Starker Partner - starker Service!
IVD
- Kondensatoren
- Löttechnik
- elektronische Bauelemente

ZEZ SILKO
Get energized with us

CAPACITORS FOR POWER ELECTRONICS

Power capacitors

Design

MKP capacitors uses polypropylene film as the dielectric, which excels in low dielectric loss. PP film is metalized with a thin layer of zinc-aluminium alloy. Two layers of metalized film are wound into cylindrical windings. Flat sides of windings are contacted with zinc layer ensuring connection to terminals.

Special structure of winding ensures feature called “self-healing”. In the event of voltage breakdown, the metal layer is evaporated around the breakdown channel in very short time. Thanks to evaporation, no conductive channel is created between both metal layers and capacitor remains in full functionality.

Case

Most of our capacitors - cylindrical DC Link capacitors, AC filters, some types of rectangular DC Link or impulse capacitors - are cased in aluminium can. Other bigger rectangular capacitors may be encapsulated in stainless steel can. Plastic housing is mainly used for snubber or impulse capacitors.

PU resin

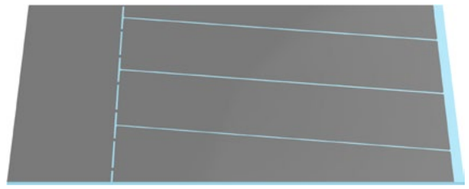
Winding elements are very vulnerable to humidity, oxygen and other environmental interferences. Therefore capacitors are filled with PU resin to protect winding elements from entering by air environmental interferences. As a result, is extension of lifetime of capacitor. On top of that resin also keeps winding elements mechanically safe and fixed against any vibrations.

Dry system

No impregnation is used for metalized polypropylene film.

Safety System

Segmented film



Segmented film offers one of the most important internal protective mechanism that ensures safe operation through the lifetime, ageing and during overload of the capacitor. Special segmented metallization feature fuse gates protect capacitor element from internal faults in case of improper self-healing caused by weak spots in PP film. Fuse gates are limiting current flowing into the weak spot and disconnects particular segment. Which protects winding element from destruction. Depending on rated voltage and type of foil, different segments are used. Capacitance decrease takes place when the capacitor is on the edge of its lifetime. Segmented film is used in DC applications.

Overpressure disconnector

There is an attenuated spot at internal wiring of the capacitor. When pressure starts to increase, case expands. Pressure is forced to push the lid, where terminals are placed. Expansion of the lid cause separation of connecting wires at attenuated spot and capacitor disconnects. Only AC filters capacitors use overpressure disconnector.

