EUNSUNG

Low Voltage **Power Capacitors**



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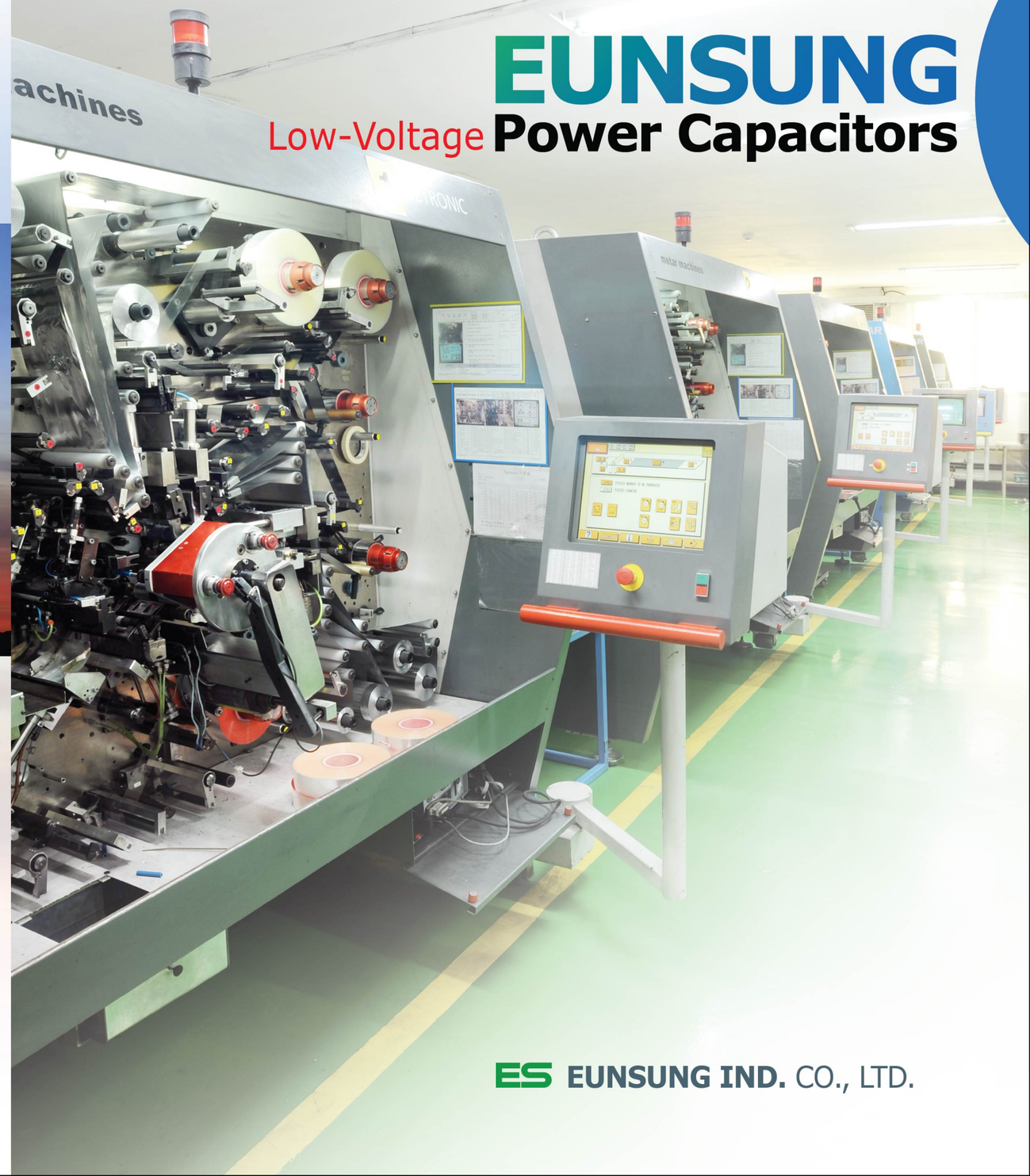
EUNSUNG 20230110 / Design by HANGIL Communications | 010-3714-7292

www.**eunsungcap**.com

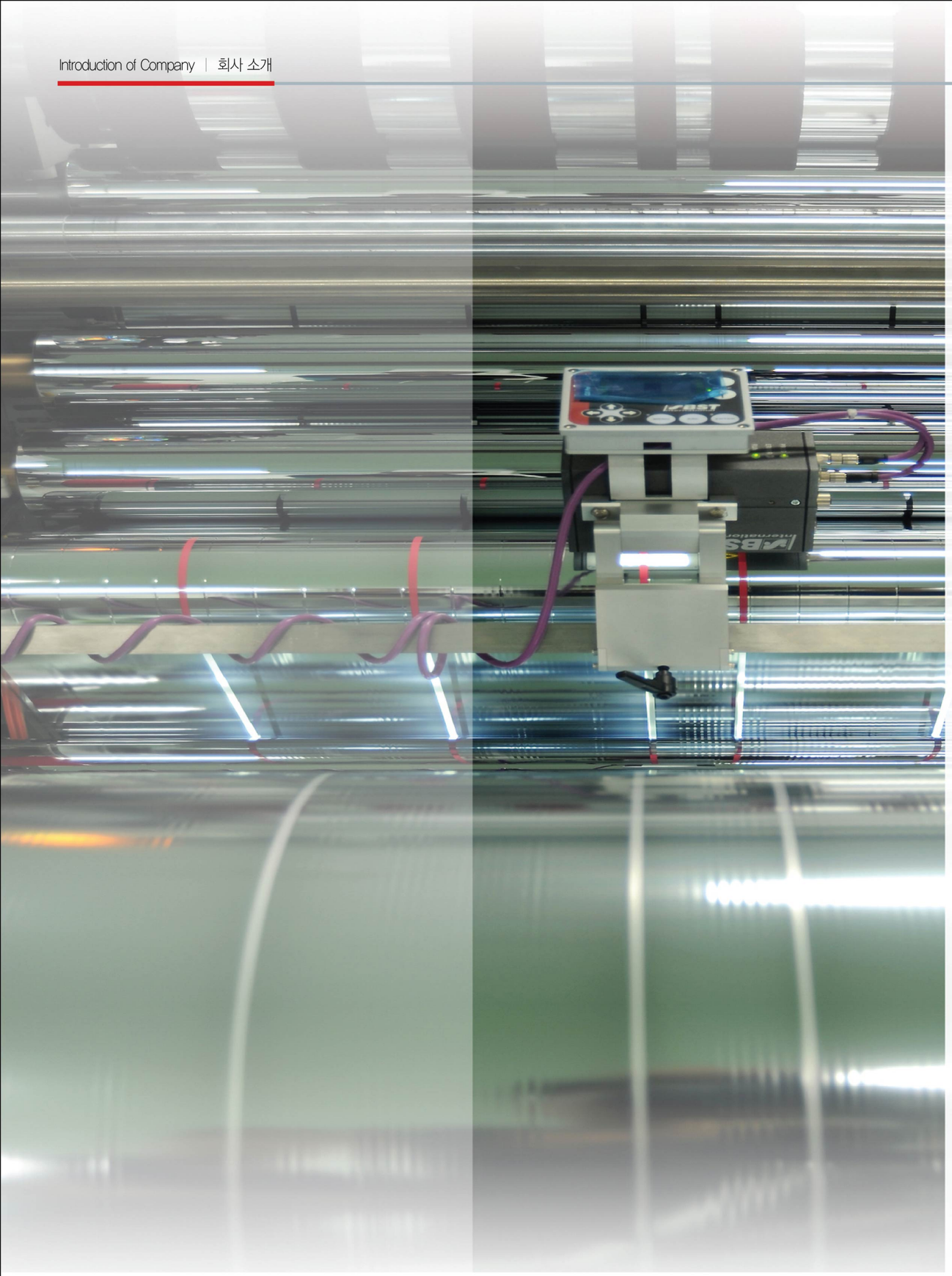
KSC-4801 | NO. 3683 KAB-QC-06 KAB-EC-16

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Low-Voltage **Power Capacitors**



EUNSUNG IND. CO., LTD.



EUNSUNG

We, Eunsung Industrial Co., Ltd. will be renovated to be
No. 1 company for best quality in practice of customer-principle

저희 은성산업은 최고의 품질을 위한 고객제일주의와 함께
No.1 품질기업으로 거듭나겠습니다

We devote for best quality with state of the art technology which will a key for future, this is also our goal and destiny.

최고의 품질을 만들기 위하여 신기술개발로 미래를 열어갑니다.

1977-Present

EUNSUNG



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We think first for best quality and customer,
are manufacturing capacitor for electrical apparatus,
low voltage power factor capacitor, AC filter capacitor, DC link capacitor and
metallized film. We wish to be renovated company who knows
value of customer and also be respected in this market.

최고의 품질과고객을 먼저 생각하는 은성산업(주)는
전기 기기용 콘덴서, 저압진상 콘덴서, AC Filter 콘덴서, DC Link 콘덴서 및 증착필름을
생산하고 있으며, 고객가치를 최우선으로 하는 존경받는 기업으로 거듭나겠습니다.



EUNSUNG

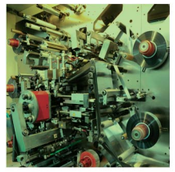
We are first company who has been produced metallized paper for capacitor in 1977 in Korea,
have build up own know-how and technology which is well accepted in the market,
so growing and jump up too.
We will do our best for customer prosperous with development of new technology.

**1977년, 한국 최초 콘덴서용 금속화 종이 생산 시작으로
은성산업(주)은 콘덴서분야에서 축척된 노하우와 그 기술력을 인정받아
성장과 도약을 하고 있으며, 신기술개발로 고객분들의 부흥에 더욱 기여하겠습니다.**

생산설비




Production Machine



생산라인




Production Line






Test

테스트





Office

사무실




Design



설계

We wish to be a leading company who can provide
a rapid change by maximum internal ability from
a result of **40 years** experience and best quality
management system.

40년의 풍부한 경험과 최고의 품질경영 시스템으로
내부 역량을 극대화하여
빠른 변화를 리드해 나가는 기업이 되겠습니다.
고객여러분의 지속적인 관심과 성원을 부탁드립니다.



SPECIFICATIONS

SPECIFICATIONS

Specification | 사양

1. Installation Place : Indoor Type
2. Ambient Temperature : –25℃ to 45℃
   (Below 35℃ for 24 Hours Average)
3. Construction and Class : SH, E Type
4. Capacitance Tolerance : –5% to +10%
   (inter phase unbalance factor of capacitance : Max. 103%)
5. Maximum Permissible Voltage (JIS C 4901, KS C 4801, IEC 60831)

Overload Voltage (%)	Maximum Duration
110	Less than 8 hours during 24 hours
115	Less than 30 minute during 24 hour
120	Less than 2 times during 5 minutes for 1 month
130	Less than 2 times during 1 minutes for 1 month

6. Maximum Permissible Overcurrent :
   130% of Rated Current
7. Maximum Permissible Capacity :
   135% of Rated VA Reactive
8. Dissipation Factor : Max. 0.35%
9. Withstanding Voltage :
   * Between Terminals : Rated Voltage ×2.15, 1 Minute
   * Between Terminals to Case : 3000VAC, 1 Minute
10. Discharge : Voltage decreases to below 75V in
    3 minutes when disconnected from power source.
11. Sealing : There shall be no oil leakage even if for
    3 hours under a thermostatic chamber 70℃
12. Safety Device
    * Protective device(pressure sensitve interrupter)
13. Filling : Pu Resin (Non PCB) or Polyurethane
14. Painting Color : Munsell No. 5Y 7/1
15. Reference Standard :
    KS C 4801, JIS C 4901, IEC 60831

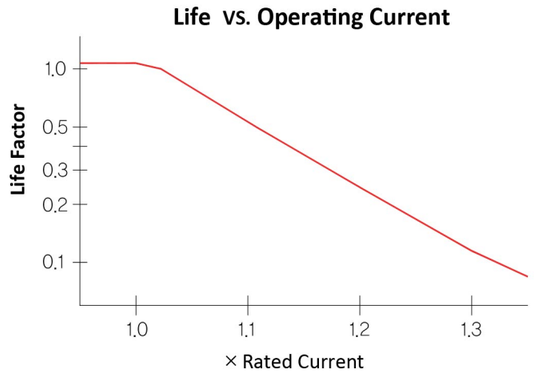
1. 설치 장소 : 옥 내 용
2. 사용 주위 온도 : –25℃ ~ 45℃
   (24시간 평균 35℃ 이하)
3. 구조 및 종류 : SH . E 형
4. 용량 허용 차 : –5% ~ 10%
   (상간 용량 불 평형율 : 103 % 이하)
5. 최고 허용 과전압 (JIS C 4901, KS C 4801, IEC 60831)

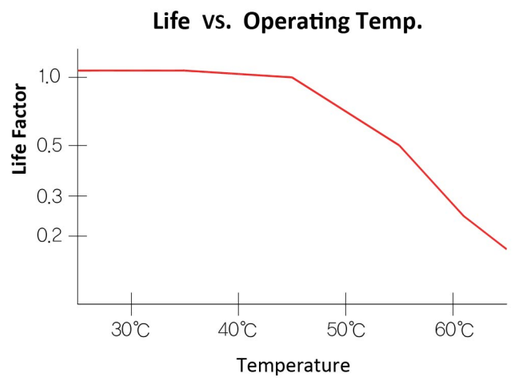
과전압율(%)	과전압 인가 시간
110	24시간중 8시간 이내
115	24시간중 30분 이내
120	1개월중에서 5분이내가 2회 이하
130	1개월 중에서 1분 이내가 2회 이하

6. 최대 허용 과전류
   정격전류의 130% 이내
7. 최대 허용 용량
   정격용량(var)의 135% 이내
8. 손실율 : 0.35% 이내
9. 내전압:
   * 단자 상호간 : 정격 전압 × 2.15배, 1분간
   * 단자 일괄 케이스간 : 3000VAC, 1분간
10. 방전성 : 전원에서 개방후의 잔류 전압이
    3분 이내 75V 이하
11. 밀폐성 : 70℃항온조에 3시간 방치후 함침제의
    누출이 없을것.
12. 보안성
    * 보안장치 내장형 (압력식 보안장치)
13. 충진제 : Pu Resin (Non PCB) or Polyurethane
14. 도장 색상 : Munsell No. 5Y 7/1
15. 관련 규격 :
    KS C 4801, JIS C 4901, IEC 60831

