

## 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).

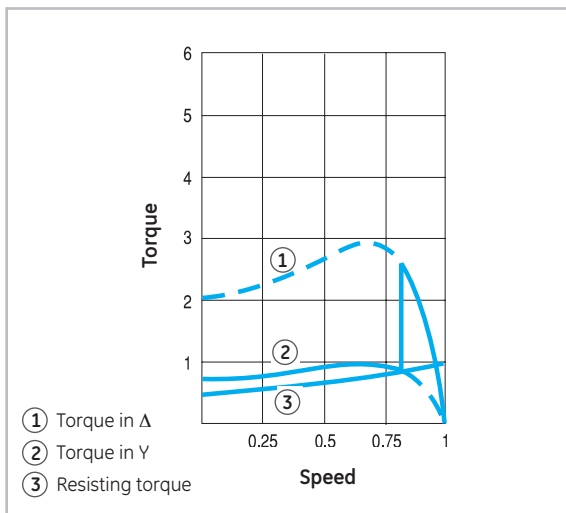
The line voltage should be the same as the motor delta connection voltage.

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).

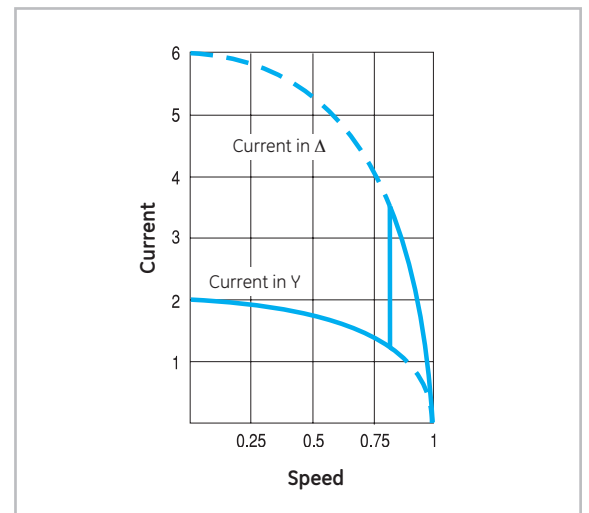
The target of this type of starting is to reduce the current during starting to  $1/3$ , there by reducing the linedrop (see current speed curves).

Reduce the motor torque to  $1/3$  to smooth out mechanical stress on the machine and on the load (see torque speed curves).

