



SHIHLIN ELECTRIC
士林電機

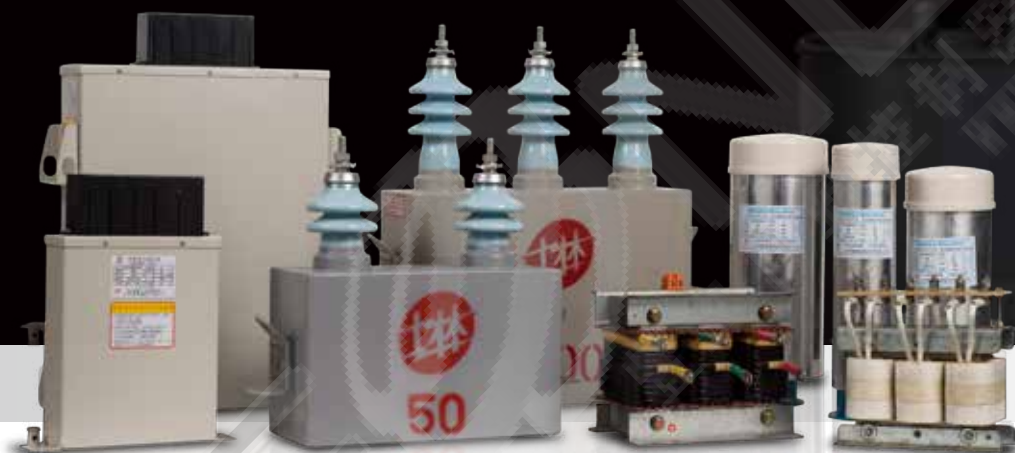
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Power Capacitors / Series Reactor

進相電容器 / 串聯電抗器



工廠驗證



INTEGRATION OF POWER SYSTEM





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一、高壓電容器 (油式) High voltage power capacitors (Oil type)

規範

設置處所	屋內外兼用
依據標準	CNS 1372、3739，JIS C4902，IEC 60871-1，GB T11024-2010
周圍溫度	- 20°C ~ + 40°C (24小時平均30°C以下，年平均溫度20°C以下)
最高使用電壓	額定電壓之110%以下 (24小時期間，容許8小時內)
最大使用電流	額定電流之135%以下 (含高諧波，製造裕度)
容量誤差	額定值之-5% ~ + 10% (相間誤差在3%以內)
損失	20°C時在0.1%以下
溫升	周溫低於40°C時，溫升25°C以下
密閉性	80 ± 5°C恆溫槽中4小時加熱，電容器外表無漏油現象
放電性	內裝放電電阻，電容器於切離電源後五分鐘其殘留電壓降至50V以下
安全性	內附熔絲型內部每一小單元電容器皆有個別熔絲保護，安全性極佳
油浸式	絕緣油為非多氯聯苯(Non-PCB)
外殼	採SUS 430不銹鋼

Specifications

Installation Location	Indoor and outdoor
Standards	CNS 1372 and 3739, JIS C4902, IEC 60871-1, GB T11024-2010
Ambient Temperature	- 20°C ~ + 40°C (24-hr average: lower than 30°C, annual average: lower than 20°C)
Max. Working Voltage	Within 110% rated voltage (8hr in every 24hrs)
Max. Working Current	Within 135% rated current (including high harmonics and manufacturing tolerances)
Capacity Tolerance	- 5% ~ + 10% of rated value (within 3% phase-to-phase tolerances)
Loss	Less than 0.1% at 20°C
Temperature Rise	Lower than 25°C when the ambient temperature is lower than 40°C
Sealing	No trace of oil leaking outside of capacitor case after heating in constant temperature tank at 80 ± 5°C for 4 hrs
Discharge	With built-in discharge resistor, residual voltage drops to lower than 50V after capacitor is disconnected for 5 minutes
Safety	Excellent, due to individual fuse protection for every single unit inside the capacitor (IF type).
Oil type	Non-PCB
Case	SUS 430

內附熔絲型與標準型比較表

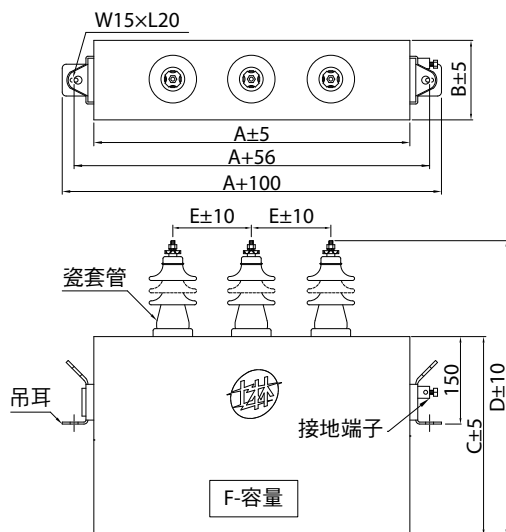
項目	內附熔絲型	標準型
安裝尺寸空間	小	較大
小單元動作後繼續使用性	佳	視情況
無功電力損失性	低	普通
不平衡保護性	佳	普通
熔絲保護性	佳	普通
外殼爆裂性	低	普通
熔絲誤動作可能性	低	普通
外附熔絲	免	必需
顏色	沙色	灰色

Internal comparison table of fuse type and standard type capacitors

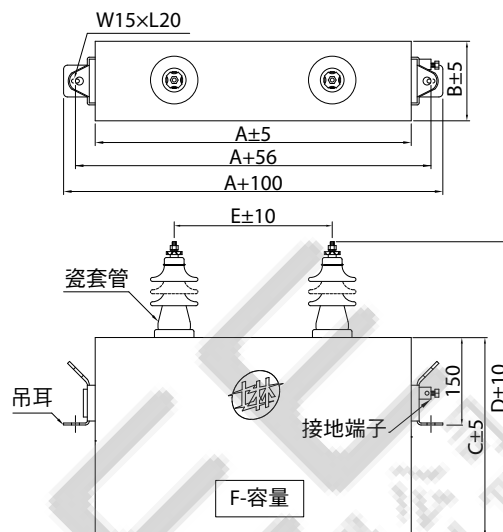
Item	Internal Fuse Type	Standard Type
Installation space	Small	Larger
Continuous usability after triggering	Excellent	Varies with different conditions
Reactive power loss	Low	Average
Imbalance protectivity	Good	Average
Fuse protectivity	Good	Average
Case breakdown possibility	Low	Average
Fuse misoperation possibility	Low	Average
External Fuse	No	Yes
Color	sand	gray

(1) 内附熔絲型 Internal fuse type

外形尺寸 Outline dimensions



圖A Fig. A



圖B Fig. B

3Ø, 60Hz, 3.8kV 内附熔絲型 (適用於系統電壓3.3kV)

3Ø, 60Hz, 3.8kV Internal fuse type (For 3.3kV system voltage)

型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-03806100T	100	15.2	430	130	300	470	150	A	27
SPF-03806150T	150	22.8	430	130	450	620	150	A	38
SPF-03806200T	200	30.4	530	130	450	620	200	A	46
SPF-03806250T	250	38.0	530	150	450	620	200	A	52
SPF-03806300T	300	45.6	630	150	450	620	250	A	61

3Ø, 60Hz, 4.8kV 内附熔絲型 (適用於系統電壓4.16kV)

3Ø, 60Hz, 4.8kV Internal fuse type (For 4.16kV system voltage)

型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-04806100T	100	12.0	430	130	300	470	150	A	27
SPF-04806150T	150	18.0	430	130	450	620	150	A	38
SPF-04806200T	200	24.1	530	130	450	620	200	A	46
SPF-04806250T	250	30.1	530	170	450	620	200	A	57
SPF-04806300T	300	36.1	630	170	450	620	250	A	67

3Ø, 60Hz, 7.6kV 内附熔絲型 (適用於系統電壓6.6kV)

3Ø, 60Hz, 7.6kV Internal fuse type (For 6.6kV system voltage)

型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-07606100T	100	7.6	430	130	300	536	150	A	29
SPF-07606150T	150	11.4	430	130	450	686	150	A	40
SPF-07606200T	200	15.2	530	130	450	686	200	A	48
SPF-07606250T	250	19.0	530	150	450	686	200	A	54
SPF-07606300T	300	22.8	630	150	450	686	250	A	63


3Ø, 60Hz, 12.8kV 內附熔絲型 (適用於系統電壓11.4kV)
3Ø, 60Hz, 12.8kV Internal fuse type (For 11.4kV system voltage)

型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-12806100T	100	4.5	430	130	300	536	150	A	29
SPF-12806150T	150	6.8	430	130	450	686	150	A	40
SPF-12806200T	200	9.0	530	130	450	686	200	A	48
SPF-12806250T	250	11.3	530	170	450	686	200	A	60
SPF-12806300T	300	13.5	630	150	450	686	250	A	63

1Ø, 60Hz, 14.7kV 內附熔絲型 (適用於系統電壓22.8kV)
1Ø, 60Hz, 14.7kV Internal fuse type (For 22.8kV system voltage)

型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-14706100S	100	6.8	340	110	450	731	200	B	29
SPF-14706150S	150	10.2	340	150	450	731	200	B	37
SPF-14706200S	200	13.6	430	150	450	731	200	B	45
SPF-14706250S	250	17.0	530	170	450	731	200	B	59
SPF-14706300S	300	20.4	630	170	450	731	300	B	69

3Ø, 60Hz, 25.4kV 內附熔絲型 (適用於系統電壓22.8kV)
3Ø, 60Hz, 25.4kV Internal fuse type (For 22.8kV system voltage)

