

SE 型馬達繼電器

DIN 尺寸 (48 × 96) 加上保護方式 (1E ~ 3E)

可進行任意選擇的電子型馬達繼電器

- 依據 JEM - 1357 三相誘導馬達用電子型保護繼電器規範。
- 保護元件可經由開關切換，進行過負載、欠相、反相 (1E ~ 3E) 之任意組合。
- 採用動作元件 LED，事故檢查容易。
- 可進行較廣範圍電流調整 (1 ~ 160A)、時間調整 (1 ~ 40S)。
- 採用電壓方式反相檢測，可不起動馬達，可防止發生逆轉事情。



種類

主要

外觀	控制電源電壓	復歸方式	動作要素	
			反限時動作類型	起動時鎖住・瞬時動作類型
盤內型	AC 100/110/120V	手動	SE-KP1N 型	SE-KQP1N 型
		自動	SEKP1AN 型	SE-KQP1AN 型
	AC 200/220/240V	手動	SE-KP2N 型	SE-KQP2N 型
		自動	SE-KP2AN 型	SE-KQP2AN 型
盤面型	AC 100/110/120V	手動	SE-K1N 型	SE-KQ1N 型
		自動	SE-K1AN 型	SE-KQ1AN 型
	AC 200/220/240V	手動	SE-K2N 型	SE-KQ2N 型
		自動	SE-K2AN 型	SE-KQ2AN 型
	AC 380/400/440V	手動	SE-K4N 型	SE-KQ4N 型
		自動	—	—

調整

型式	適用電流範圍
SET-3A	1 ~ 80A
SET-3B	64 ~ 160A

予置調整型 (SE - K □ P2 □ N 型)

型式	電壓規格	
SE - PT400 型	1 次側	AC 380~480v (共用)
	2 次側	AC 190~240v (共用)

變壓器・高壓・馬達保護

若使用做為變壓器及高壓・馬達保護用時，或使用傳統 SE- □ □ -YL 型時，建議您將欠相要素調整開關撥至 “L” 端 (動作不平衡率 65%) 使用。

項目		種類	反限時動作型	起動時鎖住・瞬時動作型	
額定電壓	額定電壓	AC 500V 以下（三相）【SET 型電流轉換器之一次端電壓】			
	額定電流	1 ～ 80A 或 64 ～ 160A（三相）【SET 型電流轉換器之一次端電壓】			
控制電源電路	額定電壓	AC 100/110/120V、AC 200/220/240V（三相）【若無須反相保護時亦可使用單相電壓】			
	容許變動範圍	額定電壓之 + 10% ～ - 15%（但手動復歸型的欠相要素為 + 10% ～ - 50%）			
頻率	額定頻率	50/60Hz			
	容許變動範圍	額定電壓之 ± 5%			
電流調整範圍		請參考調整電流一覽表。			
輸出接點	接點組成	1c			
	接點容量	控制電源電壓	接點	手動復歸型	自動復歸型
		AC 100/110/120V AC 200/220/240V	a	AC 240V 3A（cos φ = 0.1） 1.5A（cos φ = 0.3 ～ 0.4）	AC 240V 3A（cos φ = 0.1） 2A（cos φ = 0.4）
			b	AC 240V 3A（cos φ = 0.1） 2A（cos φ = 0.3 ～ 0.4）	
		AC 380/400/440V	a	AC 440V 3A（cos φ = 0.1） 1.5A（cos φ = 0.3 ～ 0.4）	—
			b	AC 440V 3A（cos φ = 0.1） 2A（cos φ = 0.3 ～ 0.4）	
		接點容量的級別		AC11 級 ※	
消耗電力負擔	控制電源電壓	AC 100/110/120V	AC 200/220/240V	AC 380/400/440V	
	消耗電力	約 3.5VA	約 7VA	約 11VA	
重量		約 170 ～ 230g			
外殼顏色	盤內型	白米色 5Y7/I			
	盤面型	黑色 N1.5			

SE 型馬達繼電器

R

SE

■ 常規使用狀態

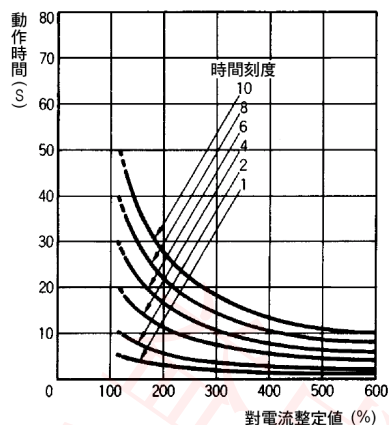
使用溫度範圍	- 10 ~ + 60℃ (但、不得凍結)
使用溼度範圍	35 ~ 85%RH
保存溫度範圍	- 25 ~ + 65℃
標高	2,000m 以下

■ 性能

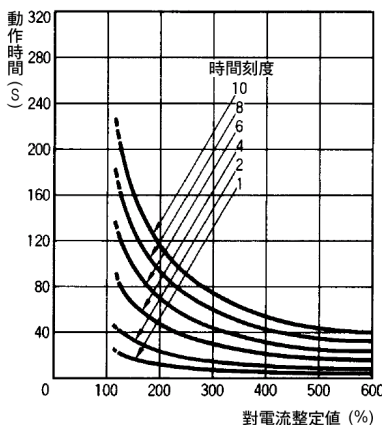
項目	種類	反限時動作型	起動時鎖住・瞬時動作型		
過負載	動作值	電流調整值之 115% 動作			
	動作時間特性	反限時動作動作特性	起動時鎖住・運轉中瞬時動作特性		
	動作時間	・ 在電流調整值之 600% 過電流時 時間刻度倍率 × 1：1~10s 時間刻度倍率 × 4：4~40s ・ 在電流調整值之 200% 過電流時 600% 時之動作時間的 2.8 倍 ± 30% (最大時間調整時)	在電流調整值之 140% 過電流時 0.5s 以下		
	起動時鎖住時間 起動電流值	——	電流調整值之約 30%		
	起動時鎖住 動作時間	——	・ 在電流調整值之 30% 過電流 動作刻度倍率 × 1：1~10s (定限時) 動作刻度倍率 × 4：4~40s (定限時)		
	慣性特性	在最小電流調整、最大動作時間調整時，600% 過電流在動作時間的 80% 通電下不動作。	——		
	復歸值 (自動復歸型)	電流調整值的 100% 以上			
欠相	動作值	電流調整值之 50% 以下 (一相完全欠相時)			
	動作不平衡率	高感度調整 (H)：35 ± 10% (在三相電流之最大電流與電流調整值) 低感度調整 (L)：65 ± 10% (相等狀態時之動作不平衡率)			
	動作時間	高感度調整 (H)：2s 以下 (在一相完全欠相時之電流若與電流調整值) 低感度調整 (L)：3 ± 1s (相等狀態時之動作時間)			
反相	動作值	額定電壓之 80% 以下			
	動作時間	0.5s 以下 (在與額定電壓相等的反相電壓狀態下之動作時間)			
過負載之 調整誤差	動作值	電流調整值之 ± 10%			
	動作時間 (起動時鎖住時間)	・ 時間調整刻度 1：最大調整值之 +10% -5% ・ 時間調整刻度 2~10：最大調整值之 ± 10%			
過負載之 溫度影響	動作值	・ ± 5% (在 0 ~ +40 ° 時) ・ ± 10% (在 -10 ~ +50 ° 時)			
	動作時間 (起動時鎖住時間)	・ ± 10% (在 0 ~ +40 ° 時) ・ ± 20% (在 -10 ~ +50 ° 時)			
過負載之 頻率影響	動作值	± 3% (在額定頻率之 ± 5% 變化時)			
	動作時間 (起動時鎖住時間)	± 5% (在額定頻率之 ± 5% 變化時)			
過負載之 控制電壓影響	動作值	± 3% (在額定電壓之 +10% -15% 變化時)			
	動作時間 (起動時鎖住時間)	± 5% (在額定電壓之 +10% -15% 變化時)			
絕緣阻抗		・ 電子電路整體與安裝面板間：10MΩ 以上 ・ 接點電路與其他電路及接點極間：5MΩ 以上			
耐電壓		試驗場所	控制電源電壓		
		AC 100/110/120V	AC 200/220/240V	AC 380/400/440V	
		電子電路與安裝面板間	AC 2,000V 1min		AC 2,500V 1min
		接點電路與其他電路間	AC 2,000V 1min		AC 2,500V 1min
		接點極間	AC 1,000V 1min		AC 1,000V 1min
脈衝電壓		1.2/50 μs 波形 (JEC-212) 正負極各 3 次 ・ 電子電路整體與安裝面板間：6,000V ・ 電路與其他電路間：4,500V ・ 控制電源電路端子間：4,500V			
過負載耐量	電動機電路	電流調整值之 20 倍、2s、2 次 (1min 間隔) 【型號 SET 比流器之一次端電流】 連續通電電流：各電流調整範圍之最大調整電流值之 125%			
	控制電源電路	額定電壓之 1.15 倍、3h、1 次			
耐久性 (手動復歸型)		10,000 次 (接點不通電)			
耐振動	誤動作	10~55Hz、複振幅 0.3mm、X、Y、Z 方向 各 10min			
	耐久	10~25Hz、複振幅 2mm、X、Y、Z 方向 各 2h			
耐衝擊	誤動作	98m/s ² (10G)、X、Y、Z 方向			
	耐久	294m/s ² (30G)、X、Y、Z 方向			
使用測試鈕之動作		瞬時動作 (動作元件 LED 不會點亮)			

■動作時間特性 (參考值)

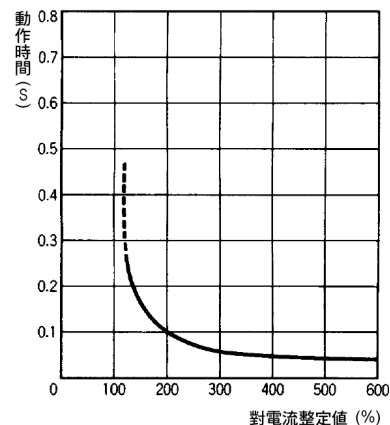
- 反限時動作型的過負載要素之動作時間特性
時間刻度倍率：× 1



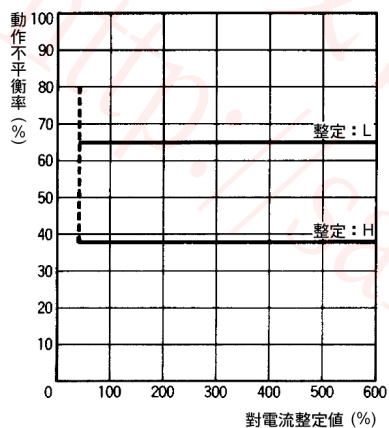
時間刻度倍率：× 4



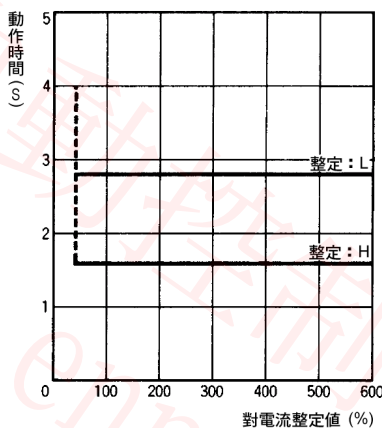
- 起動時 Lock・瞬時動作型的過負荷要素之動作時間特性



- 欠相要素之動作特性

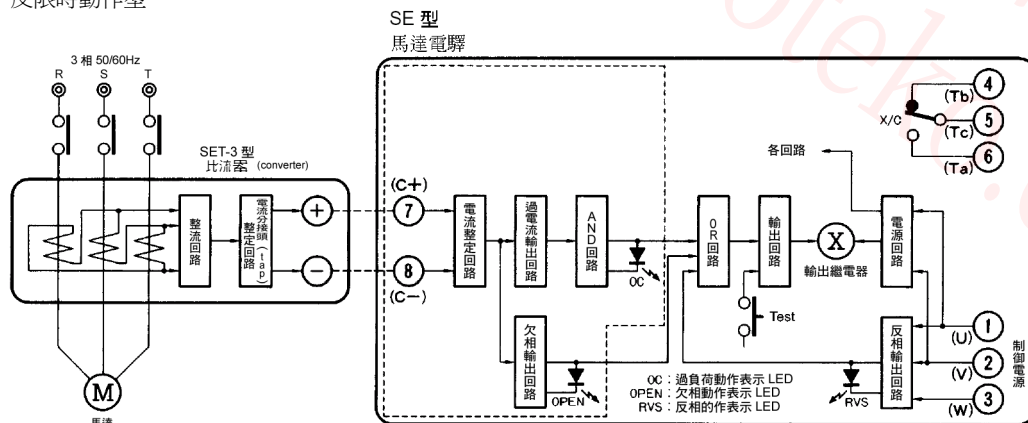


- 欠相要素之動作時間特性

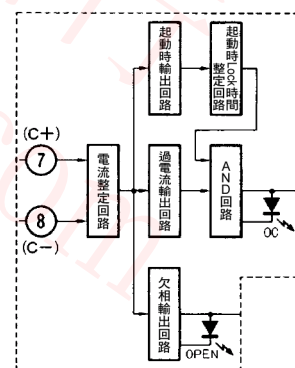


■內部區塊圖

反限時動作型



起動時 Lock・瞬時動作型



註：1. 數字是插銷型之端子號碼，() 內表示面板安裝型之端子記號。

2. 控制電源使用單相時，(①, ② 配線)，不能做反相保護，故整定開關之反相要素請務必在「OFF」使用。如果在「ON」使用可能造成誤動作的原因。
3. 內部區塊圖中「AND 回路」包含時間整定回路。

