Contactor utilisation categories conforming to IEC 60947-1

The standard utilisation categories define the current values which the contactor must be able to make or break.

These values depend on:
- the type of load being switched: squirrel cage or slip ring motor, resistors,
- the conditions under which making or breaking takes place: motor stalled, starting or running, reversing, plugging.

a.c. applications

Category AC-1	This category applies to all types of a.c. load with a power factor equal to or greater than 0.95 ($\cos \varphi \geq 0.95$). Application examples: heating, distribution.
Category AC-2	This category applies to starting, plugging and inching of slip ring motors. ■ On closing, the contactor makes the starting current, which is about 2.5 times the rated current of the motor. ■ On opening, it must break the starting current, at a voltage less than or equal to the mains supply voltage.
Category AC-3	This category applies to squirrel cage motors with breaking during normal running of the motor. ■ On closing, the contactor makes the starting current, which is about 5 to 7 times the rated current of the motor. ■ On opening, it breaks the rated current drawn by the motor. Application examples: all standard squirrel cage motors: lifts, escalators, conveyor belts, bucket elevators, compressors, pumps, mixers, air conditioning units, etc... .
Category AC-4	This category covers applications with plugging and inching of squirrel cage and slip ring motors. The contactor closes at a current peak which may be as high as 5 or 7 times the rated motor current. On opening it breaks this same current at a voltage which is higher, the lower the motor speed. This voltage can be the same as the mains voltage. Breaking is severe. Application examples: printing machines, wire drawing machines, cranes and hoists, metallurgy industry.

d.c. applications

Category DC-1	This category applies to all types of d.c. load with a time constant (L/R) of less than or equal to 1 ms.
Category DC-3	This category applies to starting, counter-current braking and inching of shunt motors. Time constant ≤ 2 ms. ■ On closing, the contactor makes the starting current, which is about 2.5 times the rated motor current. ■ On opening, the contactor must be able to break 2.5 times the starting current at a voltage which is less than or equal to the mains voltage. The slower the motor speed, and therefore the lower its back e.m.f., the higher this voltage. Breaking is difficult.
Category DC-5	This category applies to starting, counter-current braking and inching of series wound motors. Time constant ≤ 7.5 ms. On closing, the contactor makes a starting current peak which may be as high as 2.5 times the rated motor current. On opening, the contactor breaks this same current at a voltage which is higher, the lower the motor speed. This voltage can be the same as the mains voltage. Breaking is severe.

Utilisation categories for auxiliary contacts & control relays conforming to IEC 60947-1

a.c. applications

Category AC-14 (1)	This category applies to the switching of electromagnetic loads whose power drawn with the electromagnet closed is less than 72 VA. Application example: switching the operating coil of contactors and relays.
Category AC-15 (1)	This category applies to the switching of electromagnetic loads whose power drawn with the electromagnet closed is more than 72 VA. Application example: switching the operating coil of contactors.

d.c. applications

Category DC-13 (2)	This category applies to the switching of electromagnetic loads for which the time taken to reach 95 % of the steady state current (T = 0.95) is equal to 6 times the power P drawn by the load (with P ≤ 50 W). Application example: switching the operating coil of contactors without economy resistor.

(1) Replaces category AC-11.
(2) Replaces category DC-11.

TeSys contactors
Definitions and comments

Definitions

Altitude

The rarefied atmosphere at high altitude reduces the dielectric strength of the air and hence the rated operational voltage of the contactor. It also reduces the cooling effect of the air and hence the rated operational current of the contactor (unless the temperature drops at the same time).

No derating is necessary up to 3000 m.

Derating factors to be applied above this altitude for main pole operational voltage and current (a.c. supply) are as follows.

Altitude	3500 m	4000 m	4500 m	5000 m
Rated operetional voltage	0.90	0.80	0.70	0.60
Rated operational current	0.92	0.90	0.88	0.86

Ambient air temperature

The temperature of the air surrounding the device, measured near to the device.
The operating characteristics are given:
- with no restriction for temperatures between -5 and +55 °C,
- with restrictions, if necessary, for temperatures between -50 and +70 °C.

Rated operational current (Ie)

This is defined taking into account the rated operational voltage, operating rate and duty, utilisation category and ambient temperature around the device.

Rated conventional thermal current (Ith) (1)

The current which a closed contactor can sustain for a minimum of 8 hours without its temperature rise exceeding the limits given in the standards.

Permissible short time rating

The current which a closed contactor can sustain for a short time after a period of no load, without dangerous overheating.

Rated operational voltage (Ue)

This is the voltage value which, in conjunction with the rated operational current, determines the use of the contactor or starter, and on which the corresponding tests and the utilisation category are based. For 3-phase circuits it is expressed as the voltage between phases.
Apart from exceptional cases such as rotor short-circuiting, the rated operational voltage Ue is less than or equal to the rated insulation voltage Ui.

Rated control circuit voltage (Uc)

The rated value of the control circuit voltage, on which the operating characteristics are based. For a.c. applications, the values are given for a near sinusoidal wave form (less than 5 % total harmonic distortion).

Rated insulation voltage (Ui)

This is the voltage value used to define the insulation characteristics of a device and referred to in dielectric tests determining leakage paths and creepage distances. As the specifications are not identical for all standards, the rated value given for each of them is not necessarily the same.

Rated impulse withstand voltage (Uimp)

The peak value of a voltage surge which the device is able to withstand without breaking down.

Rated operational power (expressed in kW)

The rated power of the standard motor which can be switched by the contactor, at the stated operational voltage.

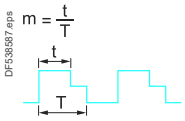
Rated breaking capacity (2)

This is the current value which the contactor can break in accordance with the breaking conditions specified in the IEC standard.

Rated making capacity (2)

This is the current value which the contactor can make in accordance with the making conditions specified in the IEC standard.

On-load factor (m)



This is the ratio between the time the current flows (t) and the duration of the cycle (T).
Cycle duration: duration of current flow + time at zero current.

Pole impedance

The impedance of one pole is the sum of the impedance of all the circuit components between the input terminal and the output terminal.
The impedance comprises a resistive component (R) and an inductive component ($X = L\omega$).
The total impedance therefore depends on the frequency and is normally given for 50 Hz.
This average value is given for the pole at its rated operational current.

Electrical durability

This is the average number of on-load operating cycles which the main pole contacts can perform without maintenance. The electrical durability depends on the utilisation category, the rated operational current and the rated operational voltage.

Mechanical durability

This is the average number of no-load operating cycles (i.e. with zero current flow through the main poles) which the contactor can perform without mechanical failure.

(1) Conventional thermal current, in free air, conforming to IEC standards.
(2) For a.c. applications, the breaking and making capacities are expressed by the rms value of the symmetrical component of the short-circuit current. Taking into account the maximum asymmetry which may exist in the circuit, the contacts therefore have to withstand a peak asymmetrical current which may be twice the rms symmetrical component.
***Note:** these definitions are extracted from standard IEC 60947-1.*

TeSys contactors
For utilisation category AC-3

Operational current and power conforming to IEC ($\theta \leq 60$ °C)

Contactor size			LC1/ LP1 K06	LC1/ LP1 K09	LC1 K12	LC1 K16	LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38	LC1 D40A
Maximum operational current in AC-3	≤ 440 V	**A**	6	9	12	16	9	12	18	25	32	38	40
Rated operational power P (standard motor power ratings)	220/240 V	**kW**	1.5	2.2	3	3	2.2	3	4	5.5	7.5	9	11
	380/400 V	**kW**	2.2	4	5.5	7.5	4	5.5	7.5	11	15	18.5	18.5
	415 V	**kW**	2.2	4	5.5	7.5	4	5.5	9	11	15	18.5	22
	440 V	**kW**	3	4	5.5	7.5	4	5.5	9	11	15	18.5	22
	500 V	**kW**	3	4	4	5.5	5.5	7.5	10	15	18.5	18.5	22
	660/690 V	**kW**	3	4	4	4	5.5	7.5	10	15	18.5	18.5	30
	1000 V	**kW**	–	–	–	–	–	–	–	–	–	–	–

Maximum operating rate in operating cycles/hour (1)

On-load factor	Operational power						LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38	LC1 D40A
≤ 85 %	P		–	–	–	–	1200	1200	1200	1200	1000	1000	1000
	0.5 P		–	–	–	–	3000	3000	2500	2500	2500	2500	2500
≤ 25 %	P		–	–	–	–	1800	1800	1800	1800	1200	1200	1200

Operational current and power conforming to UL, CSA ($\theta \leq 60$ °C)

Contactor size			LC1/ LP1 K06	LC1/ LP1 K09	LC1/ LP1 K12	LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38	LC1 D40A
Maximum operational current in AC-3	≤ 440 V	**A**	6	9	12	9	12	18	25	32	–	40
Rated operational power P (standard motor power ratings 60 Hz)	200/208 V	**HP**	1.5	2	3	2	3	5	7.5	10	–	10
	230/240 V	**HP**	1.5	3	3	2	3	5	7.5	10	–	10
	460/480 V	**HP**	3	5	7.5	5	7.5	10	15	20	–	30
	575/600 V	**HP**	3	5	10	7.5	10	15	20	25	–	30

(1) Depending on the operational power and the on-load factor ($\theta \leq 60$ °C).
(2) Other values: please contact us.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors

For utilisation category AC-3

LC1 D50A	LC1 D65A	LC1 D80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 F1000	LC1 BL	LC1 BM	LC1 BP	LC1 BR
50	65	80	80	95	115	150	185	225	265	330	400	500	630	780	800	1000	750	1000	1500	1800
15	18,5	22	22	25	30	40	55	63	75	100	110	147	200	220	250	315	220	280	425	500
22	30	37	37	45	55	75	90	110	132	160	200	250	335	400	450	560	400	500	750	900
25	37	37	45	45	59	80	100	110	140	180	220	280	375	425	450	630	425	530	800	900
30	37	37	45	45	59	80	100	110	140	200	250	295	400	425	450	670	450	560	800	900
30	37	37	55	55	75	90	110	129	160	200	257	355	400	450	450	–	500	600	750	900
33	37	37	45	45	80	100	110	129	160	220	280	335	450	475	475	–	560	670	750	900
–	–	-	45	45	65	75	100	100	147	160	185	335	450	450	450	–	530	530	670	750

