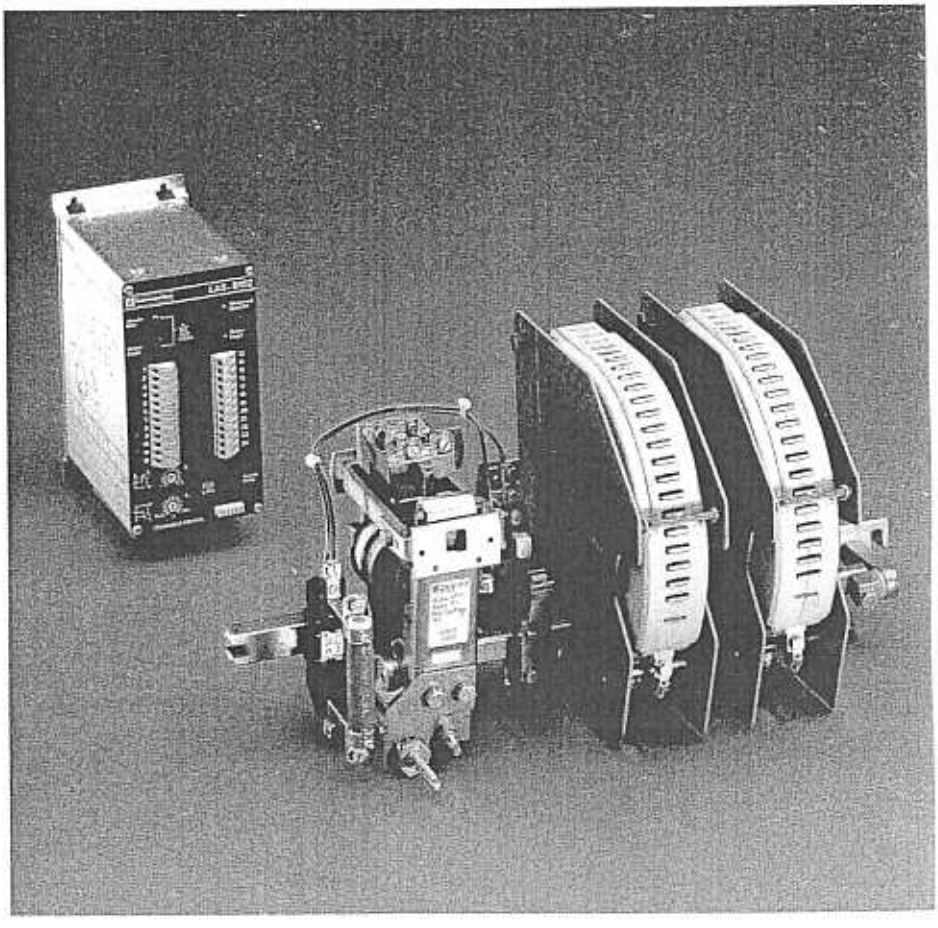
Telemecanique

CR3-...B102 electronically controlled fast contactors

catalogue



protection of D.C. reversible speed drives

Contents

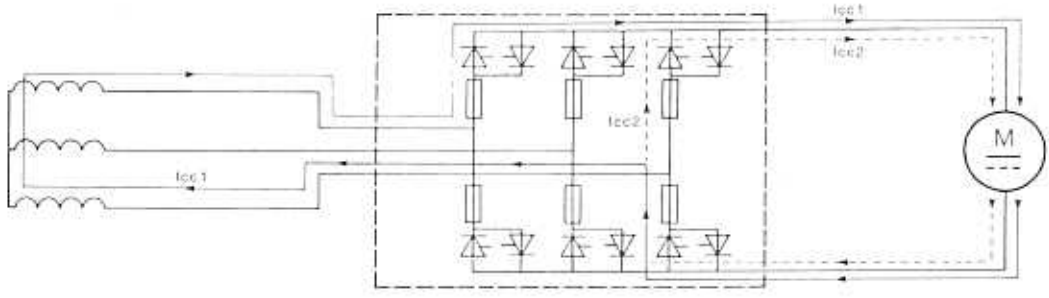
General

Application areas for the fast contactor

The CR3 fast contactor and its control module are mainly used in control equipment incorporating reversing speed controllers for d.c. machines.
These speed controllers provide the possibility of regenerative braking when the machine is operating as a generator (operation in inverter mode).

Why use a fast contactor :

The purpose is to prevent the fuses blowing in the event of a fault during "inverter" operation. This is the case should there be a mains supply failure upstream of the speed controller, causing a motor short-circuit current to flow in the transformer via the thyristors (Icc1).
The fast contactor equally protects against the effects of accidental conduction of 2 thyristors of the same bridge during operation as a generator which causes a direct motor short-circuit through the power bridge (Icc2).



When and how to use the fast contactor :

On very unstable power supplies and when the speed controller often operates as an inverter or when operational constraints necessitate very short stopping durations. In all cases the poles of the contactor are connected in the motor/speed controller loop.

Role of the fast contactor

The fast contactor breaks the fault current and can be closed remotely when the mains voltage returns to normal.
This avoids the consequences of the installation being out of action for a long period.

Fuse-contactor coordination

To correctly protect the fuses, it is essential to know the time constants of the circuit to ensure that the fault energy, until the current falls to zero, is less than the I^2t of the fuses. Coordination is difficult if the time constant is low, and in all cases it should be determined by the user according to the equipment used and the characteristics of the circuit.

Role of the control module

- Ensure the energisation of the CR3 fast contactor.
- Enable it to hold in with a low current.
- Ensure that the contactor opens quickly in the event of accidental overcurrent in the motor/speed controller loop to protect the quick-acting fuses.
- Disconnect the supply to the contactor if it does not close within 1 second.

General

Environmental conditions

Operating temperature	0°C to + 55°C
Storage temperature	- 25°C to + 70°C
Operating altitude	≤ 3000 m
Protective treatment	TC
Maximum inclination of the contactor with respect to the vertical mounting plane	± 30°
Degree of protection of the module	IP20
A.C. supply voltage	110V - 50/60 Hz

Presentation

• CR3 fast contactor

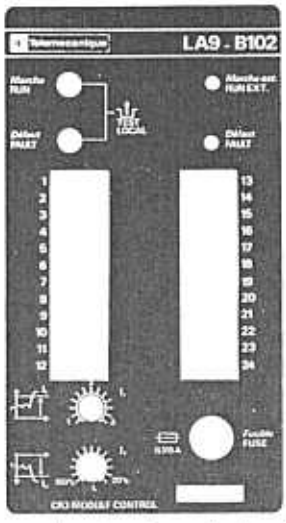
Contactor with :
- 2 or 4 single break poles,
- 1 coil type EB1 or EB5,
- 1 late break (economy) contact,
- 2 or 3 N/O contacts,
- 1 N/C contact,
- 1 economy resistor.

} auxiliary contacts available

• LA9-B102 module

Comprising a metal enclosure housing :
- 1 detection function board,
- 1 contactor coil control board,

and with the following units mounted on the front plate :
- the terminal blocks,
- a RUN push-button : local test,
- a FAULT push-button : local test,
- a green LED : run signal indication,
- a red LED : fault indication,
- two potentiometers for adjusting the tripping thresholds,
- a fuse.



I1 : tripping threshold adjustment direction > 0 →
I2 : tripping threshold adjustment direction < 0 (for asymmetrical bridges) →

The contactor and its associated module are ordered using a single reference CR3-...B102, and are supplied in the same package.

Operation

Type of detection

Fault detection can be carried out :

- D.C side :
  - by connecting a shunt in the motor/speed controller loop,
    not to be used with a mains supply above 500 V, bearing in mind the insulation limits of the electronic module.
  - by Hall effect sensor.
- A.C. side :
  - by using the current data supplied by the internal speed controller current transformers,
  - by using the current data supplied by two current transformers connected in two of the supply phases.

See circuit diagrams, pages : 14 and 15.

Utilisation precautions

The effectiveness of the protection will be different depending on the type of detection used.

- D.C side :

  Protection is maximum. The detection covers a short duration power failure equally as well as an abrupt opening of a protective device, on the a.c. side, when the motor is in a braking phase. Protection is also provided during accidental conducting of 2 thyristors of the same branch of a bridge during operation as a generator which creates a direct motor short-circuit through the power bridge.

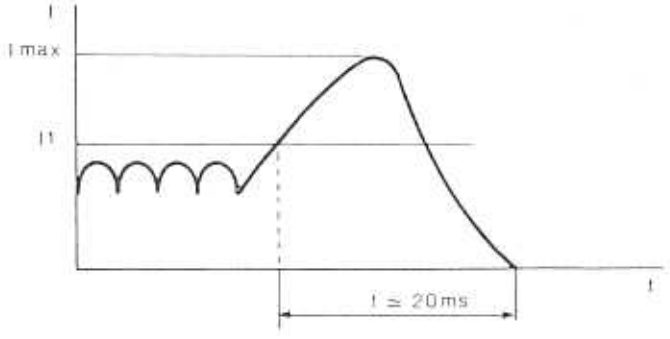
  - Do not use current reading by shunt if the mains supply is above 500 V.