SE

■調整

利用馬達的電流值，對型號 SE 馬達繼電器及型號 SET 比流器之各種項目進行調整。

■調整電流一覽表 (表 1)

馬達額定容量 (JIS C4201 200V 4P)			馬達繼電器		電流轉換器			
			額定電流 (電流調整範圍) (A)	電流刻度倍率 STECKER No.	導體貫通次數 (次)	調整選擇	型式	
kW	IP*	A						
0.2	1/4	1.4	1~2.5	0.25	8	20	SET -3A 型	
0.4 0.75	1/2 1	2.3 3.8	2 ~ 5	0.5	4	20		
使用超過37kW馬達 之市售CT 2次端		5						
1.5	2	6.8	4 ~ 10	1	2	20		
2.2 3.7	3 5	9.5 15	8 ~ 20	2	1	20	SET -3A 型	
5.5 7.5	7.5 10	22 30	16 ~ 40	4	1	40	SET -3A 型	
11 15	15 20	43 57	32 ~ 80	8		80	SET -3A 型	
19 22 30 37	25 30 40 50	72 82 111 135	64 ~ 160	16		固定		SET -3B 型

註：若使用於高壓電動機、低壓大容量電動機時，請併用市售比流器。

* 符號：1HP = 745.7W。

以 3.7kW 馬達為例說明。

□馬達繼電器調整項目

④動作顯示(LED)

機能(過負載、欠相、反相)動作時，與條件相對應之LED將連續點亮。

⑤跳脫顯示/復歸按鈕 (手動復歸型)

當繼電器動作時，顯示按鈕將跳出約4mm。動作後，如欲復歸時請採取下列方法。

過負荷、欠相：請壓下動作顯示按鈕。

反相：開關控制電源、壓下按鈕。

⑥機能調整開關

機能調整開關請配合使用目的選用。

機能	調整	調整內容
反相要素	ON	反相條件使用反相
	OFF	反相條件不使用反相
欠相要素	ON	欠相條件使用反相
	OFF	欠相條件不使用反相
	H	動作不平衡率:35%
	L	動作不平衡率:65%
過負載	ON	使用過負載要素
	OFF	不使用過負載要素
	x 4sec	動作時間:4~40s (起動時鎖住時間)
	x 1sec	動作時間:1~10s (起動時鎖住時間)

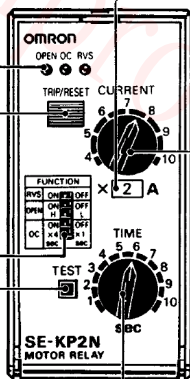
⑦測試鈕

壓下測試鈕後，瞬間內跳脫顯示及輸出繼電器將開始動作。

①電流刻度倍率之決定

依表決定配合電流調整範圍的電流刻度倍率，並將倍率貼在馬達繼電器上。

例：電流調整範圍
8~20A → 倍率為 2



③動作時間之調整

將時間調整鈕設定在必要的動作時間上。

註：1. 水中幫浦請設定在5秒以下。
2. 一般用低壓馬達(誘導電動機)就衡量指標而言，請將其調整為自動起至常態運轉之時間。

時間 刻度倍率	刻度值	
	x 1	x 4
1	1s	4s
2	2	8
3	3	12
4	4	16
5	5	20
6	6	24
7	7	28
8	8	32
9	9	36
10	10	40

• 請使用切換開關選擇刻度倍率。
• 若為型號 SE-KQ □ N 時，則為其起動時鎖住時間。

②動作電流之調整

由所須調整電流值及刻度倍率來決定動作電流之刻度值，使用電流調整選鈕進行設定。

倍率 No.	調整電流值 (A)									
	x 0.25	x 0.5	x 1	x 2	x 4	x 8	x 16	1	1.25	1.5
1	1	2	4	8	16	32	64	4	5	6
2	2	4	8	16	32	64	128	8	10	12
3	3	6	12	24	48	96	192	12	15	18
4	4	8	16	32	64	128	256	16	20	24
5	5	10	20	40	80	160	320	20	25	30
6	6	12	24	48	96	192	384	24	30	36
7	7	14	28	56	112	224	448	28	35	42
8	8	16	32	64	128	256	512	32	40	48
9	9	18	36	72	144	288	576	36	45	54
10	10	20	40	80	160	320	640	40	50	60

此外，因電流調整選鈕之刻度係採用額定電流刻度之故，動作值為調整值之115%。

例：動作電流值 = 15 × 1.15 = 17.25A (115%)

②決定電流轉換器項目

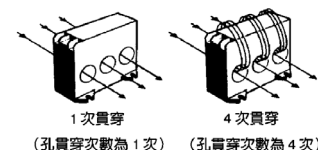
①決定一次導體貫通次數

• 依表決定一次導體貫通次數及調整選擇。

例：電流調整範圍 8 ~ 20A

→ 貫通次數 1、調整選擇 20。

• 貫通時請將3條線均從同一方向加以貫通。任意相可從任意孔穿入。

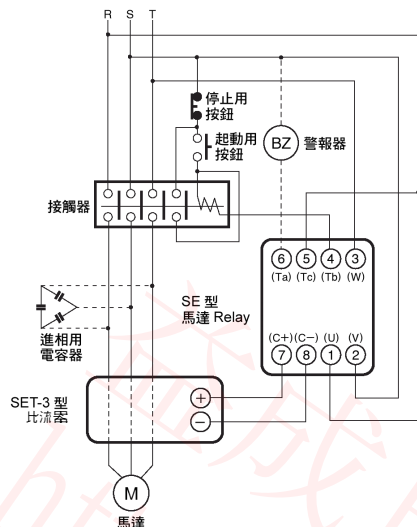


②選擇之調整

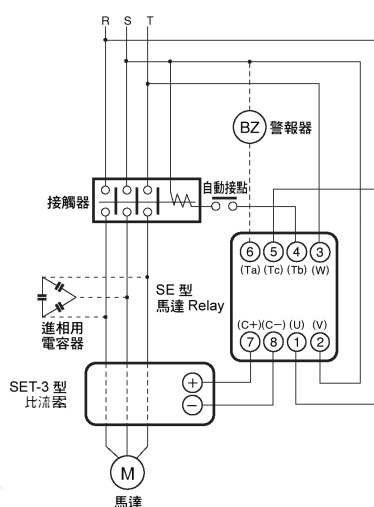
使用附屬的調整螺絲，以螺絲起子鎖入孔中。調整後務必將蓋子回復原狀。

■ 外部連接

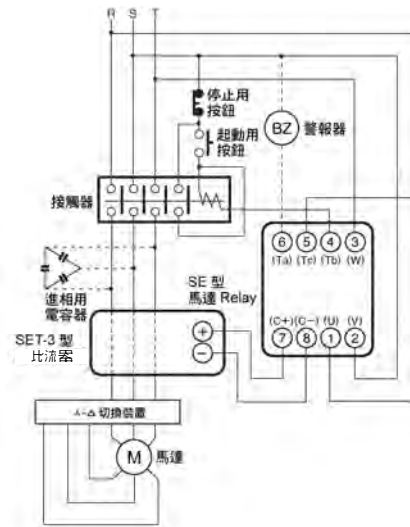
手動淨轉低壓回路
200/220V (或者 400/440V)



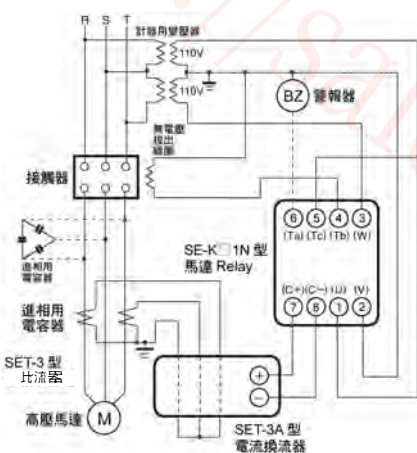
手動淨轉低壓回路
200/220V (或者 400/440V)



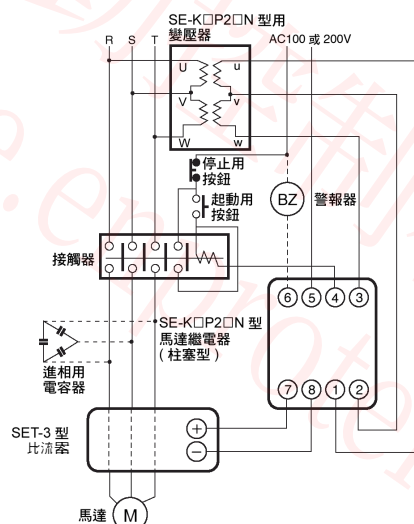
起動回路 200/220V
(或者 400/440V)



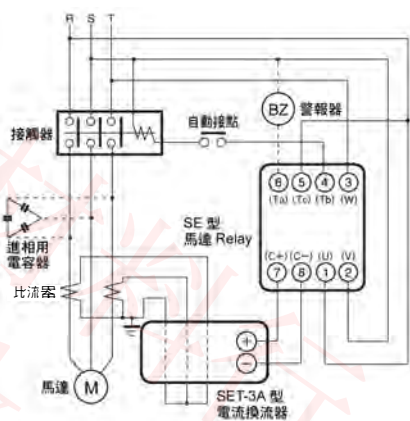
高壓電動機電壓引出回路



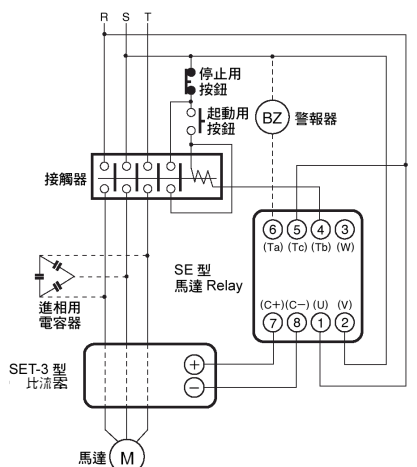
手動淨轉低壓回路
在 400/440V (400/440V 回路) 上使用
SE-K □ P2 □ N 型的情況時)



低壓大容量電動機回路
200/220V (或者 400/440V)

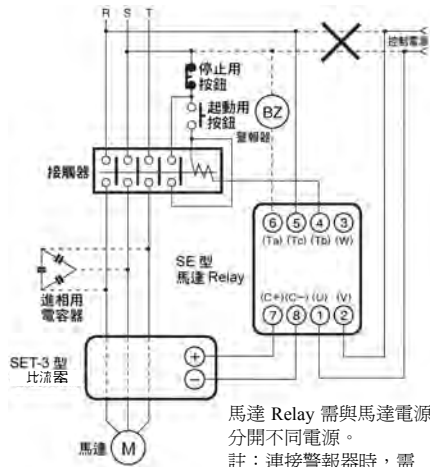


2E (過負載・欠相) 使用場合時



註：反相要素請在「切」使用。

自動復歸型使用場合時



馬達 Relay 需與馬達電源
分開不同電源。
註：連接警報器時，需
要自己保持回路。

- 註：1. 2E (過負載・欠相) 使用時，端子 3 (W) 不用配線。
2. 自動復歸型時，電動機回路之電源欠相時，馬達 Relay 會有不動作。
將反相要素放在「切」位置，控制電源請另外獨立。
3. 馬達 Relay 之控制電源請由接觸器之電源供給。馬達啟動同時控制電源投入，整定時間相同會有不動作現象。

