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KSC-4801 / NO. 3683



KAB-QC-06



KAB-EC-16



K.T.L. CERTIFIED PRODUCT



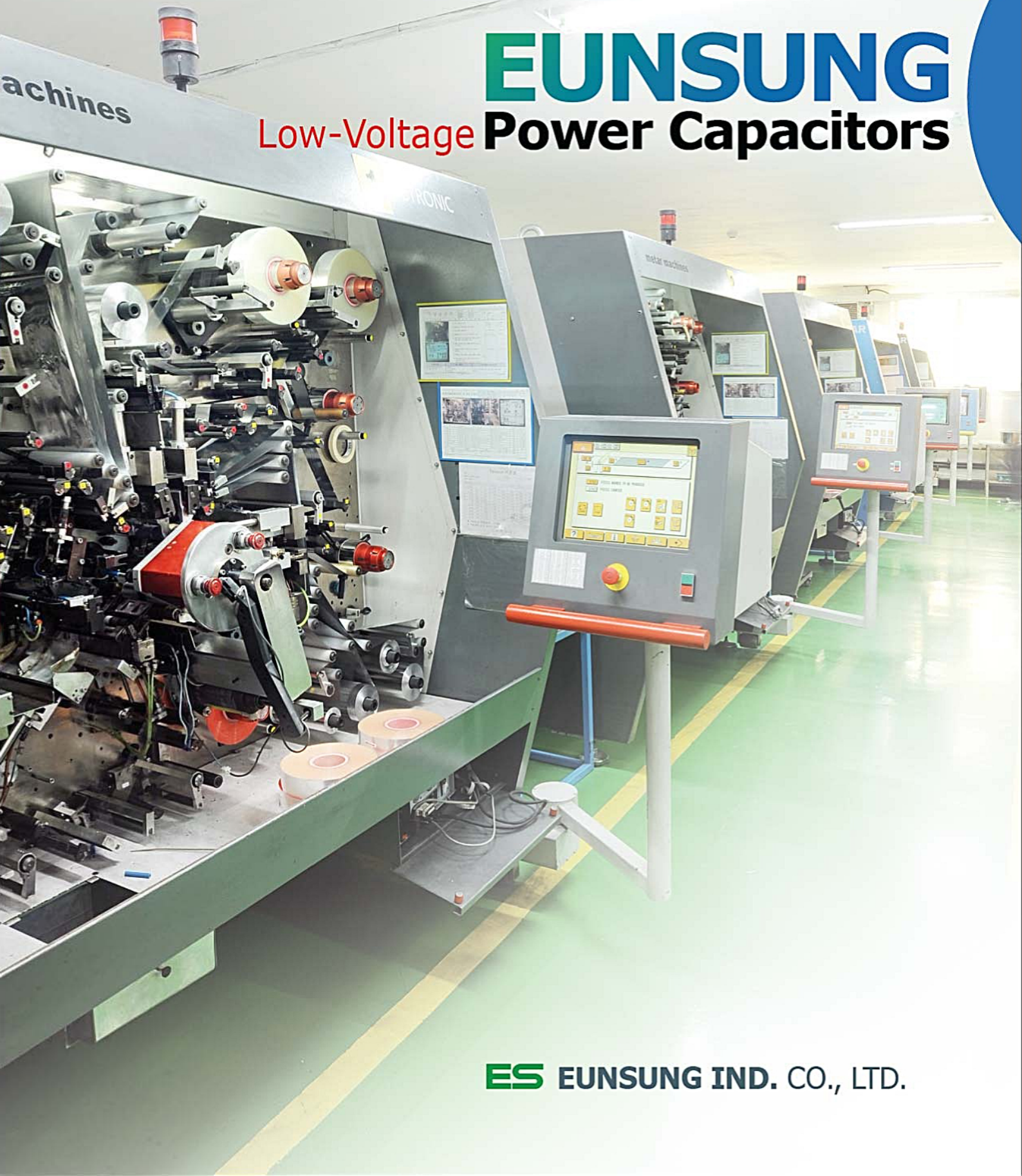
TÜV Rheinland
CERTIFIED



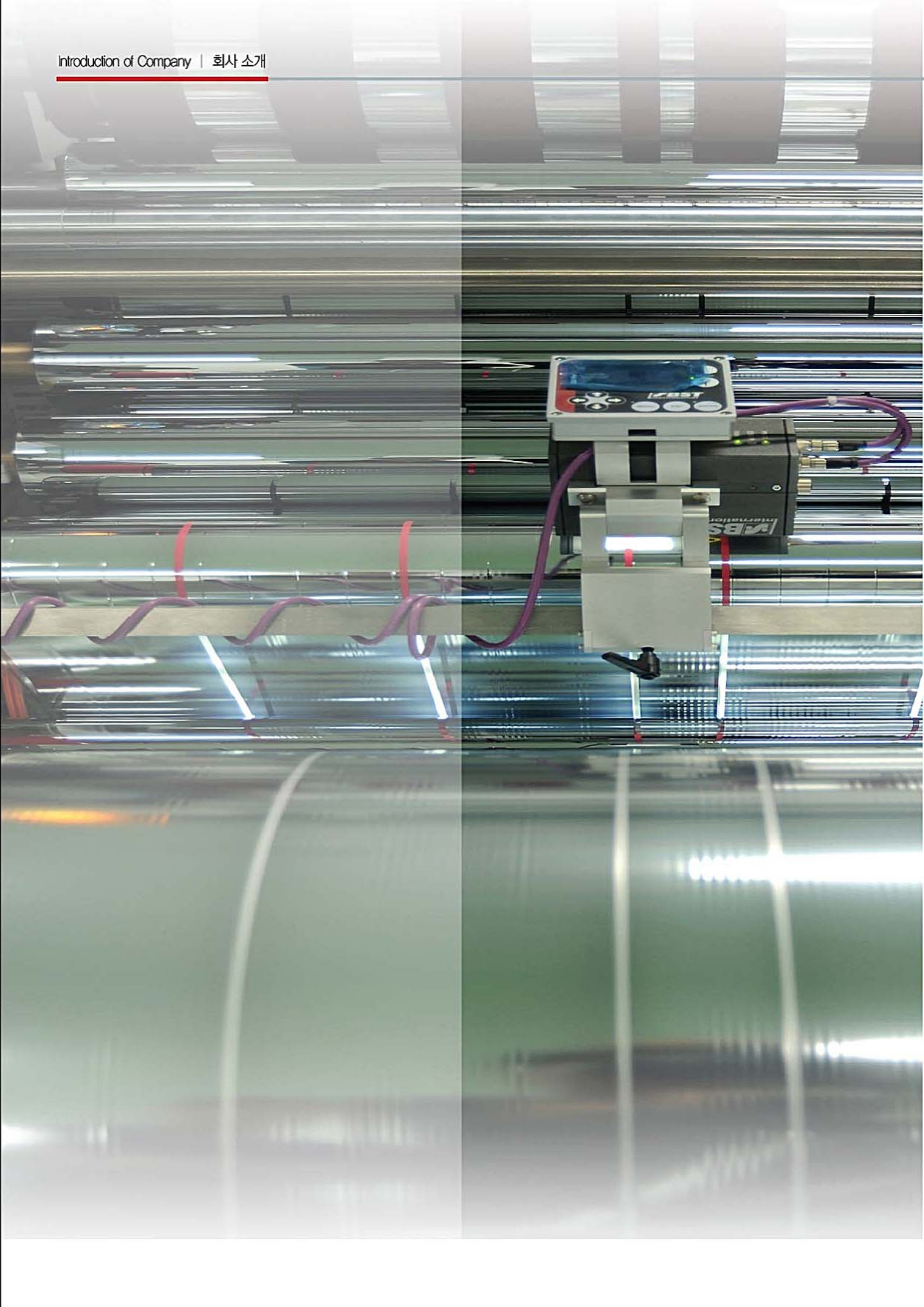
achines

EUNSUNG

Low-Voltage Power Capacitors



ES 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

1977-Present EUNSUNG



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.

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We think first for best quality and customer,
are manufacturing capacitor for electrical apparatus,
low voltage power factor capacitor and metallized film.

We wish to be renovated company who knows
value of customer and also be respected in this market.

최고의 품질과 고객을 먼저 생각하는 은성산업(주)는
전기 기기용 콘덴서, 저압진상 콘덴서, 증착필름을 생산하고 있으며,
고객가치를 최우선으로 하는 존경받는 기업으로 거듭나겠습니다.



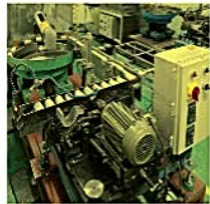
We are first company who has been produced metallized paper for capacitor in 1977 in Korea, have build up own know-how and technology which is well accepted in the market, so growing and jump up too.

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 축적된 노하우와 그 기술력을 인정받아
성장과 도약을 하고 있으며, 신기술개발로 고객분들의 부흥에 더욱 기여하겠습니다.



Production Machine



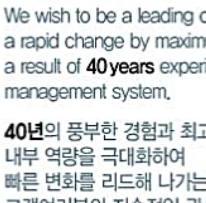
Production Line



Test



Office



Design

We wish to be a leading company who can provide a rapid change by maximum internal ability from a result of 40years 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.