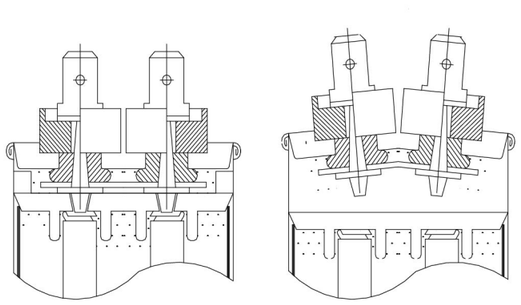
SPECIFICATIONS

Characteristic | 특성



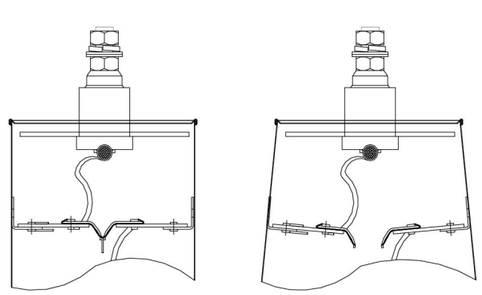


Pressure sensitive interrupter | 압력식 보안 장치



Nomal Condition　　Operating Condition

Page 17　Fig 1 ~ 3



Nomal Condition　　Operating Condition

Page 17　Fig 4 ~ 6

Harmonics | 고조파

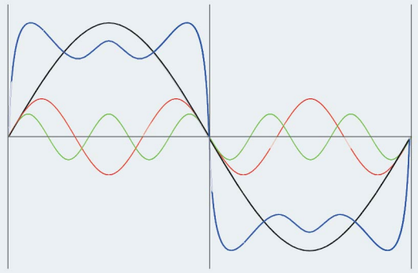
Harmonics are sinusoidal voltage and current with multiple frequencies of the 50 or 60Hz line frequency.
고조파란 전원 주파수(50Hz 또는 60Hz)의 정수배의 전압 및 전류를 말합니다.

Sinusoidal waveform 기본파	n Hamonics n 고조파
50 Hz	50×n Hz
60 Hz	60×n Hz

◆ : Harmonic voltage regulation level | 전압 고조파 규제치 ◆ (IEE519)

Receiving voltage 수 전 전 압 (kV)	Delicate line VTHD% 개별 또는 특수 수용가 전압 고조파 왜형율	General line VTHD% 일반 계통 전압 고조파 왜형율
Less than 69kV | 69kV 이하	3.0	5.0
69 kV ~ 161kV	1.5	2.5
More than 161kV | 161kV 이상	1.0	1.5

Synthetic waveform of Harmonic
고조파합성형태



Synthetic waveform | 합성 파형
Sinusoidal waveform | 기본 파형
3-Harmonic waveform | 3 고조파 파형
5-Harmonic waveform | 5 고조파 파형

◆ Harmonic current regulation level | 전류 고조파 규제치 ◆ (IEE519)

I_{sc}/I_L	Harmonic current regulation level 전류 고조파 규제치					TDD
	Less than 11th 11차 이하	11th ~ 17th 11차 ~ 17차	17th ~ 23th 17차 ~ 23차	23th ~ 35차 23차 ~ 35차	More than 35th 35차 이상	
Under 20 | 20 미만	4.0	2.0	1.5	0.6	0.3	5.0
20 ~ 50	7.0	3.5	2.5	1.0	0.5	8.0
50 ~ 100	10.0	4.5	4.0	1.5	0.7	12.0
100 ~1000	12.0	5.5	5.0	2.0	1.0	15.0
1000 초과	15.0	7.0	6.0	2.5	1.4	20.0

※ I_{sc} : Short-circuit current 단락 전류　I_L : Maximum load current 최대 부하 전류

VTHD(Voltage Total Harmonic Distortion, 전압 총합 왜형률)
: Content of the sinusoidal waveform voltage contrast harmonic voltage
: 기본파 전압 대비 고조파 전압의 함유율.(고조파 전압 규제치의 판단 기준값)

ITHD(Current Total Harmonic Distortion, 전류 총합 왜형률)
: Content of the sinusoidal waveform current contrast harmonic current
: 기본파 전류 대비 고조파 전류의 함유율.

ITDD(Current Total Demand Distortion, 전류 총 수요 왜형률)
: Content of the maximum load current contrast harmonic current
: 최대 부하 전류 대비 고조파 전류의 함유율.(고조파 전류 규제치의 기준값)

Protection of the capacitor by harmonic
고조파 유입에 따른 콘덴서 보호

Harmonic current content, which is created from harmonic generation source, is obeyed of Ohm's law which is basic of electrical circuit, so the harmonic current is flowed to lower impedence.

Harmonic current is a current (high frequency) which has integer ratio frequency against basic pulse, so high frequency harmonic current is for low impedence equipment, as mainly for power factor correction capacitor (capacitor impedence is $-j \cdot \frac{1}{2\pi \cdot f \cdot C}$ current is 2π fCV(A)). So it could incur a disability by over current caused by harmonic current, and in this case please install series reactor for capacitor protection. When series reactor L(%) is installed, capacitor terminal voltage is rised as $\frac{100}{100-L} \times 100(\%)$ please select rated voltage of capacitor, which is provided for voltage rise, so overload voltage can't be applied.

고조파 발생원으로부터 발생한 고조파 전류 성분은 전기회로의 기본 법칙인 옴의 법칙에 따르게 되는데 즉, 고조파 발생원에서 발생한 고조파 전류는 임피던스가 낮은 쪽으로 흐른다.

고조파 전류란 기본파의 정수배의 주파수를 가진 전류(주파수가 높다)이고, 이러한 주파수가 높은 고조파전류는 임피던스가 낮은 기기, 즉 주로 **역률 개선용 콘덴서이므로**(콘덴서의 임피던스는 $-j \cdot \frac{1}{2\pi \cdot f \cdot C}$ 이고, 전류는 2π fCV(A)) 고조파전류로 인한 과전류가 유입 되어 장해를 발생시키게 되므로, Capacitor 보호용 직렬 Reactor를 설치 하여 주십시요.

직렬 Reactor L(%)를 설치할 경우에 콘덴서 단자 전압은 $\frac{100}{100-L} \times 100(\%)$ 로 상승하기 때문에 전압상승을 고려한 콘덴서 정격 전압을 선정하시어 과전압이 인가 되지 않도록 해야 합니다.

Harmonic Generation Source | 고조파발생원

Generally harmonic generation source is nonlinear circuit (electrical circuit includes circuit component

일반적으로 고조파 발생원은 비 선형 회로(옴의 법칙이 적용되지 않는 회로소자를 포함한 전기 회로)에서 발생되며, 그 종류는 아래 표와 같다.

Harmonic Generation Source
Transformer, Rotation machine which is generated by magnetic saturation.
Arc furnace, Welding machine, Induction furnace
SCR AC phase control system, UPS
DC rectifier, Converter, Inverter
Single phase rectifier system (Computer etc), Elevater, Escalator
Fluoresent lamp ballast, Dimmer

고 조 파 발 생 원
변압기, 회전기 등의 자기 포화에 의한 발생.
아크로, 용접기, 유도로
SCR 교류 위상 제어 장치, UPS
DC 정류기, Converter, Inverter
단상 정류 장치(컴퓨터 등), Elevator, Escalator
형광등 안정기, Dimmer

Influence of harmonic | 고조파 영향

Name	Influence
Capacitor Reactor	· Circuit impedence is dropped due to resonant phenomenon caused by harmonic current, overheat / damage / vibration / noise can be appeared.
Transformer	· Noise due to magnetization phenomenon of metal core by · Capacitance drops due to rise of iron loss and copper loss by harmonic current and voltage.
Fluorescent lamp	· Impedence dops by harmonic current, overheat and damage on choke coil and power factor correction capacitor.
Cable	· Neutrial line overheat due to inflow of harmonic current on neutrial line of 3 phase circuit.
Induction motor	· periodical change of rnumber of rotation caused by appearance of stationary vibration torque of harmonic current.
Instrument Transformer	· In case of initial phase tolerance in voltage transformer, Measuring accuracy drops due to harmonic (Ø is phase angle of control current as thyristor phase control).
Intergrated wattmeter	· Measuring tolerance appearance in useful magnetic flux of voltage and current due to non-operation of the flux change by nonlinear property.
Rectifier controller	· Malfunction caused by phase dislocation of control signal.
Relay	· Excess of set value by harmonic voltage and current · Malfunction or out of function caused by phase change.
Power fuse	· Break casued by excess harmonic current
Circuit breaker	· Malfunction casued by excess harmonic current

기 기 명	영 향 의 종 류
콘 덴 서 리 액 터	· 고조파 전류로 인하여 회로의 임피던스가 공진현상 등에 의해 감소하여 과대 전류가 유입되고, 과열, 소손, 진동, 소음 발생 함.
변압기	· 고조파 전류에 의한 철심의 자화 현상으로 소음 발생 · 고조파 전류.전압에 의한 철손, 동손의 증가로 용량 감소
형광등	· 고조파 전류때문에 임피던스가 감소하여 역률개선용 콘덴 서 및 쵸크코일에 과전류 유입으로 과열.소손
케이블	· 3상 회로의 중성선에 고조파 전류 유입에 의한 중성선 과열
유도전동기	· 고조파 전류로 정상진동 토오크가 발생하여 회전수의 주기적 변동 · 철손.동손 등 손실 증가
계기용변성기	· 계기용 변성기에 초기 위상오차가 있는 경우,고조파(ϕ는 사이리 스터 위상제어등 제어전류의 위상각)의 영향으로 측정 정밀도 저하
적산전력계	· 전압,전류의 유효자속이 비선형 특성으로 자속변화가 완전히 적응하지 못하므로 측정오차 발생 · 고조파 전류의 과대한 유입에 의한 전류코일 소손
정류기제어장치	· 제어신호의 위상 어긋남에 의한 오제어 등
계전기	· 고조파 전류, 전압에 의한 설정값 등의 초과 · 위상변화에 의한 오동작 또는 동작 하지 않음.
전력 fuse	· 과대한 고조파 전류에 의한 용단
배선용차단기	· 과대한 고조파 전류에 의한 오동작

Power factor correction | 역율 개선 효과

▶ Power Factor Correction 역율 개선의 효과 ◀

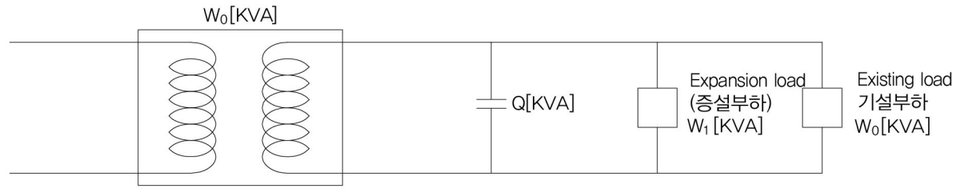
1) Reduction of transformer, distribution line loss | 변압기, 배전선의 손실 저감
2) Efficient use of transformer | 설비 용량의 증가
3) Voltage drop compensation | 전압 강하의 경감.

1. Reduction of Transformer Loss 변압기/배전선의 손실 저감

The loss of distribution line(선로의 손실은) $P_L = I^2R = (\frac{P}{V\cos\theta})^2R = \frac{P^2R}{V^2\cdot\cos^2\theta}$ 에서

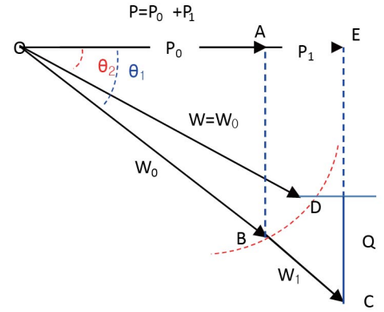
- Loss is inversely proportional to the square power factor so the loss reduced if the power factor correction.
- 손실은 역율 제곱에 반비례 하므로 역율을 개선 하면 손실을 감소 시킬 수 있습니다.