- A.C. side :
  - Protection in the event of short power cuts or mains failure only.

- In all cases :
  - Use twisted cable with a twist pitch of ≤ 5 cm.
  - Make the cable length as short as possible and do not run the interconnecting cable adjacent to interference generating cables (speed controller supply, contactor cables, etc...).
  - Ensure that an RC armature protection circuit is provided at the speed controller output.

Operation

When a fault causes excessive overcurrent in the motor/speed controller loop, the tripping threshold set on potentiometer I1 or I2 of the module is exceeded. The CR3 fast contactor drops out opening the loop and breaking the fault current. Indication by the red LED.
The time between the moment of detection and the breaking of the current must be less than the pre-arcing time of the fuse corresponding to this current.



Selection of the fast contactor and associated module

CR3 fast contactors are designed to be used as safety devices and ensure the characteristics given below in the following functions :
- breaking a rectified voltage in rectifier mode,
- breaking fault currents in inverter mode,
- operational contactor up to a maximum of 30 operating cycles per hour,
- mechanical endurance 250.000 operating cycles.

Rating selection : rated operational current ≥ rated motor current.

Control voltage 110 V + 10 % - 15 % 50/60 Hz

Rated operational current (A) 40°C	55°C	Number of poles	Maximum a.c. mains supply voltage (V)	Maximum d.c. motor voltage (V)	Control supply power requirement (VA)	Reference of the contactor + module package (1)
55	55	2	440	460	200	**CR3-GB42F21B102**
80	80	2	440	460	200	**CR3-GB32F21B102**
125	125	2	440	460	200	**CR3-GB22F21B102**
160	160	2	440	460	200	**CR3-GB12F21B102**
250	250	2	440	460	350	**CR3-HB12F21B102**
500	500	2	440	460	350	**CR3-KB12F21B102**
800	700	2	600 (2)	630	1500	**CR3-LB12F31B102**
1250	1100	2	600 (2)	630	1500	**CR3-MB12F31B102**
2000	1750	2	600 (2)	630	1500	**CR3-PB12F31B102**
2750	2400	2	600 (2)	630	1500	**CR3-RB12F31B102**
3200	2800	4 (3)	600 (2)	630	1500	**CR3-PB14F31B102**
800	700	4 (4)	1000 (2)	1050	1500	**CR3-LB14F31B102**
1250	1100	4 (4)	1000 (2)	1050	1500	**CR3-MB14F31B102**
2000	1750	4 (4)	1000 (2)	1050	1500	**CR3-PB14F31B102**
2750	2400	4 (4)	1000 (2)	1050	1500	**CR3-RB14F31B102**

(1) The reference corresponds to a fast contactor and its associated control module, supplied in a single package. To order a contactor or a control module as separate items, see table given on page 20.

(2) For this application, do not use detection by shunt (500 V max).

(3) The poles must be connected in parallel.

(4) The poles must be connected in series.

see page 6.

Drop out voltage : 0,4 to 0,65 Un.
Increase in drop out time at 1,1 Un : + 0,2 ms.
Time between the detection of a fault and the opening of the contactor ≤ 6 ms.

Auxiliary contacts

CR3 - GB to KB
- 1 N/O contact ZC4 - GM1,
- 1 N/O + 1 N/C contact ZC1 - GP5.

CR3 - LB to RB
- 3 N/O contacts ZC4 - GM1,
- 1 N/C contact ZC4 - GM2.

General characteristics

Instantaneous auxiliary contacts
Cabling

ZC4-GM instantaneous auxiliary contacts

Rated thermal current	A	20			
Rated insulation voltage					
- according to IEC 158-1	V	660			
- according to VDE, group C	V	750			
Operational power					
- A.C. 50/60 Hz	V	100/127	220/240	380/415	440
- Category AC11	VA	2000	4000	4000	4000
- Making/breaking capacity	VA	14000	23000	35000	45000

Utilisation with an inductive load such as an electromagnet coil :
inrush power (cos φ 0,7) = 10 times the power broken when sealed (cos φ 0,4).

ZC1-GP instantaneous auxiliary contacts

Rated thermal current	A	10			
Rated insulation voltage					
- according to IEC 158-1	V	660			
- according to VDE, group C	V	750			
Operational power					
- A.C. 50/60 Hz	V	110/127	220/240	380/415	440
- Category AC11	VA	900	1200	1200	1200
- Making/breaking capacity	VA	8000	14000	12000	10000

Utilisation with an inductive load such as an electromagnet coil :
inrush power (cos φ 0,7) = 10 times the power broken when sealed (cos φ 0,4).

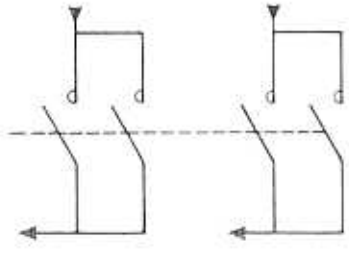
Cabling

Auxiliary contacts		ZC4-GM	ZC1-GP
Number of conductors		2	2
Maximum cross section			
- with cable end	mm^2	4	2,5
- without cable end	mm^2	6	4

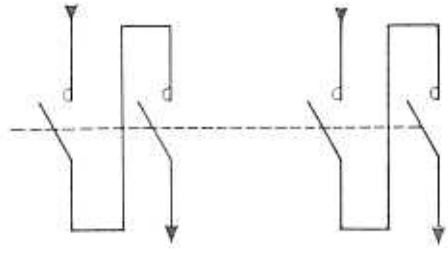
Contactor cabling

Control circuit :
To be carried out using 1,5 mm^2 cable for ratings ≤ KB ,
2,5 mm^2 cable for ratings > KB.

Power circuit :
For 4 pole contactors, 2 connection arrangements are possible :



CR3-PB14F31



CR3-LB/MB/PB and RB14F31

Current sensor selection

Selection of a shunt (mains supply ≤ 500 V)

This is connected in the motor/speed controller loop and is generally associated with a moving scale ammeter, which provides a direct reading of the machine current.

The standard measuring instruments are selected for 100 mV at I ≥ Id (maximum starting current). The same conditions therefore apply to the selection of the measurement shunt, and its rating must be adapted in the ratio Id/In to optimise the cost.

The most common cases, using standard equipment are as follows :

a) Id between 1,6 and 2 In (short starting times) :
   - shunt 50 mV, rating ≥ In (100 mV ammeter),
b) Id between In and 1,2 In (long starting times) :
   - shunt 100 mV, rating ≥ 1,2 In (100 mV ammeter),

where In : rated motor current,
Id : maximum starting current.

In both cases, the maximum voltage at the shunt terminals is 100 mV, as an average value. Using a safety factor of 1,3 and a peak factor of 1,4, this gives a peak voltage of 182 mV.

The adjustment range of the control module is from 90 to 200 mV peak, on input 11-12.

Selection of a Hall effect sensor (mains supply > 500 V)

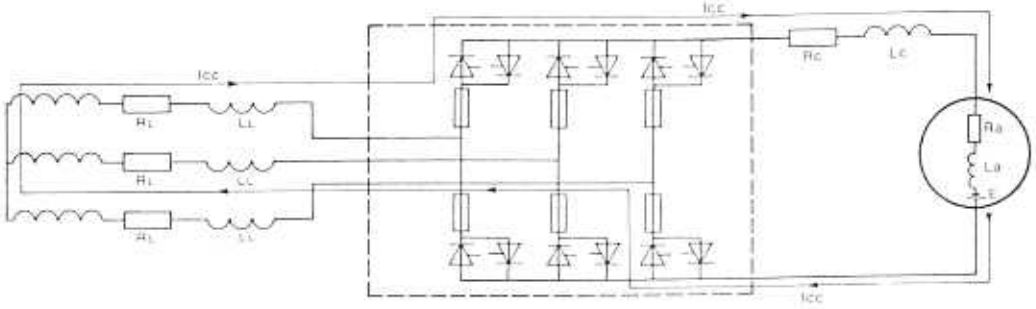
Consult the manufacturer's catalogue, use a safety factor of 1,3 and the same peak factor of 1,4 ; take into account that, in this case, the adjustment range is from 8 to 19 volts peak, on input 23-24.

Fuse-fast contactor coordination

Determination of the maximum short-circuit current

Icc is the prospective short-circuit current in inverter mode, i.e. the current which the motor would supply if the mains supply completely disappeared.

