



SHIHLIN ELECTRIC
士林電機

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Intelligent Low Voltage Power Capacitor / Panel

智慧型低壓電容器 / 盤



INTEGRATION
OF POWER SYSTEM

前言 Introduction:

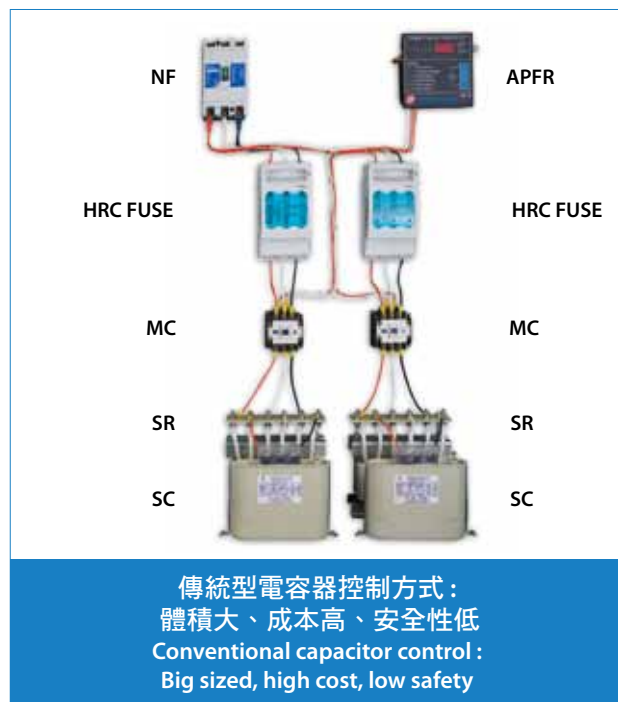
- 1 智慧型低壓電容器係採用電力電子之控制技術與電容器製造技術將其整合於同一組電容器中，使電容器本身就具有控制、量測、保護、信號輸出及液晶顯示等功能；即具低壓無功自動補償功能，使其能夠可靠工作、方便使用零點投切、保護、量測、信號、聯機等功能，是低壓無功因自動補償技術的重大突破。
 - 2 依總容量大小將各段之電容器配置於盤內，並由一只MCCB控制整體之電容器，便於維修切離電源。
 - 3 智慧型電容器可靈活應用於低壓無功補償的各種場合，且突破傳統現有低壓無功自動補償設備的結構模式，具有全自動化性能、使用方便等優點。
- 1 An intelligent low-voltage power capacitor uses the current advanced capacitor manufacturing technology to integrate with sophisticated microcircuit software and hardware control technology for producing a capacitor set that has versatile functions such as controlling, measurement, protection, signal output and LCD display. To be more specific, the integrated capacitor set has a low-voltage reactive-power self-compensating capability to provide such functions as reliable work, easy access to zero-point switching, protection, measurement, signaling and networking. It is a major breakthrough in low-voltage reactive-power self-compensating technology.
 - 2 The capacity panel houses varieties of capacitor sections according to total capacitance, with the whole set of capacitors controlled by one MCCB to facilitate maintenance and power switch-off.
 - 3 The intelligent capacitor set can be flexibly applied to almost all situations requiring low-voltage reactive power. Its breakthrough from the structure of conventional low-voltage reactive-power self-compensating device makes it fully automatic and easy to use.

產品特色 Product features:

- 1 零點投入及切離，無瞬間突入電流及回朔過電壓
→免串聯電抗器、電容器專用電磁接觸器及HRC FUSE
 - 2 內部自行偵測調整具有自動功因調整(APFR)功能
 - 3 具有過電壓、過電流、過溫、三相不平衡及欠壓保護功能
 - 4 電容器本身裝置壓力式之保護安全無虞
 - 5 所有用電資訊液晶即時顯示(V、 $\cos \theta$ 、 $^{\circ}\text{C}$ 、A、ERR)
 - 6 顛覆傳統，性能提高、結構簡單、組裝簡易、維護簡便
 - 7 體積縮小，同尺寸的盤體可多裝電容量50%以上
 - 8 線路損失降低50%左右
 - 9 控制段數：2~40段，有微調功能(使功率因數趨近 $\text{PF} \approx 1$)
 - 10 三大保證：保證三年、保證不爆炸、保證不燃燒
- 1 zero-point switch-on/off, avoiding transient inrush current and feedback over-voltage
→No need to connect series reactor, specific electromagnetic contactor for capacitor and HRC fuse.
 - 2 Built-in self-detection and adjustment with automatic power factor regulation (APFR) function
 - 3 Protection against over-voltage, over-current, over-temperature, three-phase imbalance and under-voltage.
 - 4 The capacitor has built-in voltage-type protection device to ensure safety.
 - 5 LCD real-time display for all electricity usage information (V, $\cos \theta$, $^{\circ}\text{C}$, A, ERR)
 - 6 Unlike conventional design: high performance, simple structure, easy assembly, easy maintenance.
 - 7 Smaller size, allowing panel of the same size to accommodate over 50% more capacitance.
 - 8 50% reduction in circuit power loss.
 - 9 Controllable sections: 2 ~ 40 sections, with micro-adjustment provided (allowing the power factor to approach $\text{PF} \approx 1$)
 - 10 Guarantee: 3-year warranty, explosion proof guarantee, combustion proof guarantee