SE

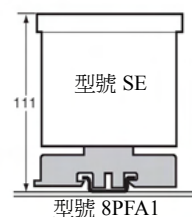
■外觀尺寸

盤內型
SE-KP □ N 型
SE-KQP □ N 型



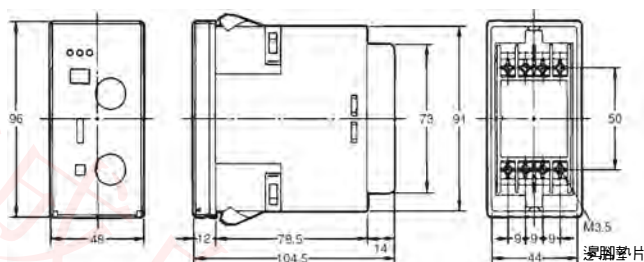
CAD 檔案 SE_02 (與型號 8PFA1 相組合)

連接底座



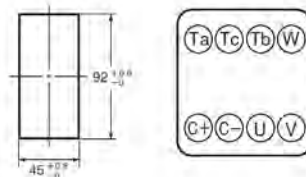
註：請使用型號 8PFA1 表面連接底座 (另售)。

盤內型
SE-K □ N 型
SE-KQ □ N 型



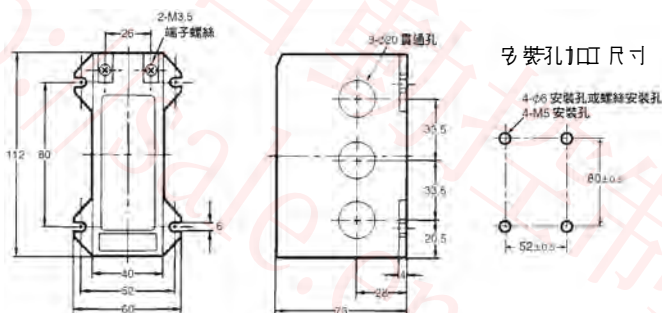
CAD 檔案 SE_01

安裝孔口尺寸 端子配置



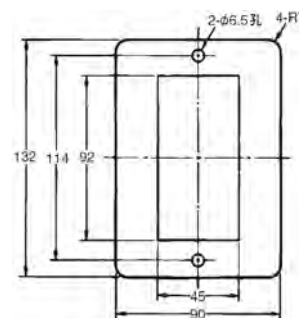
註：可使用面板板厚 1~3.2mm。

比流器
SET-3A 型
SET-3B 型



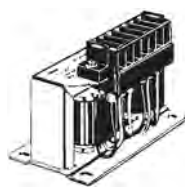
CAD 檔案 SET_01

選擇/轉換器
SE-F7AD 型

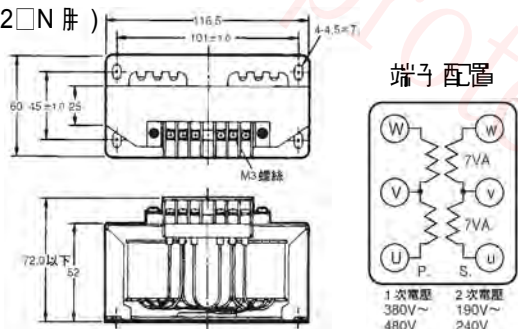


將舊有埋入安裝型更換為新型產品的轉換器。(另售價格NTD)
板材質：鋼板 (厚 2mm) 顏色：黑色 (mancell N1.5)

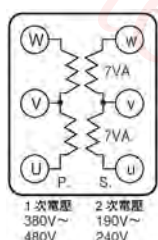
另售/變壓器 (型號 SE-K □ P2 □ N 型)
SE-PT400 型



註：本變壓器僅能連接 1 台
型號 SE。
或為型號 SE-K □ P2 □ N
專用。



端子配置



●安裝

- 若使用型號 8PFA1 表面底座時，請先使用螺絲將其安裝在面板上，之後再插入主機中，最後使用掛鉤固定即可。此外，考量掛鉤部份，請在底座間保留 30mm 空間。
- 安裝方向並無特別限制。但儘可能安裝在水平方向，並請確實安裝。

●連接

- 電流轉換器與主機間之連接極性請接對。
- 若為高壓電動機或低壓大容量電動機等時，而為使用市售比流器時，如外部連接般，請將該 2 次線貫穿該電流轉換器孔。
- 如使用 3E 時，請如外部連接般，請將三相電壓依正確的相順序進行連接。如使用 2E 時，無需使用端子 3(W) 配線。此時請務必將反相要素切換至 "OFF"。若在 "ON" 的狀態時，可能會導致誤動作。

■請正確使用

注意事項

- 進相用電容器之連接方式，如同外部連接般，請從比流器向電源端連接。
- 請注意此馬達繼電器無法使用在開流體控制、變頻器、或包含整流器之電路中。
- 若將型號 SE 使用在發電機時，請注意相位差。
- 若各相相位差不正常時，則反相要素可能無法動作。

正確使用法

●使用注意事項

- 在控制電源方面，僅能使用商品頻率電源。
- 若使用變壓器或高壓馬達保護用時，建議您將欠相要素調整開關切換在 "L" 端 (動作不平衡率 65%) 使用。
- 若在脈動電路中使用負載電流時，欠相要素可能產生誤動作，故請將欠相要素切換至 "OFF"。

SAO/SAO-SU/APR-S

SAO/SAO-SU/APR-S

型號 SAO 電流感測器（馬達過電流保護用）

最適用於馬達過電流保護之電子型過電流繼電器

- 可使於馬達過負荷保護、一般三相電路之交流電流檢測。
- 具備反限時特性者、起動時鎖住、瞬間動作者等各種類型，可配合使用狀況，進行適當保護、檢測、控制。
- 無需配合電流大小，進行 CT 更換、繼電器部份之輸入阻抗更換，使用簡便。
- 採用盤式型態，安裝、拆除、配線等工作均簡便。
- 另亦備有單相保護用之型號 SAO 產品。



種類

機能	操作電壓	形式
反限時動作	AC100/110/120V AC200/220/240V	SAO-R □ N 型
啟動時鎖住・瞬時動作		SAO-Q □ N 型
瞬時動作		SAO-S □ N 型

型號 SAO-SU 電流感測器（不足電流檢測用）

可使用於一般三相電路之交流電流檢測（電流不足）

- 無需配合電流大小，進行 CT 更換、繼電器部份之輸入阻抗更換，使用簡便。
- 採用盤式型態，安裝、拆除、配線等工作均簡便。



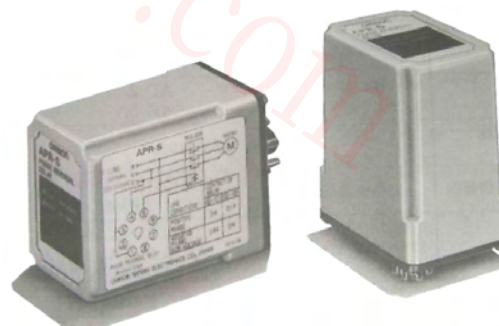
種類

型式
SAO-SU □ N 型 (AC100/110/120V、AC200/220/240V)
SAO-SU □ N 型 (DC24V、48V、100/110V)

型號 APR-S 防止逆轉繼電器

電壓檢測方式之三相馬達防止逆轉繼電器

- 可確實防止因誤配線所導致之馬達逆轉。
- 電源投入時，可進行正相、反相之判別，若在反相狀態時，可阻止電機開關之投入。
- 若利用接線方法，亦可防止電機開關之欠相投入。
- 採用盤式型態，隨時無須進行任何調整。
- 採用電壓檢測型態，可不受負載電流影響使用。
- 若與型號 SE-PT400（三相變壓器）組合使用，則亦可在 380 ~ 480V 使用。



種類

型式
APR-S 型

※型號 SE-PT400 刊載在「機能・安全用保護機器綜合型錄」中，請參閱。（型錄編號：SAO0-316）

K2CU 型加熱斷線警報器

從小容量加熱器到大容量加熱器 均能確實進行斷線故障檢測

- 能確實檢測出成形機械、包裝機械等之加熱器斷線，並發出警報。
- 因具有高精度之判定能力，若使用多個加熱器時，即使只有1根斷線時，亦可檢測出。
- 從小容量到大容量，適用於廣範疇之加熱器。
- 型號K2CU-F大容量CT-體型-占即可適用於任一單相、三相加熱器。
- 具有電壓變動補償機能，對於因電源電壓變動所引起的加熱器電流變動，不會產生錯誤警報，可以獲得高精度警報輸出。



種類

- 具有輸入端子之類型（型號K2CU-F□□A-□GS）

控制電源電壓	動作電流	AC4 ~ 10A	AC8 ~ 20A	AC16 ~ 40A	AC32 ~ 80A
AC 100V	附電壓變動補償	K2CU-F10A-CGS 型	K2CU-F20A-CGS 型	K2CU-F40A-CGS 型	K2CU-F80A-CGS 型
AC 110V		K2CU-F10A-DGS 型	K2CU-F20A-DGS 型	K2CU-F40A-DGS 型	K2CU-F80A-DGS 型
AC 200V		K2CU-F10A-EGS 型	K2CU-F20A-EGS 型	K2CU-F40A-EGS 型	K2CU-F80A-EGS 型
AC 220V		K2CU-F10A-FGS 型	K2CU-F20A-FGS 型	K2CU-F40A-FGS 型	K2CU-F80A-FGS 型

- 大容量CT-體型（型號K2CU-F）

控制電源電壓	動作電流	AC4 ~ 10A	AC8 ~ 20A	AC16 ~ 40A	AC32 ~ 80A
AC 100V	附電壓變動補償	K2CU-F10A-C 型	K2CU-F20A-C 型	K2CU-F40A-C 型	K2CU-F80A-C 型
AC 110V		K2CU-F10A-D 型	K2CU-F20A-D 型	K2CU-F40A-D 型	K2CU-F80A-D 型
AC 200V		K2CU-F10A-E 型	K2CU-F20A-E 型	K2CU-F40A-E 型	K2CU-F80A-E 型
AC 220V		K2CU-F10A-F 型	K2CU-F20A-F 型	K2CU-F40A-F 型	K2CU-F80A-F 型

- 小容量體型（型號K2CU-P）

控制電源電壓	動作電流	AC0.25 ~ 0.5A	AC0.5 ~ 1A	AC1 ~ 2A	AC2 ~ 4A
AC 100/200V	附電壓變動補償	K2CU-P0.5A-A 型	K2CU-P1A-A 型	K2CU-P2A-A 型	K2CU-P4A-A 型
	無電壓變動補償	—	K2CU-P1-A 型	K2CU-P2-A 型	K2CU-P4-A 型
AC 110/220V	附電壓變動補償	K2CU-P0.5A-B 型	K2CU-P1A-B 型	K2CU-P2A-B 型	K2CU-P4A-B 型
	無電壓變動補償	—	K2CU-P1-B 型	K2CU-P2-B 型	K2CU-P4-B 型

構造

項目	型式	K2CU-F 型	K2CU-P 型
額定控制電源電壓		AC 100,110,200,220V (專用)	AC 100/200V (共用) 110/220V (共用)
額定頻率		50/60Hz (共用)	
額定電流		各種最大電流值的1.25倍	AC 2.5A * AC 5A
控制電源電壓變動範圍		額定值的85 ~ 110%	
電源電壓補償範圍		額定值的85 ~ 110%	額定值的85 ~ 110% (但電壓變動補償時)
動作電流		AC 4 ~ 10A, 8 ~ 20A, 16 ~ 40A, 32 ~ 80A, (連續可變)	AC 0.25 ~ 0.5A, AC 0.5 ~ 1A, 1 ~ 2A, 2 ~ 4A (連續可變)
復歸電流		動作值的105%以下	動作值的110%以下
動作時間		0.5s以下 (當電流動作值由150%變化為0時)	—
開級輸入電壓範圍 (僅限附開極規格者)		DC5 ~ 30V	—
控制輸出		1c AC 220V 2A (cos φ = 0.4)	
消耗 VA		輸入部 0.5VA以下 電源部 5VA以下	輸入部 1VA以下 電源部 4VA以下
周圍使用溫度		-10 ~ +55℃ (但不可結水)	
周圍使用溼度		45 ~ 85%RH	
重量		約 390g	約 300g

