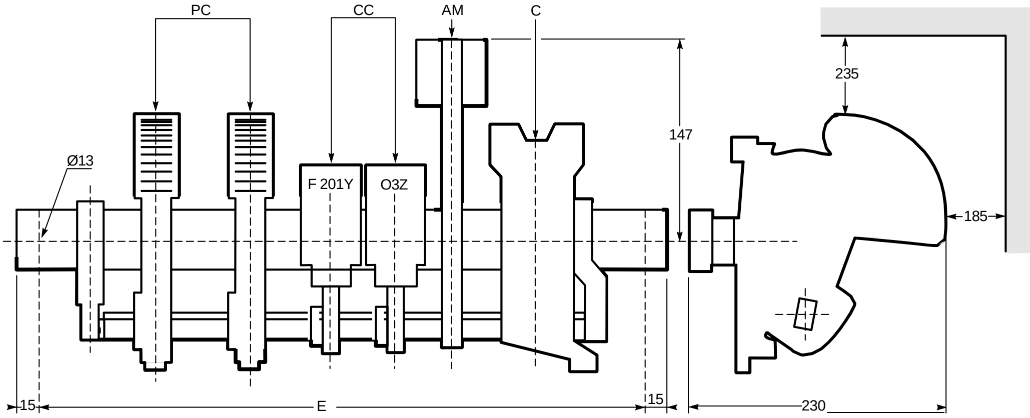


70. Definition of K eaccording to Kcc and T



71. CBT 200 - 400 - 800

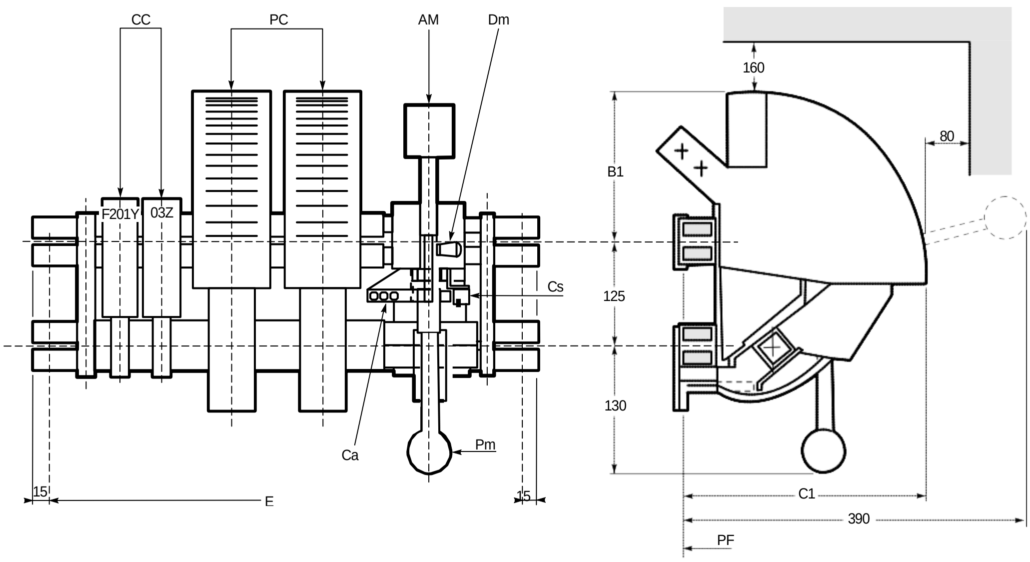
CBT 200



AM: mechanical latching with electrical release.
C: closing electromagnet.
CC: auxiliary contacts.

E: attachment centre-to-centre distance:
1 pole = 375,
2 poles = 450.
PC: arc-blowout poles..

CBT 400 - 800 manual control

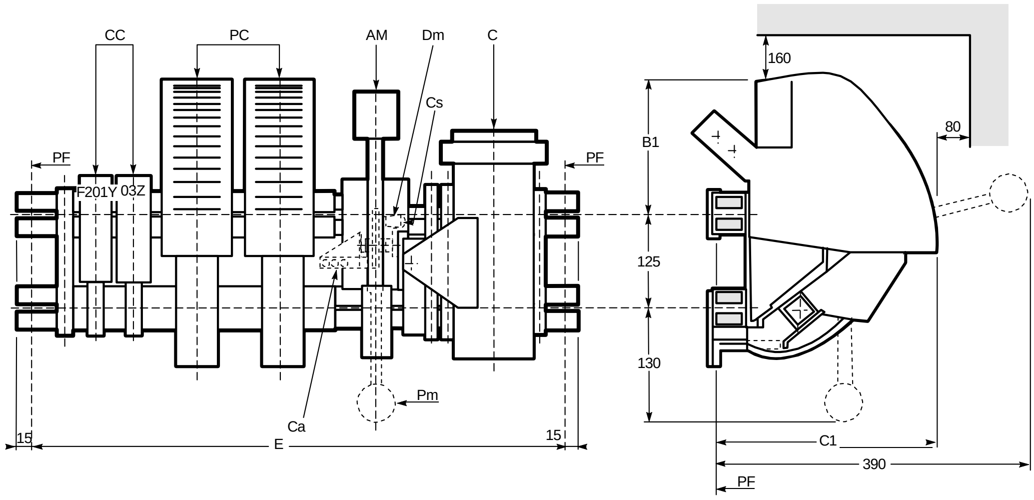


AM: mechanical latching with electrical release.
Ca: padlocking facility.
CC: auxiliary contacts.
Cs: safety contact.
Dm: manual release.
PC: arc-blowout poles.
PF: attachment plane.
Pm: manual handle.

		400	800
E	1 pole	450	450
	2 poles	550	550
B1		132	211
C1		292	330

Overall dimensions CBT 200 to 800 A

CBT 400 - 800 electrical control



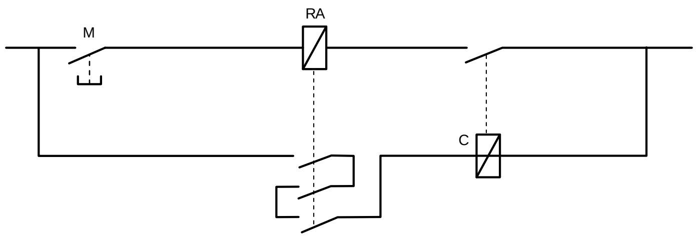
AM: mechanical latching with electrical release.
C: closing electromagnet.
Ca: padlocking facility.
CC: auxiliary contacts.
Cs: safety contact.
Dm: manual release.
PC: arc-blowout poles.
PF: attachment plane.
Pm: manual handle.

		400	800
E	1 pole	575	575
	2 poles	675	675
B1		132	211
C1		292	330

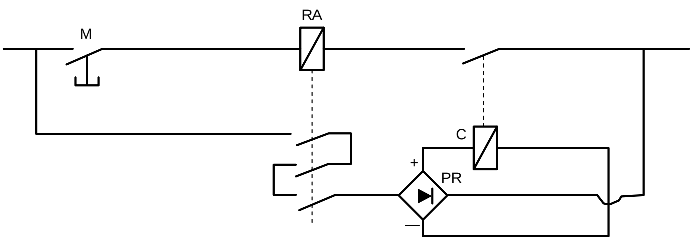
Control circuit drawing(1)

Closing

- DC supply

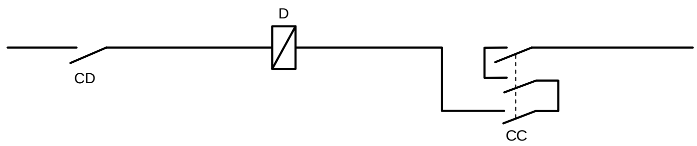


- AC supply

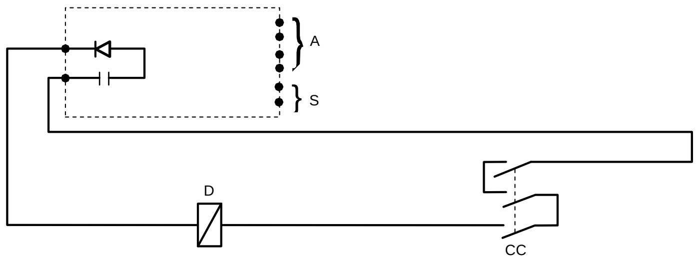


Opening

- DC supply, 220 Vdc



- Via detector with inserted capacitor

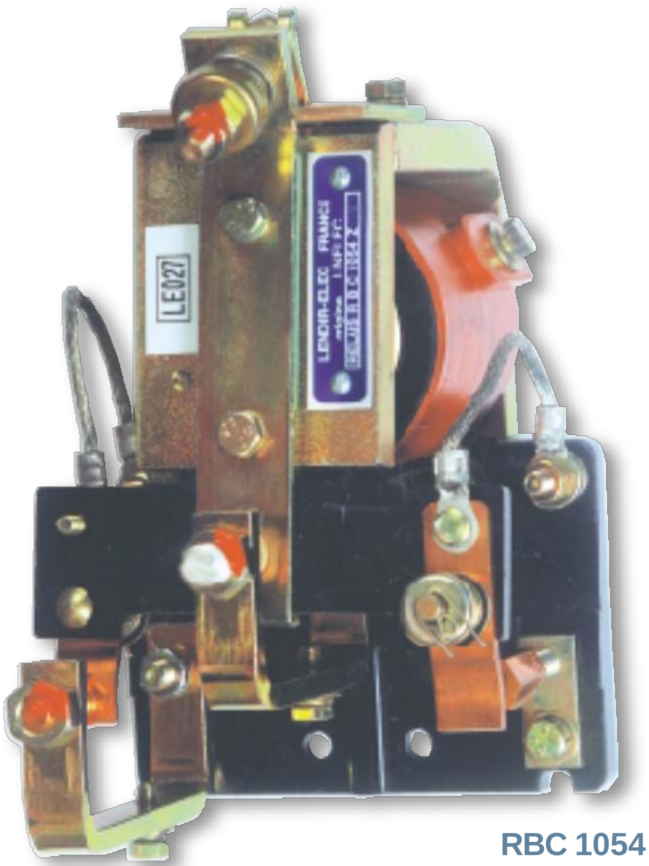


A: detector can be supplied with 110, 220 or 380 V, 50 or 60 Hz.
C: CBT contactor.
CC: CBT's auxiliary contacts.
CD: detector's contact.
D: tripping coil

M: Push-button «on».
PR: rectifier bridge.
RA: auxiliary contactor.
S: Shunt connection: 100 mV.
(1) contactor delivered not cabbled..

Magnetic RBC 1054 Z relays

RBC 1054 ZA,
RBC 1054 ZB,
RBC 1054 ZD,
RBC 1054 ZBA,
RBC 1054 ZBP,
RBC 1054 ZCD,
RBC 1054 ZCH,
RBC 1054 ZCP,
RBC 1054 ZDB,
RBC 1054 ZDK,
RBC 1054 ZBQ,
RBC 1054 ZBM,
RBC 1054 ZCT,
RBC 1054 ZLT,
RBC 1054 ZPC.



RBC 1054 Z Relay
Voltage-trigger ed

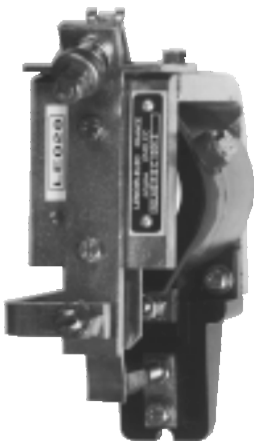
This equipment can be used as:

- instant voltage-triggered or current-triggered control relay,
- voltage-triggered, current-triggered or magnetically delayed on opening of the circuit control relay (delay on opening 1.2 sec. max.),
- reverse-current relay,
- synchronizing relay,
- regenerative braking control relay.

Type of applications: industries, metros, tramways, travelling cranes…

Magnetics DC relays

72. RBC 1054 Z



RBC 1054 ZA Volmétrique

Use

This device is used as:

- Instantaneous, voltage-triggered or current-triggered control relay.
- Control relay, magnet-controlled time delay on opening of circuit, voltage-triggered or current-triggered.
- Reverse-current relay.
- Synchronizing relay.
- Regenerative braking control relay.

Description

RBC 1054 Z relays include:

- 1 solid magnetic circuit: lower section of armature hinged if device has at least 1 arc-blowout contact, upper section if relay has no arc-blowout contacts.
- Contacts normally made of copper (silver on request):
  - -1 contact NO or NC,
  - -2 contacts NO or NC,
  - -3 contacts 3 NC, 1 NC + 2 NO.

The table below gives number, position and form of contacts according to the type of relay.
Relay installation is intended for insulated rods 30 x 21 or 44 x 24.

Relay delivered with 0.25 mm gap plate 0.5 - 0.2 and 1.1 plates can be delivered on request.

The device can be equipped with mechanical latching with manual release on request..

Contacts number	Contacts position	Type of relay	NO contact without arc-blowout 15 A	NO contact without arc-blowout 2 A	NO contact with arc-blowout 6 A(1)	NC contact without arc-blowout 15 A	NC contact without arc-blowout 2A(2) dry	NC contact without arc-blowout 2A(2) blade	Weight (kg)
1	central	ZA	•	-	-	-	-	-	2.250
		ZCT	-	•	-	-	-	-	2.250
		ZD	-	-	•	-	-	-	2.750
		ZB	-	-	-	-	•	-	2.250
		ZCH	-	-	-	-	-	•	2.250
2	lateral	ZBA	• (3)	-	-	-	-	-	2.800
		ZBM	•	-	-	•	-	-	2.800
		ZCD	-	-	• (3)	-	-	-	3.800
		ZBQ	•	-	•	-	-	-	3.300
3	1 central 2 lateral	ZBP	• (3)	-	-	-	•	-	3.000
		ZDB	-	-	-	• (3)	•	-	3.000
		ZCP	• (3)	-	-	-	-	•	3.000
		ZDK	-	-	• (3)	-	-	•	4.000

Technical features

Operating voltage		V	600	
NO or NC 15 A without arc-blowout	thermal nominal current	A	15	
	current switch-off rating(4) under voltage	V	250	600
	resistive circuit	A	1.5	0,6
	inductive circuit	A	1	0,4
NO with arc-blowout	thermal nominal current current switch-off rating(4)	A	according to arc-blowout coil capacity	
Standard coils Other values and/or 10000 V dielectric strength on request.	instantaneous voltage-triggered relays	V	92 - 127 - 220 - 250*	
	delayed voltage-triggered relays	V	130 - 250*	
	instantaneous current-triggered relays	A	2 to 8000	
	delayed current-triggered relays	A	100 - 125 - 150 - 200 - 500*	
	reverse-current relays			
	shunt coil	V	6 - 12 - 16 - 38 - 48 - 60 - 95 - 115 - 167 - 220	
	series coil	V	2 - 5 - 10 - 100 - 200 - 320 - 350 - 600 - 900 - 1000 - 2000 - 3500 - 5000	
	average consumption of voltage-triggered coils	W	20	
	min. closing ampere-turns		400	
Minimum ratio between closing and opening voltages			1.2	

(1) can be equipped with 1-2-3-4-16-25 or 30 A coil.
(2) dry: without penetration, with blade: penetration by bending of blade.
(3) 2 contacts of this type.
(4) for normal settings, special settings may reduce them to a large extent.
* for other values, consult us.