A. 傳統型與智慧型控制方式比較圖

Comparison of control between conventional and intelligent control



B. 智慧型電容器核心技術

Core Technology of Intelligent Capacitor

- (1) 零點投入裝置、無瞬間突入電流及回朔過電壓
- (2) 具有過電壓、過溫、過電流、欠壓及三相不平衡保護
- (3) 液晶即時顯示訊息
- (4) 免串聯電抗器、電容器專用電磁接觸器及HRC FUSE

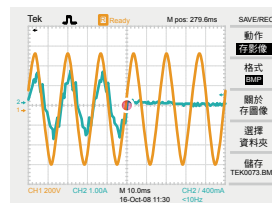
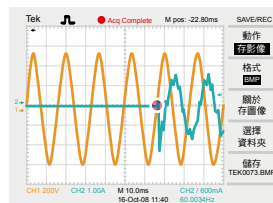
- (1) Zero-point switch-on device, to avoid transient inrush current and feedback over-voltage
- (2) Protection against over-voltage, over-temperature, over-current, under-voltage and three-phase imbalance.
- (3) LCD real-time display of information
- (4) No need to connect series reactor, specific electromagnetic contactor for capacitor and HRC fuse.



零點投入 Zero-point switch on

零點切離 Zero-point switch off

1



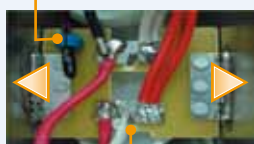
4



3

動作靈敏的壓力式保護裝置
Sensitive voltage-type protective device

溫控開關 Thermal-controlled switch



裝置密封在外殼內
Well-housed device



填充難燃性特殊配方軟質樹脂，取得UL安全認證及各項國家專利
Padded with specially formulated non-combustible soft resin, with UL safety certificate and varieties of patents granted

C. 傳統型與智慧型低壓電容器功能比較圖表

Function comparison between conventional and intelligent low-voltage power capacitor

NO.	功能 / 類別 Function / Type	一般傳統型電容器 Conventional low-voltage power capacitor	智慧型低壓電容器 Intelligent low-voltage power capacitor
1	電流零點投入與切離 Current zero-point switch-on/off	X	O
2	無功功率及功率因數顯示 Display of reactive-power factor and power factor	X	O
3	過電壓顯示及保護 Display and protection of over-voltage	X	O
4	欠電壓顯示及保護 Display and protection of under-voltage	X	O
5	過電流顯示及保護 Display and protection of over-current	X	O
6	過溫顯示及保護 Display and protection of over-temperature	X	O
7	三相不平衡顯示及保護 Display and protection of three-phase imbalance	X	O
8	具有APFR之功能可直接補償 APFR function for direct compensation	X	O
9	液晶螢幕顯示 LCD display	X	O

◎ 一般傳統型電容器：APFR及上述功能必須外接儀錶來控制，體積大成本高

◎ 智慧型低壓電容器：將上述功能全部整合在電容器組上，體積小成本低

◎ Conventional capacitor: requires external devices to display and control the APFR and afore-listed functions, resulting in extra size and costs.

◎ Intelligent low-voltage power capacitor: the afore-listed functions are integrated in the capacitor set, resulting in small size and lower costs.