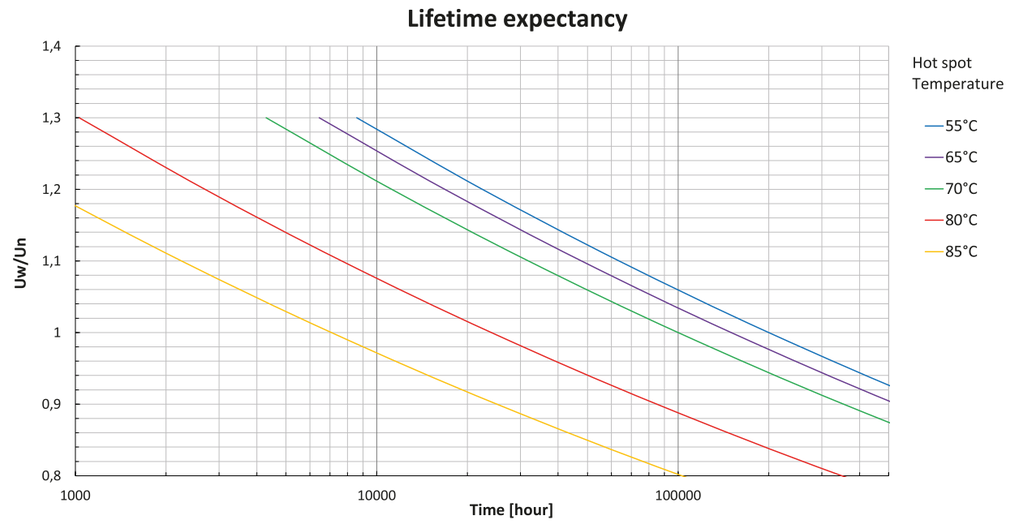
Pressure switch

Pressure switch might be used for capacitors with hermetical housing. When self-healing system fails, surge of temperature and pressure occurs and the capacitor might tear up. Overpressure sensor detects the surge of pressure and provides signal which shall be used for safety circuit and disconnection of capacitor. Sensor contains NC or NO switch. Switch is activated when overpressure reaches 0,3-0,5 bar. Switching voltage and current up to 250 V and 5 A.

Capacitors for Power Electronics

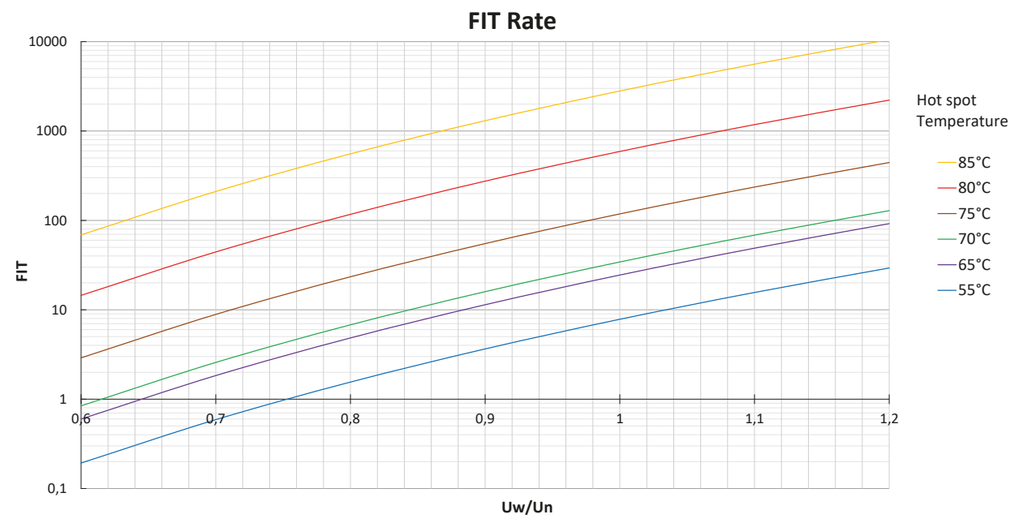
Lifetime

Capacitor lifetime depends strongly on hotspot temperature and working voltage. The higher the hotspot temperature and the voltage is, the lifetime decreases exponentially. Hotspot temperature is linked with current load of the capacitor. Lifetime expectancy, described in graph below, is calculated according to previous experiments, long-time experiences and theoretical predictions. Graph is theoretical curve and lifetime of different types of capacitors may vary. Standard designed lifetime is 100.000 hours at hot spot temperature 70°C.



FIT Rate

FIT (failures in time) represents probability of failure during operating procedure under specific conditions. In the other word, it provides information about what can we expect when capacitor is overloaded. It is statistic value calculated from long-time experiences and theoretical predictions. FIT rate depends mainly on working hot spot temperature and applied working voltage but of course also on capacitor design itself.



