TeSys contactors
For switching 3-phase capacitor banks used for power factor correction

Standard contactors

Capacitors, together with the circuits to which they are connected, form oscillatory circuits which can, at the moment of switch-on, give rise to high transient currents (> 180 In) at high frequencies (1 to 15 kHz).
As a general rule, the peak current on energisation is lower when:
- the mains inductances are high,
- the line transformer ratings are low,
- the transformer short-circuit voltage is high,
- the ratio between the sum of the ratings of the capacitors already switched into the circuit and that of the capacitor to be switched in is small (for multiple step capacitor banks).

In accordance with standards IEC 60070, NF C 54-100, VDE 0560, the switching contactor must be able to withstand a continuous current of 1.43 times the rated current of the capacitor bank step being switched.
The rated operational powers given in the tables below take this overload into account.
Short-circuit protection is normally provided by gI type HPC fuses rated at 1.7 to 2 In.

Contactor applications

Operating conditions

Capacitors are directly switched. **The values of peak current at switch-on must not exceed the values indicated opposite.**
An inductor may be inserted in each of the three phases supplying the capacitors to reduce the peak current, if necessary.
Inductance values are determined according to the selected operating temperature.

Power factor correction by a single-step capacitor bank

The use of a choke inductor is unnecessary: the inductance of the mains supply is adequate to limit the peak to a value compatible with the contactor characteristics.

Power factor correction by a multiple-step capacitor bank

Select a special contactor as defined on page 24569/2.
If a standard contactor is used, it is essential to insert a choke inductor in each of the three phases of each step.

Maximum operational power of contactors

Standard contactors

Maximum operating rate: 120 operating cycles/hour.
Electrical durability at maxiumum load: 100 000 operating cycles.
With choke inductors connected, where necessary.

Operational power at 50/60 Hz						Max. peak current	Contactor rating
$\theta \leq$ 40 °C *(1)*			$\theta \leq$ 55 °C *(1)*				
220/240 V	400/440 V	600/690 V	220/240 V	400/440 V	600/690 V		
kvAR	kvAR	kvAR	kvAR	kvAR	kvAR	A	
6	11	15	6	11	15	560	**LC1 D09, D12**
9	15	20	9	15	20	850	**LC1 D18**
11	20	25	11	20	25	1600	**LC1 D25**
14	25	30	14	25	30	1900	**LC1 D32, D38**
17	30	37	17	30	37	2160	**LC1 D40**
22	40	50	22	40	50	2160	**LC1 D50**
22	40	50	22	40	50	3040	**LC1 D65**
35	60	75	35	60	75	3040	**LC1 D80, D95**
50	90	125	38	75	80	3100	**LC1 D115**
60	110	135	40	85	90	3300	**LC1 D150**
70	125	160	50	100	100	3500	**LC1 F185**
80	140	190	60	110	110	4000	**LC1 F225**
90	160	225	75	125	125	5000	**LC1 F265**
100	190	275	85	140	165	6500	**LC1 F330**
125	220	300	100	160	200	8000	**LC1 F400**
180	300	400	125	220	300	10 000	**LC1 F500**
250	400	600	190	350	500	12 000	**LC1 F630**
250	400	600	190	350	500	14 200	**LC1 F800**
200	350	500	180	350	500	25 000	**LC1 BL**
300	550	650	250	500	600	25 000	**LC1 BM**
500	850	950	400	750	750	25 000	**LC1 BP**
600	1100	1300	500	1000	1000	25 000	**LC1 BR**

(1) Upper limit of temperature category conforming to IEC 60070.

Characteristics :
pages 24505/2 to 24505/7

References :
pages 24501/2 to 24502/3

Dimensions, schemes :
pages 24531/2 to 24532/3

TeSys contactors

For switching 3-phase capacitor banks, used for power factor correction,

Direct connection without choke inductors

Special contactors

Special contactors **LC1 D●K** are designed for switching 3-phase, single or multiple-step capacitor banks; they conform to standards IEC 60070 and 60831, NFC 54-100, VDE 0560, UL and CSA.