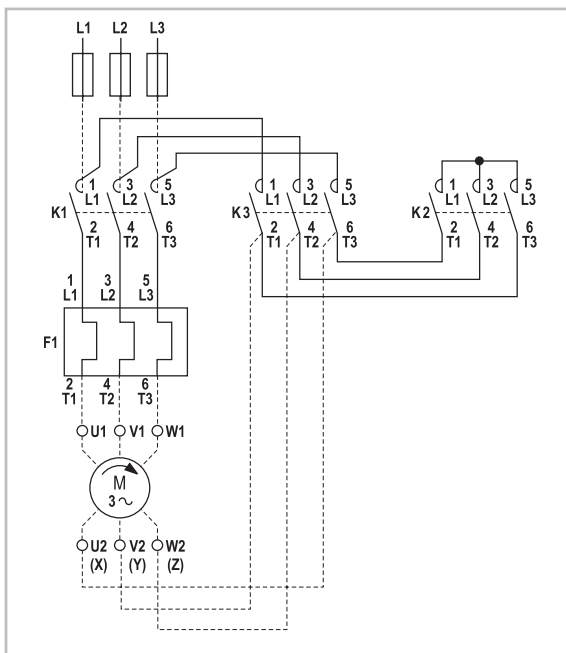
### Torque-speed curve



### Current-speed curve



### Diagram



Selection table

Motor												Contactors		Thermal	Fuse	
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line and	Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	Delta			A	A
2.2	9	4	9	-	-	5.5	9	7.5	9	-	-	CL00	CL00	RT1L	16	25
3	12	5.5	12	5.5	11	7.5	12	-	-	-	-	CL00	CL00	RT1M	16	35
3.7	14	-	-	-	-	-	-	-	-	-	-	CL00	CL00	RT1N	20	40
4	16	7.5	16	7.5	14	-	-	-	-	-	-	CL01	CL00	RT1N	20	40
-	-	-	-	-	-	-	-	11	13	-	-	CL01	CL00	RT1M	20	40
-	-	-	-	-	-	11	17	-	-	-	-	CL01	CL00	RT1N	20	40
5.5	21	11	22.5	11	21	-	-	-	-	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	-	-	15	18	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	15	23	-	-	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	-	-	18.5	23	-	-	CL25	CL02	RT1P	32	50
7.5	27	15	30	15	28	-	-	-	-	-	-	CL25	CL02	RT1S	40	63
-	-	-	-	-	-	18.5	28.5	22	26	-	-	CL25	CL02	RT1S	40	63
-	-	-	-	18.5	35	22	33	-	-	-	-	CL25	CL02	RT1T	50	80
11	40	18.5	37	-	-	-	-	-	-	-	-	CL25	CL25	RT1U	50	63
-	-	-	-	-	-	-	-	30	35	-	-	CL03	CL25	RT1T	50	63
-	-	22	44	22	40	30	45	-	-	-	-	CL03	CL25	RT1U	63	80
15	50	25	50	-	-	-	-	-	-	-	-	CL04	CL03	RT1V	63	80
-	-	-	-	-	-	-	-	37	41	-	-	CL45	CL03	RT1U	50	80
-	-	30	60	30	55	-	-	-	-	-	-	CL45	CL03	RT1W	63	80
18.5	65	-	-	-	-	-	-	-	-	-	-	CL45	CL03	RT1W	80	125
-	-	-	-	-	-	37	55	45	49	-	-	CL45	CL03	RT1V	63	80
22	75	-	-	-	-	-	-	-	-	-	-	CL06	CL04	RT2G	100	160
-	-	33	65	37	66	-	-	-	-	-	-	CL06	CL04	RT1W	80	100
-	-	-	-	-	-	45	65	55	60	-	-	CL06	CL04	RT2E	100	160
-	-	37	72	-	-	-	-	-	-	-	-	CL06	CL04	RT2E	100	160
-	-	45	85	45	80	55	80	-	-	-	-	CL06	CL04	RT2G	100	160
-	-	-	-	-	-	-	-	75	80	-	-	CL07	CL06	RT2G	100	160
30	105	55	105	55	100	-	-	-	-	-	-	CL07	CL06	RT2H	125	160
-	-	-	-	-	-	75	105	-	-	-	-	CL08	CL06	RT2H	125	160
37	126	-	-	-	-	-	-	-	-	-	-	CL08	CL06	RT2J	160	200
-	-	-	-	75	135	-	-	-	-	-	-	CL08	CL06	RT2J	160	200
-	-	-	-	-	-	-	-	90	97	-	-	CL09	CL06	RT2H	125	160
40	138	-	-	-	-	-	-	-	-	-	-	CL09	CL07	RT2L	160	250
-	-	-	-	-	-	90	129	-	-	-	-	CL09	CL07	RT2J	160	250
-	-	75	138	-	-	-	-	-	-	-	-	CL09	CL07	RT2L	160	250
-	-	-	-	-	-	-	-	110	118	-	-	CL10	CL07	RT2J	160	250
45	150	-	-	-	-	-	-	-	-	-	-	CL10	CL07	RT2L	160	250
-	-	-	-	-	-	110	156	-	-	-	-	CL10	CL08	RT2L	200	250
-	-	90	170	90	165	-	-	-	-	-	-	CL10	CL08	RT2M	200	250
-	-	-	-	-	-	-	-	132	141	-	-	CK75C	CL08	RT3C	160	200
55	182	-	-	-	-	132	188	-	-	-	-	CK75C	CL08	RT3D	200	250
-	-	-	-	110	200	-	-	-	-	-	-	CK75C	CL08	RT3D	250	315
-	-	-	-	-	-	-	-	150	166	-	-	CK75C	CL09	RT3D	200	250
-	-	-	-	-	-	-	-	160	170	-	-	CK75C	CL10	RT3D	200	250
-	-	110	211	-	-	150	218	-	-	-	-	CK75C	CL10	RT3E	250	315
-	-	-	-	132	240	160	228	-	-	-	-	CK75C	CL10	RT3E	250	315
75	239	-	-	-	-	-	-	-	-	-	-	CK75C	CL10	RT3E	250	315
-	-	-	-	-	-	-	-	-	-	90	64	CK75C	CK75C	RT4LJ	80	125
-	-	-	-	-	-	-	-	-	-	110	78	CK75C	CK75C	RT4LJ	108	160
-	-	132	245	-	-	-	-	-	-	-	-	CK75C	CL10	RT3F	315	355
-	-	-	-	-	-	-	-	185	193	-	-	CK75C	CK75C	RT3E	250	315
-	-	150	288	150	269	185	261	-	-	-	-	CK08C	CK75C	RT3F	315	355
-	-	-	-	160	285	-	-	-	-	-	-	CK08C	CK75C	RT3F	315	355
-	-	-	-	-	-	-	-	200	207	-	-	CK08C	CK75C	RT3E	250	315
-	-	-	-	-	-	-	-	220	230	-	-	CK08C	CK75C	RT3E	250	315
90	309	-	-	-	-	-	-	-	-	-	-	CK08C	CK75C	RT3F	315	355