Capacitors for Power Electronics

AC Filter Capacitors

General technical parameters

Rated voltage	250 V – 2 500 V AC
Rated capacitance	1 µF – 600 µF
Capacitance tolerance	±5 %
Voltage test between terminals	1,5 x U_{RMS} AC/10 s
Mounting position	Vertical
Case temperature	-40/85 °C
Storage temperature	-40/85 °C
Hot spot	max 85 °C
Lifetime expectancy	100 000 – 150 000 h
FIT	50 – 100
Case	Aluminium

Standard types

(other parameters on request)

U_{RMS} = 250 V U_N = 350 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
100	PVAJP 16 - 0,25/100 AC	20	1,3	3,9	1,1	5,2	70	65 x 110	0,4	1
200	PVAJP 2 - 0,25/200 AC	35	1,6	4,8	0,9	4,6	70	85 x 135	0,9	2
300	PVAJP 2 - 0,25/300 AC	50	2,8	8,4	0,7	3,7	80	85 x 200	1,3	2
400	PVAJP 2 - 0,25/400 AC	50	3,7	11,1	0,6	3,7	80	85 x 200	1,3	2
500	PVAJP 2 - 0,25/500 AC	50	4,3	12,9	0,4	3,0	120	85 x 261	1,7	2

U_{RMS} = 330 V U_N = 460 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
150	PVAJP 2 - 0,33/150 AC	30	1,6	6,0	1,2	4,1	70	85 x 150	1,0	2
200	PVAJP 2 - 0,33/200 AC	40	2,2	7,0	0,9	4,1	70	85 x 150	1,0	2
300	PVAJP 2 - 0,33/300 AC	50	3,6	10,8	0,4	3,4	80	85 x 220	1,5	2
400	PVAJP 2 - 0,33/400 AC	50	3,9	11,7	0,4	3,0	120	85 x 261	1,7	2
500	PVAJP 2 - 0,33/500 AC	65	5,1	15,3	0,3	2,1	90	110 x 220	2,2	2

U_{RMS} = 420 V U_N = 600 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
22	PVAJP 2 - 0,42/22 AC	40	1,3	3,9	1,5	6,5	60	65 x 120	0,4	1
33	PVAJP 2 - 0,42/33 AC	40	1,9	5,7	1,2	6,5	60	65 x 120	0,4	1
47	PVAJP 2 - 0,42/47 AC	60	2,6	7,8	0,7	4,2	70	85 x 145	1,0	2

U_{RMS} = 450 V U_N = 640 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
10	PVAJP 2 - 0,45/10 AC	40	0,5	1,5	4,1	9,6	60	65 x 85	0,3	1
30	PVAJP 2 - 0,45/30 AC	40	1,2	3,6	1,3	6,5	60	65 x 120	0,4	1
50	PVAJP 2 - 0,45/50 AC	50	1,5	4,5	0,7	4,2	60	85 x 145	1,0	2
100	PVAJP 2 - 0,45/100 AC	60	2,9	8,7	0,5	4,2	70	85 x 145	1,0	2
150	PVAJP 2 - 0,45/150 AC	40	2,6	7,8	0,9	3,7	80	85 x 200	1,3	2
200	PVAJP 2 - 0,45/200 AC	60	3,2	9,6	0,4	3,4	90	85 x 220	1,5	2
300	PVAJP 2 - 0,45/300 AC	50	3,8	11,4	0,3	2,1	90	110 x 220	2,2	2
350	PVAJP 2 - 0,45/350 AC	60	4,2	12,6	0,3	2,1	90	110 x 220	2,2	2
500	PVAJP 2 - 0,45/500 AC	80	6,3	18,9	0,2	1,9	120	136 x 220	3,3	2

U_{RMS} = 480 V U_N = 680 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
60	PVAJP 2 - 0,48/60 AC	43	1,8	5,4	0,7	4,2	70	85 x 145	1,0	2
100	PVAJP 2 - 0,48/100 AC	43	2,2	6,6	0,8	3,4	90	85 x 220	1,5	2
150	PVAJP 2 - 0,48/150 AC	50	2,8	8,4	0,5	3,4	90	85 x 220	1,5	2
200	PVAJP 2 - 0,48/200 AC	55	2,9	8,7	0,4	2,1	90	110 x 220	2,2	2
300	PVAJP 2 - 0,48/300 AC	65	3,9	11,7	0,4	1,9	120	110 x 261	2,6	2
300	PVAJP 20 - 0,48/300 AC	80	4,8	13,0	0,7	1,9	80	110 x 220	2,2	2
400	PVAJP 2 - 0,48/400 AC	65	5,6	16,8	0,5	1,9	120	110 x 261	2,6	2

