Series CK - Maximum operational current Ie (A) - DC utilisation categories

Category DC1 L/R ≤ 1 ms	Ue	Poles in series	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
	24V	1	150	200	200	250	250	350	500	600	800	1000
		2	200	250	250	315	315	450	600	700	1000	1250
		3	200	250	250	315	315	450	600	700	1000	1250
		4	200	(1)	250	(1)	315	450	600	700	1000	1250
	125V	1	20	25	25	30	30	50	60	70	100	125
		2	110	200	200	250	250	300	400	500	600	1000
		3	200	250	250	315	315	500	600	700	1000	1250
		4	200	(1)	250	(1)	315	500	600	700	1000	1250
	220V	1	–	–	–	–	–	–	–	–	–	–
		2	65	110	110	150	150	200	250	250	300	400
		3	200	250	250	315	315	500	600	700	1000	1250
		4	200	250	250	315	315	500	600	700	1000	1250
	440V	1	–	–	–	–	–	–	–	–	–	–
		2	–	–	–	–	–	–	–	–	–	–
		3	60	120	120	150	150	180	240	300	400	480
		4	100	(1)	200	(1)	250	315	400	500	700	800

Category DC3 L/R ≤ 2.5 ms	Ue	Poles in series	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
	24V	1	105	150	185	205	250	309	420	550	700	825
		2	105	150	185	205	250	309	420	550	700	825
		3	105	150	185	205	250	309	420	550	700	825
		4	105	(1)	185	(1)	250	309	420	550	700	825
	125V	1	20	25	25	30	30	50	60	70	100	125
		2	105	150	185	205	250	309	420	550	700	825
		3	105	150	185	205	250	309	420	550	700	825
		4	105	(1)	185	(1)	250	309	420	550	700	825
	220V	1	–	–	–	–	–	–	–	–	–	–
		2	10	60	70	80	85	95	140	185	225	400
		3	105	150	185	205	250	309	420	550	700	825
		4	105	(1)	185	(1)	250	309	420	550	700	825
	440V	1	–	–	–	–	–	–	–	–	–	–
		2	–	–	–	–	–	–	–	–	–	–
		3	8	50	55	65	70	80	120	150	180	320
		4	80	(1)	105	(1)	185	205	250	300	400	700

Category DC5 L/R ≤ 15 ms	Ue	Poles in series	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
	24V	1	105	150	185	205	250	309	420	550	700	825
		2	105	150	185	205	250	309	420	550	700	825
		3	105	150	185	205	250	309	420	550	700	825
		4	105	(1)	185	(1)	250	309	420	550	700	825
	125V	1	15	20	20	25	25	40	50	60	80	100
		2	80	95	105	150	185	205	250	300	400	700
		3	105	150	185	205	250	309	420	550	700	825
		4	105	(1)	185	(1)	250	309	420	550	700	825
	220V	1	–	–	–	–	–	–	–	–	–	–
		2	8	50	55	65	70	80	120	150	180	320
		3	80	95	105	150	185	205	250	300	400	700
		4	105	(1)	185	(1)	250	309	420	550	700	825
	440V	1	–	–	–	–	–	–	–	–	–	–
		2	–	–	–	–	–	–	–	–	–	–
		3	5	40	40	50	50	60	90	100	100	200
		4	65	(1)	95	(1)	150	185	205	250	300	400

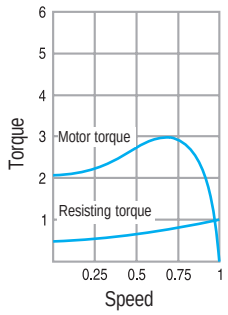
(1) Not available in four-pole execution.

Series M - Direct-on-line starters

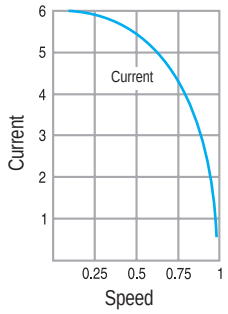
- Motors connected directly on-line with a contactor and a thermal overload relay.
- Simple installation with high starting torque and current.
- For use with motors of medium power that do not need a progressive start.

AC3	Switching off motors during running Ic = Ie
AC4	Switching off motors during starting Ic = 6 Ie

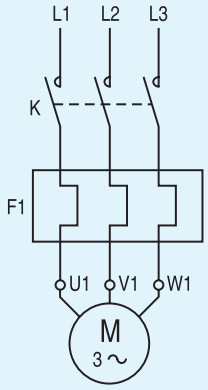
Torque-speed curve



Current-speed curve



Diagram



Selection table

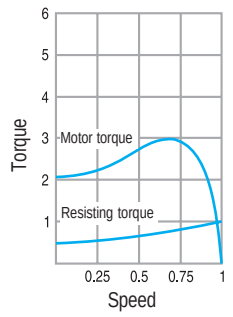
Motor												Mini-contactor	Thermal relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V				aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A			A
–	–	–	–	–	–	–	–	0.06	0.13	–	–	MC0	MT03A	0.5
–	–	0.06	0.23	0.06	0.21	0.06	0.17	0.09	0.2	–	–		MT03B	0.5
–	–	–	–	–	–	–	–	0.12	0.25	–	–		MT03B	0.5
0.06	0.39	0.09	0.34	0.09	0.31	0.09	0.26	0.18	0.35	–	–		MT03C	1
–	–	–	–	0.12	0.4	0.12	0.33	–	–	–	–		MT03C	1
0.09	0.58	0.12	0.44	–	–	0.18	0.46	0.25	0.46	–	–		MT03D	1
–	–	0.18	0.61	0.18	0.56	0.25	0.6	–	–	–	–		MT03D	1
–	–	–	–	–	–	–	–	0.37	0.7	–	–		MT03E	2
0.12	0.76	0.25	0.78	0.25	0.7	0.37	0.9	0.55	0.9	–	–		MT03E	2
0.18	1.05	0.37	1.13	0.37	1.1	0.55	1.2	0.75	1.1	–	–		MT03F	2
0.25	1.4	–	–	–	–	–	–	–	–	–	–		MT03G	2
–	–	0.55	1.6	0.55	1.5	0.75	1.5	1.1	1.5	–	–		MT03H	4
0.37	2	0.75	2	0.75	2	1.1	2	1.5	2	–	–		MT03I	4
–	–	1.1	2.6	1.1	2.5	1.5	2.6	–	–	–	–		MT03J	4
0.56	2.75	–	–	–	–	–	–	2.2	2.9	–	–		MT03J	4
0.75	3.5	1.5	3.5	1.5	3.4	2.2	3.8	3	3.5	–	–		MT03K	6
1.1	5	2.2	5	2.2	4.5	3	5	–	–	–	–		MT03L	10
1.5	7	–	–	–	–	–	–	–	–	–	–		MT03M	12
–	–	–	–	–	–	–	–	3.7	4.6	–	–	MC1	MT03L	10
–	–	–	–	–	–	–	–	4	5	–	–		MT03L	10
–	–	3	7	3	6.5	3.7	6	–	–	–	–		MT03M	12
–	–	–	–	3.7	7.3	4	6.5	–	–	–	–		MT03M	12
–	–	3.7	8	4	8	–	–	–	–	–	–		MT03N	16
2.2	9	4	9	–	–	–	–	–	–	–	–		MT03N	16
3	12	–	–	–	–	–	–	–	–	–	–		MT03P	20

Series CL - Direct-on-line starters

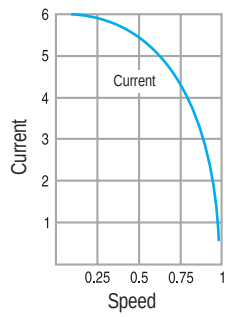
- Motors connected directly on-line with a contactor and a thermal overload relay.
- Simple installation with high starting torque and current.
- For use with motors of medium power that do not need a progressive start.

AC3	Switching off motors during running Ic = Ie
AC4	Switching off motors during starting Ic = 6 Ie

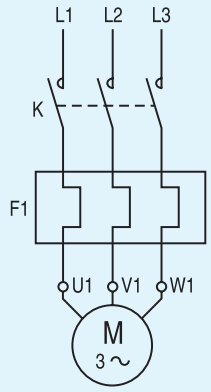
Torque-speed curve



Current-speed curve



Diagram



Selection table

Motor												Contactor	Thermal relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V				aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A			A
–	–	0.06	0.23	0.06	0.21	0.06	0.17	0.09	0.2	–	–	**CL00**	RT1B	2
–	–	–	–	–	–	0.09	0.26	0.12	0.25	–	–		RT1C	2
0.06	0.39	0.09	0.34	0.09	0.31	0.12	0.33	0.18	0.35	–	–		RT1C	2
0.09	0.58	0.12	0.44	0.12	0.4	0.18	0.46	0.25	0.46	–	–		RT1D	2
–	–	0.18	0.61	0.18	0.56	0.25	0.6	–	–	–	–		RT1D	2
–	–	–	–	–	–	–	–	0.37	0.7	–	–		RT1F	2
0.12	0.76	0.25	0.78	0.25	0.7	0.37	0.9	0.55	0.9	–	–		RT1F	2
0.18	1.05	0.37	1.13	0.37	1.1	0.55	1.2	0.75	1.1	–	–		RT1G	4
0.25	1.4	0.55	1.6	0.55	1.5	0.75	1.5	1.1	1.5	–	–		RT1H	4
0.37	2	0.75	2	0.75	2	1.1	2	1.5	2	–	–		RT1J	6
0.55	2.75	1.1	2.6	1.1	2.5	1.5	2.6	2.2	2.9	–	–		RT1K	6
0.75	3.5	1.5	3.5	1.5	3.4	2.2	3.8	–	–	–	–		RT1K	8
–	–	–	–	–	–	–	–	3.7	4.6	–	–		RT1L	8
1.1	5	2.2	5	2.2	4.5	–	–	–	–	–	–		RT1L	12
1.5	7	–	–	3.7	7.3	3.7	6	5.5	7	–	–		RT1M	12
–	–	3.7	8	–	–	–	–	–	–	–	–		RT1M	12
2.2	9	4	9	4	9	5.5	9	–	–	–	–		RT1N	16
–	–	–	–	–	–	–	–	7.5	9	–	–	**CL01**	RT1N	16
3	12	5.5	12	5.5	11	7.5	12	–	–	–	–		RT1P	20
3.7	14	–	–	7.5	14	–	–	–	–	–	–	**CL02**	RT1P	25
4	16	7.5	16	–	–	10	15.5	–	–	–	–		RT1S	25
–	–	–	–	–	–	–	–	11	13	–	–	**CL25**	RT1P	20
–	–	–	–	–	–	11	17	13	16	–	–		RT1S	25
5.5	21	–	–	11	21	13	20	–	–	–	–		RT1T	32
–	–	11	22.5	–	–	15	23	–	–	–	–		RT1U	32
–	–	–	–	–	–	–	–	17	20	–	–	**CL04**	RT1T	32
7.5	27	15	30	15	28	17.5	26.5	–	–	–	–		RT1V	40
–	–	–	–	–	–	–	–	18.5	23	–	–		RT1U	32
–	–	–	–	–	–	–	–	22	25	–	–	**CL45**	RT1V	40
–	–	–	–	–	–	18.5	28.5	–	–	–	–		RT1V	40
–	–	18.5	37	18.5	35	22	33	–	–	–	–		RT1W	50
–	–	–	–	–	–	25	37.5	30	35	–	–		RT1W	50
11	40	–	–	22	40	–	–	–	–	–	–		RT2E (1)	63
–	–	–	–	–	–	–	–	33	38	–	–	**CL06**	RT2E	50
–	–	22	44	25	45	–	–	–	–	–	–		RT2G	63
15	50	–	–	–	–	–	–	–	–	–	–		RT2G	80
–	–	–	–	–	–	–	–	37	41	–	–	**CL07**	RT2E	63
–	–	–	–	–	–	30	45	40	43	–	–		RT2G	63
–	–	30	60	30	55	37	55	–	–	–	–		RT2H	80
18.5	65	–	–	37	66	–	–	–	–	–	–		RT2J	100
–	–	–	–	–	–	–	–	45	49	–	–	**CL08**	RT2G	80
–	–	37	72	–	–	45	65	–	–	–	–		RT2J	100
22	75	–	–	–	–	–	–	–	–	–	–		RT2J	100
–	–	–	–	45	80	–	–	–	–	–	–		RT2L	125
–	–	–	–	–	–	–	–	55	60	–	–	**CL09**	RT2H	80
–	–	–	–	–	–	50	73	–	–	–	–		RT2J	100
25	84	45	85	50	88	55	80	–	–	–	–		RT2L	125
30	105	55	105	55	100	–	–	–	–	–	–	**CL10**	RT2M	160

