



New Reactors Description TK



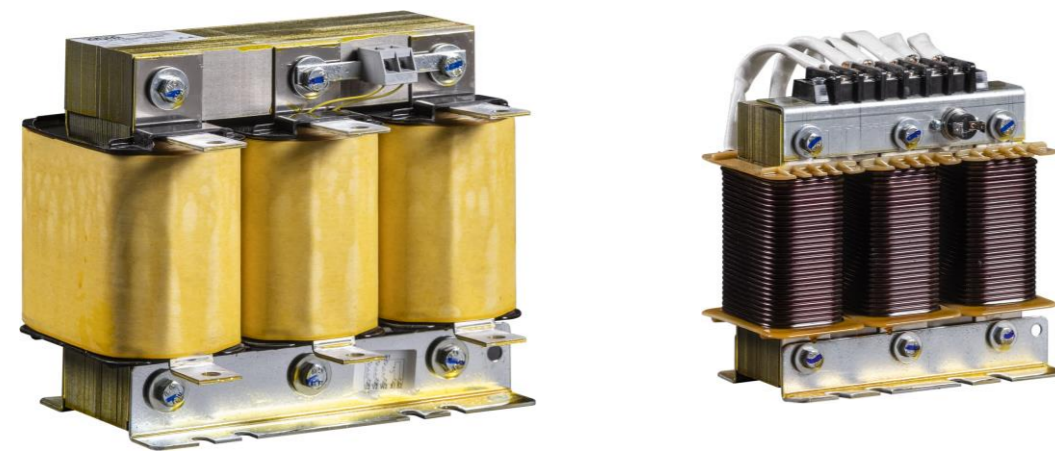
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Reactors