Contactor applications

Specification

Contactors fitted with a block of early make poles and damping resistors, limiting the value of the current on closing to 60 In max.
This current limitation increases the life of all the components of the installation, in particular that of the fuses and capacitors.
The patented design of the add-on block (n° 90 119-20) ensures safety and long life of the installation.

Operating conditions

There is no need to use choke inductors for either single or multiple-step capacitor banks.
Short-circuit protection must be provided by gI type fuses rated at 1.7…2 In.

Maximum operational power

The power values given in the selection table below are for the following operating conditions:

Prospective peak current at switch-on	LC1 D●K		200 In
Maximum operating rate	LC1 DFK, DGK, DLK, DMK, DPK		240 operating cycles/hour
	LC1 DTK, DWK		100 operating cycles/hour
Electrical durability at nominal load	All contactor ratings	400 V	300 000 operating cycles
		690 V	200 000 operating cycles

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LC1 DFK11●●

Operational power at 50/60 Hz *(1)* θ ≤ 55 °C *(2)*			Instantaneous auxiliary contacts		Tightening torque on cable end	Basic reference, to be completed by adding the voltage code *(3)*	Weight
220 V 240 V	400 V 440 V	660 V 690 V					
kVAR	kVAR	kVAR	N/O	N/C	N.m		kg
6.7	12.5	18	1	1	1.2	**LC1 DFK11●●**	0.430
			–	2	1.2	**LC1 DFK02●●**	0.430
8.5	16.7	24	1	1	1.7	**LC1 DGK11●●**	0.450
			–	2	1.7	**LC1 DGK02●●**	0.450
10	20	30	1	1	1.9	**LC1 DLK11●●**	0.600
			–	2	1.9	**LC1 DLK02●●**	0.600
15	25	36	1	1	2.5	**LC1 DMK11●●**	0.630
			–	2	2.5	**LC1 DMK02●●**	0.630
20	33.3	48	1	2	5	**LC1 DPK12●●**	1.300
25	40	58	1	2	5	**LC1 DTK12●●**	1.300
40	60	92	1	2	9	**LC1 DWK12●●**	1.650

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LC1 DPK12●●

Switching of multiple-step capacitor banks (with equal or different power ratings)

The correct contactor for each step is selected from the above table, according to the power rating of the step to be switched.
Example: 50 kVAR 3-step capacitor bank. Temperature: 50 °C and U = 400 V or 440 V.
One 25 kVAR step: contactor LC1 DMK, one 15 kVAR step: contactor LC1 DGK, and one 10 kVAR step: contactor LC1 DFK.

(1) Operational power of the contactor according to the scheme on the page opposite.
(2) The average temperature over a 24-hour period, in accordance with standards IEC 60070 and 60831 is 45 °C.
(3) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

Volts	24	42	48	110	115	220	230	240	380	400	415	440
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7

For other voltages between 24 and 440 V, please consult your Regional Sales Office