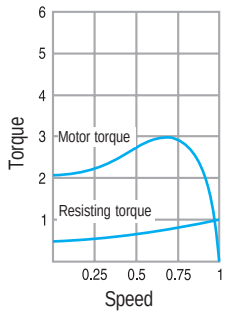
(1) Separate mounting: type RT2XP. See page K.24 for RT-accessories.

Series CK - Direct-on-line starters

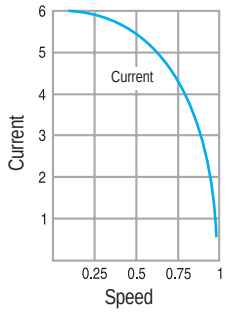
- Motors connected directly on-line with a contactor and a thermal overload relay.
- Simple installation with high starting torque and current.
- For use with motors of medium power that do not need a progressive start.

AC3	Switching off motors during running Ic = Ie
AC4	Switching off motors during starting Ic = 6 Ie

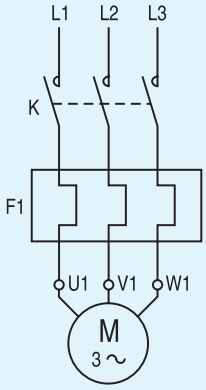
Torque-speed curve



Current-speed curve



Diagram



Selection table

Motor												Contactor	Thermal relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V				aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A			A
–	–	–	–	–	–	–	–	–	–	55	40	**CK75**	RT4LJ	63
–	–	–	–	–	–	–	–	75	80	–	–		RT3C	125
–	–	–	–	–	–	–	–	90	97	–	–		RT3D	125
–	–	–	–	–	–	75	105	–	–	–	–		RT3D	160
37	126	–	–	–	–	–	–	–	–	–	–		RT3E	160
–	–	75	138	75	135	90	129	–	–	–	–		RT3E	200
45	150	–	–	–	–	–	–	–	–	–	–		RT3F	250
–	–	–	–	–	–	–	–	–	–	75	54	**CK08**	RT4LK	80
–	–	–	–	–	–	–	–	–	–	90	64		RT3B	100
–	–	–	–	–	–	–	–	110	118	–	–		RT3E	160
–	–	–	–	–	–	–	–	132	141	–	–		RT3F	200
–	–	90	170	90	165	110	156	–	–	–	–		RT3F	250
55	182	–	–	100	182	–	–	–	–	–	–		RT3F	250
–	–	–	–	–	–	–	–	–	–	110	78	**CK85**	RT4LL	125
–	–	–	–	–	–	–	–	150	166	–	–		RT4LN	250
–	–	–	–	110	200	132	188	–	–	–	–		RT4LP	250
–	–	110	211	–	–	–	–	–	–	–	–		RT4LP	315
–	–	–	–	–	–	–	–	–	–	132	94	**CK09**	RT4LM	125
–	–	–	–	–	–	–	–	–	–	150	105		RT4LM	160
–	–	–	–	–	–	–	–	160	170	–	–		RT4LN	250
–	–	–	–	–	–	–	–	185	193	–	–		RT4LP	250
–	–	–	–	–	–	–	–	–	–	160	113	**CK95**	RT4LM	160
–	–	–	–	–	–	–	–	–	–	185	130		RT4LN	160
–	–	–	–	–	–	–	–	–	–	200	141		RT4LN	200
–	–	–	–	–	–	–	–	–	–	220	155	**CK10**	RT5LA	200
–	–	–	–	–	–	–	–	–	–	250	175		RT5LA	250
–	–	–	–	–	–	–	–	220	230	–	–	**CK95**	RT4LP	315
–	–	–	–	150	269	185	261	250	262	–	–		RT4LR	400
–	–	150	283	160	285	–	–	–	–	–	–		RT4LR	400
90	309	160	309	–	–	200	281	–	–	–	–		RT4LR	400

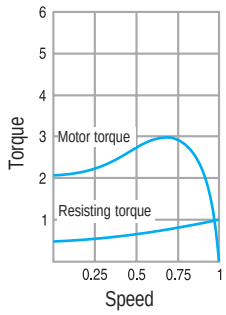
Continued on 3.15

Series CK - Direct-on-line starters

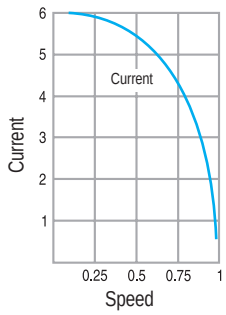
- Motors connected directly on-line with a contactor and a thermal overload relay.
- Simple installation with high starting torque and current.
- For use with motors of medium power that do not need a progressive start.

AC3	Switching off motors during running Ic = Ie
AC4	Switching off motors during starting Ic = 6 Ie

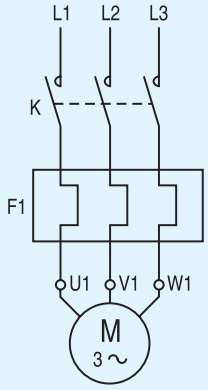
Torque-speed curve



Current-speed curve



Diagram



Selection table (continued from 3.14)

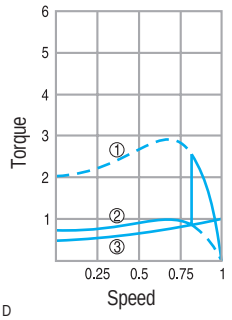
Motor												Contactor	Thermal relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V				aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A			A
–	–	–	–	–	–	220	310	280	292	–	–	CK10	RT5LC	500
–	–	–	–	185	325	–	–	300	307	–	–		RT5LC	500
–	–	–	–	–	–	–	–	315	322	–	–		RT5LC	500
110	356	185	355	200	350	250	348	335	344	–	–		RT5LD	500
–	–	220	370	220	385	–	–	355	366	–	–		RT5LD	500
–	–	–	–	–	–	280	385	375	390	–	–		RT5LD	500
–	–	220	408	–	–	300	409	–	–	–	–		RT5LD	500
–	–	–	–	–	–	–	–	–	–	280	197	CK11	RT5LB	250
–	–	–	–	–	–	–	–	–	–	300	211		RT5LB	315
–	–	–	–	–	–	–	–	–	–	315	221		RT5LB	315
–	–	–	–	–	–	–	–	–	–	335	234		RT5LB	315
–	–	–	–	–	–	–	–	–	–	355	245		RT5LB	315
–	–	–	–	–	–	–	–	400	412	–	–		RT5LD	500
132	425	–	–	250	437	315	426	–	–	–	–		RT5LD	630
–	–	–	–	–	–	335	456	425	442	–	–		RT5LD	630
–	–	250	475	280	480	355	485	450	462	–	–		RT5LE	630
150	500	–	–	300	508	375	513	–	–	–	–		RT5LE	800
160	520	280	530	315	530	400	543	–	–	–	–		RT5LE	630
–	–	–	–	–	–	–	–	–	–	375	256	CK12	RT5LB	315
–	–	–	–	–	–	–	–	–	–	400	273		RT5LC	400
–	–	–	–	–	–	–	–	–	–	425	290		RT5LC	400
–	–	–	–	–	–	–	–	–	–	450	307		RT5LC	400
–	–	–	–	–	–	–	–	475	488	–	–		RT5LE	630
–	–	–	–	–	–	–	–	500	514	–	–		RT5LE	800
–	–	300	563	335	565	–	–	–	–	–	–		RT5LE	800
185	609	315	580	355	600	–	–	–	–	–	–		RT5LE	800
200	630	335	630	375	630	450	613	–	–	–	–		RT5LE	800
220	710	355	650	–	–	475	647	–	–	–	–		RT5LE	1000
–	–	375	680	400	673	–	–	–	–	–	–		RT5LE	1000
–	–	–	–	–	–	–	–	–	–	475	324	CK13	RT5LC	500
–	–	–	–	–	–	–	–	–	–	500	341		RT5LC	500
–	–	–	–	–	–	500	680	–	–	–	–		RT6LA	1000
–	–	400	720	425	714	–	–	–	–	–	–		RT6LA	1000
–	–	425	763	450	756	–	–	–	–	–	–		RT6LA	1000
250	823	450	800	–		–	–	–	–	–	–		RT6LA	1000

Series CL - Star-delta starters

For AC squirrel-cage motors

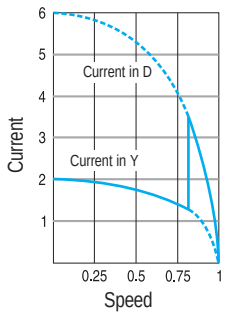
In order to use this type of starting, the following conditions must be met:
The ends of the three stator windings should terminate in a terminal box (6 terminals, see diagram). The line voltage should be the same as the motor delta connection voltage.
This starting system is suitable for machines where the resisting torque during starting is less than 1/3 of the motor torque (see torque speed curves).
The target of this type of starting is to reduce the current during starting to 1/3, there by reducing the linedrop (see current speed curves).
Reduce the motor torque to 1/3 to smooth out mechanical stress on the machine and on the load (see torque speed curves).