When you order, please let us know:

- the RBC type, name and kind of contacts.
- the nominal voltage or the nominal current of the closing coil.
- the closing range and, if necessary, the opening range.
- if the relay has to be equipped with a mechanical latching with manual release.
- if an arc-blowout coil is to be supplied with the relay, please specify its amperage.
- if instant or delayed on opening operation is required.

Operation

Instantaneous control relay:
voltage-triggered or current-triggered.

The relay coil, connected to the terminals of the circuit to be controlled, closes the device when the voltage or current reaches a determined value.

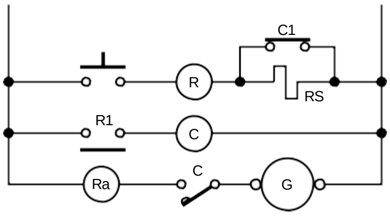
- Closing can occur from 30 % of coil rated voltage or current.
- Opening can be set at closest to 80 % of closing voltage or current.

Control relay magnetically delayed
on opening of circuit:
voltage-triggered or current-triggered.

Same closing and opening characteristics as for instantaneous relays.

Delay on opening:

- 0.8 seconds max when trip coil is short circuited by inserting a series-connected resistor.
- 1.2 seconds max when relay coil is equipped with a retarding turn.



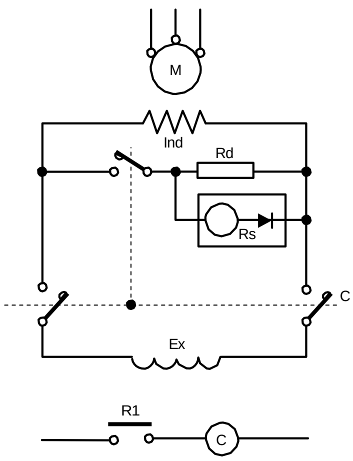
Reverse-current relay.

The device includes 2 coils:

- 1 series coil.
- 1 shunt coil.

The relay is closed by its shunt coil R.
Relay contact R1 closes contactor C.
Contactor C switches the series coil Ra of the relay into the circuit.
Contactor C inserts an RS resistance in series with the shunt coil R of the relay by contact C1.

This resistor RS is calculated to bring the ampere-turns to the minimum required to hold the relay closed.
The relay remains closed whilst the current is in the correct direction, the ampere-turns of coils R and Ra are summed.
The relay opens, the contactor opens as soon as the current changes direction in generator G.



Synchronizing relay.

The RBC 1054 Z relay (1 NC contact) equipped with a retarding turn is used as synchronizing relay for starting synchronous motors. The relay coil is set into service by a selenium diode.
On energization of motor M, inductor Ind closed on discharge resistor Rd, a current appears at the terminals of the assembly Rs (coil + diode) and the relay closes.

Current frequency reduces as start-up progresses.

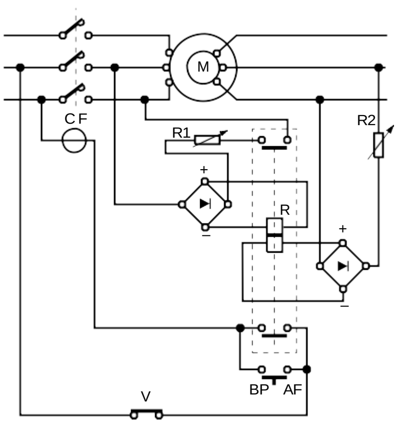
When synchronism is reached, the interval between 2 rectified half-waves is sufficient to open the relay.

Contact R1 of the relay closes contact C.

Contactor C inserts Ex and opens the discharge resistor circuit Rd.

Specify on order:

- Voltage at terminals of Rd, motor stopped, to close the relay.
- Maximum voltage reached during start-up for choice of diode.



Regenerative braking control relay.

The device includes a coil with 2 windings in opposition.

They are connected, via a rectifier, one to the terminals of the stator, the other to the terminals of the rotor of motor M.

When braking is commanded, rotor voltage is equal to 2 VR (VR = normal rotor voltage).

Relay R must open for voltage 2 VR only.

Closing the relay switches the stator winding into service:
- rotor voltage decreases from 2 VR to VR,
- motor speed falls from normal to 0.

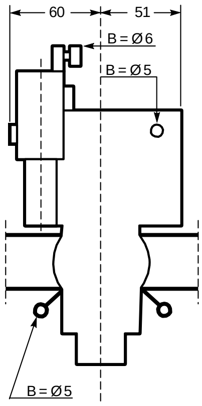
Zero speed corresponds to end of braking and opening of relay.

BP AF: “Braked stop” push-button.
CF: braking contactors.
R1 - R2: adjustable resistors.
V: electronic locking contact of “Normal run” contactor.

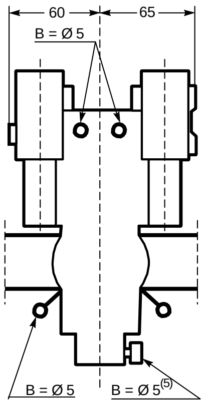
Overall dimensions

Magnetic DC relays

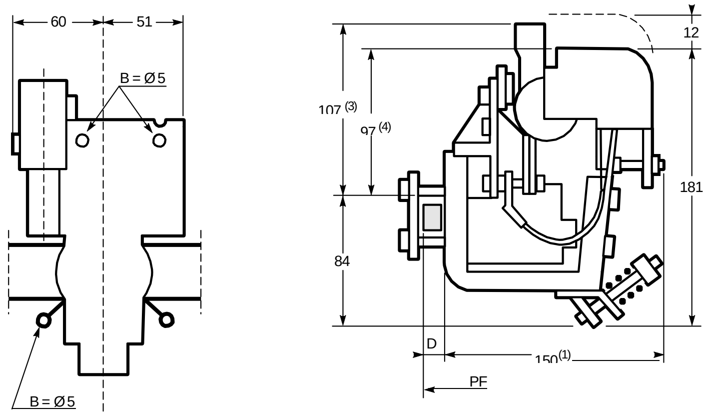
1) ZBD



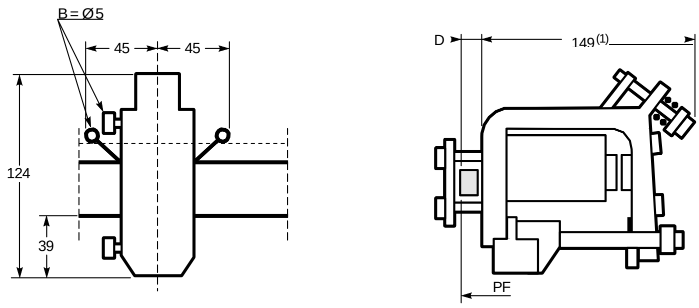
2) ZCD - ZDK



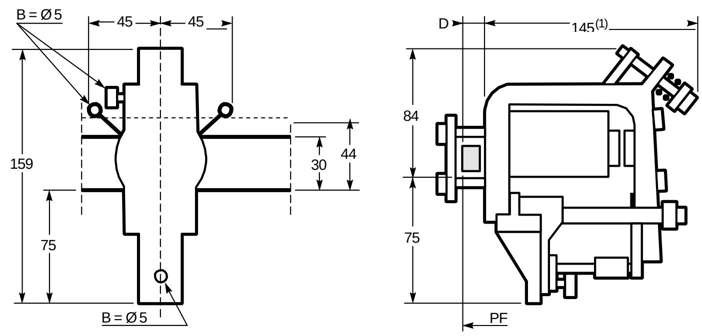
3) ZBQ



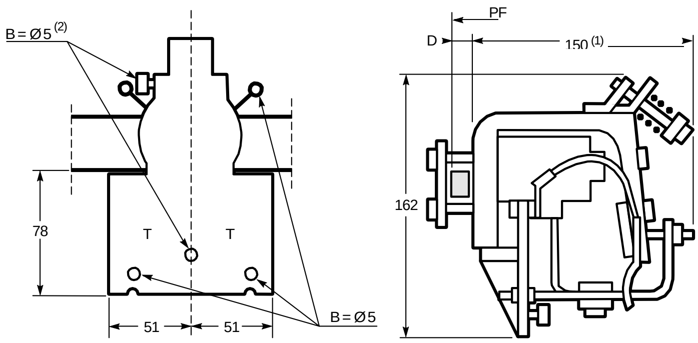
4) ZB - ZCH



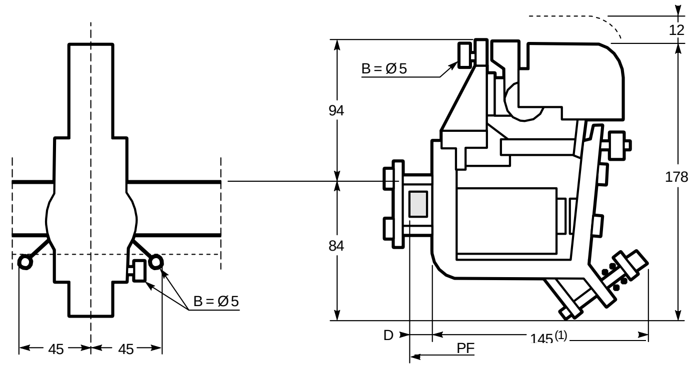
5) ZA - ZCT



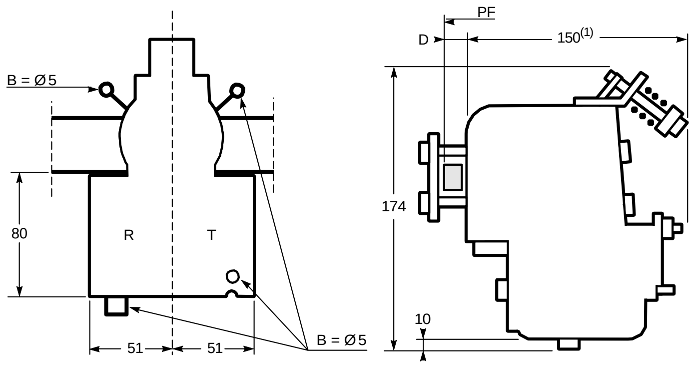
6) ZBA - ZBP - ZCP



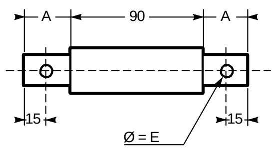
7) ZD



8) ZBM



Attachment



(1) approx.
(2) for ZBP and ZCP.
(3) for ZDB.
(4) for ZCD and ZBQ.
(5) for ZDK.

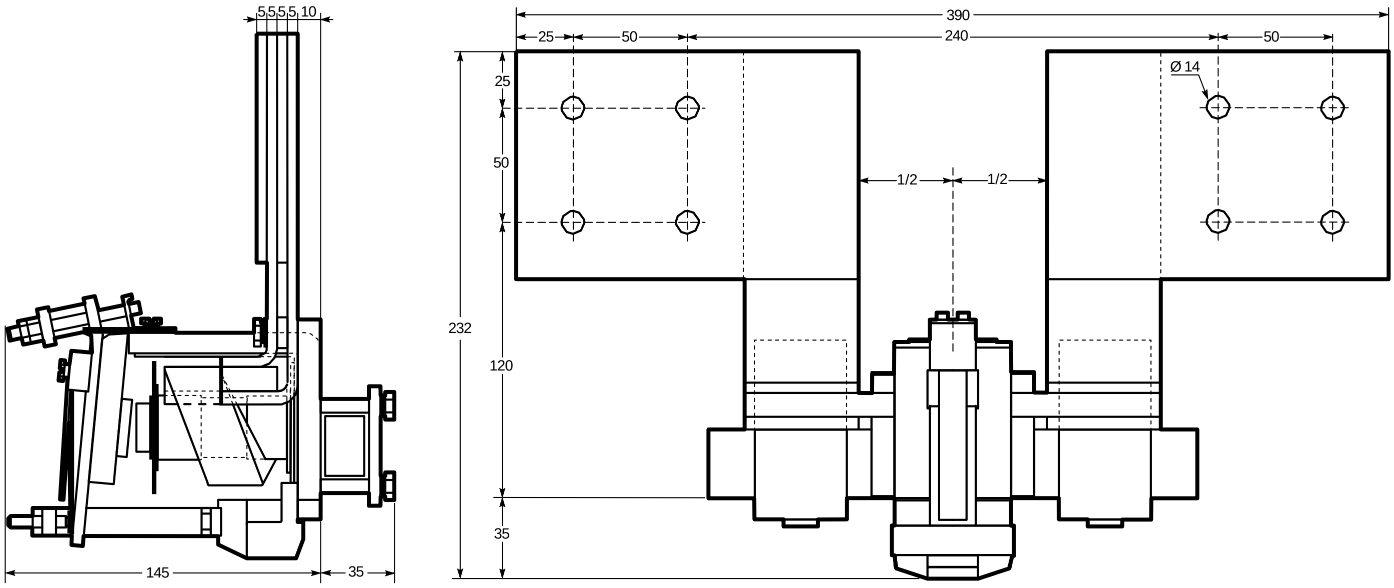
B: terminals.
D: 18.5 for bar 30 x 21,
22 for bar 44 x 24.
PF: attachment plane.