생산설비

생산라인

테스트

사무실

설계



SPECIFICATIONS

SPECIFICATIONS

○ Specification | 사양

1. Installation Place : Indoor Type
2. Ambient Temperature : -25°C to 45°C
(Below 35°C 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 $\times 2.15$, 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°C
12. Safety Device
 - * Protective device (pressure sensitive 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 : $-25^{\circ}\text{C} \sim 45^{\circ}\text{C}$
(24시간 평균 35°C 이하)
3. 구조 및 종류 : SH, E 형
4. 용량 허용 차 : $-5\% \sim 10\%$
(상간 용량 불 평형을 : 103 % 이하)
5. 최고 허용 과전압 (JIS C 4901, KS C 4801, IEC 60831)

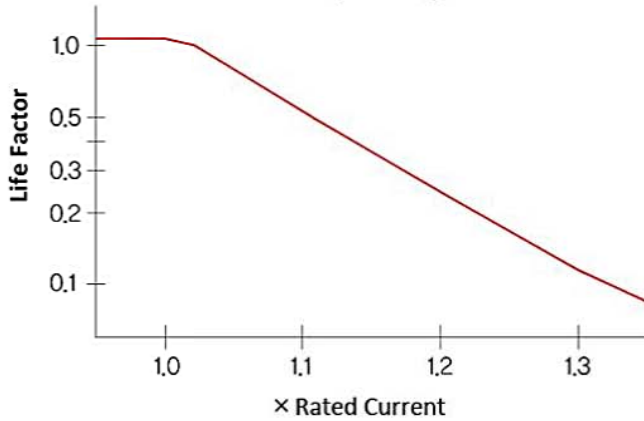
과전압율(%)	과전압 인가 시간
110	24시간중 8시간 이내
115	24시간중 30분 이내
120	1개월중에서 5분이내가 2회 이하
130	1개월 중에서 1분 이내가 2회 이하

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 $\times 2.15$ 배, 1분간
 - * 단자 일괄 케이스간 : 3000VAC, 1분간
10. 방전성 : 전원에서 개방후의 잔류 전압이
3분 이내 75V 이하
11. 밀폐성 : 70°C 항온조에 3시간 방치후 함침제의
누출이 없을것.
12. 보안성
 - * 보안장치 내장형 (압력 감지 차단형)
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

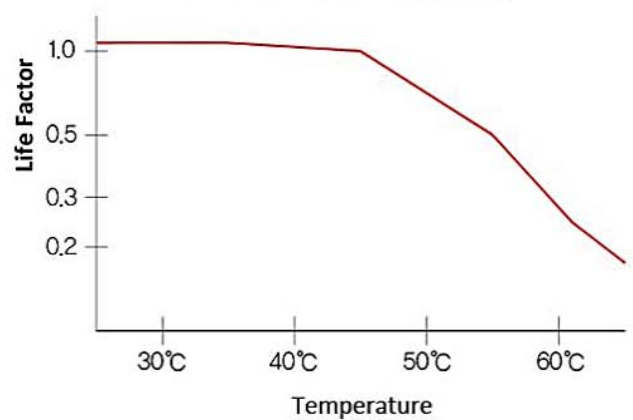
SPECIFICATIONS

Characteristic | 특성

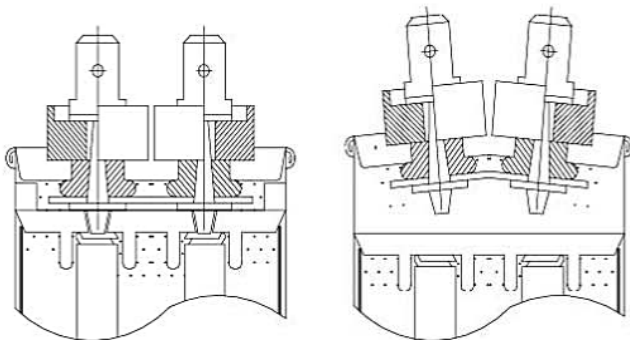
Life vs. Operating Current



Life vs. Operating Temp.



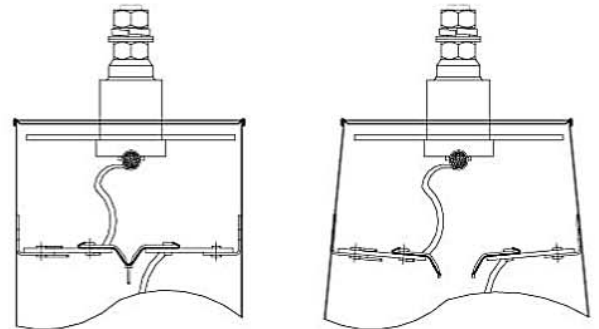
Pressure sensitive interrupter | 압력식 보안 장치



Normal Condition

Operating Condition

Page 17 Fig 1 ~ 3



Normal Condition

Operating Condition

Page 17 Fig 4 ~ 6

Harmonics | 고조파

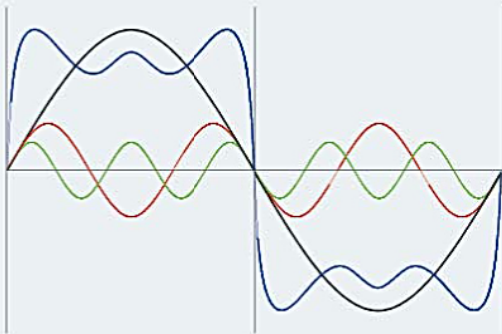
Harmonics are sinusoidal voltage and current with multiple frequencies of the 50 or 60Hz line frequency.
고조파란 전원 주파수(50Hz 또는 60Hz)의 정수배의 전압 및 전류를 말합니다.

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

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

Receiving voltage 수 전 전 압 (kV)	Delicate line VTHD% 계별 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 ~ 35th 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 impedance.

Harmonic current is a current (high frequency) which has integer ratio frequency against basic pulse, so high frequency harmonic current is for low impedance equipment, as mainly for power factor correction capacitor (capacitor impedance is $-j \cdot \frac{1}{2\pi \cdot f \cdot C}$ current is $2\pi fCV(A)$). 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 $2\pi fCV(A)$) 고조파전류로 인한 과전류가 유입 되어 장애를 발생시키게 되므로, Capacitor 보호용 직렬 Reactor를 설치 하여 주십시오.

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.

SPECIFICATIONS

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), Elevator, Escalator
Fluorescent 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 impedance 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	· Impedance drops by harmonic current, overheat and damage on choke coil and power factor correction capacitor.
Cable	· Neutral line overheat due to inflow of harmonic current on neutral line of 3 phase circuit.
Induction motor	· periodical change of number 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 (ϕ 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 caused by excess harmonic current
Circuit breaker	· Malfunction caused by excess harmonic current

기 기 명	영 향 의 종 류
콘덴서 리액터	· 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 콘덴서 및 쇼크코일에 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 (ϕ 는 사이리 스타 위상제어 등 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 ◀

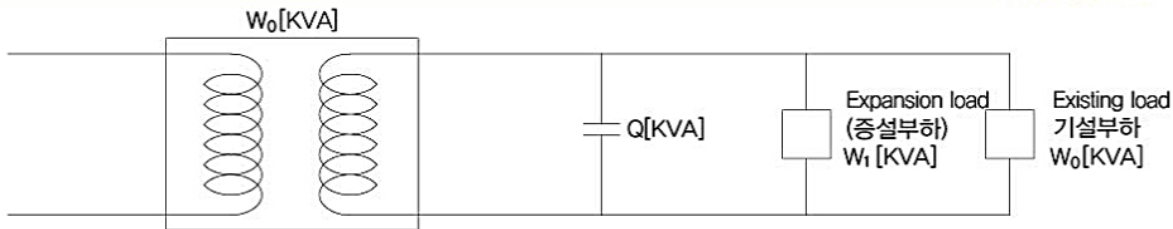
- 1) Reduction of transformer, distribution line loss | 변압기, 배전선의 손실 저감
- 2) Efficient use of transformer | 설비 용량의 증가
- 3) Voltage drop compensation | 전압 강하의 경감.

1. Reduction of Transformer Loss 변압기/배전선의 손실 저감

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

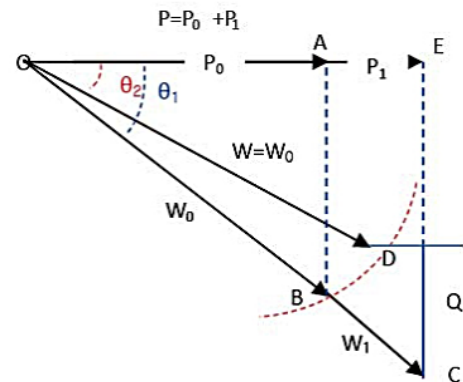
- Loss is inversely proportional to the square power factor so the loss reduced if the power factor correction.
- 손실은 역율 제곱에 반비례 하므로 역율을 개선 하면 손실을 감소 시킬 수 있습니다.