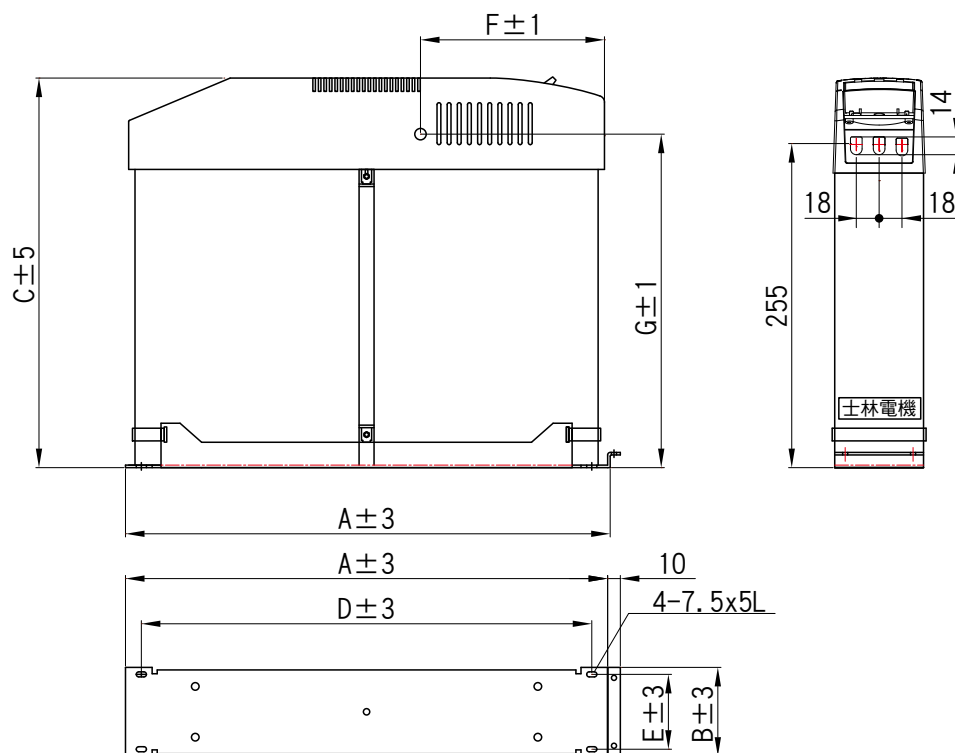
D. 產品規範 Product specification

- 環境溫度：-25°~45°C
- 相對溫濕度：40°C，20~90%
- 海拔高度：2000M以下
- 系統電壓：190V~220V / 380V / 440V (3 ϕ 3W / 3 ϕ 4W)；460V / 480V (3 ϕ 4W)
- 頻率：60Hz
- 耐電壓：極間2.15倍，額定電壓10秒，極殼間3kVAC / 10sec。
- 最大使用電流：額定電流之130%以內。
- 最大使用電壓：額定電壓之110%以下(間歇使用)。
- 依據標準：CNS 1179 C7002、CNS 3738 C6023、IEC 60831-1規範

- Environment: -25°~45°C
- Temperature: 40°C, 20~90%
- Altitude: 2000 meter
- System voltage: ~220V / ~380V / ~440V (3 ϕ 3W)；~460V/ ~480V (3 ϕ 4W)
- Frequency: 60Hz
- Withstanding voltage: 2.15 times between electrodes, rated voltage 10 seconds; between electrode and case - 3kVAC / 10 seconds
- Maximum current allowed: 130% of rated current
- Maximum voltage allowed: 110% of rated voltage (for intermittent use only)
- Standards compliance: CNS 1179 C7002, CNS 3738 C6023, IEC 60831-1

E. 外型尺寸 Dimension of Capacitor

型式	系統電壓	額定電壓	容量 Capacity		電流	各部尺寸 Dimensions (mm)						
Type	System Voltage (V)	Rated Voltage (V)	kVAR	μF	Current (A)	A	B	B	D	E	F	G
SH-M250610-10	220	250	10+10	424 / 424	46.2	380	70	305	355	59	—	—
SH-M450620-20	380	450	20+20	262 / 262	51.3	380	70	305	355	59	—	—
SH-M480620-20	380	480	20+20	230 / 230	48.1	380	70	305	355	59	—	—
SH-M525620-20	440	525	20+20	192 / 192	44.0	380	70	305	355	59	—	—
SH-M600625	460 / 480	600	8.3×3	179.3×3	24.1	380	70	305	355	59	145	263