bar (mm)	A	B	EØ
30 x 21	30	13	9
44 x 24	40	18	13

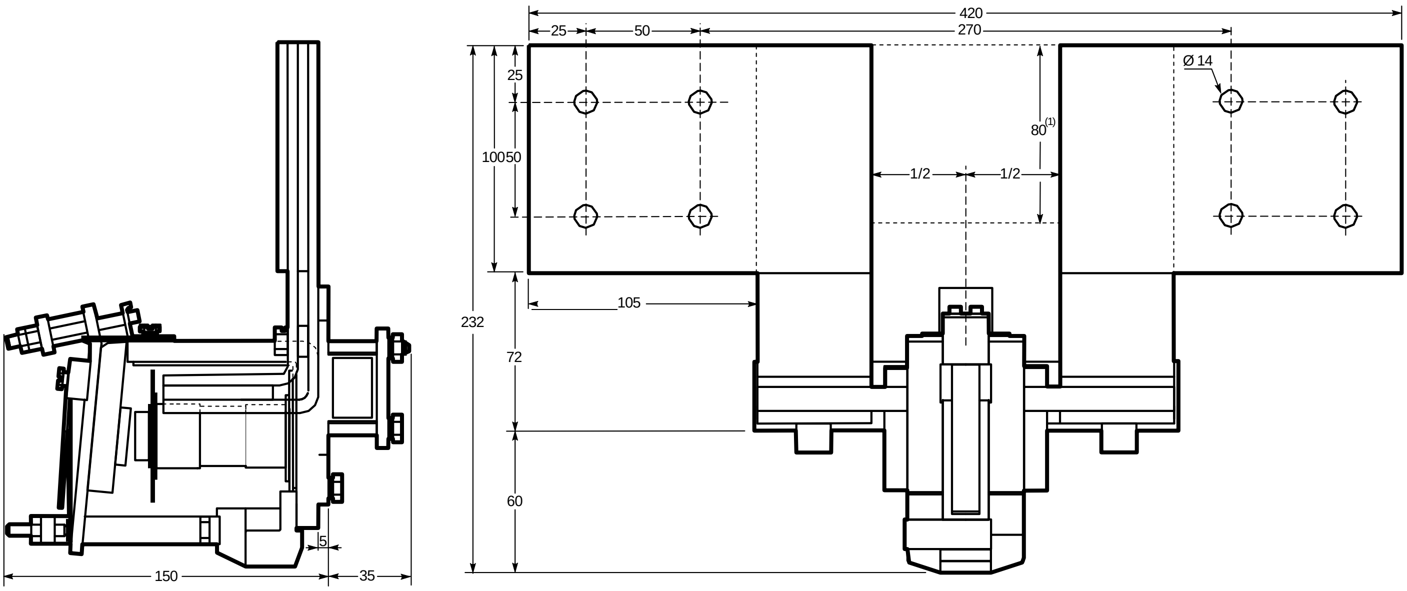
Overall dimensions for 900 à 5000 A current-triggered relays

DC current-triggered magnetic relays

73. 900 A ZCH relay(2)



74. 1250, 2000, 3500, 5000 A ZCH relay(2)

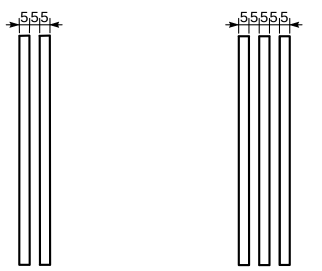


(1) only for the 5000 A relay.
(2) other forms on request.

Connecting sections

Bars 900/1250/2000 A

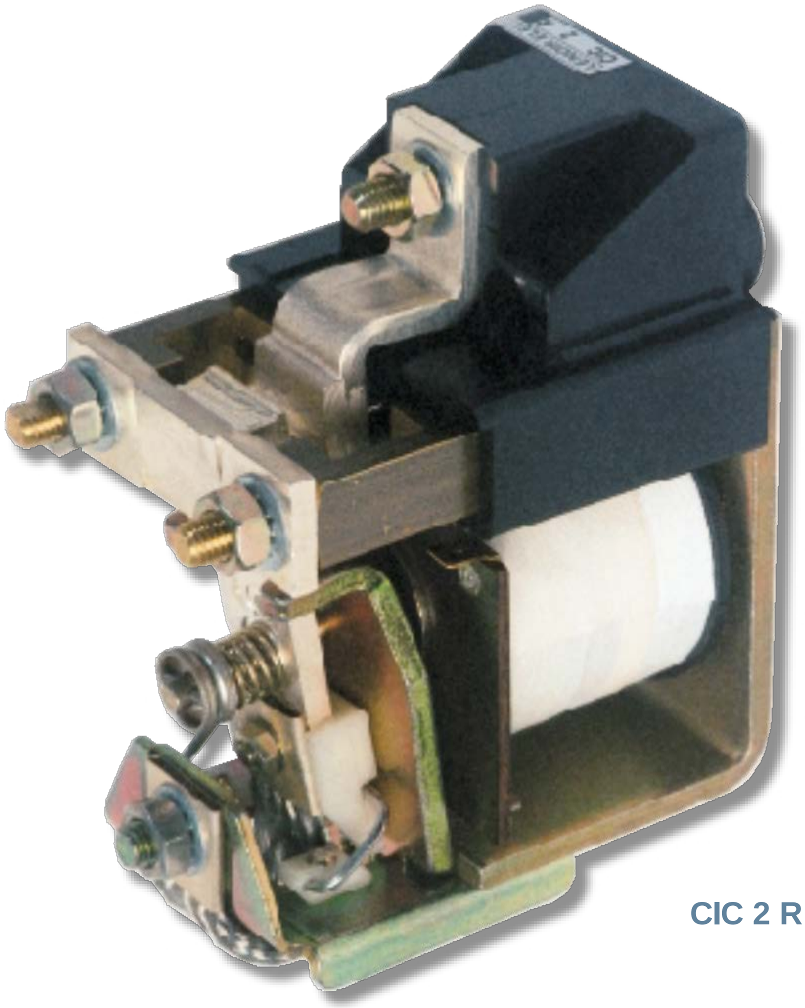
Bars 3500/5000 A



CIC 1 - 2 DC contactors

Contactors for electrical trolleys CIC :

CIC 1D,
CIC 1R,
CIC 1DS,
CIC 1RS,
CIC 2D,
CIC 2R,
CIC 2DS,
CIC 2RS.



CIC 2 R

CIC DC contactors:

- Connecting points that allow a full connection (poles and coil) on the front, making easier the installation of the equipments on the trolley.
- An easy access to all the parts subject to replacement, all located on the front.

They are also equipped with:

- A moving element on blades eliminating premature wear and jamming which allows use of the contactors in cold chamber, without risk of icing the coil core.
- A moving contact control device providing intentional sliding of “NO” and “NC” contacts which increases the reliability of the contactor when the current passes (self-cleaning) and reduces rebounds (reduced risk of welding on closing).

2 versions of CIC contactors are available:

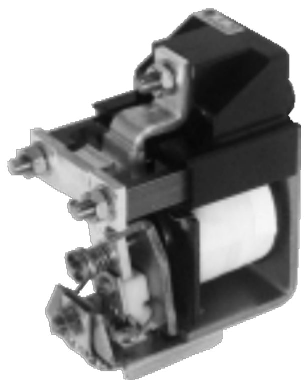
- contactor version = 1 NO contact,
- reverser version = 1 NO contact + 1 NC contact.

- It is possible to add one reverser auxiliary contact without any point in common.
- The contactor closes at 50 % of the nominal voltage which enables the trolleys to join the recharging point even after a long time of operation.
- Arc-blowout with permanent magnet device for use under nominal voltages superior to 48 V.

In that case, it is compulsory to have the fixed NO contact connected to the pole + of the battery.

Equipement for electrical trolleys

75. CIC 1-2 DCcontactors



Possible addition of a block of adjustable auxiliary contacts 1 NO + 1 NC, on request.

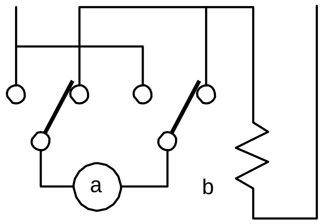
Use

Device intended to control DC loads, voltage ≤ 110 V under ambient temperature conditions of 50° C max.
It is specially recommended for:

- Equipping electrical vehicles and trolleys:
  - traction motor (strat-up by short circuiting resistors, electrical speed controller),
  - hydraulic pump motor (direct start-up or by electronic speed controller).
- Distribution by accumulator battery:
  - coupling, battery charge,
  - emergency lighting,
  - passenger car lighting, railways.
- Equipping electrical welding sets (DCside switch-off).

Description

- model element on blades elimininating premature wear and jamming allowing use in cold chamber.
- moving contact control device providing intentional sliding of contacts (self-cleaning) and reducing rebound (risk of welding on closing reduced).
- Ag Cdo contacts.
- polarised device: + to be connected to upper fixed contact.
- connection via front.
- 4 versions:
  - D: 1 main pole without magnetic arc-blowout,
  - DS: 1 main pole with magnetic arc-blowout,
  - R: 1 reverser pole without magnetic arc-blowout,
  - RS: 1 rupturing pole with magnetic arc-blowout.
- 3 power supply possibilities:
  - intermittent service (trolley),
  - permanent service without power-saving,
  - permanent service with power-saving.
- rupturing, set of 2 CIC version R or RS(rupturing pole)
  - installed on support plate,
  - upper closing and opening contacts of poles inter-connected



a : induced.
b : inductance.

Technical features

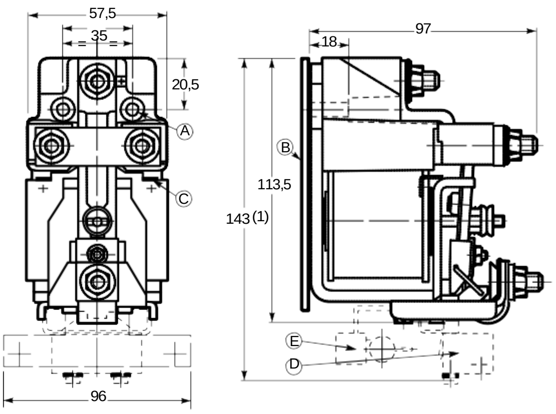
					CIC 1	CIC 2
Operating current (in open air DC_1)						
	permanent servie			A	180	240
	trolley service(1)			A	250	310
	connecting section			mm²	35	70
Operating voltage(2)				V	≤ 110	≤ 110
Pole thermal time constant				mn	18	18
Operating category: DC_1 to DC_5 class 3					•	•
Pole current switch-off and switch-on rating						
	NO contact					
		version D-R	closing	A	900	2000
		V ≤ 48	opening	A	900	1200
		version DS-RS	closing	A	900	2000
		V ≤ 96	opening	A	900	1200
	NC contact					
		version R	closing	A	400	550
		V ≤ 48	opening	A	400	500
		version RS	closing	A	400	550
		V ≤ 96	opening	A	200	500
Voltage drop at pole				mV	37	44
	under a current of			A	150	200
Maximum operating rate under load				operations/hour	300	300
Mechanical endurance				millions of operations	3	3
Control circuit: standard rated voltage				V	12-24-36-48-72-80-96-100-200	
	permanent service without power-saving(3)					
		consumption at rated voltage		W	25	32
		closing/opening time		ms	55/15	75/16
	permanent service with power-saving(4)					
		consumption at rated voltage: inrush/hold		W	44/20	53/22
		closing/opening time		ms	40/13	50/14
	intermittent service: duty factor 50 %(5)					
		consumption at rated voltage		W	44	53
		closing/opening time		ms	40/16	50/17

(1) duty factor 50 %, 5 min. open, 5 min. closed.
(2) magnetic arc-blowout by permanent magnet mandatory for opening under load with V > 48.
(3) allowable voltage 85 to 110 % rated voltage, opening voltage 20 % rated voltage.
(4) device with auxiliary contact and power-saving resistor allowable voltage 65 to 110 %, opening voltage 22 % rated voltage.
(5) max. cycle 150/150 s, allowable voltage 65 to 110 % rated voltage, opening voltage 15 % rated voltage.

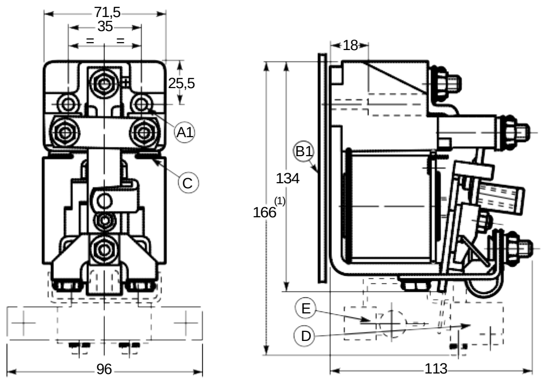
Overall dimensions

Equipement for electrical trolleys

CIC 1

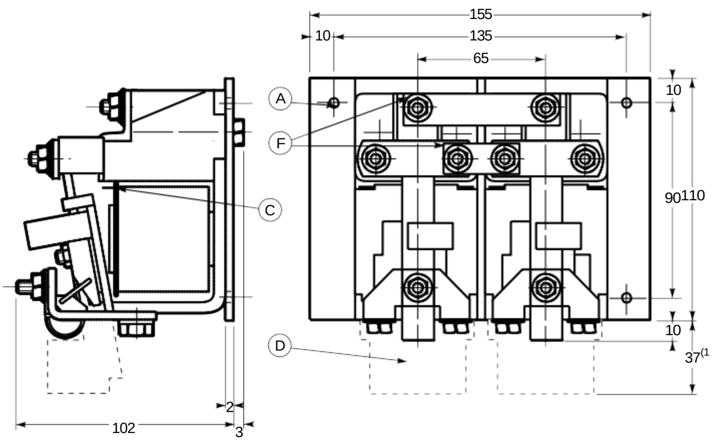


CIC 2



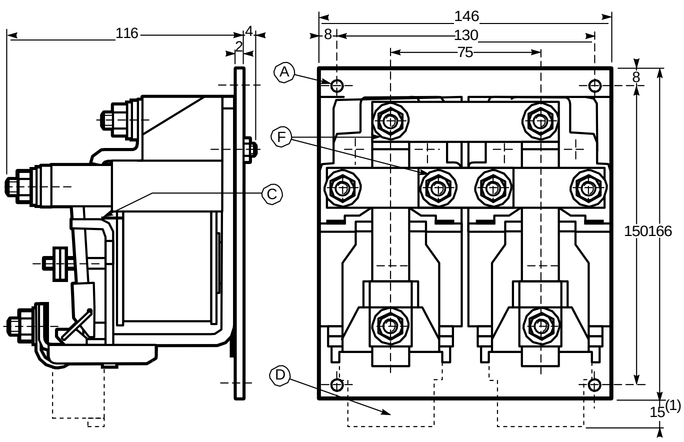
A: attachment two 5.5 dia. holes.
A1: attachment two 6.5 dia. holes.
B: insulating plate 109 x 58 x 1.
B1: insulating plate 129 x 71.5 x 1.
C: coil connection 6.35 Faston lugs.
D: auxiliary contacts 1 NO + 1 NC.
E: power-saving resistor.
(1) with auxiliary contacts.