2. Efficient use of transformer 설비 용량의 여유 증가



- 1) Capacity of new machine | 새로운 설비 용량 W1은

$$w_1 = \overline{OC} - \overline{OB} = \frac{P}{\cos \theta_1} - W_0 = \frac{W_0 \cos \theta_1}{\cos \theta_1} - W_0 = W_0 \left(\frac{\cos \theta_1}{\cos \theta_2} - 1 \right)$$



- 2) Power increase | 전력의 증가분

$$P_1 = P - P_0 = W_1 \cdot \cos \theta_1 = W_0 (\cos \theta_2 - \cos \theta_1) [KVA]$$

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

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

- 3) Before and after correction | 개선 전후 의 경감

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

$$\tan \theta_1 > X \tan \theta_2 \text{ 이므로 } \Delta e > \Delta e'$$

- 4) Reduce the voltage drop rate | 전압 강하 경감률

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

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

$QC = Pr(\tan \theta_1 - \tan \theta_2) \rightarrow$ 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																				

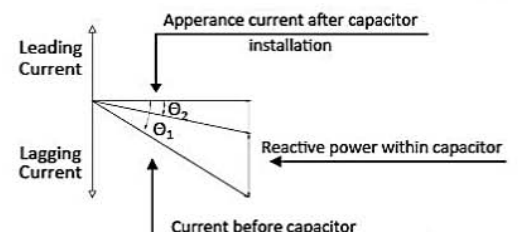
How to use table

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 × COSΘ₁
then calculate as same as #1

Q_c = Capacity(kvar) Q_c = 필요로 하는 콘덴서 용량(kvar)
 P_r = Active power (kW) P_r = 전부하 용량 (kW)
 $\cos \Theta_1$ = Power factor before correction $\cos \Theta_1$ = 현재 역률
 $\cos \Theta_2$ = Power factor after correction $\cos \Theta_2$ = 개선 후 역률

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



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	
		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 1/2로 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

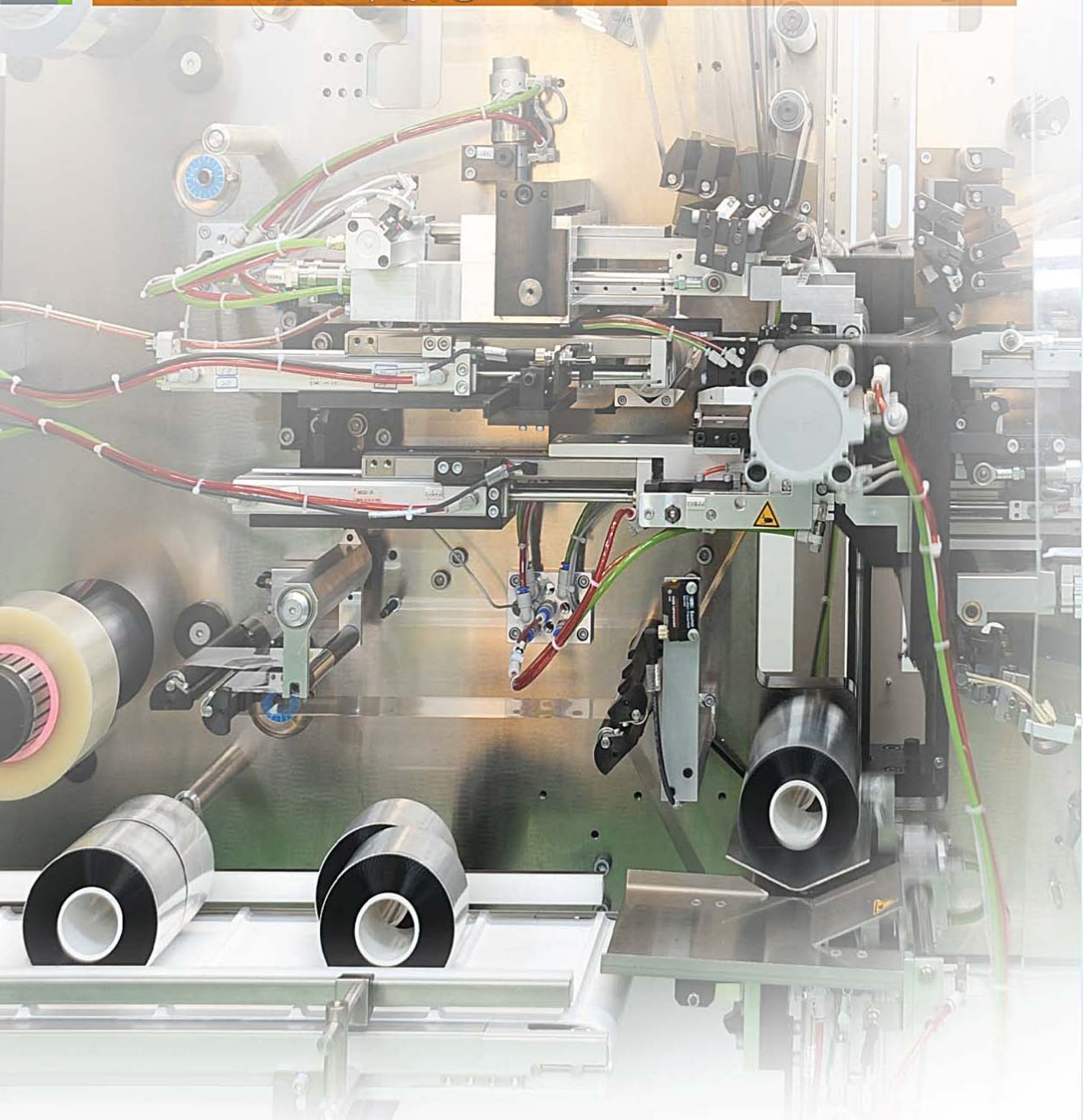
The least thickness of electric wire(copper)(mm ²)				2.0	3.5	5.5	8.0	14	22	30	38	50	60	80	100
Rated current of capacitor(A)				10	15	20	30	40	50	60	75	90	100	125	150
Capacity of switch (A)				15	30	30	50	75	100	100	150	200	200	225	300
Capacitance (μF)	60 Hz	1 Φ	220V	120	180	240	360	485	600	730	910	1100	1200	1500	1800
			220V	210	315	415	630	840	1015	1250	1550	1900	2100	2600	3150
		3 Φ	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 하십시오.

PRODUCT DESCRIPTIONS

For DOMESTIC | 내수용



SPECIFICATIONS

Construction & dimension | 구조 및 치수

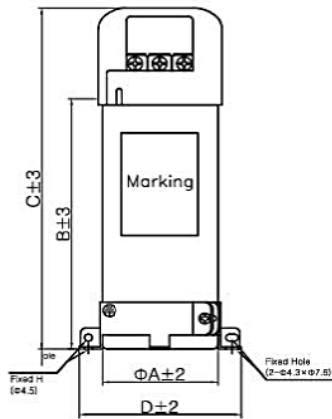
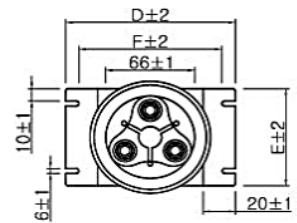
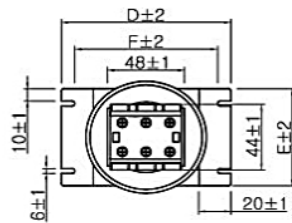
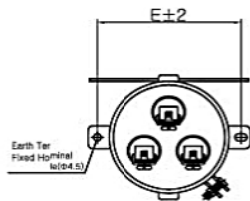


Fig1

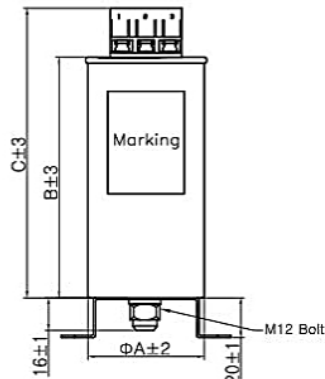


Fig2

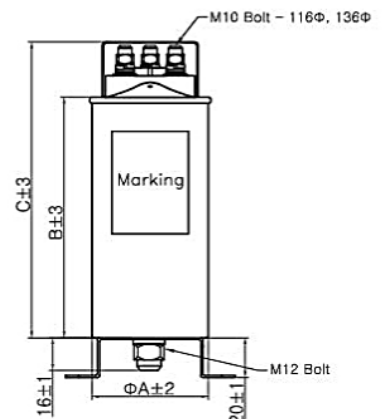


Fig3

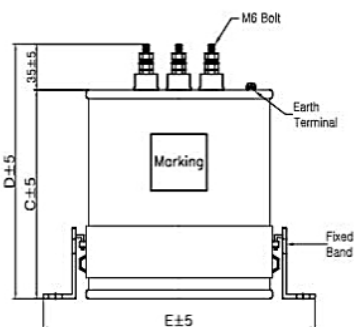
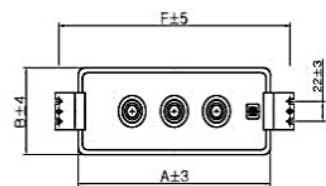
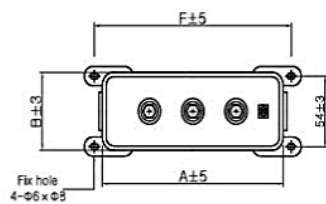
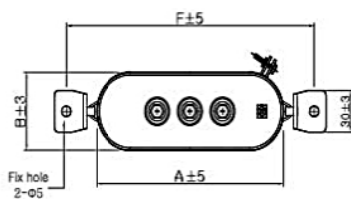