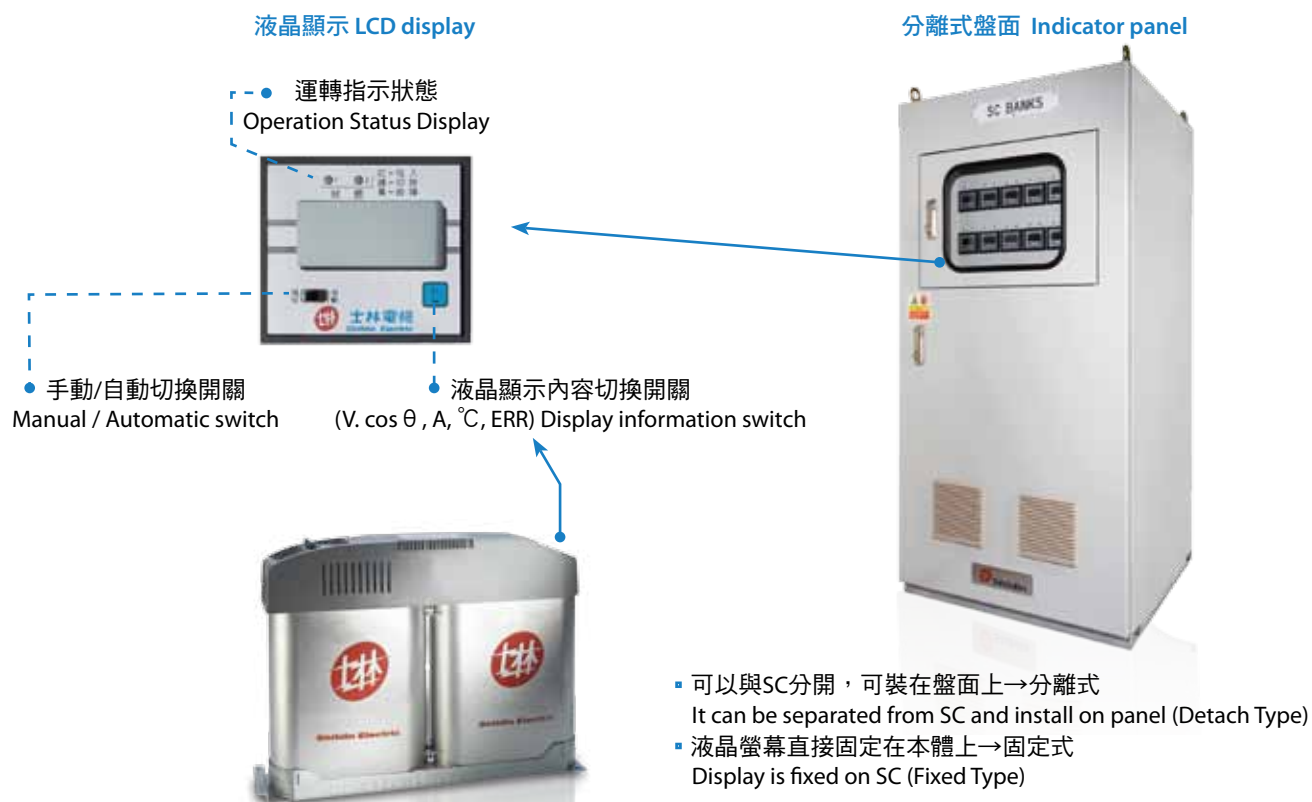
F. 智慧型SC單體訂貨須知 Order Instruction

- 請註明系統電壓 (3Ø3W、3Ø4W)
 - 請選擇液晶控制面板種類
 - 固定式
 - 分離式
 - 訂購整批時，需註明分成幾組控制 → 決定小CT數量
- Please specify the voltage of your system.
 - Please select the type of LCD control panel:
 - Fixed Indicator display panel.
 - Detached Indicator display panel.
 - Bulk order, please specify the division of the group of control (For number of CT).

G. 智慧型低壓電容器商品圖 Intelligent low-voltage power capacitor

所有用電資訊即時顯示

LED real-time display for all electricity usage information (V, cos θ , A, $^{\circ}$ C, ERR)



電容器單體 Capacitor

- | | |
|----------|-------------------------------|
| 1. 保證三年 | 1. 3-year warranty |
| 2. 保證不爆炸 | 2. Explosion proof guarantee |
| 3. 保證不燃燒 | 3. Combustion proof guarantee |

電容器盤 Capacitor panel

- | | |
|---------------|--|
| 1. 性能優越、構造簡單 | 1. Superb function with simple structure |
| 2. 體積小、裝置容量大 | 2. Small sized device with big capacity |
| 3. 零件少、配線簡易 | 3. Fewer parts required for easier connection |
| 4. 線路損失小50%以下 | 4. Over 50% of reduction in circuit power loss |