LV Power Capacitors

MV Power Capacitors

PEC Capacitors



Induction Capacitors

Energy Storage Capacitors

Capacitor Banks



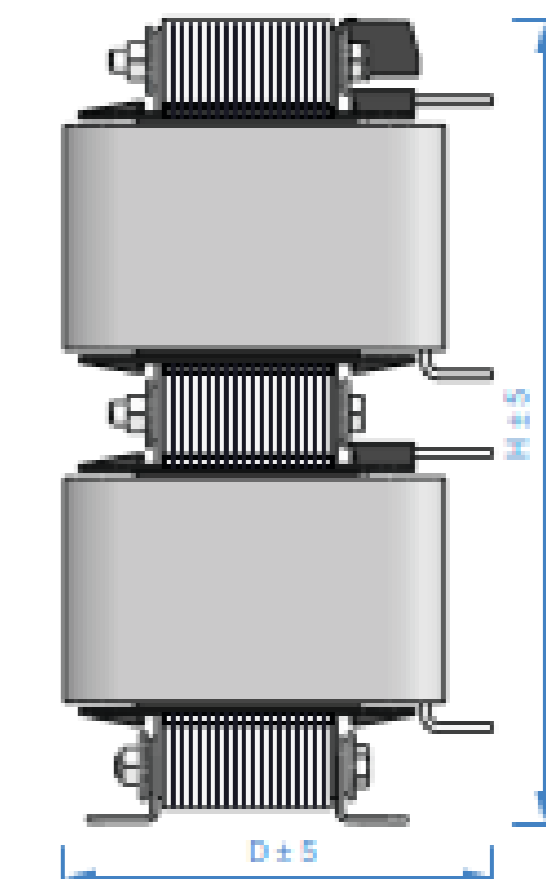
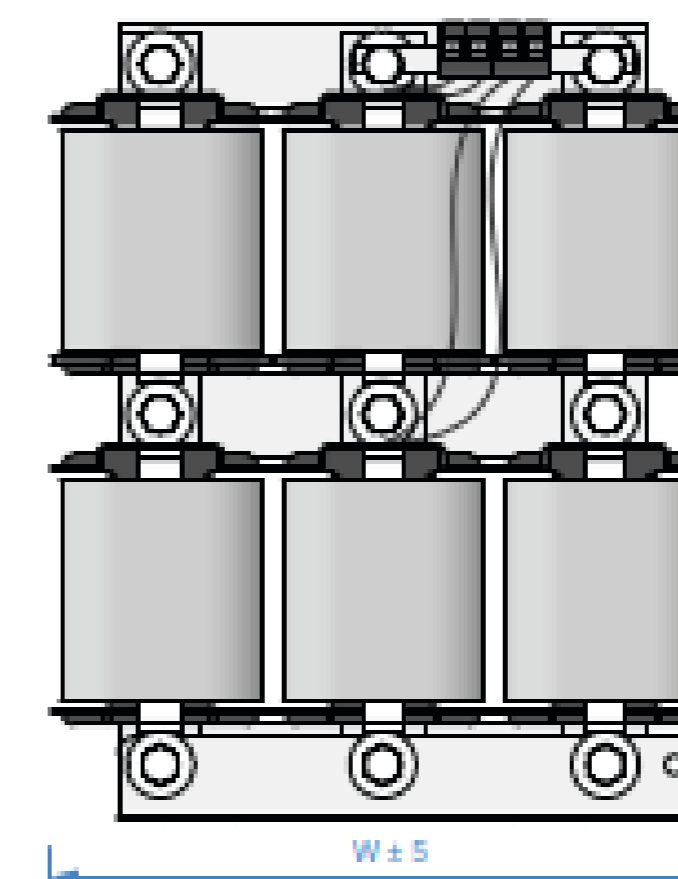