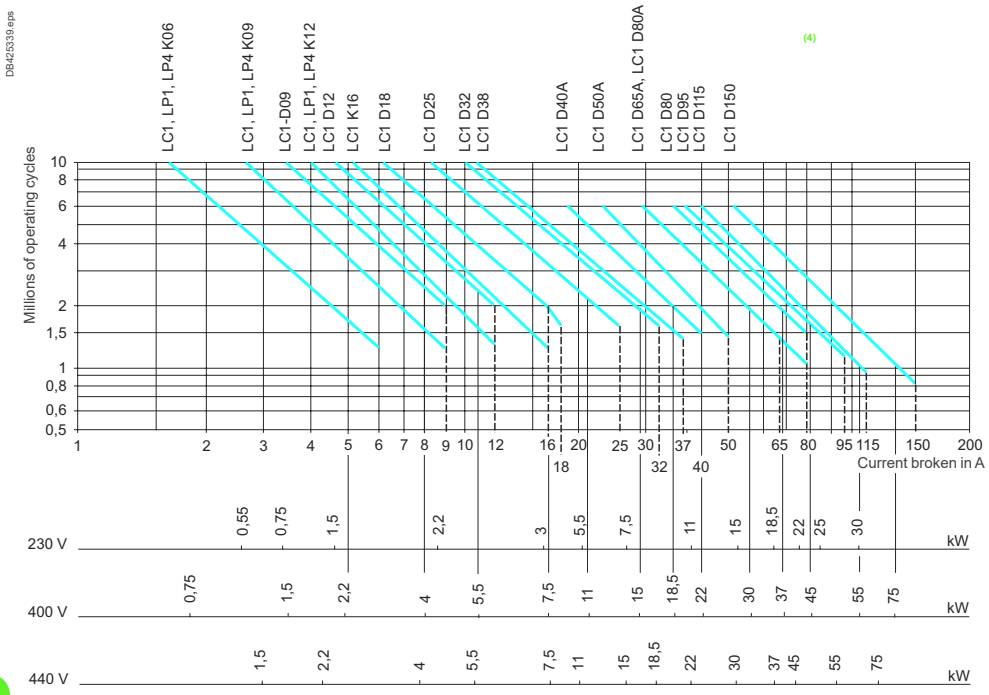
LC1 D50A	LC1 D65A	LC1 D80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 F1000	LC1 BL	LC1 BM	LC1 BP	LC1 BR
1000	1000	1000	750	750	750	750	750	750	750	750	500	500	500	500	500	(2)	120	120	120	120
2500	2500	2500	2000	2000	2000	1200	2000	2000	2000	2000	1200	1200	1200	1200	600	(2)	120	120	120	120
1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	600	600	(2)	120	120	120	120

LC1 D50A	LC1 D65A	LC1 D80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 F1000
50	65	65	80	95	115	150	185	225	265	330	400	500	630	780	800	1000
15	20	20	30	30	30	40	50	60	60	75	100	150	250	–	350	350
15	20	20	30	30	40	50	60	75	75	100	125	200	300	450	400	400
40	40	40	60	60	75	100	125	150	150	200	250	400	600	900	900	900
40	50	50	60	60	100	125	150	150	200	250	300	500	800	900	900	–

TeSys contactors
For utilisation category AC-3

Selection according to required electrical durability, in category AC-3 (Ue ≤ 440 V)

Control of 3-phase asynchronous squirrel cage motors with breaking whilst running.
The current broken (Ic) in category AC-3 is equal to the rated operational current (Ie) of the motor.



Operational power in kW-50 Hz.

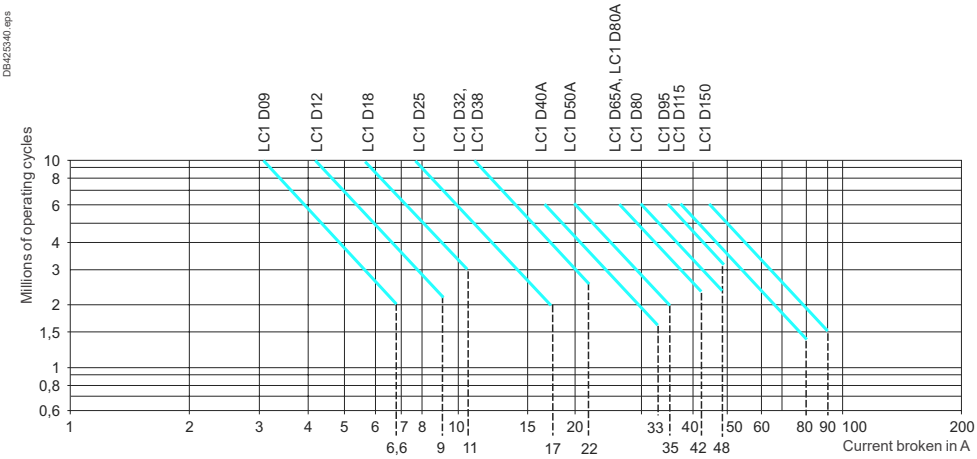
Example:

Asynchronous motor with P = 5.5 kW - Ue = 400 V - Ie = 11 A - Ic = Ie = 11 A
or asynchronous motor with P = 5.5 kW - Ue = 415 V - Ie = 11 A - Ic = Ie = 11 A
3 million operating cycles required.
The above selection curves show the contactor rating needed: LC1 D18.

Note: *for TeSys D green, consult online datasheets for values.*

Selection according to required electrical durability, in category AC-3 (Ue = 660/690 V) (1)

Control of 3-phase asynchronous squirrel cage motors with breaking whilst running.
The current broken (Ic) in category AC-3 is equal to the rated operational current (Ie) of the motor.



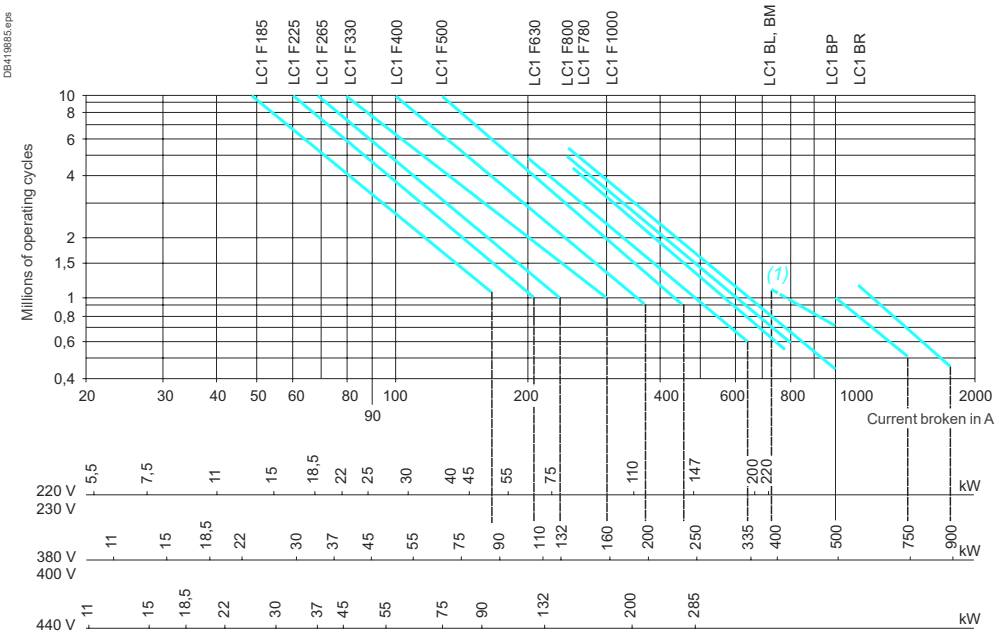
(1) *For Ue = 1000 V, use the 660/690 V curves, but do not exceed the operational current at the operational power indicated for 1000 V.*

Coordination and standards

TeSys contactors
For utilisation category AC-3

Selection according to required electrical durability, in category AC-3 (Ue ≤ 440 V)

Control of 3-phase asynchronous squirrel cage motors with breaking whilst running.
The current broken (Ic) in category AC-3 is equal to the rated operational current (Ie) of the motor.



Operational power in kW-50 Hz.

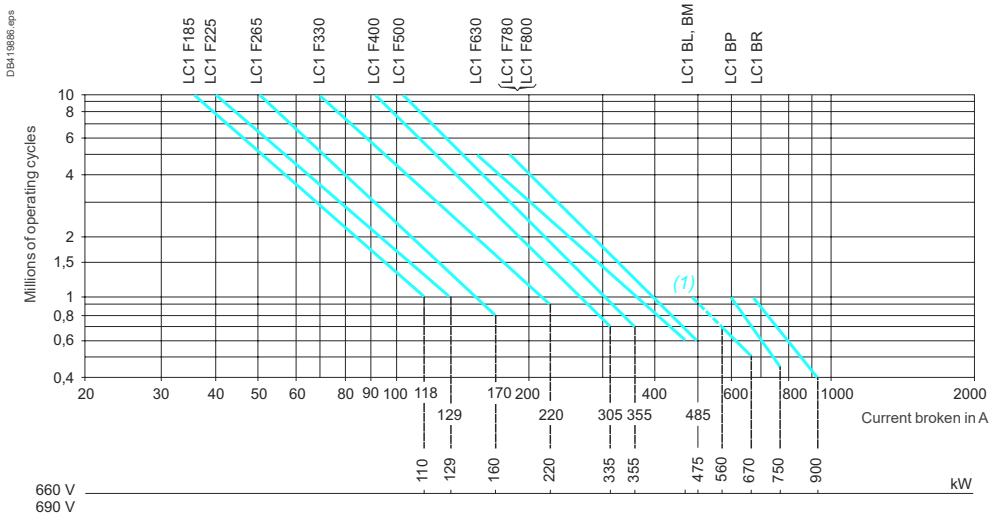
Example:

Asynchronous motor with P = 132 kW - Ue = 380 V - Ie = 245 A - Ic = Ie = 245 A
or asynchronous motor with P = 132 kW - Ue = 415 V - Ie = 240 A - Ic = Ie = 240 A
1.5 million operating cycles required.
The above selection curves show the contactor rating needed: LC1 F330.

(1) The dotted lines are only applicable to LC1 BL contactors.

Selection according to required electrical durability, in category AC-3 (Ue = 660/690 V)

Control of 3-phase asynchronous squirrel cage motors with breaking whilst running.
The current broken (Ic) in category AC-3 is equal to the rated operational current (Ie) of the motor.



Example:

Asynchronous motor with P = 132 kW - Ue = 660 V - Ie = 140 A - Ic = Ie = 140 A
1.5 million operating cycles required.
The above selection curves show the contactor rating needed: LC1 F330.

