電容器專用靜態開關

POWER FACTOR CORRECTION WITH STATIC SWITCHES


Certificate of Test

CE


Verification

CE

KVAR-C50-3W

三 相 三 線 式

靜態開關單元

Static Switch Unit

◎三只閘流體模組。（每組二個SCR）

Three thyristor modules.(two SCR in a couple)

◎ 卻系統：散熱器、風扇及自動溫度 整控制。
（當散熱器溫升至56℃時， 卻風扇運轉，使其降溫至45℃時停止）

Cooling system: Heater sink, fan, and auto temperature regulation control.
(when heater temperature is up to 56℃ ,cooling fan will be running until the temperature cooling down to 45℃)

◎具有電源欠相、熔絲熔斷、散熱器超溫.....等 報乾接點輸出。

With abnormal contact output of phase shortage, fuse burnout, heat sink overheating, and so on.

使用靜態開關之優點

Benefit of Static Switch

在某些使用場合，會有巨大及快速之負載變動，若使用傳統電磁驅動之步級電容器，功率因數無法調整，反應將不夠快速以致無法達到負載之虛功率需求。此時使用靜態開關驅動電容器組將是必要的，利用良好的閘流體（Thyristor）技術，做成的靜態開關有以下之優點：

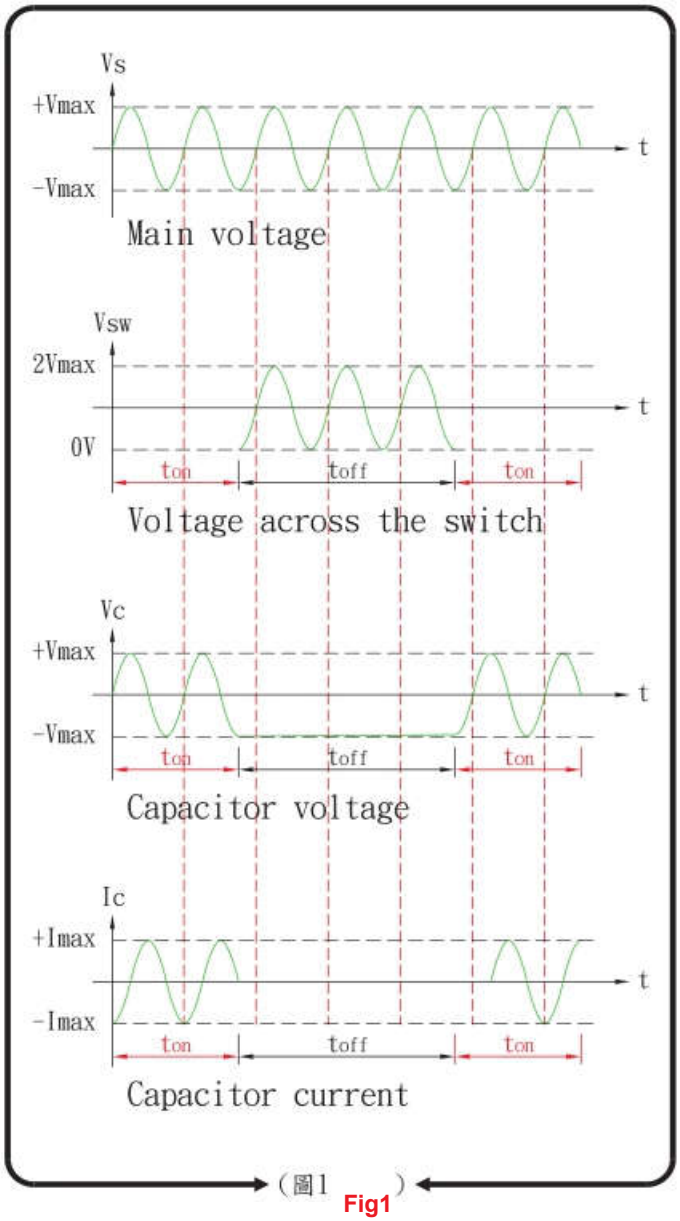
Under some huge and rapid load variation condition, if use traditional magnetic driven stepping capacitor faces the power factor correction and response speed problem. It is necessary to use Static Switch driven capacitors to meet the requirements of reactive power load.In case of the above situation, it is necessary to apply the Static Switch with was designed and fabricated by the excellent thyristor technology and consists of following advantages:

(1)消除開關投入-切離時之暫態

Eliminate the transient state during switching on/off period

每組電容器階段投入，皆於零點電壓通過開關時，即使電容器已完全或局部充電，此可消除開關暫態並避免波形畸變及其他突波，不致對線路上之電子設備造成干擾(圖1)

Capacitors shall be turn on step by step at zero crossing whenever it is fully or partially charged, it shall erase the transient state, wave distortion and other surge can be avoided, it shall not disturb on-line electronic equipment. (Fig1)



（圖1 ）

Fig1

(2)開關投入-切　速　不受限制

No limitation for switching on or off

靜態開關能操作於非常快速之開關節奏，事實上若負載需要，開關本身能於一個週期內反　(1/60Hz)

Static Switch is capable to be used in the case of fast and frequent operation.In fact, based on load requirement, the on off action could be possibly finished within on cycle (1/60Hz).

(3)對於虛功率需求之快速響

此快速響　是傳統上使用電磁開關所無　達成的，如焊接機器、起重機、吊車、發弧裝置及其它有重複及短負載週期之機器　等，用靜態開關作系統之功率因數調整成為唯一解決方案。

Fast response for reactive power requirement

The fast response is not acquired by traditional magnetic switch, such as welding machine, crane lifter, arcing facility or any other kind machine with repeated and short cycle load, the Static Switch is the only solution for system power factor correction.

(4)電容器及其開關之耐久性

Durable capacitor and switch

除暫態之結果及　有可移動機械零件，使整個設備(電容、靜態開關)之壽命比傳統系統顯著增加。

Because the transient state was eliminated and no movable mechanical parts existed, the life of equipment (capacitor and static switch) is significantly longer than traditional system.

安裝注意事項及周圍環境條件

Installation and ambient conditions

(1)靜態開關使用時，內部會產生熱量，安裝時請垂直安裝且兩旁需預留空隙，以免散熱不良造成靜態開關內部溫度持續上升。

When the Static Switch is operating, the heat will be generated auto-matically.
Please install the system vertically and leave some empty space on two sides to avoid the temperature inside the Static Switch rising continuously.

(2)產品安裝時，底部須有底板，利於散熱循環。

When the product installs, the base must attatch the mounting plates, in order to enhance cooling cycle.

(3)控制箱須有空氣對流通風孔，請依熱空氣由下往上之原理裝置通風孔或加裝抽風扇。

There must be some ventilation holes on the control box. Please follow the principle of hard air rising to install the ventilation holes or extra cooling fans.

(4)請勿安裝於高溫或通風不佳之處所，否則請低於額定容量之70%使用。

Please avoid installing the regulator in the place with high temperature or poor ventilation.Otherwise, the maximum operating capacity must be set lower than 70% of the nominal capacity.

(5)避免安裝於有嚴重水蒸氣或酸、鹼、腐蝕性氣體之場所。

Avoid installing the regulator in the places with heavy water evaporation,acid, alkaline, or corrosive air.

(6)周圍濕度：90%RH以下（無結露）

(7)周圍溫度：-10℃~45℃

Ambient humidity: below 90%RH (no condensation)