Torque-speed curve

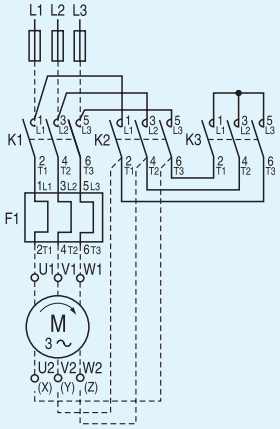


① : torque in D
② : torque in Y
③ : resisting torque

Current-speed curve



Diagram



Selection table

For electrical endurance see page K.37, but first divide the rated power and current values shown in the table by 1.73.
The thermal overload relay should be set at 0.58 In of the motor.

Motor												Contactors		Therm. relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line+ delta	Star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
2.2	9	4	9	–	–	5.5	9	7.5	9	–	–	CL00	CL00	RT1L	16
3	12	5.5	12	5.5	11	7.5	12	–	–	–	–	CL00	CL00	RT1M	20
3.7	14	–	–	–	–	–	–	–	–	–	–	CL00	CL00	RT1N	25
4	16	7.5	16	7.5	14	–	–	–	–	–	–	CL01	CL00	RT1N	25
–	–	–	–	–	–	–	–	11	13	–	–	CL01	CL00	RT1M	20
–	–	–	–	–	–	11	17	–	–	–	–	CL01	CL00	RT1N	25
5.5	21	11	22.5	11	21	–	–	–	–	–	–	CL02	CL01	RT1P	32
–	–	–	–	–	–	–	–	15	18	–	–	CL02	CL01	RT1P	25
–	–	–	–	–	–	15	23	–	–	–	–	CL02	CL01	RT1P	32
–	–	–	–	–	–	–	–	18.5	23	–	–	CL25	CL02	RT1S	32
7.5	27	15	30	15	28	–	–	–	–	–	–	CL25	CL02	RT1S	40
–	–	–	–	–	–	18.5	28.5	22	26	–	–	CL25	CL02	RT1S	40
–	–	–	–	18.5	35	22	33	–	–	–	–	CL25	CL02	RT1T	50
11	40	18.5	37	–	–	–	–	–	–	–	–	CL25	CL25	RT1U	50
–	–	–	–	–	–	–	–	30	35	–	–	CL03	CL25	RT1T	50
–	–	22	44	22	40	30	45	–	–	–	–	CL03	CL25	RT1U	63
15	50	25	50	–	–	–	–	–	–	–	–	CL04	CL03	RT1W	80
–	–	–	–	–	–	–	–	37	41	–	–	CL45	CL03	RT1U	63
–	–	30	60	30	55	–	–	–	–	–	–	CL45	CL03	RT1W	80
18.5	65	–	–	–	–	–	–	–	–	–	–	CL45	CL03	RT1W	80
–	–	–	–	–	–	37	55	45	49	–	–	CL45	CL03	RT1V	80
22	75	–	–	–	–	–	–	–	–	–	–	CL06	CL04	RT2G	100
–	–	33	65	37	66	–	–	–	–	–	–	CL06	CL04	RT1W	80
–	–	–	–	–	–	45	65	55	60	–	–	CL06	CL04	RT2E	100
–	–	37	72	–	–	–	–	–	–	–	–	CL06	CL04	RT2E	100
–	–	45	85	45	80	55	80	–	–	–	–	CL06	CL04	RT2G	100
–	–	–	–	–	–	–	–	75	80	–	–	CL07	CL06	RT2G	100
30	105	55	105	55	100	–	–	–	–	–	–	CL07	CL45	RT2H	125
–	–	–	–	–	–	75	105	–	–	–	–	CL08	CL06	RT2H	125
37	126	–	–	–	–	–	–	–	–	–	–	CL08	CL06	RT2J	160
–	–	–	–	75	135	–	–	–	–	–	–	CL08	CL06	RT2J	200
–	–	–	–	–	–	–	–	90	97	–	–	CL09	CL06	RT2H	125
40	138	–	–	–	–	–	–	–	–	–	–	CL09	CL07	RT2L	200
–	–	–	–	–	–	90	129	–	–	–	–	CL09	CL07	RT2J	160
–	–	75	138	–	–	–	–	–	–	–	–	CL09	CL07	RT2L	200
–	–	–	–	–	–	–	–	110	118	–	–	CL10	CL07	RT2J	160
45	150	–	–	–	–	–	–	–	–	–	–	CL10	CL07	RT2L	200
–	–	–	–	–	–	110	156	–	–	–	–	CL10	CL08	RT2L	250
–	–	90	170	90	165	–	–	–	–	–	–	CL10	CL08	RT2M	250

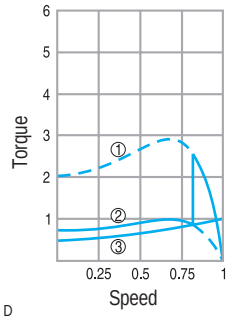
Continued on 3.17

Series CK - Star-delta starters

For AC squirrel-cage motors

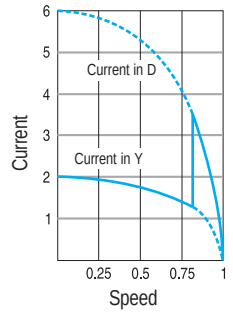
In order to use this type of starting, the following conditions must be met:
The ends of the three stator windings should terminate in a terminal box (6 terminals, see diagram). The line voltage should be the same as the motor delta connection voltage.
This starting system is suitable for machines where the resisting torque during starting is less than 1/3 of the motor torque (see torque speed curves).
The target of this type of starting is to reduce the current during starting to 1/3, there by reducing the linedrop (see current speed curves).
Reduce the motor torque to 1/3 to smooth out mechanical stress on the machine and on the load (see torque speed curves).

Torque-speed curve

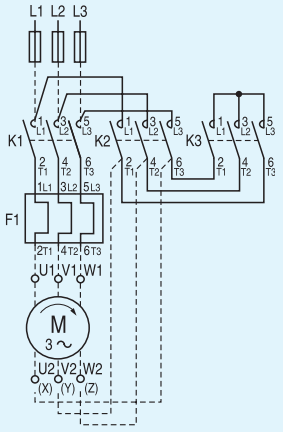


①: torque in D
②: torque in Y
③: resisting torque

Current-speed curve



Diagram



Selection table (continued from 3.16)

For electrical endurance see page 2.48, but first divide the rated power and current values shown in the table by 1.73.
The thermal overload relay should be set at 0.58 In of the motor.

Motor												Contactors		Therm. relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line+ delta	Star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
–	–	–	–	–	–	–	–	132	141	–	–	CK75C	CL08	RT3C	200
55	182	–	–	–	–	132	188	–	–	–	–	CK75C	CL08	RT3D	250
–	–	–	–	110	200	–	–	–	–	–	–	CK75C	CL08	RT3D	250
–	–	–	–	–	–	–	–	150	166	–	–	CK75C	CL09	RT3D	250
–	–	–	–	–	–	–	–	160	170	–	–	CK75C	CL10	RT3D	250
–	–	110	211	–	–	150	218	–	–	–	–	CK75C	CL10	RT3E	315
–	–	–	–	132	240	160	228	–	–	–	–	CK75C	CL09	RT3E	315
75	239	–	–	–	–	–	–	–	–	–	–	CK75C	CL10	RT3E	315
–	–	–	–	–	–	–	–	–	–	90	64	CK75C	CK75C	RT3C	80
–	–	–	–	–	–	–	–	–	–	110	78	CK75C	CK75C	RT3C	100
–	–	132	245	–	–	–	–	–	–	–	–	CK75C	CL10	RT3F	315
–	–	–	–	–	–	–	–	185	193	–	–	CK75C	CK75C	RT3E	250
–	–	150	288	150	269	185	261	–	–	–	–	CK08C	CK75C	RT3F	400
–	–	–	–	160	285	–	–	–	–	–	–	CK08C	CK75C	RT3F	400
–	–	–	–	–	–	–	–	200	207	–	–	CK08C	CK75C	RT3E	250
–	–	–	–	–	–	–	–	220	230	–	–	CK08C	CK75C	RT3E	315
90	309	–	–	–	–	–	–	–	–	–	–	CK08C	CK75C	RT3F	315
–	–	–	–	–	–	–	–	–	–	132	94	CK08C	CK75C	RT4LK	125
–	–	–	–	–	–	–	–	–	–	150	105	CK08C	CK75C	RT3PB	160
–	–	–	–	–	–	–	–	–	–	160	113	CK08C	CK75C	RT3PB	160
–	–	–	–	–	–	–	–	–	–	185	130	CK85B	CK75C	RT4LL	160
–	–	160	309	–	–	200	281	250	262	–	–	CK85B	CK75C	RT4LN	400
–	–	–	–	–	–	220	310	–	–	–	–	CK85B	CK75C	RT4LN	400
–	–	–	–	185	325	–	–	–	–	–	–	CK85B	CK75C	RT4LP	400
110	356	185	355	200	350	–	–	–	–	–	–	CK85B	CK75C	RT4LP	500
–	–	–	–	–	–	–	–	280	262	–	–	CK09B	CK75C	RT4LN	400
132	425	200	370	220	385	250	348	–	–	–	–	CK09B	CK75C	RT4LP	500
–	–	220	408	–	–	280	385	–	–	–	–	CK09B	CK08C	RT4LP	500
–	–	–	–	–	–	–	–	–	–	200	141	CK09B	CK08C	RT4LL	200
–	–	–	–	–	–	–	–	–	–	220	155	CK09B	CK08C	RT4LM	250
–	–	–	–	–	–	–	–	–	–	250	175	CK09B	CK08C	RT4LM	250
–	–	–	–	–	–	–	–	300	307	–	–	CK09B	CK08C	RT4LM	400
–	–	–	–	–	–	–	–	315	322	–	–	CK09B	CK08C	RT4LN	400
–	–	–	–	–	–	–	–	335	349	–	–	CK09B	CK08C	RT4LP	500

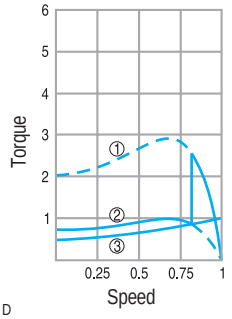
Continued on L.41

Series CK - Star-delta starters

For AC squirrel-cage motors

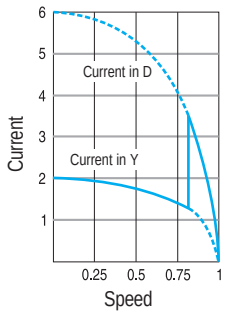
In order to use this type of starting, the following conditions must be met:
The ends of the three stator windings should terminate in a terminal box (6 terminals, see diagram). The line voltage should be the same as the motor delta connection voltage.
This starting system is suitable for machines where the resisting torque during starting is less than 1/3 of the motor torque (see torque speed curves).
The target of this type of starting is to reduce the current during starting to 1/3, there by reducing the linedrop (see current speed curves).
Reduce the motor torque to 1/3 to smooth out mechanical stress on the machine and on the load (see torque speed curves).