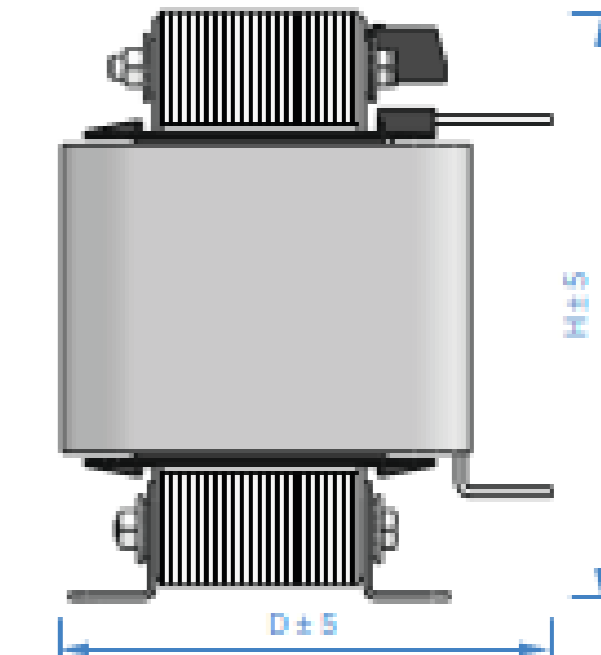
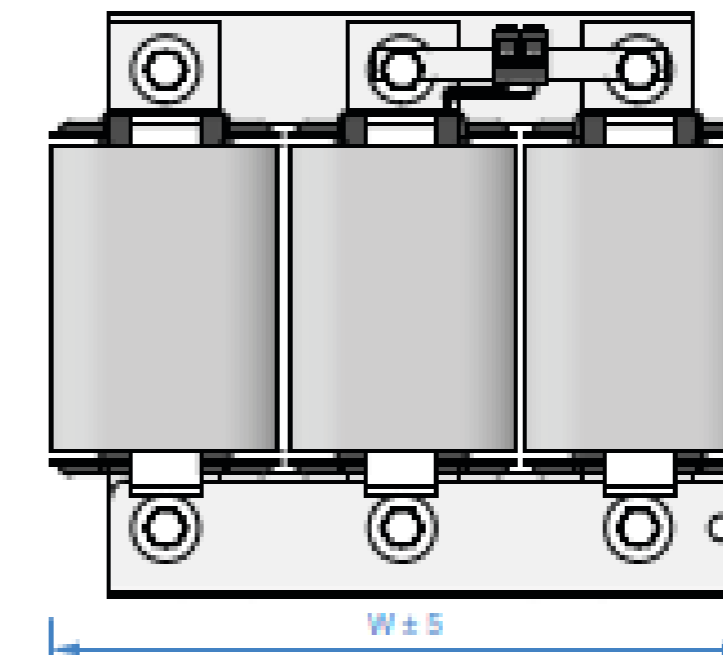
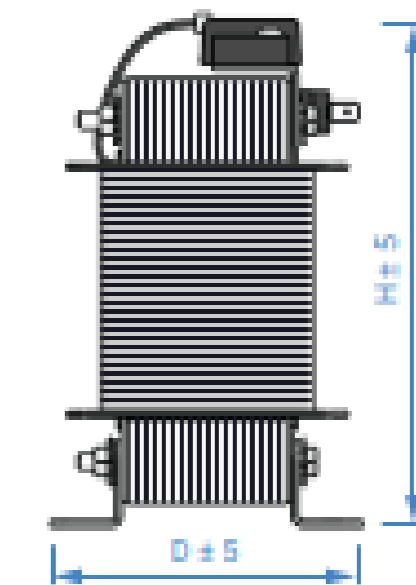
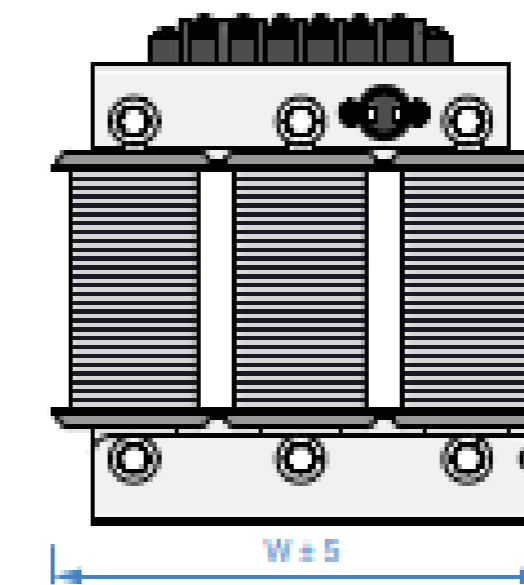
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Reactors design