(1) The dotted lines are only applicable to LC1 BL contactors.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For utilisation category AC-1

Maximum operational current (open-mounted device)

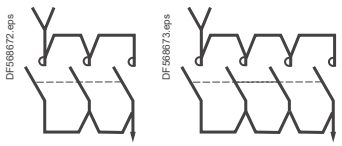
Contactor size			LC1/ LP1 K09	LC1/ LP1 K12	LC1 D09	LC1 DT20	LC1 D12 DT25	LC1 D18 DT32	LC1 D25 DT40	LC1 D32	LC1 D38	LC1 D40A DT60A	LC1 D50A
Maximum operating rate in operating cycles/hour			600	600	600	600	600	600	600	600	600	600	600
Connection conforming to IEC 60947-1	Cable c.s.a.	mm²	4	4	4	4	4	6	6	10	10	35	35
	Bar c.s.a.	mm	–	–	–	–	–	–	–	–	–	–	–
Operational current in AC-1 in A, according to the ambient temperature conforming to IEC 60947-1	≤ 40 °C	A	20	20	25	20	25	32	40	50	50	60	80
	≤ 60 °C	A (4)	20	20	25	20	25	32	40	50	50	60	80
	≤ 70 °C	A (4)	(1)	(1)	17	(1)	17	22	28	35	35	42	56
Maximum operational power ≤ 60 °C	220/230 V	kW	8	8	9	8	9	11	14	18	18	21	29
	240 V	kW	8	8	9	8	9	12	15	19	19	23	31
	380/400 V	kW	14	14	15	14	15	20	25	31	31	37	50
	415 V	kW	14	14	17	14	17	21	27	34	34	41	54
	440 V	kW	15	15	18	15	18	23	29	36	36	43	58
	500 V	kW	17	17	20	17	20	23	33	41	41	49	65
	660/690 V	kW	22	22	27	22	27	34	43	54	54	65	80
	1000 V	kW	–	–	–	–	–	–	–	–	–	–	–

(1) Please consult your Regional Sales Office.
*(2) With set of right-angled connectors **LA9F2100.***
*(3) With set of right-angled connectors **LA9F2600**.*
*(4) **LC1F115** to **LC1F2600**: maximum coil control voltage must not exceed rated Uc for temperature ≥ 60 °C.*

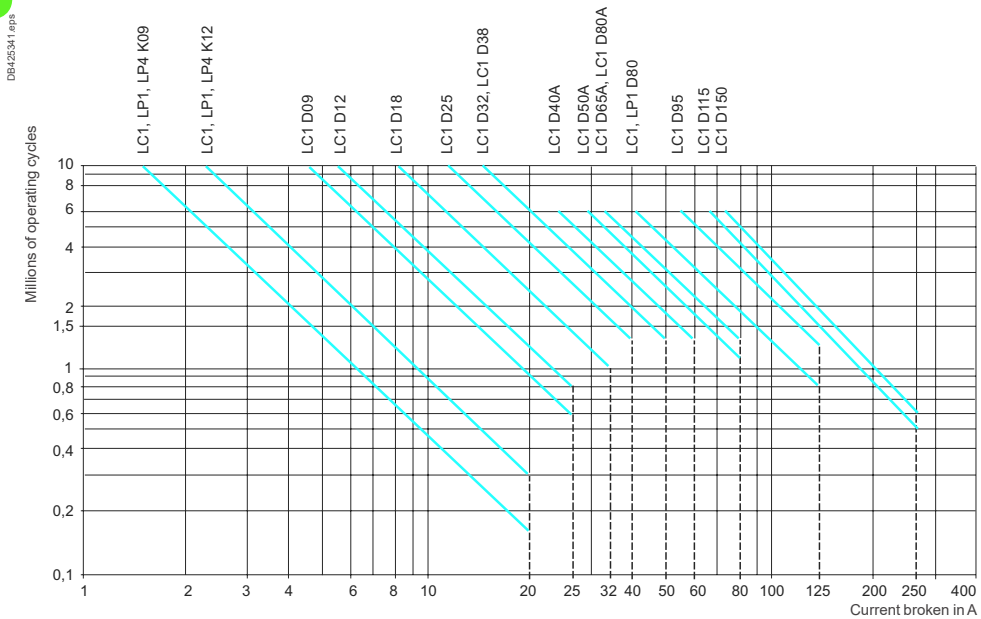
Increase in operational current by parallel connection of poles

Apply the following coefficients to the currents or power values given above; these coefficients take into account an often unbalanced current distribution between the poles:

- 2 poles in parallel: K = 1.6
- 3 poles in parallel: K = 2.25
- 4 poles in parallel: K = 2.8



Selection according to required electrical durability, in category AC-1 (Ue ≤ 690 V)



Note: for TeSys D green, consult online datasheets for values.

Control of resistive circuits (cos ϕ ≥ 0.95).
The current broken (Ic) in category AC-1 is equal to the current (Ie) normally drawn by the load.

Example:

- Ue = 220 V - Ie = 50 A θ ≤ 40 °C - Ic = Ie = 50 A
- 2 million operating cycles required
- the above selection curves show the contactor rating needed: LC1 D50A.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

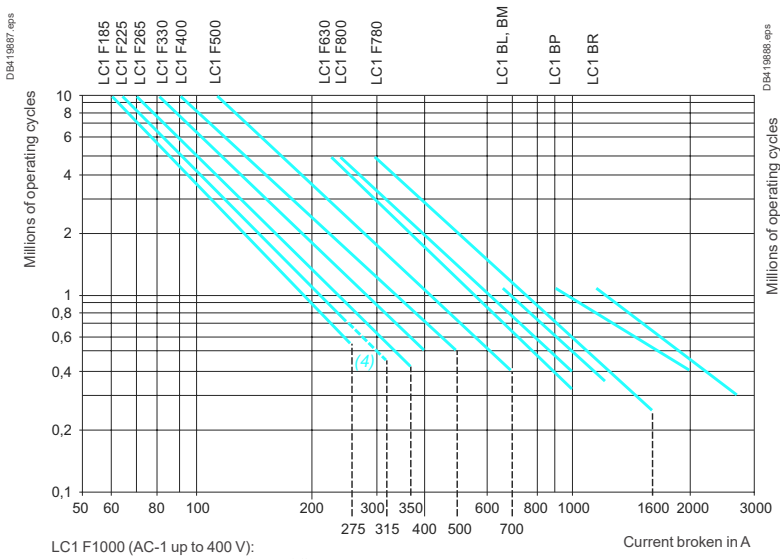
TeSys contactors

For utilisation category AC-1

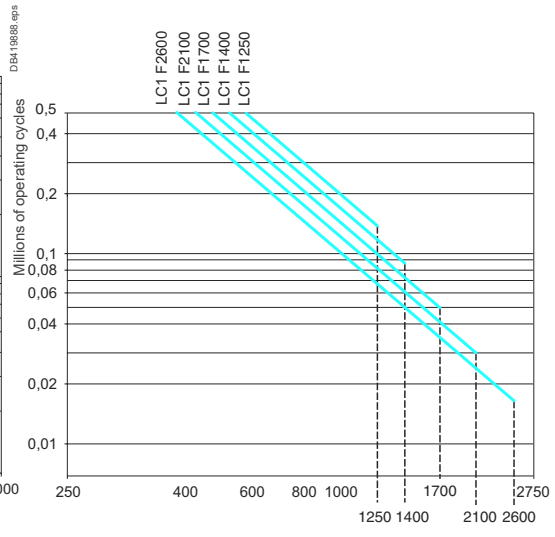
	LC1 D65A D80A DT80A	LC1/ LP1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 F1000 (1)	LC1S F1200	LC1 F1250	LC1 F1400	LC1 F1700	LC1 F2100	LC1 F2600	LC1 BL	LC1 BM	LC1 BP	LC1 BR
	600	600	600	600	600	600	600	600	600	600	600	600	600	600		300	300	200	200	200	200	120	120	120	120
	35	50	50	120	120	150	185	185	240	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	2 30x5	2 40x5	2 60x5	2 100x5	2 60x5		2 50x8	2 100x5	2 100x5	3 100x5	4 100x5	3 100x10	2 50x5	2 80x5	2 100x5	2 100x10
	80	125	125	250	250	275	315	350	400	500	700	1000	1600	1000		1200	1260	1400	1700	2100 (2)	2600	800	1250	2000	2750
	80	125	125	200	200	240	280	300	360	430	580	850	1350	850		1110	1060	1190	1450	1750 (2)	2600 (3)	700	1100	1750	2400
	56	80	80	160	160	180	200	250	290	340	500	700	1100	700		1020	900	1080	1300	1500 (2)	2150 (3)	600	900	1500	2000
	29	45	45	80	80	90	100	120	145	170	240	350	550	350		400	420	474	570	700	840	300	425	700	1000
	31	49	49	83	83	100	110	125	160	180	255	370	570	370		410	440	490	600	780	920	330	450	800	1100
	50	78	78	135	135	165	175	210	250	300	430	600	950	600		700	730	820	1000	1200	1450	500	800	1200	1600
	54	85	85	140	140	170	185	220	260	310	445	630	1000	630		720	760	850	1050	1300	1580	525	825	1250	1700
	58	90	90	150	150	180	200	230	290	330	470	670	1050	670		750	810	910	1100	1350	1680	550	850	1400	2000
	65	102	102	170	170	200	220	270	320	380	660	750	1200	750		850	920	1000	1250	1550	1910	600	900	1500	2100
	80	135	135	235	235	280	300	370	400	530	740	1000	1650	1000		1200	1260	1400	1700	2100	2520	800	1100	1900	2700
	–	120	120	345	345	410	450	540	640	760	950	1500	2400	1500		–	1840	2100	2500	3100	3820	1100	1700	3000	4200

(1) Please consult your Regional Sales Office.
*(2) With set of right-angled connectors **LA9F2100.***
*(3) With set of right-angled connectors **LA9F2600.***
*(4) **LC1F115** to **LC1F2600**: maximum coil control voltage must not exceed rated Uc for temperature ⩾ 60 °C.*

Selection according to required electrical durability, in category AC-1 (Ue ⩽ 690 V)



LC1 F1000 (AC-1 up to 400 V):
please contact your Regional Sales Office.



Example:

- Ue = 220 V - Ie = 500 A - θ ⩽ 40 °C - Ic = Ie = 500 A
- 2 million operating cycles required
- the above selection curves show the contactor rating needed: LC1 F780.

(1) Please consult your Regional Sales Office
(2) With set of right-angled connectors LA9F2100
(3) With set of right-angled connectors LA9F2600
*(4) The dotted lines are only applicable to **LC1 F225**.*

TeSys contactors
For utilisation categories AC-2 or AC-4

Maximum breaking current

Category AC-2: slip ring motors - breaking the starting current.
Category AC-4: squirrel cage motors - breaking the starting current.

Contactor size			LC1/ LP1 K06	LC1/ LP1 K09	LC1/ LP1 K12	LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38	LC1 D40A
In category AC-4 (Ie max)	Ue ≤ 440 V Ie max broken = 6 x I motor	**A**	36	54	54	54	72	108	150	192	192	240
	440 V < Ue ≤ 690 V Ie max broken = 6 x I motor	**A**	26	40	40	40	50	70	90	105	105	150
Depending on the maximum operating rate (1) and the on-load factor, θ ≤ 60 °C (2)												
From 150 and 15 % to 300 and 10 %		**A**	20	30	30	30	40	45	75	80	80	110
From 150 and 20 % to 600 and 10 %		**A**	18	27	27	27	36	40	67	70	70	96
From 150 and 30 % to 1200 and 10 %		**A**	16	24	24	24	30	35	56	60	60	80
From 150 and 55 % to 2400 and 10 %		**A**	13	19	19	19	24	30	45	50	50	62
From 150 and 85 % to 3600 and 10 %		**A**	10	16	16	16	21	25	40	45	45	53

(1) Do not exceed the maximum number of operating cycles.
(2) For temperatures higher than 60 °C, use a maximum operating rate value equal to 80 % of the actual value when selecting from the tables.