H. 傳統型與智慧型電容器盤比較

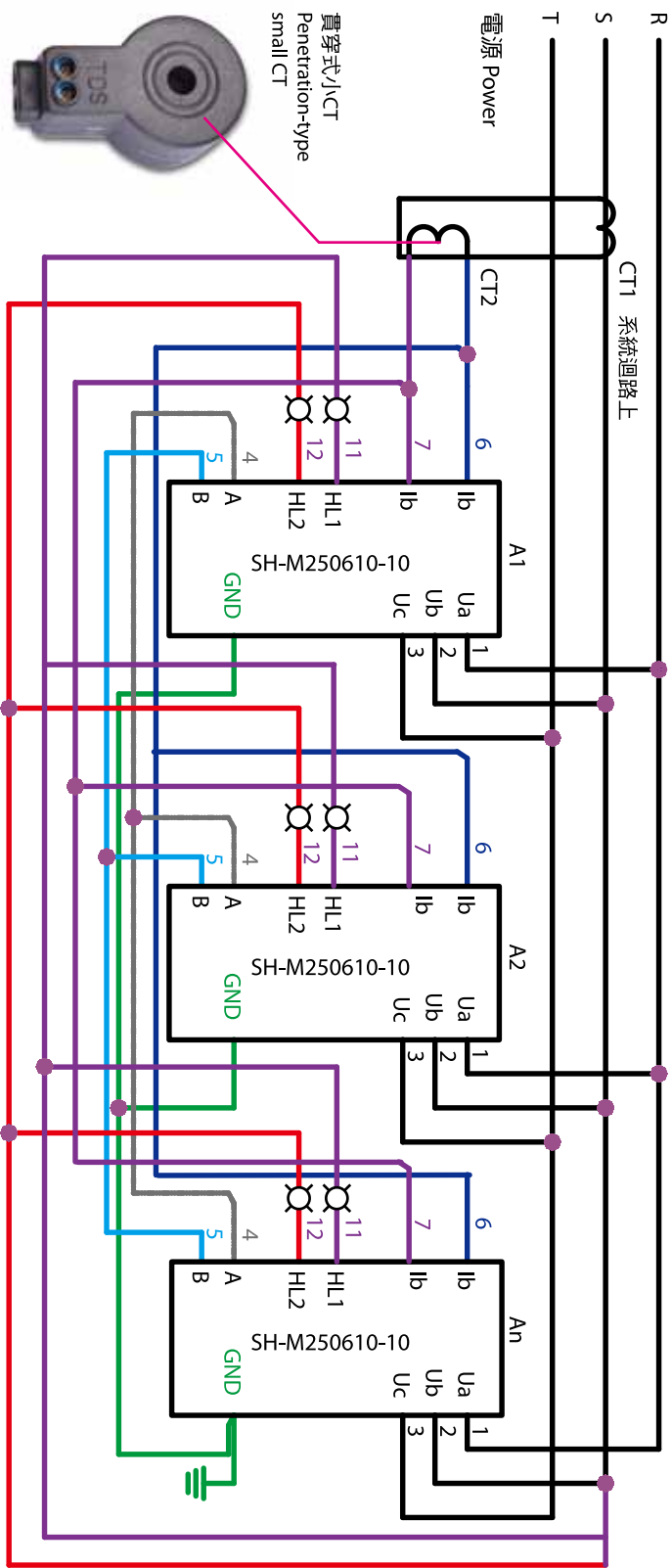
Comparison between conventional capacitor panel with intelligent capacitor panel

- 原300kVAR的空間現可容納 600kVAR
- The original 300kVAR space now accommodates 600kVAR.



1. 智慧型電容器組電氣原理圖 (3ø3W)

Electrical schematic diagram for intelligent capacitor set

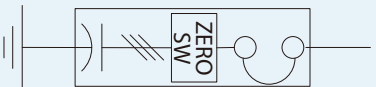


智慧型電容器單線圖(參考用)

Diagram for intelligent capacitor (for reference only)