Reverser CIC 1 contactor 1



A: attachment: four 7 dia. holes.
C: coil connection 6.35 Faston lugs.
D: auxiliary contacts 1 NO + 1 NC.

IReverser CIC 2 contactor



F: coupling of NO and NC contacts of reverser pole.
(1) with auxiliary contacts

Weights (kg)	CIC 1	CIC 2
D without arc-blowout	1.100	1.850
R without arc-blowout	1.140	1.850
Complete reverser contactor (2 NC without arc-blowout)	2.500	4.000
Magnetic arc-blowout	0.025	0.045
Auxiliary contact block(1)	0.055	0.055
Power-saving device(2)	0.085	0.085

(1) with support and hardware.
(2) contact block, power-saving resistor and support

Connection drawings

Magnetic circuit type	Poles for	Type and size of the contactor	Mechanical latching with manual and electrical release	Magnetic circuit supplied with					Page
				Alternating current			Direct current		
				direct	rectified				
					power-saved	not power-saved	not power-saved	power-saved	
laminated	Alternating current	CBA55 80 - 150 - 200	without	**1**	•			(2)	145
			single	**7**	•			(8)	146
			double	**25**	•			(26)	150
solid	Alternating current	CBPA57 80 - 150 - 200	without		(3)	•	**2**	**2**	145
			single		(9)	•	**8** (18)	**8** (18)	146
			double		(27)	•	26 (36)	26 (36)	150
solid	Direct current	CBC57B 80 - 150 - 200	without		(3)	•	**2**	**2**	145
			single		(9)	•	**8** (18)	**8** (18)	146
			double		(27)	•	**26** (36)	**26** (36)	150
laminated	Direct current	CBFC55 80 - 150 - 200	without	**1**	•			(2)	145
			single	**7**	•			(8)	146
			double	**25**	•			(26)	150
solid	Direct current	CBC57 80 - 150				•	**2**		145
		CBC68 200				•	**2**		145
		CBC96 400 - 630			•	•	**2**	•	145
		RUBC96 400 - 630			•			**2**	145
laminated	Alternating current	CBA75 400 1 to 4 poles and 500 - 630 1 to 2 poles	without	**1**	(3-5)			**4** (6)	145
			single	**7**	(9-13-17-19-21-23)	(11-15)	(12-16)	(10-14-18-20-22-24)	146
			double	**25**	(27-31-35-37-39-41)	(29-33)	(30-34)	(28-32-36-38-40-42)	150
laminated	Alternating current	CBA75 500 to 1000 > to 2 poles for 500 - 630	without		3 (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
laminated	Direct current	CBFC75 400 1 to 4 poles and 500 - 630 1 to 2 poles	without	1	(3-5)			**4** (6)	145
			single	7	(9-13-17-19-21-23)	(11-15)	(12-16)	(10-14-18-20-22-24)	146
			double	25	(27-31-35-37-39-41)	(29-33)	(30-34)	(28-32-36-38-40-42)	150
laminated	Direct current	CBFC75 500 to 1000 > to 2 poles for 500 - 630	without		**3** (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Alternating current	CBA71 1250 - 1600 - 2000	without		**3** (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Direct current	CBC71 1250 - 1600 - 2000	without		**3** (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Alternating current	CBA54 2500 - 60 4000	without		**3** (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Direct current	CBC54 3000 - 60 5000	without		**3** (5)			**4** (6)	145
			single		**9** (13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		**27** (31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Direct current	CBT200							
laminated	Direct current	CBT400 & 800							
solid	Direct current	CEX57 80 - 150 - 200	without	•	•	•	**2**	**2**	145
			single	•	•	•	**8** (18)	**8** (18)	146
			double					**26** (28)	150
laminated	Direct current	CEX75 400 to 1000	without		(3-5)			**4** (6)	145
			single		(9-13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		(27-31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Direct current	CEX71 1250 to 2000	without		(3-5)			**4** (6)	145
			single		(9-13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		(27-31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150
solid	Direct current	CEX54 3000 - 60 5000	without		(3-5)			**4** (6)	145
			single		(9-13-17-19-21-23)	(11-15)	(12-16)	**10** (14-18-20-22-24)	146
			double		(27-31-35-37-39-41)	(29-33)	(30-34)	**28** (32-36-38-40-42)	150

• consult us.
(x) x is the n° of the optional connection drawing that can be applied to the contactor. It has to be determined, when you consult us or when you order.
Bold figures represent the standard type of connection.

Note: All the contactors from 80 to 200 A are delivered not connected.
For the whole range of contactors from 80 to 5000 A:
- overall dimensions are only given for standard connections. In case you wish your contactor to have other optional connections, please contact our technical department to have its total dimensions.

We can also supply, for contactors that are not equipped with a mechanical latching with electrical release, a system installed on a support plate designed to maintain the contactor closed in order to avoid untimely micro-cuts, please consult our technical department.

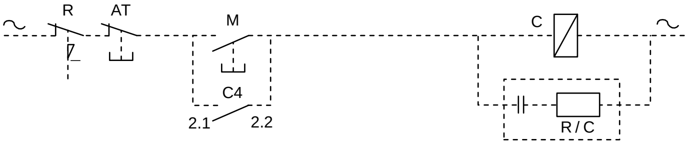
76. Control circuit of contactors without mechanical latching with electrical release

AC control voltage, alternating or rectified device

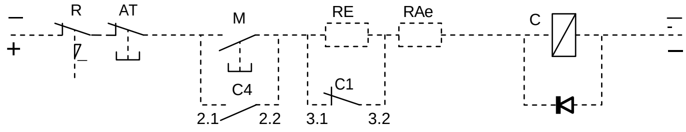
DC control voltage

- Control by pulse switch for range 80 to 200 A, in AC supply for range 400 A -1 to 4 poles, 500/630 A-1 and 2 poles..

◆**Drawing n° 1**

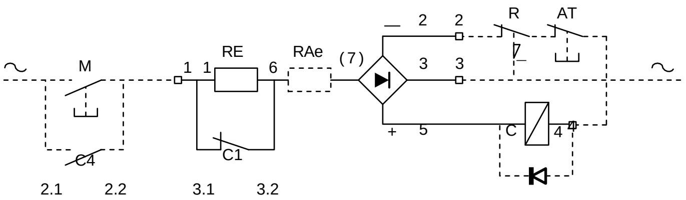


◆**Drawing n° 2***

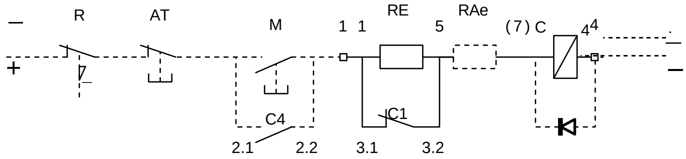


- Control by pulse switch.

◆**Drawing n° 3**

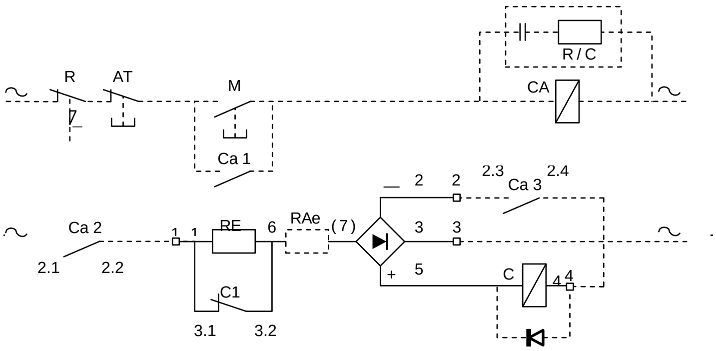


◆**Drawing n° 4**

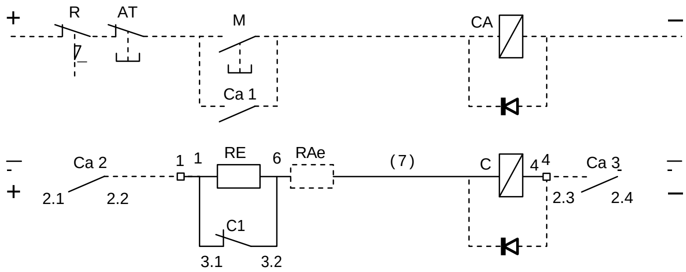


- Control by pulse switch and auxiliary contactor.

◆**Drawing n° 5****



◆**Drawing n° 6****



* in case of direct supply, there are no economy resistor 'RE', no eventual extra resistor 'Rae' and no insertion contact 'C1'.
** 'CA' relay not supplied.

On request, diode or RC on control circuit.

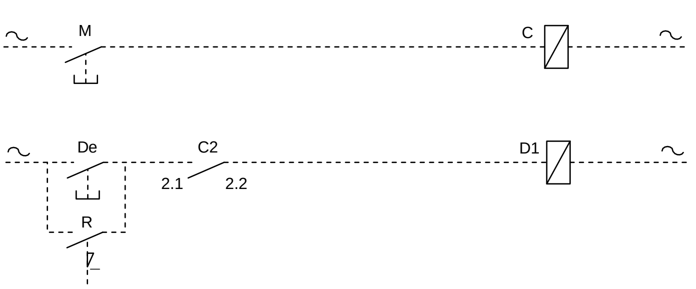
77. Control circuit of contactors with mechanical latching with single electrical release

AC control voltage, alternating or rectified device

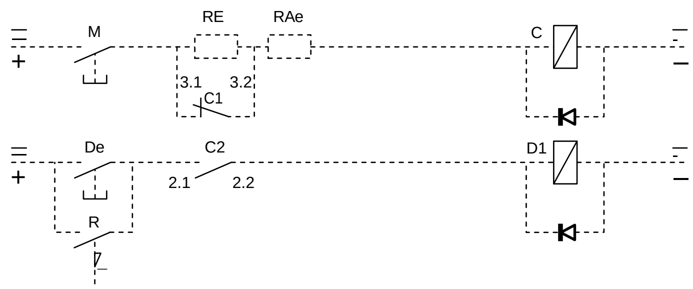
DC control voltage

- Control by pulse switch (required pulse time � 0.5 s) for range 80 to 200 A, in AC supply for range 400 A -1 to 4 poles, 500/630 A-1 and 2 poles.

◆ **Drawing n° 7**

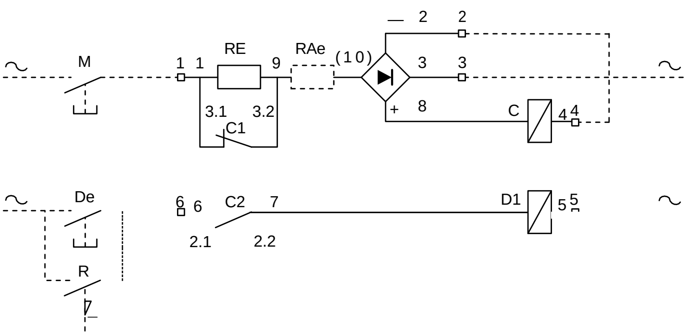


◆ **Drawing n° 8***

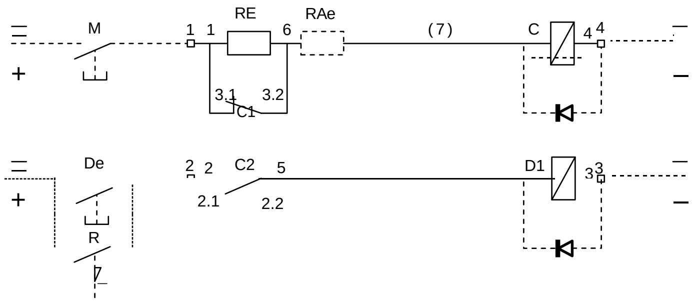


- Control by pulse switch (required pulse time � 0.5 s)..

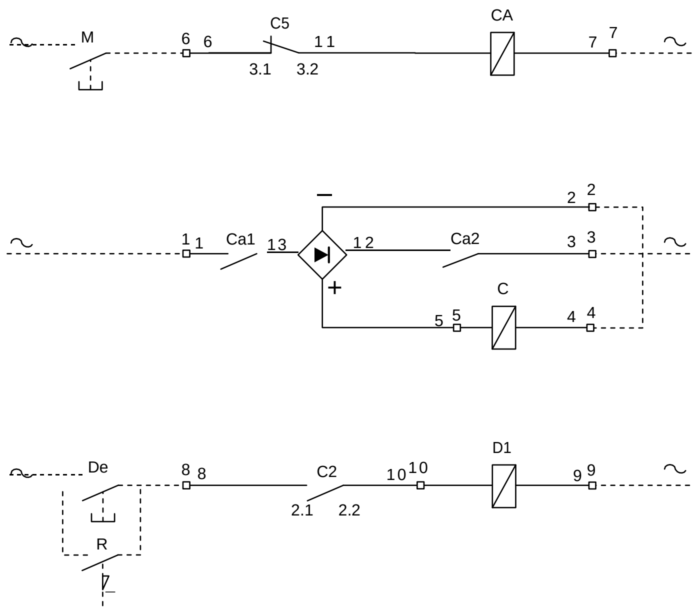
◆ **Drawing n° 9**



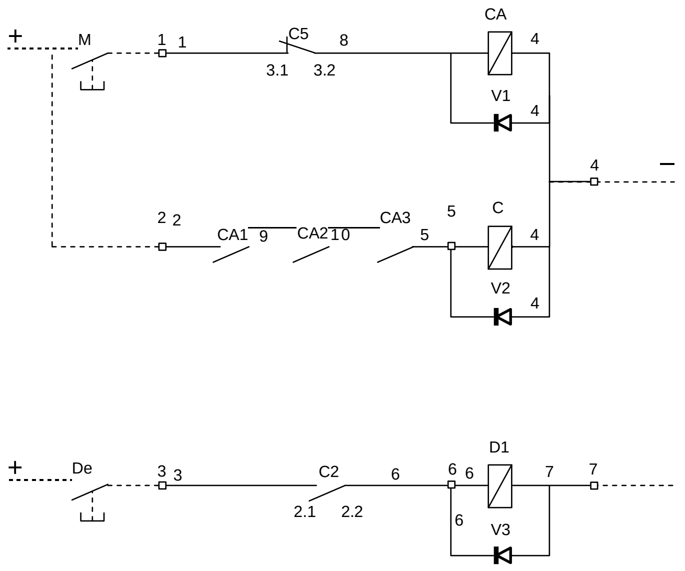
◆ **Drawing n° 10**



● **Drawing n° 11**



● **Drawing n° 12**



* in case of direct supply, there are no economy resistor 'RE', no eventual extra resistor 'Rae' and no insertion contact 'C1'.