Counter current braking (plugging)

The current varies from the maximum plug-braking current to the rated motor current.
The making current must be compatible with the rated making and breaking capacities of the contactor.

As breaking normally takes place at a current value at or near the locked rotor current, the contactor can be selected using the criteria for categories AC-2 and AC-4.

Permissible AC-4 power rating for 200 000 operating cycles

Operational voltage		LC●/ LP● K06	LC●/ LP● K09	LC● LP● K12	LC● D09	LC● D12	LC● D18	LC● D25	LC● D32	LC● D38	LC● D40A
220/230 V	**kW**	0.75	1.1	1.1	1.5	1.5	2.2	3	4	4	4
380/400 V	**kW**	1.5	2.2	2.2	2.2	3.7	4	5.5	7.5	7.5	9
415 V	**kW**	1.5	2.2	2.2	2.2	3	3.7	5.5	7.5	7.5	9
440 V	**kW**	1.5	2.2	2.2	2.2	3	3.7	5.5	7.5	7.5	11
500 V	**kW**	2.2	3	3	3	4	5.5	7.5	9	9	11
660/690 V	**kW**	3	4	4	4	5.5	7.5	10	11	11	15

TeSys contactors

For utilisation categories AC-2 or AC-4

LC1 D50A	LC1 D65A	LC1 D80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F26	LC1 F330	LC1 F40	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 BL	LC1 BM	LC1 BP	LC1 BR
300	390	390	480	570	630	830	1020	1230	1470	1800	2220	2760	3360	4260	3690	4320	5000	7500	9000
170	210	210	250	250	540	640	708	810	1020	1410	1830	2130	2760	2910	2910	4000	4800	5400	6600
140	160	160	200	200	280	310	380	420	560	670	780	1100	1400	1600	1600	2250	3000	4500	5400
120	148	148	170	170	250	280	350	400	500	600	700	950	1250	1400	1400	2000	2400	3750	5000
100	132	132	145	145	215	240	300	330	400	500	600	750	950	1100	1100	1500	2000	3000	3600
80	110	110	120	120	150	170	240	270	320	390	450	600	720	820	820	1000	1500	2000	2500
70	90	90	100	100	125	145	170	190	230	290	350	500	660	710	710	750	1000	1500	1800

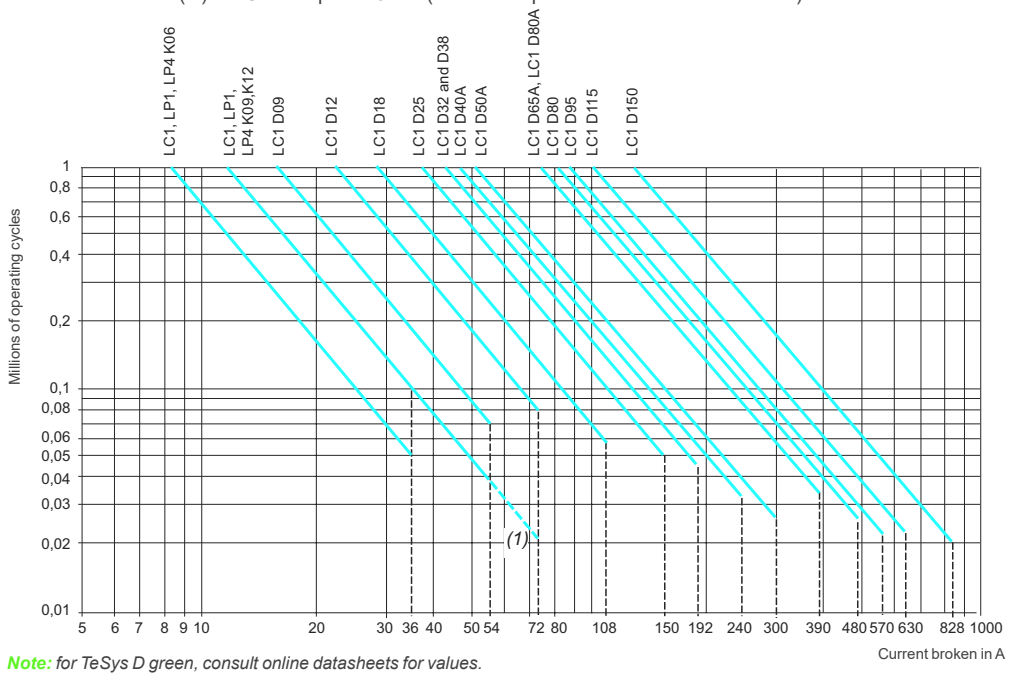
LC● D50A	LC● D65A	LC1 D80A	LC● D80	LC● D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 BL	LC1 BM	LC1 BP	LC1 BR
5.5	7.5	7.5	7.5	9	9	11	18.5	22	28	33	40	45	55	63	63	90	110	150	200
11	11	11	15	15	18.5	22	33	40	51	59	75	80	100	110	110	160	160	220	250
11	11	11	15	15	18.5	22	37	45	55	63	80	90	100	110	110	160	160	250	280
11	15	15	15	15	18.5	22	37	45	59	63	80	100	110	132	132	160	200	250	315
15	15	15	22	22	30	37	45	55	63	75	90	110	132	150	150	180	200	250	355
15	18.5	18.5	25	25	30	45	63	75	90	110	129	140	160	185	185	200	250	315	450

TeSys contactors
For utilisation categories AC-2 or AC-4

Selection according to required electrical durability, in categories AC-2 or AC-4 (Ue ≤ 440 V)

Control of 3-phase asynchronous squirrel cage motors (AC-4) or slip ring motors (AC-2) with breaking whilst motor stalled.
The current broken (Ic) in AC-2 is equal to 2.5 x Ie.
The current broken (Ic) in AC-4 is equal to 6 x Ie (Ie = rated operational current of the motor).

DB425342.eps



Note: for TeSys D green, consult online datasheets for values.

Coordination and standards

Example:

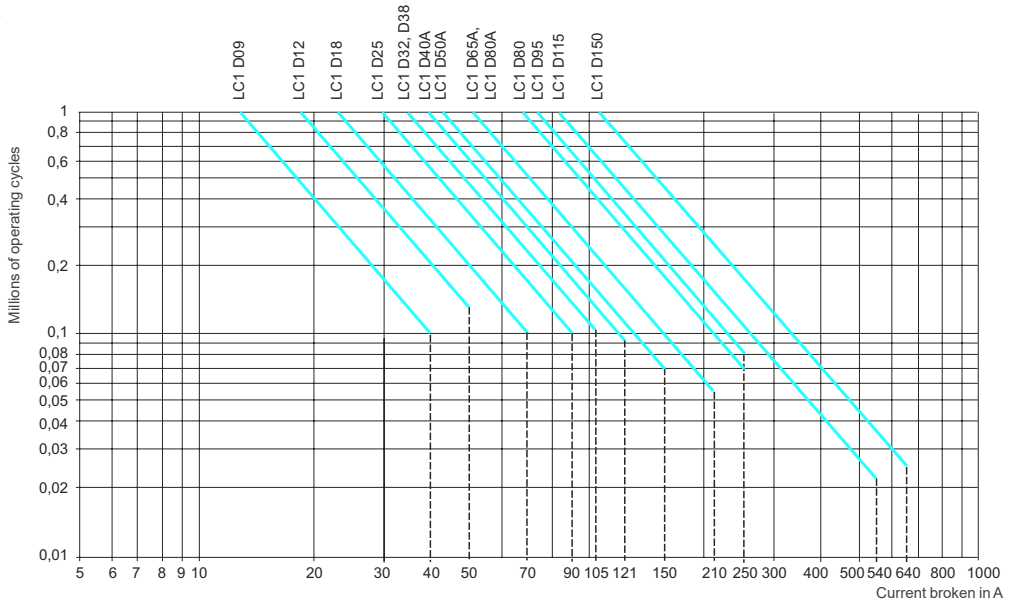
- asynchronous motor with P = 5.5 kW - Ue = 400 V - Ie = 11 A. Ic = 6 x Ie = 66 A
- or asynchronous motor with P = 5.5 kW - Ue = 415 V - Ie = 11 A. Ic = 6 x Ie = 66 A
- 200 000 operating cycles required
- the above selection curves show the contactor rating needed: LC1 D25.

(1) The dotted lines are only applicable to LC1, LP1 K12 contactors.

Selection according to required electrical durability, use in category AC-4 (440 V < Ue ≤ 690 V)

Control of 3-phase asynchronous squirrel cage motors with breaking whilst motor stalled.
The current broken (Ic) in AC-2 is equal to 2.5 x Ie.
The current broken (Ic) in AC-4 is equal to 6 x Ie (Ie = rated operational current of the motor).

DB425343.eps



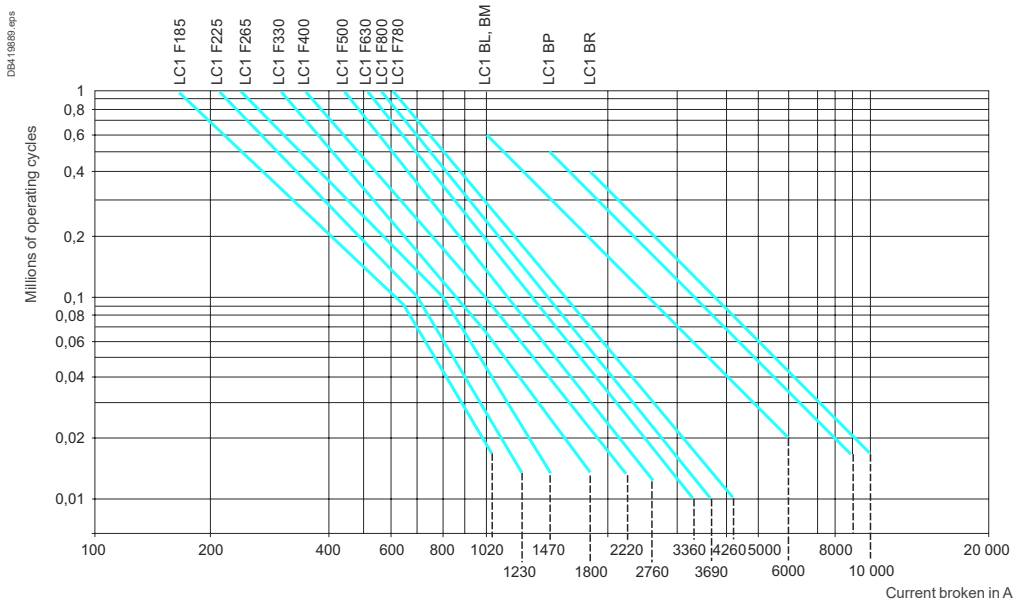
Note: for TeSys D green, consult online datasheets for values.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For utilisation categories AC-2 or AC-4

Selection according to required electrical durability, in categories AC-2 or AC-4 (Ue ≤ 440 V)

Control of 3-phase asynchronous squirrel cage motors (AC-4) or slip ring motors (AC-2) with breaking whilst motor stalled.
The current broken (Ic) in AC-4 is equal to 6 x Ie.
(Ie = rated operational current of the motor).