Fig4

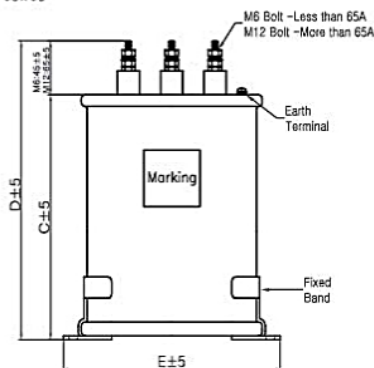


Fig5

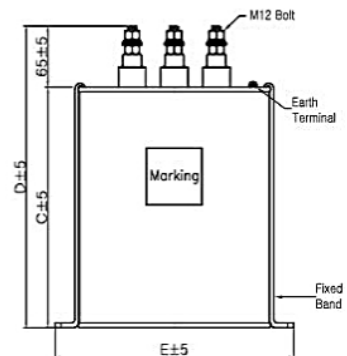


Fig6

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		220V	10	0.18	1Φ	0.83		50	65	110	80	65		Fig 1
ESL6-22015S/TC			15	0.27		1.24		50	65	110	80	65		
ESL6-22020S/TC			20	0.36		1.66		50	65	110	80	65		
ESL6-22030S/TC			30	0.55		2.49		50	65	110	80	65		
ESL6-22040S/TC			40	0.73		3.32		50	65	110	80	65		
ESL6-22050S/TC			50	0.91		4.14		50	75	120	80	65		
ESL6-22075S/TC			75	1.37		6.22		50	85	130	80	65		
ESL6-22100S/TC			100	1.82		8.29		50	105	150	80	65		
	ESL6-22010T/TC		10	0.18	3Φ		0.48	50	105	150	80	65		Fig 1
	ESL6-22015T/TC		15	0.27			0.72	50	105	150	80	65		
	ESL6-22020T/TC		20	0.36			0.96	50	105	150	80	65		
	ESL6-22030T/TC		30	0.55			1.44	50	135	180	80	65		
	ESL6-22040T/TC		40	0.73			1.91	50	135	180	80	65		
	ESL6-22050T/TC		50	0.91			2.39	50	135	180	80	65		
	ESL6-22075T/TC		75	1.37			3.59	50	135	180	80	65		
	ESL6-22100T/TC		100	1.82			4.79	50	135	180	80	65		
ESL6-22150S/TC	ESL6-22150T/TC		150	2.74	1Φ or 3Φ	12.4	7.18	50	165	210	80	65		Fig 4
ESL6-22200S/TC	ESL6-22200T/TC		200	3.65		16.6	9.57	63	165	210	90	80		
ESL6-22250S/TC	ESL6-22250T/TC		250	4.56		20.7	12.0	63	165	210	90	80		
ESL6-22300S/TC	ESL6-22300T/TC		300	5.47		24.9	14.4	63	195	240	90	80		
ESL6-22400S/TO	ESL6-22400T/TO		400	7.30		33.2	19.1	170	60	120	155	215	195	
ESL6-22500S/TO	ESL6-22500T/TO		500	9.12		41.4	23.9	170	60	160	195	215	195	
ESL6-22600S/TO	ESL6-22600T/TO		600	10.9		49.7	28.7	170	60	160	195	215	195	
ESL6-22750S/TO	ESL6-22750T/TO		750	13.7		62.2	35.9	170	60	180	215	215	195	
ESL6-22900S/TO	ESL6-22900T/TO		900	16.4		74.6	43.1	170	60	220	255	215	195	
ESL6-221000S/TO	ESL6-221000T/TO		1000	18.2		82.9	47.9	170	60	220	255	215	195	
ESL6-2202.5KS/TC	ESL6-2202.5KT/TC	220V	137	2.5	1Φ or 3Φ	11.4	6.56	50	165	210	80	65		Fig 1
ESL6-2205KS/TC	ESL6-2205KT/TC		274	5		22.7	13.10	63	165	210	90	80		
ESL6-2207.5KS/TO	ESL6-2207.5KT/TO		411	7.5		34.1	19.7	170	60	120	155	215	195	Fig 4
ESL6-22010KS/TO	ESL6-22010KT/TO		548	10		45.5	26.2	170	60	160	195	215	195	
ESL6-2212.5KS/TO	ESL6-2212.5KT/TO		685	12.5		56.8	32.8	170	60	180	215	215	195	
ESL6-22015KS/TO	ESL6-22015KT/TO		822	15		68.2	39.4	170	60	180	215	215	195	
ESL6-22020KS/TO	ESL6-22020KT/TO		1097	20	3Φ	90.9	52.5	170	60	260	295	215	195	Fig 5
ESL6-22025KS/TR	ESL6-22025KT/TR		1371	25		113.6	65.6	220	60	240	285	260	240	
ESL6-22030KS/TR	ESL6-22030KT/TR		1645	30		136.4	78.7	220	60	260	305	260	240	Fig 6
	ESL6-22040KT/TR		2193	40			105	300	120	250	325	340	330	
	ESL6-22050KT/TR		2742	50			131	300	120	270	345	340	330	

※ This dimension is able to change without notice for better quality.

※ 상기 치수는 품질 개선으로 변경될 수 있으므로 주문시 당사로 확인 바랍니다.

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		220V	10	0.18	1Φ	0.83		50	65	110	80	65		Fig 1
ESD6-22015S/TC			15	0.27		1.24		50	65	110	80	65		
ESD6-22020S/TC			20	0.36		1.66		50	65	110	80	65		
ESD6-22030S/TC			30	0.55		2.49		50	65	110	80	65		
ESD6-22040S/TC			40	0.73		3.32		50	65	110	80	65		
ESD6-22050S/TC			50	0.91		4.14		50	75	120	80	65		
ESD6-22075S/TC			75	1.37		6.22		50	85	130	80	65		
ESD6-22100S/TC			100	1.82		8.29		50	105	150	80	65		
	ESD6-22010T/TC		10	0.18	3Φ		0.48	50	105	150	80	65		Fig 1
	ESD6-22015T/TC		15	0.27			0.72	50	105	150	80	65		
	ESD6-22020T/TC		20	0.36			0.96	50	105	150	80	65		
	ESD6-22030T/TC		30	0.55			1.44	50	135	180	80	65		
	ESD6-22040T/TC		40	0.73			1.91	50	135	180	80	65		
	ESD6-22050T/TC		50	0.91			2.39	50	135	180	80	65		
	ESD6-22075T/TC		75	1.37			3.59	50	135	180	80	65		
	ESD6-22100T/TC		100	1.82			4.79	50	135	180	80	65		
ESD6-22150S/TC	ESD6-22150T/TC		150	2.74	1Φ or 3Φ	12.4	7.18	50	165	210	80	65		Fig 2
ESD6-22200S/TC	ESD6-22200T/TC		200	3.65		16.6	9.57	63	165	210	90	80		
ESD6-22250S/TC	ESD6-22250T/TC		250	4.56		20.7	12.0	63	165	210	90	80		
ESD6-22300S/TC	ESD6-22300T/TC		300	5.47		24.9	14.4	63	195	240	90	80		
ESD6-22400S/MC	ESD6-22400T/MC		400	7.30		33.2	19.1	76	175	212	110	80	90	
ESD6-22500S/MC	ESD6-22500T/MC		500	9.12		41.4	23.9	76	205	242	110	80	90	
ESD6-22600S/MC	ESD6-22600T/MC		600	10.9		49.7	28.7	76	235	272	110	80	90	
ESD6-22750S/MC	ESD6-22750T/MC		750	13.7		62.2	35.9	96	210	247	126	96	106	
ESD6-22900S/MC	ESD6-22900T/MC		900	16.4	1Φ or 3Φ	74.6	43.1	96	240	277	126	96	106	Fig 2
ESD6-221000S/MC	ESD6-221000T/MC		1000	18.2		82.9	47.9	96	240	277	126	96	106	
ESD6-2202.5KS/TC	ESD6-2202.5KT/TC	220V	137	2.5		11.4	6.56	50	165	210	80	65		Fig 1
ESD6-2205KS/TC	ESD6-2205KT/TC		274	5		22.7	13.10	63	165	210	90	80		
ESD6-2207.5KS/MC	ESD6-2207.5KT/MC		411	7.5	1Φ or 3Φ	34.1	19.7	76	175	212	110	80	90	Fig 2
ESD6-22010KS/MC	ESD6-22010KT/MC		548	10		45.5	26.2	76	235	272	110	80	90	
ESD6-2212.5KS/MC	ESD6-2212.5KT/MC		685	12.5		56.8	32.8	96	210	247	126	96	106	
ESD6-22015KS/MC	ESD6-22015KT/MC		822	15		68.2	39.4	96	210	247	126	96	106	
ESD6-22020KS/MC	ESD6-22020KT/MC		1097	20		90.9	52.5	96	270	307	126	96	106	
ESD6-22025KS/TC	ESD6-22025KT/TC		1371	25		113.6	65.6	116	250	292	146	110	126	
ESD6-22030KS/TC	ESD6-22030KT/TC		1645	30		136.4	78.7	116	280	322	146	110	126	Fig 3
	ESD6-22040KT/TC		2193	40	3Φ		105	136	280	322	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.