- ✓ 3 phase
- ✓ Inductance tolerance: $-5 / +5 \%$
- ✓ Material: Copper, Aluminum
- ✓ Protection degree: IP 00
- ✓ Impregnation: Polyester (Epoxy) resin
- ✓ Iron core: High quality with multi air gap
- ✓ Safety device: Thermal switch (Al 130°C , Cu 90°C)



Technical specification

- ✓ Standard IEC 60076-6
- ✓ Voltage: 230 – 1000 V
- ✓ Line Frequency: 50 / 60 Hz
- ✓ Output up to 100 kvar
- ✓ Detuning: 5,67 %, 7 %, 14 %
- ✓ Temperature Class: F (155 °C)



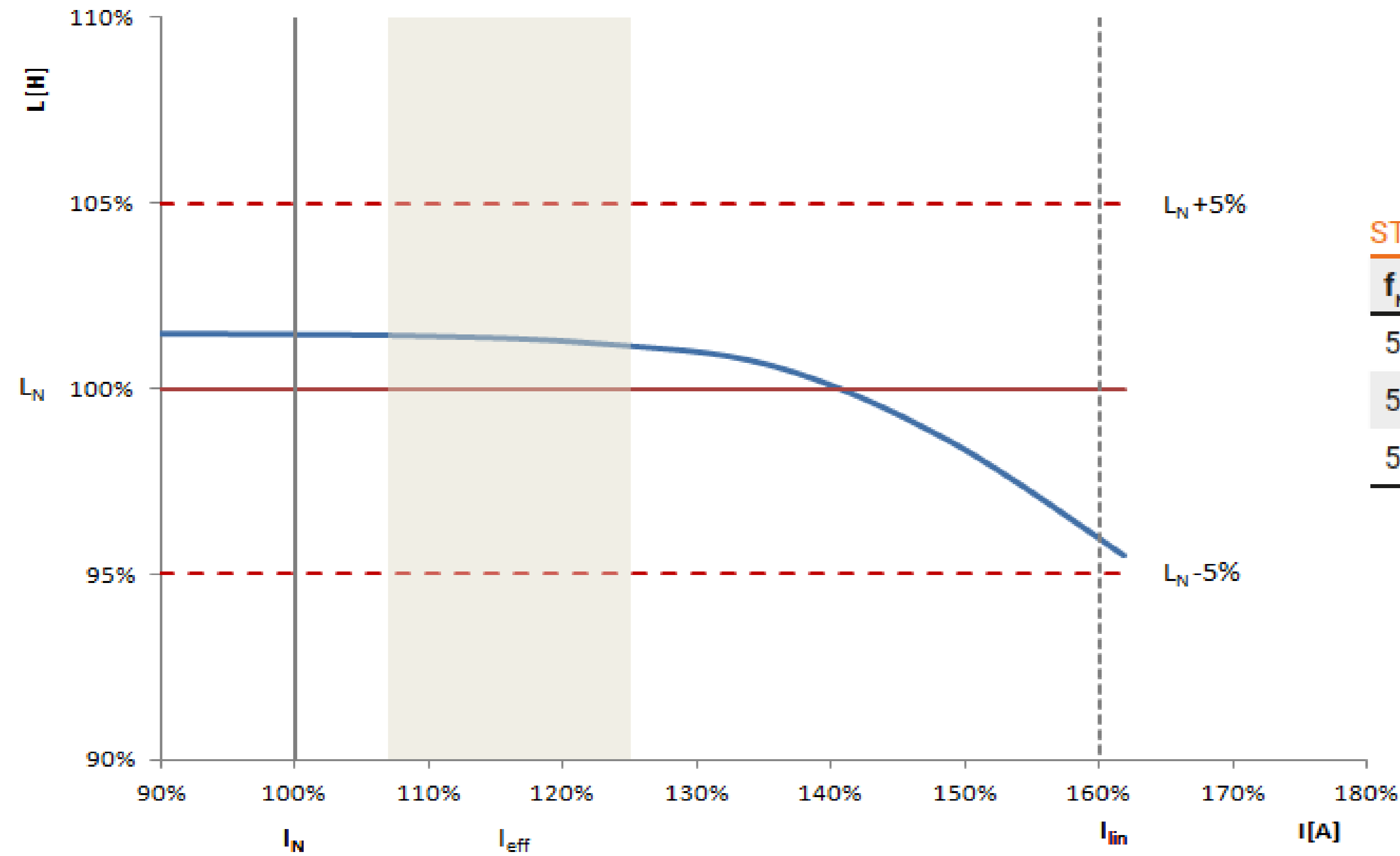
Basic formulas

✓ Capacitor Voltage: $U_C = \frac{U_N}{1 - \frac{p}{100\%}}$ $U_C = 440 \text{ V}, 480 \text{ V}, 525 \text{ V}, 690 \text{ V}$

✓ Detuning Factor: $p = \frac{X_L}{X_C} \cdot 100\%$ $p = 5,67 \%, 7 \%, 14 \%$

✓ Resonance Frequency: $f_r = f_N \cdot \sqrt{\frac{100\%}{p}}$ $f_r = 210 \text{ Hz}, 189 \text{ Hz}, 134 \text{ Hz}$ (Line freq. 50 Hz)
 $f_r = 252 \text{ Hz}, 227 \text{ Hz}, 160 \text{ Hz}$ (Line freq. 60 Hz)