τ is the time constant of the circuit, $\tau = L/R$.



When the mains supply returns at the time of a fault, a phenomenon of non-reswitching of the thyristors can occur, with the risk that this voltage will be summated with the machine emf.

To take this phenomenon into account, a multiplying factor of 1,35 should be applied to the emf of the machine.

$$Icc = \frac{1,35\ E}{R} \text{ and } \tau = \frac{L}{R} \quad \text{where } R = Ra + Rc + 2\,RL \text{ and } L = La + Lc + 2\,LL$$

It is often difficult to know the line impedances, but the machine values are provided by the manufacturer.

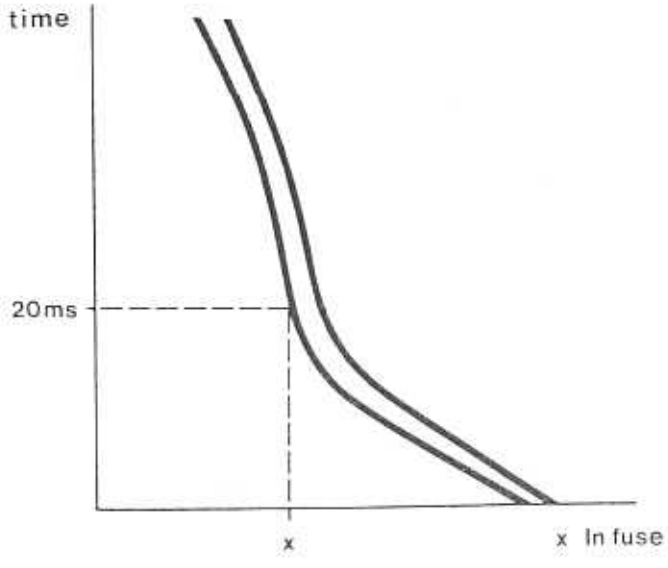
Consult the machine manufacturer to determine the maximum value of Icc and the value of τa :

$$Icc\ max = 1,35\ \frac{E}{Ra} \text{ and } \tau a = \frac{La}{Ra}$$

This method of calculation also covers the risk of a direct bridge/motor short-circuit.

Determination of the maximum pre-arcing current of the fuse

Defined for a fault time of 20 ms and according to the prearcing curve given by the fuse manufacturer.



xIn : rms value of pre-arcing current in multiples of rated current.

Determination of the operating point

For TELEMECANIQUE speed controllers, the following table gives the values of xIn. For other cases, refer to the fuse manufacturer's catalogue.

Speed controller	Fuse	xIn (A rms) at 20 ms
RTV64 D24Q **RTV84 D24Q**	6,621 CPURGB145140	175 A
RTV64 D24S D36Q and S **RTV84 D24S D36Q and S**	6,621 CPURD225850	175 A
RTV64 D72Q and S **RTV84 D72Q and S**	6,621 CPURD2258100	600 A
RTV64 C15Q and S **RTV84 C15Q and S**	6,6 Bod KCAURB31 Ttc 200	800 A
RTV64 C25Q and S **RTV84 C25Q and S**	6,6 Bod KCAURB31 Ttc 350	1750 A
RTV64 C40Q and S **RTV84 C40Q and S**	6,6 Bod KCAURB32 Ttc 500	2500 A
RTV64 C65Q and S **RTV84 C65Q and S**	6,6 Bod KCAURB33 Ttc 800	4400 A
RTV64 C80Q and S **RTV84 C80Q and S** **VZ8DL C80Q and S**	6 Bod KC3URQ33 Ttc 630S	2700 A
RTV64 M12Q and S **RTV84 M12Q and S** **VZ8DL M12Q and S**	6,6 Bod KCAURB33 Ttc 900 S	5400 A
RTV64 M17Q and S **RTV84 M17Q and S** **VZ8DL M17Q and S**	6,6 Bod KCAURB33 Ttd 1250 S	8000 A
RTV64 M30Q and S **RTV84 M30Q and S** **VZ8DL M30Q and S**	6,6 Bod KCAURB 2x33 Ttd 2200 S	14000 A

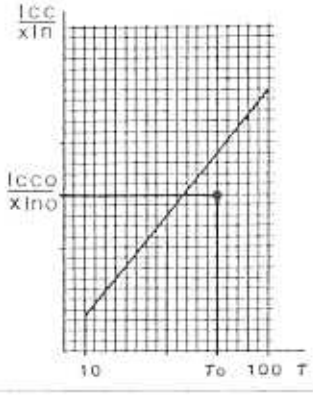
COORDINATION is obtained when the RMS value of short-circuit current is less than the pre-arcing current of the fuses.
In addition, to prevent premature ageing of the fuses, it is recommended to use a safety factor of 0,7.

Knowing the relationship I rms = f (Icc, τ) and incorporating this safety factor, we have drawn the curve

$\frac{Icc}{xIn}$ max = f (τ)

Conclusion :

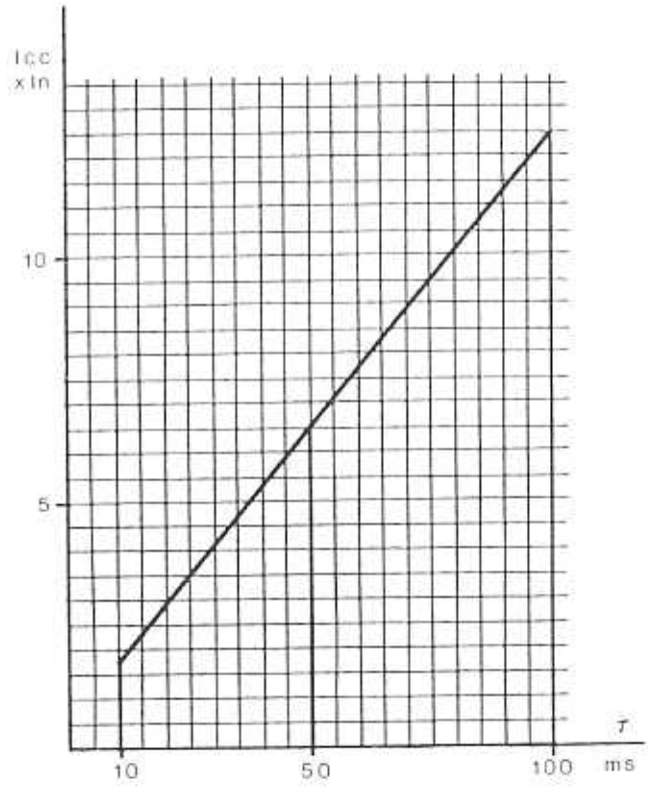
Knowing Icco and τo (most probable values or at the limit of the values for the machine only) and the pre-arcing current xIno, draw the operating point.



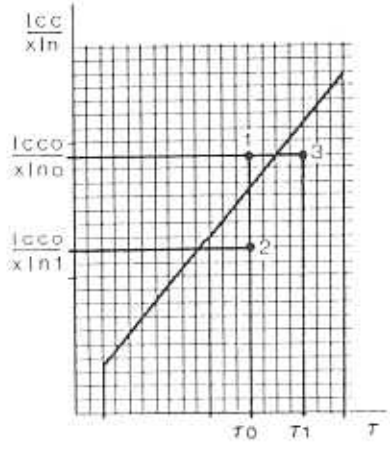
This operating point must be below the coordination curve.

Fuse-fast contactor coordination

Coordination curve



Correction of the operating point



Suppose that we have the graph shown on the left, where the operating point is above the coordination curve.
There are two solutions to resolve the problem :

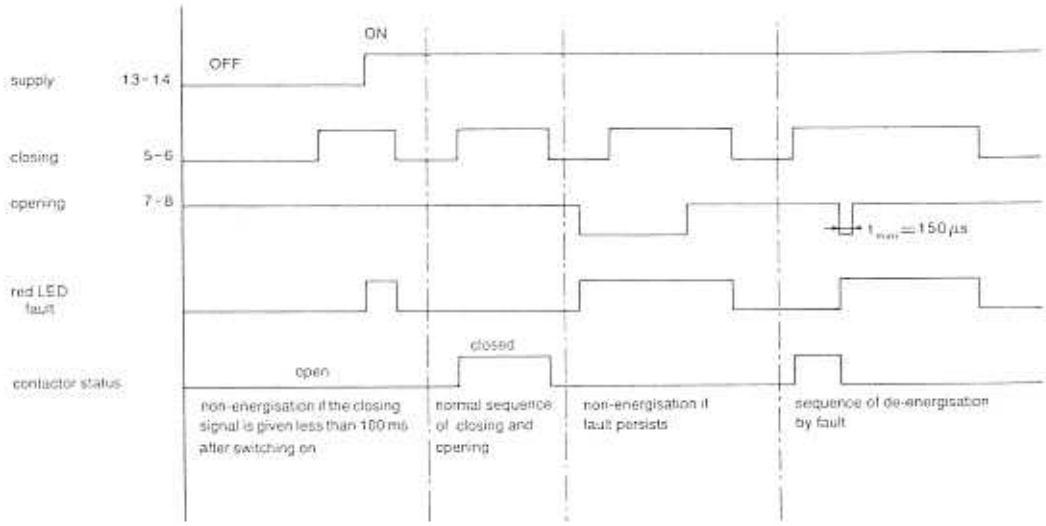
- Select fuse F1 rather than fuse F0.
  In which case use thyristors with a higher rating.