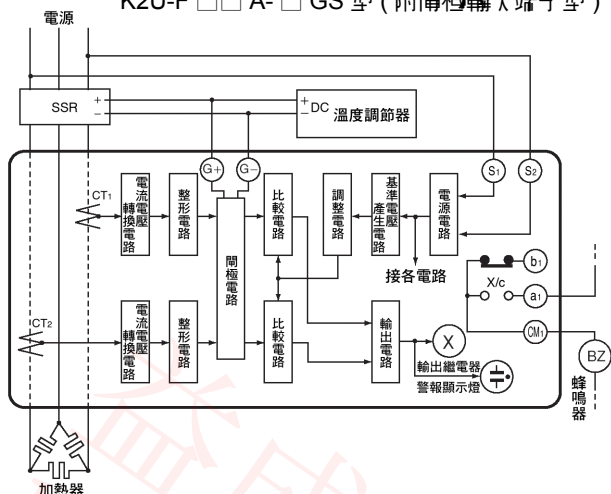
*若為型號K2CU-P0.5A-A, B時，其額定電流為AC2.5A。

性能

調整誤差	± 7%以內
重複誤差	± 3%以內
溫度之影響	± 10%以內 (在 20 ± 30℃時)
電壓之影響	無變動補償時 對額定變壓時之實測值在± 3%以內 (在額定電壓之85 ~ 110%時) 有變動補償時 對額定變壓時之實測值在理論值的± 5%以內 (在額定電壓之85 ~ 110%時) (理論值: 若額定電壓之實測值為1, 而電壓變動範圍為85 ~ 110%時, 則以其動作值0.85 ~ 1.1為理論值)
頻率之影響	± 3%以內 (在額定頻率之± 5%時)
絕緣阻抗	在 DC 500V 時 在 10M Ω以上 (電子電路整體與安裝面板間)
耐電壓	AC 1500V 50/60Hz 1min (電子電路整體與安裝面板間)
過電流強度	在最大調整值的20倍時為2s
耐振動	耐久 16.7Hz 複振幅 1mm 3方向各10min
耐衝擊	耐久 98m/s ² (10G)

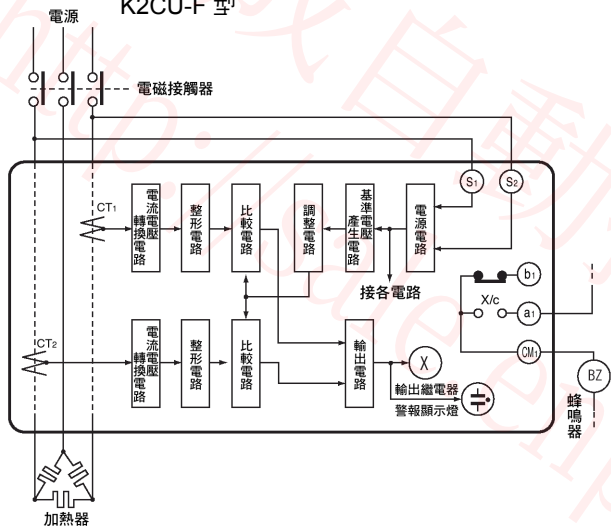
功能方塊圖

K2U-F □□ A- □ GS 型 (附開極輸入端子型)

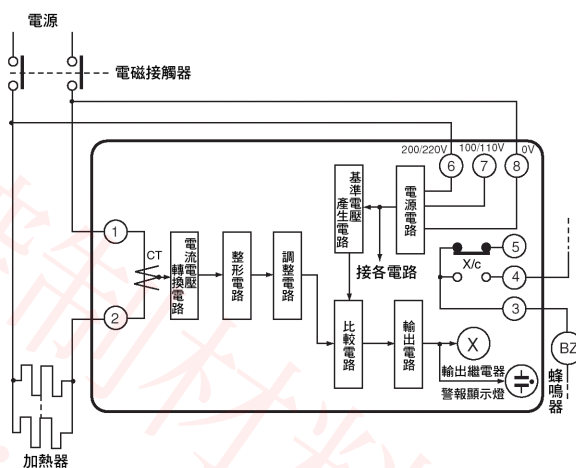


- 註: 1. 虛線代表貫穿 CT 部分者。
2. 通過開極電路之電流值 (G+, G- 間) 爲
DC 5V 時 ----- 約 1.4mA
DC 12V 時 ----- 約 3.4mA
DC 24V 時 ----- 約 6.7mA
* 若使用GS型時, 溫度調節器之控制輸出請使用電壓輸出型。

K2CU-F 型



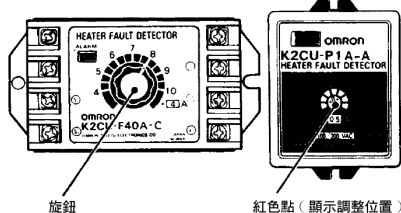
K2CU-P 型



調整

- 動作電流之調整係使用主機正面的調整裝置 (可變電阻) 進行。
- 轉動可變電阻時, 即可進行動作電流值調整。(請勿超越刻度範圍。)
- 型號 K2CU-F 具有輔助 12 刻度、型號 K2CU-P 具有輔助 5 刻度, 請配合期望動作值, 調整刻度。
- 圖形為型號 K2CU-F 為 32A、型號 K2CU-P 為 0.7A 之進行調整時。
- 動作電流調整時, 請調整至加熱器正常時電流與故障時電流的中間值。

$$\text{調整值} = \frac{\text{正常電流值} + \text{故障時電流值}}{2}$$



加熱器之連接方法與電流

加熱器各種連接方法, 其故障時電流值如下表所示。
請做為決定動作電流調整值時之參考。

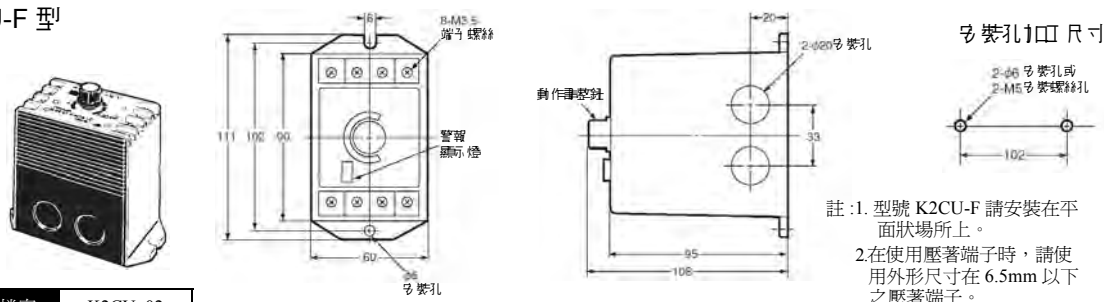
	正常時	故障時
單相		
三相	△接線 	
	Y接線 	
	V接線 	

註: 當將 200V, 1kW 之加熱器使用於單相或三相時之電流值。

K2CU

■外觀尺寸

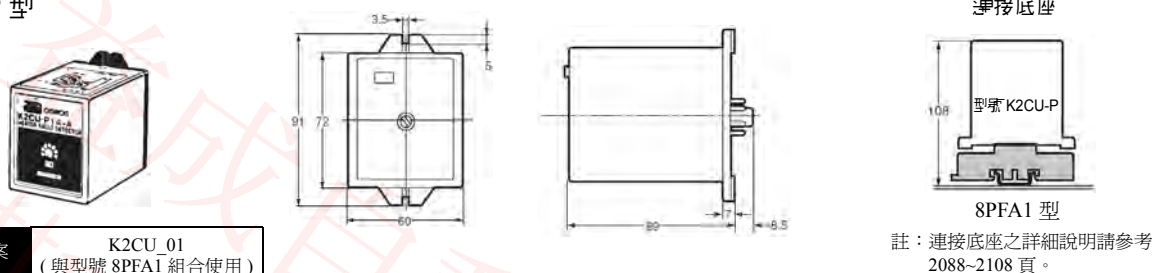
K2CU-F 型



CAD 檔案

K2CU_02

K2CU-P 型



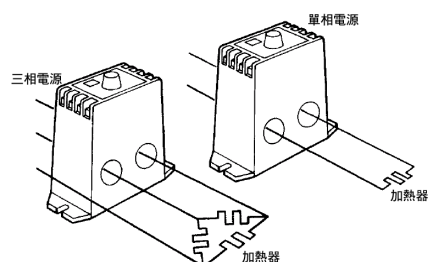
CAD 檔案

K2CU_01
(與型號 8PFA1 組合使用)

■請正確使用

請配合事項

- K2CU 無法使用於相位控制電路、變頻器電路、頻率計數電路、週期控制單元、馬達中。
- ＜ K2CU-F □□ A-□ GS ＞
- 在加熱器溫度控制中，若使用與 PID 控制方式之溫調相互組合使用時，請使用型號 K2CU-F □□ A-□ GS (附開極輸入端子型)。
- 此外，加熱器之 ON/OFF 時間請設定在 0.1 秒以上。
- ＜ K2CU-F ＞
- 若為單相加熱器時，請用 2 根電線貫穿，若為三相加熱器時，請將 2 相的 2 根電線，貫穿警報器主機的貫穿孔。若僅貫通 1 條時，將產生警報訊號。



- 若在調整範圍以下使用時，請依下列公式貫穿電線。
(動作電流) × n = 主機調整範圍內
n：貫穿次數
- K2CU-F 之全機種均為電壓變動補償型。
- ＜ K2CU-P ＞
- K2CU-P 為單相電路專用。
- 通電時，請勿將接頭(底座)與警報器主機進行插拔。特別是若與市售的 CT 進行組合使用時，CT2 次端發生開放狀態是非常危險的。

正確使用方法

- 與外部 CT 組合使用時之連接方法，請參考外部連接項目。
- 若將 K2CU-F □□ A-□ GS 以外之商品與溫度調節器組合使用時，請將加熱器 ON 時間最少設定在 1 秒以上 (額定值 0.5 秒)、OFF 時間也設定在 1 秒以上。
- 安裝
- 安裝方向雖無特別限制，但儘可能安裝在水平方向上，並請確實安裝。
- 連接
- 對端子部之壓著端子等之安裝，請確實進行。
- 端子配置、外部連接請從根本予以正確配線。雖無極性端子，但對於型號 K2CU-P，若將其 100(110V) 及 200(220V) 端子予以交錯配線時，將導致故障。
- 加熱器斷線警報器之控制電源請從電磁接觸器透過負載端接取。(型號 K2CU-F □□ A-□ GS 以外)
- 若為型號 K2CU-P 時，若對其 100(110V) 及 200(220V) 之端子附加電壓時，其仍不會動作。請務必使用 0V 與 100(110V) 及 200(220V) 端子。

- 電線請僅通過 1 次。若通過 2 次以上時，動作電流將小於調整電流。此外，電線貫通無方向性。

SDV 型電壓感測器

最適於電壓檢測・警報用途之電壓感測器。

附計時器功能的新系列追加

- 備有過電壓檢測、不足電壓檢測（開關切換式）之單動作型（型號 SDV-F）及雙動作型（型號 SDV-D）等 2 種類。
- 在本系列產品中，追加 ON 延遲／OFF 延遲／電源起動鎖住（計時器開關切換式）動作機能之單動作型計時器功能。（型號 SDV-FH □ T）
- 交流電壓、直流電壓。（型號 SDV-F、-D 均使開關進行切換。）
- 直流微小輸入專用產品（型號 SDV-FL），可切換直流極性之有或無。
- 附歸值調整範圍更廣泛。（2 ~ 30%、型號 SDV-F）
- 設法便於動作檢查時之動作顯示發光二極體。（型號 SDV-F、-D）
- UL/CSA 認證機種。（型號 SDV-F）