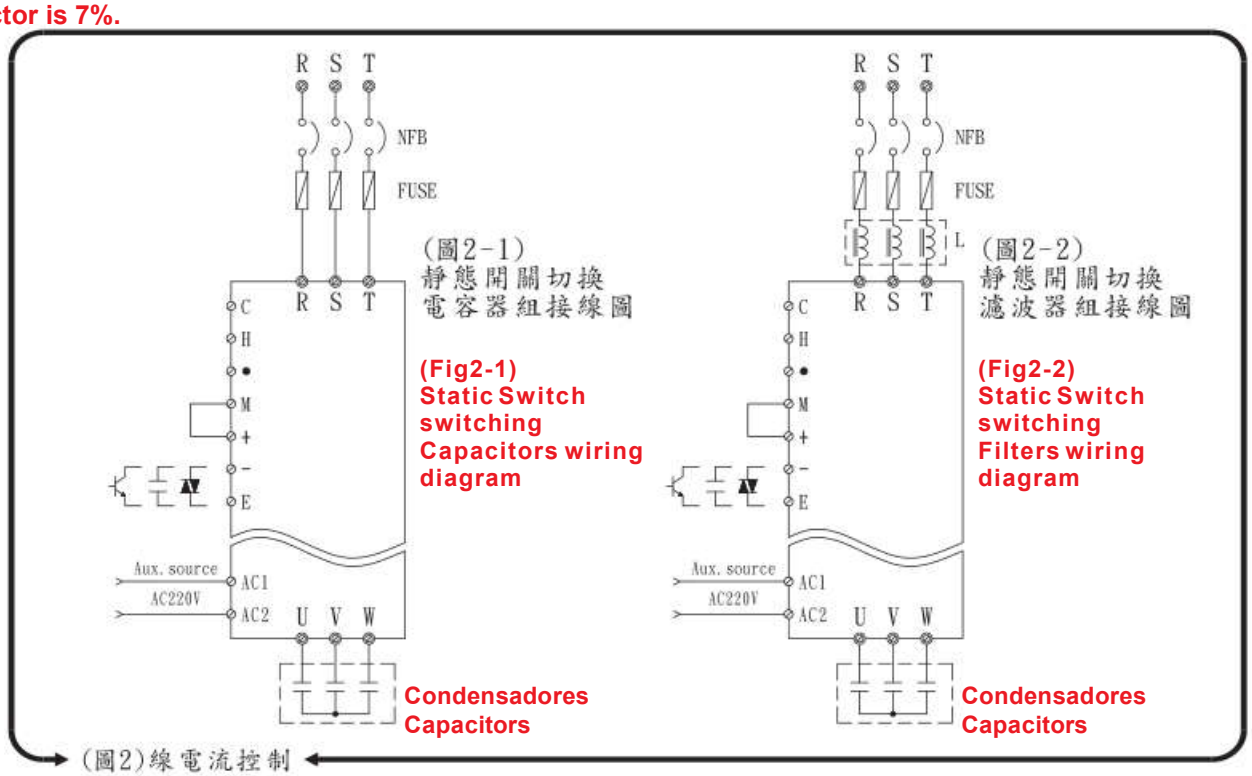
Ambient temperature: -10　~45

諧波濾波器之　用

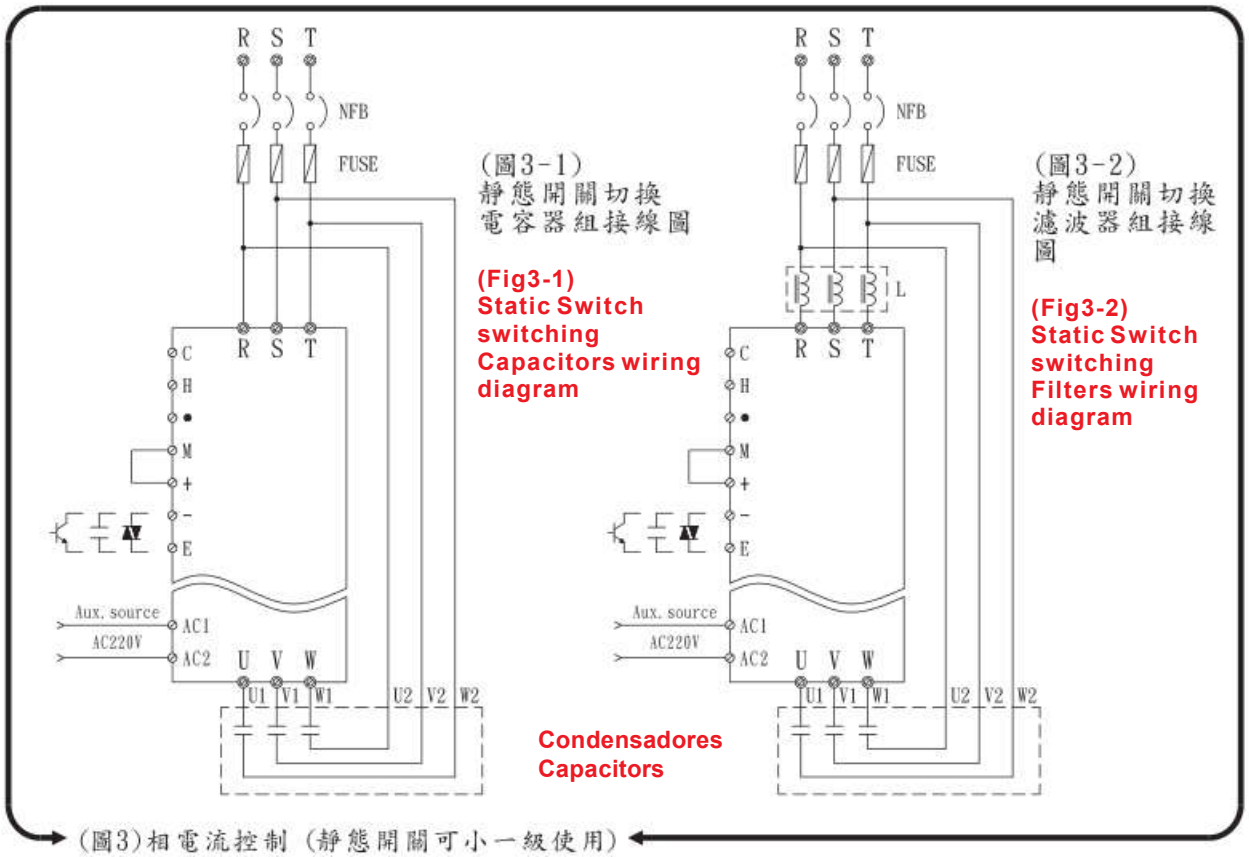
Application of Harmonics Filter

使用電感器加電容器組（L＋C）取代單純電容器，如此可避免電容器過載及諧振，最常使用之例子為調諧濾波器，其過電壓因數為7%。

In order to avoid capacitor overloading and harmonic resonant, the simple capacitor shall be replaced by inductor and capacitors (L+C).Most common example is Harmonics Filter whose voltage factor is 7%.



(Fig2)Line current control



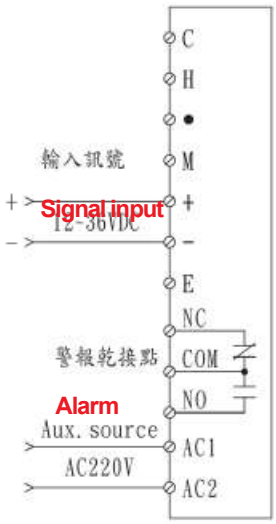
(Fig3)Phase current control (Static Switch selecting can be downgrade)