U_{RMS} = 530 V U_N = 750 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
70	PVAJP 2 - 0,53/70 AC	26	1,9	5,7	1,0	5,6	60	65 x 165	0,6	1
90	PVAJP 2 - 0,53/90 AC	43	3,2	9,6	0,8	4,0	80	85 x 175	1,1	2
100	PVAJP 2 - 0,53/100 AC	60	3,3	12,1	0,6	3,1	90	85 x 220	1,5	2
150	PVAJP 22 - 0,53/150 AC	80	4,8	13,0	0,7	2,1	90	110 x 175	1,9	2
220	PVAJP 2 - 0,53/220 AC	80	4,6	14,0	0,6	2,1	60	110 x 220	2,2	2

U_{RMS} = 600 V U_N = 850 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
68	PVAJP 2 - 0,6/68 AC	40	1,8	5,4	0,5	4,0	80	85 x 175	1,1	2
100	PVAJP 2 - 0,6/100 AC	40	2,9	8,7	0,6	3,4	90	85 x 220	1,5	2
120	PVAJP 2 - 0,6/120 AC	80	3,3	9,9	0,3	2,9	90	110 x 185	1,9	2
150	PVAJP 2 - 0,6/150 AC	50	3,8	11,4	0,4	2,1	90	110 x 220	2,2	2

U_{RMS} = 720 V U_N = 1020 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
53	PVAJP 2 - 0,72/53 AC	80	2,9	8,7	0,6	3,4	90	85 x 220	1,5	2
68	PVAJP 2 - 0,72/68 AC	80	3,2	9,6	0,6	2,9	90	110 x 185	1,9	2

U_{RMS} = 780 V U_N = 1100 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
33	PVAJP 2 - 0,78/33 AC	50	3,2	9,0	0,8	4,1	70	85 x 150	1,0	2
47	PVAJP 2 - 0,78/47 AC	60	4,2	12,6	0,5	3,4	90	85 x 220	1,5	2
68	PVAJP 2 - 0,78/68 AC	60	5,6	16,8	0,3	2,1	90	110 x 220	2,2	2