2. Efficient use of transformer 설비 용량의 여유 증가



1) Capacity of new machine | 새로운 설비 용량 W1은

$$w1 = \overline{OC} - \overline{OB} = \frac{P}{\cos\theta 1} - W_0 = \frac{W_0\cos\theta_1}{\cos\theta_1} - W_0$$
$$= W_0(\frac{\cos\theta_1}{\cos\theta_2} - 1)$$



2) Power increase | 전력의 증가분

$$P_1 = P - P_0 = W_1\cdot\cos\theta_1 = W0(\cos\theta_2 - \cos\theta_1)\ [KVA]$$

3. Voltage drop Compensation 전압 강하의 경감.

1) Before correction | 개선전

$$\Delta e = I\cdot(R\cos\theta_1 + X\sin\theta_1) = \frac{Pr}{Er}(R + X\tan\theta_1)$$

2) After correction | 개선후

$$\Delta e' = I\cdot(R\cos\theta_2 + X\cdot\sin\theta_2) = \frac{Pr}{Er}(R + X\cdot\tan\theta_2)$$

3) Before and after correction | 개선 전후 의 경감

$$\Delta e - \Delta e' = \frac{X\cdot Pr}{Er}(X\cdot\tan\theta_1 - X\cdot\tan\theta_2)$$

$\tan\theta_1 > X\tan\theta_2$ 이므로 $\Delta e > \Delta e'$

4) Reduce the voltage drop rate | 전압 강하 경감률

$$\frac{\Delta e - \Delta e'}{Er}\times 100 = \frac{X\cdot Pr}{Er^2}(\tan\theta_1 - \tan\theta_2)\times 100 = \frac{X}{Er^2}\ \mathrm{Pr}\cdot(\tan\theta_1 - \tan\theta_2)\times 100 \cong \frac{X_C}{R_C}\times 100$$

$RC \cong \frac{Er^2}{X}$ Short-circuit capacity of the capacitor installation busbar (콘덴서 설치 모선의 단락 용량)

$QC = \mathrm{Pr}(\tan\theta_1 - \tan\theta_2)$ → Capacity of capacitor (콘덴서 용량)

SPECIFICATIONS

Capacity Calculation Table of Capacitors | 콘덴서 용량산출표

Power factor after correction cos Θ2 개선후 역률

Power factor before correction cos Θ1 개선전 역률

	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80
0.50	137	159	153	148	144	140	137	134	131	128	125	122	119	117	114	111	109	106	103	101	98
0.51	169	154	148	144	140	136	132	129	126	123	120	118	115	112	109	107	104	102	99	96	94
0.52	164	150	144	139	135	131	125	125	122	119	116	113	110	108	105	102	100	97	95	92	89
0.53	160	146	140	135	131	127	124	121	117	114	112	109	106	103	101	98	95	96	90	88	85
0.54	156	142	136	131	127	123	120	116	113	110	108	105	102	99	97	94	91	89	86	84	81
0.55	152	138	132	127	123	119	110	112	109	106	104	101	98	95	93	90	87	85	82	80	77
0.56	148	134	128	123	119	115	112	109	105	102	100	97	94	91	89	86	83	81	78	76	73
0.57	144	130	124	119	115	111	108	105	102	99	96	93	90	88	85	82	80	77	74	72	69
0.58	141	126	120	115	111	108	104	101	98	95	92	89	87	84	81	79	76	73	71	68	66
0.59	137	123	117	112	108	104	101	97	94	91	89	86	83	80	78	75	72	70	67	65	62
0.60	133	119	113	108	104	100	97	94	91	88	85	82	79	77	74	71	69	66	64	61	58
0.61	130	116	110	105	101	97	94	90	87	84	82	79	76	73	71	68	65	63	60	58	55
0.62	127	112	106	102	97	94	90	87	84	81	78	75	73	70	67	65	62	59	57	54	52
0.63	123	109	103	98	94	90	87	84	81	78	75	72	69	67	64	61	59	56	54	51	48
0.64	120	106	100	95	91	87	84	81	78	75	72	69	66	63	61	58	56	53	50	48	45
0.65	117	103	97	92	88	84	81	77	74	71	69	66	63	60	58	55	52	50	47	45	42
0.66	114	100	94	89	85	81	78	74	71	68	65	63	60	57	55	52	48	47	44	41	39
0.67	111	97	91	86	82	78	75	71	68	65	62	60	57	54	52	49	46	44	47	38	36
0.68	108	94	88	83	79	75	72	68	65	62	59	57	54	51	49	46	43	41	38	35	33
0.69	105	91	85	80	76	72	69	65	62	59	57	54	51	48	46	43	40	37	35	32	30
0.70	102	88	82	77	73	69	66	63	59	56	54	51	48	45	43	40	37	35	32	30	27
0.71	99	85	79	74	70	66	63	60	57	54	51	48	45	43	40	37	35	32	29	27	24
0.72	96	82	76	71	67	64	60	57	54	51	48	45	42	40	37	34	32	29	27	24	21
0.73	94	79	73	69	64	61	57	54	51	48	45	42	40	37	34	32	29	26	24	21	19
0.74	91	77	71	66	62	58	55	61	48	45	43	40	37	34	32	29	26	24	21	19	16
0.75	88	74	68	63	59	55	52	49	46	43	40	37	34	32	29	26	24	21	18	16	13
0.76	86	71	65	60	56	53	49	46	43	40	37	34	32	29	26	24	21	18	16	13	11
0.77	83	69	63	58	54	50	47	43	40	37	35	32	29	26	24	21	18	16	13	11	8
0.78	80	66	60	55	51	47	44	41	38	35	32	29	26	24	21	18	16	13	10	8	5
0.79	78	63	57	53	48	46	41	38	35	32	29	26	24	21	18	16	13	10	8	5	2.6
0.80	75	61	55	50	46	42	39	36	32	29	27	24	21	18	16	13	10	8	5	2.6	
0.81	72	58	52	47	43	40	36	33	30	27	24	21	18	16	13	10	8	5	2.6		
0.82	70	56	50	45	41	37	34	30	27	24	21	19	16	13	10	8	5	2.6			
0.83	67	53	47	42	38	34	31	28	25	22	19	16	13	10	8	5	2.6				
0.84	65	50	44	40	35	32	28	25	22	19	16	13	11	8	5	2.6					
0.85	62	48	42	37	33	29	26	23	19	16	14	11	8	5	2.7						
0.86	59	45	39	34	30	26	23	20	17	14	11	8	5	2.7							
0.87	57	42	36	32	28	24	20	17	14	11	8	6	2.7								
0.88	54	40	34	29	25	21	18	15	11	8	6	2.8									
0.89	51	37	31	26	22	18	15	12	9	6	2.8										
0.90	48	34	28	23	19	16	12	9	6	2.8											
0.91	46	31	25	21	16	13	9	6	3												
0.92	43	28	22	18	13	10	6	3.1													
0.93	40	25	19	14	10	7	3.2														
0.94	36	22	16	11	7	3.4															
0.95	33	19	13	8	3.7																
0.96	29	15	9	4.1																	
0.97	25	11	4.8																		
0.98	20	6																			
0.99	14																				

How to use table

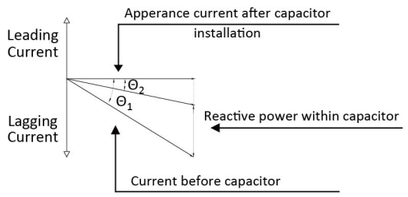
1. In case of improve the power factor to 0.95 from 0.75 at load capacity 500kW.
   Look for the cross point 55(%) from vertical axis 0.75 and horizontal axis 0.95 Then demanded capacity = 500kW×0.55=275kVA

2. In case of KVA load,
   At first calculate KW = KVA × $COS\Theta_1$
   then calculate as same as #1

Qc = Capacity(Kvar)
Pr = Active power (kW)
$Cos\Theta_1$ = Power factor before correction
$Cos\Theta_2$ = Power factor after correction

Qc = 필요로 하는 콘덴서 용량(Kvar)
Pr = 전부하 용량 (kW)
$Cos\Theta_1$ = 현재 역률
$Cos\Theta_2$ = 개선 후 역률

$$Qc = Pr\left(\frac{\sqrt{1-\cos^2\Theta_1}}{\cos\Theta_1} - \frac{\sqrt{1-\cos^2\Theta_2}}{\cos\Theta_2}\right)$$



Capacity calculation table for load | 부하별 콘덴서 용량산출표

■ : Three-Phase induction motor 3상 유도 전동기

Out Put		필요한 콘덴서 용량 (60Hz)					
		220 VAC		380 VAC		440 VAC	
kW	HP	μF	Kvar	μF	Kvar	μF	Kvar
0.2	1/4	15	0.27	5	0.27	5	0.36
0.4	1/2	20	0.36	5	0.27	5	0.36
0.75	1	30	0.55	7.5	0.41	5	0.36
1	1.3	30	0.55	7.5	0.41	7.5	0.55
1.1	1.5	30	0.55	10	0.54	7.5	0.55
1.5	2	50	0.91	10	0.54	10	0.73
2	2.5	50	0.91	15	0.82	10	0.73
2.2	3	75	1.37	15	0.82	15	1.09
3	4	75	1.37	20	1.09	15	1.09
3.7	5	100	1.82	20	1.09	20	1.46
4	5.5	100	1.82	30	1.63	20	1.46
5	7	100	1.82	40	2.18	30	2.19
5.5	7.5	175	3.19	50	2.72	30	2.19
7.5	10	200	3.65	75	4.08	40	2.92
10	13.5	250	4.56	100	5.44	50	3.65
11	15	300	5.47	100	5.44	75	5.47
15	20	400	7.30	100	5.44	75	5.47
19	25	500	9.12	150	8.17	100	7.30
20	26.5	500	9.12	150	8.17	100	7.30
22	30	500	9.12	150	8.17	100	7.30
25	33.5	600	10.9	200	10.9	150	10.9
30	40	800	14.6	200	10.9	150	10.9
37	50	900	16.4	250	13.6	200	14.6
40	53.5	1000	18.2	300	16.3	200	14.6
45	60	1100	20.1	300	16.3	250	18.2
50	66.5	1200	21.9	350	19.1	250	18.2
55	75	1300	23.7	400	21.8	300	21.9

■ Arc welder for 220VAC 220VAC 아크 용접기

Input (kVA)	콘덴서 용량 (60Hz)	
	μF	Kvar
1	50	0.91
2	75	1.37
3	100	1.82
5	150	2.74
7.5	250	4.56
10	300	5.47
15	450	8.21
20	600	10.9
25	700	12.8
30	900	16.4
35	1000	18.2
40	1100	20.1
45	1300	23.7
50	1450	26.5

AC resistance welding machine and DC welding machine uses to 1/2 of μF
교류 저항 용접기와 DC 용접기는 상기 μF에 ½ 로 사용함.

■ Single-Phase induction motor 단상 유도 전동기

Out Put		Capacity of Capacitors(콘덴서 용량 (60Hz))			
		220 VAC		380 VAC	
kW	HP	μF	Kvar	μF	Kvar
0.1	1/8	15	0.27	5	0.27
0.2	1/4	20	0.36	5	0.27
0.25		30	0.55	7.5	0.41
0.4	1/2	30	0.55	7.5	0.41
0.55		30	0.55	10	0.54
0.75	1	50	0.91	10	0.54
1.0		50	0.91	15	0.82

The thickness of wire & connecting with capacitor | 전선 굵기 선정

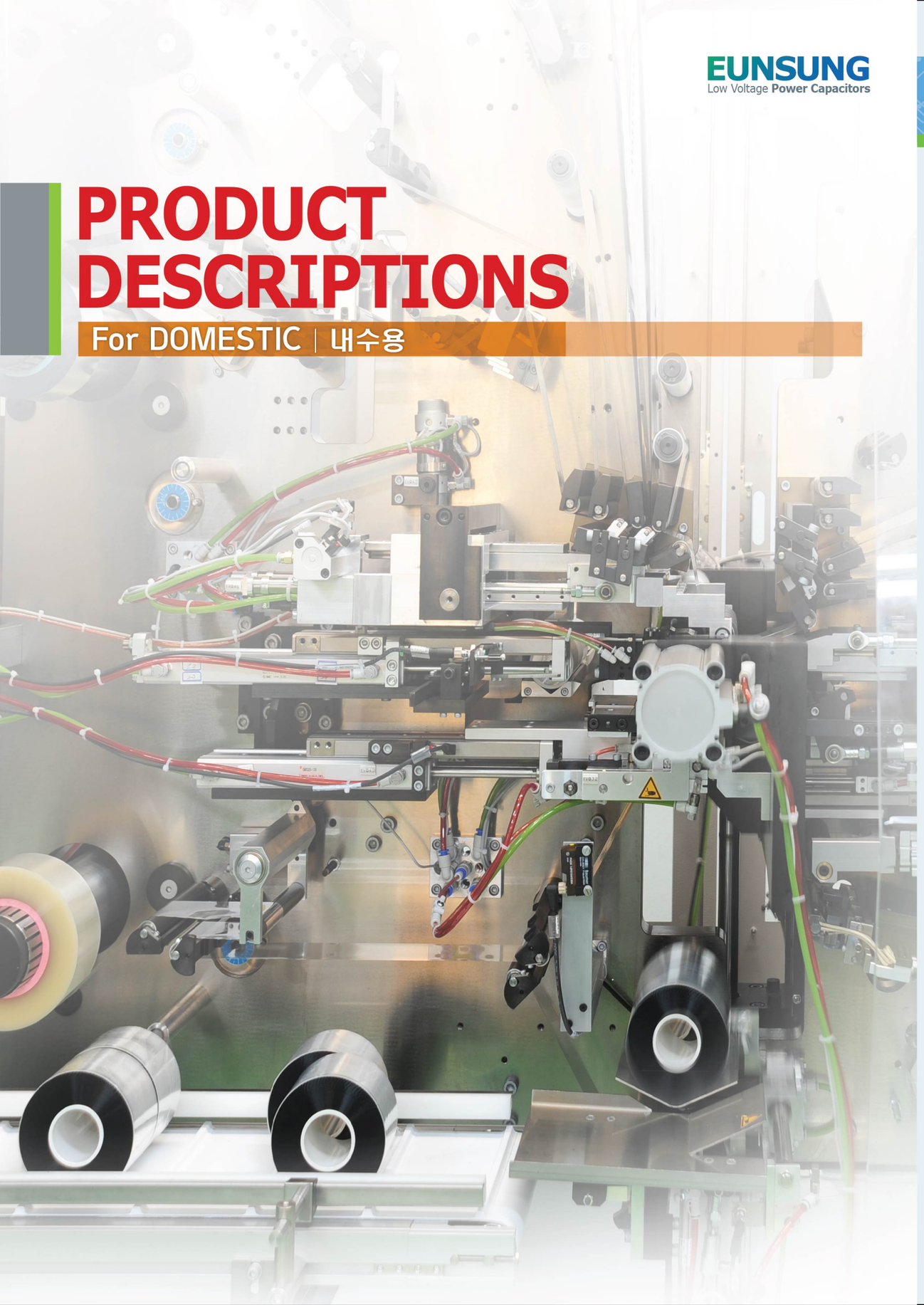
The least thickness of electric wire(copper)(㎟)				2.0	3.5	5.5	8.0	14	22	30	38	50	60	80	100
Rated current of capacitor(A)				10	15	20	30	40	50	60	75	90	100	125	150
Capacity of switch (A)				15	30	30	50	75	100	100	150	200	200	225	300
Capacitance (μF)	60 Hz	1 Φ	220V	120	180	240	360	485	600	730	910	1100	1200	1500	1800
		3 Φ	220V	210	315	415	630	840	1015	1250	1550	1900	2100	2600	3150
			380V	120	180	240	360	485	600	730	910	1100	1200	1500	1800
			440V	105	155	210	310	420	520	630	780	940	1050	1300	1500

※ Please use exclusive breaker for capacitor and allowable current can be 1.5 times higher than capacitor.
※ 차단기는 Capacitor 전용 차단기를 사용 하시고 허용 전류는 Capacitor의 1.5배의 전류 제품을 사용 하십시요.