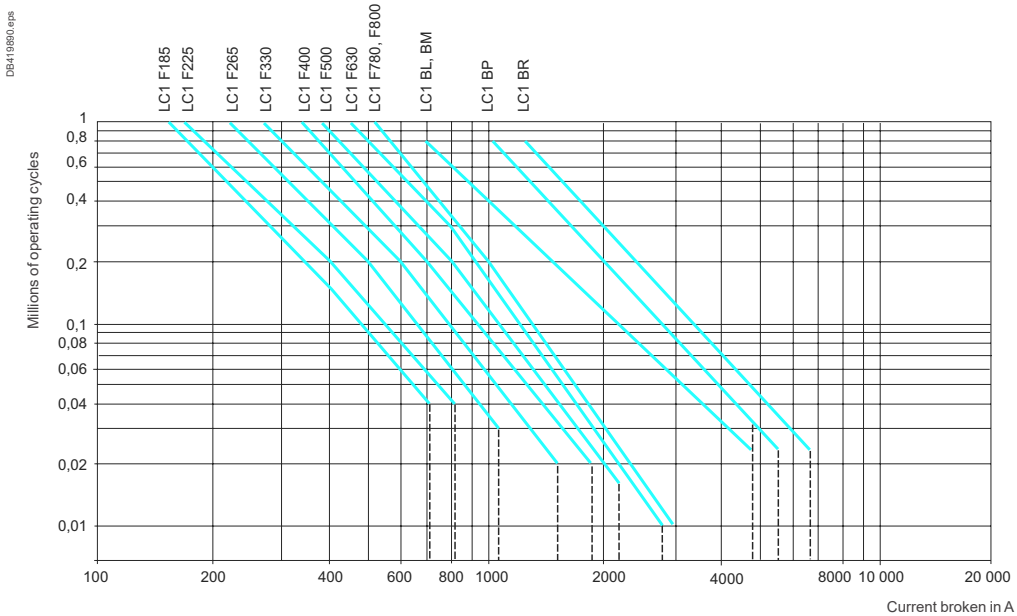


Example:

- asynchronous motor with P = 90 kW - Ue = 380 V - Ie = 170 A. Ic = 6 x Ie = 1020 A.
or asynchronous motor with P = 90 kW - Ue = 415 V - Ie = 165 A. Ic = 6 x Ie = 990 A.
- 60 000 operating cycles required.
- the above selection curves show the contactor rating needed: LC1 F265.

Selection according to required electrical durability, use in category AC-4 (440 V < Ue ≤ 690 V)

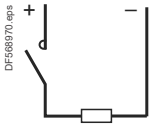
Control of 3-phase asynchronous squirrel cage motors with breaking whilst motor stalled.
The current broken (Ic) in AC-4 is equal to 6 x Ie (Ie = rated operational current of the motor).



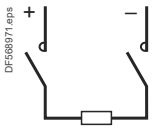
Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors

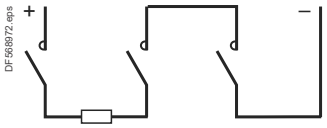
For utilisation categories DC-1 to DC-5 (2)



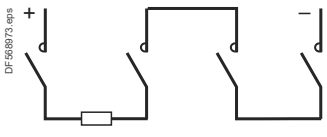
1 pole



2 poles



3 poles



4 poles

Rated operational current (Ie) in Amperes, in utilisation category DC-1, resistive loads: time constant $\frac{L}{R}$ ≤ 1 ms, ambient temperature ≤ 60 °C

Rated operational voltage Ue	No. of poles connected in series	Contactor rating (1) (2)								
		LC1 D09	LC1 DT20	LC1 D12 DT25	LC1 D18 DT32	LC1 D25 DT40	LC1 D32	LC1 D38	LC1 D40A	LC1 DT60A
V										
24	1	20	20	20	25	32	40	40	50	50
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
48/75	1	20	20	20	25	32	40	40	50	50
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
125	1	4	4	4	4	7	7	7	7	7
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
250	1	1	1	1	1	1	1	1	1	1
	2	4	4	4	4	7	7	7	7	7
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
300	3	4	4	4	4	7	7	7	7	–
	4	–	20	20	25	32	–	–	–	50
460	1	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
900	2	–	–	–	–	–	–	–	–	–
1200	3	–	–	–	–	–	–	–	–	–
1500	4	–	–	–	–	–	–	–	–	–

Rated operational current (Ie) in Amperes, in utilisation category DC-2 to DC-5, inductive loads: time constant $\frac{L}{R}$ ≤ 15 ms, ambient temperature ≤ 60 °C

Rated operational voltage Ue	No. of poles connected in series	Contactor rating (1) (2)								
		LC1 D09	LC1 DT20	LC1 D12 DT25	LC1 D18 DT32	LC1 D25 DT40	LC1 D32	LC1 D38	LC1 D40A	LC1 DT60A
V										
24	1	20	20	20	25	32	40	40	50	50
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
48/75	1	20	20	20	25	32	40	40	50	50
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
125	1	2	2	2	2	3	3	3	4	4
	2	20	20	20	25	32	40	40	50	50
	3	20	20	20	25	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
250	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1
	2	2	2	2	2	3	3	3	4	4
	3	8	8	8	8	32	40	40	50	50
	4	–	20	20	25	32	–	–	–	50
300	3	2	2	2	2	3	3	3	3	3
	4	–	8	8	8	32	–	–	–	50
460	1	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
900	2	–	–	–	–	–	–	–	–	–
1200	3	–	–	–	–	–	–	–	–	–
1500	4	–	–	–	–	–	–	–	–	–

(1) For rated operational currents of contactors LC1, LP1 K: please contact us.
(2) TeSys D Green contactors are not validated for DC-1 to DC-5 applications.

Coordination and standards

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors

For utilisation categories DC-1 to DC-5 (2)

LC1 D50A	LC1 D65A D80A	LC1 DT80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 BL	LC1 BM	LC1 BP	LC1 BR
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
7	7	7	12	12	12	12	210	230	270	320	380	520	760	1180	760	700	1100	1750	2400
65	65	65	100	100	200	200	210	230	270	320	380	520	760	1180	760	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
1	1.5	1.5	2	2	10	10	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
7	7	7	12	12	200	200	190	200	250	280	350	450	700	1000	700	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
7	7	7	12	12	200	200	190	200	250	280	350	450	700	1000	700	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1000	850	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	200	–	190	200	250	280	350	450	700	1000	700	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400

LC1 D50A	LC1 D65A D80A	LC1 DT80A	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F780	LC1 F800	LC1 BL	LC1 BM	LC1 BP	LC1 BR
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	–	–	–	–
65	65	65	100	100	200	200	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
4	4	4	5	5	10	10	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
65	65	65	100	100	200	200	160	180	250	300	350	500	700	1000	700	700	1100	1750	2400
65	65	65	100	100	200	200	240	240	280	310	350	550	850	1000	850	700	1100	1750	2400
–	–	65	100	–	200	–	240	240	280	310	350	550	850	1000	850	700	1100	1750	2400
1	1.5	1.5	1	1	3	3	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
4	4	4	5	5	200	200	140	160	220	280	310	480	680	900	680	700	1100	1750	2400
65	65	65	100	100	200	200	160	180	250	300	350	500	700	1000	700	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
3	3	3	5	5	200	200	140	160	220	280	310	480	680	900	680	700	1100	1750	2400
–	–	65	100	–	200	–	240	260	300	360	430	580	850	1300	850	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	200	–	140	160	220	280	310	480	680	800	680	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	700	1100	1750	2400

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors

For utilisation categories DC-1 to DC-5 (1)

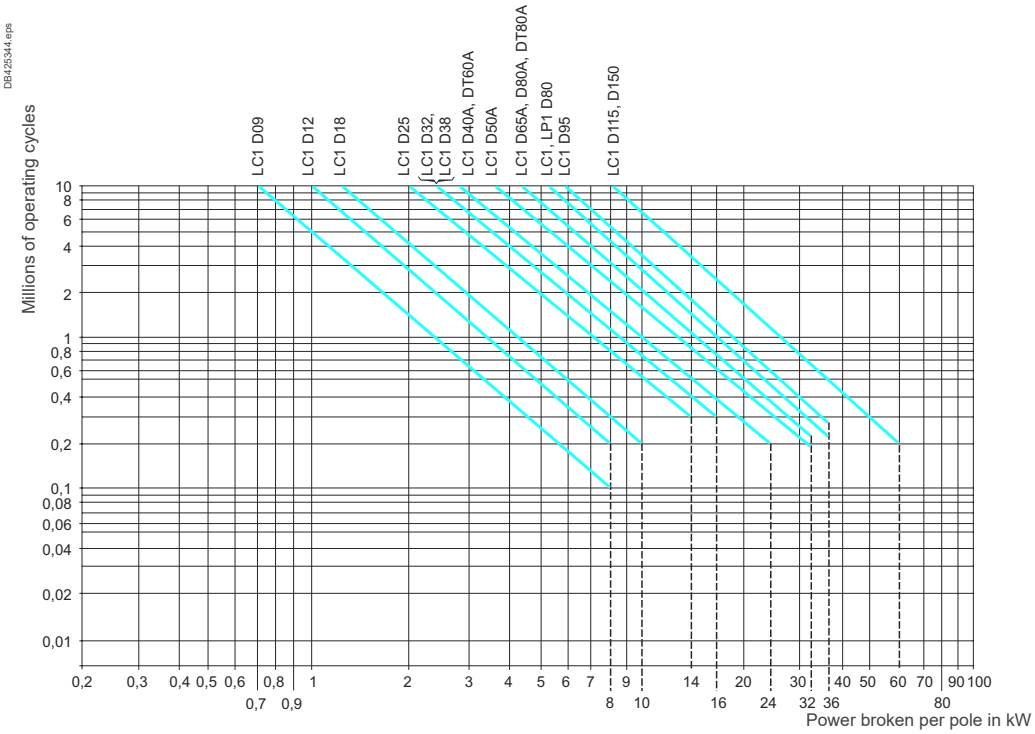
Selection according to required electrical durability, use in categories DC-1 to DC-5

The criteria for contactor selection are:
- the rated operational current Ie
- the rated operational voltage Ue
- the utilisation category and the time constant L/R
- the required electrical durability.

Maximum operating rate (operating cycles)

The following limits must not be exceeded: 120 operating cycles/hour at rated operational current Ie.