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	80	65		Fig 1
ESL6-38015S/TC	ESL6-38015T/TC		15	0.82		2.15	1.24	50	105	150	80	65		
ESL6-38020S/TC	ESL6-38020T/TC		20	1.09		2.86	1.65	50	105	150	80	65		
ESL6-38030S/TC	ESL6-38030T/TC		30	1.63		4.30	2.48	50	135	180	80	65		
ESL6-38040S/TC	ESL6-38040T/TC		40	2.18		5.73	3.31	50	135	180	80	65		
ESL6-38050S/TC	ESL6-38050T/TC		50	2.72		7.16	4.13	50	135	180	80	65		
ESL6-38075S/TC	ESL6-38075T/TC		75	4.08		10.7	6.20	63	165	210	90	80		Fig 4
ESL6-38100S/TC	ESL6-38100T/TC		100	5.44		14.3	8.27	63	165	210	90	80		
ESL6-38150S/TO	ESL6-38150T/TO		150	8.16		21.5	12.4	170	60	120	155	215	195	
ESL6-38200S/TO	ESL6-38200T/TO		200	10.9		28.6	16.5	170	60	120	155	215	195	
ESL6-38250S/TO	ESL6-38250T/TO		250	13.6		35.8	20.7	170	60	160	195	215	195	
ESL6-38300S/TO	ESL6-38300T/TO		300	16.3		43.0	24.8	170	60	160	195	215	195	
ESL6-38400S/TO	ESL6-38400T/TO		400	21.8		57.3	33.1	170	60	200	235	215	195	Fig 5
ESL6-38500S/TO	ESL6-38500T/TO		500	27.2		71.6	41.3	170	60	260	295	215	195	
ESL6-38600S/TR	ESL6-38600T/TR		600	32.6		85.9	49.6	220	60	240	285	260	240	Fig 6
ESL6-38750S/TR	ESL6-38750T/TR		750	40.8		107	62.0	220	60	300	345	260	240	
ESL6-38900S/TR	ESL6-38900T/TR		900	49.0		129	74.4	240	85	230	305	280	270	Fig 6
ESL6-381000S/TR	ESL6-381000T/TR		1000	54.4		143	82.7	240	85	260	335	280	270	
ESL6-3802.5KS/TC	ESL6-3802.5KT/TC	380V	45.9	2.5	1Φ or 3Φ	6.58	3.80	50	135	180	80	65		Fig 1
ESL6-3805KS/TC	ESL6-3805KT/TC		91.9	5		13.2	7.60	63	165	210	90	80		
ESL6-3807.5KS/TO	ESL6-3807.5KT/TO		138	7.5		19.7	11.4	170	60	120	155	215	195	Fig 4
ESL6-38010KS/TO	ESL6-38010KT/TO		184	10		26.3	15.2	170	60	120	155	215	195	
ESL6-3812.5KS/TO	ESL6-3812.5KT/TO		230	12.5		32.9	19.0	170	60	120	155	215	195	
ESL6-38015KS/TO	ESL6-38015KT/TO		276	15		39.5	22.8	170	60	160	195	215	195	
ESL6-38020KS/TO	ESL6-38020KT/TO		368	20		52.6	30.4	170	60	180	215	215	195	
ESL6-38025KS/TO	ESL6-38025KT/TO		459	25		65.8	38.0	170	60	220	255	215	195	Fig 5
ESL6-38030KS/TO	ESL6-38030KT/TO		551	30		78.9	45.6	170	60	260	295	215	195	
ESL6-38040KS/TR	ESL6-38040KT/TR		735	40		105	60.8	220	60	300	345	260	240	Fig 6
ESL6-38050KS/TR	ESL6-38050KT/TR		919	50		132	76.0	240	85	230	305	280	270	
	ESL6-38075KT/TR		1378	75	3Φ		114	300	120	270	345	340	330	Fig 6
	ESL6-38100KT/TR		1838	100			152	300	120	350	425	340	330	

※ This dimension is able to change without notice for better quality.

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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	80	65		Fig 1
ESD6-38015S/TC	ESD6-38015T/TC		15	0.82		2.15	1.2	50	105	150	80	65		
ESD6-38020S/TC	ESD6-38020T/TC		20	1.09		2.86	1.65	50	105	150	80	65		
ESD6-38030S/TC	ESD6-38030T/TC		30	1.63		4.30	2.48	50	135	180	80	65		
ESD6-38040S/TC	ESD6-38040T/TC		40	2.18		5.73	3.31	50	135	180	80	65		
ESD6-38050S/TC	ESD6-38050T/TC		50	2.72		7.16	4.13	50	135	180	80	65		
ESD6-38075S/TC	ESD6-38075T/TC		75	4.08		10.7	6.20	63	165	210	90	80		
ESD6-38100S/TC	ESD6-38100T/TC		100	5.44		14.3	8.27	63	165	210	90	80		
ESD6-38150S/TC	ESD6-38150T/TC		150	8.16		21.5	12.4	63	195	240	90	80		Fig 2
ESD6-38200S/MC	ESD6-38200T/MC		200	10.9		28.6	16.5	76	205	242	110	80	90	
ESD6-38250S/MC	ESD6-38250T/MC		250	13.6		35.8	20.7	76	235	272	110	80	90	
ESD6-38300S/MC	ESD6-38300T/MC		300	16.3		43.0	24.8	96	210	247	126	96	106	
ESD6-38400S/MC	ESD6-38400T/MC		400	21.8		57.3	33.1	96	240	277	126	96	106	Fig 3
ESD6-38500S/TC	ESD6-38500T/TC		500	27.2		71.6	41.3	116	220	262	146	110	126	
ESD6-38600S/TC	ESD6-38600T/TC		600	32.6		85.9	49.6	116	250	292	146	110	126	
ESD6-38750S/TC	ESD6-38750T/TC		750	40.8		107	62.0	136	250	292	170	130	150	
ESD6-38900S/TC	ESD6-38900T/TC		900	49.0		129	74.4	136	250	292	170	130	150	Fig 1
ESD6-381000S/TC	ESD6-381000T/TC		1000	54.4		143	82.7	136	280	322	170	130	150	
ESD6-3802.5KS/TC	ESD6-3802.5KT/TC	380V	45.9	2.5	1Φ or 3Φ	6.58	3.80	50	135	180	80	65		
ESD6-3805KS/TC	ESD6-3805KT/TC		91.9	5		13.2	7.60	63	165	210	90	80		Fig 1
ESD6-3807.5KS/TC	ESD6-3807.5KT/TC		138	7.5		19.7	11.4	63	195	240	90	80		
ESD6-38010KS/MC	ESD6-38010KT/MC		184	10		26.3	15.2	76	205	242	110	80	90	Fig 2
ESD6-3812.5KS/MC	ESD6-3812.5KT/MC		230	12.5		32.9	19.0	76	235	272	110	80	90	
ESD6-38015KS/MC	ESD6-38015KT/MC		276	15		39.5	22.8	76	235	272	110	80	90	
ESD6-38020KS/MC	ESD6-38020KT/MC		368	20		52.6	30.4	96	210	247	126	96	106	
ESD6-38025KS/MC	ESD6-38025KT/MC		459	25		65.8	38.0	96	240	277	126	96	106	Fig 3
ESD6-38030KS/TC	ESD6-38030KT/TC		551	30		78.9	45.6	116	250	292	146	110	126	
ESD6-38040KS/TC	ESD6-38040KT/TC		735	40		105	60.8	136	220	262	170	130	150	
ESD6-38050KS/TC	ESD6-38050KT/TC		919	50		132	76.0	136	280	322	170	130	150	

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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	80	65		Fig 1
ESL6-44015S/TC	ESL6-44015T/TC		15	1.09		2.49	1.44	50	105	150	80	65		
ESL6-44020S/TC	ESL6-44020T/TC		20	1.46		3.32	1.91	50	105	150	80	65		
ESL6-44030S/TC	ESL6-44030T/TC		30	2.19		4.97	2.87	50	135	180	80	65		
ESL6-44040S/TC	ESL6-44040T/TC		40	2.92		6.63	3.83	50	165	210	80	65		
ESL6-44050S/TC	ESL6-44050T/TC		50	3.65		8.29	4.79	50	165	210	80	65		
ESL6-44075S/TC	ESL6-44075T/TC		75	5.47		12.4	7.18	63	165	210	90	80		Fig 4
ESL6-44100S/TO	ESL6-44100T/TO		100	7.29		16.6	9.57	170	60	120	155	215	195	
ESL6-44150S/TO	ESL6-44150T/TO		150	10.9		24.9	14.4	170	60	120	155	215	195	
ESL6-44200S/TO	ESL6-44200T/TO		200	14.9		33.2	19.1	170	60	160	195	215	195	
ESL6-44250S/TO	ESL6-44250T/TO		250	18.2		41.4	23.9	170	60	180	215	215	195	
ESL6-44300S/TO	ESL6-44300T/TO		300	21.9		49.7	28.7	170	60	220	255	215	195	
ESL6-44400S/TO	ESL6-44400T/TO		400	29.2		66.3	38.3	170	60	260	295	215	195	Fig 5
ESL6-44500S/TR	ESL6-44500T/TR		500	36.5		82.9	47.9	220	60	260	305	260	240	
ESL6-44600S/TR	ESL6-44600T/TR		600	43.8		99.5	57.4	220	60	320	365	260	240	Fig 6
ESL6-44750S/TR	ESL6-44750T/TR		750	54.7		124	71.8	240	85	260	335	280	270	
ESL6-44900S/TR	ESL6-44900T/TR		900	65.7		149	86.1	240	85	280	355	280	270	Fig 6
	ESL6-441000T/TR		1000	72.9	3Φ		95.7	300	120	270	345	340	330	
ESL6-4402.5KS/TC	ESL6-4402.5KT/TC	440V	34.3	2.5	1Φ or 3Φ	6.58	3.28	50	135	180	80	65		Fig 1
ESL6-4405KS/TC	ESL6-4405KT/TC		68.5	5		13.2	6.56	63	165	210	90	80		
ESL6-4407.5KS/TO	ESL6-4407.5KT/TO		103	7.5		19.7	9.84	170	60	120	155	215	195	Fig 4
ESL6-44010KS/TO	ESL6-44010KT/TO		137	10		26.3	13.1	170	60	120	155	215	195	
ESL6-4412.5KS/TO	ESL6-4412.5KT/TO		171	12.5		32.9	16.4	170	60	120	155	215	195	
ESL6-44015KS/TO	ESL6-44015KT/TO		206	15		39.5	19.7	170	60	160	195	215	195	
ESL6-44020KS/TO	ESL6-44020KT/TO		274	20		52.6	26.2	170	60	180	215	215	195	
ESL6-44025KS/TO	ESL6-44025KT/TO		343	25		65.8	32.8	170	60	220	255	215	195	Fig 5
ESL6-44030KS/TO	ESL6-44030KT/TO		411	30		78.9	39.4	170	60	260	295	215	195	
ESL6-44040KS/TR	ESL6-44040KT/TR		548	40		105	52.5	220	60	300	345	260	240	Fig 6
ESL6-44050KS/TR	ESL6-44050KT/TR		685	50		132	65.6	240	85	230	305	280	270	
	ESL6-44075KT/TR		1028	75	3Φ		98.4	300	120	270	345	340	330	Fig 6
	ESL6-44100KT/TR		1371	100			131	300	120	350	425	340	330	