For electrical endurance see page A.94-A.104, 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.

Intro

A

B

C

D

E

F

G

H

I

J/X



## Star-delta starters

Selection table (continued 1)

Motor										Contactors		Thermal	Fuse			
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line and	Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	Delta			A	A
-	-	-	-	-	-	-	-	-	-	132	94	CK08C	CK75C	RT4LK	125	160
-	-	-	-	-	-	-	-	-	-	150	105	CK08C	CK75C	RT3B	125	160
-	-	-	-	-	-	-	-	-	-	160	113	CK08C	CK75C	RT3B	125	160
-	-	-	-	-	-	-	-	-	-	185	130	CK85B	CK75C	RT4LL	160	200
-	-	160	309	-	-	200	281	250	262	-	-	CK85B	CK75C	RT4N	355	400
-	-	-	-	-	-	220	310	-	-	-	-	CK85B	CK75C	RT4N	355	400
-	-	-	-	185	325	-	-	-	-	-	-	CK85B	CK75C	RT4P	400	425
110	356	185	355	200	350	-	-	-	-	-	-	CK85B	CK75C	RT4P	400	425
-	-	-	-	-	-	-	-	280	262	-	-	CK09B	CK75C	RT4N	315	355
132	425	200	370	220	385	250	348	-	-	-	-	CK09B	CK75C	RT4P	500	500
-	-	220	408	-	-	280	385	-	-	-	-	CK09B	CK08C	RT4P	500	500
-	-	-	-	-	-	-	-	-	-	200	141	CK09B	CK08C	RT4LL	200	250
-	-	-	-	-	-	-	-	-	-	220	155	CK09B	CK08C	RT4LM	200	250
-	-	-	-	-	-	-	-	-	-	250	175	CK09B	CK08C	RT4LM	200	250
-	-	-	-	-	-	-	-	300	307	-	-	CK09B	CK08C	RT4N	355	400
-	-	-	-	-	-	-	-	315	322	-	-	CK09B	CK08C	RT4N	355	400
-	-	-	-	-	-	-	-	335	349	-	-	CK09B	CK08C	RT4P	500	500
-	-	-	-	-	-	-	-	-	-	280	197	CK95B	CK09B	RT4LM	250	315
-	-	-	-	250	437	-	-	-	-	-	-	CK95B	CK08C	RT4P	500	500
-	-	-	-	-	-	-	-	355	366	-	-	CK95B	CK85B	RT4P	425	500
-	-	-	-	-	-	300	409	375	390	-	-	CK95B	CK85B	RT4P	500	500
-	-	-	-	-	-	315	426	-	-	-	-	CK95B	CK85B	RT4P	500	500
150	500	250	475	280	480	-	-	-	-	-	-	CK95B	CK85B	RT4R	630	630
-	-	-	-	-	-	-	-	-	-	300	211	CK95B	CK85B	RT4LM	250	315
-	-	-	-	-	-	-	-	-	-	315	221	CK95B	CK85B	RT4LM	250	315
-	-	-	-	-	-	-	-	400	412	-	-	CK95B	CK85B	RT4R	500	500
-	-	-	-	-	-	-	-	425	442	-	-	CK95B	CK85B	RT4R	500	500
-	-	-	-	300	508	335	456	450	462	-	-	CK10C	CK85B	RT5C	630	630
160	520	-	-	-	-	355	485	-	-	-	-	CK10C	CK85B	RT4C	630	630
-	-	-	-	-	-	375	513	-	-	-	-	CK10C	CK85B	RT5C	630	630
-	-	280	530	315	530	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
-	-	300	563	355	561	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
-	-	315	580	-	-	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
185	609	-	-	355	600	-	-	-	-	-	-	CK10C	CK85B	RT5C	800	800
-	-	-	-	-	-	-	-	-	-	335	234	CK10C	CK09B	RT5A	315	355
-	-	-	-	-	-	-	-	-	-	355	245	CK10C	CK09B	RT5A	315	355
-	-	-	-	-	-	-	-	-	-	375	256	CK10C	CK09B	RT5A	315	355
-	-	-	-	-	-	-	-	-	-	400	273	CK10C	CK09B	RT5A	355	400
-	-	-	-	-	-	-	-	-	-	425	290	CK10C	CK09B	RT5A	355	400
-	-	-	-	-	-	-	-	-	-	450	307	CK10C	CK09B	RT5A	355	400
-	-	-	-	-	-	-	-	475	488	-	-	CK10C	CK09B	RT5C	630	630
-	-	-	-	-	-	-	-	500	514	-	-	CK10C	CK09B	RT5C	630	630
-	-	-	-	-	-	400	543	530	545	-	-	CK10C	CK09B	RT5C	630	630
-	-	-	-	375	587	425	580	560	575	-	-	CK10C	CK09B	RT5C	630	630
200	630	335	630	375	630	450	613	-	-	-	-	CK10C	CK09B	RT5D	800	800
-	-	355	650	-	-	-	-	-	-	-	-	CK10C	CK09B	RT5D	800	800
-	-	-	-	-	-	-	-	600	616	-	-	CK10C	CK95B	RT5D	800	800
-	-	-	-	400	622	475	647	630	646	-	-	CK10C	CK95B	RT5D	800	800
-	-	-	-	-	-	-	-	-	-	475	324	CK10C	CK95B	RT5B	355	400
-	-	-	-	-	-	-	-	-	-	500	341	CK10C	CK95B	RT5B	400	425
-	-	-	-	-	-	-	-	-	-	600	407	CK10C	CK95B	RT5B	500	500
-	-	-	-	400	673	425	659	-	-	-	-	CK10C	CK10C	RT5D	800	800
-	-	375	680	-	-	500	680	670	688	-	-	CK11C	CK10C	RT5D	800	800
220	710	400	720	425	714	530	725	710	729	-	-	CK11C	CK10C	RT5D	800	800
-	-	-	-	450	756	560	762	750	770	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	425	763	475	798	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	-	-	-	-	600	817	-	-	-	-	CK11C	CK10C	RT5E	1000	1000