U_{RMS} = 850 V U_N = 1200 V AC Single phase

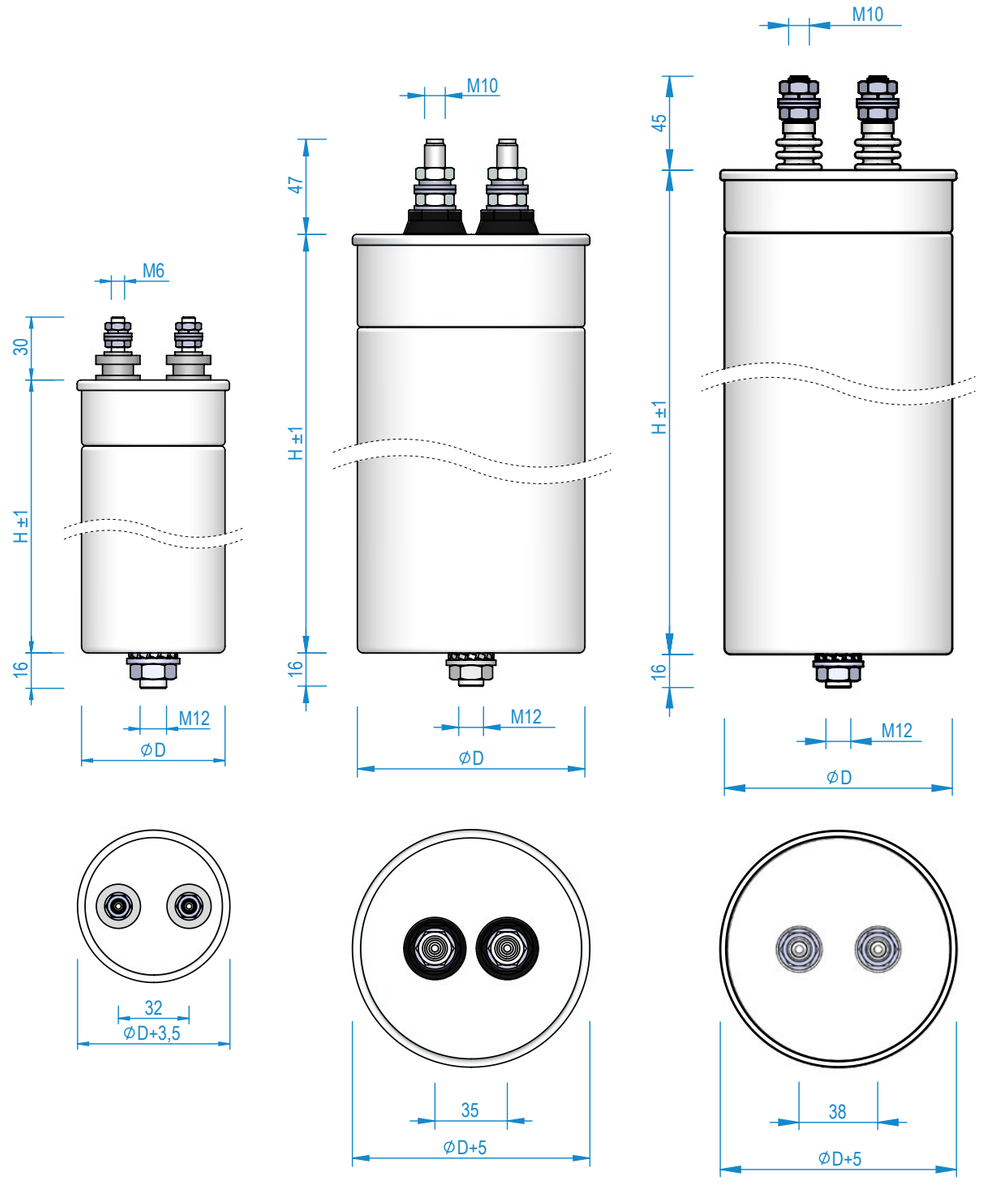
C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
33	PVAJP 2 - 0,85/33 AC	50	3,3	9,9	0,4	3,7	90	85 x 200	1,3	2
55,7	PVAJP 2 - 0,85/55,7 AC	60	6,1	18,3	0,3	2,1	90	110 x 220	2,2	2
80	PVAJP 2 - 0,85/80 AC	65	4,2	12,0	0,6	2,1	110	110 x 220	2,4	2
120	PVAJP 2 - 0,85/120 AC	60	6,5	19,5	1,0	2,1	120	136 x 220	3,3	2

U_{RMS} = 1200 V U_N = 1700 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
40	PVAJP 116 - 1,2/40 AC	60	4,0	11,8	0,7	2,2	90	116 x 175	1,9	2
60	PVAJP 116 - 1,2/60 AC	80	5,5	15,4	0,7	1,8	110	116 x 220	2,4	2
60	PJAJP 116 - 1,2/60 AC	80	5,5	15,4	0,7	1,8	110	116 x 220	2,4	2

U_{RMS} = 2500 V U_N = 3535 V AC Single phase

C_N (µF)	Type	I (A)	Î (kA)	I_s (kA)	R_s (mΩ)	R_{TH} (K/W)	L_s (nH)	D x H (mm)	m (kg)	Drw. No.
2,2	PJAJP 10 - 2,5/2,2 AC	30	0,6	1,8	1,1	4,1	90	85 x 165	1,1	3
4	PJAJP 20 - 2,5/4 AC	40	1,3	3,9	0,6	2,1	90	110 x 165	1,7	3