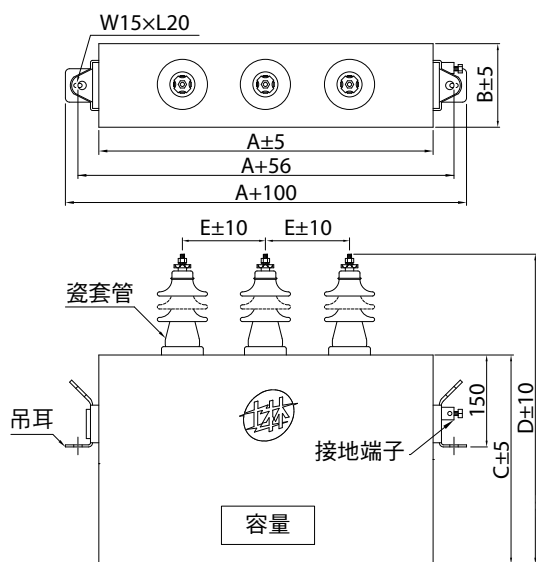
型號 Type	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 Weight (kg)
			A	B	C	D	E		
SPF-25406100T	100	2.3	630	110	300	581	250	A	36
SPF-25406150T	150	3.4	630	150	300	581	250	A	46
SPF-25406200T	200	4.6	630	130	450	731	250	A	57
SPF-25406250T	250	5.7	630	150	450	731	250	A	64
SPF-25406300T	300	6.8	630	170	450	731	250	A	71

#1. 其他電壓、容量之規格，歡迎洽詢訂購。

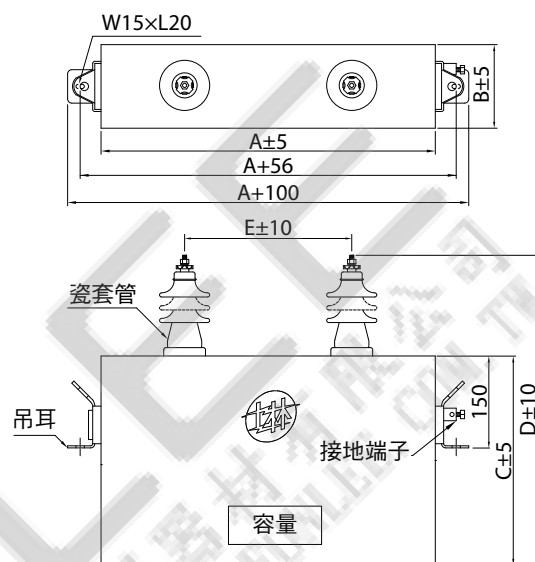
#1. Please contact Shihlin Electric for special specifications.

(2) 標準型(無內附熔絲) Standard type (non-internal fuse)

外形尺寸 Outline dimensions



圖A Fig. A



圖B Fig. B

3Ø, 60Hz, 3.8kV 標準型 (適用於系統電壓3.3kV)

3Ø, 60Hz, 3.8kV Standard type (For 3.3kV system voltage)

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVar)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-03806100T	3800	100	15.2	430	130	300	470	150	A	26
SPO-03806150T		150	22.8	430	130	450	620	150	A	37
SPO-03806200T		200	30.4	530	130	450	620	200	A	48
SPO-03806250T		250	38.0	530	150	450	620	200	A	55
SPO-03806300T		300	45.6	630	150	450	620	250	A	63

3Ø, 60Hz, 4.8kV 標準型 (適用於系統電壓4.16kV)

3Ø, 60Hz, 4.8kV Standard type (For 4.16kV system voltage)

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVar)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-04806100T	4800	100	12.0	430	130	300	470	150	A	26
SPO-04806150T		150	18.0	430	130	450	620	150	A	37
SPO-04806200T		200	24.1	530	130	450	620	200	A	48
SPO-04806250T		250	30.1	530	150	450	620	200	A	55
SPO-04806300T		300	36.1	630	150	450	620	250	A	63

3Ø, 60Hz, 7.6kV 標準型 (適用於系統電壓6.6kV)**3Ø, 60Hz, 7.6kV Standard type (For 6.6kV system voltage)**

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-07606100T	7600	100	7.6	430	130	300	536	150	A	29
SPO-07606150T		150	11.4	430	130	450	686	150	A	39
SPO-07606200T		200	15.2	530	130	450	686	200	A	47
SPO-07606250T		250	19.0	530	150	450	686	200	A	53
SPO-07606300T		300	22.8	630	150	450	686	250	A	62

3Ø, 60Hz, 12.8kV 標準型 (適用於系統電壓11.4kV)**3Ø, 60Hz, 12.8kV Standard type (For 11.4kV system voltage)**

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-12806100T	12800	100	4.5	430	130	300	536	150	A	28
SPO-12806150T		150	6.8	430	130	450	686	150	A	39
SPO-12806200T		200	9.0	530	130	450	686	200	A	50
SPO-12806250T		250	11.3	530	150	450	686	200	A	57
SPO-12806300T		300	13.5	630	150	450	686	250	A	65

1Ø, 60Hz, 14.7kV 標準型 (適用於系統電壓22.8kV)**1Ø, 60Hz, 14.7kV Standard type (For 22.8kV system voltage)**

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-14706100S	14700	100	6.8	340	110	450	731	200	B	29
SPO-14706150S		150	10.2	340	150	450	731	200	B	40
SPO-14706200S		200	13.6	430	150	450	731	200	B	48
SPO-14706250S		250	17.0	530	150	450	731	200	B	55
SPO-14706300S		300	20.4	630	150	450	731	300	B	65

3Ø, 60Hz, 25.4kV 標準型 (適用於系統電壓22.8kV)**3Ø, 60Hz, 25.4kV Standard type (For 22.8kV system voltage)**

型號 Type	額定電壓 Rated Voltage (V)	容量 Capacity (kVAr)	電流 Current (A)	尺寸 Dimensions (mm)					圖別 Fig.	概重 weight (kg)
				A	B	C	D	E		
SPO-25406100T	25400	100	2.3	630	150	210	491	250	A	32
SPO-25406150T		150	3.4	630	130	300	581	250	A	42
SPO-25406200T		200	4.6	630	170	300	581	250	A	50
SPO-25406250T		250	5.7	630	130	450	731	250	A	62
SPO-25406300T		300	6.8	630	150	450	731	250	A	67

二、低壓電容器 Low voltage power capacitors

規範

- 依據標準：IEC 60831-1、GB 12747-91、JIS 4901、CNS 1179, 3738、UL 810 等標準。
- 使用條件：屋內用，工作環境溫度-25°C~45°C(24小時平均溫度小於35°C，一年平均溫度不得超出25°C)濕度95%海拔2000米以下。
- 額定頻率：50/60Hz。
- 容量允差：-5~+15%（各相間誤差在±3%以內）。
- 耐電壓：極間2.15倍額定電壓10秒鐘，極殼間3kV10秒鐘。
- 介質損失：0.2W/kVAr以下。
- 最高使用電壓：額定電壓之110%以下(24小時期間，容許8小時內)。
- 最大使用電流：額定電流之130%以內。
- 保護等級：IP42。
- 自放電特性：內裝放電電阻，電容器切離電源1分鐘後，殘留電壓降至50V以下。

Specifications

- Standard: IEC 60831-1、GB 12747-91、JIS 4901、CNS 1179, 3738、UL 810.
- Location: indoor, ambient temperature -25°C~+45°C(24hr average lower than 35°C, annual average lower than 25°C), humidity ≤ 95%, below 2000m altitude.
- Frequency: 50/60Hz
- Capacity tolerances: -5%~+15% (phase to phase tolerance within ±3%)
- Dielectric Strength: 2.15 × VAC, Term-Term (10sec), 3kV Term-Case (10sec)
- Medium loss: <0.2W/kVAr
- Max. voltage: no more than 110% of rated voltage (8hr in every 24hr)
- Max. current: no more than 130% of rated current
- Protection level: IP42
- Discharging characteristics: with built-in discharge resistor, residual terminal voltage drops to below 50V within 1 minute after being disconnected.

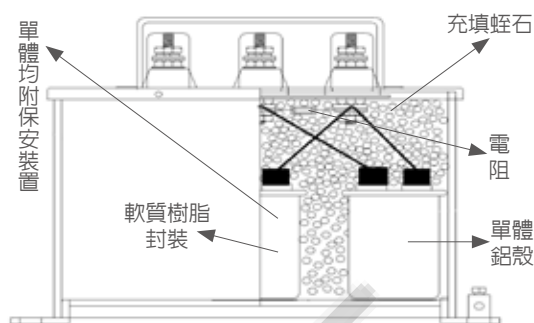
特點

- 採用耐電壓高及誘電性良好之金屬化塑膠膜(MPP)為介質，具有絕緣自復機能。
- 內部單體為鋁殼封裝，可直接將熱源傳導出去，溫升極低。
- 符合CNS、JIS、IEC等標準，內部個體電容器均附裝保護裝置（UL檢驗合格，E105535）；當線路或個體電容器發生異常時，該保護裝置將會立即動作，自動切離電源，以防止二次災害的發生。
- 電容器內裝單體均以壓力式保安裝置及填充軟質樹脂來雙重保護，連結單體時採用UL等級105°C導線連接，外殼採用高強度鋼板構成，且利用難燃性及可壓縮性蛭石，作為防火及防爆的保護。
- 電容器均附裝放電電阻，可確保用電及維護保養之安全。

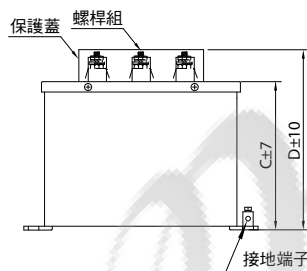
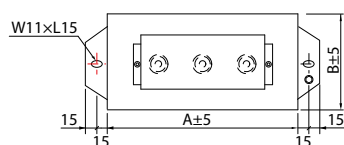
Characteristics

- The capacitor is made with self-healing high-voltage endurance and excellent dielectric metallized polypropylene film.
- Inside each capacitor unit is an aluminum sealed case that could transduce the heat rapidly and reach low temperature rise.
- The capacitor meets CNS、JIS and IEC standards. Every capacitor has an internal safety device (UL approved, E105535); this device cuts off power automatically and prevent further hazards when the capacitor malfunctions.
- The internal unit has adopted pressure protection device and epoxy resin for double protection. The capacitor adopts UL certified wire in terminal connections, vermiculite for refractory insulation. High tension steel case, filled with.
- Capacitors come with discharge resistors to ensure safe usage and maintenance.