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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	80	65		Fig 1
ESD6-44015S/TC	ESD6-44015T/TC		15	1.09		2.49	1.44	50	105	150	80	65		
ESD6-44020S/TC	ESD6-44020T/TC		20	1.46		3.32	1.91	50	105	150	80	65		
ESD6-44030S/TC	ESD6-44030T/TC		30	2.19		4.97	2.87	50	135	180	80	65		
ESD6-44040S/TC	ESD6-44040T/TC		40	2.92		6.63	3.83	50	165	210	80	65		
ESD6-44050S/TC	ESD6-44050T/TC		50	3.65		8.29	4.79	50	165	210	80	65		
ESD6-44075S/TC	ESD6-44075T/TC		75	5.47		12.4	7.18	63	165	210	90	80		Fig 2
ESD6-44100S/TC	ESD6-44100T/TC		100	7.29		16.6	9.57	63	195	240	90	80		
ESD6-44150S/MC	ESD6-44150T/MC		150	10.9		24.9	14.4	76	205	242	110	80	90	
ESD6-44200S/MC	ESD6-44200T/MC		200	14.9		33.2	19.1	76	235	272	110	80	90	
ESD6-44250S/MC	ESD6-44250T/MC		250	18.2		41.4	23.9	96	210	247	126	96	106	Fig 3
ESD6-44300S/MC	ESD6-44300T/MC		300	21.9		49.7	28.7	96	240	277	126	96	106	
ESD6-44400S/TC	ESD6-44400T/TC		400	29.2		66.3	38.3	116	250	292	146	110	126	
ESD6-44500S/TC	ESD6-44500T/TC		500	36.5		82.9	47.9	136	220	262	170	130	150	
ESD6-44600S/TC	ESD6-44600T/TC		600	43.8		99.5	57.4	136	250	292	170	130	150	Fig 3
ESD6-44750S/TC	ESD6-44750T/TC		750	54.7		124	71.8	136	280	322	170	130	150	
ESD6-4402.5KS/TC	ESD6-4402.5KT/TC	440V	34.3	2.5	1Φ or 3Φ	6.58	3.28	50	135	180	80	65		Fig 1
ESD6-4405KS/TC	ESD6-4405KT/TC		68.5	5		13.2	6.56	63	165	210	90	80		
ESD6-4407.5KS/TC	ESD6-4407.5KT/TC		103	7.5		19.7	9.84	63	195	240	90	80		
ESD6-44010KS/MC	ESD6-44010KT/MC		137	10		26.3	13.1	76	205	242	110	80	90	Fig 2
ESD6-4412.5KS/MC	ESD6-4412.5KT/MC		171	12.5		32.9	16.4	76	235	272	110	80	90	
ESD6-44015KS/MC	ESD6-44015KT/MC		206	15		39.5	19.7	76	235	272	110	80	90	
ESD6-44020KS/MC	ESD6-44020KT/MC		274	20		52.6	26.2	96	210	247	126	96	106	Fig 3
ESD6-44025KS/TC	ESD6-44025KT/TC		343	25		65.8	32.8	116	220	262	146	110	126	
ESD6-44030KS/TC	ESD6-44030KT/TC		411	30		78.9	39.4	116	250	292	146	110	126	
ESD6-44040KS/TC	ESD6-44040KT/TC		548	40		105	52.5	136	250	292	170	130	150	
ESD6-44050KS/TC	ESD6-44050KT/TC		685	50		132	65.6	136	280	322	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.

PRODUCT DESCRIPTIONS

For EXPORT 수출용



SPECIFICATIONS

Construction & dimension | 구조 및 치수

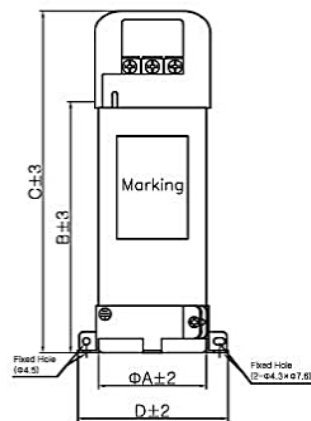
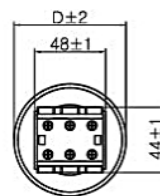
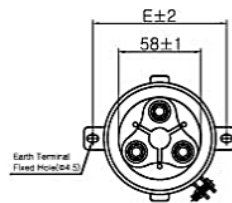
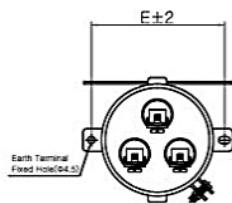


Fig1

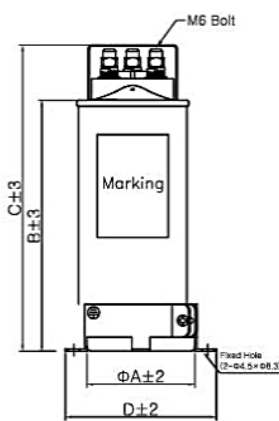


Fig2

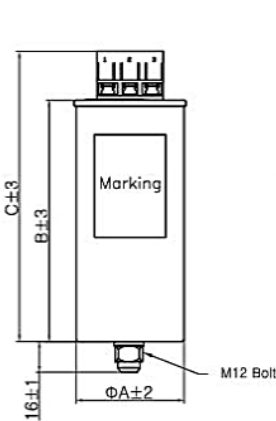


Fig3

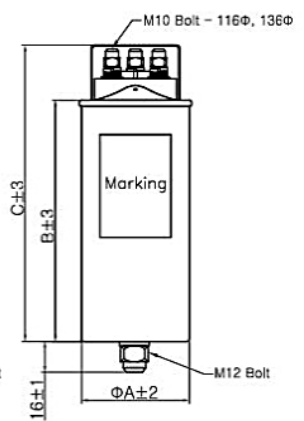


Fig4

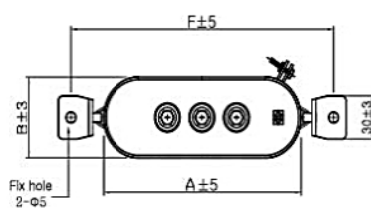


Fig5

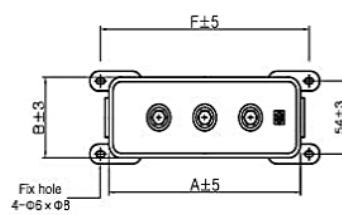


Fig6

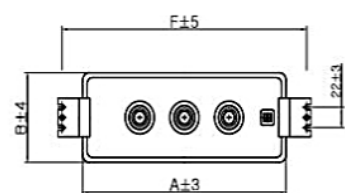
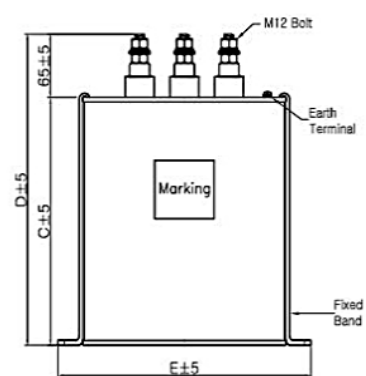
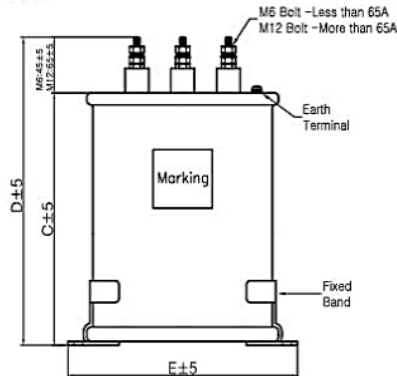
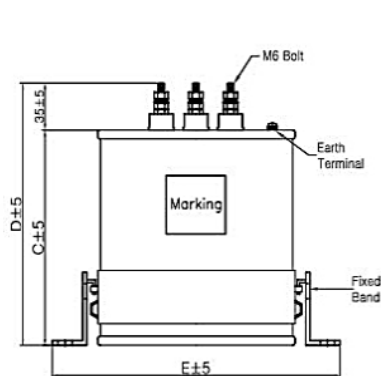


Fig7



PRODUCT DESCRIPTIONS



For EXPORT | 수출용 | 50Hz [ESL-0il 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	80	65		Fig 1
ESL5-2305KT/TC	5	301	12.6	63	165	210	90	80		
ESL5-2307.5KT/TC	7.5	452	18.8	76	205	250	105	95		Fig 2
ESL5-23010KT/TC	10	602	25.1	76	235	280	105	95		
ESL5-23012.5KT/TC	12.5	753	31.4	76	265	310	105	95		Fig 5
ESL5-23015KT/TO	15	903	37.7	170	60	210	245	215	195	
ESL5-23020KT/TO	20	1204	50.2	170	60	260	295	215	195	Fig 6
ESL5-23025KT/TR	25	1505	62.8	220	60	260	305	260	240	
ESL5-23030KT/TR	30	1806	75.3	220	60	320	365	260	240	Fig 7
ESL5-23040KT/TR	40	2408	100.0	300	120	260	335	340	330	
ESL5-23050KT/TR	50	3010	126.0	300	120	300	375	340	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	80	65		Fig 1
ESL5-4005KT/TC	5	99.5	7.2	63	165	210	90	80		
ESL5-4007.5KT/TC	7.5	149	10.8	63	195	240	90	80		Fig 2
ESL5-40010KT/TC	10	199	14.4	76	205	250	105	95		
ESL5-40012.5KT/TC	12.5	249	18.0	76	235	280	105	95		Fig 5
ESL5-40015KT/TC	15	299	21.7	76	265	310	105	95		
ESL5-40020KT/TO	20	398	28.9	170	60	210	245	215	195	Fig 6
ESL5-40025KT/TO	25	498	36.1	170	60	260	295	215	195	
ESL5-40030KT/TR	30	597	43.3	220	60	240	285	260	240	Fig 7
ESL5-40040KT/TR	40	796	57.7	220	60	320	365	260	240	
ESL5-40050KT/TR	50	995	72.2	240	85	260	335	280	270	