Drawing 1 Drawing 2 Drawing 3

U_{RMS} = 450 V U_N = 640 V AC Three phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
3 x 33	PSAJP 10 - 0,45/3 x 33 AC	3 x 43	3 x 1,1	3 x 3,3	3 x 1,2	3,8	90	85 x 175	1,0	4
3 x 40	PSAJP 10 - 0,45/3 x 40 AC	3 x 43	3 x 1,2	3 x 3,6	3 x 1,0	3,8	90	85 x 175	1,0	4
3 x 65	PSAJP 10 - 0,45/3 x 65 AC	3 x 43	3 x 1,4	3 x 4,2	3 x 1,3	3,2	110	85 x 220	1,5	4

U_{RMS} = 530 V U_N = 750 V AC Three phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
3 x 10	PSAJP 16 - 0,53/3 x 10 AC	3 x 16	3 x 0,5	3 x 8,8	3 x 3,1	5,2	70	65 x 165	0,6	4
3 x 15	PSAJP 16 - 0,53/3 x 15 AC	3 x 16	3 x 0,7	3 x 8,8	3 x 2,2	5,2	70	65 x 165	0,6	4
3 x 23	PSAJP 10 - 0,53/3 x 23 AC	3 x 43	3 x 1,1	3 x 8,8	3 x 1,3	3,8	90	85 x 175	1,1	4
3 x 44	PSAJP 4 - 0,53/3 x 44 AC	3 x 56	3 x 3,8	3 x 11,0	3 x 0,4	2,9	110	110 x 175	1,8	5
3 x 69	PSAJP 10 - 0,53/3 x 69 AC	3 x 43	3 x 2,6	3 x 8,8	3 x 0,9	2,1	110	110 x 220	2,2	4
3 x 100	PSAJP 3 - 0,53/3 x 100 AC	3 x 72	3 x 1,2	3 x 8,8	3 x 0,7	1,9	130	136 x 220	3,4	6
3 x 115	PSAJP 5 - 0,53/3 x 115 AC	3 x 56	3 x 4,5	3 x 12,6	3 x 0,5	1,8	110	136 x 220	3,3	5
3 x 150	PSAJP 5 - 0,53/3 x 150 AC	3 x 56	3 x 4,9	3 x 13,7	3 x 0,5	1,8	130	136 x 220	3,3	5

U_{RMS} = 600 V U_N = 850 V AC Three phase

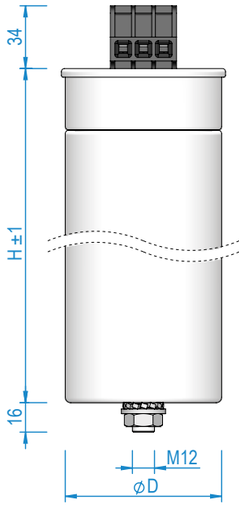
C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
3 x 47	PSAJP 10 - 0,6/3 x 47 AC	3 x 43	3 x 0,6	3 x 1,8	3 x 1,2	2,1	110	110 x 220	2,2	4
3 x 68	PSAJP 10 - 0,6/3 x 68 AC	3 x 43	3 x 0,8	3 x 2,4	3 x 0,9	2,1	110	110 x 220	2,2	4
3 x 102	PSAJP 3 - 0,6/3 x 102 AC	3 x 60	3 x 1,3	3 x 3,9	3 x 0,8	1,8	140	136 x 261	3,8	6