控制迴路接線範例

Examples of connecting circuit

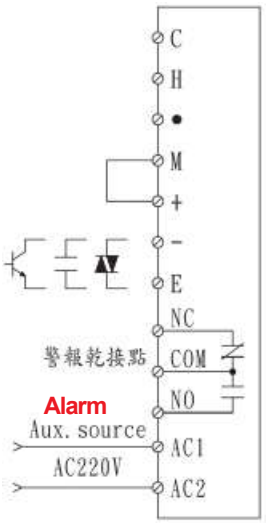
(1)直流12~36VDC
訊號輸入控制

DC 12~36V Signal input control



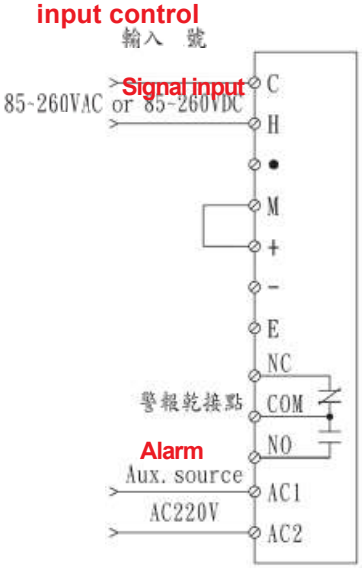
(2)乾接點或電子接點
訊號輸入控制

Dry contact or electronic contact Signal input control



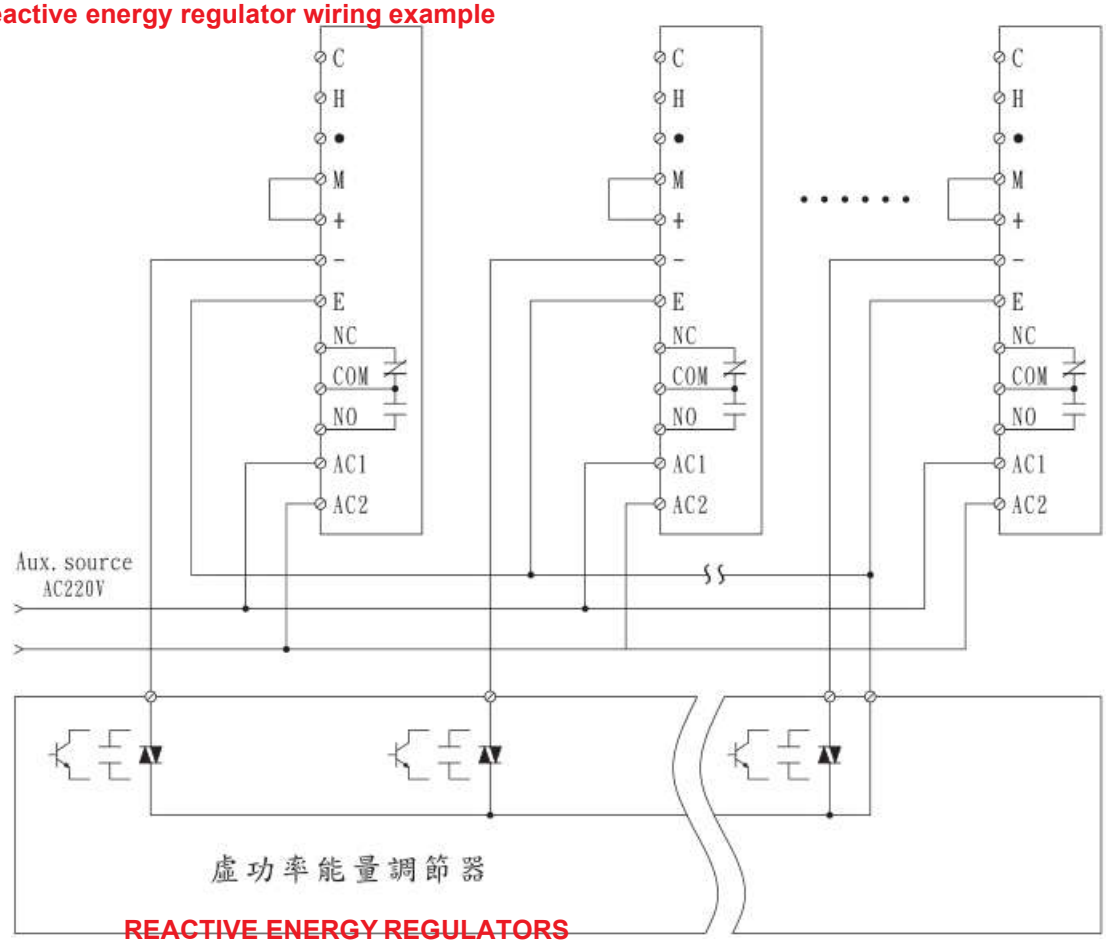
(3) 流或直流85~260V
訊號輸入控制

AC or DC 85~260V Signal input control



(4)虛功 能量 節器接線範例

Reactive energy regulator wiring example



產品技術特性
Product technique specification

額定輸入電壓：230/400/500VAC	Rated input voltage：230/400/500 VAC
頻率　：50/60Hz	Frequency：50/60Hz
額定功率　：請對照(表1)	Rated power：please refer Table1
過載　：1.5In/Min	Overload：1.5 In/Min
dV/dt　：保護於1000V/μS	dV/dt：protect within 1000V/μS
dI/dt　：保護於100A/μS	dI/dt：protect within 100A/μS
自動溫度調整：56℃內	Auto temperature regulation：within 56℃
最大容許溫度：85℃(超過切離輸出)	Maximum allowable temperature：85℃
熔絲型式　：NH型式(須外加)	Fuse type：NH Type (extra)

型號說明
Type description

KVAR-C50-3W-230/010

產品系列 Product series	KVAR-C50	KVAR-C50 series	
控制方式 Control	3W	三線式控制 Three-wire control	
額定電壓 Rated voltage	230	230VAC (10~**100**KVAR)	
	400	400VAC (10~**200**KVAR)	
	500	500VAC (10~**200**KVAR)	
額定容量 Rated capacity	010	10KVAR	
	020	20KVAR	
	030	30KVAR	
	040	40KVAR	
	050	50KVAR	
	060	60KVAR	
	080	80KVAR	
	100	100KVAR	
	130	130KVAR	
	150	150KVAR	
	180	180KVAR	
	200	200KVAR	