▶ 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	80	65		Fig 1
ESL5-4205KT/TC	5	92.5	7.0	63	165	210	90	80		
ESL5-4207.5KT/TC	7.5	139	10.4	63	195	240	90	80		Fig 2
ESL5-42010KT/TC	10	185	13.9	76	205	250	105	95		
ESL5-42012.5KT/TC	12.5	231	17.4	76	235	280	105	95		Fig 5
ESL5-42015KT/TC	15	277	20.9	76	235	280	105	95		
ESL5-42020KT/TO	20	370	27.8	170	60	180	215	215	195	Fig 6
ESL5-42025KT/TO	25	462	34.8	170	60	220	255	215	195	
ESL5-42030KT/TO	30	555	41.7	170	60	260	295	215	195	Fig 7
ESL5-42040KT/TR	40	740	55.6	220	60	320	365	260	240	
ESL5-42050KT/TR	50	925	69.6	240	85	230	305	280	270	

▶ 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	80	65		Fig 1
ESL5-4405KT/TC	5	82.2	6.6	63	165	210	90	80		
ESL5-4407.5KT/TC	7.5	123	9.8	76	175	220	105	95		Fig 2
ESL5-44010KT/TC	10	164	13.1	76	205	250	105	95		
ESL5-44012.5KT/TC	12.5	206	16.4	76	265	310	105	95		Fig 5
ESL5-44015KT/TO	15	247	19.7	170	60	180	215	215	195	
ESL5-44020KT/TO	20	329	26.2	170	60	220	255	215	195	Fig 6
ESL5-44025KT/TO	25	411	32.8	170	60	260	295	215	195	
ESL5-44030KT/TR	30	493	39.4	220	60	260	305	260	240	Fig 7
ESL5-44040KT/TR	40	658	52.5	240	85	230	305	280	270	
ESL5-44050KT/TR	50	822	65.6	240	85	280	355	280	270	

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

○ 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	E	
ESD5-2302.5KT/TC	2.5	151	6.3	50	165	210	80	65	Fig 1
ESD5-2305KT/TC	5	301	12.6	63	165	210	90	80	
ESD5-2307.5KT/MC	7.5	452	18.8	76	205	242	79		
ESD5-23010KT/MC	10	602	25.1	76	235	272	79		Fig 3
ESD5-23012.5KT/MC	12.5	753	31.4	76	265	302	79		
ESD5-23015KT/MC	15	903	37.7	96	240	277	99		
ESD5-23020KT/MC	20	1204	50.2	96	270	307	99		Fig 4
ESD5-23025KT/TC	25	1505	62.8	116	280	325	120		
ESD5-23030KT/TC	30	1806	75.3	136	250	295	140		
ESD5-23040KT/TC	40	2408	100.0	136	280	325	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	E	
ESD5-4202.5KT/TC	2.5	46.2	3.5	50	135	180	80	65	Fig 1
ESD5-4205KT/TC	5	92.5	7.0	63	165	210	90	80	
ESD5-4207.5KT/TC	7.5	139	10.4	63	195	240	90	80	
ESD5-42010KT/MC	10	185	13.9	76	205	242	79		Fig 3
ESD5-42012.5KT/MC	12.5	231	17.4	76	235	272	79		
ESD5-42015KT/MC	15	277	20.9	76	235	272	79		
ESD5-42020KT/MC	20	370	27.8	96	210	247	99		Fig 4
ESD5-42025KT/MC	25	462	34.8	96	240	277	99		
ESD5-42030KT/TC	30	555	41.7	116	250	295	120		
ESD5-42040KT/TC	40	740	55.6	136	250	295	140		
ESD5-42050KT/TC	50	925	69.6	136	280	325	140		

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

▶ 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	
ESD5-4002.5KT/TC	2.5	49.8	3.6	50	135	180	80	65	Fig 1
ESD5-4005KT/TC	5	99.5	7.2	63	165	210	90	80	
ESD5-4007.5KT/TC	7.5	149	10.8	63	195	240	90	80	
ESD5-40010KT/MC	10	199	14.4	76	205	242	79		Fig 3
ESD5-40012.5KT/MC	12.5	249	18.0	76	235	272	79		
ESD5-40015KT/MC	15	299	21.7	76	265	302	79		
ESD5-40020KT/MC	20	398	28.9	96	240	277	99		Fig 4
ESD5-40025KT/MC	25	498	36.1	96	270	307	99		
ESD5-40030KT/TC	30	597	43.3	116	250	295	120		
ESD5-40040KT/TC	40	796	57.7	136	250	295	140		
ESD5-40050KT/TC	50	995	72.2	136	280	325	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	E	
ESD5-4402.5KT/TC	2.5	41.1	3.3	50	165	210	80	65	Fig 1
ESD5-4405KT/TC	5	82.2	6.6	63	165	210	90	80	
ESD5-4407.5KT/MC	7.5	123	9.8	76	175	212	79		
ESD5-44010KT/MC	10	164	13.1	76	205	242	79		Fig 3
ESD5-44012.5KT/MC	12.5	206	16.4	76	265	302	79		
ESD5-44015KT/MC	15	247	19.7	96	210	247	99		
ESD5-44020KT/MC	20	329	26.2	96	240	277	99		Fig 4
ESD5-44025KT/TC	25	411	32.8	116	250	295	120		
ESD5-44030KT/TC	30	493	39.4	116	280	325	120		
ESD5-44040KT/TC	40	658	52.5	136	250	295	140		
ESD5-44050KT/TC	50	822	65.6	136	295	340	140		

PRODUCT DESCRIPTIONS



○ For EXPORT | 수출용 | 60Hz [ESL-0il 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	80	65		Fig 1
ESL6-2305KT/TC	5	251	12.6	63	165	210	90	80		
ESL6-2307.5KT/TC	7.5	376	18.8	76	175	220	105	95		Fig 2
ESL6-23010KT/TC	10	502	25.1	76	205	250	105	95		
ESL6-23012.5KT/TC	12.5	627	31.4	76	235	280	105	95		
ESL6-23015KT/TC	15	753	37.7	76	265	310	105	95		Fig 5
ESL6-23020KT/TO	20	1003	50.2	170	60	220	255	215	195	
ESL6-23025KT/TO	25	1254	62.8	170	60	260	295	215	195	
ESL6-23030KT/TR	30	1505	75.3	220	60	260	305	260	240	Fig 6
ESL6-23040KT/TR	40	2007	100	300	120	210	285	340	330	Fig 7
ESL6-23050KT/TR	50	2508	126	300	120	260	335	340	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	80	65		Fig 1
ESL6-4005KT/TC	5	82.9	7.2	63	165	210	90	80		
ESL6-4007.5KT/TC	7.5	124	10.8	63	195	240	90	80		Fig 2
ESL6-40010KT/TC	10	166	14.4	76	175	220	105	95		
ESL6-40012.5KT/TC	12.5	207	18.0	76	205	250	105	95		
ESL6-40015KT/TC	15	249	21.7	76	235	280	105	95		Fig 5
ESL6-40020KT/TO	20	332	28.9	170	60	180	215	215	195	
ESL6-40025KT/TO	25	415	36.1	170	60	220	255	215	195	
ESL6-40030KT/TO	30	498	43.3	170	60	260	295	215	195	Fig 6
ESL6-40040KT/TR	40	663	57.7	220	60	260	305	260	240	
ESL6-40050KT/TR	50	829	72.2	240	85	230	305	280	270	Fig 7

▶ 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	80	65		Fig 1
ESL6-4205KT/TC	5	77.0	7.0	63	165	210	90	80		
ESL6-4207.5KT/TC	7.5	116	10.4	63	165	210	90	80		Fig 2
ESL6-42010KT/TC	10	154	13.9	63	195	240	90	80		
ESL6-42012.5KT/TC	12.5	193	17.4	76	205	250	105	95		
ESL6-42015KT/TC	15	231	20.9	76	235	280	105	95		Fig 5
ESL6-42020KT/TO	20	308	27.8	170	60	160	195	215	195	
ESL6-42025KT/TO	25	385	34.8	170	60	210	245	215	195	
ESL6-42030KT/TO	30	462	41.7	170	60	220	255	215	195	Fig 6
ESL6-42040KT/TR	40	616	55.6	220	60	260	305	260	240	
ESL6-42050KT/TR	50	770	69.6	220	60	320	365	260	240	

▶ 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	80	65		Fig 1
ESL6-4405KT/TC	5	68.5	6.6	63	165	210	90	80		
ESL6-4407.5KT/TC	7.5	103	9.8	63	195	240	90	80		Fig 2
ESL6-44010KT/TC	10	137	13.1	76	205	250	105	95		
ESL6-44012.5KT/TC	12.5	171	16.4	76	235	280	105	95		
ESL6-44015KT/TC	15	206	19.7	76	235	280	105	95		Fig 5
ESL6-44020KT/TO	20	274	26.2	170	60	180	215	215	195	
ESL6-44025KT/TO	25	343	32.8	170	60	220	255	215	195	
ESL6-44030KT/TO	30	411	39.4	170	60	260	295	215	195	Fig 6
ESL6-44040KT/TR	40	548	52.5	220	60	300	345	260	240	
ESL6-44050KT/TR	50	685	65.6	240	85	230	305	280	270	Fig 7