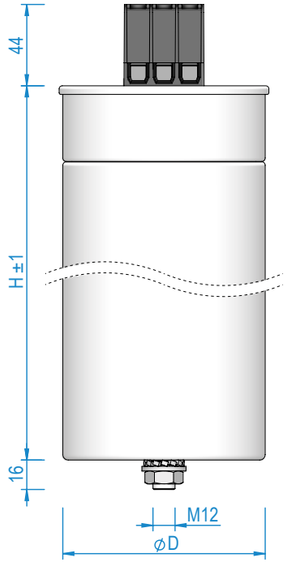
U_{RMS} = 760 V U_N = 1080 V AC Three phase

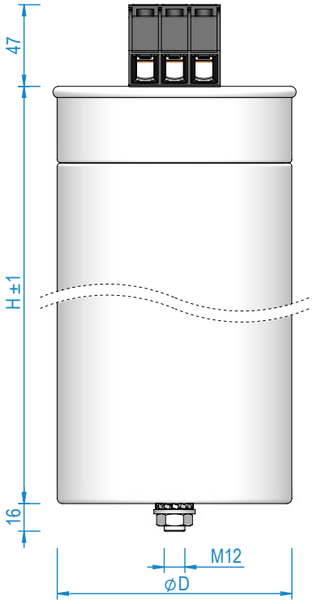
C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
3 x 11	PSAJP 10 - 0,76/3 x 11 AC	3 x 43	3 x 0,5	3 x 3,6	3 x 1,1	3,8	90	85 x 175	1,1	4
3 x 33	PSAJP 30 - 0,76/3 x 33 AC	3 x 43	3 x 1,5	3 x 4,5	3 x 0,6	1,9	130	136 x 220	3,3	4
3 x 49	PSAJP 3 - 0,76/3 x 49 AC	3 x 43	3 x 2,2	3 x 6,6	3 x 0,7	1,6	140	136 x 261	3,8	4

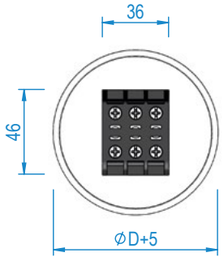
U_{RMS} = 850 V U_N = 1200 V AC Three phase

C_N (µF)	Type	I (A)	Î (kA)	I_S (kA)	R_S (mΩ)	R_{TH} (K/W)	L_S (nH)	D x H (mm)	m (kg)	Drw. No.
3 x 8	PSAJP 10 - 0,85/3 x 8 AC	3 x 43	3 x 0,4	3 x 3,0	3 x 1,3	3,8	90	85 x 175	1,1	4
3 x 33	PSAJP 4 - 0,85/3 x 33 AC	3 x 56	3 x 4,0	3 x 12,0	3 x 0,4	2,6	110	116 x 220	2,4	5
3 x 42	PSAJP 30 - 0,85/3 x 42 AC	3 x 43	3 x 1,5	3 x 4,5	3 x 0,5	1,9	130	136 x 220	3,3	4
3 x 49	PSAJP 3 - 0,85/3 x 49 AC	3 x 43	3 x 1,9	3 x 5,7	3 x 0,7	1,8	140	136 x 261	3,8	4
3 x 56	PSAJP 3 - 0,85/3 x 56 AC	3 x 80	3 x 2,2	3 x 12,7	3 x 0,5	1,8	140	136 x 261	3,8	6

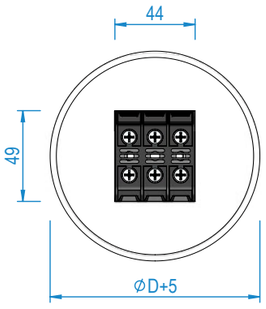




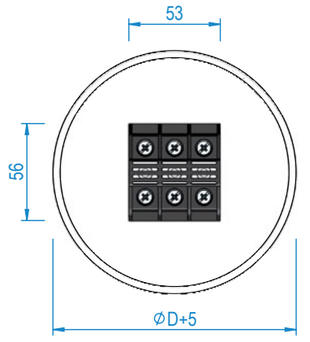




Drawing 4



Drawing 5



Drawing 6