On request, diode or RC on control circuit.

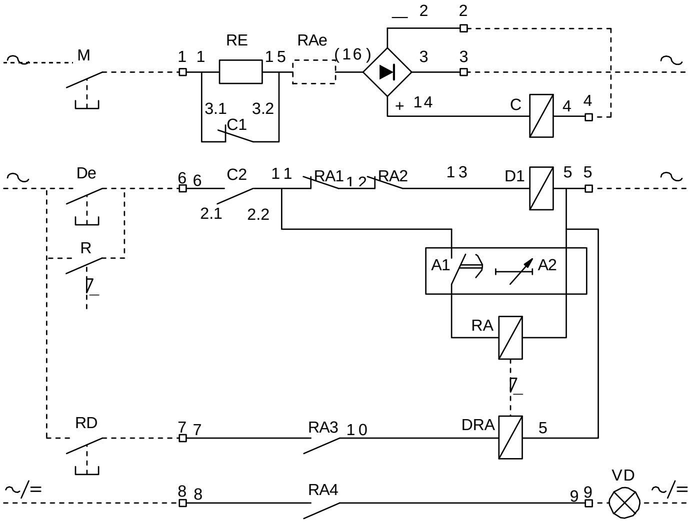
77. Control circuit of contactors with mechanical latching with single electrical release (§1)

AC control voltage, alternating or rectified device

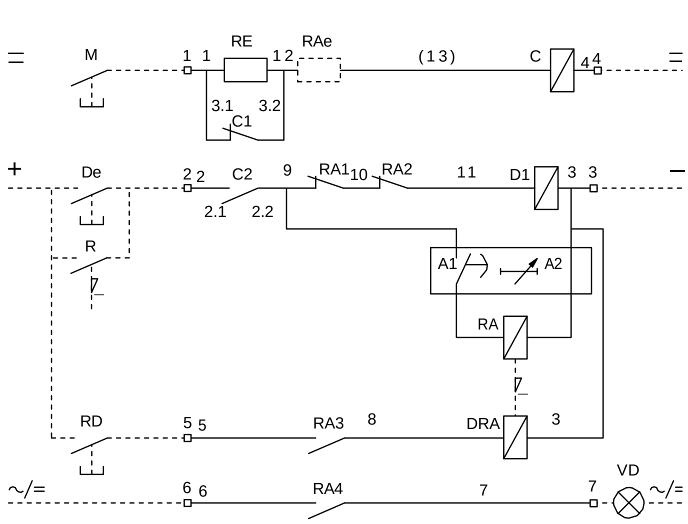
DC control voltage

- Control by pulse switch (required pulse time � 0.5 s) and protective device with defect memorisation for the release coil.

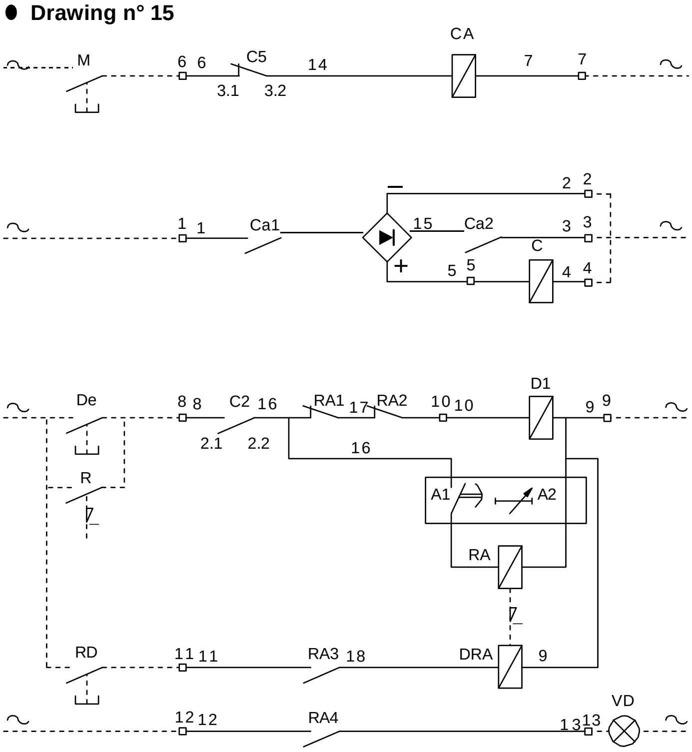
● Drawing n° 13



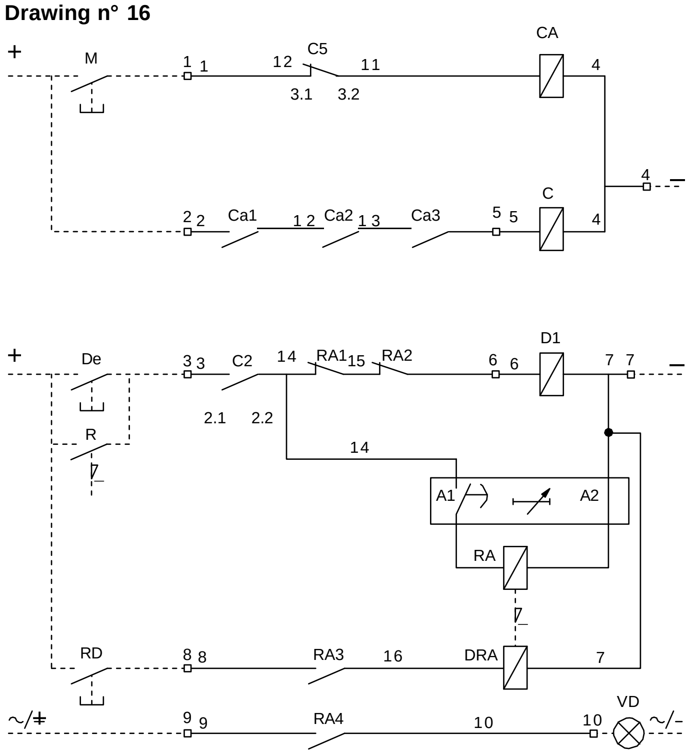
● Drawing n° 14



● Drawing n° 15



● Drawing n° 16



On request, diode or RC on control circuit.

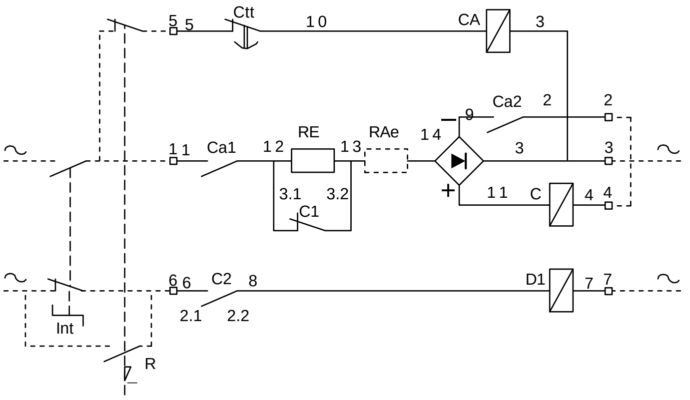
77. Control circuit of contactors with mechanical latching with single electrical release (§2)

AC control voltage, alternating or rectified device

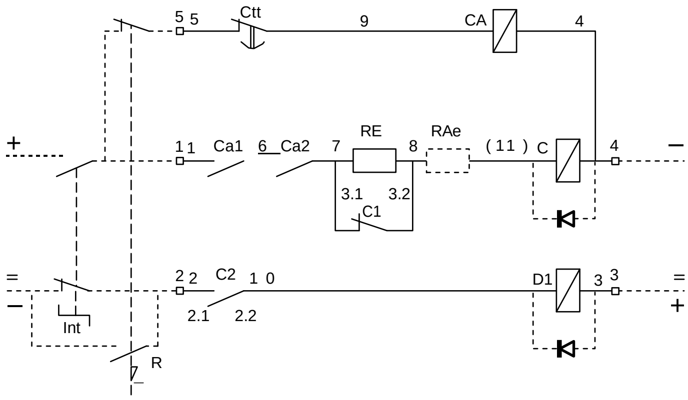
DC control voltage

- Control by switch, mechanically delayed contact and auxiliary contactor..

● **Drawing n° 17**

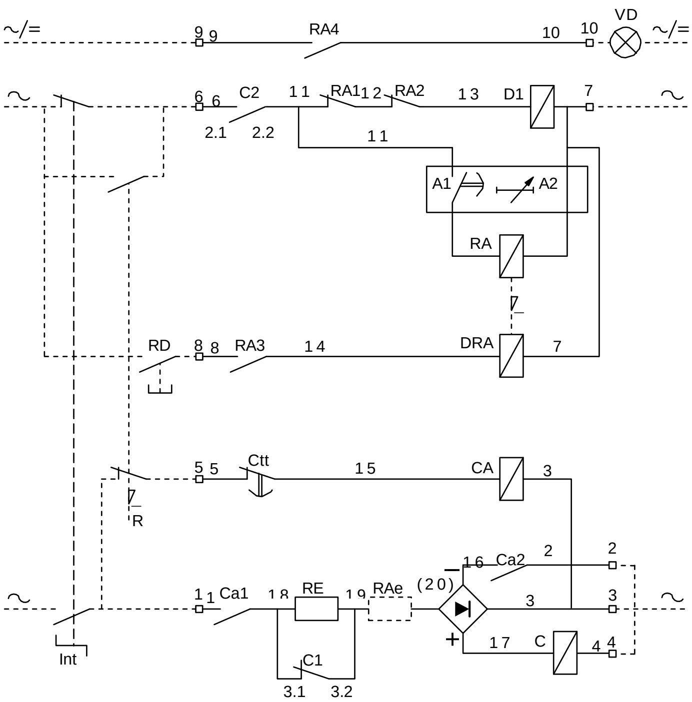


● **Drawing n° 18**

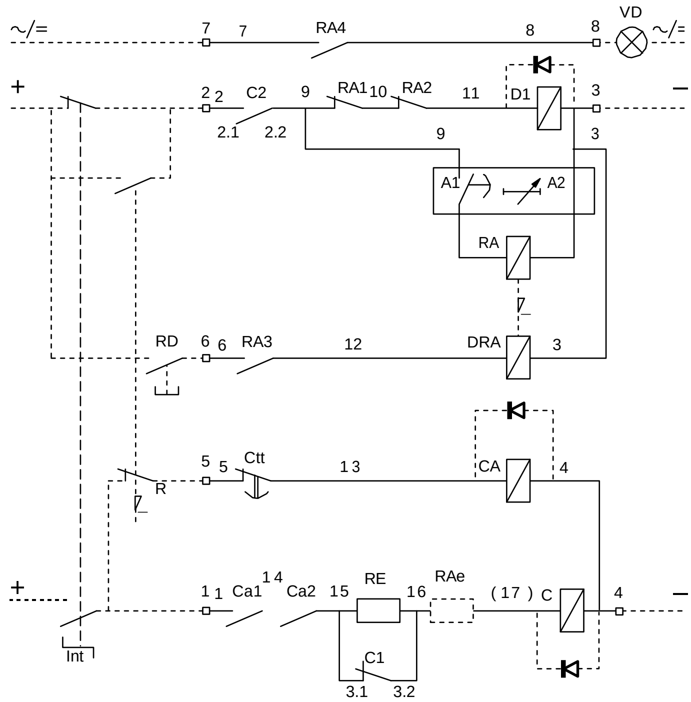


- Control by switch delayed auxiliary contactor and protective device with defect memorisation for the release coil.

● **Drawing n° 19**



● **Drawing n° 20**



On request, diode or RC on control circuit

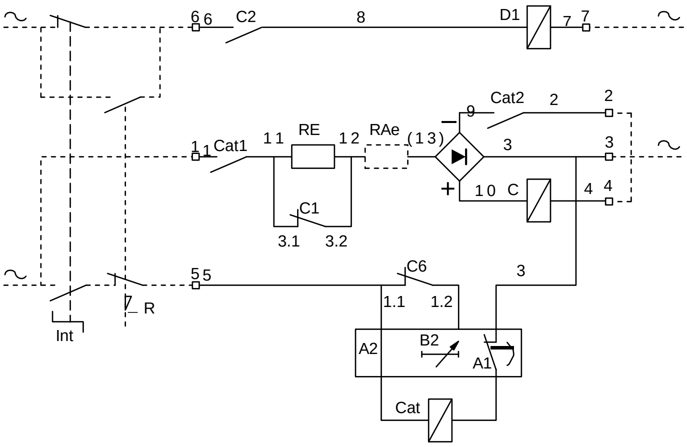
77. Control circuit of contactors with mechanical latching with single electrical release (§3)

AC control voltage, alternating or rectified device

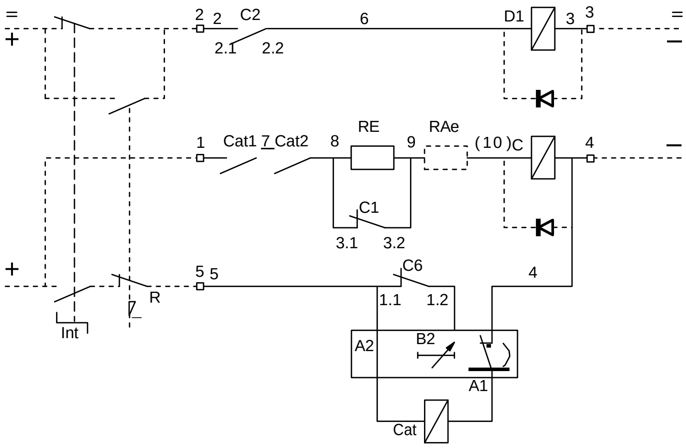
DC control voltage

- Control by switch and delayed auxiliary contactor.