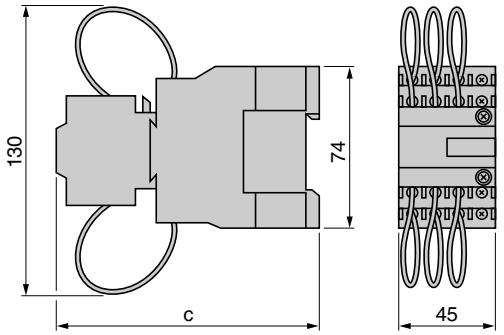
Dimensions, schemes :
page 24569/3

TeSys contactors

For switching 3-phase capacitor banks, used for power factor correction

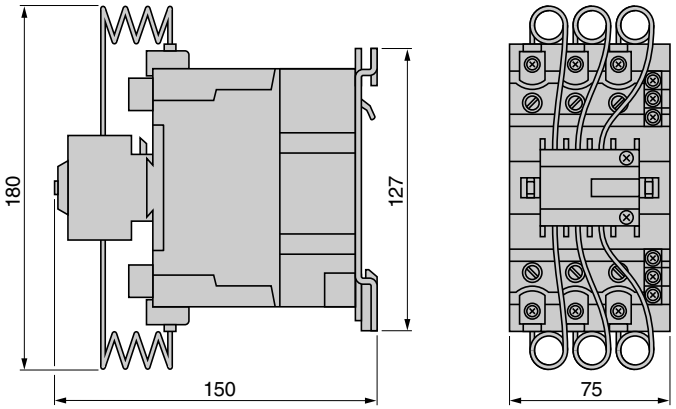
Dimensions

LC1 DFK, DGK



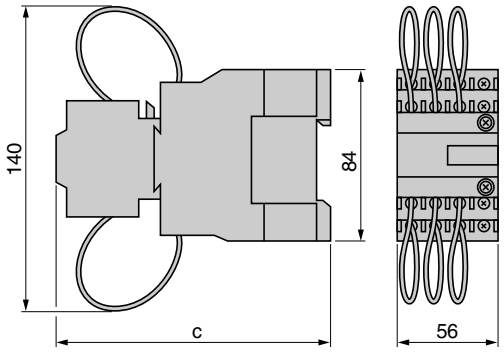
LC1	c	Type of fixing	
DFK	117	LC1 D12	See page 24531/4
DGK	122	LC1 D18	See page 24531/4

LC1 DPK, DTK



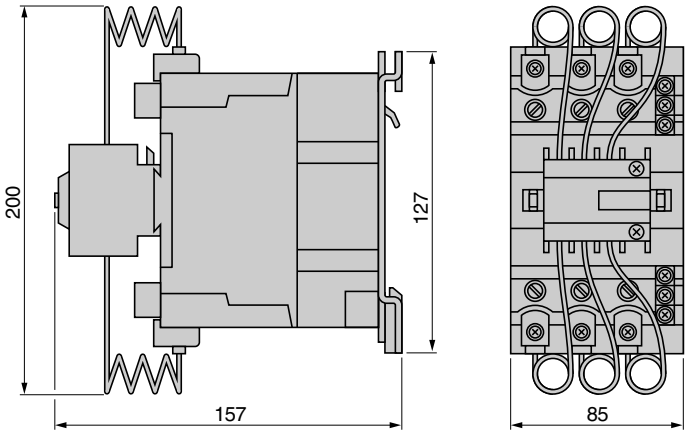
LC1	Type of fixing	
DPK	LC1 D40	See page 24531/4
DTK	LC1 D50	See page 24531/4

LC1 DLK, DMK



LC1	c	Type of fixing	
DLK	117	LC1 D25	See page 24531/4
DMK	122	LC1 D32	See page 24531/4

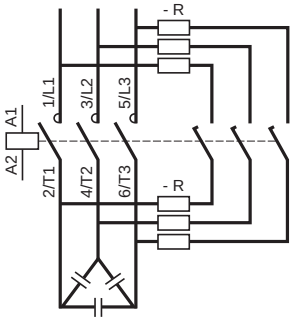
LC1 DWK



LC1	Type of fixing	
DWK	LC1 D80	See page 24531/4

Schemes

LC1 D●K



R = Pre-wired resistor connections.

Cabling (maximum permissible c.s.a.)

Contactor type LC1	DFK		DGK		DLK		DMK		DPK, DTK		DWK	
Number of conductors	1	2	1	2	1	2	1	2	1	2	1	2
Flexible cable with cable end (mm^2)	2.5	1.5	4	2.5	4	4	6	4	16	6	50	25
Solid cable with cable end (mm^2)	4	4	6	6	10	6	16	10	25	16	50	35

References :
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