Torque-speed curve

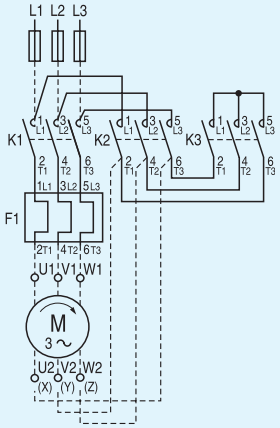


① : torque in D
② : torque in Y
③ : resisting torque

Current-speed curve



Diagram



Selection table (continued from 3.17)

For electrical endurance see page 2.48, but first divide the rated power and current values shown in the table by 1.73.
The thermal overload relay should be set at 0.58In of the motor.

Motor												Contactors		Therm. relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line+ delta	Star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
–	–	–	–	–	–	–	–	–	–	280	197	CK95B	CK09B	RT4LM	250
–	–	–	–	250	437	–	–	–	–	–	–	CK95B	CK08C	RT4LP	500
–	–	–	–	–	–	–	–	355	366	–	–	CK95B	CK85B	RT4LP	500
–	–	–	–	–	–	300	409	375	390	–	–	CK95B	CK85B	RT4LP	500
–	–	–	–	–	–	315	426	–	–	–	–	CK95B	CK85B	RT4LP	500
150	500	250	475	280	480	–	–	–	–	–	–	CK95B	CK85B	RT4LR	630
–	–	–	–	–	–	–	–	–	–	300	211	CK95B	CK85B	RT4LM	315
–	–	–	–	–	–	–	–	–	–	315	221	CK95B	CK85B	RT4LM	315
–	–	–	–	–	–	–	–	400	412	–	–	CK95B	CK85B	RT4LB	500
–	–	–	–	–	–	–	–	425	442	–	–	CK95B	CK85B	RT4LB	500
–	–	–	–	300	508	335	456	450	462	–	–	CK10C	CK85B	RT5LC	630
160	520	–	–	–	–	355	485	–	–	–	–	CK10C	CK85B	RT5LR	630
–	–	–	–	–	–	375	513	–	–	–	–	CK10C	CK85B	RT5LC	630
–	–	280	530	315	530	–	–	–	–	–	–	CK10C	CK85B	RT5LC	800
–	–	300	563	–	–	–	–	–	–	–	–	CK10C	CK85B	RT5LC	800
–	–	315	580	–	–	–	–	–	–	–	–	CK10C	CK85B	RT5LC	800
185	609	–	–	355	600	–	–	–	–	–	–	CK10C	CK85B	RT5LC	800
–	–	–	–	–	–	–	–	–	–	335	234	CK10C	CK09B	RT5LA	315
–	–	–	–	–	–	–	–	–	–	355	245	CK10C	CK09B	RT5LA	315
–	–	–	–	–	–	–	–	–	–	375	256	CK10C	CK09B	RT5LA	315
–	–	–	–	–	–	–	–	–	–	400	273	CK10C	CK09B	RT5LA	400
–	–	–	–	–	–	–	–	–	–	425	290	CK10C	CK09B	RT5LA	400
–	–	–	–	–	–	–	–	–	–	450	307	CK10C	CK09B	RT5LA	400
–	–	–	–	–	–	–	–	475	488	–	–	CK10C	CK09B	RT5LC	630
–	–	–	–	–	–	–	–	500	514	–	–	CK10C	CK09B	RT5LC	630
–	–	–	–	–	–	400	543	530	545	–	–	CK10C	CK09B	RT5LC	800
–	–	–	–	–	–	425	580	560	575	–	–	CK10C	CK09B	RT5LC	800
200	630	335	630	375	630	450	613	–	–	–	–	CK10C	CK09B	RT5LD	800
–	–	355	650	–	–	–	–	–	–	–	–	CK10C	CK09B	RT5LD	800
–	–	–	–	–	–	–	–	600	616	–	–	CK10C	CK95B	RT5LD	800
–	–	–	–	–	–	475	647	630	646	–	–	CK10C	CK95B	RT5LD	800
–	–	–	–	–	–	–	–	–	–	475	324	CK10C	CK95B	RT5LB	400
–	–	–	–	–	–	–	–	–	–	500	341	CK10C	CK95B	RT5LB	500
–	–	–	–	–	–	–	–	–	–	600	407	CK10C	CK95B	RT5LB	500
–	–	–	–	400	673	–	–	–	–	–	–	CK10C	CK10C	RT5LD	800

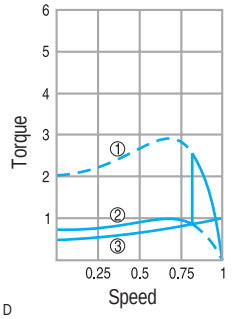
Continued on 3.19

Series CK - Star-delta starters

For AC squirrel-cage motors

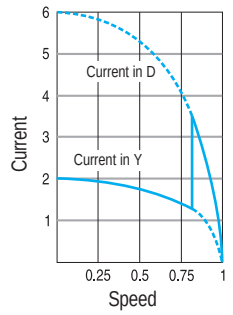
In order to use this type of starting, the following conditions must be met:
The ends of the three stator windings should terminate in a terminal box (6 terminals, see diagram). The line voltage should be the same as the motor delta connection voltage.
This starting system is suitable for machines where the resisting torque during starting is less than 1/3 of the motor torque (see torque speed curves).
The target of this type of starting is to reduce the current during starting to 1/3, there by reducing the linedrop (see current speed curves).
Reduce the motor torque to 1/3 to smooth out mechanical stress on the machine and on the load (see torque speed curves).

Torque-speed curve

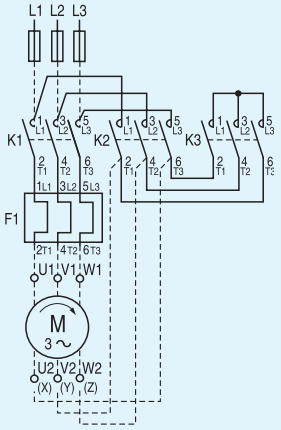


①: torque in D
②: torque in Y
③: resisting torque

Current-speed curve



Diagram



Selection table (continued from 3.18)

For electrical endurance see page 2.48, but first divide the rated power and current values shown in the table by 1.73.
The thermal overload relay should be set at 0.58In of the motor.

Motor												Contactors	Therm. relay	Fuse	
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line+ delta	Star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
–	–	375	680	–	–	500	680	670	688	–	–	CK11C	CK10C	RT5LD	1000
220	710	400	720	425	714	530	725	710	729	–	–	CK11C	CK10C	RT5LD	1000
–	–	–	–	450	756	560	762	750	770	–	–	CK11C	CK10C	RT5LE	1000
–	–	425	763	475	798	–	–	–	–	–	–	CK11C	CK10C	RT5LE	1000
–	–	–	–	–	–	600	817	–	–	–	–	CK11C	CK10C	RT5LE	800
250	823	–	–	–	–	–	–	–	–	–	–	CK11C	CK10C	RT5LE	1000
–	–	–	–	–	–	–	–	–	–	–	428	CK11C	CK10C	RT5LB	630
–	–	–	–	–	–	–	–	–	–	–	455	CK11C	CK10C	RT5LC	630
–	–	450	800	–	–	–	–	–	–	–	–	CK11C	CK10C	RT5LE	1000
–	–	475	846	500	840	–	–	–	–	–	–	CK11C	CK10C	RT5LE	1000
–	–	–	–	–	–	–	–	800	821	–	–	CK11C	CK10C	RT5LE	1000
–	–	500	892	530	890	630	857	850	873	–	–	CK11C	CK10C	RT5LE	1000
280	910	530	943	560	941	670	912	–	–	–	–	CK11C	CK10C	RT5LE	2x630
300	975	–	–	–	–	710	965	–	–	–	–	CK12C	CK10C	RT5LE	2x630
315	1023	560	996	600	1010	750	1020	–	–	–	–	CK12C	CK10C	RT5LE	2x630
335	1083	–	–	630	1058	–	–	–	–	–	–	CK12C	CK10C	RT5LE	2x630
–	–	–	–	–	–	–	–	–	–	750	510	CK12C	CK11C	RT5LC	630
–	–	–	–	–	–	–	–	900	924	–	–	CK13B	CK11C	RT6LA	2x630
–	–	–	–	–	–	800	1088	950	975	–	–	CK13B	CK11C	RT6LA	2x630
–	–	600	1074	–	–	–	–	–	–	–	–	CK12B	CK11C	RT5LE	2x630
355	1142	–	–	–	–	–	–	–	–	–	–	CK12B	CK11C	RT5LE	2x800
–	–	–	–	–	–	–	–	–	–	800	543	CK13B	CK11C	RT5LC	800
–	–	630	1128	670	1125	–	–	–	–	–	–	CK12B	CK11C	RT5LE	2x800
375	1206	670	1200	710	1190	850	1156	–	–	–	–	CK13B	CK11C	RT6LA	2x800
400	1286	710	1270	750	1255	–	–	–	–	–	–	CK13B	CK11C	RT6LA	2x800
425	1364	–	–	–	–	–	–	–	–	–	–	CK13B	CK12C	RT6LA	2x800
–	–	750	1342	–	–	–	–	–	–	–	–	CK13B	CK12C	RT6LA	2x800

Series CL - Autotransformer starters

For AC squirrel-cage motors

This type of starting is used for machines where the resisting torque during starting is less than the motor torque (see torque speed curves):

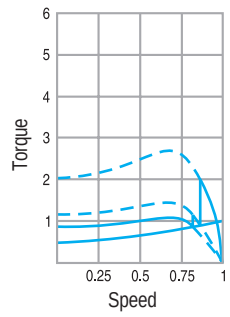
- Reduce current during starting to the required value. (This will depend on the autotransformer voltage ratio selected).
- Reduce motor torque to smooth out mechanical stress on the machine and on the load (see torque speed curves). Reduction of the motor will depend on the autotransformer voltage ratio.

The two requirements for star-delta starting do not apply here. That is to say both end of the three windings do not have to be accessible and the line voltage does not have to be the same as the delta connection voltage.

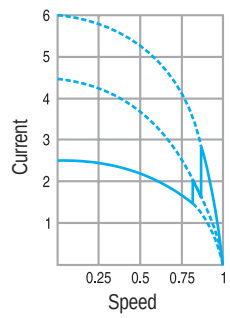
This system also has the following advantages over star-delta starting:

- Required current and starting torque can be selected.
- Starting can be effected at various points.
- Motor voltage continuity during network switching.