1. 零點投切，無突入電流及回朔過電壓
2. 具有APFR功能
3. 過電壓、過電流、過諧波、過溫、三相不平衡保護
4. 接點11與12指示燈可依實際需求接線

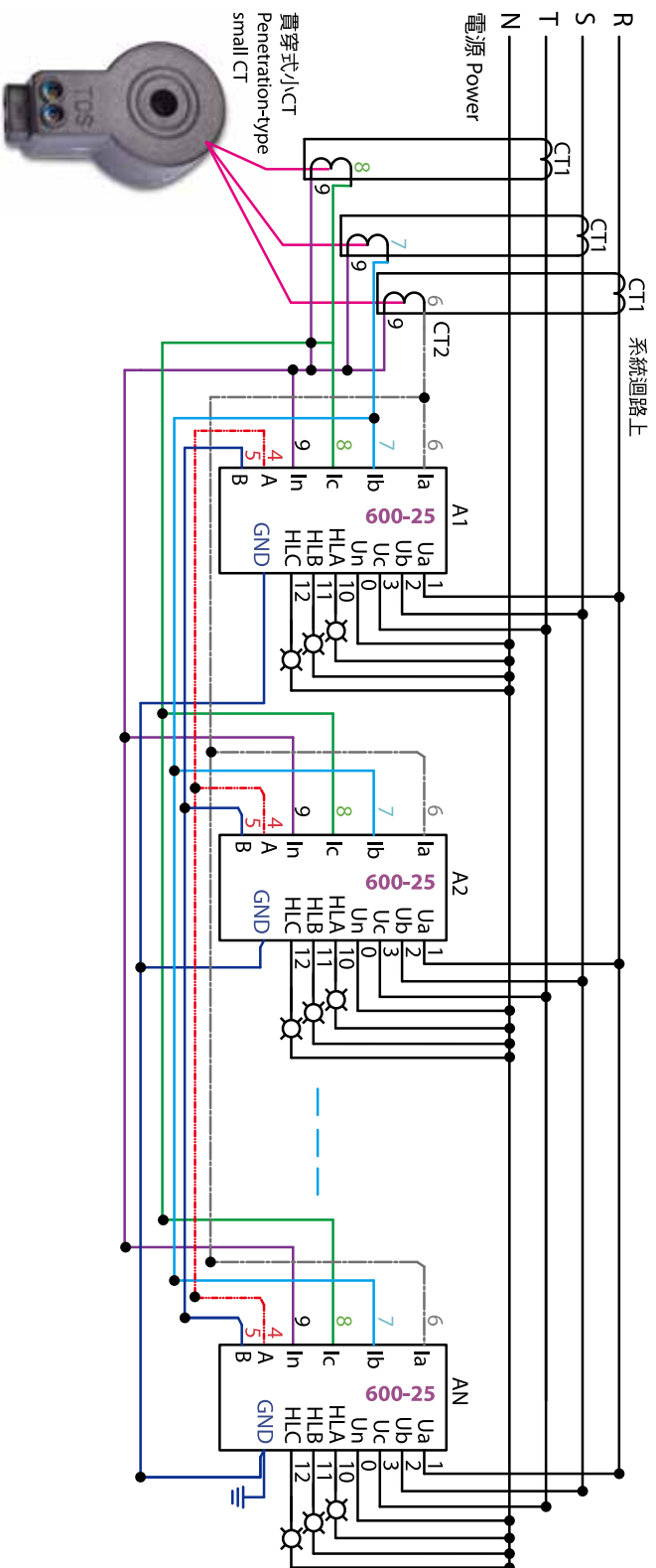
1. Zero-point switch-on, with no transient inrush current and feedback over-voltage
2. APFR function
3. Protection against over-voltage, over-current, over-temperature and 3-phase imbalance
4. Indicator light 11 and 12 wiring as per request



- (1) 小CT需接S相，否則智慧型電容器無法接受信號
- (2) 1個小CT可控制20台 40段投切
- (3) 如系統迴路中S相無CT、R、T相有CT時，請將電容器進線端1、2對調或2、3對調(目的在使系統上用電資訊正確無誤送至智慧型SC控制迴路中)
- (4) 貫穿式小CT無極性之分
- (1) Small CT must be connected to S-phase; otherwise the intelligent capacitor will receive no signal.
- (2) A single small CT controls 20 sets of 40-section switches.
- (3) If S phase has no CT and R and T phase, please switch the input wire "1 and 2" or "2 and 3" (The purpose is marking sure the system data can be sent to SC control circuit correctly).
- (4) Penetration type CT is uni-pole.

智慧型電容器組電氣原理圖 (3ø4W)

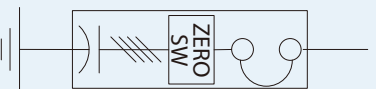
Electrical schematic diagram for intelligent capacitor set



智慧型電容器單線圖(參考用)

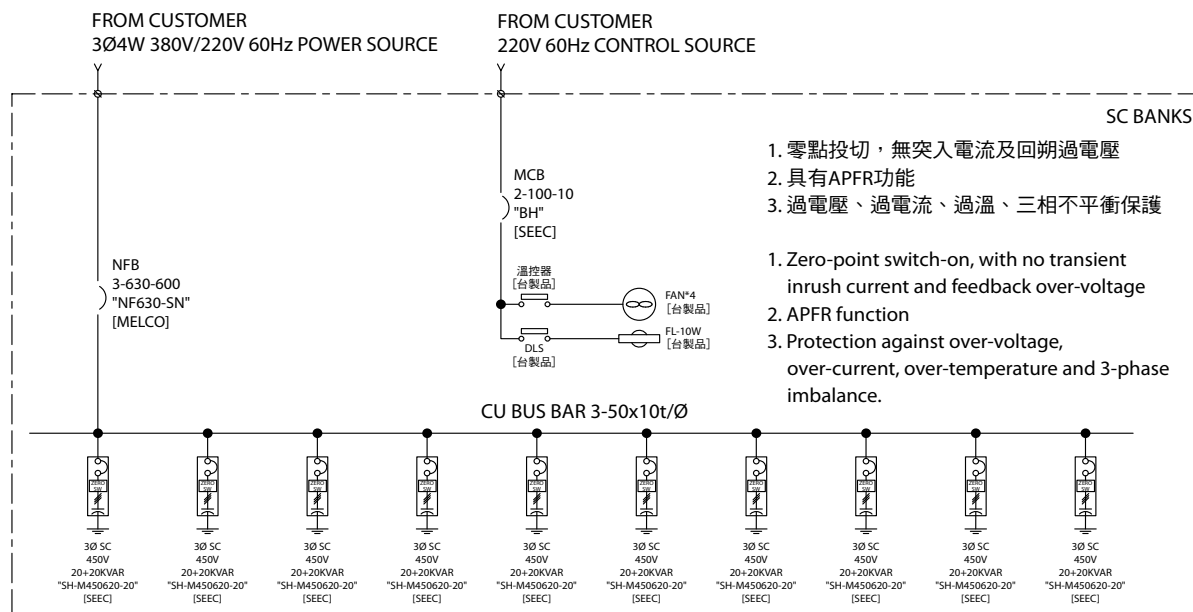
Diagram for intelligent capacitor (for reference only)