種類

單動作型 過電壓檢測或不足電壓檢測（開關切換式）

項目 型式	輸入	動作值調整範圍		復歸值調整範圍	控制電源
		整體值	各範圍值		
SDV-FL 型	直流專用	4 ~ 240mV	4 ~ 12mV, 10 ~ 30mV, 20 ~ 60mV 40 ~ 120mV, 80 ~ 240mV	2 ~ 30%	* DC12V AC100/110V 24V 200/220V 48V (50/60Hz) 100/110V 125V
SDV-FM 型	直流及 交流用	0.2 ~ 12V	0.2 ~ 0.6V, 0.5 ~ 1.5V 1 ~ 3V, 2 ~ 6V, 4 ~ 12V		
SDV-FH 型 SDV-FH □ T 型 **	（開關 切換式）	10 ~ 300V	10 ~ 30V, 25 ~ 75V 50 ~ 150V, 100 ~ 300V		

雙重動作型 過電壓及不足電壓檢測

項目 型式	輸入	動作值調整範圍			復歸值	控制電源
		中心電壓調整值 之整體值	中心電壓調整值	不感帶調整值		
SDV-DM 型	直流及 交流用 （開關 切換式）	0.2 ~ 12V	0.2~0.6V	0.02 ~ 0.1V	過電壓端 （動作值）-（不感帶×2/3） 以上 不足電壓端 （動作值）+（不感帶×2/3） 以下	* DC12V AC100/110V 24V 200/220V 48V (50/60Hz) 100/110V 125V
			0.5~1.5V	0.05 ~ 0.25V		
			1~3V	0.1 ~ 0.5V		
			2~6V	0.2 ~ 1V		
SDV-DH 型	（開關 切換式）	10 ~ 300V	4~12V	0.4 ~ 2V		
			10~30V	1 ~ 5V		
			25~75V	2.5 ~ 12.5V		
			50~150V	5 ~ 25V		
			100~300V	10 ~ 50V		

註：1. 亦可製作控制電源為 AC120V、AC240V 者。AC120V 之型號為 SDV-□□ 61。AC240V 之型號為 SDV-□□ 71。

2. 亦可製作熱帶處理規格。型號如下。（型號 SDV-F □□ -TC、型號 SDV-D □□ -TC）

* DC 電源之脈動率須在 5% 以下。 ** 附計時器功能之動作模態為 ON 延遲、OFF 延遲、電源起動鎖住。

規格

項目 型式	連續耐過電壓輸入	輸入阻抗	控制輸出	消耗電力	消耗電力	控制電源電壓
SDV-FL □ 型	DC ± 10V	1k Ω	1c 額定負載 AC 220V 5A (cos φ = 1) DC 24V 5A (cos φ = 1) AC 220V 2A (cos φ = 0.4) DC 24V 2A (L/R = 7ms)	直流控制電源 5W 以下	-10 ~ +55℃ （但不得凍結）	* DC12V 24V 48V 100/110V 125V DC 電源 變動範圍 80 ~ 130% AC100/110V 200/220V (50/60Hz) AC 電源 變動範圍 85 ~ 110%
SDV-FM □ 型	DC ± 150V AC150V	50k Ω				
SDV-FH □ 型 SDV-FH □ T 型	DC ± 350V (DC ± 500V 1min) AC350V (AC500V 1min)	2,500k Ω	額定通電電流 5A 接點電壓之最大值 AC 250V, DC125V 接點電流之最大值 5A 開關容量之最大值 1,100V A (cos φ = 1) 120W (cos φ = 1) 440V A (cos φ = 0.4) 48W (L/R = 7ms)	交流控制 電源 5VA 以下		
SDV-DM □ 型	DC ± 150V AC150V		過電壓及不足電壓之 1a, 1b 額定負載 AC 220V 5A (cos φ = 1) DC 24V 5A (cos φ = 1) AC 220V 5A (cos φ = 0.4) DC 24V 5A (L/R = 7ms)			
SDV-DH □ 型	DC ± 350V (DC ± 500V 1min) AC350V (AC500V 1min)		額定通電電流 5A 接點電壓之最大值 AC 250V, DC125V 接點電流之最大值 5A 開關容量之最大值 1,100V A (cos φ = 1) 120W (cos φ = 1) 440V A (cos φ = 0.4) 48W (L/R = 7ms)			

* 輸入阻抗係基準值，與實測值之間多少有些差異。

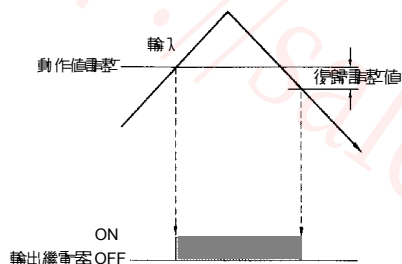
SDV

性能

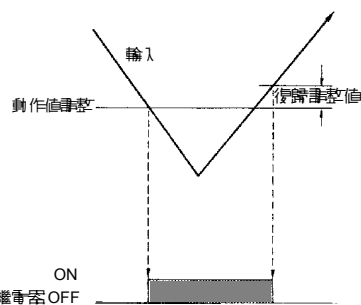
項目	形式	SDV-F □□型	SDV-FH □□ T 型	SDV-D □□型
調整誤差		動作值 ± 2%、復歸值 ± 7%		中心電壓 ± 2%、不感帶 ± 1%
動作時間		0.5s 以下過電壓調整時：變化為動作值之 80% → 120% 時；不足電壓調整時：變化為動作值之 120% → 80% 時		
溫度影響		動作值 ① ± 2% ② ± 4%		中心電壓，不感帶 ① ± 2% ② ± 4%
		① 0 ~ +40℃ ② -10 ~ +55℃ (但 SDV-FL 之 4~12mV 範圍時為 ① ± 4% ② ± 8%)		
控制電源影響		動作值 ± 1%		中心電壓，不感帶 ± 1%
		DC 電源變動範圍 80~130%		
		AC 電源變動範圍 85~110%		
頻率影響		動作值 ± 1%		中心電壓，不感帶 ± 1%
		交流輸入時，變化為 20~500Hz 者 (輸入端)		
波型影響		動作值 ± 3%		中心電壓，不感帶 ± 3%
		商用頻率單相全波輸入附加時 (直流輸入範圍)		
絕緣阻抗		10M Ω 以上 (在 DC500V 時，電子電路整體與外箱間、輸入端子與電源端子之間)		
耐電壓		AC 2,000V 1min (電子電路整體與外箱間、輸入端子與電源端子之間)		
脈波耐電壓		± 1.2 × 50 μs 4,500V (電子電路整體與外箱間) ± 1.2 × 50 μs 3,000V (電源端子間)		
耐振動	耐久	10 ~ 25Hz 複振幅 2mm (最大到 2c) 3 方向 2h		
	誤動作	16.7Hz 複振幅 1mm 3 方向 10min		
耐衝擊	耐久	294m/s ² { 30G		
	誤動作	98m/s ² { 10G		
重量		約 290g	約 350g	約 310g

動作

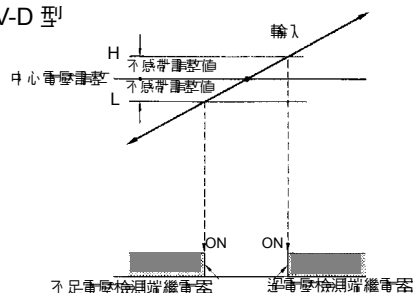
• 雙重動作型 SDV-F 型/逆電壓檢測



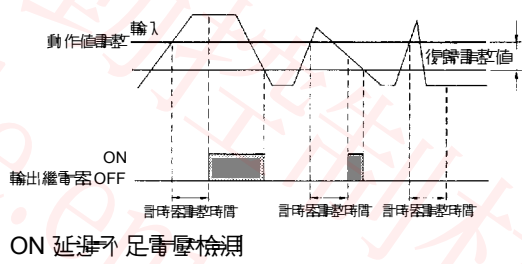
不足電壓檢測



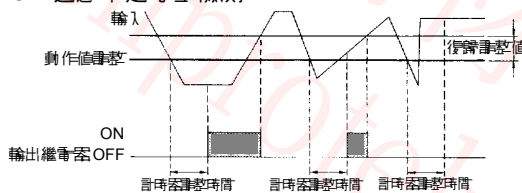
• 雙重動作型 SDV-D 型



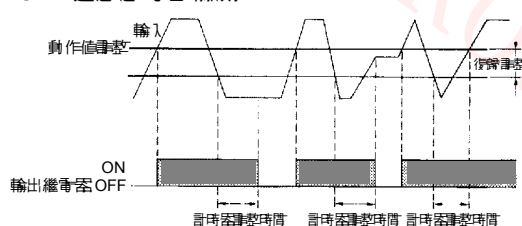
• 單動作型附計時機能 OFF 延遲逆電壓檢測



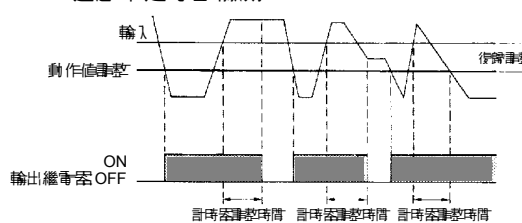
ON 延遲不足電壓檢測



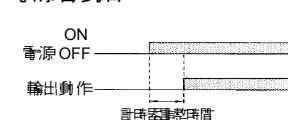
OFF 延遲逆電壓檢測



ON 延遲不足電壓檢測



電源啓動口



計時器部分

項目	形式	SDV-FH □ T 型
計時器設定時間		* 0.5~30s
動作時間之不平衡		± 5% 以下 (對最大刻度之時間比率)
設定誤差		± 15% 以下 (對常溫下最大刻度時間之比率)
重置時間		5s 以上
溫度影響		± 10% 以下 (在使用溫度範圍內對最大刻度時間之比率)
動作模式		ON 延遲 OFF 延遲 電源起動鎖住計時器 (使用 dip switch 選擇其中之一模式)

* 在動作模式下，設定為電源起動鎖住計時時，其最小時間約為 1 秒。

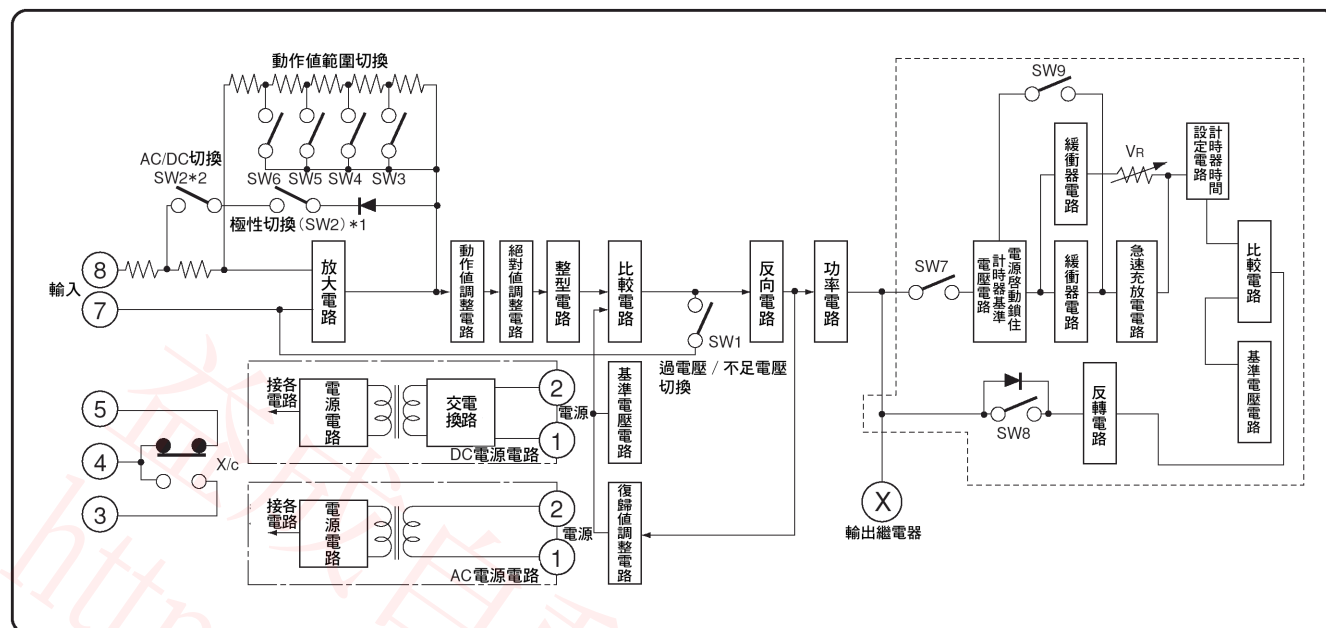
產品型號 (附屬零件等)