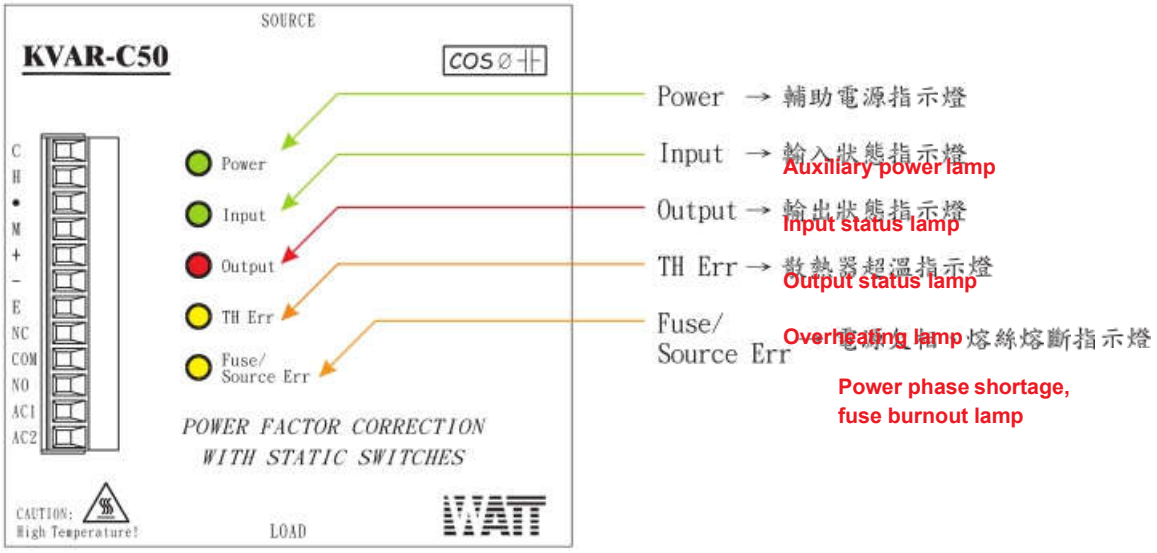
(表1 Table 1)

端子說明
Descriptions of the connectors

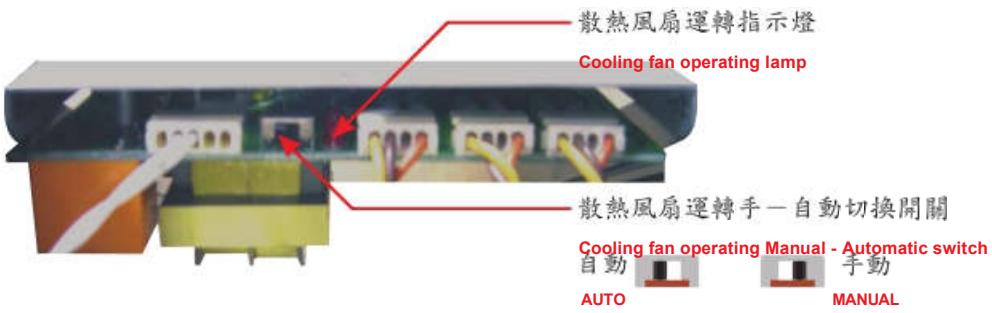
端子腳位 Connector pin	端子編號 Connector No.	說　明 Description	備　註 Notes
TB-01	C	交流或直流85~260V控制訊號輸入 AC or DC 85~260V Signal input control.	
TB-02	H		
TB-03	•	空腳 Empty pin	請勿接線 Do not connect.
TB-04	M	+5VDC	
TB-05	+	控制訊號正輸入端 Positive control signal input.	直流12~36VDC控制訊號輸入 DC 12~36V Signal input control.
TB-06	−	類比訊號基準電位 Standard analog signal voltage.	
TB-07	E	乾接點或電子接點控制接點輸入 Control Dry contact or electronic contact signal input.	
TB-08	NC	警報乾接點(常閉) Alarm connector output (normal close)	輸出接點容量 Connector capacity 250VAC 2A 125VAC 2A 30VAC 2A
TB-09	COM	警報乾接點(共點) Alarm connector output (common point)	
TB-10	NO	警報乾接點(常開) Alarm connector output (normal open)	
TB-11	AC1	輔助電源 Auxiliary power source.	輔助電源電壓請參照規格標籤 Please refer to the stick for the auxiliary power and voltage.
TB-12	AC2		