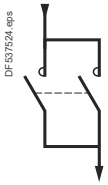
Electrical durability (1)



(1) TeSys D Green contactors are not validated for DC-1 to DC-5 applications

Example

Series wound motor - P = 1.5 kW - Ue = 200 V - Ie = 7.5 A.
Utilisation: reversing, inching.
- Utilisation category = DC-5.
- Select contactor LC1 D09 with 3 poles in series.
- The power broken is: Pc total = 2.5 x 200 x 7.5 = 3.75 kW.
- The power broken per pole is: 1.25 kW.
- The electrical durability read from the curve is ⩾ 3 millions of operating cycles.



Use of poles in parallel

Electrical durability can be increased by using poles connected in parallel.

With N poles connected in parallel, the electrical durability becomes: electrical durability read from the curves x N x 0.7.

Note:
When the poles are connected in parallel, the maximum operational currents indicated on pages A6/36 and A6/37 must not be exceeded.

Note:
Ensure that the connections are made in such a way as to equalise the currents in each pole.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors

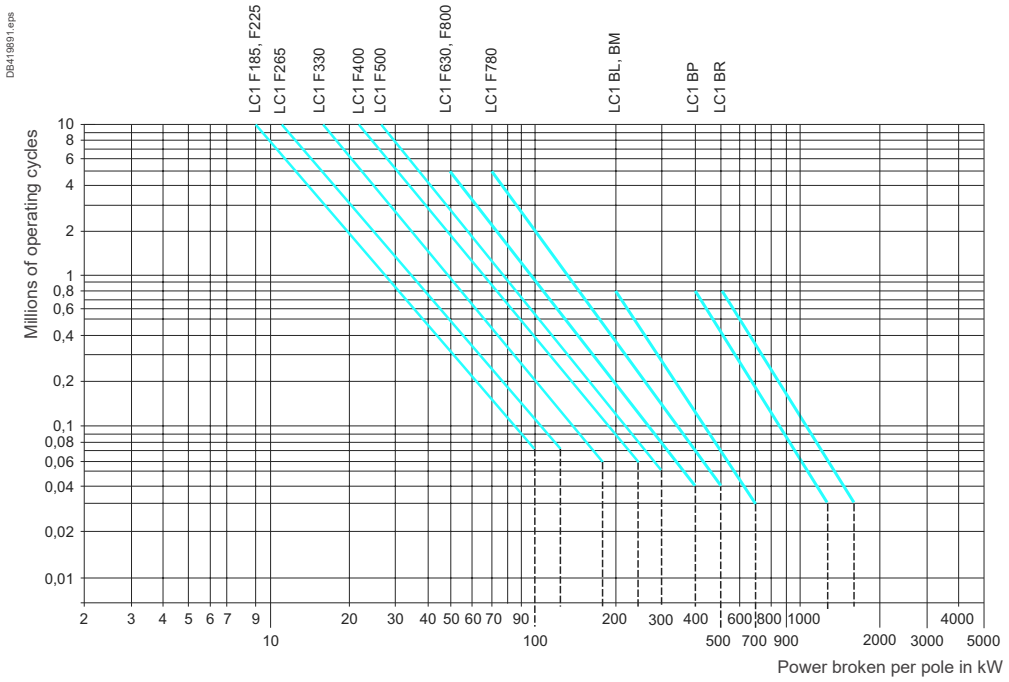
For utilisation categories DC-1 to DC-5 (1)

Selection according to required electrical durability, use in categories DC-1 to DC-5

Determining the electrical durability

The electrical durability can be read directly from the curves below, having previously calculated the power broken as follows:
P broken = U broken x I broken.
The tables below give the values of Uc and Ic for the various utilisation categories.

Power broken			
Utilisation categories	**U broken**	**I broken**	**P broken**
DC-1 Non inductive or slightly inductive loads	Ue	Ie	Ue x Ie
DC-2 Shunt wound motors, breaking whilst motor running	0.1 Ue	Ie	0.1 Ue x Ie
DC-3 Shunt wound motors, reversing, inching	Ue	2.5 Ie	Ue x 2.5 Ie
DC-4 Series wound motors, breaking whilst motor running	0.3 Ue	Ie	0.3 Ue x Ie
DC-5 Series wound motors, reversing, inching	Ue	2.5 Ie	Ue x 2.5 Ie



Example
Series wound motor: P = 40 kW - Ue = 200 V - Ie = 200 A.
Utilisation: reversing, inching.
Utilisation category = DC-5.

- Select contactor LC1 F265 with 2 poles in series.
- The power broken is: Pc total = 2.5 x 200 x 200 = 100 kW.
- The power broken per pole is 50 kW.
- The electrical durability read from the curve is 500000 operating cycles.

TeSys contactors
For lighting circuits

General

The operating conditions of lighting circuits have the following characteristics:
- continuous duty: the switching device can remain closed for several days or even months
- a dispersion factor of 1: all luminaires in the same group are switched on or off simultaneously
- a relatively high temperature around the device due to the enclosure, the presence of fuses, or an unventilated control panel location.

This is why the operational current for lighting is lower than the value given for AC-1 duty.

Protection

The continuous duty current drawn by a lighting circuit is constant. In fact:
- it is unlikely that the number of luminaires of an existing circuit will be modified
- this type of circuit cannot create an overload of long duration.

It is therefore only necessary to provide short-circuit protection.
This can be provided by:
- gG type fuses, or
- modular circuit breakers.

Nevertheless, it is always possible and sometimes more economical (smaller cable size) to protect the circuit by a thermal overload relay and associated aM type uses.

Distribution system

Single-phase circuit, 220/240 V

The tables on pages A6/41 to A6/45 are based on a single-phase 220/240 V circuit and can therefore be applied directly in this case.

3-phase circuit, 380/415 V (with neutral)

The total number of lamps (N) to be switched simultaneously is divided into three equal groups, each connected between one phase and neutral. The contactor can then be selected from the 220/240 V single-phase tables for a number of lamps equal to $\frac{N}{3}$ lamps.

3-phase circuit, 220/240 V

The total number of lamps (N) to be switched simultaneously is divided into three equal groups, each connected between 2 phases (L1-L2), (L2-L3), (L3-L1).
The contactor can then be selected from the 220/240 V single-phase table for a number of lamps equal to $\frac{N}{\sqrt{3}}$ lamps.

Contactor selection tables

For the different types of lamps, the tables on pages A6/41 to A6/45 give the maximum number of lamps of unit power P (in Watts), which can be switched simultaneously for each size of contactor.
They are based on:
- a 220/240 V single-phase circuit
- an ambient temperature of 55 °C (1), taking into account the operating conditions (see General paragraph)
- an electrical life of more than 10 years (200 days' operation per year).

They take into account:
- the total current drawn (including ballast)
- transient phenomena which occur at switch-on
- the starting currents and their duration
- the circulation of any harmonics which may be present.

Lamps with compensating capacitor C (µF) connected in parallel

Parallel connected compensating capacitors **C** cause a current peak at the moment of switch-on. To ensure that the value of this current peak remains compatible with the making characteristics of the contactors, the unit value of the capacitance must not exceed the following:

Switching contactor rating	LC1 K09	LP1 K09	LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38	LC1 D40A	LC1 D50A	LC1 D65A	LC1 D80A	LC1 D80
Maximum unit value C (µF) of parallel connected compensating capacitor	7	3	18	18	25	60	96	96	120	120	240	240	240

Switching contactor rating	LC1 D80	LC1 D95	LC1 D115	LC1 D150	LC1 F185	LC1 F225	LC1 F265	LC1 F330	LC1 F400	LC1 F500	LC1 F630	LC1 F800
Maximum unit value C (µF) of parallel connected compensating capacitor	240	240	300	360	800	1200	1700	2500	4000	6000	9000	10800

This value is independent of the number of lamps switched by the contactor.
(1) For an ambient temperature of 40 °C, multiply the number by 1.2.

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For lighting circuits

Usual values

The tables show the following values:
- IB: value of current drawn by each lamp at its rated voltage,
- C: unit capacitance for each lamp,

corresponding to the values normally quoted by lamp manufacturers.

These values are given for an ambient temperature of 55 °C (for 40 °C, multiply the number by 1.2).

Incandescent and halogen lamps

P (W)	60	75	100	150	200	300	500	750	1000	
IB (A)	0.27	0.34	0.45	0.68	0.91	1.40	2.30	3.40	4.60	LC1
Max. no. of lamps according to P (W)	35	28	21	14	10	6	4	2	2	K09
	59	47	35	23	17	11	7	4	3	D09, D12
	77	61	46	30	23	15	9	6	4	D18
	92	73	55	36	27	18	11	7	5	D25
	129	103	77	51	38	25	15	10	7	D32, D38
	163	129	97	64	48	31	19	13	9	D40A
	207	164	124	82	62	40	24	16	12	D50A, D65A, D80A
	296	235	177	117	88	57	34	23	17	D80, D95
	430	340	256	170	126	82	50	34	24	D115
	466	370	280	184	138	90	54	36	26	D150
	710	564	426	282	210	136	82	56	40	F185
	770	610	462	304	228	148	90	60	44	F225
	888	704	532	352	262	170	104	70	52	F265
	1006	800	604	400	298	194	118	80	58	F330
	1274	1010	764	504	378	244	148	100	74	F400
	1718	1364	1030	682	508	330	200	136	100	F500
	2328	1850	1396	924	690	448	272	184	136	F630
	2776	2204	1666	1102	824	534	326	220	162	F800

Mixed lighting lamps

P (W)	100	160	250	500	1000	
IB (A)	0.45	0.72	1.10	2.30	4.50	LC1
Max. no. of lamps according to P (W)	21	13	8	4	2	K09
	35	22	14	7	3	D09, D12
	46	29	18	9	4	D18
	55	36	23	11	5	D25
	77	48	30	15	7	D32, D38
	97	61	38	19	9	D40A
	124	77	49	24	12	D50A, D65A, D80A
	177	111	70	34	17	D80, D95
	256	160	104	50	26	D115
	280	174	114	54	28	D150
	426	266	174	82	42	F185
	462	288	188	90	46	F225
	532	332	218	104	52	F265
	604	378	246	118	60	F330
	764	478	312	150	76	F400
	1030	644	422	202	102	F500
	1398	874	572	272	140	F630
	1666	1040	680	326	166	F800

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For lighting circuits

Usual values

The tables show the following values:
- IB: value of current drawn by each lamp at its rated voltage
- C: unit capacitance for each lamp

corresponding to the values normally quoted by lamp manufacturers.

These values are given for an ambient temperature of 55 °C (for 40 °C, multiply the number by 1.2).