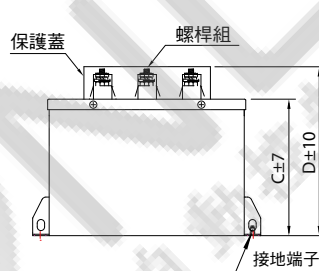
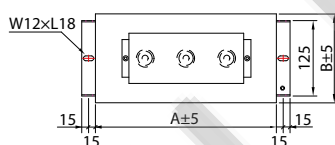
(1) 乾式KS防爆型 Dry explosion-proof KS type



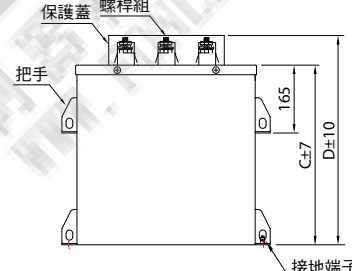
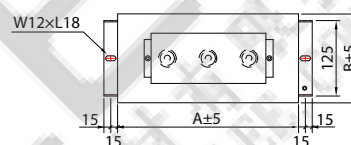
外形尺寸 Outline dimensions



圖A Fig. A



圖B Fig. B



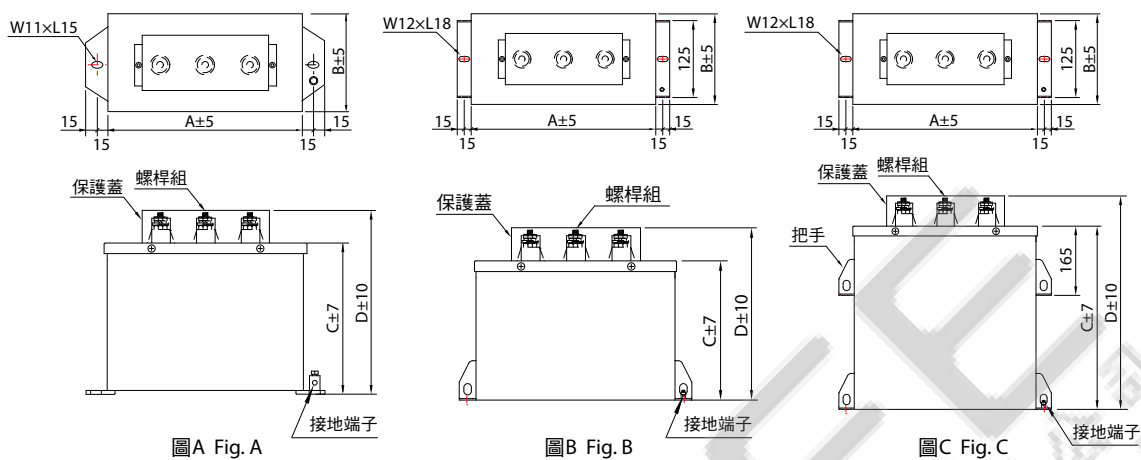
圖C Fig. C

3Ø, 60Hz, 260V, 280V KS防爆型 (適用於系統電壓220V)

3Ø, 60Hz, 260V, 280V KS type (For 220V system voltage)

型號 Type	容量 Capacity (kVAr)	額定電壓 Rated Voltage 260 (VAC)		額定電壓 Rated Voltage 280 (VAC)		尺寸 Dimensions (mm)				圖別 Fig	概重 Weight (kg)
		μ F	電流 Current (A)	μ F	電流 Current (A)	A	B	C	D		
SH-S***605T	5	196	11.1	169	10.3	220	75	250	324	A	4
SH-S***610T	10	392	22.2	338	20.6	220	75	250	324	A	4
SH-S***615T	15	589	33.3	508	30.9	220	140	250	324	B	6
SH-S***620T	20	785	44.4	677	41.2	220	140	250	324	B	6
SH-S***625T	25	981	55.5	846	51.5	230	205	250	324	B	9
SH-S***630T	30	1177	66.6	1015	61.9	230	205	250	324	B	9
SH-S***635T	35	1373	77.7	1184	72.2	300	205	250	324	B	11.5
SH-S***640T	40	1570	88.8	1353	82.5	300	205	250	324	B	11.5
SH-L***645T	45	1766	99.9	1523	92.8	350	140	470	544	C	14.5
SH-L***650T	50	1962	111.0	1692	103.1	350	140	470	544	C	14.5
SH-L***655T	55	2158	122.1	1861	113.4	350	140	470	544	C	14.5
SH-L***660T	60	2354	133.2	2030	123.7	350	140	470	544	C	14.5
SH-L***665T	65	2551	144.3	2199	134.0	420	140	470	544	C	18
SH-L***670T	70			2368	144.3	420	140	470	544	C	18

外形尺寸 Outline dimensions



3Ø, 60Hz, 440V, 480V KS 防爆型 (適用於系統電壓380V)
3Ø, 60Hz, 440V, 480V KS type (For 380V system voltage)

型號 Type	容量 Capacity (kVar)	額定電壓 Rated Voltage 440 (VAC)		額定電壓 Rated Voltage 480 (VAC)		尺寸 Dimensions (mm)				圖別 Fig	概重 Weight (kg)
		μF	電流 Current (A)	μF	電流 Current (A)	A	B	C	D		
SH-S***605T	5	69	6.6	58	6.0	220	75	250	324	A	4
SH-S***610T	10	137	13.1	115	12.0	220	75	250	324	A	4
SH-S***615T	15	206	19.7	173	18.0	220	75	250	324	A	4
SH-S***620T	20	274	26.2	230	24.1	220	140	250	324	B	6
SH-S***625T	25	343	32.8	288	30.1	220	140	250	324	B	6
SH-S***630T	30	411	39.4	345	36.1	220	140	250	324	B	6
SH-S***635T	35	480	45.9	403	42.1	230	205	250	324	B	9
SH-S***640T	40	548	52.5	461	48.1	230	205	250	324	B	9
SH-S***645T	45	617	59.0	518	54.1	230	205	250	324	B	9
SH-S***650T	50	685	65.6	576	60.1	300	205	250	324	B	11.5
SH-S***655T	55	754	72.2	633	66.2	300	205	250	324	B	11.5
SH-S***660T	60	822	78.7	691	72.2	300	205	250	324	B	11.5
SH-L***665T	65	891	85.3	748	78.2	350	140	470	544	C	13
SH-L***670T	70	959	91.9	806	84.2	350	140	470	544	C	13
SH-L***675T	75	1028	98.4	863	90.2	350	140	470	544	C	13
SH-L***680T	80	1096	105.0	921	96.2	350	140	470	544	C	14
SH-L***685T	85	1165	111.5	979	102.2	350	140	470	544	C	14
SH-L***690T	90	1233	118.1	1036	108.3	350	140	470	544	C	14
SH-L***6100T	100	1370	131.2	1151	120.3	420	140	470	544	C	14
SH-L***6110T	110	1507	144.3	1266	132.3	420	140	470	544	C	19
SH-L***6120T	120	1644	157.5	1382	144.3	420	140	470	544	C	19

#1. 使用自動功率調整器APFR控制及系統電流諧波含量高時請務必串聯電抗器來使用，電容器額定電壓建議選用系統電壓之1.25倍以上。

#2. 其他特殊電壓、容量之規格，歡迎訂購。

#1. Series reactors must be used with APFR control and high harmonic current. Suggested capacitor rated voltage would be 1.25 times above system voltage.

#2. Please contact Shihlin Electric for special specifications.

(2) 乾式圓柱型 Dry cylinder type

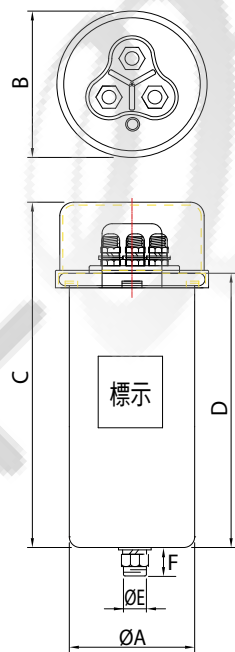
特點

- 省空間
- 電容器為鋁殼封裝，內部介質與外層鋁殼接觸，可直接將熱源傳導出去，溫昇低。
- 電容器均附裝放電電阻，可確保用電及維護保養之安全。
- 本公司所生產電容器，填充通過UL認證之難燃性軟質樹脂，可避免侵蝕及污染環境，為士林特有之綠色產品。

Characteristics

- Space efficient cylinder type.
- The capacitor is sealed in an aluminium shell. The inner medium touches the outer aluminium case, which provides good heat dissipation, slow temperature rise and long life span.
- The capacitor is equipped with discharge resistors to ensure the safety of usage and maintenance.
- This is a special Shihlin eco-friendly product, filled with UL certified flame resistant resin to prevent corrosion and containment.