- Increase the time constant from $\tau 0$ to $\tau 1$ by the addition of an external inductance in series with the motor armature so as to bring the operating point down below the coordination curve.

Note :

- Time constants less than 10 ms automatically require an additional inductance.
- If the time constants are greater than 100 ms (high power motors), use compensated motors.

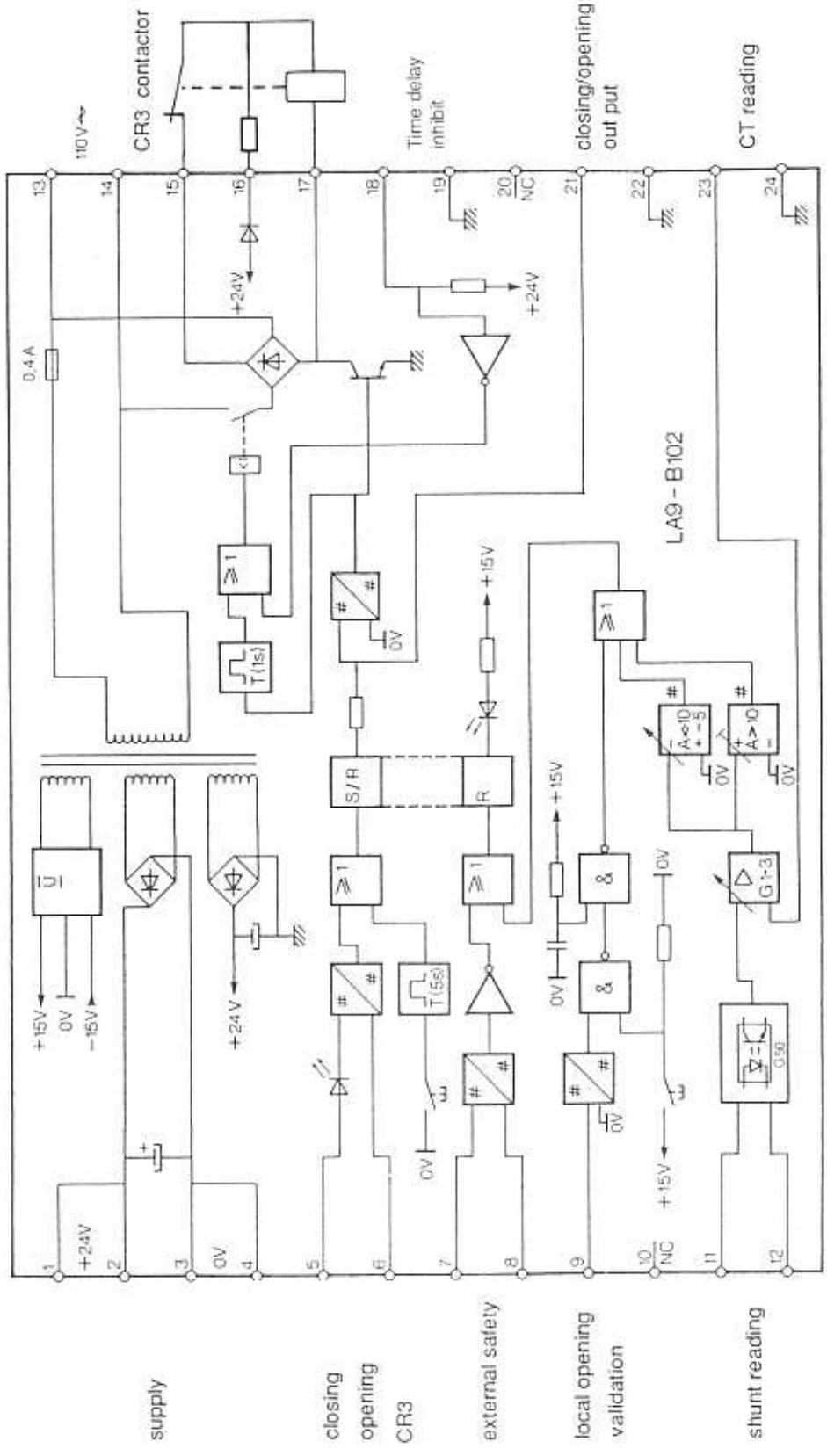
Operating diagram



Energisation of the module by the "Run" push-button is operative under the same conditions as for the energisation signal (5-6), but de-energisation occurs after a 5 second delay.

- Local de-energisation is only operative if input 9 is at logic state 1 (e.g. line contactor not closed).
- Current measurement using the shunt or the current transformers trips the contactor at the threshold value with the same sequence as inputs 7-8.

Block diagram



Terminal arrangement

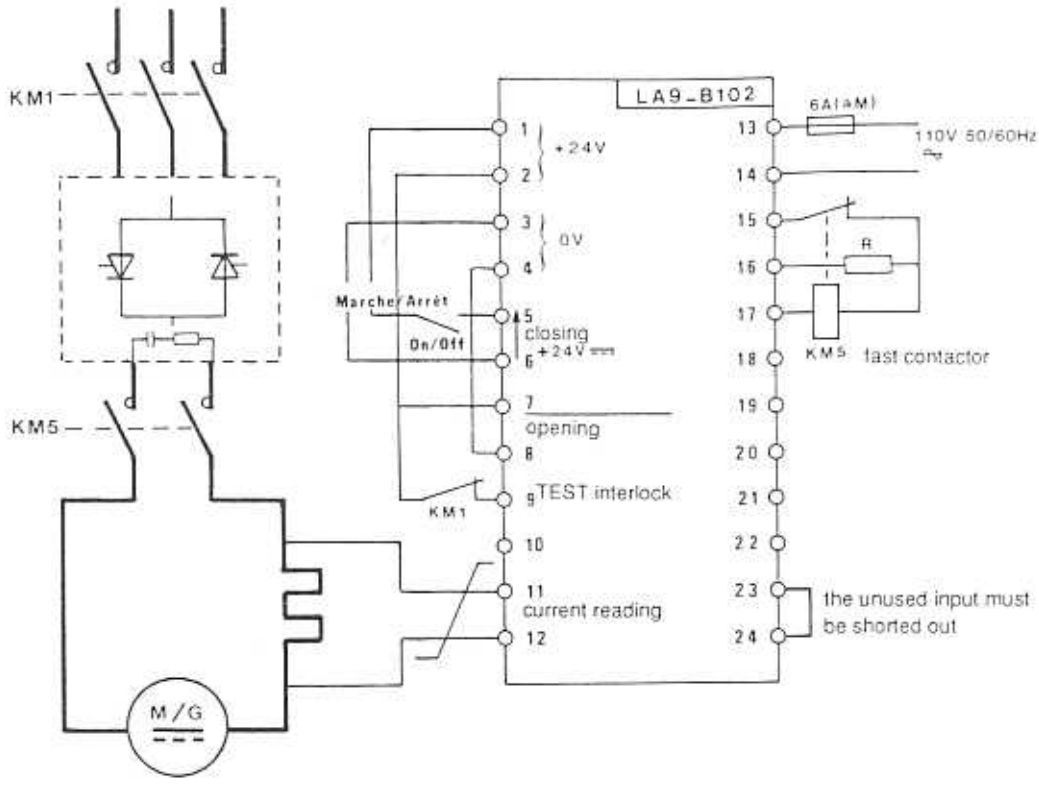
Marking	Function and characteristic	
1-2	+ 24 V	Filtered rectified supply voltage
3-4	OV	Us = 24 V C, Is max. = 60 mA
5	Ve (+)	Logic signal input "CLOSE/OPEN" • State 1 : 18 V to 30 V (Run) Ve = 30 V • State 0 : – 15 V to 5 V (Open) I max : 20 mA
6	Ve (–)	
7	Ve (+)	External "FAULT" logic signal • State 1 : 18 V to 30 V (Run) • State 0 : – 15 V to 5 V (Open)τ e = 0,25 ms (2) I max : 20 mA
8	Ve (–)	
9	Validation Local Fault Test The presence of + 24 V (1-2) validates the push-button	
10	Not connected	
11	OVERCURRENT detection Reading on shunt τ e = 0,5 ms (2) Ve = 100 mV for In shunt. Re = 47 Ω	
12		
13-14	Supply to LA9. Ue = 110 V 50/60 Hz. I max = 10 A inrush, 0,25 A sealed.	
15	Late break economy contact	Outputs to CR3 fast contactor
16	Economy resistance	
17	Coil common	
18	Inrush current breaking limit cancellation (do not link 18-19 for normal operation) (1)	
19		
20	Not connected	
21	Ve (+)	Output indicating a contactor open signal, used for example to lock the speed controller simultaneously with the opening of the contactor. State 1 : 12 V min on no-load (close) State 0 : 0 V (open) Internal impedance : approximately 1200 Ω. To be used with an optocoupler having suitable characteristics.
22	Ve (–)	
23	OVERCURRENT detection Reading by current transformers or Hall effect sensor Ve max = 24 V - Re = 8 kΩ τe = 0,3 ms (2)	
24		

(1) For normal operation, each time the contactor closes, the fast contactor coil is supplied at a voltage of 110 V rectified. A safety delay limits the duration of this phase of operation to one second. This protective feature can be cancelled by linking terminals 18 and 19 for **exceptional circumstances** such as during adjustment of the CR3 contactor, for example.