Fluorescent lamps with starter. Single fitting

	Non corrected				With parallel correction						
P (W)	**20**	**40**	**65**	**80**	**110**	**20**	**40**	**65**	**80**	**110**	
IB (A)	**0.39**	**0.45**	**0.70**	**0.80**	**1.2**	**0.17**	**0.26**	**0.42**	**0.52**	**0.72**	
C (µF)	**–**	**–**	**–**	**–**	**–**	**5**	**5**	**7**	**7**	**16**	**LC1**
Max. no. of lamps according to P (W)	24	21	13	12	8	56	36	22	18	–	**K09**
	41	35	22	20	13	94	61	38	30	22	**D09, D12**
	53	46	30	26	17	123	80	50	40	29	**D18**
	66	57	37	32	21	152	100	61	50	36	**D25**
	89	77	50	43	29	205	134	83	67	48	**D32, D38**
	112	97	62	55	36	258	169	104	84	61	**D40A**
	143	124	80	70	46	329	215	133	107	77	**D50A, D65A, D80A**
	205	177	114	100	66	470	367	190	153	111	**D80, D95**
	410	354	228	200	132	940	614	380	306	222	**D115, D150**
	492	426	274	240	160	1128	738	456	368	266	**F185**
	532	462	296	260	172	1224	800	490	400	288	**F225**
	614	532	342	300	200	1412	922	570	462	332	**F265**
	696	604	388	340	226	1600	1046	648	522	378	**F330**
	882	764	490	430	286	2024	1322	818	662	478	**F400**
	1190	1030	662	580	386	2728	1724	1104	892	644	**F500**
	1612	1398	698	786	524	3700	2418	1498	1210	874	**F630, F800**

Fluorescent lamps with starter. Twin fitting

	Non corrected					With series correction					
P (W)	**2x20**	**2x40**	**2x65**	**2x80**	**2x110**	**2x20**	**2x40**	**2x65**	**2x80**	**2x110**	
IB (A)	**2x0.22**	**2x0.41**	**2x0.67**	**2x0.82**	**2x1.1**	**2x0.13**	**2x0.24**	**2x0.39**	**2x0.48**	**2x0.65**	**LC1**
Max. no. of lamps according to P (W)	2x21	2x11	2x7	2x5	2x4	2x36	2x20	2x12	2x10	2x7	**K09**
	2x36	2x18	2x10	2x8	2x6	2x60	2x32	2x20	2x16	2x12	**D09, D12**
	2x46	2x24	2x14	2x12	2x8	2x80	2x42	2x26	2x20	2x16	**D18**
	2x58	2x30	2x18	2x14	2x10	2x100	2x54	2x32	2x26	2x20	**D25**
	2x78	2x42	2x26	2x20	2x14	2x134	2x72	2x44	2x36	2x26	**D32, D38**
	2x100	2x52	2x32	2x26	2x18	2x168	2x90	2x56	2x44	2x32	**D40A**
	2x126	2x68	2x40	2x34	2x24	2x214	2x116	2x70	2x58	2x42	**D50A, D65A, D80A**
	2x180	2x96	2x58	2x48	2x36	2x306	2x166	2x102	2x82	2x60	**D80, D95**
	2x360	2x194	2x118	2x96	2x72	2x614	2x332	2x204	2x166	2x122	**D115, D150**
	2x436	2x234	2x142	2x116	2x86	2x738	2x400	2x246	2x200	2x148	**F185**
	2x472	2x254	2x154	2x126	2x94	2x800	2x432	2x266	2x216	2x160	**F225**
	2x544	2x292	2x178	2x146	2x108	2x922	2x500	2x308	2x250	2x184	**F265**
	2x618	2x332	2x202	2x166	2x124	2x1046	2x566	2x348	2x282	2x208	**F330**
	2x782	2x420	2x256	2x210	2x156	2x1322	2x716	2x440	2x358	2x264	**F400**
	2x1054	2x566	2x346	2x282	2x210	2x1784	2x966	2x594	2x482	2x356	**F500**
	2x1430	2x766	2x468	2x384	2x286	2x2418	2x1310	2x806	2x654	2x484	**F630, F800**

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For lighting circuits

Usual values

The tables show the following values:
- IB: value of current drawn by each lamp at its rated voltage
- C: unit capacitance for each lamp

corresponding to the values normally quoted by lamp manufacturers.

These values are given for an ambient temperature of 55 °C (for 40 °C, multiply the number by 1.2).

Fluorescent lamps without starter. Single fitting

	Non corrected					With parallel correction					
P (W)	**20**	**40**	**65**	**80**	**110**	**20**	**40**	**65**	**80**	**110**	
IB (A)	**0.43**	**0.55**	**0.80**	**0.95**	**1.4**	**0.19**	**0.29**	**0.46**	**0.57**	**0.79**	
C (µF)	**–**	**–**	**–**	**–**	**–**	**5**	**5**	**7**	**7**	**16**	**LC1**
Max. no. of lamps according to P (W)	22	17	12	10	6	50	33	20	16	–	**K09**
	37	29	20	16	11	84	55	34	28	20	**D09, D12**
	48	38	26	22	15	110	72	45	36	26	**D18**
	60	47	32	27	18	136	89	56	45	32	**D25**
	97	63	43	36	25	184	101	76	61	44	**D32, D38**
	102	80	55	46	31	231	151	95	77	55	**D40A**
	130	101	70	58	40	294	193	121	98	70	**D50A, D65A, D80A**
	186	145	100	84	57	421	275	173	140	101	**D80, D95**
	372	290	200	168	114	842	550	346	280	202	**D115, D150**
	446	348	240	202	136	1010	662	416	336	242	**F185**
	484	378	260	218	148	1094	716	452	364	262	**F225**
	558	436	300	252	170	1262	828	522	420	304	**F265**
	632	494	340	286	194	1432	938	590	476	344	**F330**
	800	624	430	362	246	1810	1186	748	604	434	**F400**
	1078	844	580	488	330	2442	1600	1008	814	586	**F500**
	1462	1144	786	662	448	3310	2168	1366	1104	796	**F630, F800**

Fluorescent lamps without starter. Twin fitting

	Non corrected					With series correction					
P (W)	**2x20**	**2x40**	**2x65**	**2x80**	**2x110**	**2x20**	**2x40**	**2x65**	**2x80**	**2x110**	
IB (A)	**2x0.25**	**2x0.47**	**2x0.76**	**2x0.93**	**2x1.3**	**2x0.14**	**2x0.26**	**2x0.43**	**2x0.53**	**2x0.72**	**LC1**
Max. no. of lamps according to P (W)	2x19	2x10	2x6	2x5	2x3	2x34	2x18	2x11	2x9	2x6	**K09**
	2x32	2x16	2x10	2x8	2x6	2x56	2x30	2x18	2x14	2x10	**D09, D12**
	2x42	2x22	2x12	2x10	2x8	2x74	2x40	2x24	2x18	2x14	**D18**
	2x52	2x26	2x16	2x12	2x10	2x92	2x50	2x30	2x24	2x18	**D25**
	2x70	2x36	2x22	2x18	2x12	2x124	2x66	2x40	2x32	2x24	**D32, D38**
	2x88	2x46	2x28	2x22	2x16	2x156	2x84	2x50	2x40	2x30	**D40A**
	2x112	2x58	2x36	2x30	2x20	2x200	2x106	2x64	2x52	2x38	**D50A, D65A, D80A**
	2x160	2x84	2x52	2x42	2x30	2x234	2x152	2x92	2x74	2x54	**D80, D95**
	2x320	2x170	2x104	2x86	2x60	2x570	2x306	2x186	2x150	2x110	**D115, D150**
	2x384	2x204	2x126	2x102	2x74	2x686	2x368	2x222	2x180	2x132	**F185**
	2x416	2x220	2x136	2x112	2x80	2x742	2x400	2x242	2x196	2x144	**F225**
	2x480	2x254	2x158	2x128	2x92	2x856	2x462	2x278	2x226	2x166	**F265**
	2x544	2x288	2x178	2x146	2x104	2x970	2x522	2x316	2x256	2x188	**F330**
	2x688	2x366	2x226	2x184	2x132	2x1228	2x662	2x400	2x324	2x238	**F400**
	2x928	2x494	2x304	2x248	2x178	2x1656	2x892	2x540	2x438	2x322	**F500**
	2x1258	2x668	2x414	2x338	2x242	2x2246	2x1210	2x730	2x592	2x436	**F630, F800**

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For lighting circuits

Usual values

The tables show the following values:
- IB: value of current drawn by each lamp at its rated voltage
- C: unit capacitance for each lamp

corresponding to the values normally quoted by lamp manufacturers.

These values are given for an ambient temperature of 55 °C (for 40 °C, multiply the number by 1.2).

Low pressure sodium vapour lamps

	Non corrected							With parallel correction							
P (W)	**35**	**55**	**90**	**135**	**150**	**180**	**200**	**35**	**55**	**90**	**135**	**150**	**180**	**200**	
IB (A)	**1.2**	**1.6**	**2.4**	**3.1**	**3.2**	**3.3**	**3.4**	**0.3**	**0.4**	**0.6**	**0.9**	**1**	**1.2**	**1.3**	
C (µF)	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**17**	**17**	**25**	**36**	**36**	**36**	**36**	**LC1**
Max. no. of lamps according to P (W)	6	5	3	2	2	2	2	–	–	–	–	–	–	–	**K09**
	10	7	5	3	3	3	3	40	30	–	–	–	–	–	**D09, D12**
	12	9	6	4	4	4	4	50	37	25	–	–	–	–	**D18**
	15	11	7	6	5	5	5	63	47	31	21	19	15	14	**D25**
	21	16	10	8	8	7	7	86	65	43	28	26	21	20	**D32, D38**
	27	20	13	10	10	10	9	110	82	55	36	33	27	25	**D40A**
	35	26	17	13	13	12	12	140	105	70	46	42	35	32	**D50A, D65A, D80A**
	50	37	25	19	18	18	17	200	150	100	66	60	50	46	**D80, D95**
	100	75	50	38	36	36	34	400	300	200	132	120	100	92	**D115, D150**
	140	104	70	54	52	50	48	560	420	280	186	168	140	128	**F185**
	152	114	76	58	56	54	54	606	454	302	202	182	152	140	**F225**
	174	130	88	68	66	64	62	700	524	350	232	210	174	162	**F265**
	198	148	98	76	74	72	70	792	594	396	264	238	198	182	**F330**
	250	188	124	96	94	90	88	1002	752	502	334	300	250	252	**F400**
	338	254	168	130	126	122	118	1352	1014	676	450	406	338	312	**F500**
	496	372	248	192	186	180	174	1982	1488	992	660	594	496	458	**F630, F800**

High pressure sodium vapour lamps

	Non corrected					With parallel correction					
P (W)	**150**	**250**	**400**	**700**	**1000**	**150**	**250**	**400**	**700**	**1000**	
IB (A)	**1.9**	**3.2**	**5**	**8.8**	**12.4**	**0.84**	**1.4**	**2.2**	**3.9**	**5.5**	
C (µF)	**–**	**–**	**–**	**–**	**–**	**20**	**32**	**48**	**96**	**120**	**LC1**
Max. no. of lamps according to P (W)	4	2	1	–	–	–	–	–	–	–	**K09**
	6	3	2	1	–	–	–	–	–	–	**D09, D12**
	7	4	3	1	1	17	–	–	–	–	**D18**
	10	5	3	2	1	22	13	8	–	–	**D25**
	13	8	5	2	2	30	18	11	6	–	**D32, D38**
	17	10	6	3	2	39	23	15	8	6	**D40A**
	22	13	8	4	3	50	30	19	10	7	**D50A, D65A, D80A**
	31	18	12	6	4	71	42	27	15	10	**D80, D95**
	62	36	24	12	8	142	84	54	30	20	**D115, D150**
	88	52	34	18	14	200	120	76	42	30	**F185**
	96	56	36	20	16	216	130	82	46	32	**F225**
	110	66	42	24	18	250	150	94	54	38	**F265**
	124	74	48	26	20	282	170	108	60	42	**F330**
	158	94	60	34	24	358	214	136	76	54	**F400**
	214	126	80	46	32	482	290	184	104	74	**F500**
	312	186	118	68	48	708	424	270	152	108	**F630, F800**

TeSys contactors
For lighting circuits

Usual values

The tables show the following values:
- IB: value of current drawn by each lamp at its rated voltage
- C: unit capacitance for each lamp

corresponding to the values normally quoted by lamp manufacturers.