EUNSUNG
Low Voltage **Power Capacitors**

PRODUCT DESCRIPTIONS

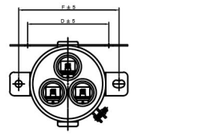
For DOMESTIC | 내수용

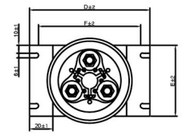


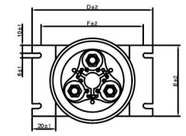
SPECIFICATIONS



Construction & dimension | 구조 및 치수







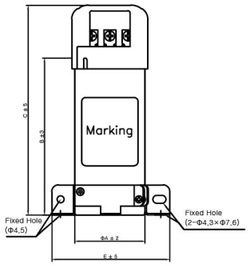


Fig 1

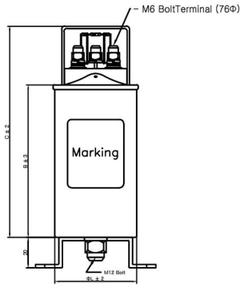


Fig 2

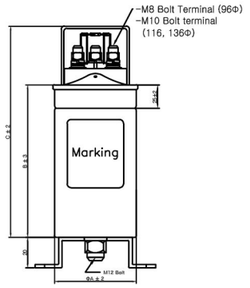


Fig 3

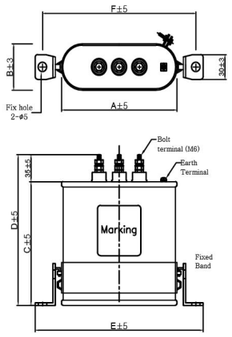


Fig 4

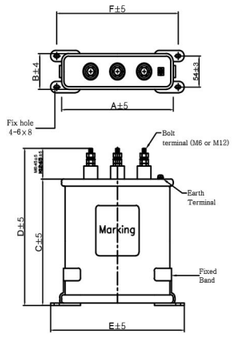


Fig 5

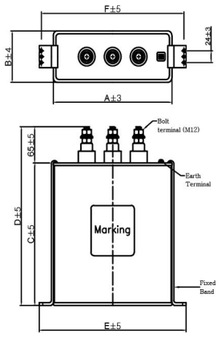


Fig 6

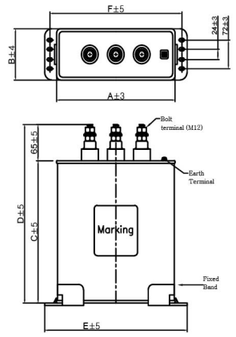


Fig 7

PRODUCT DESCRIPTIONS



For DOMESTIC | 내수용 | 220V, 60Hz [ESL-Oil Type/습식]

Permitted Overload Voltage		허용 과전압	
24 Hr	220 VAC	24시간	220 VAC
Less than 8 hours during 24 hours	242 VAC	24시간중 8시간 이내	242 VAC
Less than 30 minute during 24 hours	253 VAC	24시간중 30분 이내	253 VAC
Less than 2 times during 5 minute for 1 month	264 VAC	1개월중에서 5분이내가 2회 이하	264 VAC
Less than 2 times during 1 minute for 1 month	286 VAC	1개월 중에서 1분 이내가 2회 이하	286 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESL6-22010S/TC			10	0.18		0.83		50	65	110	65	80	73	
ESL6-22015S/TC			15	0.27		1.24		50	65	110	65	80	73	
ESL6-22020S/TC			20	0.36		1.66		50	65	110	65	80	73	
ESL6-22030S/TC			30	0.55	1Φ	2.49		50	65	110	65	80	73	
ESL6-22040S/TC			40	0.73		3.32		50	65	110	65	80	73	
ESL6-22050S/TC			50	0.91		4.14		50	75	120	65	80	73	
ESL6-22075S/TC			75	1.37		6.22		50	85	130	65	80	73	
ESL6-22100S/TC			100	1.82		8.29		50	105	150	65	80	73	
	ESL6-22010T/TC		10	0.18			0.48	50	105	150	65	80	73	
	ESL6-22015T/TC		15	0.27			0.72	50	105	150	65	80	73	
	ESL6-22020T/TC		20	0.36			0.96	50	105	150	65	80	73	Fig 1
	ESL6-22030T/TC		30	0.55	3Φ		1.44	50	135	180	65	80	73	
	ESL6-22040T/TC	220V	40	0.73			1.91	50	135	180	65	80	73	
	ESL6-22050T/TC		50	0.91			2.39	50	135	180	65	80	73	
	ESL6-22075T/TC		75	1.37			3.59	50	135	180	65	80	73	
	ESL6-22100T/TC		100	1.82			4.79	50	135	180	65	80	73	
ESL6-22150S/TC	ESL6-22150T/TC		150	2.74		12.4	7.18	50	165	210	65	80	73	
ESL6-22200S/TC	ESL6-22200T/TC		200	3.65		16.6	9.57	63	165	210	80	95	85	
ESL6-22250S/TC	ESL6-22250T/TC		250	4.56		20.7	12.0	63	165	210	80	95	85	
ESL6-22300S/TC	ESL6-22300T/TC		300	5.47		24.9	14.4	63	195	240	80	95	85	
ESL6-22400S/TO	ESL6-22400T/TO		400	7.30		33.2	19.1	170	60	120	155	210	195	
ESL6-22500S/TO	ESL6-22500T/TO		500	9.12	1Φ or 3Φ	41.4	23.9	170	60	160	195	210	195	
ESL6-22600S/TO	ESL6-22600T/TO		600	10.9		49.7	28.7	170	60	160	195	210	195	Fig 4
ESL6-22750S/TO	ESL6-22750T/TO		750	13.7		62.2	35.9	170	60	180	215	210	195	
ESL6-22900S/TO	ESL6-22900T/TO		900	16.4		74.6	43.1	170	60	220	255	210	195	
ESL6-221000S/TR	ESL6-221000T/TR		1000	18.2		82.9	47.9	220	60	190	255	255	240	Fig 5
ESL6-2202.5KS/TC	ESL6-2202.5KT/TC		137	2.5		11.4	6.56	50	165	210	65	80	73	Fig 1
ESL6-2205KS/TC	ESL6-2205KT/TC		274	5		22.7	13.10	63	165	210	80	95	85	
ESL6-2207.5KS/TO	ESL6-2207.5KT/TO		411	7.5		34.1	19.7	170	60	120	155	210	195	
ESL6-22010KS/TO	ESL6-22010KT/TO		548	10		45.5	26.2	170	60	160	195	210	195	Fig 4
ESL6-2212.5KS/TO	ESL6-2212.5KT/TO		685	12.5	1Φ or 3Φ	56.8	32.8	170	60	180	215	210	195	
ESL6-22015KS/TO	ESL6-22015KT/TO	220V	822	15		68.2	39.4	170	60	180	215	210	195	
ESL6-22020KS/TR	ESL6-22020KT/TR		1097	20		90.9	52.5	220	60	190	235	255	240	
ESL6-22025KS/TR	ESL6-22025KT/TR		1371	25		113.6	65.6	220	60	240	285	255	240	Fig 5
ESL6-22030KS/TR	ESL6-22030KT/TR		1645	30		136.4	78.7	220	60	260	305	255	240	
	ESL6-22040KT/TR		2193	40	3Φ		105	300	120	250	315	350	330	Fig 7
	ESL6-22050KT/TR		2742	50			131	300	120	270	335	350	330	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.



For DOMESTIC | 내수용 | 220V, 60Hz [ESD-Dry Type/건식]

Permitted Overload Voltage		허용 과전압	
24 Hr	220 VAC	24시간	220 VAC
Less than 8 hours during 24 hours	242 VAC	24시간중 8시간 이내	242 VAC
Less than 30 minute during 24 hours	253 VAC	24시간중 30분 이내	253 VAC
Less than 2 times during 5 minute for 1 month	264 VAC	1개월중에서 5분이내가 2회 이하	264 VAC
Less than 2 times during 1 minute for 1 month	286 VAC	1개월 중에서 1분 이내가 2회 이하	286 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESD6-22010S/TC			10	0.18		0.83		50	65	110	65	80	73	
ESD6-22015S/TC			15	0.27		1.24		50	65	110	65	80	73	
ESD6-22020S/TC			20	0.36		1.66		50	65	110	65	80	73	
ESD6-22030S/TC			30	0.55		2.49		50	65	110	65	80	73	
ESD6-22040S/TC			40	0.73	1Φ	3.32		50	65	110	65	80	73	
ESD6-22050S/TC			50	0.91		4.14		50	75	120	65	80	73	
ESD6-22075S/TC			75	1.37		6.22		50	85	130	65	80	73	
ESD6-22100S/TC			100	1.82		8.29		50	105	150	65	80	73	
	ESD6-22010T/TC		10	0.18			0.48	50	105	150	65	80	73	
	ESD6-22015T/TC		15	0.27			0.72	50	105	150	65	80	73	
	ESD6-22020T/TC		20	0.36			0.96	50	105	150	65	80	73	Fig 1
	ESD6-22030T/TC		30	0.55	3Φ		1.44	50	135	180	65	80	73	
	ESD6-22040T/TC	220V	40	0.73			1.91	50	135	180	65	80	73	
	ESD6-22050T/TC		50	0.91			2.39	50	135	180	65	80	73	
	ESD6-22075T/TC		75	1.37			3.59	50	135	180	65	80	73	
	ESD6-22100T/TC		100	1.82			4.79	50	135	180	65	80	73	
ESD6-22150S/TC	ESD6-22150T/TC		150	2.74		12.4	7.18	50	165	210	65	80	73	
ESD6-22200S/TC	ESD6-22200T/TC		200	3.65		16.6	9.57	63	165	210	80	95	85	
ESD6-22250S/TC	ESD6-22250T/TC		250	4.56		20.7	12.0	63	165	210	80	95	85	
ESD6-22300S/TC	ESD6-22300T/TC		300	5.47		24.9	14.4	63	195	240	80	95	85	
ESD6-22400S/TC	ESD6-22400T/TC		400	7.30		33.2	19.1	76	175	219	110	80	90	
ESD6-22500S/TC	ESD6-22500T/TC		500	9.12	1Φ or 3Φ	41.4	23.9	76	205	249	110	80	90	Fig 2
ESD6-22600S/TC	ESD6-22600T/TC		600	10.9		49.7	28.7	76	235	279	110	80	90	
ESD6-22750S/TC	ESD6-22750T/TC		750	13.7		62.2	35.9	96	240	284	126	96	106	
ESD6-22900S/TC	ESD6-22900T/TC		900	16.4		74.6	43.1	96	270	314	126	96	106	Fig 3
ESD6-221000S/TC	ESD6-221000T/TC		1000	18.2		82.9	47.9	116	210	254	146	110	126	
ESD6-2202.5KS/TC	ESD6-2202.5KT/TC		137	2.5		11.4	6.56	50	165	210	65	80	73	Fig 1
ESD6-2205KS/TC	ESD6-2205KT/TC		274	5		22.7	13.10	63	165	210	80	95	85	
ESD6-2207.5KS/TC	ESD6-2207.5KT/TC		411	7.5		34.1	19.7	76	175	219	110	80	90	Fig 2
ESD6-22010KS/TC	ESD6-22010KT/TC		548	10		45.5	26.2	76	235	279	110	80	90	
ESD6-2212.5KS/TC	ESD6-2212.5KT/TC		685	12.5	1Φ or 3Φ	56.8	32.8	96	240	284	126	96	106	
ESD6-22015KS/TC	ESD6-22015KT/TC	220V	822	15		68.2	39.4	96	270	314	126	96	106	
ESD6-22020KS/TC	ESD6-22020KT/TC		1097	20		90.9	52.5	116	210	254	146	110	126	
ESD6-22025KS/TC	ESD6-22025KT/TC		1371	25		113.6	65.6	136	210	254	170	130	150	Fig 3
ESD6-22030KS/TC	ESD6-22030KT/TC		1645	30		136.4	78.7	136	240	284	170	130	150	
	ESD6-22040KT/TC		2193	40	3Φ		105	136	270	314	170	130	150	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

PRODUCT DESCRIPTIONS



For DOMESTIC | 내수용 | 380V, 60Hz [ESL-Oil Type/습식]