註：為使計時器能獲確實動作，reset 時間請至少須確保有 5 秒以上。

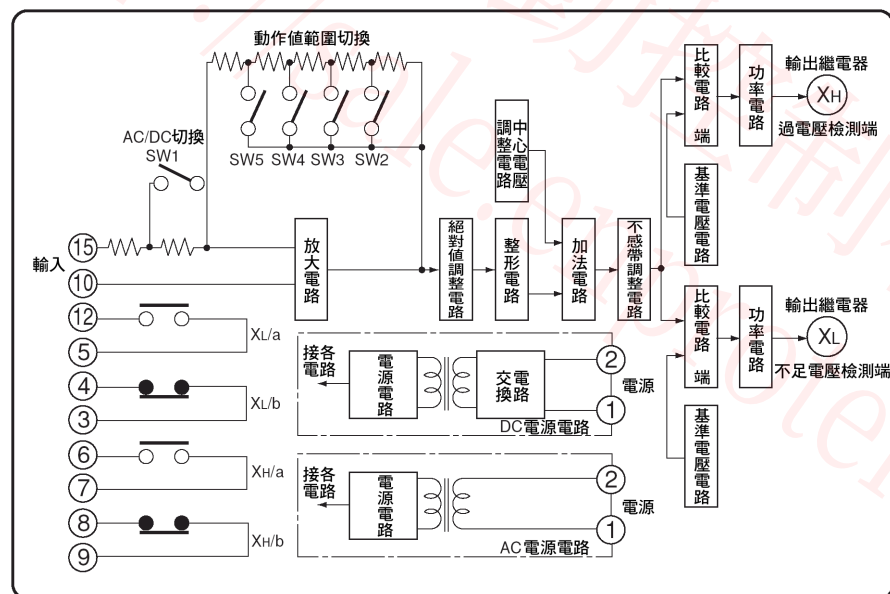
註：從電源投入時到計時器調整時間之間，輸出繼電器將被強制 OFF。

■內部機能方塊圖

SDV-F/SDV-FH □ T 型



SDV-D 型



註：1. 型 SDV-FM 型，-FH 型之 DC 輸入時，並無極性指定。

2. DC 電源時無極性指定。

3. 使用 SDV-FH □ T 型附計時器功能者，須追加電線部電路。

* SDV-FL 型附有極性切換開關 (SW2)。

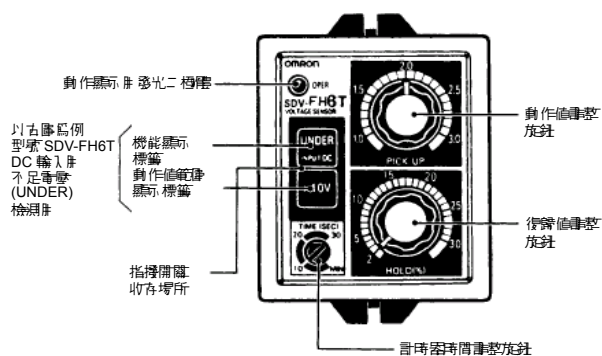
** SDV-FM 型，-FH 型附 AC/DC 切換開關 (SW2)。

註：1. DC 電源時，無極性指定。

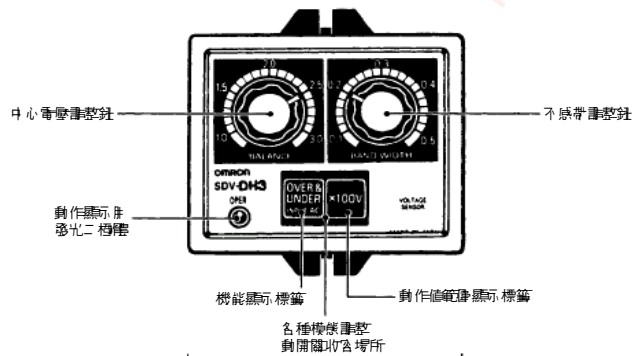
2. DC 輸入時，無極性指定。

■各部分名稱

SDV-F □ /SDV-FH □ T 型



註：型號 SDV-F □ 並未裝設計時器時間調整鈕



上圖型號 SDV-DH3
AC 輸入 100-300V

SDV

調整

- 請打開主機之"各種模態調整撥動開關"蓋子，並請參考主機側面之撥動開關調整表 (SWITCH SELECTION) 進行撥動開關調整。
- 請依必要機能、動作輸入、電壓，對主機正面之撥動開關進行調整設定。
 - 代表將撥動開關往上撥 (ON)，○則代表往下撥 (OFF)。

INPUT 代表輸入、DC 代表直流輸入、AC 代表交流輸入。

SDV-FL □型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5	6
	OFF ○↓	■	■	■	■	■	■
FUNCTION	UNDER	●					
	OVER	○					
POLARITY	8(+) 7(-)	●					
	FREE	○					
MULTIPLY-ING FACTOR	x 4mV	→	○	○	○	○	○
	x10mV	→	●	○	○	○	○
	x20mV	→	○	●	○	○	○
	x40mV	→	○	○	●	○	○
	x80mV	→	○	○	○	●	○

上圖中 "FUNCTION" 代表過電壓 (OVER)、不足電壓 (UNDER) 之機能選擇。"POLARITY" 則代表極性之選擇 (僅限型號 SDV-FL)。8 (+)、7 (-) 顯示接腳編號之極性。"FREE" 則表示無極性。"MULTIPLYING FACTOR" 則代表動作值範圍。

SDV-FM □型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5	6
	OFF ○↓	■	■	■	■	■	■
FUNCTION	UNDER	●					
	OVER	○					
INPUT	AC(20to500Hz)	●					
	DC	○					
MULTIPLY-ING FACTOR	x0.2V	→	○	○	○	○	○
	x0.5V	→	●	○	○	○	○
	x 1V	→	○	●	○	○	○
	x 2V	→	○	○	●	○	○
	x 4V	→	○	○	○	●	○

SDV-FH □型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5
	OFF ○↓	■	■	■	■	■
FUNCTION	UNDER	●				
	OVER	○				
INPUT	AC(20to500Hz)	●				
	DC	○				
MULTIPLY-ING FACTOR	x 10V	→	○	○	○	○
	x 25V	→	●	○	○	○
	x 50V	→	○	●	○	○
	x 100V	→	○	○	○	●

註：NO USE 代表無需調整，開關之位置與動作無關。

SDV-FH □ T 型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5	6	7	8	9	10
	OFF ○↓	■	■	■	■	■	■	■	■	■	■
FUNCTION	UNDER	●									
	OVER	○									
POLARITY	AC(20to500Hz)	●									
	DC	○									
MULTIPLY-ING FACTOR	x10V	→	○	○	○						
	X25V	→	●	○	○						
	X50V	→	○	●	○						
	X100V	→	○	○	●						
TIMER	ON DELAY	→	●	●	●						
	OFF DELAY	→	●	●	○						
	LOCK TIMER	→	○	○	●						
	TIMER OFF	→	○	○	○						

註：NO USE 代表無需調整，開關之位置與動作無關。

上圖中 "TIMER" 代表計時器功能選擇。

"ON DELAY" (起動延遲計時器)、"OFF (關閉延遲計時器) DELAY"、"LOCK TIMER (電源起動鎖住計時器)"、"TIMER OFF" (計時器切斷)，其代表意義各如上所示。

SDV-DM □型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5
	OFF ○↓	■	■	■	■	■
INPUT	AC (20to500Hz)	●				
	DC	○				
MULTIPLY-ING FACTOR	x0.2v	→	○	○	○	○
	x0.5v	→	●	○	○	○
	x 1v	→	○	●	○	○
	x 2v	→	○	○	●	○
	x 4v	→	○	○	○	●

註：INPUT 代表輸入、DC 代表直流輸入、AC 代表交流輸入。

SDV-DH □型

開關調整設定表

SWITCH	ON ●↑	1	2	3	4	5
	OFF ○↓	■	■	■	■	■
INPUT	AC (20to500Hz)	●				
	DC	○				
MULTIPLY-ING FACTOR	x 10V	→	○	○	○	
	x 25V	→	●	○	○	
	x 50V	→	○	●	○	
	x 100V	→	○	○	●	

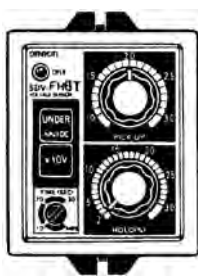
註：NO USE 代表無需調整，開關之位置與動作無關。

■ 調整例

SDV-F 型



SDV-FH □ T 型



SDV-D 型



圖示案例顯示

- "PICK UP" 鈕 → 1.5
 - "HOLD" 鈕 → 20%
 - 動作值範圍顯示標籤 → × 10V
 - 機能顯示標籤 → OVER INPUT DC
- 動作值為 $1.5 \times 10V = 15V$
 復歸值為 $15V \times (100\% - 20\%) = 12V$
 直流動作值 15V、復歸值 12V
 之過電壓檢測用。

圖示案例顯示

- "PICK UP" 鈕 → 2.0
 - "HOLD" 鈕 → 2%
 - 動作值範圍顯示標籤 → × 10V
 - 機能顯示標籤 → UNDER INPUT DC
- 動作值為 $2 \times 10V = 20V$
 復歸值為 $20V \times (100\% + 20\%) = 20.4V$
 直流動作值 20V、復歸值 20.4V
 計時器調整時間 30 秒之
 不足電壓檢測用。

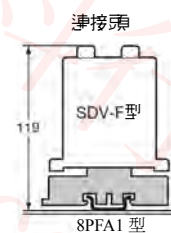
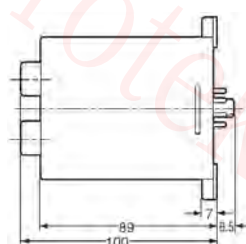
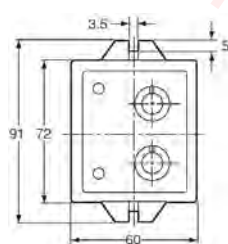
圖示案例顯示

- "BALANCE" 鈕 → 2.5
 - "BAND WIDTH" 鈕 → 0.2
 - 動作值範圍顯示標籤 → × 100V
 - 機能顯示標籤 → OVER&UNDER INPUT AC
- 中心工作電壓 $2.5 \times 100V = 250V$
 不感帶 $0.2 \times 100V = 20V$
 (以中心電壓為邊界之單邊電壓)
 過電壓檢測端為 $250V + 20V = 270V$
 不足電壓檢測端為 $250V - 20V = 230V$
 顯示其為交流過電壓檢測端 270V、
 不足電壓檢測端 230V 之雙重動作。
 此外，在復歸值方面，
 過電壓檢測端為 $270 - (20 \times 2/3) = 256.7V$
 以上 $230 + (20 \times 2/3) = 243.3V$ 以下。

■ 外觀尺寸

主機

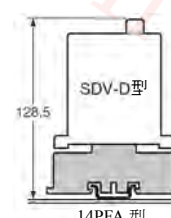
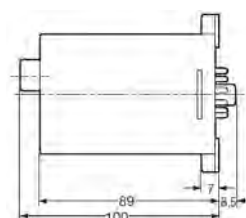
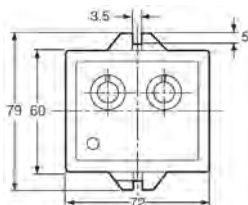
SDV-F □□型 / SQV-FH □ T 型



CAD 檔案

SDV_02
(與型號 8PFA1 組合使用)

SDV-Q □□型



CAD 檔案

SDV_01
(與型號 14PFA 組合使用)

■ 周邊機器

請另行準備將直流電流轉換成直流電壓之分流器。
 詳細內容請參考「機器・安全用保護機器 綜合型錄」。(型錄編號：SA00-316)