Torque-speed curve



Current-speed curve

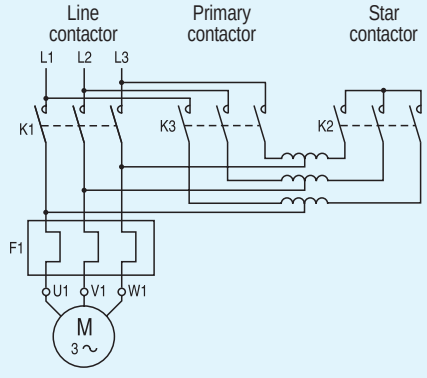


Selection table

Motor												Contactors		Therm. relay	Fuse
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line	Prim. trafo+ star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
2.2	9	–	–	–	–	–	–	–	–	–	–	CL00	CL00	RT1N	16
–	–	–	–	–	–	–	–	7.5	9	–	–	CL01	CL00	RT1N	16
–	–	5.5	12	5.5	11	7.5	12	–	–	–	–	CL01	CL00	RT1P	20
3.7	14	–	–	7.5	14	–	–	–	–	–	–	CL02	CL00	RT1P	25
–	–	7.5	16	–	–	–	–	–	–	–	–	CL02	CL00	RT1S	25
–	–	–	–	–	–	–	–	11	13	–	–	CL25	CL01	RT1P	20
–	–	–	–	–	–	11	17	–	–	–	–	CL25	CL01	RT1T	25
5.5	21	11	22.5	11	21	–	–	–	–	–	–	CL25	CL01	RT1U	32
–	–	–	–	–	–	–	–	15	18	–	–	CL03	CL01	RT1T	25
–	–	–	–	–	–	15	23	–	–	–	–	CL04	CL01	RT1U	32
7.5	27	15	30	15	28	–	–	–	–	–	–	CL04	CL02	RT1V	40
–	–	–	–	–	–	–	–	18.5	23	–	–	CL45	CL02	RT1U	32
–	–	–	–	–	–	18.5	22.5	22	25	–	–	CL45	CL02	RT1U	40
–	–	–	–	18.5	35	22	33	–	–	–	–	CL45	CL02	RT1W	50
11	40	18.5	37	22	40	–	–	–	–	–	–	CL06	CL03	RT2E	63
–	–	–	–	–	–	–	–	30	35	–	–	CL06	CL03	RT2E	50
–	–	22	44	–	–	–	–	–	–	–	–	CL06	CL03	RT2G	63
15	50	–	–	–	–	–	–	–	–	–	–	CL06	CL03	RT2G	80
–	–	–	–	–	–	30	45	–	–	–	–	CL07	CL03	RT2G	63
–	–	–	–	–	–	–	–	37	41	–	–	CL07	CL04	RT2E	50
–	–	30	60	30	55	37	55	–	–	–	–	CL07	CL04	RT2H	80
18.5	65	–	–	37	66	–	–	–	–	–	–	CL07	CL04	RT2J	80
–	–	–	–	–	–	–	–	45	49	–	–	CL08	CL04	RT2G	80
–	–	–	–	–	–	–	–	55	60	–	–	CL08	CL04	RT2H	80
–	–	–	–	–	–	45	65	–	–	–	–	CL08	CL06	RT2J	100
22	75	37	72	–	–	–	–	–	–	–	–	CL08	CL06	RT2J	100
–	–	–	–	45	80	55	80	–	–	–	–	CL08	CL06	RT2J	125
–	–	45	85	–	–	–	–	–	–	–	–	CL09	CL06	RT2J	125
–	–	–	–	–	–	–	–	75	80	–	–	CL09	CL06	RT2K	125
30	105	55	105	55	100	75	105	–	–	–	–	CL10	CL06	RT2M	160
–	–	–	–	–	–	–	–	90	97	–	–	CL10	CL07	RT2M	125

Continued on 3.21

Diagram



Series CK - Autotransformer starters

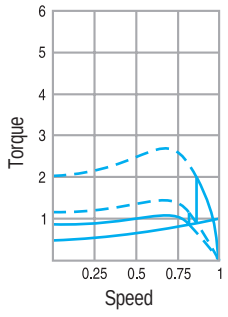
For AC squirrel-cage motors

This type of starting is used for machines where the resisting torque during starting is less than the motor torque (see torque speed curves):
- Reduce current during starting to the required value. (This will depend on the autotransformer voltage ratio selected).
- Reduce motor torque to smooth out mechanical stress on the machine and on the load (see torque speed curves). Reduction of the motor will depend on the autotransformer voltage ratio.

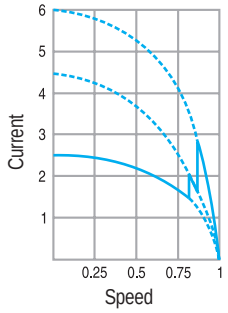
The two requirements for star-delta starting do not apply here. That is to say both end of the three windings do not have to be accessible and the line voltage does not have to be the same as the delta connection voltage.

This system also has the following advantages over star-delta starting:
- Required current and starting torque can be selected.
- Starting can be effected at various points.
- Motor voltage continuity during network switching.

Torque-speed curve



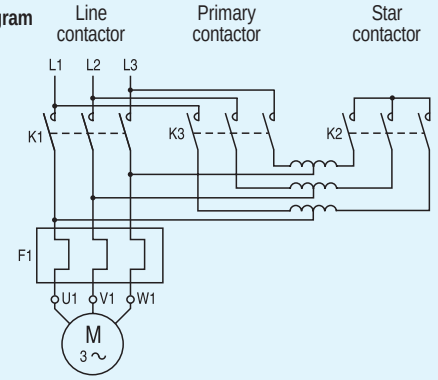
Current-speed curve



Selection table (continued from 3.20)

Motor												Contactors		Therm. relay	Fuse ring
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line	Prim trafo+ star		aM
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A
37	126	75	138	75	135	90	129	–	–	–	–	CK75C	CL07	RT3E	200
–	–	–	–	–	–	–	–	110	118	–	–	CK08C	CL08	RT3E	160
–	–	–	–	–	–	–	–	132	141	–	–	CK08C	CL08	RT3F	200
45	150	90	170	90	165	110	156	–	–	–	–	CK08C	CL08	RT3F	250
55	182	–	–	–	–	–	–	–	–	–	–	CK08C	CL08	RT4LP	250
–	–	–	–	–	–	–	–	–	–	90	64	CK08C	CK75C	RT4LP	100
–	–	–	–	–	–	–	–	150	166	–	–	CK85B	CL09A	RT4LN	250
–	–	110	211	110	200	132	188	–	–	–	–	CK85B	CL09A	RT4LP	250
–	–	–	–	–	–	–	–	–	–	110	78	CK85B	CK75C	RT4LN	125
–	–	–	–	–	–	–	–	160	170	–	–	CK09B	CK75C	RT4LN	250
–	–	–	–	–	–	150	218	185	193	–	–	CK09B	CK75C	RT4LP	250
75	239	132	245	132	240	160	228	200	207	–	–	CK09B	CK75C	RT4LR	315
–	–	–	–	–	–	–	–	–	–	150	105	CK09B	CK75C	RT4LM	125
–	–	–	–	–	–	–	–	–	–	160	113	CK95B	CK08C	RT4LM	160
–	–	–	–	–	–	–	–	–	–	220	155	CK10C	CK08C	RT5LA	200
–	–	–	–	–	–	–	–	–	–	250	175	CK10C	CK85B	RT5LA	250
–	–	–	–	–	–	–	–	220	230	–	–	CK95B	CK08C	RT4LP	315
90	309	160	309	–	–	220	310	300	307	–	–	CK10C	CK08C	RT5LC	400
–	–	–	–	185	325	–	–	315	322	–	–	CK10C	CK08C	RT5LC	500
110	356	220	408	220	385	280	285	335	344	–	–	CK10C	CK85B	RT5LD	500
132	425	–	–	250	437	–	–	–	–	–	–	CK11C	CK85B	RT5LD	630
–	–	–	–	–	–	–	–	–	–	280	197	CK10C	CK09B	RT5LB	250
–	–	–	–	–	–	–	–	–	–	335	234	CK11C	CK09B	RT5LB	315
–	–	–	–	–	–	–	–	–	–	255	245	CK11C	CK09B	RT5LB	400
–	–	–	–	–	–	300	409	400	412	–	–	CK11C	CK09B	RT5LD	500
–	–	–	–	–	–	315	426	–	–	–	–	CK11C	CK09B	RT5LD	630
150	500	250	475	280	480	335	456	–	–	–	–	CK11C	CK09B	RT5LE	630
–	–	–	–	–	–	–	–	–	–	375	256	CK12B	CK95B	RT5LB	400
–	–	–	–	300	508	375	513	450	462	–	–	CK12B	CK95B	RT5LE	630
160	520	315	580	335	565	–	–	–	–	–	–	CK12B	CK95B	RT5LE	800
–	–	–	–	–	–	–	–	–	–	450	307	CK12B	CK10C	RT5LC	400
–	–	–	–	–	–	–	–	475	488	–	–	CK12B	CK10C	RT5LD	630
200	630	335	630	375	630	450	613	–	–	–	–	CK12B	CK10C	RT5LE	800
–	–	–	–	–	–	–	–	–	–	500	341	CK13B	CK10C	RT5LD	500
–	–	–	–	–	–	–	–	500	514	–	–	CK13B	CK10C	RT6LA	800
220	710	425	762	450	756	500	800	–	–	–	–	CK13B	CK10C	RT6LA	1000
250	823	450	800	–	–	–	–	–	–	–	–	CK13B	CK10C	RT6LA	1000

Diagram

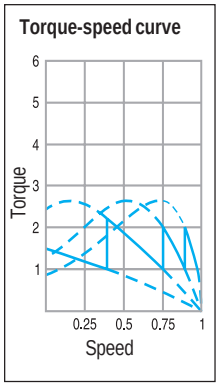


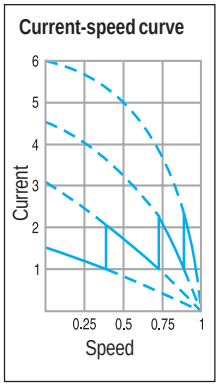
Series CL/CK
Contactors for rotor starters

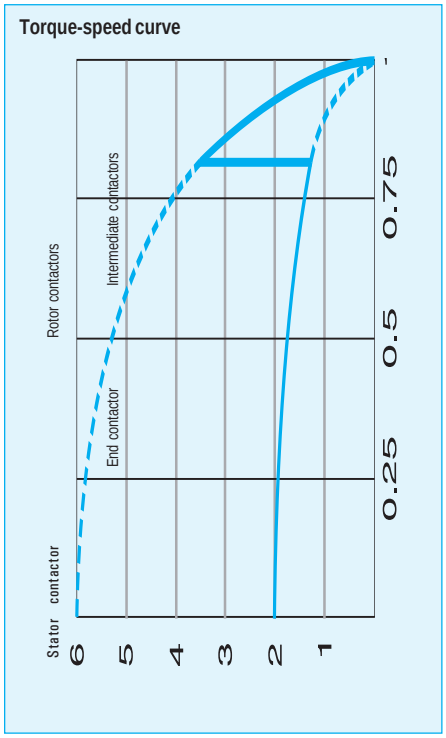
For AC slip-ring motors

This type of starter is used in machines with resisting torque of any value where it is required to:
- Start with reduced peak currents without consequent motor torque reduction, as is the case with high resisting torques and when starting with reduced peak currents is required.
- Control speed for different load or resisting torque values, with reduced peak currents: lifting and transport gear, flow volume control, etc.