Permitted Overload Voltage		허용 과전압	
24 Hr	380 VAC	24시간	380 VAC
Less than 8 hours during 24 hours	418 VAC	24시간중 8시간 이내	418 VAC
Less than 30 minute during 24 hours	437 VAC	24시간중 30분 이내	437 VAC
Less than 2 times during 5 minute for 1 month	456 VAC	1개월중에서 5분이내가 2회 이하	456 VAC
Less than 2 times during 1 minute for 1 month	494 VAC	1개월 중에서 1분 이내가 2회 이하	494 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESL6-38010S/TC	ESL6-38010T/TC	380V	10	0.54	1Φ or 3Φ	1.43	0.83	50	105	150	65	80	73	Fig 1
ESL6-38015S/TC	ESL6-38015T/TC		15	0.82		2.15	1.24	50	105	150	65	80	73	
ESL6-38020S/TC	ESL6-38020T/TC		20	1.09		2.86	1.65	50	105	150	65	80	73	
ESL6-38030S/TC	ESL6-38030T/TC		30	1.63		4.30	2.48	50	135	180	65	80	73	
ESL6-38040S/TC	ESL6-38040T/TC		40	2.18		5.73	3.31	50	165	210	65	80	73	
ESL6-38050S/TC	ESL6-38050T/TC		50	2.72		7.16	4.13	50	165	210	65	80	73	
ESL6-38075S/TC	ESL6-38075T/TC		75	4.08		10.7	6.20	63	165	210	80	95	85	
ESL6-38100S/TC	ESL6-38100T/TC		100	5.44		14.3	8.27	63	195	240	80	95	85	
ESL6-38150S/TO	ESL6-38150T/TO		150	8.16		21.5	12.4	170	60	120	155	210	195	Fig 4
ESL6-38200S/TO	ESL6-38200T/TO		200	10.9		28.6	16.5	170	60	160	195	210	195	
ESL6-38250S/TO	ESL6-38250T/TO		250	13.6		35.8	20.7	170	60	180	215	210	195	
ESL6-38300S/TO	ESL6-38300T/TO		300	16.3		43.0	24.8	170	60	200	235	210	195	
ESL6-38400S/TR	ESL6-38400T/TR		400	21.8		57.3	33.1	220	60	200	245	255	240	Fig 5
ESL6-38500S/TR	ESL6-38500T/TR		500	27.2		71.6	41.3	220	60	260	305	255	240	
ESL6-38600S/TR	ESL6-38600T/TR		600	32.6		85.9	49.6	220	60	310	355	255	240	
ESL6-38750S/TR	ESL6-38750T/TR		750	40.8		107	62.0	240	85	280	345	275	265	Fig 6
ESL6-38900S/TR	ESL6-38900T/TR		900	49.0		129	74.4	240	85	300	365	275	265	
ESL6-381000S/TR	ESL6-381000T/TR		1000	54.4		143	82.7	240	85	300	365	275	265	
ESL6-3802.5KS/TC	ESL6-3802.5KT/TC	380V	45.9	2.5	1Φ or 3Φ	6.58	3.80	50	165	210	65	80	73	Fig 1
ESL6-3805KS/TC	ESL6-3805KT/TC		91.9	5		13.2	7.60	63	165	210	80	95	85	
ESL6-3807.5KS/TO	ESL6-3807.5KT/TO		138	7.5		19.7	11.4	170	60	120	155	210	195	Fig 4
ESL6-38010KS/TO	ESL6-38010KT/TO		184	10		26.3	15.2	170	60	160	195	210	195	
ESL6-3812.5KS/TO	ESL6-3812.5KT/TO		230	12.5		32.9	19.0	170	60	160	195	210	195	
ESL6-38015KS/TO	ESL6-38015KT/TO		276	15		39.5	22.8	170	60	180	215	210	195	
ESL6-38020KS/TR	ESL6-38020KT/TR		368	20		52.6	30.4	220	60	190	235	255	240	Fig 5
ESL6-38025KS/TR	ESL6-38025KT/TR		459	25		65.8	38.0	220	60	260	305	255	240	
ESL6-38030KS/TR	ESL6-38030KT/TR		551	30		78.9	45.6	220	60	270	315	255	240	
ESL6-38040KS/TR	ESL6-38040KT/TR		735	40		105	60.8	240	85	280	345	275	265	Fig 6
ESL6-38050KS/TR	ESL6-38050KT/TR		919	50		132	76.0	240	85	300	365	275	265	
	ESL6-38075KT/TR		1378	75	3Φ		114	300	120	270	335	350	330	Fig 7
	ESL6-38100KT/TR		1838	100			152	300	120	350	415	350	330	

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※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 안전장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.



For DOMESTIC | 내수용 | 380V, 60Hz [ESD-Dry Type/건식]

Permitted Overload Voltage		허용 과전압	
24 Hr	380 VAC	24시간	380 VAC
Less than 8 hours during 24 hours	418 VAC	24시간중 8시간 이내	418 VAC
Less than 30 minute during 24 hours	437 VAC	24시간중 30분 이내	437 VAC
Less than 2 times during 5 minute for 1 month	456 VAC	1개월중에서 5분이내가 2회 이하	456 VAC
Less than 2 times during 1 minute for 1 month	494 VAC	1개월 중에서 1분 이내가 2회 이하	494 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESD6-38010S/TC	ESD6-38010T/TC	380V	10	0.54	1Φ or 3Φ	1.43	0.83	50	105	150	65	80	73	Fig 1
ESD6-38015S/TC	ESD6-38015T/TC		15	0.82		2.15	1.24	50	105	150	65	80	73	
ESD6-38020S/TC	ESD6-38020T/TC		20	1.09		2.86	1.65	50	105	150	65	80	73	
ESD6-38030S/TC	ESD6-38030T/TC		30	1.63		4.30	2.48	50	135	180	65	80	73	
ESD6-38040S/TC	ESD6-38040T/TC		40	2.18		5.73	3.31	50	165	210	65	80	73	
ESD6-38050S/TC	ESD6-38050T/TC		50	2.72		7.16	4.13	50	165	210	65	80	73	
ESD6-38075S/TC	ESD6-38075T/TC		75	4.08		10.7	6.20	63	165	210	80	95	85	
ESD6-38100S/TC	ESD6-38100T/TC		100	5.44		14.3	8.27	63	195	240	80	95	85	
ESD6-38150S/TC	ESD6-38150T/TC		150	8.16		21.5	12.4	76	205	249	110	80	90	Fig 2
ESD6-38200S/TC	ESD6-38200T/TC		200	10.9		28.6	16.5	76	235	279	110	80	90	
ESD6-38250S/TC	ESD6-38250T/TC		250	13.6		35.8	20.7	76	265	309	110	80	90	
ESD6-38300S/TC	ESD6-38300T/TC		300	16.3		43.0	24.8	96	270	314	126	96	106	Fig 3
ESD6-38400S/TC	ESD6-38400T/TC		400	21.8		57.3	33.1	116	240	284	146	110	126	
ESD6-38500S/TC	ESD6-38500T/TC		500	27.2		71.6	41.3	116	270	314	146	110	126	
ESD6-38600S/TC	ESD6-38600T/TC		600	32.6		85.9	49.6	136	240	284	170	130	150	
ESD6-38750S/TC	ESD6-38750T/TC		750	40.8		107	62.0	136	270	314	170	130	150	
ESD6-3802.5KS/TC	ESD6-3802.5KT/TC	380V	45.9	2.5	1Φ or 3Φ	6.58	3.80	50	165	210	65	80	73	Fig 1
ESD6-3805KS/TC	ESD6-3805KT/TC		91.9	5		13.2	7.60	63	165	210	80	95	85	
ESD6-3807.5KS/TC	ESD6-3807.5KT/TC		138	7.5		19.7	11.4	76	205	249	110	80	90	Fig 2
ESD6-38010KS/TC	ESD6-38010KT/TC		184	10		26.3	15.2	76	235	279	110	80	90	
ESD6-3812.5KS/TC	ESD6-3812.5KT/TC		230	12.5		32.9	19.0	76	265	309	110	80	90	
ESD6-38015KS/TC	ESD6-38015KT/TC		276	15		39.5	22.8	96	270	314	126	96	106	Fig 3
ESD6-38020KS/TC	ESD6-38020KT/TC		368	20		52.6	30.4	116	240	284	146	110	126	
ESD6-38025KS/TC	ESD6-38025KT/TC		459	25		65.8	38.0	116	270	314	146	110	126	
ESD6-38030KS/TC	ESD6-38030KT/TC		551	30		78.9	45.6	136	240	284	170	130	150	
ESD6-38040KS/TC	ESD6-38040KT/TC		735	40		105	60.8	136	270	314	170	130	150	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 안전장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

PRODUCT DESCRIPTIONS

For DOMESTIC | 내수용 | 440V, 60Hz [ESL-Oil Type/습식]

Permitted Overload Voltage		허용 과전압	
24 Hr	440 VAC	24시간	440 VAC
Less than 8 hours during 24 hours	484 VAC	24시간중 8시간 이내	484 VAC
Less than 30 minute during 24 hours	506 VAC	24시간중 30분 이내	506 VAC
Less than 2 times during 5 minute for 1 month	528 VAC	1개월중에서 5분이내가 2회 이하	528 VAC
Less than 2 times during 1 minute for 1 month	572 VAC	1개월 중에서 1분 이내가 2회 이하	572 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESL6-44010S/TC	ESL6-44010T/TC	440V	10	0.73	1Φ or 3Φ	1.66	0.96	50	105	150	65	80	73	Fig 1
ESL6-44015S/TC	ESL6-44015T/TC		15	1.09		2.49	1.44	50	105	150	65	80	73	
ESL6-44020S/TC	ESL6-44020T/TC		20	1.46		3.32	1.91	50	105	150	65	80	73	
ESL6-44030S/TC	ESL6-44030T/TC		30	2.19		4.97	2.87	50	135	180	65	80	73	
ESL6-44040S/TC	ESL6-44040T/TC		40	2.92		6.63	3.83	50	165	210	65	80	73	
ESL6-44050S/TC	ESL6-44050T/TC		50	3.65		8.29	4.79	50	165	210	65	80	73	
ESL6-44075S/TC	ESL6-44075T/TC		75	5.47		12.4	7.18	63	165	210	80	95	85	
ESL6-44100S/TO	ESL6-44100T/TO		100	7.29		16.6	9.57	170	60	120	155	210	195	Fig 4
ESL6-44150S/TO	ESL6-44150T/TO		150	10.9		24.9	14.4	170	60	120	155	210	195	
ESL6-44200S/TO	ESL6-44200T/TO		200	14.9		33.2	19.1	170	60	160	195	210	195	
ESL6-44250S/TO	ESL6-44250T/TO		250	18.2		41.4	23.9	170	60	180	215	210	195	
ESL6-44300S/TO	ESL6-44300T/TO		300	21.9		49.7	28.7	170	60	220	255	210	195	
ESL6-44400S/TR	ESL6-44400T/TR		400	29.2		66.3	38.3	220	60	200	245	255	240	Fig 5
ESL6-44500S/TR	ESL6-44500T/TR		500	36.5		82.9	47.9	220	60	260	305	255	240	
ESL6-44600S/TR	ESL6-44600T/TR		600	43.8		99.5	57.4	220	60	320	365	255	240	
ESL6-44750S/TR	ESL6-44750T/TR		750	54.7		124	71.8	240	85	260	325	275	265	Fig 6
ESL6-44900S/TR	ESL6-44900T/TR		900	65.7		149	86.1	240	85	280	345	275	265	
	ESL6-441000T/TR		1000	72.9	3Φ		95.7	300	120	270	335	350	330	Fig 7
ESL6-4402.5KS/TC	ESL6-4402.5KT/TC	440V	34.3	2.5	1Φ or 3Φ	5.69	3.28	50	135	180	65	80	73	Fig 1
ESL6-4405KS/TC	ESL6-4405KT/TC		68.5	5		11.4	6.56	63	165	210	80	95	85	
ESL6-4407.5KS/TO	ESL6-4407.5KT/TO		103	7.5		17.1	9.84	170	60	120	155	210	195	Fig 4
ESL6-44010KS/TO	ESL6-44010KT/TO		137	10		22.7	13.1	170	60	120	155	210	195	
ESL6-4412.5KS/TO	ESL6-4412.5KT/TO		171	12.5		28.4	16.4	170	60	120	155	210	195	
ESL6-44015KS/TO	ESL6-44015KT/TO		206	15		34.2	19.7	170	60	160	195	210	195	
ESL6-44020KS/TO	ESL6-44020KT/TO		274	20		45.4	26.2	170	60	180	215	210	195	
ESL6-44025KS/TR	ESL6-44025KT/TR		343	25		56.9	32.8	220	60	190	235	255	240	Fig 5
ESL6-44030KS/TR	ESL6-44030KT/TR		411	30		68.1	39.4	220	60	240	285	255	240	
ESL6-44040KS/TR	ESL6-44040KT/TR		548	40		90.9	52.5	220	60	300	345	255	240	
ESL6-44050KS/TR	ESL6-44050KT/TR		685	50		114	65.6	240	85	230	295	275	265	Fig 6
	ESL6-44075KT/TR		1028	75	3Φ		98.4	300	120	270	335	350	330	Fig 7
	ESL6-44100KT/TR		1371	100			131	300	120	350	415	350	330	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.
※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

For DOMESTIC | 내수용 | 440V, 60Hz [ESD-Dry Type/건식]

Permitted Overload Voltage		허용 과전압	
24 Hr	440 VAC	24시간	440 VAC
Less than 8 hours during 24 hours	484 VAC	24시간중 8시간 이내	484 VAC
Less than 30 minute during 24 hours	506 VAC	24시간중 30분 이내	506 VAC
Less than 2 times during 5 minute for 1 month	528 VAC	1개월중에서 5분이내가 2회 이하	528 VAC
Less than 2 times during 1 minute for 1 month	572 VAC	1개월 중에서 1분 이내가 2회 이하	572 VAC