SDV/LG2

■ 正確使用

注意事項

- 電源電壓變動・周圍使用溫度請保持在容許範圍內。特別是，檢測部份之電壓，請勿附加超過規格值以上之過電壓。
- 請勿再有腐蝕性氣體、爆炸性氣體的地方使用。
- 此電壓感測器係採平均值檢測方式，請勿使用於閘流體控制、變頻器等。
- 型號 SDV 在響應速度方面，無法使用做為瞬間停電檢測用。

正確使用方法

- 型號 SDV 係採取平均值檢測方式，故須有相當動作時間。因此在進行動作值確認時，請將輸入電壓徐徐改變下，進行確認。

安裝

- 使用型號 PL08, PL05 內面接頭進行安裝時，請以螺絲將接頭鎖入面板（厚度 1 ~ 4mm）中，請充分鎖緊後再插入主機中。

安裝時，請將接頭的 key 溝朝下，同時亦請使用螺絲將面板固定在主機上。

- 使用型號 8PFA1, 14PFA 內面接頭進行安裝時，請使用主機插入掛鉤將其加以固定。此外，考慮掛鉤部份所需空間，請在接腳間保留 30mm 左右空間。
- 若使用本機 2 台以上時，請保持 30mm 以上安裝間隔距離。

■ 標準規格

主機

控制電源電壓 (V)	型式
DC 12	SDV-FL1 型
DC 24	SDV-FL2 型
DC 48	SDV-FL3 型
DC100/110	SDV-FL4 型
AC100/110	SDV-FL6 型
AC200/220	SDV-FL7 型
DC12	SDV-FM1 型
DC24	SDV-FM2 型
DC48	SDV-FM3 型
DC100/110	SDV-FM4 型
AC100/110	SDV-FM6 型
AC200/220	SDV-FM7 型
DC12	SDV-FH1 型
DC24	SDV-FH2 型
DC48	SDV-FH3 型
DC100/110	SDV-FH4 型
AC100/110	SDV-FH6 型
AC200/220	SDV-FH7 型
DC12	SDV-DM1 型
DC24	SDV-DM2 型
DC48	SDV-DM3 型
DC100/110	SDV-DM4 型
AC100/110	SDV-DM6 型
AC200/220	SDV-DM7 型
DC12	SDV-DH1 型
DC24	SDV-DH2 型
DC48	SDV-DH3 型
DC100/110	SDV-DH4 型
AC100/110	SDV-DH6 型
AC200/220	SDV-DH7 型

控制電源電壓 (V)	型式
DC 125	SDV-FL5 型
	SDV-FM5 型
	SDV-FH5 型
	SDV-DM5 型
	SDV-DH5 型

附屬零件

控制電源電壓 (V)	型式
DC 12V	SDV-FH1T 型
DC 24V	SDV-FH2T 型
DC 48V	SDV-FH3T 型
DC 100/100V	SDV-FH4T 型
DC 125V	SDV-FH5T 型
AC 100/110V	SDV-FH6T 型
AC 200/220V	SDV-FH7T 型

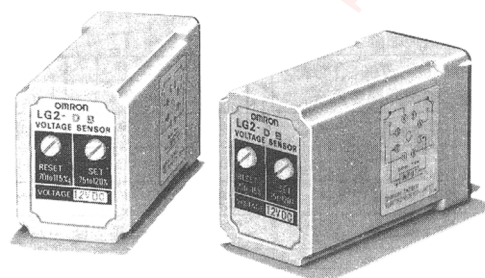
分流量 (60mV 時)

分類	額定電流	型式
有座	5A	SDV-SH5 型
	7.5A	SDV-SH7.5 型
	10A	SDV-SH10 型
	15A	SDV-SH15 型
	20A	SDV-SH20 型
	30A	SDV-SH30 型
	50A	SDV-SH50 型
	75A	SDV-SH75 型
	100A	SDV-SH100 型
	150A	SDV-SH150 型
	200A	SDV-SH200 型
	300A	SDV-SH300 型
無座	500A	SDV-SH500 型
	750A	SDV-SH750 型
	1,000A	SDV-SH1000 型

型號 LG2 電壓感測器 (電壓檢測繼電器)

精巧、易使用、低價格之電壓檢測繼電器

- 守護自動化・省力化機器安全之簡易型電壓檢測繼電器。
- 具有 2c 輸出接點，可廣泛應用於控制、警報、顯示等。
- 檢測訊號可直接驅動繼電器，可使用與電磁繼電器相同的概念進行電壓控制。
- 電壓調整範圍廣泛，同時並可進行微小調整。
- 機器內藏容易，維護、檢查簡單，屬於精巧之盤內型。
- 使用溫度範圍 -10 ~ +40℃。



■ 種類

型號 (額定電壓)
LG2-AB (AC 100V、AC110V、AC 200V)
LG2-DB (DC 12V、DC 24V、DC48V、DC 100)

Digital Heater Element Burnout Detector K8AC-H



A high-precision Heater Element Burnout Detector compatible with a wide-range of heater control methods.

- Screw-less clamp terminals to reduce work. *1
- Scaling *1
- NPN or PNP equivalent output. *1
- Lineup includes models compatible with many heater control methods, including ON/OFF control, phase control, and cyclic control.
- High-precision heater burnout alarm with digital measurement.
- Contributes to preventative maintenance.
- If the gate function is disabled, the gate input can be used as an undercurrent/overcurrent relay or for motor or lamp loads.
- Undercurrent detection values can be set separately for CT1 and CT2. *2
- CE marking and cUL certified (K8AC-H2□□□ Series pending).

*1. K8AC-H2□□□ Series only.

*2. The overvoltage detection value is the same for the CT1 and CT2. Also, there is one undercurrent output.

Note: Consult with your OMRON representative before using the K8AC with phase control or cyclic control under the following conditions.

- Using multiple heaters with different heater capacities
- Using heaters with varying heater resistance (e.g., halogen heaters)



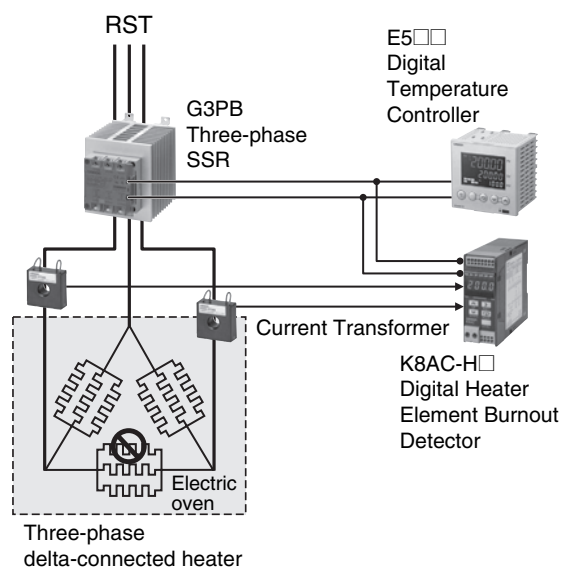
Wide Current Input Range: 0.200 to 200.0 A AC.

Features

High-precision Heater Burnout Alarms with High-resolution Digital Measurement

Burnout Alarm Possible for One of Multiple Heater Elements

Heater burnout is detected by digitally processing minor current fluctuations.



Screw-less Clamp Terminals for Reduced Work

(K8AC-H2□□□ Series Only)

Screw-clamp terminals with no screws eliminate the need to control screw torque and retighten screw.

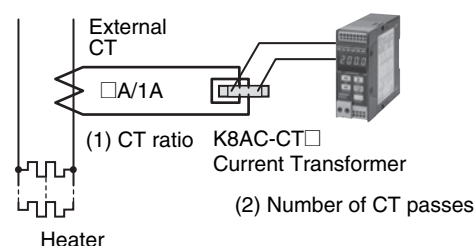


Easily connect terminals using ferrules with insulation sleeves.

Easy Scaling Using the External CT Ratio and Number of CT Passes

(K8AC-H2□□□ Series Only)

Easily set the scaling just by inputting (1) the CT ratio and (2) the number of CT passes.



K8AC-H

Compatible with Various Heater Control Methods

Models with heater burnout alarms for ON/OFF control, phase control, and cyclic control have been added to the lineup. Check the current input range, connected CT, and relay output type before selecting the model from the product specifications.

Note: Both single-phase and three-phase heaters are supported.

Overcurrent and SSR Failure Detection from Heater Layer Short Circuits.

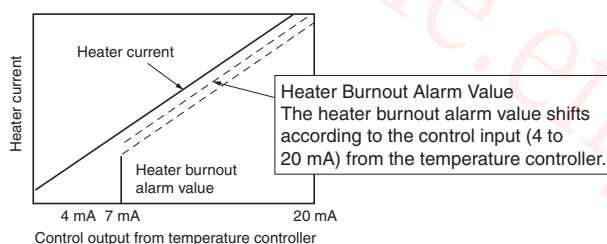
- Overcurrent can be detected from layer short circuits in addition to providing heater burnout alarms with overcurrent detection settings.
- SSR short circuit failures and SSR open circuit failures are detected by monitoring the heater current and the control outputs from the temperature controller.
- Detecting SSR failures enables promptly discovering that temperature control has failed.

Compatible with Heater Burnout Alarms for Phase Control Heaters

(K8AC-H□□P□)

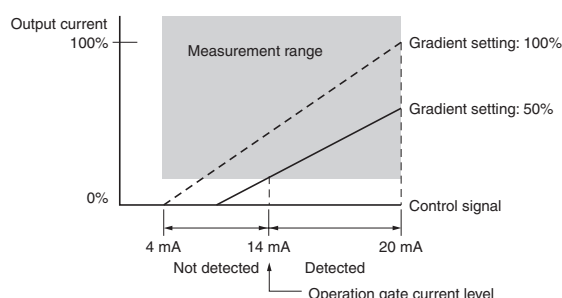
The burnout detection value is shifted according to the control output value from the temperature controller.

- Analog control is performed on the output power according to the temperature controller's current output (4 to 20 mA) when phase control or cyclic control is used.
- Heater burnout alarms are stable with the K8AC-H because the heater burnout alarm values are linked with the control output value from the temperature controller.



Compatible with Gradient Settings of Power Controllers

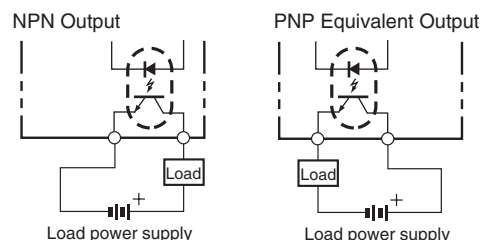
When using gradient settings with a power controller, set a gate current level that is suitable for the gradient settings.



Note: Set the heater burnout alarm value based on the current at the heater's rated input.

The transistor output from the K8AC-H2□□N can be used as either an NPN open-collector output or a PNP equivalent output.

The transistor output of the K8AC-H2□□N uses a photocoupler for isolation with the internal circuits, and so either an NPN open-collector output or a PNP equivalent output can be used.



Preventive Maintenance

The run time can be measured by the K8AC-H.

Managing the run time history until burnouts occur is useful for diagnosis and preventative maintenance for equipment.

Count the Total Number of Alarms Output

Set the upper and lower limits to count the total number of alarms that have been output.

Model Number Structure

Model Number Legend

K8AC-H **-FLK** **100-240VAC**

1 2 3 4 5 6 7

1. Basic Model

K8AC-H: Digital Heater Element Burnout Detector

2. Product Type

- 1: Screw terminals
- 2: Screw-less clamp terminals (power input: screw terminals)

3. Current Input Range

- 1: 0.200 to 2.200 A
- 2: 2.00 to 22.00 A
- 3: 20.0 to 200.0 A

4. Heater Control Type

- C: ON/OFF control (SSR or contactor)
- P: Phase control or cyclic control

5. Output Type

- C: Contact output (one SPDT relay contact output)
- T: Transistor output (two NPN open collector outputs) *1
- N: Transistor outputs (Two outputs: either NPN open-collector output or PNP equivalent output can be used.) *2
- *1. K8AC-H1□□T only.
- *2. K8AC-H2□□N only.