(2) τe : system response time.

Circuit diagrams

Reading by shunt :
or mains supply
< 500V rms

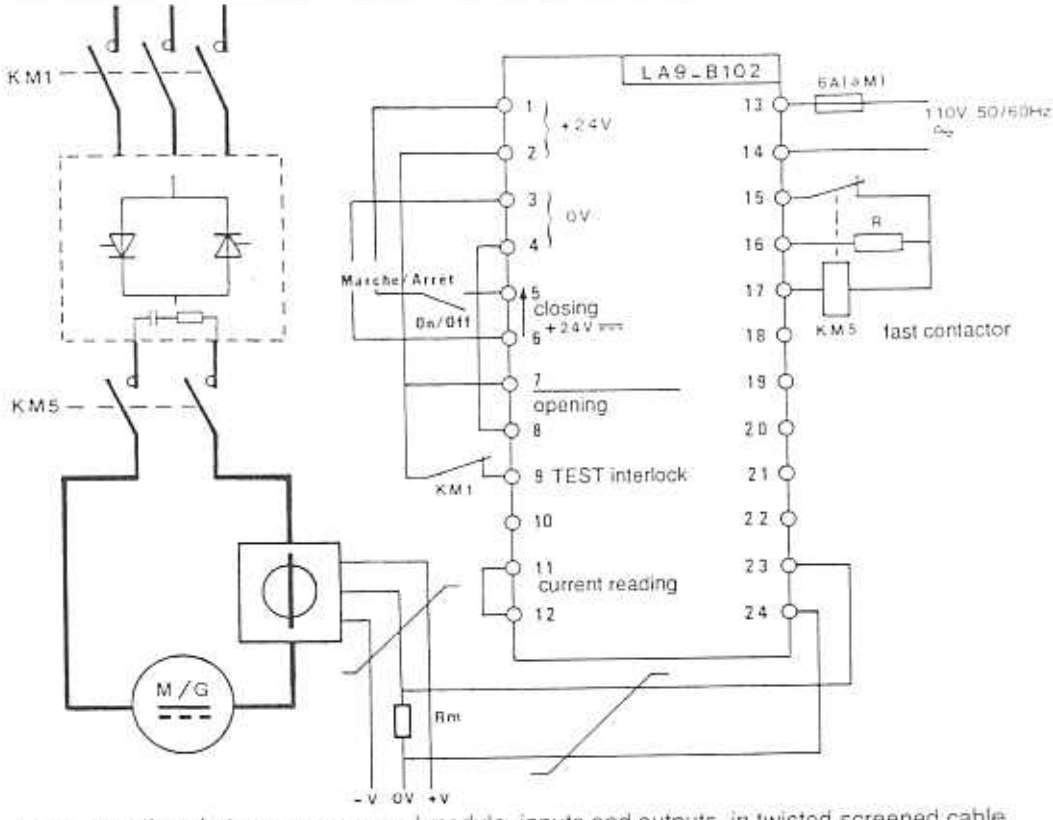


Cabling

- Cabling capacity of the module terminals : 2,5 mm².
- Cabling of the contactor :
  - control and coil supply part (13 - 14) : 1,5 mm² for ratings ≤ KB, : 2.5 mm² for ratings > KB,
  - power part : depending on the operational current and the terminal capacity of the speed controller and the contactor.
- Wiring precautions :
  The connections between the shunt and the LA9-B102 control module should be carried out using twisted screened cable (pitch ≤ 5 cm).
  The same applies to the inputs and outputs.

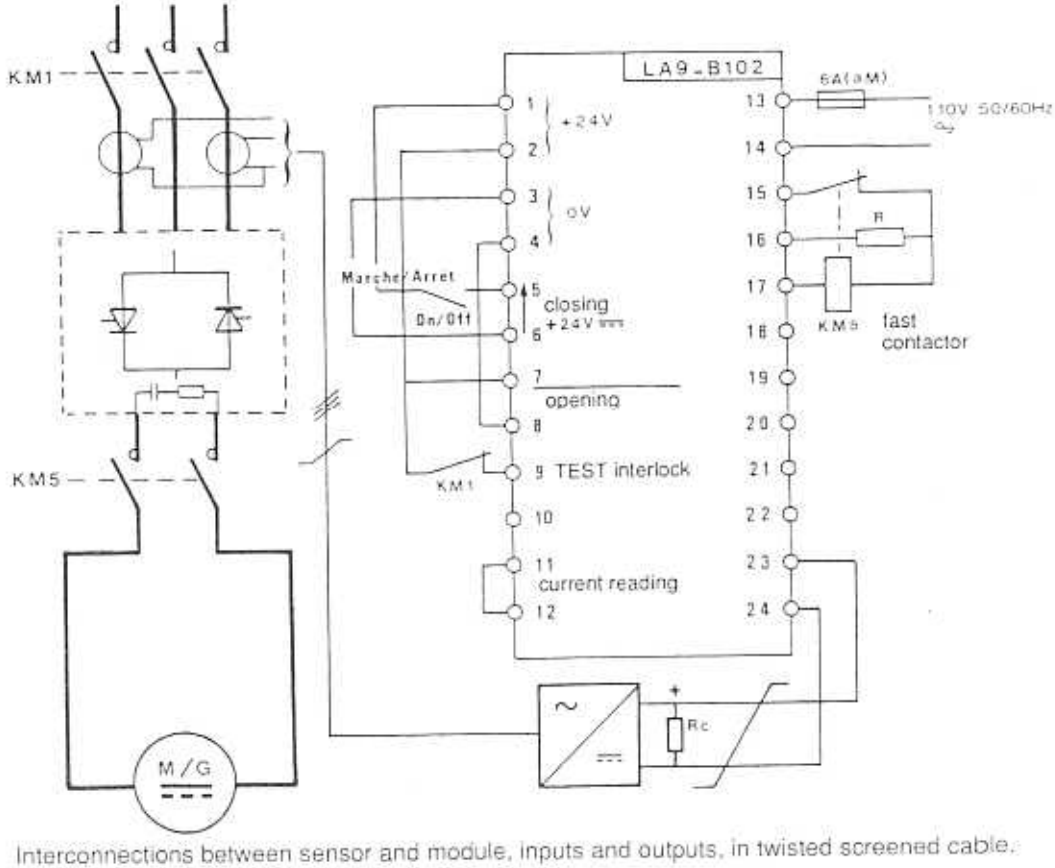
Circuit diagrams

Reading by Hall effect sensor



Interconnections between sensor and module, inputs and outputs, in twisted screened cable.