1. 零點投切，無突入電流及回朔過電壓
2. 具有 APFR功能
3. 過電壓、過電流、過諧波、過溫、三相不平衡保護
4. 接點10、11與12指示燈可依實際需求接線



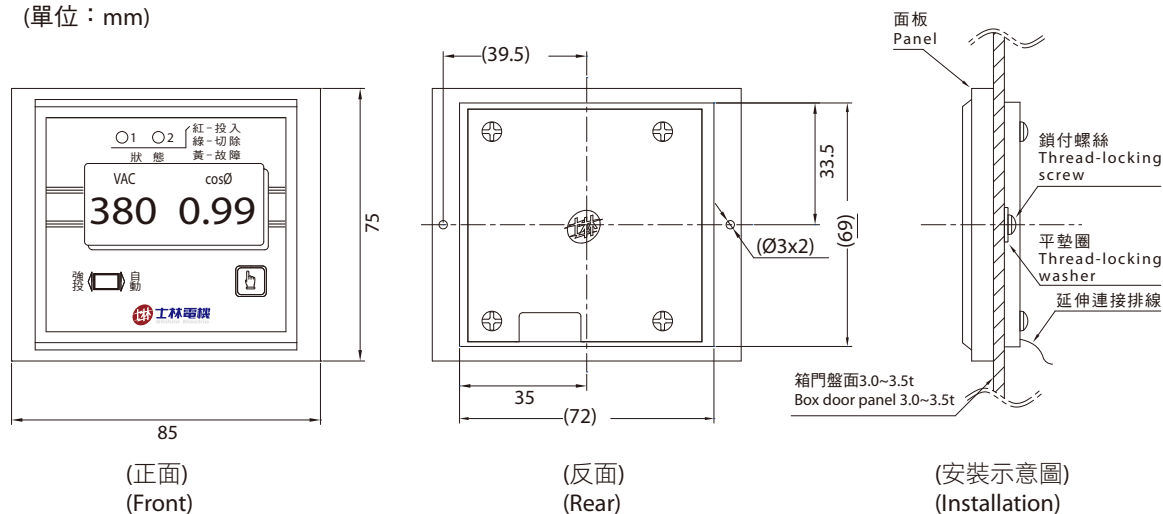
- (1) 小CT接法有相序之分，否則智慧型電容器無法接受信號
- (2) 3個小CT為一組，可控制8台24段投切
- (3) 貫穿式小CT無極性區分
- (1) Small CT must be connected to 5-phase; otherwise the intelligent capacitor will receive no signal.
- (2) A single small CT controls 20 sets of 40-section switches.
- (3) Penetration type CT is uni-pole.

J. 盤單線示意圖 Wiring Diagram in Capacitor Panel



K. 分離式液晶螢幕安裝示意圖 Installation Diagram for Detached LCD

(單位：mm)



說明：

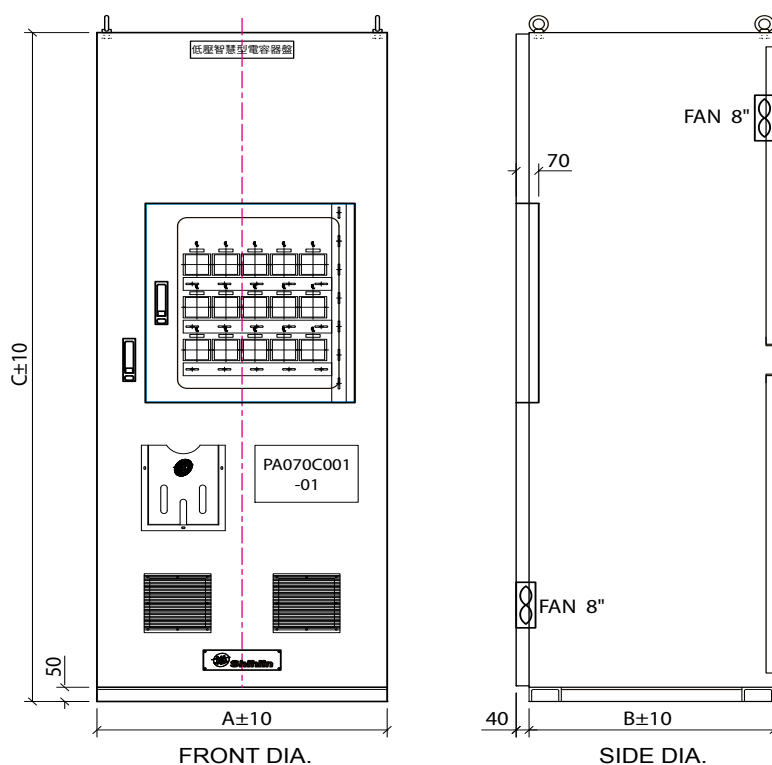
1. 鎖付螺絲長度僅適用於盤面厚度為3.0~3.5t。
2. 若盤面厚度 < 3.0t時，需增加平墊圈以增加盤面厚度至3.0t以上。
3. 盤面開孔尺寸，建議以()內尺寸表示為準。
4. 控制面板延伸至盤面，長度最長2.85M。