外形尺寸 Outline dimensions



3Ø, 60Hz, 260V, 280V KR圓柱型 (適用於系統電壓220V)
3Ø, 60Hz, 260V, 280V KR type (For 220V system voltage)

型號 Type	額定電壓 Rated Voltage (VAC)	容量 Capacity		電流 Current (A)	引出 接線 端子	尺寸 Dimensions (mm)						概重 Weight (kg)
		(kVAR)	μ F			A	B	C	D	E	F	
SH-R260605T	260	5	196.2	11.1	M8	76	80	320	280	12	15	1.3
SH-R260610T		10	392.4	22.2	M8	106	110	330	290	12	15	2.2
SH-R260615T		15	588.6	33.3	M8	116	120	330	290	12	15	2.7
SH-R260620T		20	784.8	44.4	M10	136	140	330	290	12	15	3.7
SH-R280605T	280	5	169.2	10.3	M8	76	80	320	280	12	15	1.3
SH-R280610T		10	338.3	20.6	M8	106	110	330	290	12	15	2.2
SH-R280615T		15	507.5	30.9	M8	116	120	330	290	12	15	2.7
SH-R280620T		20	676.7	41.2	M10	136	140	330	290	12	15	3.7

3Ø, 60Hz, 440V, 480V KR圓柱型 (適用於系統電壓380V)
3Ø, 60Hz, 440V, 480V KR type (For 380V system voltage)

型號 Type	額定電壓 Rated Voltage (VAC)	容量 Capacity		電流 Current (A)	引出 接線 端子	尺寸 Dimensions (mm)						概重 Weight (kg)
		(kVAR)	μ F			A	B	C	D	E	F	
SH-R440605T	440	5	68.5	6.7	M8	76	80	320	280	12	15	1.3
SH-R440610T		10	137.0	13.1	M8	76	80	320	280	12	15	1.3
SH-R440615T		15	205.5	19.7	M8	106	110	330	290	12	15	2.2
SH-R440620T		20	274.0	26.2	M8	106	110	330	290	12	15	2.2
SH-R440625T		25	342.5	32.8	M8	116	120	330	290	16	25	2.7
SH-R440630T		30	411.0	39.4	M10	136	140	330	290	16	25	3.7
SH-R480605T	480	5	57.6	6.0	M8	76	80	320	280	12	15	1.3
SH-R480610T		10	115.1	12.0	M8	76	80	320	280	12	15	1.3
SH-R480615T		15	172.7	18.0	M8	106	110	330	290	12	15	2.3
SH-R480620T		20	230.3	24.0	M8	106	110	330	290	12	15	2.2
SH-R480625T		25	287.8	30.0	M8	116	120	330	290	16	25	2.7
SH-R480630T		30	345.4	36.1	M10	136	140	330	290	16	25	3.7

#1. 使用自動功率調整器APFR控制及系統電流諧波含量高時請務必串聯電抗器來使用，電容器額定電壓建議選用系統電壓1.25倍以上。

#2. 其他特殊電壓、容量之規格，歡迎訂購。

#3. 3Ø, 220V 300 μ F →以280V 10K選用(SH-R280610T)。3Ø, 220V 500 μ F →以280V 15K選用(SH-R280615T)。

#1. Series reactors must be used with APFR control and high harmonic current. Suggested capacitor rated voltage would be 1.25 times above system voltage.

#2. Please contact Shihlin Electric for special specifications.

#3. 3Ø, 220V 300 μ F →280V 10K(SH-R280610T)。3Ø, 220V 500 μ F →280V 15K(SH-R280615T)。

(3) SK油浸式 SK Oil immersed type

規範

- 依據規格：CNS 1179、3738、JIS 4901
- 設置處所：屋內/外用
- 周圍溫度：-25°C~45°C
- 最高使用電壓：額定電壓之110%以下 (24小時期間，容許8小時內)
- 最大使用電流：額定電流之130%以內
- 容量誤差：-5% ~ +15% (各相間誤差在±3%以內)
- 介質損失：0.2W/ kVA以下
- 溫升：周圍溫度低於40°C時，溫升25°C以下
- 密閉性：70°C ±3°C，恆溫槽中，2小時加熱在電容器外表無漏油現象
- 放電特性：內裝放電電阻，電容器於切離電源後1分鐘其殘留電壓降至50V以下
- 衝擊電壓試驗(BIL)：30kV(瓷套管)
- 耐電壓：極間2.15倍，10秒；極殼間3kV，10秒
- 外觀顏色：沙色(屋內用(圖A))；淺灰色(屋內/外共用(圖B))

Specifications

- Standard: CNS 1179, 3738 and JIS 4901.
- Location: Indoor or outdoor.
- Ambient temperature: -25°C~45°C
- Max. voltage: No more than 110% of rated voltage (8hr in every 24hr)
- Max. current: No more than 130% of rated current
- Capacity tolerances: -5% ~ +15% (Phase to phase tolerance within ±3%)
- Medium loss: <0.2W/ kVA
- Temperature rise: When the ambient temperature is below 40°C, the temperature rise of the capacitor shall be below 25°C
- Leak test: Oil should be hold for 2hrs when heated to 70°C ±3°C.
- Discharging characteristics: with built-in discharge resistor, residual terminal voltage drops to below 50V within 1 minute after being disconnected.
- BIL: 30kV(porcelain)
- Dielectric Strength: 2.15×VAC, Term-Term (10sec), 3kV Term-Case (10sec).
- Color: sand(Indoor) ; gray(Indoor/Outdoor)

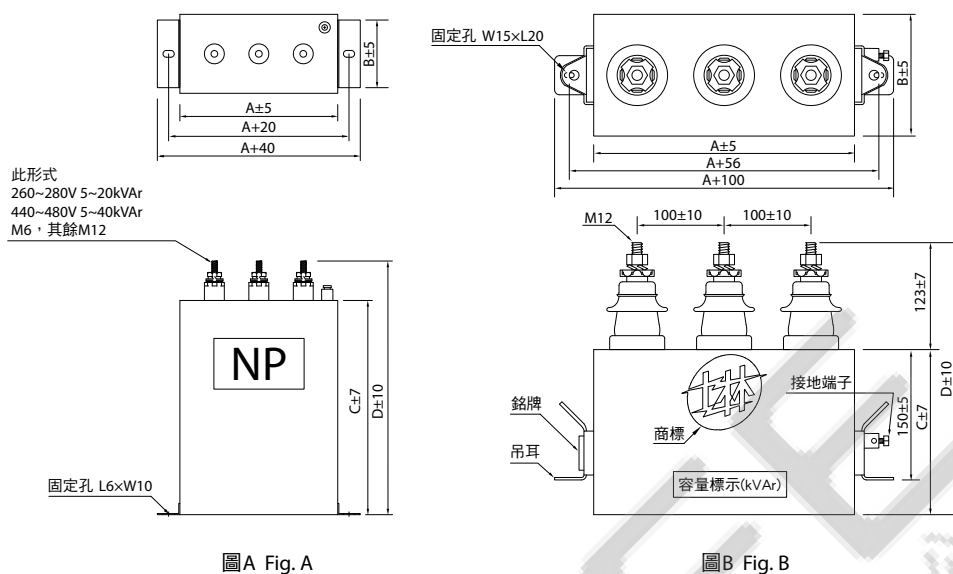
特點

- 體積小重量輕：採用耐壓及誘電性良好之金屬化塑膠薄膜捲製而成，體積小、重量輕搬運安裝極為方便。
- 介質損失小。
- 經濟性：電力使用經費可大幅節省。
- 安全性：內裝保安裝置於電壓異常時電容器內部保安動作，切斷電源可防止二次災害發生。
- 無公害：因所用絕緣油為無公害油(NON-PCB)對環境無污染之現象。
- 外殼採用SUS430不鏽鋼

Characteristics

- Compact and light weight: It is made of high voltage endurance and excellent dielectric metallized film.
- Economical: The electricity cost can be reduced to a great scale.
- Safety: An internal protective device is installed and functions when the capacitor is under fault; cuts off power to prevent the further damage.
- Hazard free: An Eco-friendly, Non-PCB, insulation oil is used.
- Stainless Case (SUS430), ceramic bushing.

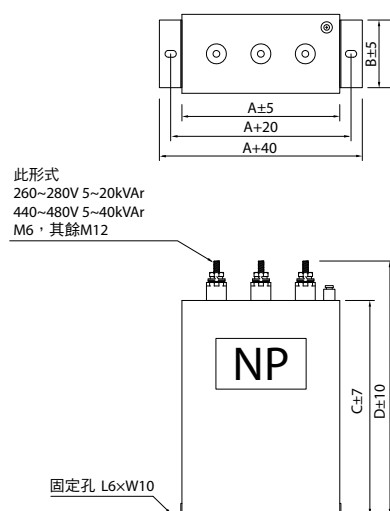
外形尺寸 Outline dimensions



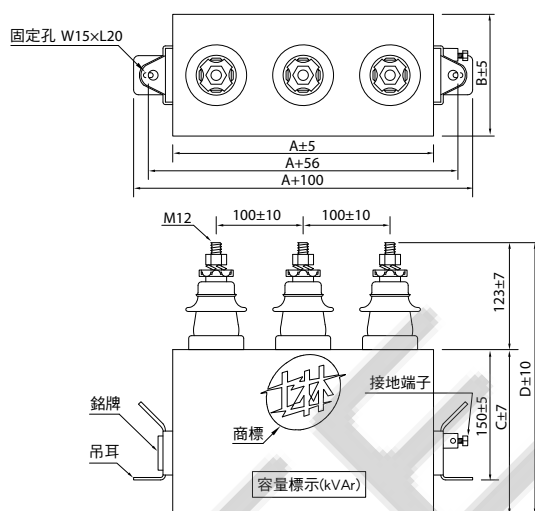
3Ø, 60Hz, 260V, 280V 油浸式 (適用於系統電壓220V)

3Ø, 60Hz, 260V, 280V Oil type (For 220V system voltage)