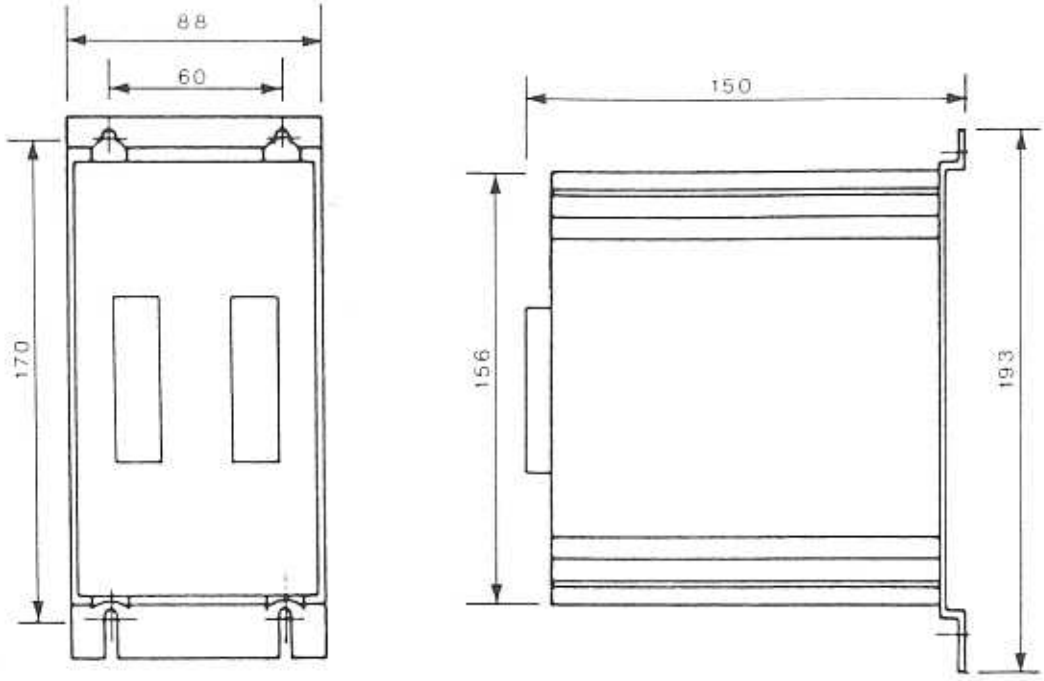
Reading by current transformers



Interconnections between sensor and module, inputs and outputs, in twisted screened cable.

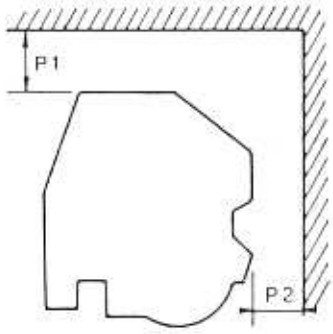
Dimensions and fixings

Control module

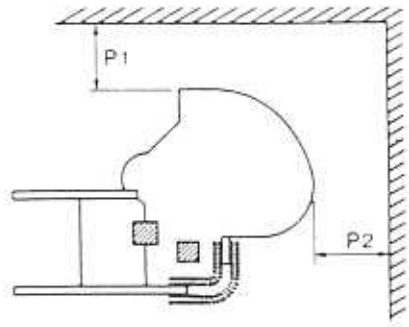


CR3 fast contactors

Electrical clearance distance :
- corresponding to breaking maximum fault current.



GB-HB-KB
With arc splitters



LB-MB-PB-RB High performance
arc chute without splitters

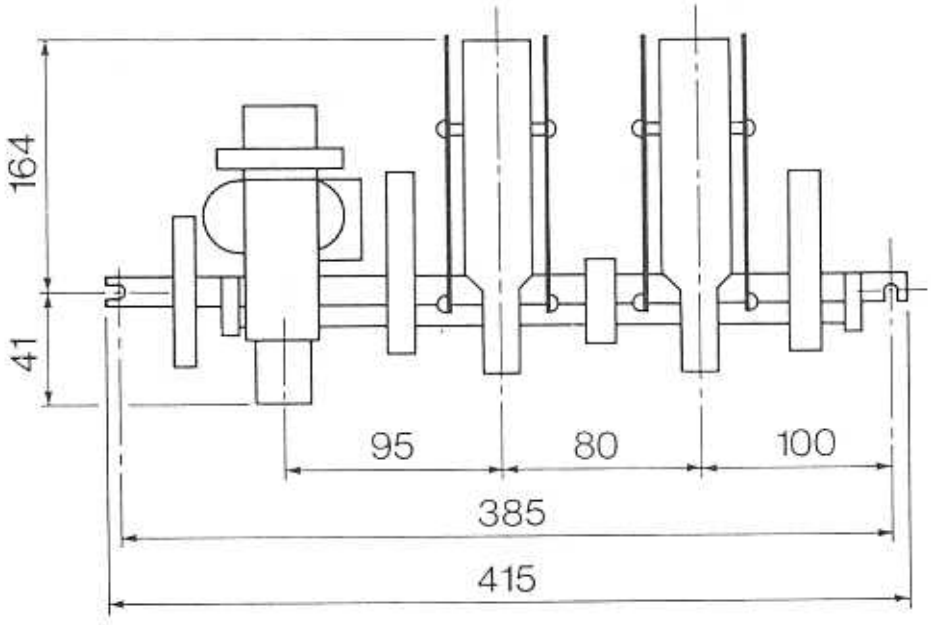
rating	GB	HB-KB	LB-MB	PB	RB
P1	120	150	300	330	350
P2	100	120	220	240	260