Description:

1. The length of thread-locking screw is only suitable for panel thickness between 3.0~3.5t.
2. If the thickness of the panel is less than 3.0t, an additional flat pad is required to increase the panel thickness to 3.0t or above.
3. The dimensions of the panel opening are suggested as shown within the parentheses "()".
4. The control panel can extend to the panel, with a maximum length of 2.85M.

L. 尺寸圖

Dimensions of Capacitor (mm)



規格 Specification		A (mm)	B (mm)	C (mm)
250V (系統電壓220V) System Voltage 220V	100 kvar	900	800	1750
	200 kvar	900	800	1750
	300 kvar	900	800	2350
	360 kvar	900	800	2350
450V (系統電壓380V) System Voltage 380V	200 kvar	900	800	1750
	400 kvar	900	800	1750
	600 kvar	900	800	2350
	720 kvar	900	800	2350

L. 訂貨須知 Order Instruction

- 請註明系統電壓 (3ø3W、3ø 4W)
- 請選擇智慧型組盤種類
 - 指示燈盤面
 - 分離式盤面
- Please specify the system voltage.
- Please select a panel for your intelligent capacitor set:
 - Indicator light panel
 - Detached panel



INTEGRATION OF POWER SYSTEM

重電事業處



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總公司 Head Office	111 台北市中山北路六段88號16樓 16F, No.88, Sec. 6, Chung-Shan N.Rd., Taipei City 111, Taiwan	TEL. +886-2-2834-2662 FAX. +886-2-2836-6187
重電廠 Heavy Electric System	303 新竹縣新竹工業區中華路23號 No.23, Chung-Hwa Rd., Huko Hsiang, Hsinchu County 303, Taiwan	TEL. +886-3-598-1921 FAX. +886-3-598-1480
機電外銷部 Heavy Electric Export Sales Dept.	111 台北市中山北路六段88號13樓 13F, No.88, Sec. 6, Chung-Shan N.Rd., Taipei City 111, Taiwan	TEL. +886-2-2832-1556 FAX. +886-2-2832-1003
配電盤事業 Panelboard System Div.	303 新竹縣新竹工業區中華路23號 No.23, Chung-Hwa Rd., Huko Hsiang, Hsinchu County 303, Taiwan	TEL. +886-3-598-1921 ext.236 FAX. +886-3-597-3774

台北分公司 Taipei Branch	104 台北市長安東路一段9號3樓 3F, No.9, Sec. 1, Chang-An E.Rd., Taipei City 104, Taiwan	TEL. +886-2-2541-9822 FAX. +886-2-2581-2665
新竹分公司 Hsinchu Branch	303 新竹縣湖口鄉鳳凰村中華路23號 No.23, Chung-Hwa Rd., Huko Hsiang, Hsinchu County 303, Taiwan	TEL. +886-3-598-1210 FAX. +886-3-598-5200
台中分公司 Taichung Branch	407 台中市台中港路三段134之3號 No.134-3, Sec. 3, Chung-Kang Rd., Taichung City 407, Taiwan	TEL. +886-4-2461-0466 FAX. +886-4-2461-0468
台南分公司 Tainan Branch	701 台南市中華東路一段198號 No.198, Sec. 1, Chung-Hwa E.Rd., Tainan City 701, Taiwan	TEL. +886-6-237-1246 FAX. +886-6-237-1279
高雄分公司 Kaohsiung Branch	807 高雄市三民區中華二路250號 No.250, Chung-Hwa 2nd Rd., Sunming District, Kaohsiung City 807, Taiwan	TEL. +886-7-316-0228 FAX. +886-7-316-0226

經銷商

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