Whatever the application, a distinction should be made between the two electrical circuits which are used in this type of starters:
- Stator circuit, present in two categories and having a different breaking current in each:
  Category AC'2: switching-off motors during running, Ic = Ie
  Category AC 2: switching-off of during starting, Ic = 2.5 Ie
- Rotor circuit, with similar characteristics to those in category AC 1.







Stator circuit

Motor power						Con-tactor	Therm. overl. relay	Fuse aM
230V 220V	400V 380V	440V 415V	500V	690V 660V	1000V			aM
kW	kW	kW	kW	kW	kW			A
–	–	11	13	–	–	CL25	RT1T	32
5.5	11	–	–	–	–	CL25	RT1U	32
–	–	–	–	15	–	CL03	RT1T	25
–	–	–	–	17	–	CL04	RT1T	32
–	–	–	15	–	–	CL04	RT1U	32
7.5	15	15	17	–	–	CL04	RT1V	40
–	–	–	–	18.5	–	CL45	RT1U	32
–	–	18.5	22	33	–	CL45	RT1W	50
11	18.5	22	–	–	–	CL06	RT2E	63
–	22	25	25	33	–	CL06	RT2G	63
15	–	–	–	–	–	CL06	RT2G	63
–	–	–	30	40	–	CL07	RT2G	63
–	30	30	37	–	–	CL07	RT2H	80
18.5	–	37	–	–	–	CL07	RT2J	100
–	–	–	–	45	–	CL08	RT2G	80
–	–	–	–	55	–	CL09	RT2H	100
–	–	–	45	–	–	CL08	RT2J	100
22	37	45	–	–	–	CL08	RT2J	100
–	–	–	55	75	–	CL10	RT2J	100
25	45	50	63	–	–	CL10	RT2L	100
–	–	–	–	90	–	CL75C	RT3D	125
30	55	55	75	–	–	CL75C	RT3D	160
37	75	75	90	–	–	CK75C	RT3E	200
–	–	–	–	–	90	CK08C	RT3B	100
–	–	–	–	110	–	CK08C	RT3E	160
–	–	–	–	132	–	CK08C	RT3F	200
45	90	90	110	–	–	CK08C	RT3F	250
55	–	100	–	–	–	CK08C	RT4LN	250
–	–	110	132	–	–	CK85B	RT4LP	250
–	–	–	–	–	150	CK09B	RT4LM	125
–	–	–	–	160	–	CK09B	RT4LN	250
–	–	–	–	200	–	CK09B	RT4LP	250
75	132	132	160	–	–	CK09B	RT4LP	315
–	–	–	–	–	185	CK95B	RT4LN	160
–	–	–	–	–	250	CK10C	RT4LN	250
–	–	–	–	220	–	CK10C	RT4LP	315
90	160	160	220	300	–	CK10C	RT5LC	400
–	–	185	–	315	–	CK10C	RT5LC	500
110	200	220	250	335	–	CK10C	RT5LC	500
–	–	–	–	–	280	CK10C	RT5LB	250
–	–	–	–	–	335	CK11C	RT5LB	315
–	–	–	–	–	355	CK11C	RT5LB	400
–	220	–	300	400	–	CK11C	RT5LD	500
132	–	250	315	–	–	CK11C	RT5LD	630
150	250	250	335	–	–	CK11C	RT5LE	630
–	–	–	–	–	375	CK12B	RT5LB	400
–	–	–	–	–	450	CK12B	RT5LC	400
–	–	300	375	475	–	CK12B	RT5LE	630
220	335	375	–	–	–	CK12B	RT5LE	800
–	–	–	–	–	500	CK13B	RT5LC	500
–	–	–	–	500	–	CK13B	RT6LA	800
220	425	–	450	–	–	CK13B	RT6LA	1000
250	450	450	500	–	–	CK13B	RT6LA	1000

Rotor circuit

Rotor current	Rotor voltage Max.	Contactors	
A(1)	V	Inter	End
28	1000	CL00	CL00
37	1000	CL00	CL01
42	1000	CL00	CL01
48	1000	CL01	CL02
55	1000	CL02	CL25
60	1000	CL02	CL03
75	1000	CL25	CL04
90	1000	CL25	CL45
98	1000	CL03	CL45
112	1000	CL04	CL06
120	1000	CL45	CL06
135	1000	CL45	CL06
147	1000	CL06	CL06
165	1000	CL06	CL07
180	1000	CL06	CL07
187	1000	CL07	CL08
202	1000	CL07	CL09
240	1000	CL08	CL10
247	1000	CL08	CK75C
280	1000	CL09	CK75C
315	1000	CL09	CK08C
360	1000	CL10	CK85C
390	1500	CK75C	CK09B
472	1500	CK08C	CK95B
525	1500	CK85B	CK95B
585	1500	CK09B	CK10C
660	1500	CK95B	CK10C
825	1500	CK10C	CK11C
945	1500	CK10C	CK12B
1087	1500	CK11C	CK12B
1188	1500	CK11C	CK12B
1485	1500	CK12B	CK13B
1956	1500	CK13B	–

(1) The currents shown relate to the delta connection of the contactors poles.
If the poles are star-connected, divide the values given in the column by 1.5

Electrical endurance
stator circuit (see graph. AC2)

For contactor rotor circuit current (see graph. AC1)

Contactors for rotor speed drives

For AC slip-ring motors AC2/AC'2 mixed service

Stator circuit

Rotor circuit

Jogging: 10% AC2

Motor power (V) (1)							Con-tactor	Rotor current (2)	Rotor volt. Without counter-current	Rotor volt. With counter-current`	Con-tactor
230 220	400 380	415	440	500	600	1000					
kW	kW	kW	kW	kW	kW	kW		A	V	V	
2.4	4.5	5	5.5	5.5	6.3	–	CL00	22	660	500	CL00
3.7	6.5	7.5	8	8	9	–	CL01	30	660	500	CL01
5	8	9.5	10	10	11	–	CL02	39	660	500	CL02
7	13	14	15	15	15	–	CL25	60	660	500	CL03
9	16.5	18	19	19	19	–	CL04	72	660	500	CL04
10.5	19.5	22	24	24	27	–	CL45	87	750	600	CL45
13.5	23	26	27	27	30	–	CL06	105	750	600	CL06
18.5	28	30	32	32	35	–	CL07	127	750	600	CL07
21	34	37	40	40	45	–	CL08	147	750	600	CL08
22.5	39	42	47	47	50	–	CL09	177	750	600	CL09
27.5	49	51	55	55	60	–	CL10	195	750	600	CL10
38	65	70	70	75	75	–	CK75C	220	1000	750	CK75C
40	75	78	85	85	95	80	CK08C	240	1000	750	CK08C
50	85	90	90	100	100	95	CK85B	280	1000	750	CK85B
55	96	100	110	110	120	110	CK09B	315	1000	750	CK09B
70	110	115	115	125	125	120	CK95B	360	1000	750	CK95B
85	147	160	175	175	195	165	CK10C	405	1000	750	CK10C
105	181	200	220	220	233	220	CK11C	525	1000	750	CK11C
124	215	220	235	257	270	250	CK12B	780	1000	750	CK12B
140	250	258	260	300	280	276	CK13B	885	1000	750	CL13B

Jogging: 20% AC2

2.1	3.7	4	4.4	4.4	5	–	CL00	18	660	500	CL00
2.6	4.5	5.5	6.1	6.1	7	–	CL01	25	660	500	CL01
3.6	6.5	7.5	8.2	8.2	9	–	CL02	37	660	500	CL02
6.3	11	12	12.7	12.7	11	–	CL25	48	660	500	CL03
8	13.8	15	15.9	15.9	17	–	CL04	60	660	500	CL04
9.2	16	17.4	18.5	18.5	20	–	CL45	72	750	600	CL45
10.5	18.5	20.7	22	22	25	–	CL06	85	750	600	CL06
13	23	25	27	27	31	–	CL07	106	750	600	CL07
17.3	30	32.7	34.6	34.6	43	–	CL08	123	750	600	CL08
19.6	34	37	39	39	47	–	CL09	147	750	600	CL09
22	38	41.5	46	46	55	–	CL10	165	750	600	CL10
32	60	65	65	65	70	65	CK75C	190	1000	750	CK75C
36	75	30.5	75	75	90	75	CK08C	210	1000	750	CK08C
42	78	85	85	85	100	85	CK85B	240	1000	750	CK85B
47.8	82.5	90	96	96	115	100	CK09B	273	1000	750	CK09B
60	96	110	110	110	135	125	CK95B	305	1000	750	CK95B
77	132	140	150	150	190	160	CK10C	348	1000	750	CK10C
89	153	167	178	185	220	185	CK11C	453	1000	750	CK11C
110	190	200	218	220	258	220	CK12B	570	1000	750	CK12B
132	228	230	230	258	240	230	CK13B	750	1000	750	CK13B

Electrical endurance 1.3 x 10^6 operations

Continued on 3.24

(1) Power values shown are not standard as they refer to intermittent service.
(2) The current shown relates to the delta connection of the contactor poles.
If the poles are star-connected, divide the values given in the column by 1.5

Contactors for rotor speed drives (continued from 3.23)

For AC slip-ring motors AC2/AC'2 mixed service

Jogging: 35% AC2

Stator circuit

Motor power (V) (1)							Con-tactor
230 220	400 380	415	440	500	600	1000	
kW	kW	kW	kW	kW	kW	kW	
1.4	2.8	3.2	3.4	3.4	4	–	CL00
2.2	3.8	4.1	4.5	4.5	5.5	–	CL01
3	5.5	6.3	7.5	7.5	7.5	–	CL02
4.9	9	9.5	10	10	11	–	CL25
6.7	12.8	13.8	14.8	14.8	13		CL04
7	13	14	15	15	17	–	CL45
9	15	17	18	18	20	–	CL06
10.5	18.5	20.7	22	22	25	–	CL07
13.5	24	26	28	28	33	–	CL08
18.5	29	31	33	33	40	–	CL09
19.6	34	37	39	39	45	–	CL10
25	45	47	47	47	55	60	CK75C
30	55	60	63	63	77	63	CK08C
35	78	80	80	80	90	75	CK85B
40	75	78	85	85	100	80	CK09B
46	83	100	100	100	135	117	CK95B
63	110	120	132	132	150	132	CK10C
79	136	146	157	160	190	160	CK11C
91	157	165	176	188	220	185	CK12B
115	200	200	200	220	205	202	CK13B

Rotor circuit

Rotor current (2)	Rotor volt. Without counter-current	Rotor volt. With counter-current`	Con-tactor
A	V	V	
14	660	500	CL00
20	660	500	CL01
26	660	500	CL02
42	660	500	CL03
50	660	500	CL04
57	750	600	CL45
70	750	600	CL06
85	750	600	CL07
100	750	600	CL08
120	750	600	CL09
138	750	600	CL10
455	1000	750	CK75C
172	1000	750	CK08C
200	1000	750	CK85B
225	1000	750	CK09B
250	1000	750	CK95B
285	1000	750	CK10C
385	1000	750	CK11C
495	1000	750	CK12B
637	1000	750	CK13B

Electrical endurance 1.3 x 10^6 operations

(1) Power values shown are not standard as they refer to intermittent service.
(2) The current shown relates to the delta connection of the contactor poles.
If the poles are star-connected, divide the values given in the column by 1.5

Contactors for connection of power transformers

In this application it is essential to ascertain the no-load inrush current of the transformer Iμ, (magnetisation current) which in the majority of cases determines the size of the contactor.