Type No.		Rated Voltage (VAC)	Rated Capacity		Phase (Φ)	Rated Current (A)		Dimension (mm)						Fig No
1Φ	3Φ		μF	KVAR		1Φ	3Φ	A	B	C	D	E	F	
ESD6-44010S/TC	ESD6-44010T/TC	440V	10	0.73	1Φ or 3Φ	1.66	0.96	50	105	150	65	80	73	Fig 1
ESD6-44015S/TC	ESD6-44015T/TC		15	1.09		2.49	1.44	50	105	150	65	80	73	
ESD6-44020S/TC	ESD6-44020T/TC		20	1.46		3.32	1.91	50	105	150	65	80	73	
ESD6-44030S/TC	ESD6-44030T/TC		30	2.19		4.97	2.87	50	135	180	65	80	73	
ESD6-44040S/TC	ESD6-44040T/TC		40	2.92		6.63	3.83	50	165	210	65	80	73	
ESD6-44050S/TC	ESD6-44050T/TC		50	3.65		8.29	4.79	50	165	210	65	80	73	
ESD6-44075S/TC	ESD6-44075T/TC		75	5.47		12.4	7.18	63	165	210	80	95	85	
ESD6-44100S/TC	ESD6-44100T/TC		100	7.29		16.6	9.57	63	195	240	80	95	85	
ESD6-44150S/TC	ESD6-44150T/TC		150	10.9		24.9	14.4	76	205	249	110	80	90	Fig 2
ESD6-44200S/TC	ESD6-44200T/TC		200	14.9		33.2	19.1	76	235	279	110	80	90	
ESD6-44250S/TC	ESD6-44250T/TC		250	18.2		41.4	23.9	96	240	284	126	96	106	Fig 3
ESD6-44300S/TC	ESD6-44300T/TC		300	21.9		49.7	28.7	96	270	314	126	96	106	
ESD6-44400S/TC	ESD6-44400T/TC		400	29.2		66.3	38.3	116	240	284	146	110	126	
ESD6-44500S/TC	ESD6-44500T/TC		500	36.5		82.9	47.9	116	270	314	146	110	126	
ESD6-44600S/TC	ESD6-44600T/TC		600	43.8		99.5	57.4	136	240	284	170	130	150	
ESD6-44750S/TC	ESD6-44750T/TC		750	54.7		124	71.8	136	270	314	170	130	150	
ESD6-4402.5KS/TC	ESD6-4402.5KT/TC	440V	34.3	2.5	1Φ or 3Φ	5.69	3.28	50	135	180	65	80	73	Fig 1
ESD6-4405KS/TC	ESD6-4405KT/TC		68.5	5		11.4	6.56	63	165	210	80	90	85	
ESD6-4407.5KS/TC	ESD6-4407.5KT/TC		103	7.5		17.1	9.84	63	195	240	80	90	85	
ESD6-44010KS/TC	ESD6-44010KT/TC		137	10		22.7	13.1	76	205	249	110	80	90	Fig 2
ESD6-4412.5KS/TC	ESD6-4412.5KT/TC		171	12.5		28.4	16.4	76	235	279	110	80	90	
ESD6-44015KS/TC	ESD6-44015KT/TC		206	15		34.2	19.7	76	235	279	110	80	90	
ESD6-44020KS/TC	ESD6-44020KT/TC		274	20		45.4	26.2	96	270	314	126	96	106	Fig 3
ESD6-44025KS/TC	ESD6-44025KT/TC		343	25		56.9	32.8	116	210	254	146	110	126	
ESD6-44030KS/TC	ESD6-44030KT/TC		411	30		68.1	39.4	116	240	284	146	110	126	
ESD6-44040KS/TC	ESD6-44040KT/TC		548	40		90.9	52.5	136	240	284	170	130	150	
ESD6-44050KS/TC	ESD6-44050KT/TC		685	50		114	65.6	136	270	314	170	130	150	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.
※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

EUNSUNG
Low Voltage Power Capacitors

PRODUCT DESCRIPTIONS

For EXPORT | 수출용

SPECIFICATIONS



Construction & dimension | 구조 및 치수

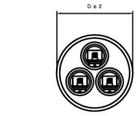


Fig 1

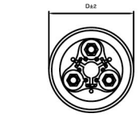


Fig 2

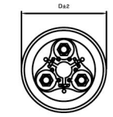


Fig 3

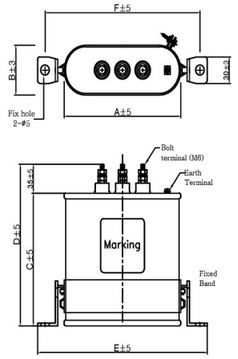


Fig 4

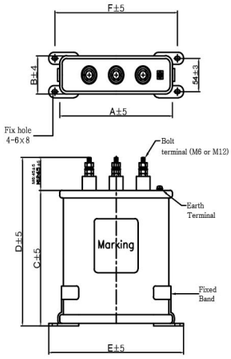


Fig 5

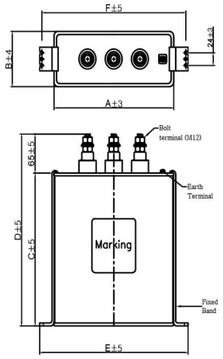


Fig 6

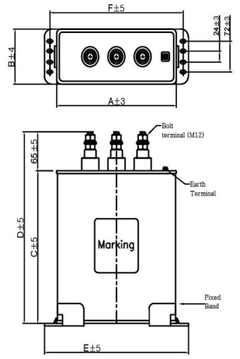


Fig 7

PRODUCT DESCRIPTIONS



For EXPORT | 수출용 | 50Hz [ESL-Oil Type/습식]

▶ 230V, 50Hz, 3 Phase

24 Hr	..... 230 VAC
Less than 8 hours during 24 hours	..... 253 VAC
Less than 30 minute during 24 hours	..... 265 VAC
Less than 2 times during 5 minute for 1 month	.... 276 VAC
Less than 2 times during 1 minute for 1 month	.... 299 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL5-2302.5KT/TC	2.5	151	6.3	50	165	210	53			Fig 1
ESL5-2305KT/TC	5	301	12.6	63	165	210	63			
ESL5-2307.5KT/TC	7.5	452	18.8	76	205	249	80			Fig 2
ESL5-23010KT/TC	10	602	25.1	76	235	279	80			
ESL5-23012.5KT/TC	12.5	753	31.4	76	265	309	80			
ESL5-23015KT/TR	15	903	37.7	220	60	180	225	255	240	Fig 5
ESL5-23020KT/TR	20	1204	50.2	220	60	240	285	255	240	
ESL5-23025KT/TR	25	1505	62.8	220	60	260	305	255	240	
ESL5-23030KT/TR	30	1806	75.3	220	60	320	365	255	240	
ESL5-23040KT/TR	40	2408	100.0	300	120	250	315	350	330	Fig 7
ESL5-23050KT/TR	50	3010	126.0	300	120	300	365	350	330	

▶ 400V, 50Hz, 3 Phase

24 Hr	..... 400 VAC
Less than 8 hours during 24 hours	..... 440 VAC
Less than 30 minute during 24 hours	..... 460 VAC
Less than 2 times during 5 minute for 1 month	.... 480 VAC
Less than 2 times during 1 minute for 1 month	.... 520 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL5-4002.5KT/TC	2.5	49.8	3.6	50	135	180	53			Fig 1
ESL5-4005KT/TC	5	99.5	7.2	63	165	210	66			
ESL5-4007.5KT/TC	7.5	149	10.8	63	195	240	66			Fig 2
ESL5-40010KT/TC	10	199	14.4	76	205	249	80			
ESL5-40012.5KT/TC	12.5	249	18.0	76	235	279	80			
ESL5-40015KT/TC	15	299	21.7	76	265	309	80			Fig 5
ESL5-40020KT/TR	20	398	28.9	220	60	200	245	255	240	
ESL5-40025KT/TR	25	498	36.1	220	60	260	305	255	240	
ESL5-40030KT/TR	30	597	43.3	220	60	320	365	255	240	
ESL5-40040KT/TR	40	796	57.7	240	85	280	345	275	265	Fig 6
ESL5-40050KT/TR	50	995	72.2	300	120	210	275	350	330	Fig 7

▶ 415V, 50Hz, 3 Phase

24 Hr	..... 415 VAC
Less than 8 hours during 24 hours	..... 457 VAC
Less than 30 minute during 24 hours	..... 477 VAC
Less than 2 times during 5 minute for 1 month	..... 498 VAC
Less than 2 times during 1 minute for 1 month	..... 540 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL5-4202.5KT/TC	2.5	46.2	3.5	50	135	180	53			Fig 1
ESL5-4205KT/TC	5	92.5	7.0	63	165	210	66			
ESL5-4207.5KT/TC	7.5	139	10.4	63	195	240	66			Fig 2
ESL5-42010KT/TC	10	185	13.9	76	205	249	80			
ESL5-42012.5KT/TC	12.5	231	17.4	76	235	279	80			
ESL5-42015KT/TC	15	277	20.9	76	235	279	80			
ESL5-42020KT/TR	20	370	27.8	220	60	190	235	255	240	Fig 5
ESL5-42025KT/TR	25	462	34.8	220	60	260	305	255	240	
ESL5-42030KT/TR	30	555	41.7	220	60	270	315	255	240	
ESL5-42040KT/TR	40	740	55.6	240	85	260	325	275	265	Fig 6
ESL5-42050KT/TR	50	925	69.6	240	85	280	345	275	265	

▶ 440V, 50Hz, 3 Phase

24 Hr	..... 440 VAC
Less than 8 hours during 24 hours	..... 484 VAC
Less than 30 minute during 24 hours	..... 506 VAC
Less than 2 times during 5 minute for 1 month	..... 528 VAC
Less than 2 times during 1 minute for 1 month	..... 572 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL5-4402.5KT/TC	2.5	41.1	3.3	50	165	210	53			Fig 1
ESL5-4405KT/TC	5	82.2	6.6	63	165	210	66			
ESL5-4407.5KT/TC	7.5	123	9.8	76	175	219	80			Fig 2
ESL5-44010KT/TC	10	164	13.1	76	205	249	80			
ESL5-44012.5KT/TC	12.5	206	16.4	76	265	309	80			
ESL5-44015KT/TO	15	247	19.7	170	60	180	215	210	195	Fig 4
ESL5-44020KT/TR	20	329	26.2	220	60	180	215	255	240	Fig 5
ESL5-44025KT/TR	25	411	32.8	220	60	240	285	255	240	
ESL5-44030KT/TR	30	493	39.4	220	60	260	305	255	240	
ESL5-44040KT/TR	40	658	52.5	240	85	230	295	275	265	Fig 6
ESL5-44050KT/TR	50	822	65.6	240	85	280	345	275	265	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.



For EXPORT | 수출용 | 50Hz [ESD-Dry Type/건식]

▶ 230V, 50Hz, 3 Phase

24 Hr	..... 230 VAC
Less than 8 hours during 24 hours	..... 253 VAC
Less than 30 minute during 24 hours	..... 265 VAC
Less than 2 times during 5 minute for 1 month	.... 276 VAC
Less than 2 times during 1 minute for 1 month	.... 299 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD5-2302.5KT/TC	2.5	151	6.3	50	165	210	53	Fig 1
ESD5-2305KT/TC	5	301	12.6	63	165	210	66	
ESD5-2307.5KT/TC	7.5	452	18.8	76	205	249	80	Fig 2
ESD5-23010KT/TC	10	602	25.1	76	235	279	80	
ESD5-23012.5KT/TC	12.5	753	31.4	96	240	284	100	Fig 3
ESD5-23015KT/TC	15	903	37.7	96	270	314	100	
ESD5-23020KT/TC	20	1204	50.2	116	240	284	120	
ESD5-23025KT/TC	25	1505	62.8	116	270	314	120	
ESD5-23030KT/TC	30	1806	75.3	136	240	284	140	
ESD5-23040KT/TC	40	2408	100.0	136	285	329	140	

▶ 400V, 50Hz, 3 Phase

24 Hr	..... 400 VAC
Less than 8 hours during 24 hours	..... 440 VAC
Less than 30 minute during 24 hours	..... 460 VAC
Less than 2 times during 5 minute for 1 month	.... 480 VAC
Less than 2 times during 1 minute for 1 month	.... 520 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD5-4002.5KT/TC	2.5	49.8	3.6	50	135	180	53	Fig 1
ESD5-4005KT/TC	5	99.5	7.2	63	165	210	66	
ESD5-4007.5KT/TC	7.5	149	10.8	63	195	240	66	Fig 2
ESD5-40010KT/TC	10	199	14.4	76	205	249	80	
ESD5-40012.5KT/TC	12.5	249	18.0	76	235	279	80	Fig 3
ESD5-40015KT/TC	15	299	21.7	96	270	314	100	
ESD5-40020KT/TC	20	398	28.9	116	240	284	120	
ESD5-40025KT/TC	25	498	36.1	116	270	314	120	
ESD5-40030KT/TC	30	597	43.3	136	240	284	140	
ESD5-40040KT/TC	40	796	57.7	136	285	329	140	

▶ 415V, 50Hz, 3 Phase

24 Hr	..... 415 VAC
Less than 8 hours during 24 hours	..... 457 VAC
Less than 30 minute during 24 hours	..... 477 VAC
Less than 2 times during 5 minute for 1 month	..... 498 VAC
Less than 2 times during 1 minute for 1 month	..... 540 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD5-4202.5KT/TC	2.5	46.2	3.5	50	135	180	53	Fig 1
ESD5-4205KT/TC	5	92.5	7.0	63	165	210	66	
ESD5-4207.5KT/TC	7.5	139	10.4	63	195	240	66	Fig 2
ESD5-42010KT/TC	10	185	13.9	76	205	249	80	
ESD5-42012.5KT/TC	12.5	231	17.4	76	235	279	80	Fig 3
ESD5-42015KT/TC	15	277	20.9	76	235	279	80	
ESD5-42020KT/TC	20	370	27.8	116	240	284	120	
ESD5-42025KT/TC	25	462	34.8	116	270	314	120	
ESD5-42030KT/TC	30	555	41.7	136	240	284	140	
ESD5-42040KT/TC	40	740	55.6	136	270	314	140	

▶ 440V, 50Hz, 3 Phase

24 Hr	..... 440 VAC
Less than 8 hours during 24 hours	..... 484 VAC
Less than 30 minute during 24 hours	..... 506 VAC
Less than 2 times during 5 minute for 1 month	..... 528 VAC
Less than 2 times during 1 minute for 1 month	..... 572 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD5-4402.5KT/TC	2.5	41.1	3.3	50	165	210	53	Fig 1
ESD5-4405KT/TC	5	82.2	6.6	63	165	210	66	
ESD5-4407.5KT/TC	7.5	123	9.8	76	175	219	80	Fig 2
ESD5-44010KT/TC	10	164	13.1	76	205	249	80	
ESD5-44012.5KT/TC	12.5	206	16.4	96	210	254	100	Fig 3
ESD5-44015KT/TC	15	247	19.7	96	240	284	100	
ESD5-44020KT/TC	20	329	26.2	116	210	254	120	
ESD5-44025KT/TC	25	411	32.8	116	240	284	120	
ESD5-44030KT/TC	30	493	39.4	136	210	254	140	
ESD5-44040KT/TC	40	658	52.5	136	270	314	140	
ESD5-44050KT/TC	50	822	65.6	136	285	329	140	

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

PRODUCT DESCRIPTIONS



For EXPORT | 수출용 | 60Hz [ESL-Oil Type/습식]