● **Drawing n° 21**

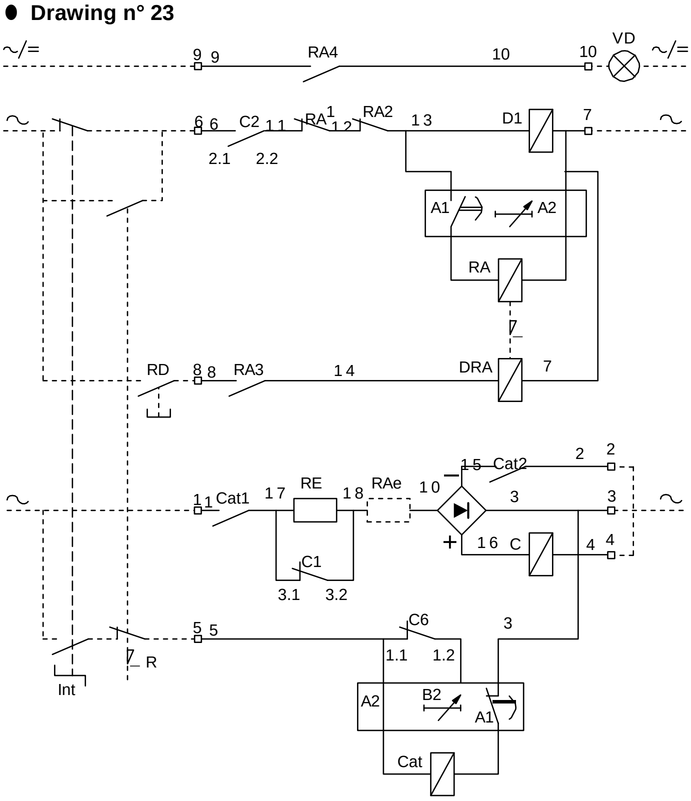


● **Drawing n° 22**

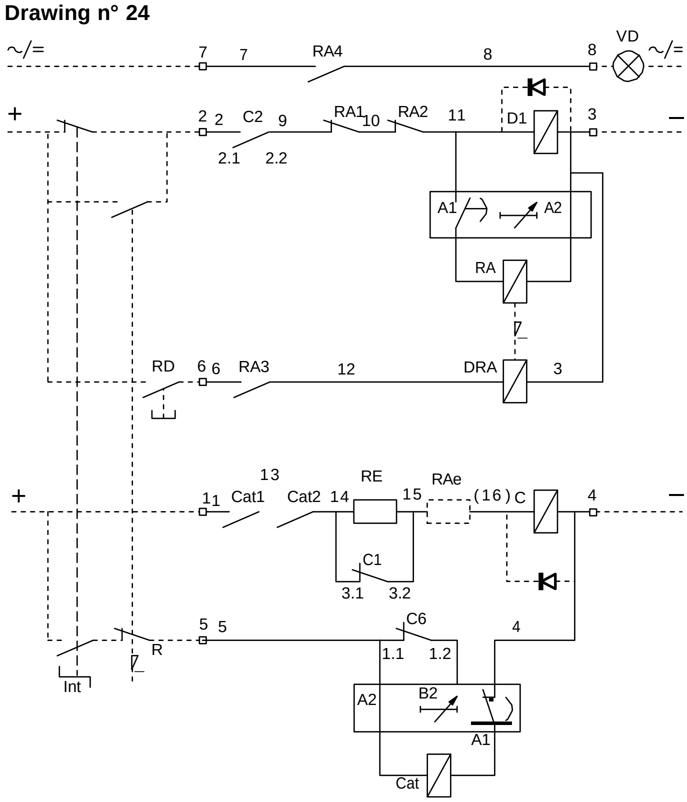


- Control by switch, delayed auxiliary contactor and protective device with defect memorisation for the release coil.

● **Drawing n° 23**



● **Drawing n° 24**



On request, diode or RC on control circuit

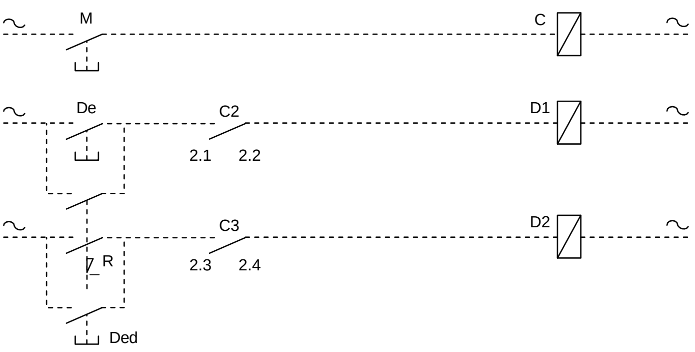
78. Control circuit of contactors with mechanical latching with double electrical release

AC control voltage, alternating or rectified device

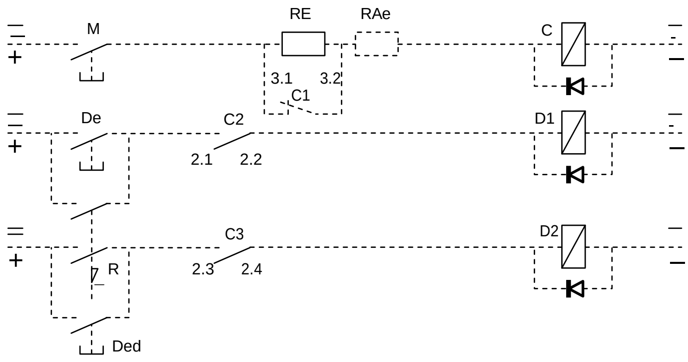
DC control voltage

- Control by pulse switch for range 80 to 200 A, in AC supply for range 400 A -1 to 4 poles, 500/630 A-1 and 2 poles.

◆Drawing n° 25

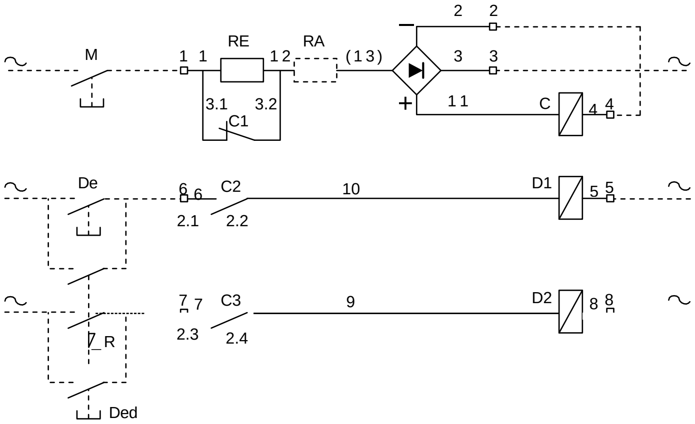


◆Drawing n° 26*

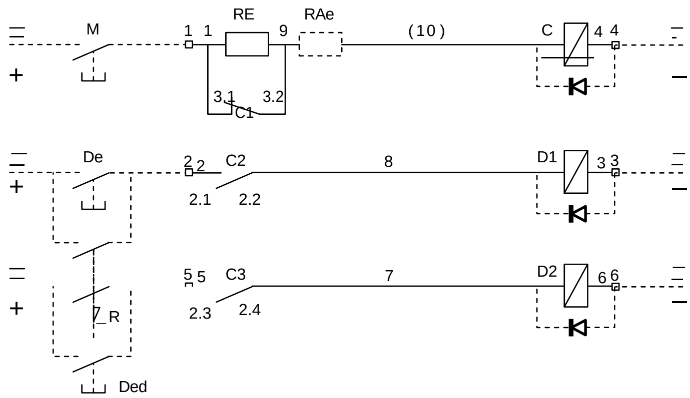


- Control by pulse switch (required pulse time � 0.5 s).

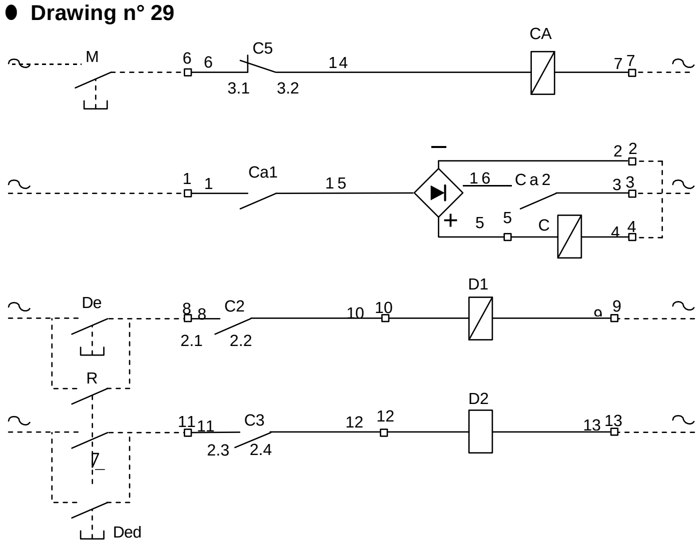
◆Drawing n° 27



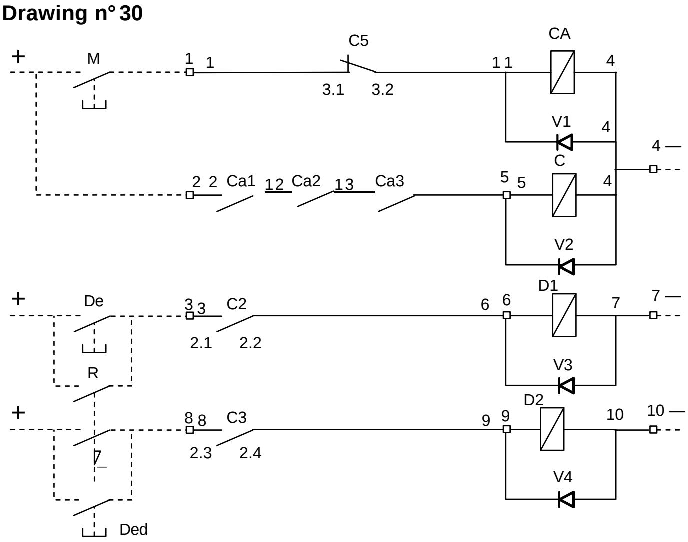
◆Drawing n° 28



● Drawing n° 29



● Drawing n° 30



* in case of direct supply, there are no economy resistor 'RE', no eventual extra resistor 'Rae' and no insertion contact 'C1'.

On request, diode or RC on control circuit.

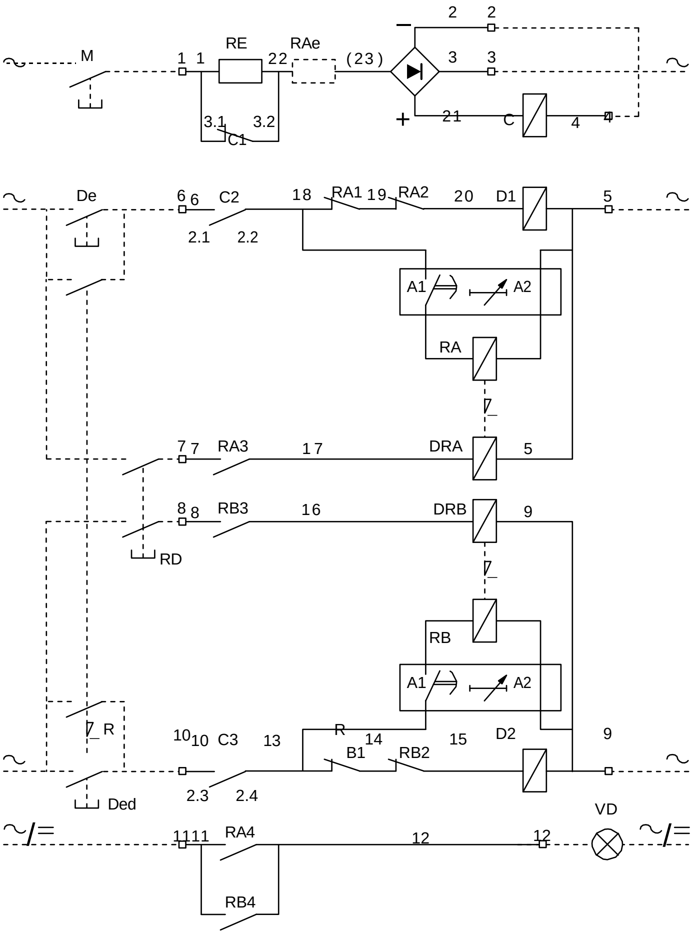
78. Control circuit of contactors with mechanical latching with double electrical release (§1)

AC control voltage, alternating or rectified device

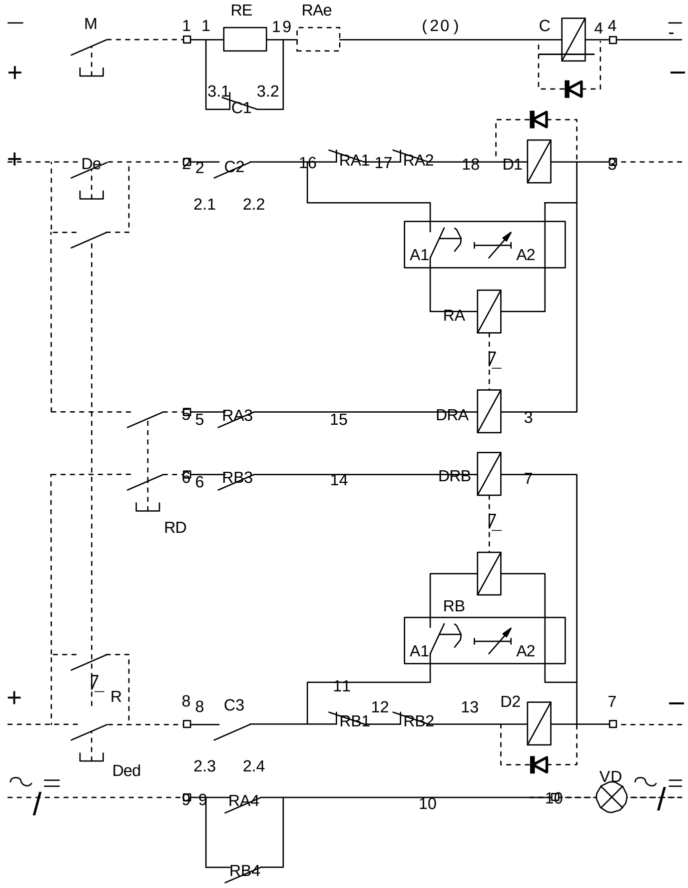
DC control voltage

- Control by pulse switch (required pulse time � 0.5 s), protective device with defect memorisation for the release coil.