Reactors linearity



STANDARD REACTORS PROPERTIES

f_N (Hz)	p (%)	f_r (Hz)	$I_{lin} (x I_N)$
50	5,67	210	2
50	7	189	1,6
50	14	134	1,38



New reactors description

$$p = 7 \% \quad U_N = 400 \text{ V}$$

Q_{LC} (kvar)	Q_c (kvar)	C_N	Type	L_N (mH)	I_N (A)	m (kg)	WxDxH (mm)
44,4	60,0	3 x 274	TK-44,4-189-400	0,86	64,1	23	255 x 185 x 215
50	66,6	3 x 308	TK-50-189-400	0,77	72,0	23	255 x 185 x 215

The tolerance for a distribution network with a voltage level of 400 V may be $\pm 10\%$. The voltage of 415 - 430 V is commonly measured. Our recommendation is therefore to use capacitors with higher nominal voltage.

RECOMMENDED CAPACITORS

U_N (V)	p (%)	U_c (V)
400	5,67	480
400	7	480
400	14	525

Detuned LV PFC Components matching

400 V / 50 Hz / 7 %

Q_{LC} (kvar)	Reactor type	L_N (mH)	C_N (μ F)	Q_C (kvar) / U_C		Capacitor type	Former equivalent type
				440 V *	480 V		
2,8	TK-2,8-189-400	13,7	3 x 17,3	3,15	3,8	1 x CSADG-0,48/3,8-HD	TKC1-3,15-189/400/440
4,4	TK-4,4-189-400	8,63	3 x 27,4	5	6	1 x CSADG-0,48/6-HD	TKC1-5-189/400/440
5	TK-5-189-400	7,67	3 x 30,8	5,6	6,7	1 x CSADG-0,48/6,7-HD	TKC1-5,6-189/400/440
5,6	TK-5,6-189-400	6,90	3 x 34,4	6,25	7,5	1 x CSADG-0,48/7,5-HD	TKC1-6,25-189/400/440
6,25	TK-6,3-189-400	6,13	3 x 38,6	7	8,2	1 x CSADG-0,48/8,2-HD	TKC1-7-189/400/440
8,9	TK-8,9-189-400	4,31	3 x 54,8	10	12	1 x CSADG-0,48/12-HD	TKC1-10-189/400/440
10	TK-10-189-400	3,83	3 x 61,7	11,5	13,5	1 x CSADG-0,48/13,5-HD	TKC1-11,25-189/400/440
11,1	TK-11,1-189-400	3,45	3 x 69,0	12,5	15	1 x CSADG-0,48/15-HD	TKC1-12,5-189/400/440
12,5	TK-12,5-189-400	3,07	3 x 76,8	14	16,7	1 x CSADG-0,48/16,7-HD	TKC1-14-189/400/440
17,8	TK-17,8-189-400	2,16	3 x 110	20	24	1 x CSADG-0,48/24-HD	TKC1-20-189/400/440
20	TK-20-189-400	1,92	3 x 124	23	27	1 x CSADG-0,48/27-HD	TKC1-22,5-189/400/440
22,2	TK-22,2-189-400	1,73	3 x 137	25	30	1 x CSADG-0,48/30-HD	TKA1-25-189/400/440
25	TK-25-189-400	1,54	3 x 154	28,1	33,3	1 x CSADG-0,48/33,3-HD	TKA1-28,1-189/400/440
35,5	TK-35,5-189-400	1,08	3 x 219	40	48	1 x CSADG-0,48/48-HD	TKA1-40-189/400/440
40	TK-40-189-400	0,96	3 x 248	2x23	2x27	2 x CSADG-0,48/27-HD	TKA1-45-189/400/440
44,4	TK-44,4-189-400	0,86	3 x 274	50	60	1 x CSADG-0,48/60-HD	TKA1-50-189/400/440
50	TK-50-189-400	0,77	3 x 308	56,2	2x33,3	2 x CSADG-0,48/33,3-HD	TKA1-56,2-189/400/440
88,9	TK-88,9-189-400	0,43	3 x 548	2x50	3x40	3 x CSADG-0,48/40-HD	TKA1-100-189/400/440
100	TK-100-189-400	0,38	3 x 616	2x56,2	4x33,3	4 x CSADG-0,48/33,3-HD	TKA1-112,5-189/400/440