Dimensions and fixings

CR3 fast contactors

Contactors
CR3-GB12F21
CR3-GB22F21
CR3-GB32F21
CR3-GB42F21

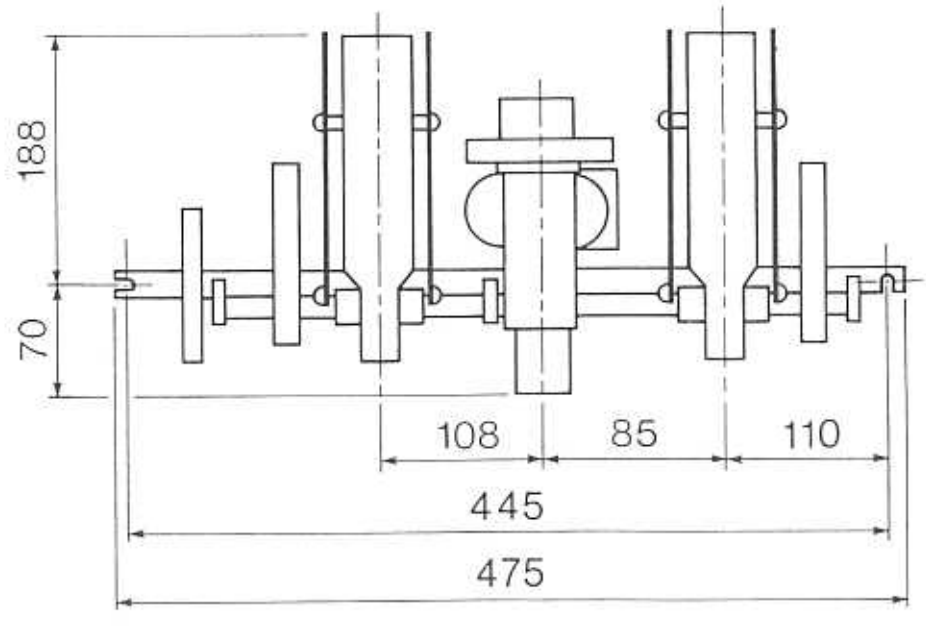
Fixing by M6 screws



Weight : 8 kg

Contactor
CR3-HB12F21

Fixing by M8 screws



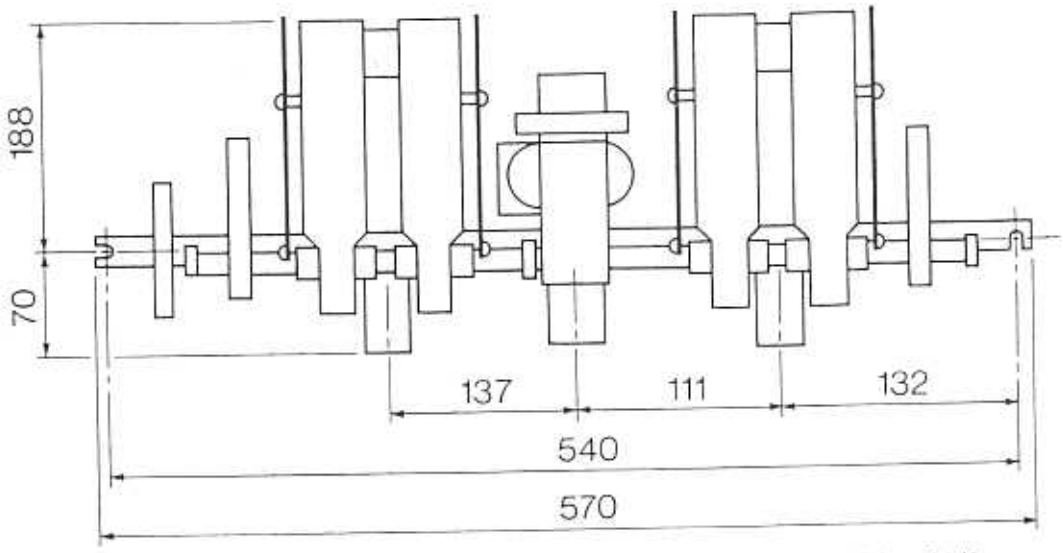
Weight : 16 kg

Dimensions

CR3 fast contactors

ontactor
R3-KB12F21

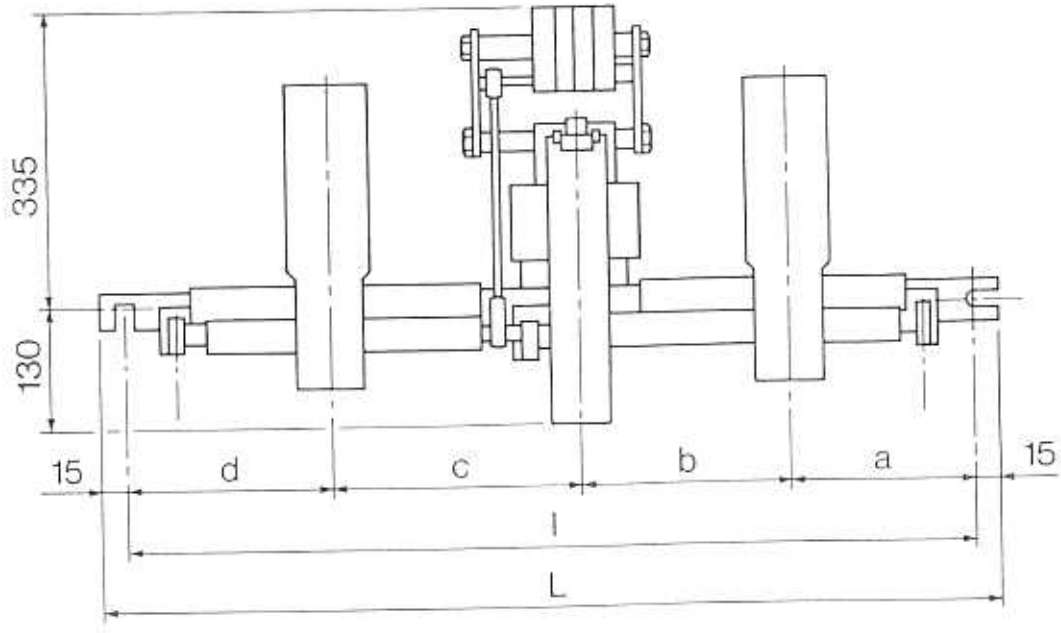
Fixing by M8 screws



Weight : 21 Kg

Contactors
CR3-LB/MB12F31
CR3-PB/RB12F31

Fixing by M12 screws

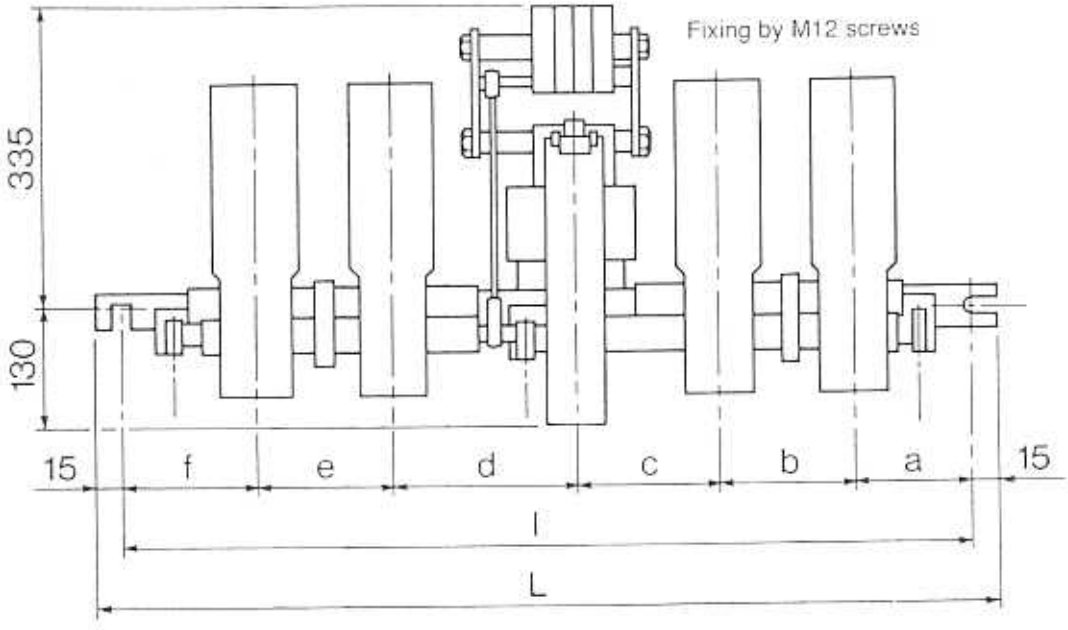


Type	a	b	c	d	l	L	Weight (kg)
CR3-LB/MB12	130	141	164	165	600	630	50/48
CR3-PB12	140	171	184	140	635	665	70
CR3-RB12	160	211	229	160	760	790	90

Dimensions and fixings

CR3 fast contactors

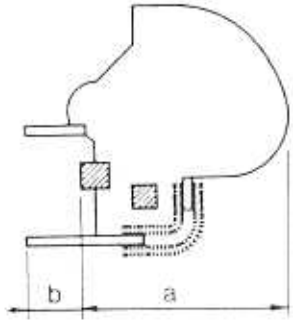
Contactors
CR3-LB/MB14F31
CR3-PB/RB14F31

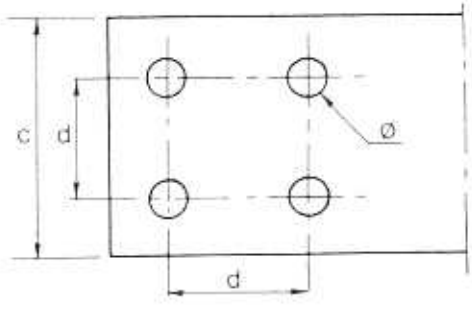


Type	a	b	c	d	e	f	l	L	Weight (kg)
CR3-LB/MB14	130	100	141	159	100	130	760	790	72/70
CR3-PB14	160	170	205	200	170	160	1065	1095	120
CR3-RB14	180	210	229	211	210	180	1220	1250	163

All ratings

Depth, terminations





CR3	GB	HB	KB	LB12	MB12	PB12	RB12	LB14	MB14	PB14	RB14
a	155	176	175	290	290	290	290	290	290	299	299
b	43	52	56	120	154	170	170	120	154	172	172
c	-	-	-	50	63	100	125	50	63	100	125
d	-	-	-	30	30	60	60	30	30	50	60
Ø	8	8	12	9	11	11	11	9	11	11	11

Preliminary checks

Make sure :

- that the equipment supplied corresponds to that ordered, by checking the label on the packaging,

- that the references of the two products which make up the complete package correspond exactly with those given in the following table.

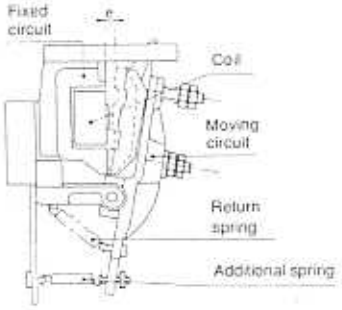
Reference of the package	Reference of the control module	Reference of the fast contactor
CR3-GB42F21 B102	LA9-B102	CR3-GB42F21
CR3-GB32F21 B102	LA9-B102	CR3-GB32F21
CR3-GB22F21 B102	LA9-B102	CR3-GB22F21
CR3-GB12F21 B102	LA9-B102	CR3-GB12F21
CR3-HB12F21 B102	LA9-B102	CR3-HB12F21
CR3-KB12F21 B102	LA9-B102	CR3-KB12F21
CR3-LB12F31 B102	LA9-B102	CR3-LB12F31
CR3-MB12F31 B102	LA9-B102	CR3-MB12F31
CR3-PB12F31 B102	LA9-B102	CR3-PB12F31
CR3-RB12F31 B102	LA9-B102	CR3-RB12F31
CR3-PB14F31 B102*	LA9-B102	CR3-PB14F31
CR3-LB14F31 B102	LA9-B102	CR3-LB14F31
CR3-MB14F31 B102	LA9-B102	CR3-MB14F31
CR3-RB14F31 B102	LA9-B102	CR3-RB14F31

* Note : two possible arrangements under this reference as the poles can be connected in series or parallel. See page 6.