Drawing n° 31



Drawing n° 32



RB4

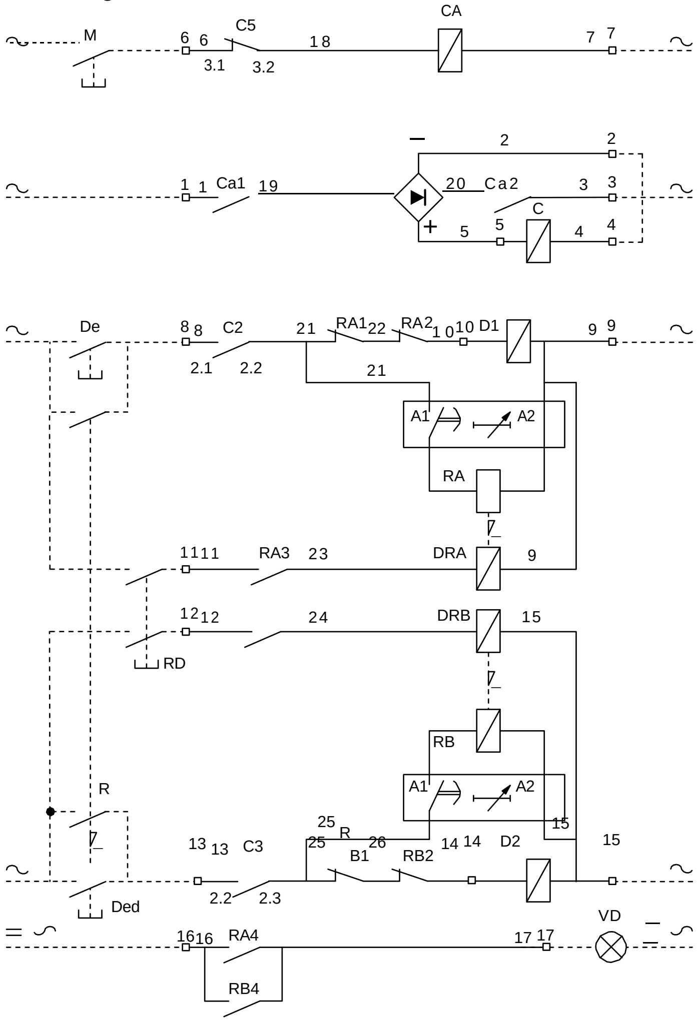
RB4

On request, diode or RC on control circuit
On request, diode or RC on control circuit

78. Control circuit of contactors with mechanical latching with double electrical release (§2)

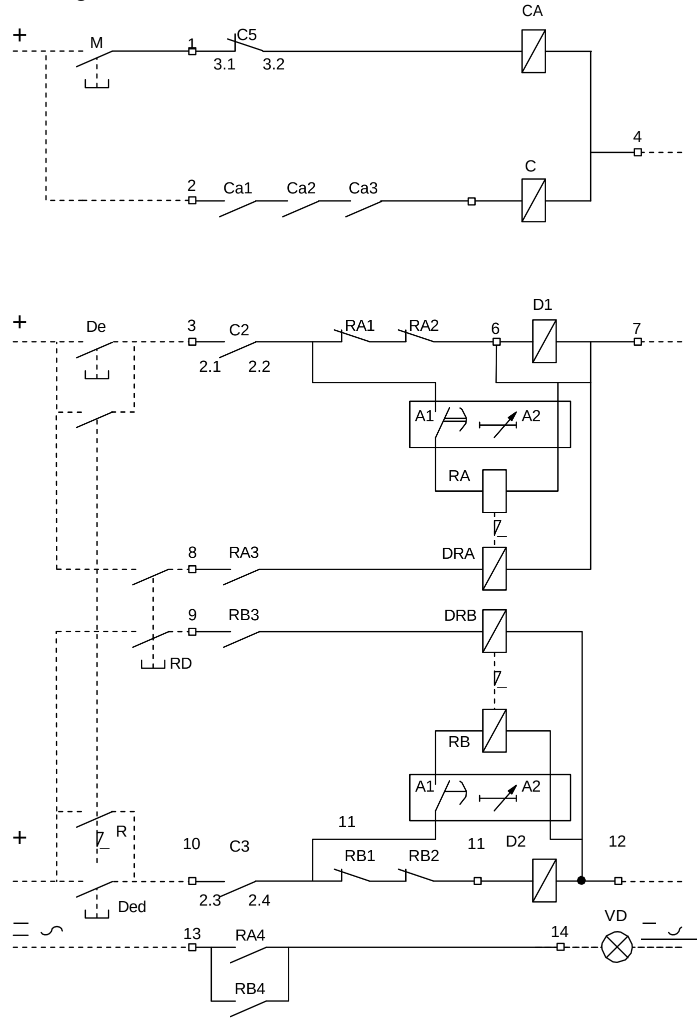
AC control voltage, alternating or rectified device

Drawing n° 33



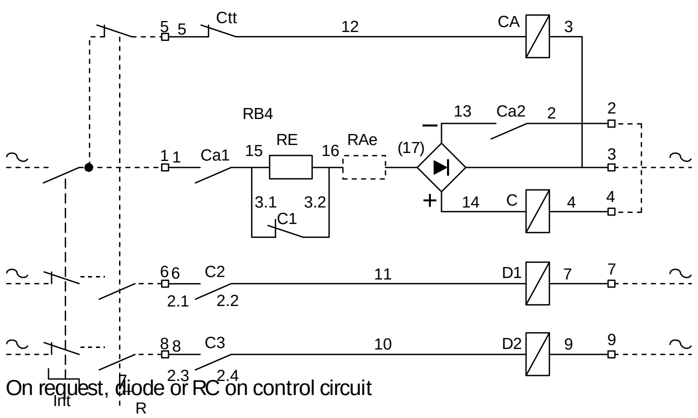
DC control voltage

Drawing n° 34



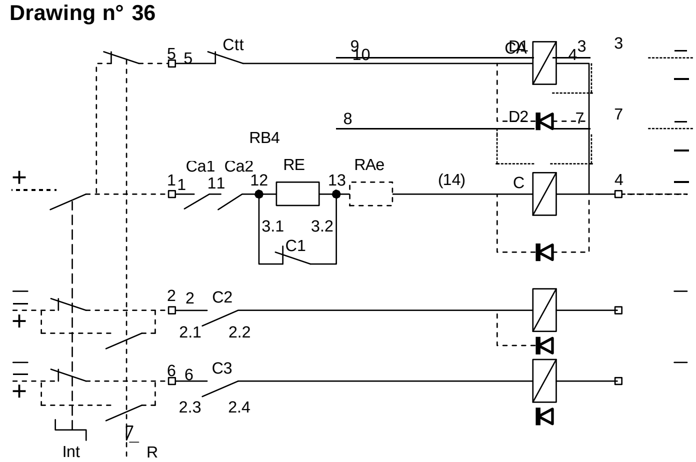
- Control by switch, mechanically delayed contact and auxiliary contactor.

Drawing n° 35



On request, diode or RC on control circuit

Drawing n° 36



On request, diode or RC on control circuit

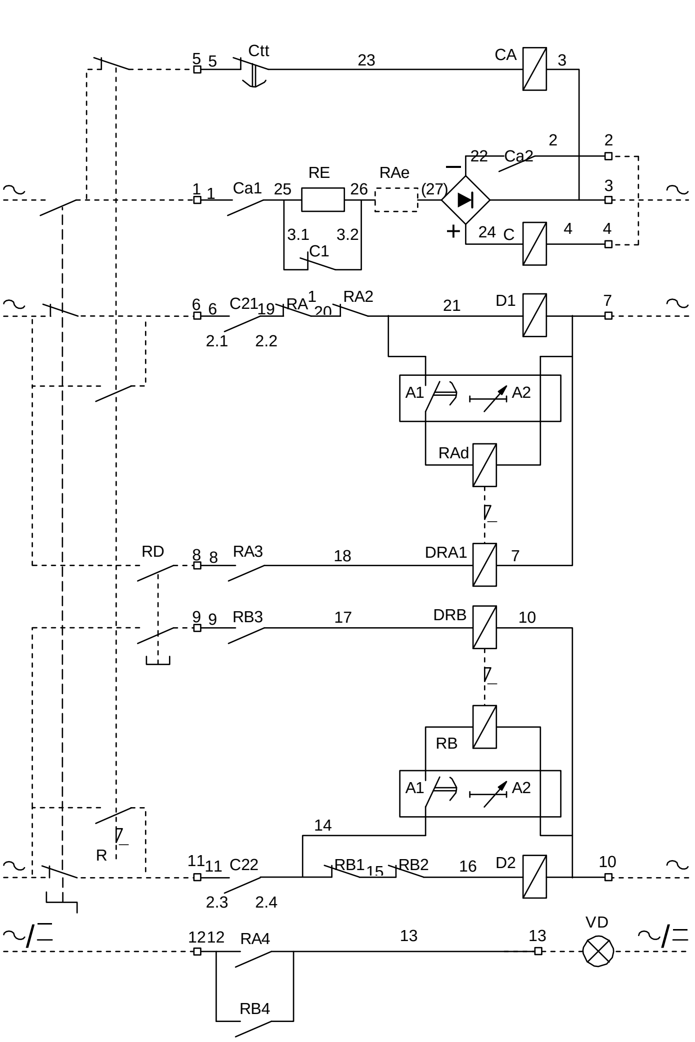
78. Control circuit of contactors with mechanical latching with double electrical release (§3)

AC control voltage, alternating or rectified device

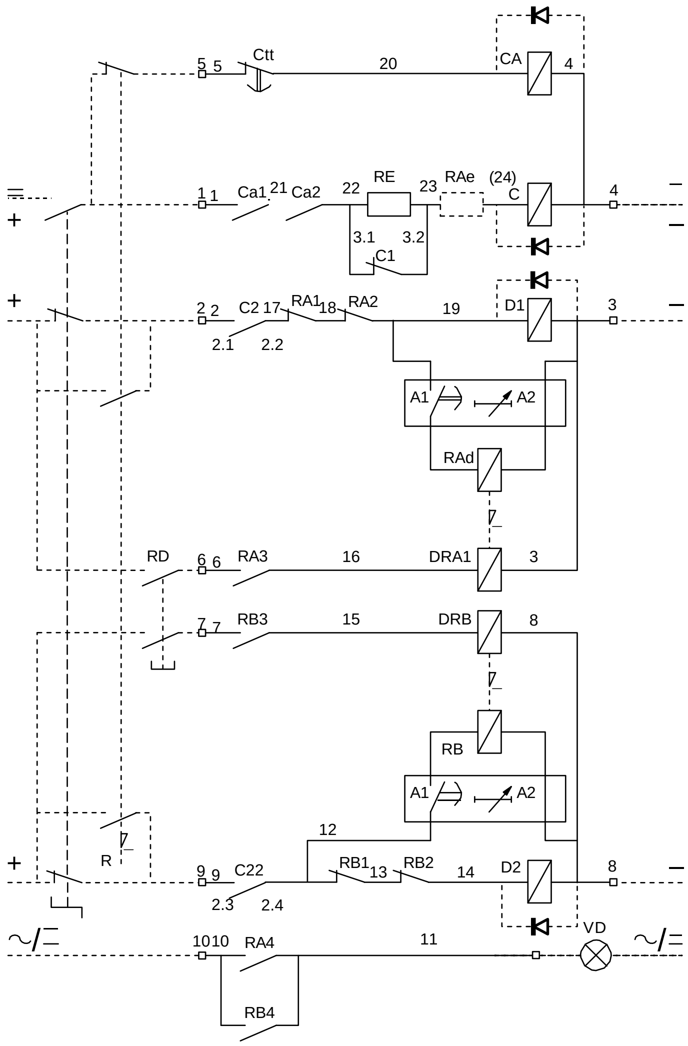
DC control voltage

- Control by switch, delayed auxiliary contactor and protective device with defect memorisation for the release coils.

● Drawing n° 37



● Drawing n° 38



RB4

RB4

On request, **diode or RC** on control circuit

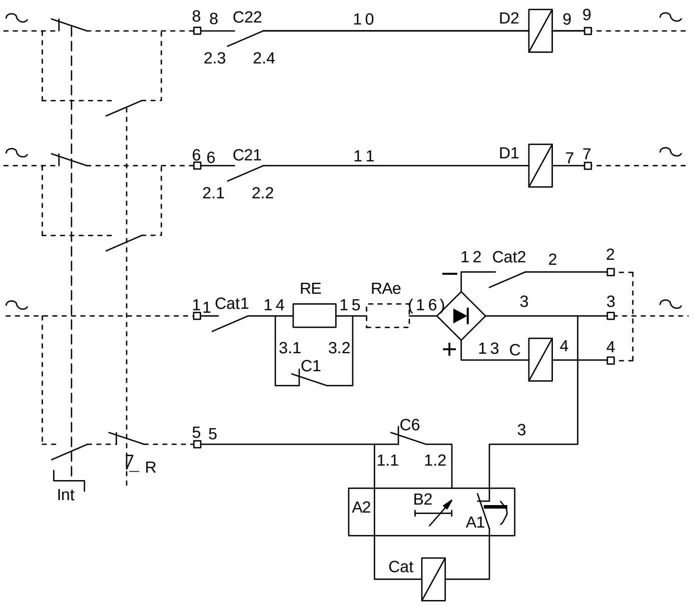
78. Control circuit of contactors with mechanical latching with double electrical release (§4)

AC control voltage, alternating or rectified device

DC control voltage

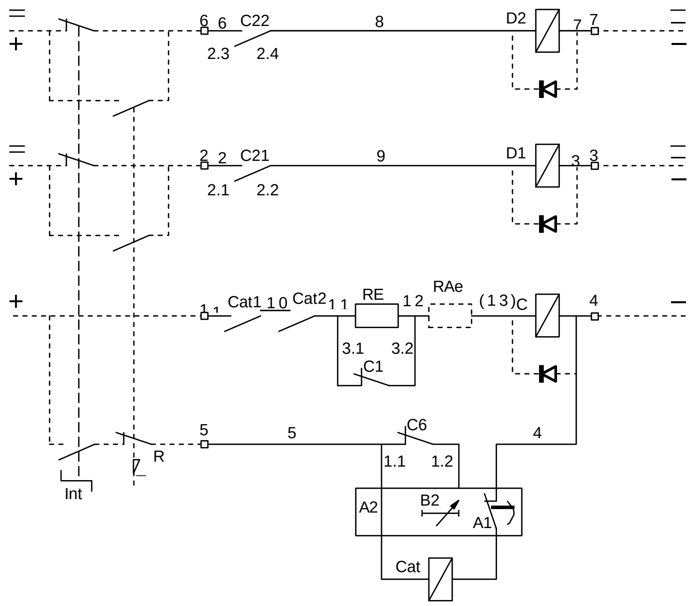
- Control by switch and delayed auxiliary contactor.