* If a true RMS voltage of a distribution network is higher than 410 V it is necessary to use 480 V capacitors.

LV Detuning Reactors

Standard types

(other voltages, power and 60 Hz on request)

$\rho = 7\%$ $U_N = 400\text{ V}$

Q_{LC} (kvar)	$C_N (\Delta)$ (μF)	Type	L_N (mH)	I_N (A)	m (kg)	Losses (W)	WxDxH (mm)	Design
2,8	3 x 17,3	TK-2,8-189-400	13,7	4,0	4,5	36	150 x 90 x 155	1
4,4	3 x 27,4	TK-4,4-189-400	8,63	6,4	4,5	40	150 x 90 x 155	1
5	3 x 30,8	TK-5-189-400	7,67	7,2	4,5	47	150 x 90 x 155	1
5,6	3 x 34,4	TK-5,6-189-400	6,90	8,0	4,5	46	150 x 90 x 155	1
6,25	3 x 38,6	TK-6,25-189-400	6,13	9,0	5,0	39	150 x 90 x 155	1
7,5	3 x 46,3	TK-7,5-189-400	5,11	10,8	7,5	39	180 x 90 x 180	1
8,9	3 x 54,8	TK-8,9-189-400	4,31	12,8	7,5	48	180 x 90 x 180	1
10	3 x 61,7	TK-10-189-400	3,83	14,4	7,5	55	180 x 100 x 180	1
11,1	3 x 69,0	TK-11,1-189-400	3,45	16,0	8,5	52	180 x 100 x 180	1
12,5	3 x 76,8	TK-12,5-189-400	3,07	18,0	11	55	180 x 110 x 180	1
15	3 x 92,5	TK-15-189-400	2,56	21,7	11	67	180 x 110 x 180	1
17,8	3 x 110	TK-17,8-189-400	2,16	25,7	11	87	180 x 110 x 180	1
20	3 x 124	TK-20-189-400	1,92	28,8	13	97	240 x 160 x 160	2
22,2	3 x 137	TK-22,2-189-400	1,73	32,1	13	107	240 x 160 x 160	2
2x22,2	2 x 3 x 137	TK-2x22,2-189-400	1,73	32,1	25	207	240 x 160 x 290	3
25	3 x 154	TK-25-189-400	1,54	36,0	13	136	240 x 160 x 160	2
2x25	2 x 3 x 154	TK-2x25-189-400	1,54	36,0	25	253	240 x 160 x 290	3
26,7	3 x 165	TK-26,7-189-400	1,44	38,4	17	112	255 x 165 x 195	2
30	3 x 183	TK-30-189-400	1,28	43,3	17	124	255 x 165 x 195	2
35,5	3 x 219	TK-35,5-189-400	1,08	51,3	18	142	255 x 165 x 195	2
40	3 x 248	TK-40-189-400	0,96	57,8	23	147	255 x 185 x 215	2
44,4	3 x 274	TK-44,4-189-400	0,86	64,1	23	150	255 x 185 x 215	2
2x44,4	2 x 3 x 274	TK-2x44,4-189-400	0,86	64,1	40	288	255 x 185 x 380	3
50	3 x 308	TK-50-189-400	0,77	72,1	23	172	255 x 185 x 215	2
2x50	2 x 3 x 308	TK-2x50-189-400	0,77	72,1	40	335	255 x 185 x 380	3
55	3 x 330	TK-55-189-400	0,70	79,4	26	191	285 x 185 x 235	2
60	3 x 366	TK-60-189-400	0,64	86,6	26	219	285 x 185 x 235	2
66,7	3 x 412	TK-66,7-189-400	0,58	96,2	31	218	310 x 190 x 255	2
70	3 x 438	TK-70-189-400	0,55	101	31	240	310 x 190 x 255	2
75	3 x 463	TK-75-189-400	0,51	108	34	203	310 x 190 x 255	2
80	3 x 492	TK-80-189-400	0,48	115	34	237	310 x 190 x 255	2
88,9	3 x 548	TK-88,9-189-400	0,43	128	34	240	310 x 190 x 255	2
90	3 x 555	TK-90-189-400	0,43	130	34	250	310 x 190 x 255	2
100	3 x 616	TK-100-189-400	0,38	144	34	274	310 x 190 x 255	2