These values are given for an ambient temperature of 55 °C (for 40 °C, multiply the number by 1.2).

High pressure mercury vapour lamps

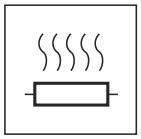
	Non corrected							With parallel correction							
P (W)	**50**	**80**	**125**	**250**	**400**	**700**	**1000**	**50**	**80**	**125**	**250**	**400**	**700**	**1000**	
IB (A)	**0.54**	**0.81**	**1.20**	**2.30**	**4.10**	**6.80**	**9.90**	**0.3**	**0.45**	**0.67**	**1.3**	**2.3**	**3.8**	**5.5**	
C (µF)	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**10**	**10**	**10**	**18**	**25**	**40**	**60**	**LC1**
Max. no. of lamps according to P (W)	14	9	6	3	1	–	–	–	–	–	–	–	–	–	**K09**
	22	14	9	5	2	1	1	40	26	17	9	–	–	–	**D09, D12**
	27	18	12	6	3	2	1	50	33	22	11	6	–	–	**D18**
	35	23	15	8	4	2	1	63	42	28	14	8	5	3	**D25**
	48	32	21	11	6	3	2	86	57	38	20	11	6	4	**D32, D38**
	61	40	27	14	8	4	3	110	73	49	25	14	8	6	**D40A**
	77	51	34	17	10	6	4	140	93	62	32	18	11	7	**D50A, D65A, D80A**
	111	74	49	26	14	8	6	200	133	89	46	26	15	10	**D80, D95**
	222	148	100	52	28	16	12	400	266	178	92	52	30	20	**D115, D150**
	310	206	140	72	40	24	17	560	372	250	128	72	44	30	**F185**
	336	224	152	78	44	26	18	606	404	272	140	78	48	32	**F225**
	388	258	174	90	50	30	20	700	466	312	162	90	54	38	**F265**
	440	294	198	102	58	34	24	792	528	354	182	102	62	42	**F330**
	556	372	250	130	72	44	30	1002	668	448	232	130	78	54	**F400**
	752	500	338	176	98	60	40	1352	902	606	312	176	106	74	**F500**
	1102	734	496	258	144	88	60	1982	1322	888	458	258	156	108	**F630, F800**

Metal iodine vapour lamps

	Non corrected				With parallel correction				
P (W)	**250**	**400**	**1000**	**2000**	**250**	**400**	**1000**	**2000**	
IB (A)	**2.5**	**3.6**	**9.5**	**20**	**1.4**	**2**	**5.3**	**11.2**	
C (µF)	**–**	**–**	**–**	**–**	**32**	**32**	**64**	**140**	**LC1**
Max. no. of lamps according to P (W)	3	2	–	–	–	–	–	–	**K09**
	4	3	1	–	–	–	–	–	**D09, D12**
	6	4	1	–	–	–	–	–	**D18**
	7	5	2	–	13	9	–	–	**D25**
	10	7	2	1	18	13	4	–	**D32, D38**
	13	9	3	1	23	16	6	–	**D40A**
	16	11	4	2	30	21	7	–	**D50A, D65A, D80A**
	24	16	6	3	42	30	11	5	**D80, D95**
	48	32	12	6	84	60	22	10	**D115, D150**
	66	46	18	8	120	84	32	14	**F185**
	72	50	20	10	130	90	34	16	**F225**
	84	58	22	12	150	104	40	18	**F265**
	94	66	24	14	170	118	44	20	**F330**
	120	84	32	16	214	150	56	26	**F400**
	162	112	42	20	290	202	76	36	**F500**
	238	164	62	30	424	298	112	52	**F630, F800**

Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For heating circuits



General
A heating circuit is a power switching circuit supplying one or more resistive heating elements switched by a contactor. The same general rules apply as for motor circuits, except that heating circuits are not normally subjected to overload currents. It is therefore only necessary to provide short-circuit protection.

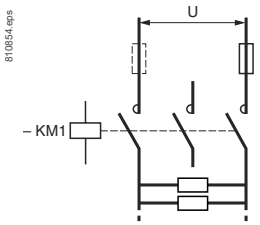
Characteristics of heating elements
The examples below are based on resistive heating elements used for industrial furnaces or for the heating of buildings (infra-red or resistive radiant type, convector heaters, closed loop heating circuits, etc.). The variation in resistance values between hot and cold states causes a current peak at switch-on which never exceeds 2 to 3 times the rated operational current (In). This initial peak does not recur during normal operation where subsequent switching is thermostatically controlled. The rated power and current of a heater are given for the normal operating temperature.

Protection
The steady state current drawn by a heating circuit is constant when the voltage is stable. In fact:
- it is unlikely that the number of loads in an existing circuit will be modified
- this type of circuit cannot create overloads. It is therefore only necessary to provide short-circuit protection.

This can be provided by:
- gG type fuses, or
- modular circuit breakers.

Nevertheless, it is always possible and sometimes more economical (smaller cable size) to protect the circuit by a thermal overload relay and associated aM type fuses.

Switching, control, protection
A heating element or group of heating elements of a given power may be either single-phase or 3-phase and may be supplied from a 220/127 V or a 400/230 V distribution system. Excluding a single-phase 127 V system (which is no longer commonly used), the following 3 types of circuit arrangement are possible:
- single-phase, 2-pole switching
- single-phase, 4-pole switching
- 3-phase switching



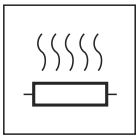
Circuit controlled by 2 poles of the contactor.

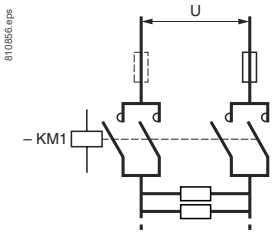
Component selection according to the power switched
The combinations suggested below are based on an ambient temperature of 55 °C and for powers at the nominal voltage, but they also ensure switching in the event of prolonged overloads up to 1.05 Ue.

Single-phase, 2-pole switching				
Maximum power (kW)				Contactor rating
220/240 V	380/415 V	660/690 V	1000 V	
3.5	6.5	11	–	**LC1, LP1K09**
4.5	8	14	–	**LC1D12**
6	10.5	18.5	–	**LC1D18**
7	13	22.5	–	**LC1D25**
10	18	30.5	–	**LC1D32, LC1D38**
13	22.5	39.5	48	**LC1D40A**
16.5	28.5	43.5	68	**LC1D65A, LC1D80A**
24	42	73	82.5	**LC1, LP1D80**
44	76	118	157	**LC1D115, LC1D150**
48	83	130	170	**LC1F185**
52	90	145	185	**LC1F225**
60	104	160	210	**LC1F265**
75	130	200	250	**LC1F330**
86	145	230	300	**LC1F4002**
116	200	310	400	**LC1F5002**
170	290	450	695	**LC1F6302, LC1F800**
270	460	715	945	**LC1F780**
140	242	370	490	**LC1BL32**
220	380	580	770	**LC1BM32**
350	605	925	1225	**LC1BP32**
480	830	1270	1680	**LC1BR32**

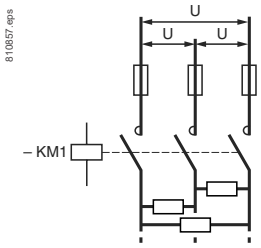
Characteristics: pages B8/63 to B8/69
References: pages B8/2 to B8/7
Dimensions, Schemes: pages B8/76 to B8/82

TeSys contactors
For heating circuits





Circuit controlled by a 4-pole contactor with the poles parallel connected in pairs using appropriate connecting links.
This solution enables the control of power values approximately equivalent to those controlled by the same contactor on 3-phase.



Circuit controlled by 3 poles of the contactor.

Component selection according to the power switched

Single-phase, 4-pole switching

Maximum power (kW)				Contactor rating
220/240 V	380/415 V	660/690 V	1000 V	
4.5	8	13.5	–	**LC1, LP1K09004**
7	13	22.5	–	**LC1DT25**
12	21	36.5	–	**LC1DT40**
26	45.5	79.5	109	**LC1DT80A**
38	66	117.5	132	**LC1, LP1D80004**
70	121	190	251	**LC1D115004**
76	132	202	270	**LC1F1854**
80	142	230	295	**LC1F2254**
96	166	253	335	**LC1F2654**
120	205	320	400	**LC1F3304**
137	236	363	480	**LC1F4004**
185	320	490	650	**LC1F5004**
272	470	718	950	**LC1F6304**
425	735	1140	1520	**LC1F7804**
224	387	590	785	**LC1BL34**
352	608	930	1230	**LC1BM34**
560	968	1478	1960	**LC1BP34**
768	1328	2025	2685	**LC1BR34**

3-phase switching

Maximum power (kW)				Contactor rating
220/240 V	380/415 V	660/690 V	1000 V	
4.5	8	13.5	–	**LC1, LP1K09**
7	13	22.5	–	**LC1D12**
10	18	30.5	–	**LC1D18**
13	22.5	39.5	–	**LC1D25**
18	31	52.5	–	**LC1D32, LC1D38**
22.5	38	68	78	**LC1D40A**
28.5	49	86	112.5	**LC1D65A, LC1D80A**
40.5	70.5	126	135.5	**LC1, LP1D80**
76	131	206	275	**LC1D115, LC1D150**
82	143	220	295	**LC1F185**
90	155	250	320	**LC1F225**
103	179	275	370	**LC1F265**
130	225	345	432	**LC1F330**
149	256	395	525	**LC1F400**
200	346	530	710	**LC1F500**
294	509	780	1030	**LC1F630, LC1F800**
463	800	1235	1650	**LC1F780**
242	419	640	850	**LC1BL33**
380	658	1005	1350	**LC1BM33**
606	1047	1600	2150	**LC1BP33**
830	1437	2200	2950	**LC1BR33**

Application example

For a 220 V, 50 Hz, single-phase circuit supplying a total heating load of 12.5 kW. Select a 3-pole contactor **LC1D65A**.

(1) See complete contactor references on pages B8/2 to B8/7 or consult your Regional Sales Office.