型號 Type	額定電壓 Rated Voltage (VAC)	容量 Capacity		電流 Current (A)	尺寸 Dimensions (mm)				圖別 Fig	概重 Weight (kg)
		(kVar)	μ F		A	B	C	D		
SH-OI260605T	260	5	196	11.1	140	70	200	235	A	2.9
SH-OI260610T		10	392	22.2	170	70	200	235	A	3.3
SH-OI260615T		15	589	33.3	170	70	350	385	A	5.3
SH-OI260620T		20	785	44.4	170	70	350	385	A	5.3
SH-O260625T		25	981	55.5	300	120	190	313	B	13
SH-O260630T		30	1177	66.6	300	120	240	363	B	13
SH-O260635T		35	1373	77.7	300	120	240	363	B	13
SH-O260640T		40	1570	88.8	300	120	280	403	B	15
SH-O260645T		45	1766	99.9	300	120	280	403	B	15
SH-O260650T		50	1962	111.0	300	120	280	403	B	15
SH-O260655T		55	2158	122.1	300	120	280	403	B	15
SH-O260660T		60	2354	133.2	300	120	330	453	B	17
SH-O260665T		65	2551	144.3	300	120	330	453	B	17
SH-O260670T		70	2747	155.4	300	140	380	503	B	20
SH-O260675T		75	2943	166.5	300	120	380	503	B	20
SH-OI280605T	280	5	169	10.3	140	70	200	235	A	2.9
SH-OI280610T		10	338	20.6	170	70	200	235	A	3.3
SH-OI280615T		15	508	30.9	170	70	350	385	A	5.3
SH-OI280620T		20	677	41.2	170	70	350	385	A	5.3
SH-O280625T		25	846	51.5	300	120	190	313	B	6
SH-O280630T		30	1015	61.9	300	120	240	363	B	13
SH-O280635T		35	1184	72.2	300	120	240	363	B	13
SH-O280640T		40	1353	82.5	300	120	240	363	B	13
SH-O280645T		45	1523	92.8	300	140	280	403	B	15
SH-O280650T		50	1692	103.1	300	120	280	403	B	15
SH-O280655T		55	1861	113.4	300	120	280	403	B	15
SH-O280660T		60	2030	123.7	300	120	280	403	B	15
SH-O280665T		65	2199	134.0	300	120	330	453	B	17
SH-O280670T		70	2368	144.3	300	140	330	453	B	17
SH-O280675T		75	2538	154.6	300	120	330	453	B	17



圖A Fig. A



圖B Fig. B

3Ø, 60Hz, 440V, 480V 油浸式 (適用於系統電壓380V)
3Ø, 60Hz, 440V, 480V Oil type (For 380V system voltage)

型號 Type	容量 Capacity (kVar)	額定電壓 Rated Voltage 440 (VAC)		額定電壓 Rated Voltage 480 (VAC)		尺寸 Dimensions (mm)				圖別 Fig	概重 Weight (kg)
		μF	電流 Current (A)	μF	電流 Current (A)	A	B	C	D		
SH-OI***605T	5	69	6.6	58	6.0	140	70	200	235	A	2.9
SH-OI***610T	10	137	13.1	115	12.0	140	70	200	235	A	2.9
SH-OI***615T	15	206	19.7	173	18.0	170	70	200	235	A	3.3
SH-OI***620T	20	274	26.2	230	24.1	170	70	350	385	A	5.3
SH-OI***625T	25	343	32.8	288	30.1	170	70	350	385	A	5.3
SH-OI***630T	30	411	39.4	345	36.1	170	70	350	385	A	5.3
SH-OI***635T	35	480	45.9	403	42.1	200	70	350	385	A	6.3
SH-OI***640T	40	—	—	461	48.1	200	70	350	385	A	6.3
SH-O***640T	40	548	52.5	—	—	300	140	190	313	B	13
SH-O***650T	50	685	65.6	576	60.1	300	140	240	363	B	14
SH-O***655T	55	754	72.2	633	66.2	300	140	240	363	B	14
SH-O***660T	60	822	78.7	691	72.2	300	140	240	363	B	15
SH-O***665T	65	891	85.3	748	78.2	300	140	240	363	B	15
SH-O***670T	70	959	91.9	806	84.2	300	140	240	363	B	15
SH-O***675T	75	1028	98.4	863	90.2	300	140	280	403	B	17
SH-O***680T	80	1096	105.0	921	96.2	300	140	280	403	B	17
SH-O***685T	85	1165	111.5	979	102.2	300	140	280	403	B	17
SH-O***690T	90	1233	118.1	1036	108.3	300	140	280	403	B	17
SH-O***6100T	100	1370	131.2	1151	120.3	300	140	330	453	B	19
SH-O***6110T	110	1507	144.3	1266	132.3	300	140	330	453	B	20
SH-O***6120T	120	1644	157.5	1382	144.3	300	140	330	453	B	20

#1. 其他電壓、容量之規格，歡迎洽詢訂購。

#1. Please contact Shihlin Electric for special specifications.

三、乾式串聯電抗器 Dry-type series reactor

串聯電抗器之優點說明

- 可抑制電容器啓閉之高頻突波之衝擊。
- 可抑制電容器切離電源瞬間，再點弧所引起的過電壓。
- 可改變系統阻抗特性，抑制諧波之放大及系統高諧波電壓和電流。
- 電容器組串聯電抗器可以減輕電路或抑制電容器突增之電流用。

Advantages of series reactors

- Suppress high frequency surge caused by capacitor power switching.
- Suppress over-voltage caused by repeated arc at instance of capacitor switch off.
- Change system impedance, suppress harmonic voltage and current.
- It can be connected to series capacitors to reduce or suppress sudden increased current.

規範

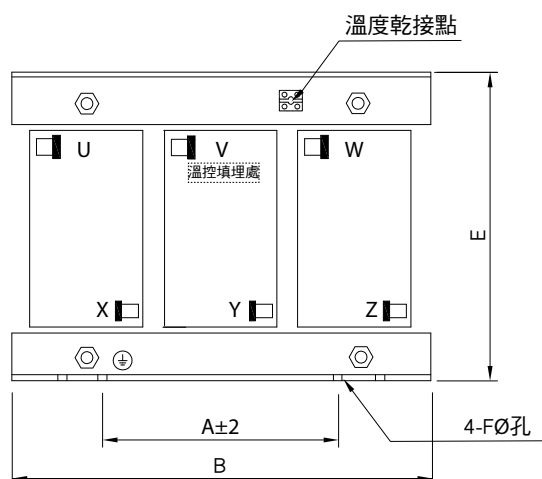
- 依據標準：依JEC-2210(2003)等之規定設計、製造及試驗。
- 使用地區為海拔1000公尺以下，周溫40°C以下，平均周溫在任何24小時內不得超過35°C之場所使用。
- 溫升：連續額定電流135%，線圈溫升不超過120°C。
- 絕緣耐壓：AC 4000V/ 1分鐘(min)。
- 最大容許電流：5th諧波電流含量35%以下，合成電流120%以下。
- 容許瞬間電流：額定電流之25倍2秒。
- 電抗器絕緣等級H級，保護等級IP00。

Specifications

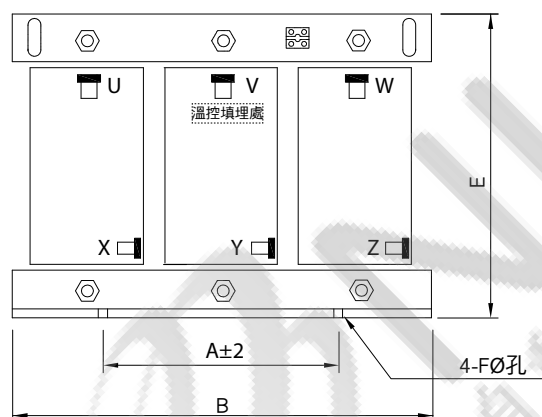
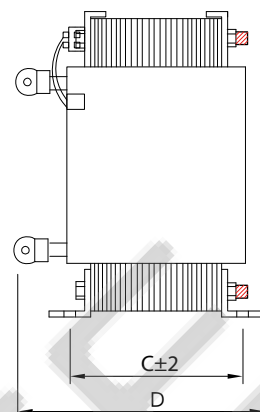
- Standard: JEC-2210(2003)
- Location: below 1000m, ambient temperature below 40°C, average temperature in 24 hours does not exceed 35°C.
- Temperature rise: continuous rated current at 135%, coil temperature below 120°C.
- Dielectric withstand voltage: AC 4000V/ 1min.
- Max. allowable current: 5th harmonic current below 35%, compound current below 120%.
- The max. excessive current for the short periods is 25 time of the rated current in 2 sec.
- Reactor insulation level: Class H. Protection level: IP00.



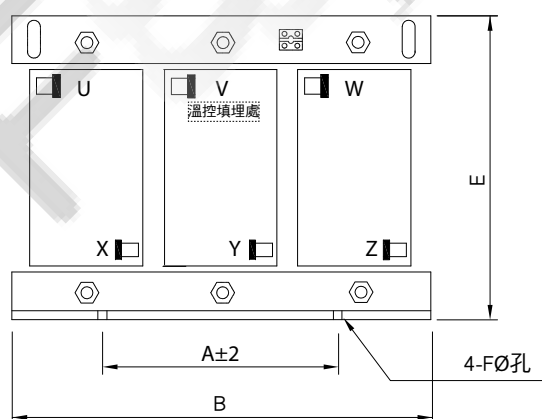
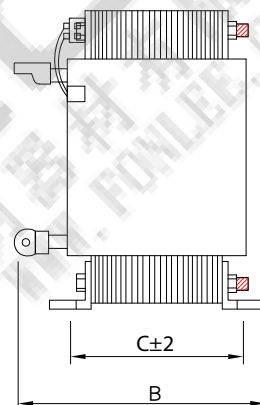
外形尺寸 Outline dimensions



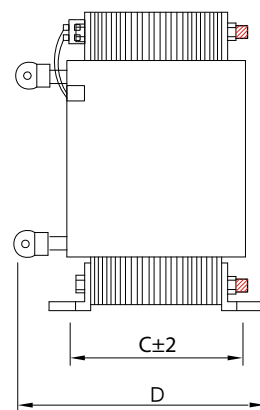
圖A Fig. A



圖B Fig. B



圖C Fig. C



公差為: ±5mm

3Ø, 60Hz, 260V (適用於系統電壓為220V)
3Ø, 60Hz, 260V (For 220V system voltage)