Two cases are illustrated in the table:
- No-loap inrush current up to 20 times the rated transformer current.
- No-loap inrush current up to 40 times the rated transformer current

The contactor should not cut out the short-circuit current; if the protective devices used are fuses, this condition will be intrinsically complied with. In the case however of devices with tripping contacts the general line circuit breaker will be driven rather than the contactor coil.

Selection table

$\frac{I\mu}{Ie} = 20$		$\frac{I\mu}{Ie} = 40$		Contactor
230V 240V	380V 660V	220V 240V	380V 660V	
kVA	kVA	kVA	kVA	
2	3.5	1	1.75	CL00A
2.75	5	1.37	2.5	CL01A
4	7	2	3.5	CL02A
5.75	10	2.85	5	CL25A
5.75	10	2.85	5	CL03A
7.25	12.5	3.65	6.25	CL04A
9	15.5	4.50	7.75	CL45A
10	17	5	8.5	CL05A
12	21	6	10.5	CL06A
15	25	7.5	12.5	CL07A
20	35	10	16	CL08A
25	40	12.5	20	CL09A
30	50	15	25	CL10A
35	55	17	27	CK75C
40	60	20	30	CK08C
45	75	22	35	CK85B
50	85	25	42.5	CK09B
80	150	40	75	CK10C
100	170	50	85	CK11C
127	215	64	107	CK12B
160	280	80	140	CK13B

Series CL/CK
Contactors for capacitors

(Category AC6b)

The most usual application of capacitors is for centralised automatic power factor (cos φ) correction. A characteristic of capacitors is the high overcurrent which appears as they are connected.

Such overcurrents are due to:
- Harmonic currents produced by saturated transformers, rectifiers, etc.
- Transient currents, the frequency and amplitude of which depend on the network inductance and the capacitor size.
- Additional transient currents arising where a capacitor is connected when others have already been connected, and caused by discharging of the latter:

GE Power Controls contactors are fitted with specially treated hardened alloy contacts which are highly resistent to welding and are therefore capable of withstanding high current peaks on connection.

The operating conditions taken as a basis for usage are:
- Near presence of other previously connected capacitors with a total power of up to eight times that of the capacitor to be connected.
- Shock coils reactances with a minimum inductance of 4 µH. These can be obtained by making 4 or 6 turns of 15 cm windings on the conductor of each phase.
- Fast discharge resistor for reconnection within 60 seconds.

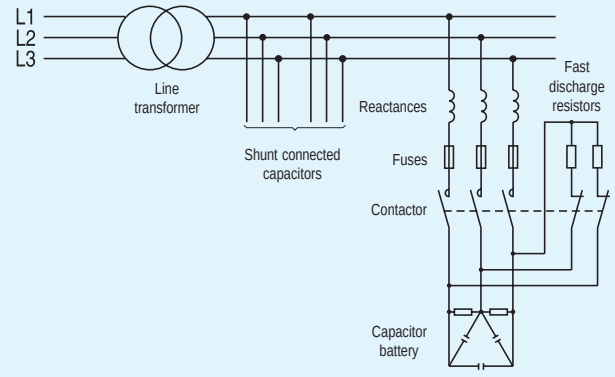
Selection table (1)

Ith	θ ≤ 40° C / θ ≤ 55° C				θ ≤ 70° C				Fuse	Contactor	Max. peak current	R(2)
	220V 230V 240V	400V 440V 480V	500V 550V	600V 660V	220V 230V 240V	400V 440V 480V	500V 550V	600V 660V	gL			
A	kVAr	kVAr	kVAr	kVAr	kVAr	kVAr	kVAr	kVAr	A		A	W
25	3	5	6.5	5.7	2.4	4	5.2	4.5	10	CL00	1000	10
25	4.5	9.5	12.5	11	3.6	6	10	7	16	CL01	1000	10
32	6.5	11	14.5	12.5	5.2	8.5	11.5	10	25	CL02	1000	10
45	7.5	12.5	16	15	6.5	10	13	12	25	CL25	1000	10
45	9	15	20	17.5	7.2	12	16	14	35	CL03	2500	10
60	12.5	21	27.5	24	10	15	22	19.5	40	CL04	2500	10
60	16.5	25	32	30	10	17	25	22	50	CL45	2500	10
90	22	40	52	50	17	30	41	35	80	CL06	3500	15
110	25	45	58	65	19	35	46	40	125	CL07	3500	15
110	30	50	65	70	22	40	52	50	125	CL08	3500	25
140	40	65	85	95	35	58	75	85	160	CL09	3500	25
140	50	80	105	120	43	70	90	105	160	CL10	3500	25
250	60	110	145	150	48	88	116	120	250	CK75C	5000	50
250	70	125	162	170	56	100	130	136	250	CK08C	5000	50
315	80	150	195	200	64	120	156	160	315	CK85B	5000	50
315	95	165	215	230	85	148	192	205	315	CK09B	5000	80
450	105	190	250	288	95	175	230	265	450	CK95B	5500	80
600	135	260	340	370	120	235	275	330	630	CK10C	10000	100
700	190	325	425	450	152	260	340	360	800	CK11C	10000	100
1000	250	400	520	600	200	320	416	480	1000	CK12B	12000	100
1250	315	525	685	650	252	420	548	520	1250	CK13B	15000	100

Electrical endurance 2.5×10^5 operations

(1) Power values shown are not standard as they refer to intermittent service.
(2) U ≤ 480V, R = 1k Ω
U > 480V, R = 2.2 k Ω

Diagram



Contactors for control of lighting circuits

The characteristics of the most usual lighting systems are as follows:

Incandescent lamps
The connection current in very high - of the order of 15 times - rated current. Although this is a very short duration, it is only taken into account in order for the contactor connection current not to be exceeded.
The power factor is always maintained at 1.

Fluorescent lamps
The connection current is slightly higher than rated current. The power factor is about 0.5.
To improve up to 0.9, compensating capacitors can be used. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

High pressure mercury vapour lamps
The connection current varies, depending on type, between 1.6 and 2 times the rated current and will hold for between 3 and 5 minutes.

The power factor is of the order of 0.6 and this can be improved up to approximately unit value by means of compensating capacitors. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

High pressure sodium vapour lamps
The connection current varies, depending on type, between 1.3 and 1.6 times the rated current and will hold between 3 and 5 minutes.

The power factor is of the order of 0.45 and this can be improved up to approximately unit value by means of compensating capacitors. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

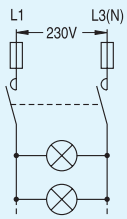
Selection table

Type	W	A	µF	Maximum number of lamps per phase at 230V					
				MCR	MC0	MC1	RL	CL00	CL01
Incandescent	60	0.27		27	37	59	59	62	62
	100	0.45		16	22	35	35	40	40
	200	0.91		8	11	17	17	20	20
	300	1.36		5	7	11	11	13	13
	500	2.27		3	4	7	7	8	8
	1000	4.5		1	2	3	3	4	4
	2000	9.1		0	1	1	1	1	1
Fluorescent Single arrangement	15	0.23		51	61	79	79	88	98
	18	0.37		32	38	49	49	57	61
Without compensation	36	0.44		28	33	41	41	48	51
	58	0.7		18	21	26	26	30	32
	100	1.5		8	10	12	12	14	16
Fluorescent Single arrangement	15	0.23	3.5	26	32	49	49	61	77
	18	0.25	4.5	20	25	38	38	48	61
With compensation	36	0.3	4.5	20	25	38	38	48	61
	58	0.45	7	13	14	25	25	31	39
	100	0.7	18	5	6	9	9	11	14
High pressure mercury vapour	250	2.13		2	3	5	5	5	6
	400	3.25		1	2	3	3	3	4
Without compensation	700	5.4		1	1	2	2	2	2
	1000	7.5		0	0	1	1	1	1
High pressure mercury vapour	250	1.3	20	5	6	7	7	10	13
	400	2.1	25	3	4	5	5	8	10
With compensation	700	3.6	40	1	2	3	3	4	6
	1000	5.3	60	0	1	2	2	3	3
High pressure sodium vapour	250	3		2	3	5	5	5	6
	400	4.4		1	2	3	3	3	4
Without compensation	1000	10.3		0	0	1	1	1	1
High pressure sodium vapour	250	1.45	40	2	2	3	3	4	5
	400	2.5	45	1	1	2	2	3	4
With compensation	1000	5.5	100	0	0	1	1	1	1

Maximum number of lamps per phase at 230V																
CL02	**CL25**	**CL03**	**CL04**	**CL45**	**CL06**	**CL07**	**CL08**	**CL09**	**CL10**	**CK08**	**CK09**	**CK95**	**CK10**	**CK11**	**CK12**	**CK13**
70	77	77	85	122	156	191	222	264	284	410	555	820	1320	1550	1860	1860
50	60	60	66	73	95	116	133	160	170	246	333	490	790	930	1120	1120
25	30	30	33	36	47	58	66	79	84	122	165	240	390	460	550	550
17	20	20	22	24	31	38	44	53	56	81	110	165	260	300	370	370
10	12	12	12	14	19	23	26	31	33	48	66	95	155	185	220	220
5	6	6	6	7	9	11	13	16	17	24	33	50	80	90	110	110
2	3	3	3	3	4	5	7	8	8	12	16	25	40	45	55	55
126	155	177	224	237	355	390	434	496	553	988	1245	1770	2340	2740	3910	4890
78	110	125	139	147	221	243	270	309	344	614	774	1090	1460	1700	2430	3040
66	93	105	118	124	186	204	227	260	289	516	650	920	1220	1430	2045	2550
41	58	66	74	78	116	127	142	163	181	324	409	570	770	900	1280	1600
19	27	30	34	36	54	59	66	76	85	151	190	270	360	420	600	750
94	111	119	134	149	191	232	273	312	347	621	786	900	1240	1450	1740	1740
74	87	92	103	115	148	180	212	243	270	482	610	700	960	1120	1350	1350
74	87	92	103	115	148	180	212	243	270	482	610	700	960	1120	1350	1350
47	56	59	66	74	95	115	136	155	173	310	393	440	610	720	860	860
17	21	23	23	29	37	45	53	60	67	120	152	170	240	280	330	330
7	10	11	12	14	21	23	26	29	33	58	74	105	140	165	235	295
5	7	8	9	10	14	15	17	19	21	38	48	70	90	105	150	190
3	4	4	5	6	8	9	10	12	13	23	29	40	55	65	90	115
2	3	3	3	4	6	6	7	8	9	16	21	30	40	45	65	80
15	17	17	20	23	31	36	42	48	54	97	123	130	195	230	275	275
11	13	13	16	18	25	29	34	38	43	77	99	110	155	180	220	220
7	8	8	10	11	17	17	20	24	27	47	61	70	100	115	135	135
4	4	4	6	7	9	9	13	16	18	31	40	45	65	75	90	90
7	10	11	12	14	21	23	26	29	33	59	75	105	140	165	235	300
5	7	8	9	10	14	15	17	19	21	40	51	75	95	110	160	200
2	3	3	3	4	6	6	7	8	9	17	21	30	40	50	70	85
6	7	8	10	11	15	17	21	24	27	48	62	75	95	115	135	135
5	6	7	9	10	14	16	19	21	24	43	55	65	85	100	120	120
2	2	2	3	4	6	4	8	10	11	19	24	30	35	45	55	55

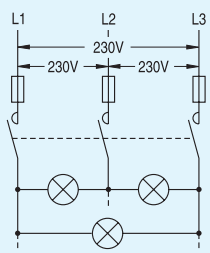
Single-phase circuit
The total number of lamps will be as shown in the table.