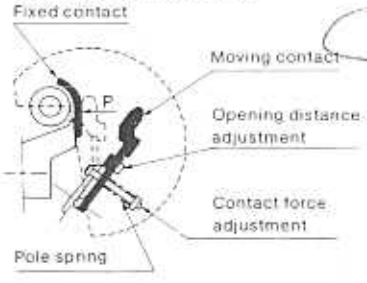
Adjustment of CR3 fast contactors

Table of settings

Electro EBS-

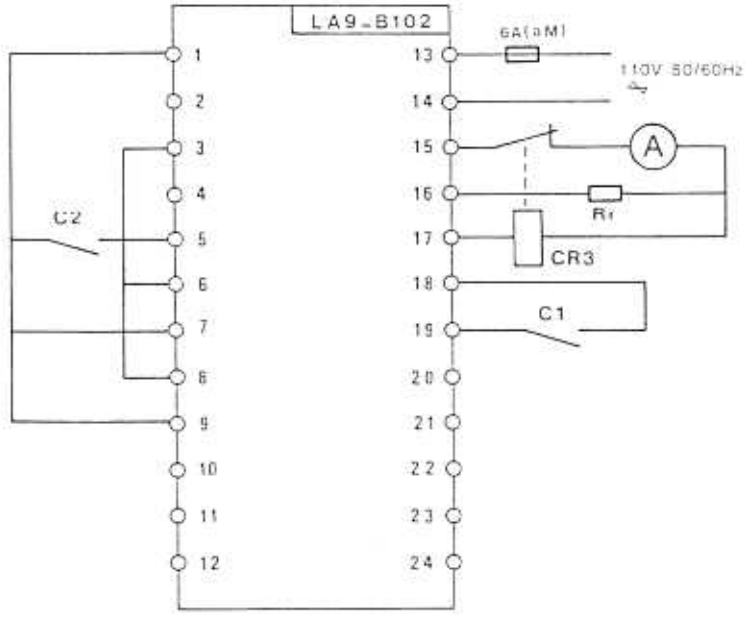


Normally open main pole



Reference CR3	Inrush current A	Supplementary spring e Compression at magnet mm	Supplementary spring Length mm	Pole e Compression at magnet mm	Pole P Pressure (per pole) daN	Opening time of the poles at Un ms
GB42F21	1,2	5,5 ± 0,5	53 ± 4	+ 0,5 3 – 0	+ 0,5 4 – 0	4,6 ± 0,4
GB32F21	1,2	5,5 ± 0,5	53 ± 4			4,6 ± 0,4
GB22F21	1,2	5,5 ± 0,5	53 ± 4			4,6 ± 0,4
GB12F21	1,2	5,5 ± 0,5	53 ± 4	+ 0,5 3 – 0	+ 0,5 4 – 0	4,6 ± 0,4
HB12F21	2,1	5 ± 0,5	53 ± 4	+ 0,5 3 – 0	+ 0,1 8 – 0	4,8 ± 0,4
KB12F21	2,1	5 ± 0,5	53 ± 4	+ 0,5 3 – 0	+ 1 8 – 0	4,8 ± 0,4
LB/MB12F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	50 ± 5	5,6 ± 0,4
PB12F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	60 ± 5	5,6 ± 0,4
RB12F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	60 ± 5	5,6 ± 0,4
LB/MB14F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	30 ± 3	5,6 ± 0,4
PB14F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	30 ± 3	5,6 ± 0,4
RB14F31	9,4	6 ± 0,5	65 ± 4	+ 0 5 – 0,5	30 ± 3	5,6 ± 0,4

Test connections



Maintenance
Adjustment of CR3 fast contactors

Maintenance

The contactor is factory preset.
The setting should be checked once a year or after 2500 on-load breaking operations. Adjust the compression travel (e) to the value specified when it reaches half the original value.
To ensure correct operation and to prevent unwanted delays on opening, it is recommended to clean the polar faces of the electromagnets of the CR3 once a year using a cloth slightly moistened with industrial solvent (baltane, trichlorethylene, alcohol...).
If the equipment undergoes a period of several months without being used, clean the device before putting it back into service.
Do not clean with an abrasive substance or with emery paper.

Mechanical adjustments

With the supply off
- compression of the upper neoprene washer of the EB5 electromagnet,
- compression travel of the poles,
- tension of the additional return spring,
- compression of the additional return spring.

With the supply on
- close contact C1 (terminals 18 and 19 of the module),
- operate the CR3 contactor using contact C2 (terminals 1-5),
  - closing current obtained when increasing the supply voltage,
  - pole pressures,
  - GM auxiliary contacts and rocker bar for ratings L, M, P et R.

Opening time at rated voltage

Use an oscilloscope or chronoscope to verify the time taken between giving the signal to open the contactor (opening of C2) and the opening of the main poles of the contactor.

0,5 ms should be added to the times given in the table on page 21. This additional time corresponds to the delay caused by the electronic module. If the opening time is not within the tolerance zone, adjust in succession :
- the tension of the additional spring,
- the pole pressure,
- the pole compression gap.

Safety on closing

To check its operation :
- open contact C1,
- block the electromagnet in the open position,
- supply at 0,8 Un (88 Volts),
- close contact C2.

The closing current of the contactor is broken after a time of between 0,6 and 1,1 seconds.

Adjustment of the detection thresholds

The 2 potentiometers I1 and I2 accessible on the front of the module enable the setting of different levels of operation depending on the polarity of the current, should this be required (asymmetrical bridges).

• Method of operation :

- **Symmetrical bridges** (same tripping point irrespective of the direction of current flow). Set potentiometer I1 to the fully clockwise position and potentiometer I2 to the fully anticlockwise position (identical detection levels irrespective of the direction of current flow in the armature). Set the speed controller to provide maximum current (current limit), then turn I1 in the anticlockwise direction until the contactor just drops out.

Check that with potentiometer I1 in this position, the contactor equally drops out with the same current flowing in the opposite direction.

Then turn potentiometer I1 two graduations in the clockwise direction in order to prevent nuisance tripping.

Then check that the contactor does not drop out whatever the direction of current flow (tripping thereshold too low). If not readjust I1.

- **Asymmetrical bridges** (different tripping thresholds depending on the direction of current flow). Set potentiometer I1 to the fully clockwise position. Set potentiometer I2 to the fully anticlockwise position.

Begin by adjusting the tripping threshold corresponding to the higher maximum current: in this case, the positive feedback voltage should be applied to terminal 11 and potentiometer I1 is active. Set the speed controller to maximum current (current limit) and turn potentiometer I1 in the anticlockwise direction until the contactor just drops out.

Then offset this same potentiometer by two graduations in the clockwise direction in order to prevent nuisance tripping.

Reverse the direction of current flow; in which case the feedback voltage should be applied to terminal 12 and potentiometer I2 is active.

Set the speed controller to maximum current (current limit) and turn potentiometer I2 in the clockwise direction until the contactor just drops out.

Then offset potentiometer I2 by two graduations in the anticlockwise direction in order to prevent nuisance tripping.

Then ensure that the contactor does not drop out irrespective of the direction of current flow.

Control module

«LOCAL TEST» controls

Run» push-button

The contactor can be closed without an external signal by using the «Run» push-button located on the front of the control module.
Actuating this push-button causes the fast contactor to close and remain in the closed condition for a period of approximately 5 seconds.

Fault» push-button

Having closed the CR3 fast contactor using the «Run» push-button the contactor can then be opened immediately by pressing the «Fault» push-button. The red LED should go on.

At the end of the 5 second time delay initiated by the «Run» push-button, the fault is automatically cancelled and the module is ready for a second test sequence or for normal operation by a signal from the automation system logic.

Note:
In order to prevent unwanted manual opening of the fast contactor on load, the test sequence opening operation is only possible with the power disconnected (line contactor open).

Spare parts

CR3 contactors

Contactor size	CR3-GB	CR3-HB	CR3-KB	CR3-LB	CR3-MB	CR3-PB	CR3-RB
Set of contacts for 1 pole	PA2-GB80	PA2-HB80	2xPA2-HB80	PA1-LB80	PA1-LB80	2xPA1-LB80	3xPA1-LB80
Blow out horn for 1 pole	None	None	None	PA1-LB89	PA1-LB89	2xPA1-LB89	3xPA1-LB89
Blow out chamber for 1 pole	PA2-GB50	PA2-HB50	2xPA2-HB50	PA1-LB50	PA1-LB50	PA1-PB50	PA1-RB50
Coil	WB1-GA300	WB1-HA300	WB1-HA300	WB1-KB123	WB1-KB123	WB1-KB123	WB1-KB123
Economy resistance	DR2-SC0220	DR2-SC0100	DR2-SC0100	DR2-SC0033	DR2-SC0033	DR2-SC0033	DR2-SC0033

Auxiliary contacts

N/O contact : ZC4-GM1
N/C contact : ZC4-GM2
1 N/O + 1 N/C contact : ZC1-GP5

Control module

For all ratings of CR3 fast contactors : LA9-B102

Module control use

0.4 A time delay fuse: SY3-AP007 (sold in lots of 10)