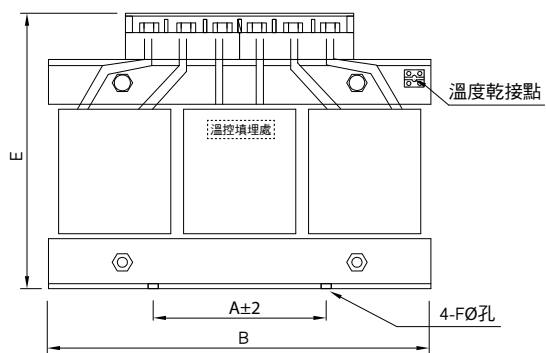
電容器 260VAC (kVAr)	電抗器		電流 Current (A)	容量		尺寸 Dimensions (mm)						圖別 Fig	概重 Weight (kg)
	型號 Type	額定電壓 (V)		(kVAr)	(mH)	A	B	C	D	E	F		
5	SR6-2660030TA	260	11.1	0.3	2.152	90	180	88	155	150	7-12L	A	8.5
10	SR6-2660060TA		22.2	0.6	1.076	90	180	88	155	150	7-12L	A	8.5
15	SR6-2660090TA		33.3	0.9	0.717	100	208	95	165	170	10-20L	B	10.8
20	SR6-2660120TA		44.4	1.2	0.538	120	226	100	175	180	10-20L	B	14.6
25	SR6-2660150TA		55.5	1.5	0.430	135	260	115	200	200	10-20L	C	22.6
30	SR6-2660180TA		66.6	1.8	0.359	135	260	115	200	200	10-20L	C	22.6
35	SR6-2660210TA		77.7	2.1	0.307	135	260	115	200	200	10-20L	C	23.4
40	SR6-2660240TA		88.8	2.4	0.269	135	260	115	200	200	10-20L	C	23.4
45	SR6-2660270TA		99.9	2.7	0.239	135	260	130	215	215	10-20L	C	28.5
50	SR6-2660300TA		111.0	3	0.215	135	260	130	215	215	10-20L	C	28.5
55	SR6-2660330TA		122.1	3.3	0.196	140	300	130	210	260	10-20L	C	34.1
60	SR6-2660360TA		133.2	3.6	0.179	140	300	130	210	260	10-20L	C	34.1
65	SR6-2660390TA		144.3	3.9	0.166	140	300	130	210	260	10-20L	C	35.4
70	SR6-2660420TA		155.4	4.2	0.154	140	300	130	210	260	10-20L	C	35.4
75	SR6-2660450TA		166.5	4.5	0.143	140	333	144	225	290	10-20L	C	50.1

3Ø, 60Hz, 280V (適用於系統電壓為220V)
3Ø, 60Hz, 280V (For 220V system voltage)

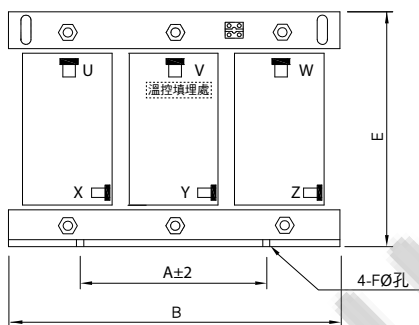
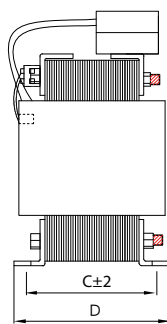
電容器 280VAC (kVAr)	電抗器		電流 Current (A)	容量		尺寸 Dimensions (mm)						圖別 Fig	概重 Weight (kg)
	型號 Type	額定電壓 (V)		(kVAr)	(mH)	A	B	C	D	E	F		
5	SR6-2860030TA	280	10.3	0.3	2.496	90	180	88	155	150	7-12L	A	8.5
10	SR6-2860060TA		20.6	0.6	1.248	90	180	88	155	150	7-12L	A	8.5
15	SR6-2860090TA		30.9	0.9	0.832	100	208	95	165	170	10-20L	B	10.8
20	SR6-2860120TA		41.2	1.2	0.624	120	226	100	175	180	10-20L	B	14.6
25	SR6-2860150TA		51.5	1.5	0.499	135	260	115	200	200	10-20L	C	22.6
30	SR6-2860180TA		61.9	1.8	0.416	135	260	115	200	200	10-20L	C	22.6
35	SR6-2860210TA		72.2	2.1	0.357	135	260	115	200	200	10-20L	C	23.4
40	SR6-2860240TA		82.5	2.4	0.312	135	260	115	200	200	10-20L	C	23.4
45	SR6-2860270TA		92.8	2.7	0.277	135	260	130	215	215	10-20L	C	28.5
50	SR6-2860300TA		103.1	3	0.250	135	260	130	215	215	10-20L	C	28.5
55	SR6-2860330TA		113.4	3.3	0.227	140	300	130	210	260	10-20L	C	34.1
60	SR6-2860360TA		123.7	3.6	0.208	140	300	130	210	260	10-20L	C	34.1
65	SR6-2860390TA		134.0	3.9	0.192	140	300	130	210	260	10-20L	C	35.4
70	SR6-2860420TA		144.3	4.2	0.178	140	300	130	210	260	10-20L	C	35.4
75	SR6-2860450TA		154.6	4.5	0.166	140	333	144	225	290	10-20L	C	50.1

- 其他電壓、容量之規格及串聯7%、8%、13%、14.8%、15%電抗器，歡迎訂購。
- Inquiries are welcomed (different voltages, capacitances of 7%, 8%, 13%, 14.8% & 15% series reactors.)

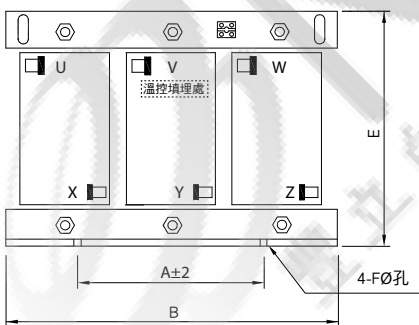
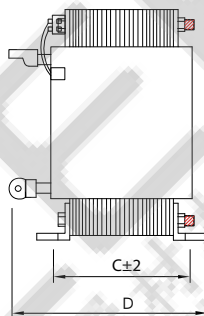
外形尺寸 Outline dimensions



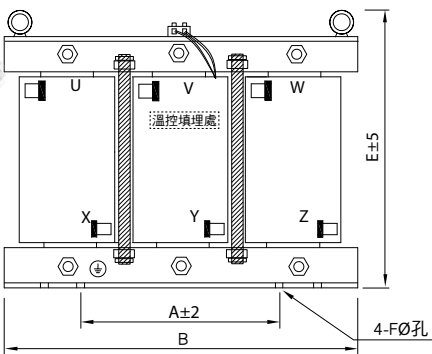
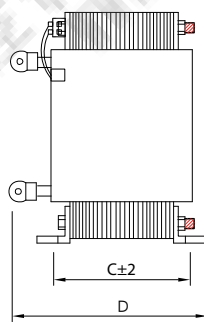
圖A Fig. A



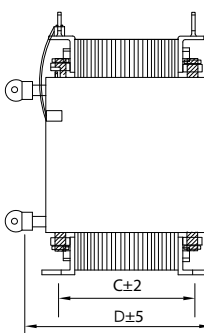
圖B Fig. B



圖C Fig. C



圖D Fig. D



公差為: ±5mm

3Ø, 60Hz, 440V (適用於系統電壓為380V)

3Ø, 60Hz, 440V (For 380V system voltage)

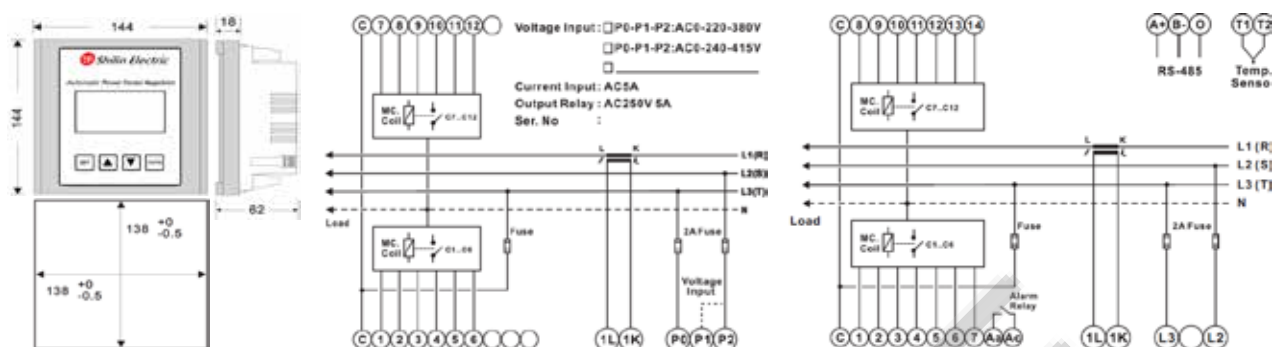
電容器 440VAC (kVAr)	電抗器		電流 Current (A)	容量		尺寸 Dimensions (mm)						圖別 Fig	概重 Weight (kg)
	型號 Type	額定電壓 (V)		(kVAr)	(mH)	A	B	C	D	E	F		
5	SR6-4460030TA	440	6.6	0.3	6.162	90	180	88	110	170	7-12L	A	8.3
10	SR6-4460060TA		13.1	0.6	3.081	90	180	88	110	170	7-12L	A	8.3
15	SR6-4460090TA		19.7	0.9	2.054	100	208	95	165	170	10-20L	B	11.1
20	SR6-4460120TA		26.2	1.2	1.541	120	226	100	175	180	10-20L	B	14.5
25	SR6-4460150TA		32.8	1.5	1.232	135	260	115	200	200	10-20L	B	23.4
30	SR6-4460180TA		39.4	1.8	1.027	135	260	115	200	200	10-20L	B	23.4
35	SR6-4460210TA		45.9	2.1	0.880	135	260	130	215	215	10-20L	B	28.5
40	SR6-4460240TA		52.5	2.4	0.770	135	260	130	215	215	10-20L	B	28.5
45	SR6-4460270TA		59.0	2.7	0.685	140	300	130	210	260	10-20L	C	33.6
50	SR6-4460300TA		65.6	3	0.616	140	300	130	210	260	10-20L	C	33.6
55	SR6-4460330TA		72.2	3.3	0.560	140	300	130	210	260	10-20L	C	33.6
60	SR6-4460360TA		78.7	3.6	0.514	140	300	130	210	260	10-20L	C	33.6
65	SR6-4460390TA		85.3	3.9	0.474	140	300	130	210	260	10-20L	C	34.6
70	SR6-4460420TA		91.9	4.2	0.440	140	300	130	210	260	10-20L	C	34.6
75	SR6-4460450TA		98.4	4.5	0.411	140	300	150	230	260	10-20L	C	42.1
80	SR6-4460480TA		105.0	4.8	0.385	140	300	150	230	260	10-20L	C	42.1
85	SR6-4460510TA		111.5	5.1	0.362	140	300	150	230	260	10-20L	C	45
90	SR6-4460540TA		118.1	5.4	0.342	140	300	150	230	260	10-20L	C	45
95	SR6-4460570TA		124.7	5.7	0.324	140	333	144	225	290	10-20L	C	52.4
100	SR6-4460600TA		131.2	6.0	0.308	140	333	144	225	290	10-20L	C	52.4
105	SR6-4460630TA		137.8	6.3	0.293	140	333	144	225	290	10-20L	C	52.4
110	SR6-4460660TA		144.3	6.6	0.280	140	333	144	225	290	10-20L	C	52.4
115	SR6-4460690TA		150.9	6.9	0.268	160	358	150	260	365	12-36L	D	57.1
120	SR6-4460720TA		157.5	7.2	0.257	160	358	150	260	365	12-36L	D	57.1