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

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 (A)	Dimension (mm)					Fig No
	3Φ	KVAR	μF	A	B	C	D	E	
ESD6-2302.5KT/TC	2.5	125	6.3	50	165	210	80	65	Fig 1
ESD6-2305KT/TC	5	251	12.6	63	165	210	90	80	
ESD6-2307.5KT/MC	7.5	376	18.8	76	175	212	79		Fig 3
ESD6-23010KT/MC	10	502	25.1	76	205	242	79		
ESD6-23012.5KT/MC	12.5	627	31.4	76	235	272	79		
ESD6-23015KT/MC	15	753	37.7	76	265	302	79		
ESD6-23020KT/MC	20	1003	50.2	96	240	277	99		
ESD6-23025KT/MC	25	1254	62.8	96	270	307	99		Fig 4
ESD6-23030KT/TC	30	1505	75.3	116	280	325	120		
ESD6-23040KT/TC	40	2007	100	136	250	295	140		
ESD6-23050KT/TC	50	2508	126	136	295	340	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 (A)	Dimension (mm)					Fig No
	3Φ	KVAR	μF	A	B	C	D	E	
ESD6-4002.5KT/TC	2.5	41.5	3.6	50	135	180	80	65	Fig 1
ESD6-4005KT/TC	5	82.9	7.2	63	165	210	90	80	
ESD6-4007.5KT/TC	7.5	124	10.8	63	195	240	90	80	Fig 3
ESD6-40010KT/MC	10	166	14.4	76	175	113	79		
ESD6-40012.5KT/MC	12.5	207	18.0	76	205	113	79		
ESD6-40015KT/MC	15	249	21.7	76	235	113	79		
ESD6-40020KT/MC	20	332	28.9	96	210	247	99		
ESD6-40025KT/MC	25	415	36.1	96	240	277	99		Fig 4
ESD6-40030KT/TC	30	498	43.3	116	220	265	120		
ESD6-40040KT/TC	40	663	57.7	136	220	265	140		
ESD6-40050KT/TC	50	829	72.2	136	250	295	140		

▶ 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 (A)	Dimension (mm)					Fig No
	3Φ	KVAR	μF	A	B	C	D	E	
ESD6-4202.5KT/TC	2.5	38.5	3.5	50	135	180	80	65	Fig 1
ESD6-4205KT/TC	5	77.0	7.0	63	165	210	90	80	
ESD6-4207.5KT/TC	7.5	116	10.4	63	165	210	90	80	Fig 3
ESD6-42010KT/TC	10	154	13.9	63	195	240	90	80	
ESD6-42012.5KT/MC	12.5	193	17.4	76	205	242	79		
ESD6-42015KT/MC	15	231	20.9	76	235	272	79		
ESD6-42020KT/MC	20	308	27.8	96	210	247	99		
ESD6-42025KT/MC	25	385	34.8	96	240	277	99		Fig 4
ESD6-42030KT/TC	30	462	41.7	116	220	265	120		
ESD6-42040KT/TC	40	616	55.6	116	250	295	120		
ESD6-42050KT/TC	50	770	69.6	136	250	295	140		

▶ 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

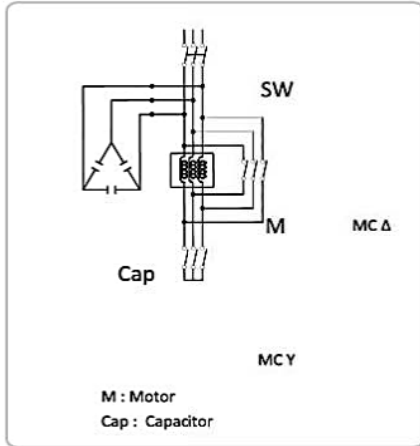
Type No.	Rated Capacity		Ic (A)	Dimension (mm)					Fig No
	3Φ	KVAR	μF	A	B	C	D	E	
ESD6-4402.5KT/TC	2.5	34.3	3.3	50	135	180	80	63	Fig 1
ESD6-4405KT/TC	5	68.5	6.6	63	165	210	90	80	
ESD6-4407.5KT/TC	7.5	103	9.8	63	195	240	90	80	Fig 3
ESD6-44010KT/MC	10	137	13.1	76	205	242	79		
ESD6-44012.5KT/MC	12.5	171	16.4	76	235	272	79		
ESD6-44015KT/MC	15	206	19.7	76	235	272	79		
ESD6-44020KT/MC	20	274	26.2	96	210	247	99		
ESD6-44025KT/TC	25	343	32.8	116	220	161	120		Fig 4
ESD6-44030KT/TC	30	411	39.4	116	250	295	120		
ESD6-44040KT/TC	40	548	52.5	136	250	295	140		
ESD6-44050KT/TC	50	685	65.6	136	280	325	140		

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

INSTALLATION AND INSPECTION

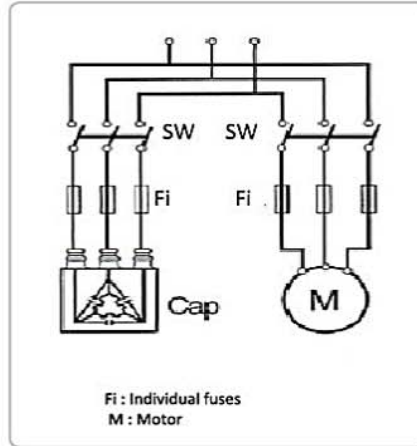
○ Installation of capacitor | 콘덴서 설치

■ Connection



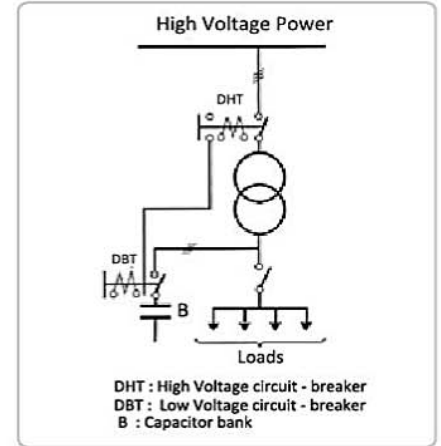
Power factor correction of Y-Δ starting motors
Y-Δ 기동 전동기의 역률개선시

※ 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.

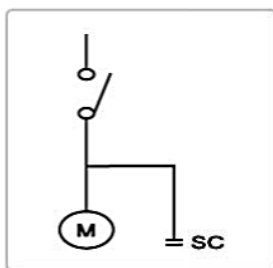


Power factor correction of motor
전동기의 역률 개선시

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



Power factor correction of transformer
변압기 역률 개선시



※ 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 effect 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 capacitor 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 고압측에서 진상전류를 취하므로 부하의 지상전류를 상쇄하는 것은 고압측이므로, 역률 개선의 효과는 고압측에 국한되어 고압측에서만 전력 손실이나 전압강하가 저감되고, 저압측의 역률 개선 효과를 얻을 수 없다. 그러나 고압측에 콘덴서를 설치하는 경우에는 콘덴서 용량은 전압의 제곱에 비례 하므로 전압이 높을수록 소형이 되어 경제적으로도 유리해진다.

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.

고압측에 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°C.
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.

SPECIFICATIONS



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 전용 개폐기 필요) ③ 고조파 장애용 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 듭

○ 콘덴서 보수 점검

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

- 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.
- 콘덴서의 케이스 외부 최고 온도부의 온도는 55℃ 이하가 되도록 설계 되어 있습니다. 만약 이것을 초과할 경우에는 강제 풍냉에 의해서 주위 온도를 감소 시켜야 합니다.
- 콘덴서는 온도 변화에 의하여 내부 절연유가 팽창 수축 하므로 케이스 표면이 팽창 수축 할수 있습니다.
운전중 콘덴서의 케이스는 편측으로 10~15mm 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 콘덴서는 이상이 없습니다.
- 콘덴서 회로의 전류, 전압은 상시 점검 하여 주십시오.
- 용량 및 절연저항은 년 1회 측정, 단 절연저항 측정의 경우 단자와 케이스간을 MEGA OHM 미터로 측정(DC 500V) 하였을 경우 500MΩ 이상 측정 되는지 확인 해 주십시오.
- 콘덴서 회로에 사용되는 차단기나 개폐기는 년 1회 접촉부분을 점검하여 주십시오. 이 접촉이 불완전하면 콘덴서가 단상 운전 되거나 접촉 불량으로 이상음을 발생하며, 고주파 진동전압이 콘덴서에 인가되어 수명을 현저하게 저하 시킬수 있습니다.
- 야간 경부하시에 진상의 역률이 될 때에는 콘덴서를 회로에서 개로하여 주십시오.

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 damage 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
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 가능성이 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.

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.

3. The ambient temperature category is -25°C to 45°C . This means up to a max. temperature of 45°C , an average one year should not exceed 35°C . The maximum casing temperature of 55°C 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.

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.

5. Recommended torque for capacitor terminals.
(According to IEC 60068-2-21)

Below M6 : 3Nm M12 : 8Nm

Check the terminals connection state in once a month at the least.

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

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

3. 사용 주변 온도는 $-25^{\circ}\text{C} \sim 45^{\circ}\text{C}$ 이고, 년 평균 기온 35°C 를 초과 하지 않는 최대 45°C 까지 라는 의미로써, Case 표면 온도는 최고 55°C 를 초과 하면 안됩니다.
온도는 Polypropylene Capacitor의 사용 수명을 단축하는 주된 원인 입니다.
(수명 단축의 주 원인 : 고조파, 온도)

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

5. 전선과 Capacitor 단자를 접속 하실때에는 아래의 Torque 강도로 접속 하여 주십시오.
(IEC 60068-2-21에 따름)

M6 이하 : 3Nm M12 : 8Nm

단자 접속 상태를 적어도 1개월에 1회이상 점검하여 조여 주십시오.

EUNSUNG

Low Voltage **Power Capacitors**



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