LED燈顯示狀況

LED indicating condition



L1 Power 電源指示燈	燈亮：表示輔助電源已投入。 On : Auxiliary power on. 未亮：表示輔助電源未送電、控制板故障。 Off : Auxiliary power sources have no output,Control board malfunction.
L2 Input 輸入指示燈	燈亮：表示控制訊號已送入。 On : Control input signal is in. 未亮：表示控制訊號未輸入、控制訊號接錯、控制板故障。 Off : Control signal is not in,Wrong connection on the electrodes of the control board, Control board malfunction.
L3 Output 輸出指示燈	燈亮：表示靜態開關輸出中。 On : Power regulator is output. 未亮：表示無輸出、保險絲熔斷或主電源未送、靜態開關超溫、控制板故障。 Off : No input signal,Fuse burn down or main power has no output,Static Switch is overheating, Control board malfunction.
L4 TH Err 超溫指示燈	燈亮：表示靜態開關超溫、散熱風扇未運轉、周圍溫度過高或通風不良。 On : Static Switch is overheating,Bad ventilation or the ambient temperature is too high. 未亮：表示正常，靜態開關未超溫。 Off : Normal, Static Switch is not overheating.
L5 FUSE/ Source Err 電源異常指示燈	燈亮：表示主電源未送或欠相、保險絲熔斷。 On : Main power source have no output or out-of-phase,fuse burn down. 未亮：表示正常。 Off : Normal.



Cooling fan operating lamp 風扇運轉指示燈	燈亮：表示散熱風扇運轉。 On : Cooling fan operating. 未亮：表示散熱風扇未運轉。 Off : Cooling fan no operating.

靜態開關重量及尺寸
The weights and related dimensions of the Static Switch

KVAR-C50-3W-230/

額定容量 Rated capacity (KVAR)	圖 Figure	外型尺寸(mm) Outline dimensions 長 Length	寬 Width	高 Height	淨重 Net weights (Kg)	包裝後尺寸(mm) Packed dimensions 長 Length	寬 Width	高 Height	毛重 Packed weights (Kg)	固定孔尺寸(mm) Fixed-hole dimensions L1	L2	L3	W	主電源螺絲 Main power source screw	冷卻方式 Way of cooling
10	A	200	140	145	2.5	262	168	182	2.9	122	O	O	132	M6	自冷 Air-cooling
20, 30, 40	C	202	140	205	3.1	262	168	245	3.5	122	O	O	132	M6	強制風冷 Fan-cooling
50	D	326	140	205	4.8	388	168	245	5.4	122	86	O	132	M8	強制風冷 Fan-cooling
60	E	382	140	205	5.8	443	168	245	6.3	122	86	94	132	M8	強制風冷 Fan-cooling
80	F	322	215	265	15.3	450	313	420	17.3	230	O	O	203	M10	強制風冷 Fan-cooling
100	G	402	215	265	21.1	540	313	420	23.4	230	80	O	203	M10	強制風冷 Fan-cooling

KVAR-C50-3W-400/

額定容量 Rated capacity (KVAR)	圖 Figure	外型尺寸(mm) Outline dimensions 長 Length	寬 Width	高 Height	淨重 Net weights (Kg)	包裝後尺寸(mm) Packed dimensions 長 Length	寬 Width	高 Height	毛重 Packed weights (Kg)	固定孔尺寸(mm) Fixed-hole dimensions L1	L2	L3	W	主電源螺絲 Main power source screw	冷卻方式 Way of cooling
10, 20	A	200	140	145	2.5	262	168	182	2.9	122	O	O	132	M6	自冷 Air-cooling
30	B	200	140	205	3.0	262	168	245	3.4	122	O	O	132	M6	自冷 Air-cooling
40, 50, 60	C	202	140	205	3.1	262	168	245	3.5	122	O	O	132	M6	強制風冷 Fan-cooling
80	D	288	140	205	4.4	350	168	245	5.0	122	86	O	132	M8	強制風冷 Fan-cooling
100	D	326	140	205	4.8	388	168	245	5.4	122	86	O	132	M8	強制風冷 Fan-cooling
130, 150	F	322	215	265	15.3	450	313	420	17.3	230	O	O	203	M10	強制風冷 Fan-cooling
180, 200	G	402	215	265	21.1	540	313	420	23.4	230	80	O	203	M10	強制風冷 Fan-cooling