Diagram 1



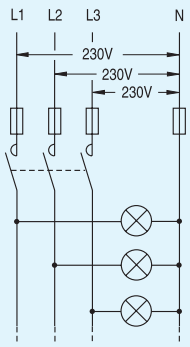
3-phase circuit, lamps delta-connected
The total number of lamps will be as shown in the table, multiplied by 1.73 and distributed in three equal quantities.

Diagram 2



3-phase circuit, lamps star-connected
The total number of lamps will be as shown in the table, multiplied by 3 and distributed in three equal quantities.

Diagram 3



Characterstics of Squirrel Cage Motors
1500 r.p.m. 4 poles 50 Hz IP CI.F

							In in amps					
Pmac		Cos l	n	nt	s	Is/In	220/230v	380/400v	415/440v	500v	660/690v	1000v
kW	Hp		%	tr/min	%	DOL						
0.60 0.09	0.08 0.12	0.78 0.77	56 58	1305 1300	13.0 13.3	2.8 3.3	0.34 0.51	0.2 0.3	0.2 0.3	0.2 0.2	0.2 0.2	0.1 0.1
0.12 0.18	0.16 0.24	0.77 0.76	56 59	1315 1315	12.3 12.3	3.0 3.2	0.70 1.01	0.4 0.6	0.4 0.5	0.3 0.5	0.2 0.3	0.2 0.2
0.25 0.37	0.34 0.50	0.73 0.77	61 66	1325 1375	11.7 8.3	3.0 3.7	1.41 1.83	0.8 1.1	0.7 1.0	0.6 0.8	0.5 0.6	0.3 0.4
0.55 0.75 0.90	0.75 1.02 1.22	0.79 0.79 0.81	71 74 74	1395 1395 1425	7.0 7.0 5.0	4.7 5.0 5.7	2.5 3.2 3.8	1.4 1.9 2.2	1.3 1.7 2.0	1.1 1.5 1.7	0.8 1.1 1.3	0.6 0.7 0.9
1.1 1.5 1.80	1.49 2.04 2.45	0.81 0.81 0.82	74 74 79	1410 1410 1410	6.0 6.0 6.0	5.0 4.9 5.7	4.6 6.3 7.0	2.6 3.6 4.0	2.4 3.3 3.6	2.1 2.9 3.2	1.5 2.1 2.3	1.1 1.4 1.6
2.2 3	2.99 4.08	0.78 0.80	78 80	1420 1430	5.3 4.7	6.0 6.2	91. 12	5.2 6.8	4.7 6.2	4.2 5.4	3.0 3.9	2.1 2.7
4	5.43	0.79	83	1435	4.3	7.0	15	8.8	8.0	7.0	5.1	3.5
5.5 7.5 9	7.47 10.19 12.23	0.81 0.81 0.83	86.0 87 85	1450 1450 1455	3.3 3.3 3.0	6.9 7.7 7.8	20 27 32	11 14 18	10 14 17	9.1 12 15	6.6 8.9 11.1	4.6 6.1 7.4
11 15	15 20	0.84 0.84	86.0 90.0	1460 1460	2.7 32.7	7.1 7.7	38 50	22 29	20 26	18 23	13 17	8.8 11
18.5 22	25 30	0.83 0.84	90.5 91.2	1460 1460	2.7 2.7	7.5 7.5	62 72	36 41	32 38	28 33	21 24	11 17
30	41	0.84	91.8	1465	2.3	7.0	98	56	51	45	32	22
37 45	50 61	0.86 0.87	92.9 93.4	1475 1475	1.7 1.7	7.0 7.0	116 139	67 60	61 73	53 64	39 46	27 32
55	75	0.87	94.0	1475	1.7	6.7	169	97	88	78	56	39
75 90	102 122	0.86 0.86	94.7 64.9	1480 1480	1.3 1.3	6.7 6.8	231 227	133 159	121 145	106 127	77 92	53 64
110 132	149 179	0.86 0.87	94.8 95.5	1485 1485	1.0 1.0	6.7 6.9	339 399	195 229	177 208	156 183	113 92	78 64
160 200	217 179	0.87 0.87	95.8 96.2	1485 1488	1.0 0.8	7.0 7.0	482 943	277 542	252 493	222 434	161 314	111 217
250 315	340 482	0.87 0.87	96.2 96.4	1488 1488	0.8 0.8	7.0 7.0	750 943	431 542	392 493	345 434	250 314	172 217
355 400 500	482 543 679	0.87 0.87 0.88	96.4 96.6 96.8	1488 1488 1488	0.8 0.8 0.8	7.0 7.0 7.0	1063 1195 1473	611 687 847	555 625 770	489 550 678	354 398 491	244 275 339
560 630 710	761 856 965	0.88 0.88 0.89	96.9 97.1 97.1	1492 1492 1492	0.5 0.5 0.5	7.0 7.0 7.0	1649 1851 2062	948 1064 1186	862 967 10.78	758 851 949	550 617 687	379 426 474
800 900 1000	1087 1223 1359	0.88 0.88 0.89	97.1 97.3 97.63	1492 1492 1492	0.4 0.5 0.5	7.0 7.0 7.0	2350 2639 2899	1351 1517 1667	1228 1379 1515	1081 1214 1333	783 880 966	541 607 660

Note : These values are given as a guide they may vary depending the type of motor & manufacturer

The IP Code characterised by 2 numerals.

Example of IP Cod

Code letters	IP
First numeral	4
Second Numeral	4

Degrees of protection against contact and foreign objects indicated by first characteristic numberal

1st numeral	Degree of protection Description	Definition
0	Non-protecte	-
1	Protected against solid foreign objects with a diameter of 50mm and greater	The object probe, a sphere 50mm diameter, shall not fully penetrate*)
2	Protected against solid foreign objects with a diameter of 12.5mm and greater	The object probe, a sphere 12.5mm diameter, shall not fully penetrate*) The joined test finger 12mm diameter 80mm length, shall have adequate clearance from hazardous parts
3	Protected against solid foreign objects of 2.5mm diameter	The object probe, a sphere 2.5mm diameter, shall not penetrate at all*)
4	Protected against soild foreign objects of 1.0mm diameter and greater	The object probe, a sphere 1.0mm diameter, shall not penetrate at all*)
5	Dust-protected	Ingress of dust is not totally prevented, but dust shall not penetrate in a quality to interfere with satisfactory operation of the apparutus or to impair safety
6	Dust-light	No ingress of dust (at a partial vacuum of 20m bar inside the enclosure

turer

*) Note : The full diameter of the object probe shall not pass through an opening
of the enclosure

Degree of protection against water indicated by the second characteristic number

2nd numeral	Degree of Protection Description	Definition
0	Non-protected	-
1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects
2	Protected against vertically falling water drops when the enclosure tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is fitted at any angle up to 15 deg on either side of the vertical
3	Protected against spraying water	Water sprayed at any angle of up to 60 deg on either side of the vertical shall have no harmful effects.
4	Protected against splashing water	Water splashed against th enclosure from any direction shall have no harmful effets
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
7	Protected against the effects of Temporarily immersed in water	Ingress of water in quantities causing harmful effects from any not be possible when the enclosure is temporarily immersed in water under standerised conditions of pressure and time.
8	Protected against the effects of continious immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continiously under conditions which shall be agreed between the manufac- and the user but which are more severe than for number 7.

The degree of protection, associated with enclosures covers, and such like, is specified in accordance with DIN 40.050/July 1980, by means of letters IP and two numerals.

The first numerial indicated the degree of protection against contact with live parts, and the ingrees of foreign bodies.

The second numeral indicates the degree of protection against water
The following table explains the protection relating to **switchgear.**

Protection Grade	Protection against contact with live parts, and ingress of foreign bodies	Protection against water
IP 00	No protectin	No protection
IP 20	Protection against accidental contact in hand. Protection against ingress of solid particles in excess of 12mm dia.	No protection
IP 30	Protection against contact by tools etc., in access of 2.5mm thick Protection against contact of solid particles in excess of 2.5mm dia.	No protection
IP 40	Protection against contact by tools etc., in access of 1mm thick. Protection against ingress of solid particles in excess of 1mm dia.	No protection
IP 41	Protection against contact by tools etc., in access of 1mm thick.	Protection against drops of condensate. Drop of condensate falling vertically shall have no harmful effects.
IP 43	Protection against contact by tools etc., in access of 1mm thick. Protection against ingress of solid particles ine excess of 1mm dia	Protection against water (rain) falling at an angle of 60 or less with respect to the vertically shall have no harmful effect
IP 44	Protection against contact by tools etc., in access of 1mm thick. Protection against ingress of solid particles in excess of 1mm dia.	Protection against liquid splashing from any direction, without harmful effect.
IP 50	Complete protection against contact with live parts. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient satisfactory operation of the equipment enclosed.	No protection
IP 54	Complete protection against contact with live parts. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient satisfactory operation of the equipment enclosed.	Protected against liquid splashing from any without any harmful effect.
IP 55	Complete protection against contact with live parts. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient satisfactory operation of the equipment enclosed.	Protection against water jets. Water projected from a nozzle, in any direction, under stated conditions shall have no harmful effect.
IP 56	Complete protection against contact with live parts. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient satisfactory operation of the equipment enclosed.	Protection against water jets. Water projected from a nozzle, in any direction, under stated conditions shall have no harmful effect.
IP 65	Complete protection against contact with live parts. Protection against harmful deposits of dust.	Protection against water jets. Water projected from a nozzle, in any direction, under stated conditions shall have no harmful effect.

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