LV Detuning Reactors

Standard types

(other voltages, power and 60 Hz on request)

$p = 14 \% \quad U_N = 400 \text{ V}$

Q_{LC} (kvar)	$C_N (\Delta)$ (μF)	Type	L_N (mH)	I_N (A)	m (kg)	Losses (W)	WxDxH (mm)	Design
5	3 x 28,7	TK-5-134-400	16,6	7,2	12	49	180 x 125 x 180	1
6,25	3 x 34,5	TK-6,25-134-400	13,3	9,0	13	49	180 x 125 x 180	1
10	3 x 57,6	TK-10-134-400	8,29	14,4	13	86	180 x 125 x 180	1
12,5	3 x 69,1	TK-12,5-134-400	6,63	18,0	17	92	225 x 125 x 180	1
15	3 x 84,7	TK-15-134-400	5,53	21,7	17	114	225 x 125 x 180	1
20	3 x 115	TK-20-134-400	4,15	28,9	24	115	285 x 185 x 215	2
25	3 x 144	TK-25-134-400	3,32	36,1	24	159	285 x 185 x 215	2
30	3 x 173	TK-30-134-400	2,76	43,3	24	202	285 x 185 x 215	2
40	3 x 230	TK-40-134-400	2,07	57,7	36	130	330 x 190 x 255	2
50	3 x 286	TK-50-134-400	1,66	72,2	36	257	330 x 190 x 255	2
60	3 x 345	TK-60-134-400	1,38	86,6	40	269	350 x 190 x 255	2
75	3 x 438	TK-75-134-400	1,11	108,3	40	372	350 x 190 x 255	2

$p = 5,67 \% \quad U_N = 400 \text{ V}$

Q_{LC} (kvar)	$C_N (\Delta)$ (μF)	Type	L_N (mH)	I_N (A)	m (kg)	Losses (W)	WxDxH (mm)	Design
6,25	3 x 39,0	TK-6,25-210-400	4,90	9,0	7	38	180 x 90 x 180	1
12,5	3 x 76,8	TK-12,5-210-400	2,45	18,0	10	71	180 x 110 x 180	1
15	3 x 93,8	TK-15-210-400	2,04	21,7	10	92	180 x 110 x 180	1
20	3 x 125	TK-20-210-400	1,53	28,9	12	87	240 x 160 x 160	2
25	3 x 154	TK-25-210-400	1,23	36,1	12	120	240 x 160 x 160	2
30	3 x 183	TK-30-210-400	1,02	43,3	17	119	255 x 165 x 195	2
40	3 x 246	TK-40-210-400	0,77	57,7	21	143	255 x 185 x 215	2
50	3 x 308	TK-50-210-400	0,61	72,2	22	177	255 x 185 x 215	2
60	3 x 366	TK-60-210-400	0,51	86,6	31	193	310 x 190 x 225	2
75	3 x 462	TK-75-210-400	0,41	108,3	32	207	310 x 190 x 225	2




Thank you for your attention!

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