KVAR-C50-3W-500/

額定容量 Rated capacity (KVAR)	圖 Figure	外型尺寸(mm) Outline dimensions 長 Length	寬 Width	高 Height	淨重 Net weights (Kg)	包裝後尺寸(mm) Packed dimensions 長 Length	寬 Width	高 Height	毛重 Packed weights (Kg)	固定孔尺寸(mm) Fixed-hole dimensions L1	L2	L3	W	主電源螺絲 Main power source screw	冷卻方式 Way of cooling
10, 20	A	200	140	145	2.5	262	168	182	2.9	122	O	O	132	M6	自冷 Air-cooling
30	B	200	140	205	3.0	262	168	245	3.4	122	O	O	132	M6	自冷 Air-cooling
40, 50, 60, 80	C	202	140	205	3.1	262	168	245	3.5	122	O	O	132	M6	強制風冷 Fan-cooling
100	D	326	140	205	4.8	388	168	245	5.4	122	86	O	132	M8	強制風冷 Fan-cooling
130	E	382	140	205	5.8	443	168	245	6.3	122	86	94	132	M8	強制風冷 Fan-cooling
150, 180	F	322	215	265	15.3	450	313	420	17.3	230	O	O	203	M10	強制風冷 Fan-cooling
200	G	402	215	265	21.1	540	313	420	23.4	230	80	O	203	M10	強制風冷 Fan-cooling

外型及固定尺寸

Outline and mounting dimensions

A

B

C

D

E

F,G

Fig.A,B

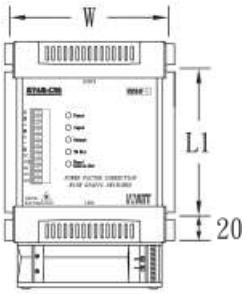


Fig.C

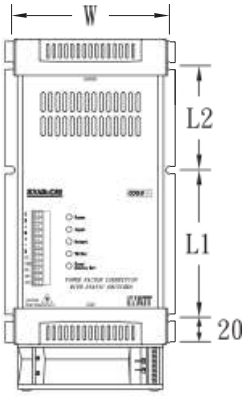


Fig.D

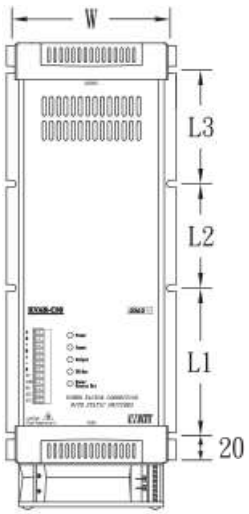


Fig.E

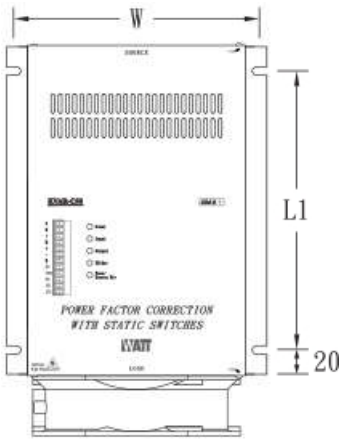


Fig.F

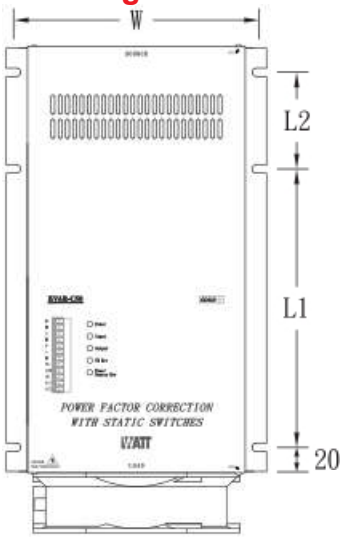


Fig.G