▶ 230V, 60Hz, 3 Phase

24 Hr	230 VAC
Less than 8 hours during 24 hours	253 VAC
Less than 30 minute during 24 hours	265 VAC
Less than 2 times during 5 minute for 1 month	276 VAC
Less than 2 times during 1 minute for 1 month	299 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL6-2302.5KT/TC	2.5	125	6.3	50	165	210	53			Fig 1
ESL6-2305KT/TC	5	251	12.6	63	165	210	66			
ESL6-2307.5KT/TC	7.5	376	18.8	76	175	219	80			Fig 2
ESL6-23010KT/TC	10	502	25.1	76	205	249	80			
ESL6-23012.5KT/TC	12.5	627	31.4	76	235	279	80			
ESL6-23015KT/TC	15	753	37.7	76	265	309	80			
ESL6-23020KT/TR	20	1003	50.2	220	60	180	225	255	240	Fig 5
ESL6-23025KT/TR	25	1254	62.8	220	60	240	285	255	240	
ESL6-23030KT/TR	30	1505	75.3	220	60	260	305	255	240	
ESL6-23040KT/TR	40	2007	100	300	120	210	285	350	330	Fig 7
ESL6-23050KT/TR	50	2508	126	300	120	260	335	350	330	

▶ 400V, 60Hz, 3 Phase

24 Hr	400 VAC
Less than 8 hours during 24 hours	440 VAC
Less than 30 minute during 24 hours	460 VAC
Less than 2 times during 5 minute for 1 month	480 VAC
Less than 2 times during 1 minute for 1 month	520 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL6-4002.5KT/TC	2.5	41.5	3.6	50	135	180	53			Fig 1
ESL6-4005KT/TC	5	82.9	7.2	63	165	210	66			
ESL6-4007.5KT/TC	7.5	124	10.8	63	195	240	66			Fig 2
ESL6-40010KT/TC	10	166	14.4	76	175	219	80			
ESL6-40012.5KT/TC	12.5	207	18.0	76	205	249	80			
ESL6-40015KT/TC	15	249	21.7	76	235	279	80			
ESL6-40020KT/TR	20	332	28.9	220	60	190	235	255	240	Fig 5
ESL6-40025KT/TR	25	415	36.1	220	60	240	285	255	240	
ESL6-40030KT/TR	30	498	43.3	220	60	260	305	255	240	
ESL6-40040KT/TR	40	663	57.7	220	60	325	370	255	240	
ESL6-40050KT/TR	50	829	72.2	240	85	280	345	275	265	Fig 6

▶ 415V, 60Hz, 3 Phase

24 Hr	415 VAC
Less than 8 hours during 24 hours	457 VAC
Less than 30 minute during 24 hours	477 VAC
Less than 2 times during 5 minute for 1 month	498 VAC
Less than 2 times during 1 minute for 1 month	540 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL6-4202.5KT/TC	2.5	38.5	3.5	50	135	180	53			Fig 1
ESL6-4205KT/TC	5	77.0	7.0	63	165	210	66			
ESL6-4207.5KT/TC	7.5	116	10.4	63	165	210	66			
ESL6-42010KT/TC	10	154	13.9	63	195	240	66			
ESL6-42012.5KT/TC	12.5	193	17.4	76	205	249	80			Fig 2
ESL6-42015KT/TC	15	231	20.9	76	235	279	80			
ESL6-42020KT/TR	20	308	27.8	220	60	180	225	255	240	Fig 5
ESL6-42025KT/TR	25	385	34.8	220	60	200	245	255	240	
ESL6-42030KT/TR	30	462	41.7	220	60	260	305	255	240	
ESL6-42040KT/TR	40	616	55.6	240	85	200	265	275	265	Fig 6
ESL6-42050KT/TR	50	770	69.6	240	85	260	325	275	265	

▶ 440V, 60Hz, 3 Phase

24 Hr	440 VAC
Less than 8 hours during 24 hours	484 VAC
Less than 30 minute during 24 hours	506 VAC
Less than 2 times during 5 minute for 1 month	528 VAC
Less than 2 times during 1 minute for 1 month	572 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)						Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	E	F	
ESL6-4402.5KT/TC	2.5	34.3	3.3	50	135	180	53			Fig 1
ESL6-4405KT/TC	5	68.5	6.6	63	165	210	66			
ESL6-4407.5KT/TC	7.5	103	9.8	63	195	240	66			Fig 2
ESL6-44010KT/TC	10	137	13.1	76	205	249	80			
ESL6-44012.5KT/TC	12.5	171	16.4	76	235	279	80			
ESL6-44015KT/TC	15	206	19.7	76	235	279	80			
ESL6-44020KT/TO	20	274	26.2	170	60	180	215	210	195	Fig 4
ESL6-44025KT/TR	25	343	32.8	220	60	190	235	255	240	Fig 5
ESL6-44030KT/TR	30	411	39.4	220	60	240	285	255	240	
ESL6-44040KT/TR	40	548	52.5	220	60	300	345	255	240	
ESL6-44050KT/TR	50	685	65.6	240	85	230	295	275	265	Fig 6

※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

※ When installing the capacitor, be sure to secure an insulation space of +50mm in height above the terminal for operation of protected device.
※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.



For EXPORT | 수출용 | 60Hz [ESD-Dry Type/건식]

▶ 230V, 60Hz, 3 Phase

24 Hr	230 VAC
Less than 8 hours during 24 hours	253 VAC
Less than 30 minute during 24 hours	265 VAC
Less than 2 times during 5 minute for 1 month	276 VAC
Less than 2 times during 1 minute for 1 month	299 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD6-2302.5KT/TC	2.5	125	6.3	50	165	210	53	Fig 1
ESD6-2305KT/TC	5	251	12.6	63	165	210	66	
ESD6-2307.5KT/TC	7.5	376	18.8	76	175	219	80	Fig 2
ESd6-23010KT/TC	10	502	25.1	76	205	249	80	
ESD6-23012.5KT/TC	12.5	627	31.4	76	235	279	80	
ESD6-23015KT/TC	15	753	37.7	96	240	284	100	Fig 3
ESD6-23020KT/TC	20	1003	50.2	116	210	254	120	
ESD6-23025KT/TC	25	1254	62.8	116	240	284	120	
ESD6-23030KT/TC	30	1505	75.3	136	210	254	140	
ESD6-23040KT/TC	40	2007	100	136	270	314	140	

▶ 400V, 60Hz, 3 Phase

24 Hr	400 VAC
Less than 8 hours during 24 hours	440 VAC
Less than 30 minute during 24 hours	460 VAC
Less than 2 times during 5 minute for 1 month	480 VAC
Less than 2 times during 1 minute for 1 month	520 VAC

Type No.	Rated Capacity		Ic	Dimension (mm)				Fig No
3Φ	KVAR	μF	(A)	A	B	C	D	
ESD6-4002.5KT/TC	2.5	41.5	3.6	50	135	180	53	Fig 1
ESD6-4005KT/TC	5	82.9	7.2	63	165	210	66	
ESD6-4007.5KT/TC	7.5	124	10.8	63	195	240	66	Fig 2
ESD6-40010KT/TC	10	166	14.4	76	175	219	80	
ESD6-40012.5KT/TC	12.5	207	18.0	76	205	249	80	
ESD6-40015KT/TC	15	249	21.7	76	235	279	80	
ESD6-40020KT/TC	20	332	28.9	116	210	254	120	Fig 3
ESD6-40025KT/TC	25	415	36.1	116	240	284	120	
ESD6-40030KT/TC	30	498	43.3	116	270	314	120	
ESD6-40040KT/TC	40	663	57.7	136	270	314	140	

▶ 415V, 60Hz, 3 Phase

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ESD6-42012.5KT/TC	12.5	193	17.4	76	205	249	80	Fig 2
ESD6-42015KT/TC	15	231	20.9	76	235	279	80	
ESD6-42020KT/TC	20	308	27.8	116	210	254	119	Fig 3
ESD6-42025KT/TC	25	385	34.8	116	240	284	119	
ESD6-42030KT/TC	30	462	41.7	116	270	314	120	
ESD6-42040KT/TC	40	616	55.6	136	240	284	140	
ESD6-42050KT/TC	50	770	69.6	136	270	314	140	

▶ 440V, 60Hz, 3 Phase

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Less than 8 hours during 24 hours	484 VAC
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ESD6-4407.5KT/TC	7.5	103	9.8	63	195	240	66	
ESD6-44010KT/TC	10	137	13.1	76	205	249	80	Fig 2
ESD6-44012.5KT/TC	12.5	171	16.4	76	235	279	80	
ESD6-44015KT/TC	15	206	19.7	76	235	279	80	
ESD6-44020KT/TC	20	274	26.2	96	270	314	100	Fig 3
ESD6-44025KT/TC	25	343	32.8	116	210	254	120	
ESD6-44030KT/TC	30	411	39.4	116	240	284	120	
ESD6-44040KT/TC	40	548	52.5	136	240	284	140	
ESD6-44050KT/TC	50	685	65.6	136	270	314	140	

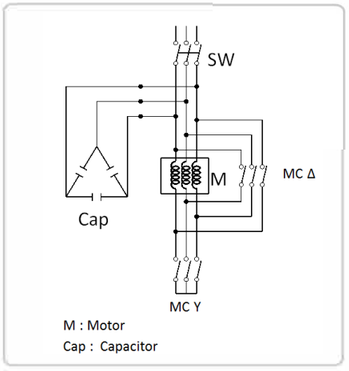
※ This dimension is able to change without notice for better quality.
※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

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※ 진상콘덴서 설치시 원활한 보안장치의 작동을 위하여 단자 상부 높이 +50mm의 절연 공간을 반드시 확보하십시요.

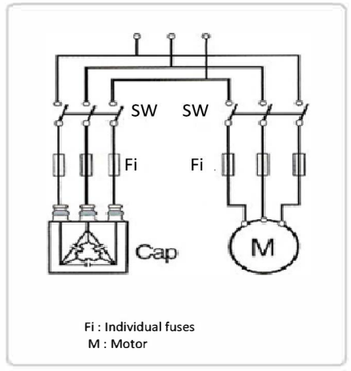


Installation of capacitor | 콘덴서 설치

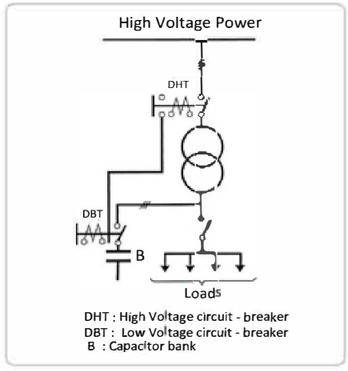
■ Connection



Power factor correction of Y-Δ starting motors
Y-Δ 기동 전동기의 역율개선시



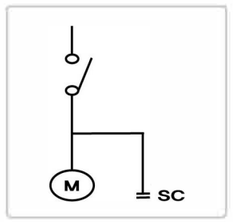
Power factor correction of motor
전동기의 역율 개선시



Power factor correction of transformer
변압기 역율 개선시

※ As installed capacitor location in Y-Δ operation system of motor, conflict phase voltage can be given to capacitor so should be installed as above picture.

※ 전동기의 Y-Δ 기동방식에서 설치된 콘덴서의 위치에 따라 콘덴서에 서로 상반되는 위상 전압이 인가 될수 있으므로 위 그림의 방식대로 설치 하셔야만 합니다.



※ When power opened on capacitor as above picture, in case serial connected with induction motor, please select capacitor to be same current as magnetizing current of induction motor.

※ 상기 그림과 같이 콘덴서가 전원 개방시 유도 전동기에 직렬로 연결 될 경우 콘덴서 전류≤유도전동기의 무부하 여자전류와 같도록 콘덴서 용량을 선정 하십시오. (자기 여자현상에 의한 전압 상승 방지)

Capacitor optimum install location | 콘덴서 적정 설치 위치

An effection of power factor correction by capacitor is appeared to power supply side in capacitor install location. Then which method can be better for capacitor install location among side of high voltage or low voltage ?

1. In high voltage side
Capacitor takes capacitive current in high voltage side and what countervail of lagging current of load is in high voltage side, power factor correction effect can be only in high voltage side where power loss or voltage drop can be appeared and such effect can't be appeared in low voltage side.
But in case capacitor install in high voltage side then economically better as capacitance can be smaller as long as voltage is higher because capacitance is in proportion again square of voltage.

2. In low voltage side
Install method of capacito in low voltage side can get effect of power factor correction in both high and low voltage sides. Specially, among passive equipments, the power factor correction of transformer output can be improved (improvement of transformer utilization ration due to drop of apparent power) but no effect even the power factor correction is done in high voltage side. More expensive as bigger size even same capacitance in low voltage side, comparing install in high voltage side.

콘덴서의 의한 역률 개선 효과는 콘덴서 설치점에서 전원측으로 나타난다. 그렇다면 콘덴서를 설치하는 경우 설치하는 위치는 고압측, 저압측 중 어느 방법이 유리한가?

1.고압측에 설치시
콘덴서는 고입측에서 진상전류를 취하므로 부하의 지상전류를 상쇄하는 것은 고압측이므로, 역률 개선의 효과는 고입측에 국한되어 고압측에서만 전력손실이나 전압강하가 저감되고, 저압측의 역률 개선 효과를 얻을수 없다.
그러나 고압측에 콘덴서를 설치하는 경우에는 콘덴서 용량은 전압의 제곱에 비례 하므로 전압이 높을수록 소형이 되어 경제적으로도 유리해 진다.

2.저압측에 설치시
콘덴서를 저압측에 설치하는 방법은 역률 개선의 효과가 고압측과 저압측에 모두 미친다. 특히, 수전 설비중 변압기의 출력측 역률을 개선(피상 전력의 감소에 의한 변압기 이용률 향상)함으로써 얻어지는 것으로 고압측의 역률을 개선하여도 효과는 없다.
고입측에 설치하는 것과 비교하여 저압측에서는 같은 용량일지라도 대형이 되어 가격이 비싸진다.