3Ø, 60Hz, 480V (適用於系統電壓為380V)

3Ø, 60Hz, 480V (For 380V system voltage)

電容器 480VAC (kVAr)	電抗器		電流 Current (A)	容量		尺寸 Dimensions (mm)						圖別 Fig	概重 Weight (kg)
	型號 Type	額定電壓 (V)		(kVAr)	(mH)	A	B	C	D	E	F		
5	SR6-4860030TA	480	6.0	0.3	7.334	90	180	78	100	170	7-12L	A	6.6
10	SR6-4860060TA		12.0	0.6	3.667	90	180	78	100	170	7-12L	A	6.6
15	SR6-4860090TA		18.0	0.9	2.445	100	208	95	165	170	10-20L	B	10.8
20	SR6-4860120TA		24.1	1.2	1.833	120	226	100	175	180	10-20L	B	14.5
25	SR6-4860150TA		30.1	1.5	1.467	135	260	115	200	200	10-20L	B	23.2
30	SR6-4860180TA		36.1	1.8	1.222	135	260	115	200	200	10-20L	B	23.2
35	SR6-4860210TA		42.1	2.1	1.048	135	260	130	215	215	10-20L	B	28.5
40	SR6-4860240TA		48.1	2.4	0.917	135	260	130	215	215	10-20L	B	28.5
45	SR6-4860270TA		54.1	2.7	0.815	140	300	130	210	260	10-20L	C	33.3
50	SR6-4860300TA		60.1	3	0.733	140	300	130	210	260	10-20L	C	33.3
55	SR6-4860330TA		66.2	3.3	0.667	140	300	130	210	260	10-20L	C	33.6
60	SR6-4860360TA		72.2	3.6	0.611	140	300	130	210	260	10-20L	C	33.6
65	SR6-4860390TA		78.2	3.9	0.564	140	300	130	210	260	10-20L	C	34.7
70	SR6-4860420TA		84.2	4.2	0.524	140	300	130	210	260	10-20L	C	34.7
75	SR6-4860450TA		90.2	4.5	0.489	140	300	150	230	260	10-20L	C	41.7
80	SR6-4860480TA		96.2	4.8	0.458	140	300	150	230	260	10-20L	C	41.7
85	SR6-4860510TA		102.2	5.1	0.431	140	300	160	240	260	10-20L	C	45.4
90	SR6-4860540TA		108.3	5.4	0.407	140	300	160	240	260	10-20L	C	45.4
95	SR6-4860570TA		114.3	5.7	0.386	140	333	144	225	290	10-20L	C	50.9
100	SR6-4860600TA		120.3	6.0	0.367	140	333	144	225	290	10-20L	C	50.9
105	SR6-4860630TA		126.3	6.3	0.349	140	333	144	235	290	10-20L	C	52.4
110	SR6-4860660TA		132.3	6.6	0.333	140	333	144	235	290	10-20L	C	52.4
115	SR6-4860690TA		138.3	6.9	0.319	140	333	144	235	290	10-20L	C	52.4
120	SR6-4860720TA		144.3	7.2	0.306	140	333	144	235	290	10-20L	C	52.4

四、自動功因調整器 (APFR)



項目	型式	SE-6S	SE-12S	SE-7MS	SE-14MS
電壓範圍		220VAC & 380VAC ±15%		90 ~ 550VAC ±10%	
		110VAC or 440VAC ±15%(選配)			
電壓消耗電力		≤ 4VA	≤ 6VA	≤ 7VA	≤ 10VA
電流範圍		AC 0.05 ~ 5A			
電流消耗電力		≤ 0.5VA			
頻率範圍		45 ~ 65Hz			
顯示器		LCD 背光顯示器 (數位, 功因數字顯示)			
功率因數設定範圍		電容性 (超前) 0.7 ~ 電感性 (落後) 0.7 P.F.			
		電容性 (超前) 0.5 ~ 電感性 (落後) 0.5 P.F.(需選配)			
功率因數設定模式		帶狀範圍 / 點模式			
控制方式		自動 / 手動			
C/k 設定		自動 / 手動 (設定範圍 0.01 ~ 2.40)			
動作延遲時間設定		1 ~ 999 秒			
動作段數設定		3 ~ 6 段	3 ~ 12 段	3 ~ 7 段	3 ~ 14 段
動作模式設定		循環式、堆疊式		循環式、堆疊式、自動	
繼電器接點		250VAC, 5A			
使用條件		溫度 0 ~ 60℃, 濕度 95% 以下			
儲存溫度範圍		-10 ~ 70℃			
保護等級		IP52			
絕緣強度		2kVAC, 60Hz, 1 分鐘 (輸入 / 輸出 / 外殼)			
接線方式		插接式端子			
概略重量		0.7kg		0.5kg	
顯示項目		cos ϕ THD A(1 ~ 31 次總諧波成分)		V、A、VA、W、VAr、cos ϕ、Hz、℃、THD V、THD A、電容量、電容衰減率、電容器投入次數、電容器投入時數 (THD V、THD A 顯示 1st ~ 31th 各次諧波成分)	
警報		過電壓、低電壓、過電流、低電流、電流諧波比過高、電容量不足 (顯示警報)		過電流、低電流、電容量衰減、電容量不足 (顯示警報並且警報接點動作)	
		過電壓、低電壓、電流諧波比過高 (警報跳脫功能)		過電壓、低電壓、電流諧波比過高、電壓諧波比過高、溫度過高 (暫停投入、跳脫、或顯示警報並且警報接點動作等設定)	
警報接點		X		附一組警報接點、SE-14MS 另附三組特殊用途接點 (12、13、14 為特殊用途接點, 投放功能、固定投入、警報接點、或風扇啟動接點等用途可擇一設定)	
無電壓跳脫功能		斷電時在 35 ms 內將所有輸出接點 跳脫, 復電 90 秒後依預設延遲時間依序投入。			
快速模式		V			
相序錯誤自動反相		V			
可設定最後一段固定投入		V			
通訊功能		X		V	
密碼鎖定功能		X		V	
內部單 / 三相計算選擇		X		V	

五、電容器裝置容量 Installed capacities

(1) 計算係數表 Calculation table of coefficients

應用例：

$$\text{改善係數}(K) = \tan(\cos^{-1} \theta_1) - \tan(\cos^{-1} \theta_2)$$

設工廠負荷：1000kW

改善前功因： $\cos \theta_1 = 0.8$ 擬改善功因： $\cos \theta_2 = 0.95$ 所需電容量 = $1000 \times 0.421 \approx 421\text{kVar}$ (由下表查得)

Example:

System load of the plant: 1000kW

Power factor before improvement: $\cos \theta_1 = 0.8$ Desired power factor after improvement: $\cos \theta_2 = 0.95$ Capacitance of the capacitor required = $1000 \times 0.421 \approx 421\text{kVar}$

(Note: 0.421 is obtained from the aforesaid table)