● Drawing n° 39



RB4

● Drawing n° 40



RB4

On request, diode or RC on control circuit

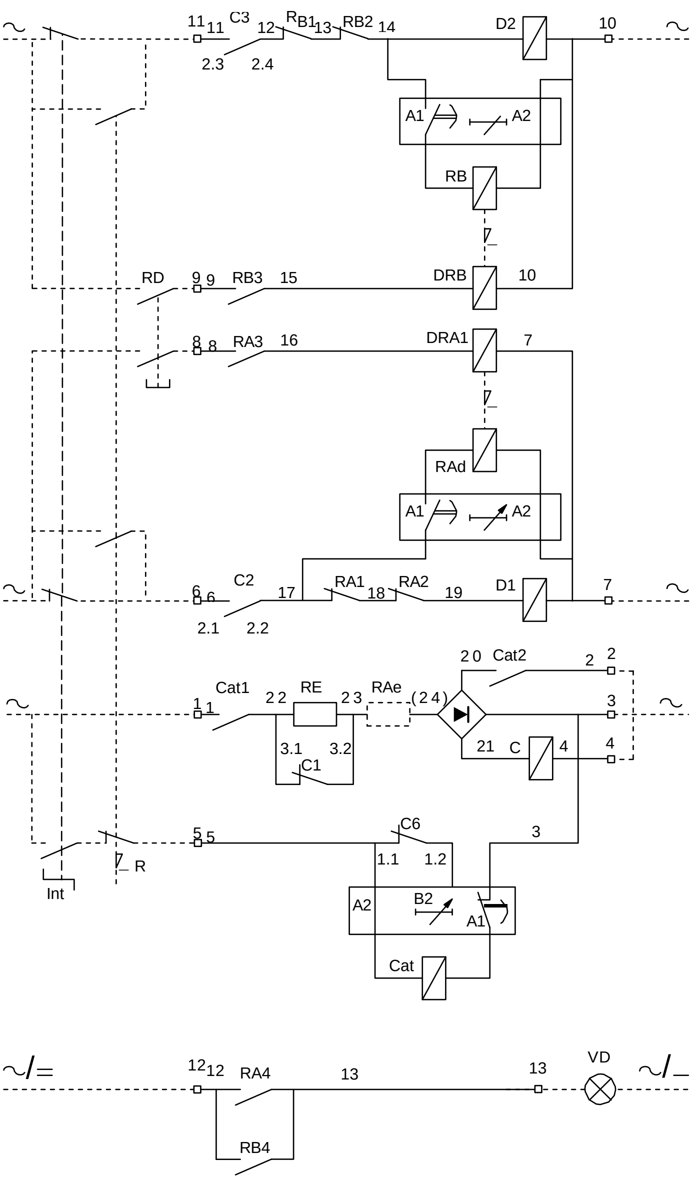
78. Control circuit of contactors with mechanical latching with double electrical release (§5)

AC control voltage, alternating or rectified device

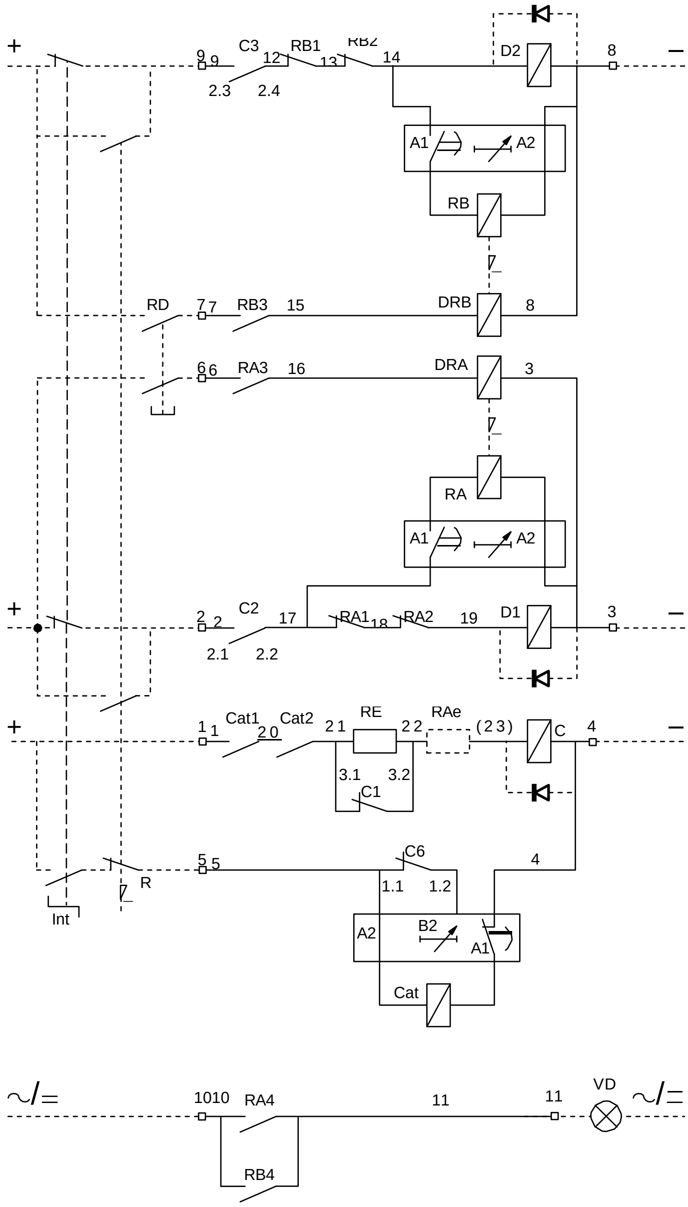
DC control voltage

- Control by switch, delayed auxiliary contactor and protective device with defect memorisation for the release coils.

● **Drawing n° 41**



● **Drawing n° 42**



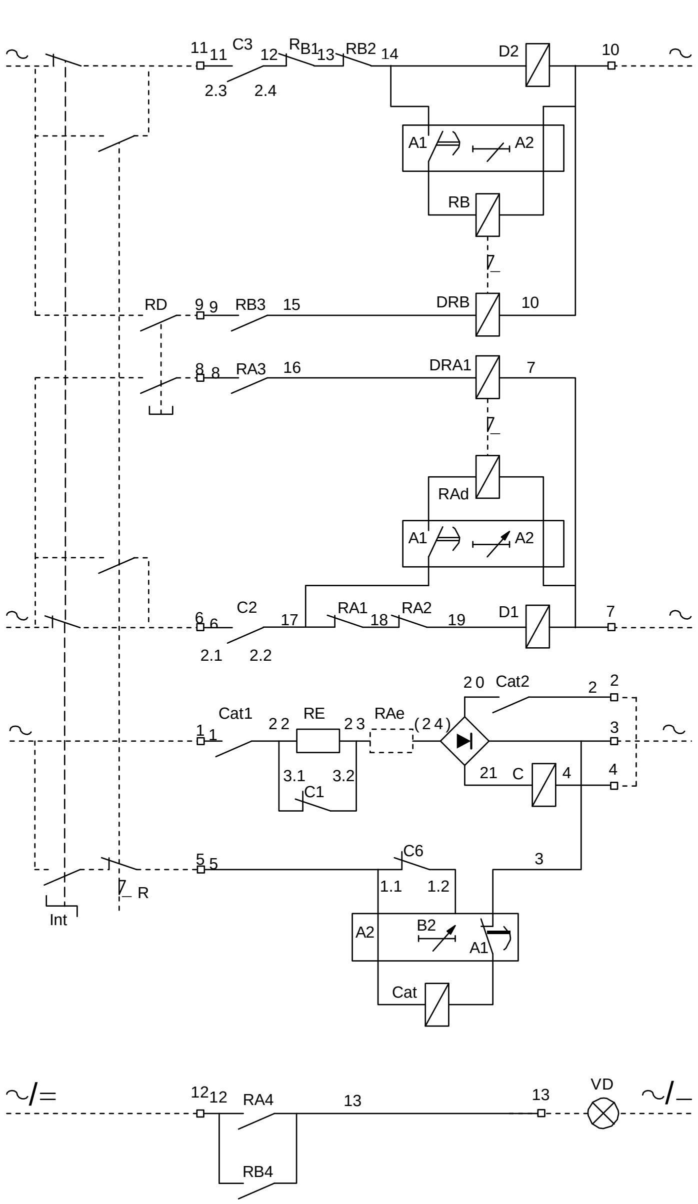
On request, diode or RC on control circuit

78. Control circuit of contactors with mechanical latching with double electrical release (§5)

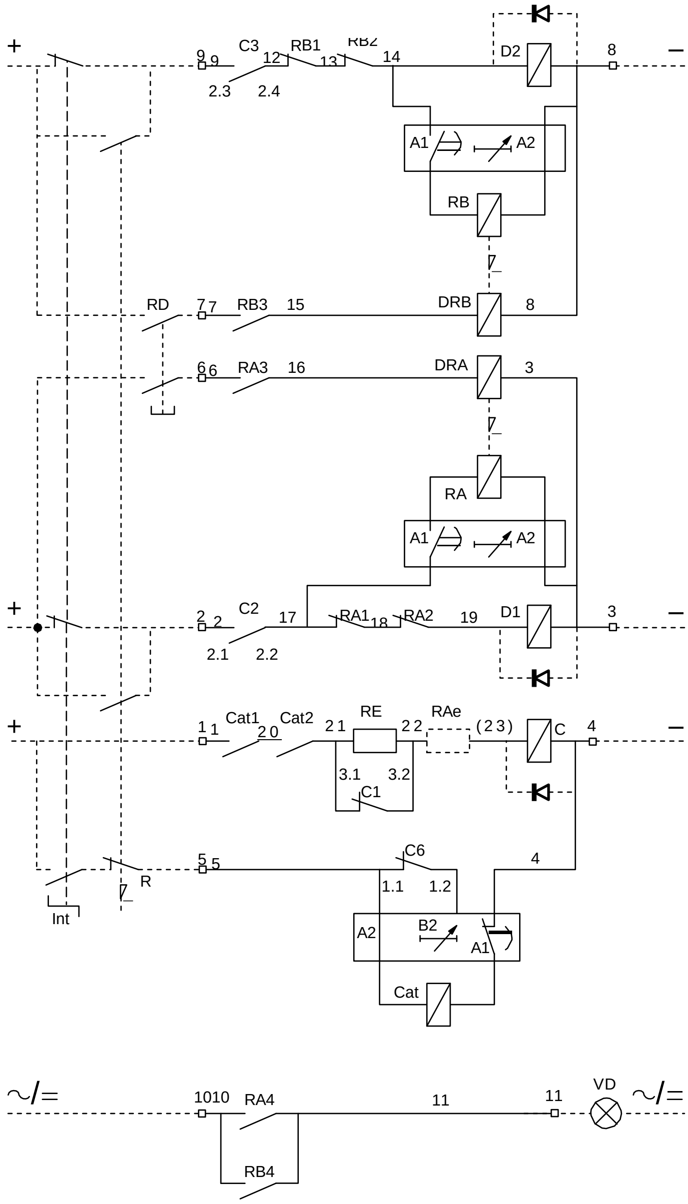
AC control voltage, alternating or rectified device | **DC control voltage**

- Control by switch, delayed auxiliary contactor and protective device with defect memorisation for the release coils.

- **Drawing n° 41**



- **Drawing n° 42**



On request, diode or RC on control circuit

CODIFICATION OF MERSEN BAR CONTACTORS

Type of contactor:
CBA : AC contactor.
CBPA: AC contactor (solid magnetic circuit for range 80 to 200 A only).
CBC: DC contactor (solid magnetic circuit for ranges 80 to 200 and 1250 to 6200 A).
CBFC: DC contactor (range 80 to 1000 A).
CBT : Rapid contactor.
CEX : Excitation contactor with overlapping of the rup turing pole and closing pole(s).
RUBC : DC contactor with opening pole only.

Generation of the equipment

'B' indicates a multipolar version, for contactors ranging from 80 to 200A only.

Calibre of the equipment :
80, 150, 200, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3000, 4000, 5000, 5500, 6200.

(x) D : x is the nomber of D auxiliary contact blocks for 400 to 1000 A.

Overall dimensions :
S : specific.
LEN or LER: range 400 to 1000 A.

Nominal voltage.

Locking possibility :
V or AV : range 400 to 1000 A.
V : range 80 to 6200 A.

Number of opening poles

CBA 75 | 400 | 3 1 | | 500 D | 2 | 2NOI | | LEN | T

Number of closing poles

T : Tropical treatment n°2.

SR (x) : Reinforced blow-out, x is the real value of the arc blo w-out coil (available only on range 80 to 200 A)

1 code : closing coil supply voltage (1).
2 codes : closing coil supply voltage (1) and release coil voltage.
3 codes: closing coil supply voltage (1) and release coils n°1 & 2 voltages.

Voltage code control circuit :

DC supply
A : 48 Vcc,
B : 110 Vcc,
C : 125/129 Vcc,
D : 222/230 Vcc,
E : 240/250 Vcc,
F : 24 Vcc,
G : 380 Vcc,
H : 440 Vcc,
K : 500 Vcc,
X : other DC voltage.

Courant alternatif
L : 24 Vac,
M : 48 Vac,
N : 110 Vac,
O : 220/230 Vac,
P : 240 Vac,
R : 380 Vac,
S : 440 Vac,
Z : other AC voltage.

(1) : if the control circuit is rectified and power-saved, this voltage is to be follo wed by 1 for AC supply and by 2 for DC supply.

Number of auxiliary contact type M, (x) NOI + (x)NFI + (x)NOR + (x)NFR + TPA + TPC
(x) : instant closing auxiliary contact.
NOI : instant opening auxiliary contact.
NFI : sligh tly mechanically delayed closing auxiliary contact.
NOR : sligh tly mechanically delayed opening auxiliary contact.
NFR : contact auxiliaire à ouverture légèrement retardé mécaniquement.
TPA: pneumatically delayed block on closing.
TPC : pneumatically delayed block on opening.