Capcitor location advantage / disadvantage

Capacitor location	Advantage	Disadvantage	Remark
High voltage side	① Power factor correction in high voltage side (Decrease of power loss, voltage drop in high voltage side) ② Discount for electricity charge per power factor correction ③ Capacitor can be compact, save facility cost.	① No power factor correction in low voltage side (Decrease of transformer utilization) ② High cost for safety by high voltage facility(necessary for exclusive switch) ③ Necessary for serious rector to suppress harmonics.	
Low voltage side	① Power factor correction both in high and low voltage side (power loss and decrease of voltage drop in the both sides) ② Improvement of transformer utilization (Decrease of apparent power) ③ Discount for electricity charge per power factor correction ④ Common use of each circuit breaker	① Bigger capacitor size ② Increase of capacitor installation cost	Higher cost for capacitor dispersed installation in low voltage side than integrated one.

Capacitor maintenance and inspection

When capacitor is disconnected for capacitor maintenance or inspection from power supply, expose the disconnection for 5 minutes and wait until residual voltage can be less than 50V then only start the maintenance or inspection after complete discharge of the residual voltage by an earth bar.

1) Maximum allowable overvoltage of capacitor is 110% against rated voltage, each phase should be parallel. Also please pay attention that circuit voltage can be increased by light-load in night and life can be shorter due to heating of internal loss increase in case continued overvoltage is impressed.

2) The capacitor is designed for maximum temperature on case outside to be in less 55℃.
If it could be more than this, ambient temperature should be decreased by forced air-cooling.

3) Insulation oil in the capacitor can be expanded or shrunk by temperature change, so capacitor case can be also expanded or shrunk. In operation, the case can be expanded or shrunk in one side about 10 ~ 15mm and this is due to above reason but no meaning of the capacitor defect. If the defect can be doubt, please check current. If the current of each phase is within rated current and 3 phases are in parallel, it means the capacitor is still in good function.

4) Required regular inspection for voltage and current of capacitor circuit.

5) Required one time measurement for capacitance and insulation resistance in every year, also required to confirm insulation resistance is more than 500MΩ in terminal and case checked by Mega-Ohm Tester.

6) Required one time inspection per year for contact point of breaker or switch which is used for capacitor circuit. If the contact is not stable, the capacitor can be run in single phase or noise is appeared by bad

7) Please open capacitor in circuit when it becomes to be power factor of phase advance in night light-load.

콘덴서 설치 위치 별 장단점

콘덴서 설치 위치	장 점	단 점	비 고
고 압 측	① 고압측의 역률 개선 (고압측의 전력손실,전압 강하 감소) ② 전기요금의 역률 할인적용 ③ 콘덴서 소형, 설비비용 감소	① 저압측 역률 개선불가 (변압기 이용률 감소) ② 고압으로 보호장치 설비비가 큼 (고압 콘덴서 전용개폐기 필요) ③ 고조파 장해용 직렬 리액터 필요	
저 압 측	① 고압측, 저압측 모두 역률개선 (고.저압측 모두 전력손실,전압강하 감소) ② 변압기 이용률 향상(피상전력 감소) ③ 전기요금 역률 할인적용 ④ 각각의 부하용 개폐기(CB) 공용 가능.	① 콘덴서 대형 ② 설치 비용증가	저압측 콘덴서 분산 설치시는 집중 설치 보다 비용이 많이 듬

콘덴서 보수 점검

콘덴서 보수 점검을 위하여 콘덴서를 전원으로부터 개방시에는 개방 후 5분이상 방치하여 잔류 접압이 50V 이하로 될 때 까지 기다린 후 접지봉을 이용 잔류 전압을 완전히 방전 시킨 후 점검을 시작 하십시요.

1) 콘덴서의 최고 허용 과전압은 정격전압의 110%이며, 각 상(相)이 평형이 되어야 합니다. 또한 야간 경 부하시에 회로 전압이 상승하는 문제가 발생될수 있으니 주의 하여 주시기 바라며, 과전압이 지속적으로 인가되면 내부 손실의 증가로 인한 발열로 수명이 단축 됩니다.

2) 콘덴서의 케이스 외부 최고 온도부의 온도는 55℃ 이하가 되도록 설계 되어 있습니다. 만약 이것을 초과할 경우에는 강제 풍냉에 의해서 주위 온도를 감소 시켜야 합니다.

3) 콘덴서는 온도 변화에 의하여 내부 절연유가 팽창 수축 하므로 케이스 표면이 팽창 수축 할수 있습니다.
운전중 콘덴서의 케이스는 편측으로 10~15㎜ 팽창 할수 있는데 이는 상기의 이유에 의하여 발생하는 것으로 콘덴서의 이상이 아닙니다.
만약 콘덴서의 기능이 의심 된다면 전류를 측정하여 주시고, 각상의 전류가 정격전류의 허용 범위 이내 이면서 삼상이 평형을 이루고 있다면 콘데서는 이상이 없습니다.

4) 콘덴서 회로의 전류, 전압은 상시 점검 하여 주십시요.

5) 용량 및 절연저항은 년 1회 측정, 단 절연저항 측정의 경우 단자와 케이스간을 MEGA OHM 미터로 측정(DC 500V) 하였을 경우 500㏁ 이상 측정 되는지 확인 해 주십시요.

6) 콘덴서 회로에 사용되는 차단기나 개폐기는 년 1회 접촉부분을 점검하여 주십시요. 이 접촉이 불완전하면 콘덴서가 단상 운정 되거나 접촉 불량으로 이상음을 발생하며, 고주파 진동전압이 콘덴서에 인가되어 수명을 현저하게 저하 시킬수 있습니다.

7) 야간 경부하시에 진상의 역률이 될 때에는 콘덴서를 회로에서 개로하여 주십시요.

SPECIFICATIONS



Detail of capacitor maintenance and action

Item	Inspection detail	Reason	Action
Oil leakage and loss	Bushing	Over joint of terminal contact	Replace as possibility of dielectric breakdown
	Case welding	1) Case demage by external force 2) Case corrosion 3) Capacitor inside defection 4) Case grounding by external	Clean oil leakage, replace if it is appeared again after some days
	Case corrosion or paint peeling	1) Damage on installation or transportation 2) Corrosion by long-term usage	Clean leaked oil and corrosion, anticorrosion treatment
Case strain	Case strain	1) Too much high ambient temperature 2) Inflow harmonic current 3) Case damage by external force 4) Defection in capacitor inside	1) Treat as defection if it can't be recovered to original condition inspite cooling after operation stop 2) Check defect or not by checking of phase current, replace in case defect 3) In case of unknown, please call to our company
Circuit voltage	Voltage	1) Overload voltage by adjustment of trasformer tab 2) Voltage increase by reactor	1) Open capacitor when underload 2) Down circuit voltage by adjustment of transformer tab 3) Change higher rated voltage of capacitor
Temperature defect		1) High ambient temperature 2) Overload voltage 3) Harmonic current is inflowed 4) Overheat by bad contact of terminal 5) Capacitor inside defection	1) Install ventilation fan if ventilation is not enough 2) Improvement measure in case of overload voltage or current 3) Improvement of terminal joint
Current	Confirmation for current and harmonic current	1) Harmonic inflow by nonlinear load 2) Overload voltage inflow 3) Capacitor inside defection	1) Add serious reactor or change reactor in case caused by harmonic 2) Confirm capacitor if not caused by harmonic and change if defect
		Current on capacitor is increased proportionally to voltage and frequency and capacitance, only frequency can be influenced by to the current when cpacitance is fixed and in rated voltage as the frequency is influenced by the harmonic inflow	
Noise (Humming)		1) Insufficient terminal joint 2) Inflow of harmonic current 3) Over inrush current 4) Switch status unstable 5) Capacitor inside defection	1) Improvement measure in case of harmonic inflow by confirmation of harmonic current 2) Install serious reactor 3) Replace capacitor
		Capacitor dosen't make noise in general usage. Recently, more inquiry for the noise on capacitor. This is due to resonance of inside component but it dosen't influence to capacitor quality. If power quality is bad (As many harmonic inflow), the noise can be increased due to of frequency. As long as inflow current and voltage still in allowed range, the capacitor is no problem to be used.	
Smell	Smell appearance	1) Degradation of insulation oil 2) Degradation of cable casued by bad terminal joint 3) Capacitor inside defection	1) Confirm oil leakage 2) Confirm terminal joint 3) Replace capacitor

SPECIFICATIONS



콘덴서 점검 내용 및 조치사항

점검 항목	점검 내용	원 인	조 치
OIL 누유 및 오손	애자부 누유	단자 결선부 조임이 과함	절연 파괴 가능이 있으므로 교환
	CASE 용접부	1) 외력에 의한 CASE 손상 2) CASE 의 부식 3) 콘덴서 내부 이상 4) 외부로 부터의 CASE 지락	OIL 누유 부분을 청소하고 수일 후 다시 점검 후 누유가 있으면 교환
	CASE의 녹발생 또는 도장이 벗겨짐	1) 설치 또는 운송중의 충격 2) 장기간 사용에 따른 부식	오손 및 녹 청소후 방청 처리
CASE 변형	CASE의 변형	1) 주위 온도가 과대하게 높다. 2) 고조파 전류가 유입되고 있다. 3) 외력에 의한 CASE 손상 4) 콘덴서 내부에 이상이 있다.	1) 운전을 정지하고 냉각 하여도 원상태로 회복되지 않으면 이상으로 판정 한다. 2) 상전류를 측정 하여 이상유무를 확인 후 이상시 교환 한다. 3) 원인 불명의 경우 당사로 연락하여 확인을 요청한다.
회로 전압	전 압	1) 변압기 TAP 조절로 인한 과전압 2) REACTOR에 의한 전압 상승	1) 경부하시 콘데서를 개방한다. 2) 변압기 탭을 조절하여 회로전압을 낮춘다. 3) 콘덴서의 정격 전압을 높은 것으로 변경 한다
온도 이상		1) 주위의 온도가 너무 높다. 2) 과전압이 인가 되어 있다. 3) 고조파 전류가 유입되고 있다. 4) 단자부의 접속 불량으로 인한 과열. 5) 콘덴서 내부에 이상이 있다.	1) 환기부족이면 환기 팬을 설치 한다. 2) 과전압, 과전류이면 이것에 대한 대책 수립 3) 단자부 조임을 개선.
전 류	전류 및 고조파 전류 확인	1) 비선형 부하에 의한 고조파 유입 2) 과전압 유입 3) 콘덴서 내부 이상	1) 고조파에 의한 경우는 직렬 리액터 부착 또는 리액턴스의 변경 2) 고조파가 아닌 경우는 정전용량을 확인 후 이상시 교환
		콘덴서에 흐르는 전류는 전압, 주파수, 용량에 비례하여 증가 하는데 용량이 고정되어 있고, 정격전압 하에서는 전류에 영향을 주는 요인은 주파수밖에 없는데 고조파 유입시에는 주파수에 영향을 주게 됨.	
이상음		1) 단자의 체결이 불충분함 2) 고조파 전류가 유입. 3) 돌입 전류 과대 함. 4) 개폐기의 상태가 불완전함. 5) 콘덴서 내부 이상.	1) 고조파 전류를 확인 하여 고조파가 유입되면, 이에 대한 대책을 수립. 2) 직렬 리액터의 설치 3) 콘덴서 교체
		콘덴서는 일반적인 사용시에는 이상음을 발생시키지 않습니다. 최근에 있어서 콘덴서 이상음으로 인한 문의가 많이 발생되고 있습니다. 이는 콘덴서에 유입되는 전력 품질에 따른 내부 구성품의 공진에 의한것으로 콘덴서에 대해서는 영향을 주지 않으며, 전력품질 (고조파 등)에 의하여 콘덴서에 영향을 주는것으로서 콘덴서의 전류 파형 및 전류가 허용치 이내에 들어 있으면 실용상 문제가 없으므로 사용 하셔도 됩니다.	
냄 새	냄새 유무	1) 절연유의 열화 2) 단자 체결 불량에 의한 전선 열화 3) 콘덴서 내부 이상	1) 누유 확인 2) 단자 체결상태 확인 3) 콘덴서 교체

General conditions for storage and operating | 사용 및 보관

1. Do not use or store Capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or similar substance are present.

1. 부식성 환경, 특히 염소 가스, 황화 가스, 산성, 알칼리, 염분 및 유사한 성분이 존재 하는 곳에서는 사용 하지 마십시요.

2. In dusty environment, regular maintenance and cleaning, especially of the terminals, is required to avoid conductive path between phase and/or phases and ground.

2. 먼지가 있는 장소에서는 청소 및 정기적 점검을 하여야 하며, 특히, 단자들, 상간 및 상과 접지에 대하여는 더욱 청결하여야 합니다.

3. The ambient temperature category is −25℃ to 45℃. This means up to a max. temperature of 45℃, an average one year should not exceed 35℃. The maximum casing temperature of 55℃ must not exceeded.
Temperature is one of the main stress factors for polypropylene type capacitors. Temperature has major influence on the useful life expectancy of the capacitor.

3. 사용 주변 온도는 −25℃ ~ 45℃ 이고, 년 평균 기온 35℃를 초과 하지 않는 최대 45℃까지 라는 의미로써, Case 표면 온도는 최고 55℃를 초과 하면 안됩니다.
온도는 Polypropylene Capcitor의 사용 수명을 단축하는 주된 원인 입니다.
(수명 단축의 주 원인 : 고조파, 온도)

4. Capacitors must be installed in a cool and well ventilated place, and should not be installed close to heat radiating objects, e.g.filter circuit, reactors, furnaces, direct sunlight.

4. Capacitor는 시원하고, 통풍이 잘되는 곳에 설치 하셔야 하며, 발열하는 물체 (예, 필터 회로, 직렬 리엑터 및 용광로, 직사 광선)와 근접하여 설치 하시면 안됩니다.

5. Recommended torque for capacitor terminals.
(Acoording to IEC 60068-2-21)
Below M6 : 3Nm M12 : 8Nm
Check the terminals connection state in once a month at the least.

5. 전선과 Capacitor 단자를 접속 하실때에는 아래의 Torque 강도로 접속 하여 주십시요.
(IEC 60068-2-21에 따름)
M6 이하 : 3Nm M12 : 8Nm
단자 접속 상태를 적어도 1개월에 1회이상 점검하여 조여 주십시요.

EUNSUNG
Low Voltage Power Capacitors