計算係數表 Calculation table of coefficients

改善前功因													
Power factor before improvement	擬改善功因 $\cos \theta_2$ Desired power after improvement												
$\cos \theta_1$	0.80	0.85	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	Unity
0.70	0.270	0.400	0.536	0.564	0.591	0.625	0.657	0.691	0.729	0.769	0.817	0.878	1.020
0.71	0.242	0.372	0.508	0.536	0.563	0.597	0.629	0.663	0.701	0.741	0.783	0.850	0.992
0.72	0.214	0.344	0.479	0.507	0.534	0.568	0.600	0.634	0.672	0.712	0.754	0.821	0.963
0.73	0.186	0.316	0.452	0.480	0.507	0.541	0.573	0.607	0.645	0.685	0.727	0.794	0.936
0.74	0.159	0.289	0.425	0.453	0.480	0.514	0.546	0.580	0.618	0.658	0.700	0.767	0.909
0.75	0.132	0.262	0.398	0.426	0.453	0.487	0.519	0.553	0.591	0.631	0.673	0.740	0.882
0.76	0.105	0.235	0.371	0.399	0.429	0.460	0.492	0.526	0.564	0.604	0.652	0.713	0.855
0.77	0.079	0.209	0.345	0.373	0.400	0.434	0.466	0.500	0.538	0.578	0.620	0.687	0.829
0.78	0.053	0.183	0.319	0.347	0.374	0.408	0.440	0.474	0.512	0.552	0.594	0.661	0.803
0.79	0.026	0.156	0.292	0.320	0.347	0.381	0.413	0.447	0.485	0.525	0.567	0.634	0.776
0.80	—	0.130	0.266	0.294	0.321	0.355	0.387	0.421	0.459	0.499	0.547	0.608	0.750
0.81	—	0.104	0.240	0.268	0.295	0.329	0.361	0.395	0.433	0.473	0.515	0.582	0.724
0.82	—	0.078	0.214	0.242	0.269	0.303	0.335	0.369	0.407	0.447	0.489	0.556	0.698
0.83	—	0.052	0.188	0.216	0.243	0.277	0.309	0.343	0.381	0.421	0.463	0.530	0.672
0.84	—	0.026	0.162	0.190	0.217	0.251	0.283	0.317	0.355	0.395	0.437	0.504	0.645
0.85	—	—	0.136	0.164	0.191	0.225	0.257	0.291	0.329	0.369	0.417	0.473	0.620
0.86	—	—	0.109	0.140	0.167	0.198	0.230	0.264	0.301	0.343	0.390	0.450	0.593
0.87	—	—	0.083	0.114	0.141	0.172	0.204	0.238	0.275	0.317	0.364	0.424	0.567
0.88	—	—	0.054	0.085	0.112	0.143	0.175	0.209	0.246	0.288	0.335	0.395	0.538
0.89	—	—	0.028	0.059	0.086	0.117	0.149	0.183	0.230	0.262	0.309	0.369	0.512
0.90	—	—	—	0.031	0.058	0.089	0.121	0.155	0.192	0.234	0.281	0.341	0.484
0.91	—	—	—	—	0.027	0.058	0.090	0.124	0.161	0.203	0.250	0.310	0.453
0.92	—	—	—	—	—	0.031	0.063	0.097	0.134	0.176	0.223	0.283	0.426
0.93	—	—	—	—	—	—	0.032	0.066	0.103	0.145	0.192	0.252	0.395
0.94	—	—	—	—	—	—	—	0.034	0.071	0.113	0.160	0.220	0.363
0.95	—	—	—	—	—	—	—	—	0.037	0.079	0.126	0.186	0.329

(2) 電壓提高後其容量變化之計算係數

Calculation coefficients of the capacitances after increasing the voltages.

(A) 高壓電容器 High voltage capacitor					
系統電壓 System Voltage (kV)	電容器擬提升後之額定電壓 (kV) Desired rated voltage for the capacitor (kV)				
	3.8	4.8	7.6	12.8	25.4
3.3	1.326	—	—	—	—
4.16	—	1.331	—	—	—
6.6	—	—	1.33	—	—
11.4	—	—	—	1.261	—
22.8	—	—	—	—	1.241

(B) 低壓電容器 Low voltage capacitor			
系統電壓 System Voltage (V)	電容器擬提升後之額定電壓 (V) Desired rated voltage for the capacitor (V)		
	280	480	600
220	1.620	—	—
380	—	1.596	—
440	—	—	1.860
460	—	—	1.701
480	—	—	1.563

應用例：

設系統電壓380V，所需電容器容量為50kVAr，因考量串聯電抗器時及高諧波含量所造成的壓升，電容器額定電壓擬提高至480V時之容量換算式：

所需電容器容量 = 50kVAr × 1.596 (由上表查得) = 80kVAr (取5的倍數容量)

Example:

Assuming the system voltage is 380V, the required capacitance is 50kVAr. Taking into consideration of voltage rise due to series reactor or high harmonics, the actual capacitance would be:

Required capacitor capacitance = 50kVAr × 1.596 (obtained from above table) = 80kVAr

換算式 Conversion formula:

$$\frac{Q_{\text{原設計}}}{Q_{\text{提升後}}} = \left(\frac{V_{\text{原設計}}}{V_{\text{提升後}}} \right)^2 \rightarrow Q_{\text{提升後}} = Q_{\text{原設計}} \times \left(\frac{V_{\text{提升後}}}{V_{\text{原設計}}} \right)^2$$

$$\rightarrow Q_{@480V} = 50 \times \left(\frac{480}{380} \right)^2 = 80 \text{ kVAr}$$

$$\frac{Q_{\text{original}}}{Q_{\text{desired}}} = \left(\frac{V_{\text{original}}}{V_{\text{desired}}} \right)^2 \rightarrow Q_{\text{desired}} = Q_{\text{original}} \times \left(\frac{V_{\text{desired}}}{V_{\text{original}}} \right)^2$$

$$\rightarrow Q_{@480V} = 50 \times \left(\frac{480}{380} \right)^2 = 80 \text{ kVAr}$$

六、一般保養維護 Maintenance

(1) 低壓進相電容器一般檢查判斷

Low Voltage Power Capacitors General Inspection And Gauge

外觀失效判定

Break down check by visual inspection

屋內型：電容器外部如有上蓋彈出或內部有污漬物噴出等。

Indoor type : If the Capacitor case is left or exposed with some smudges, then it means the capacitor is broken.

基本性能檢查

Basic function inspection

首先被測電容器一定得與電源切離3分鐘以上，再逐以對相對地及相對相實施放電。

First of all, the capacitor must be switched off at least 3 minutes in advance to discharge each phase and phase to ground.

容量的判定（以直讀式容量計測量）

Gauge of capacitance is measured by direct reading capacitor meter

1. 由銘牌標示或檢驗合格證上之額定容量除2即等於相間容量。

Half the rated capacitance printed on name plate or certificate is equal to the phase to phase capacitance.

2. 相別分辨：一般以銘牌側算起，分別為U相、V相、W相。

Identify phase: The sequence of U、V、W is from the name plate side.

3. 測得值換算為額定容量

The rated capacitance caculated by measurement value

$$U-V=a(\mu F)$$

$$U-W=b(\mu F) \therefore (a+b+c) \times 2 \div 3 = \text{額定容量}$$

$$V-W=c(\mu F)$$

$$U-V=a(\mu F)$$

$$U-W=b(\mu F) \therefore (a+b+c) \times 2 \div 3 = \text{rated capacitance}$$

$$V-W=c(\mu F)$$

4. 以額定容量為判定基準

Determination by the rated capacitance

- 額定容量的-5%~+15%之內。

Tolerance of capacitance: -5%~+15%

- 多台並聯時先求單台額定容量再乘以台數即可。

When many capacitors are connected in parallel, to know the total capacitance requires to find the individual capacitance first, then times to the total amount afterward.

- 相間不平衡率為108%以內。

二相值取最低者為基準，與其它2相個別相除求百分比即可。

Inter phase unbalanced factor is < 108%.

To adopt the lowest phase as standard level among these three phases, and then to divid another two phases to get the ratio.

(2) 低壓電容器之保養與維護

Low Voltage Capacitor's Maintenance

日常保養

Daily maintenance

1. 電容器適用於周圍溫度45°C以下，初裝時期周圍溫度之平穩與否，通風設備之良否或熱源之幅射及周圍溫度之上升情況均應加以注意。

The capacitor's ambient temperature must be lower than 45°C, whether the ambient temperature is stable during first period or not, and whether the ventilation is good or not. All of these must be paid attention to.

2. 電容器各種保護設備所使用之開關接觸情形，應注意是否有開關接觸不良之情形。

There are many switches with various kinds of protection facilities, attention must be paid regarding to whether the contact point is working properly or not.

3. 檢視所使用之電壓及電流是否正常，若過電壓使用將使得電容器容量增大，溫度上升，除危及電容器壽命外，也常因異常電壓而造成內部組件絕緣被破壞。

Voltage and current are normal or not must be checked. The results of over voltage could be:

- enlarging capacitance
- temperature rising
- shortening life time of capacitor
- destroying the internal components by abnormal voltage

4. 察看電容器端子及導線間是否有因接觸不良而引起異常之現象。

Check the terminals of capacitor and among connection wires to see whether have arc caused by disconnection or abnormal phenomena or not.

5. 察看有否其他不正常現象。

Check for other abnormal phenomena.

定期維護

Maintenance by time

1. 電容器經過長時間使用套管表面將有灰塵堆積，若一吸濕，即產生絕緣不良導致漏電嚴重，使保護設備跳脫，電容器需在切離電源後3分鐘以上，並經地線放電後，方可清除套管上之灰塵，以免觸電。

After using capacitor for a long time, dusts on bushing must be cleaned because dust will be accumulated. Dusts mixed with moisture will reduce the insulation resistance which might cause serious leakage. The protection apparatus will act when it comes seriously. After switching off the power for at least 3 minutes, and had better to discharge through grounding in order to avoid electric shock, then the cleaning can be done.

2. 應定期擦拭表面之灰塵，以免表面溫度不易揮發。

All of the capacitors must be cleaned and polished from time to time to help to release heat.

(3) 訂貨需知 Ordering information

1. 供電系統電壓、諧波狀況、負擔特性及單線圖。
2. 串聯電抗器、阻抗%、型號。範例：

280V, 1.2kVAr, 6% → SR6-2860120T

1 2 3 4 5
阻抗% 電壓 頻率 容量 三相

3. 電容器規格 → Ø、Hz、V、Q、型號。範例：

280V, 20kVAr, KS → SH-S280620T

1 2 3 4 5
KS型式 電壓 頻率 容量 三相

4. 確認新設 → 必要時協同技術單位會同檢測服務。
5. 汰換SC → 協同技術單位確認SC/SR匹配問題。

1. Power system voltage, harmonic situation, the burden of characteristics and line diagram.
2. Series reactor impedance%, type. Ex:

280V, 1.2kVAr, 6% → SR6-2860120T

Impedance% 1 2 3 5 Phase
Voltage (V) Frequency (Hz) Capacity (kVAr)

3. Capacitor specification → Ø, Hz, V, Q, type. Ex: 2

280V, 20kVAr, KS → SH-S280620T

KS type 1 2 3 4 5 Phase
Voltage (V) Frequency (Hz) Capacity (kVAr)

4. Confirm new → testing services units, together with collaborative technology.
5. Confirm replacement when necessary → capacitor matching series reactor question, together with collaborative technology.

- 其他電壓、容量之規格及串聯7%、8%、13%、14.8%、15%電抗器，歡迎訂購。
- Inquiries are welcomed (different voltages, capacitances of 7%, 8%, 13%, 14.8% & 15% series reactors.)

INTEGRATION OF POWER SYSTEM

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