For electrical endurance see page A.94-A.104, 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 I<sub>n</sub> of the motor.

Star-delta starters

Intro

A

B

C

D

E

F

G

H

I

J/X



**Selection table (continued 2)**

Motor										Contactors		Thermal	Fuse			
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line and Delta	Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A	A
250	823	-	-	-	-	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	-	-	-	-	-	-	-	-	630	428	CK11C	CK10C	RT5B	500	630
-	-	-	-	-	-	-	-	-	-	670	455	CK11C	CK10C	RT5C	500	630
-	-	450	800	-	-	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	475	846	500	840	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	-	-	-	-	-	-	800	821	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	500	892	530	890	630	857	850	873	-	-	CK11C	CK10C	RT5E	1000	1000
280	910	530	943	560	941	670	912	-	-	-	-	CK11C	CK10C	RT5E	2x630	2x630
300	975	-	-	-	-	710	965	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
315	1023	560	996	600	1010	750	1020	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
335	1083	-	-	630	1058	-	-	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
-	-	-	-	-	-	-	-	-	-	750	510	CK12C	CK11C	RT5C	630	630
-	-	-	-	-	-	-	-	900	924	-	-	CK13B	CK11C	RT6A	2x630	2x630
-	-	-	-	-	-	800	1088	950	975	-	-	CK13B	CK11C	RT6A	2x630	2x630
-	-	600	1074	-	-	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
355	1142	-	-	710	1097	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
-	-	-	-	-	-	-	-	-	-	800	543	CK13B	CK11C	RT5C	630	800
-	-	630	1128	670	1125	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
375	1206	670	1200	710	1190	850	1156	-	-	-	-	CK13B	CK11C	RT6A	2x800	2x800
400	1286	710	1270	750	1255	-	-	-	-	-	-	CK13B	CK11C	RT6A	2x800	2x800
425	1364	-	-	-	-	-	-	-	-	-	-	CK13B	CK12C	RT6A	2x800	2x800
-	-	750	1342	-	-	-	-	-	-	-	-	CK13B	CK12C	RT6A	2x800	2x800

For electrical endurance see page A.94-A.104, 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 I<sub>n</sub> of the motor.