6. Communications Specifications

FLK: RS-485

7. Power Supply Voltage

100-240VAC: 100 to 240 VAC

Ordering Information

Digital Heater Element Burnout Detectors

Models with Screw-less Clamp Terminals (Power Input: Screw Terminals.) NEW

Power supply voltage	Heater control method	Input specifications	Output specifications	Communications output	Current input range			
					0.200 to 2.200 A	2.00 to 22.00 A	20.0 to 200.0 A	
100 to 240 VAC	ON/OFF control SSR control	Two current inputs (for either single-phase or three-phase)	One relay output	RS-485	K8AC-H21CC-FLK	K8AC-H22CC-FLK	K8AC-H23CC-FLK	
			Two transistor outputs		K8AC-H21CN-FLK	K8AC-H22CN-FLK	K8AC-H23CN-FLK	
	One relay output		K8AC-H21PC-FLK		K8AC-H22PC-FLK	K8AC-H23PC-FLK		
	Two transistor outputs		K8AC-H21PN-FLK		K8AC-H22PN-FLK	K8AC-H23PN-FLK		
Applicable Current Transformer					K8AC-CT20S or K8AC-CT20L		K8AC-CT200 or K8AC-CT200L	Current Transformers (sold separately)

Note: Consult with an OMRON representative if multiple heaters with different capacities are to be connected in parallel or if the heater resistance will vary.

Models with Screw Terminals Production To Be Discontinued at the End of March 2009

Power supply voltage	Heater control method	Input specifications	Output specifications	Communications output	Current input range			
					0.200 to 2.200 A	2.00 to 22.00 A	20.0 to 200.0 A	
100 to 240 VAC	ON/OFF control SSR control	Two current inputs (for either single-phase or three-phase)	One relay output	RS-485	K8AC-H11CC-FLK	K8AC-H12CC-FLK	K8AC-H13CC-FLK	
			Two transistor outputs		K8AC-H11CT-FLK	K8AC-H12CT-FLK	K8AC-H13CT-FLK	
	One relay output		K8AC-H11PC-FLK		K8AC-H12PC-FLK	K8AC-H13PC-FLK		
	Two transistor outputs		K8AC-H11PT-FLK		K8AC-H12PT-FLK	K8AC-H13PT-FLK		
Applicable Current Transformer					K8AC-CT20S or K8AC-CT20L		K8AC-CT200 or K8AC-CT200L	Current Transformers (sold separately)

Note: Consult with an OMRON representative if multiple heaters with different capacities are to be connected in parallel or if the heater resistance will vary.

Optional Products (Sold Separately)

Current Transformers

Through-hole diameter	Rated current	Installation method	Model
5.8-mm dia.	0.200 to 22.00 A	Surface-mounted with screws	K8AC-CT20S
12-mm dia.		Rear-surface mounted with screws Binding band	K8AC-CT20L
	20.0 to 200.0 A	Rear-surface mounted with screws Binding band	K8AC-CT200
30-mm dia.	20.0 to 200.0 A	Surface-mounted with screws	K8AC-CT200L

Note: When selecting a Current Transformer, make sure that the rated current of the heater does not exceed the rated upper limit or the rated current of the Current Transformer.

K8AC-H

Specifications

Ratings

Heater control method		Models for ON/OFF control (e.g., SSRs or contactors)	Models for phase control and cyclic control
Item	Model	K8AC-H□□□C□-FLK	K8AC-H□□□P□-FLK
Power supply voltage		100 to 240 VAC (50/60 Hz) *2	
Operating voltage range		85% to 110% min. of the rated power supply voltage (85 to 264 V)	
Power consumption (at max. load)		10 VA max.	
Applicable circuits		Single-phase or three-phase (with same model)	
Applicable control methods		ON/OFF control (e.g., temperature controller with relay output) SSR control (e.g., temperature controller with voltage output) Cyclic control and phase control (e.g., temperature controller with current output)	
Input signal and applicable Current Transformer		Current measurement via two special Current Transformers (Burnout alarm set value can be set separately for each Current Transformer.) Refer to <i>Current Measurement Ranges by Model</i> on page 6 for information on the current measurement range and applicable Current Transformer.	
Measurement method		Instantaneous measurement using root-mean-square values	
Gate input signal *1	ON/OFF control	Voltage = 12/24 VDC (continuous input possible to 30 VDC) Input impedance = 4 kΩ min.	---
	SSR control	ON voltage: 9.6 VDC max., OFF voltage: 1 VDC min. Minimum voltage pulse ON time for burnout detection: 200 ms min. Input impedance = 4 kΩ min.	---
	Cyclic and phase control	---	4 to 20 mA DC (Burnout detection is possible for an input of 7 mA or greater.) Input impedance = 50 Ω max.
Outputs	Relay contact outputs: K8AC-H□□□C-FLK	One SPDT relay contact output Same output used for heater burnout, SSR short circuit, SSR open circuit, and heater layer short circuit alarms. 0.3 A at 125 VAC (resistive load), 1 A at 30 VDC (resistive load) Maximum switching capacity: 37.5 VA, 30 W Mechanical durability: 50 million operations min., electrical durability: 100,000 operations min.	
	Transistor outputs (NPN open-collector): K8AC-H1□□□N-FLK	Two transistor outputs (NPN open-collector) One ALM output: Outputs heater burnout alarm or heater layer short circuit alarm. One SSR error output: Outputs SSR short circuit alarm or SSR open circuit alarm. 12 to 24 VDC, 50 mA max. OFF leakage current: 100 μA max., ON residual voltage: 1.5 V max.	
	Transistor outputs: K8AC-H2□□□N-FLK	Two transistor outputs: Can be used either NPN open-collector outputs or PNP equivalent outputs. One ALM output: Outputs heater burnout alarm or heater layer short circuit alarm. One SSR error output: Outputs SSR short circuit or SSR open circuit detection. 12 to 24 VDC, 50 mA OFF leakage current: 100 μA max., ON residual voltage: 1.5 V max.	
Communications		RS-485 1200, 2400, 4800, 9600, 19200 bps (CompoWay/F)	
Indication method		7-segment digital display: No. of display digits: 4 (red) LED status indicators: RUN (green), ADJ (orange), SET (orange), GATE (orange), SSR (orange) and ALM (orange)	
Main functions		Heater burnout alarm, heater layer short circuit alarm, SSR short circuit detection, SSR open circuit detection, voltage fluctuation compensation, output ON-delay timer, energy-saving mode, key protection, and power supply voltage measurement	
Ambient temperature	Operating	-10 to 55°C (with no icing or condensation)	
	Storage	-25 to 65°C (with no icing or condensation)	
Ambient humidity	Operating	25% to 85% (with no condensation)	
	Storage	25% to 85% (with no condensation)	
Altitude		2,000 m max.	
Accessories		Instruction sheet	
Case material		PC (Polycarbonate)	
Case color		N1.5 (clear black)	
Mounting method		Mounting to a DIN Track	

*1. The gate input enables correct measurement by syncing to heater control.

When using it with ON/OFF control, receive the relay contact output from the temperature controller or other controller with a 24-VDC auxiliary relay and then use this signal as the gate input signal to the K8AC.

The gate function can also be disabled. If it is disabled, the gate input can be used as a normal undercurrent/overcurrent relay.

*2. When using the K8AC-H for a 380 to 480-V AC power supply circuit, use a step-down transformer. Contact your OMRON representative for information on transformers.

*3. Order the Current Transformers separately.

Characteristics

Heater control method		Models for ON/OFF control (e.g., SSRs or contactors)	Models for phase control and cycle control
Item		K8AC-H□□□C□-FLK	K8AC-H□□□P□-FLK
Heater current input (at 10 to 30°C) category II	Input range	K8AC-H□1□□: 0.200 to 2.200 A (Current Transformer: K8AC-CT20S (5.8 dia.), K8AC-CT20L (12 dia.) *1) K8AC-H□2□□: 2.00 to 22.00 A (Current Transformer: K8AC-CT20S (5.8 dia.), K8AC-CT20L (12 dia.) *1) K8AC-H□3□□: 20.0 to 200.0 A (Current Transformer: K8AC-CT200 (12 dia.), K8AC-CT200L (30 dia.) *1)	
	Measurement accuracy	±3% rdg ±10 digits max. *2	±6% rdg ±10 digits max. *2
Voltage fluctuation compensation category II	Input range	85 to 264 VAC	
	Measurement accuracy	±3% rdg ±10 digits max.	
Gate input	Input range	0 to 12 VDC or 0 to 24 VDC ON: 9.6 VDC max., OFF: 1 VDC min.	4 to 20 mA DC
Display cycle		Selectable: Immediate, 0.2 s, 0.5 s, 1.0 s	
Output ON-delay time		0.0 to 99.9 s (operating time)	
Soft start time		0.0 to 99.9 s (used when using the soft start function of a Power Controller)	
Output reset method		Automatic reset	
Alarm hysteresis		1 to 999 digits	
Output response time		500 ms max.	3.5 s max.
Insulation resistance		20 MΩ min. Between terminals and case Between power supply terminals/CT primary terminals and gate input terminals/communications terminals Between power supply terminals/CT primary terminals and output terminals Between gate input terminal/communications terminals and output terminals	
Dielectric strength		2,000 V for 1 min Between terminals and case Between power supply terminals/CT primary terminals and gate input terminals/communications terminals Between power supply terminals/CT primary terminals and output terminals Between gate input terminal/communications terminals and output terminals	
Noise immunity		Power supply terminals normal/common mode: ±1,500 V (startup 1-ns square-wave noise, pulse width: 1 μs/100 ns)	
Vibration resistance		Vibration: 10 to 55 Hz, Acceleration: 50 m/s ² for 5 min with 10 sweeps each in X, Y, and Z directions	
Shock resistance		150 m/s ² (100 m/s ² for relay contacts) 3 times in 6 directions in X, Y, and Z directions	
Maximum allowable input	Current Transformer primary current	K8AC-H□1□□: 4 A: 30 s, 12 A: 1 s K8AC-H□2□□: 40 A: 30 s, 120 A: 1 s K8AC-H□3□□: 400 A: 30 s, 1,200 A: 1 s	
	Gate signal: 4 to 20 mA	40 mA DC continuous	
	Voltage pulse gate input	30 VDC continuous	
Input impedance	Gate signal: 4 to 20 m	50 Ω max.	
	Voltage pulse gate input	4 kΩ min.	
Weight		Approx. 200 g	
Memory protection		Non-volatile memory (number of writes: 100,000 operations)	
Installation environment		Installation Category 2, Pollution Class 2	
Approved standards		UL61010-1 and CAN/CSA C22.2 No.61010-1-04 (UL pending) EN 61010-1 (IEC 61010-1) (TÜV evaluation)	
EMC		EMI: Radiated Interference Electromagnetic Field Strength: EN55011 Group 1, class A Noise Terminal Voltage: EN55011 Group 1, class A EMS: ESD Immunity: EN61326 Industrial applications EN61000-4-2: 4 kV (contact discharge) 8 kV (air discharge) Electromagnetic Immunity: EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Fast Transient Burst Immunity: EN61000-4-4: 2 kV (power line) 1 kV (I/O signal line) Surge immunity: EN61000-4-5: 1 kV (line to line, power line) 2 kV (line to ground, power line) Conducted Noise Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Voltage Dip/Interrupting Immunity EN61000-4-11: 0.5 cycle, 0.180°, 100% (rated voltage)	

*1. The Current Transformers are sold separately.

*2. The values for measurement current apply when the K8AC-H is used in combination with a Current Transformer.

K8AC-H

Current Measurement Ranges by Model

Item Model	K8AC-H□1□□-FLK	K8AC-H□2□□-FLK	K8AC-H□3□□-FLK
Current measurement range	0.200 to 2.200 A AC	2.00 to 22.00 A AC	20.0 to 200.0 A AC
200 A			200.0 A
100 A			
20 A		22.00 A	20.0 A
2 A	2.200 A 0.200 A	2.00 A	
Current Transformer	K8AC-CT20S: 5.8-mm through-hole diameter or K8AC-CT20L: 12-mm through-hole diameter		K8AC-CT200: 12-mm through-hole diameter or K8AC-CT200L: 30-mm through-hole diameter

I/O Ratings

Relay Contact Output

Item	Load	Resistive load ($\cos\phi = 1$)
Rated load		125 VAC, 0.3 A, 30 VDC, 1 A
Maximum contact voltage		125 VAC, 60 VDC
Maximum contact current		1 A
Maximum switching capacity		37.5 VA, 30 W
Minimum applicable load (failure rate P value, reference value)		5 VDC, 10 mA
Mechanical life expectancy		50,000,000 operations min. (at a switching frequency of 18,000 times/h)
Electrical life expectancy (Ambient temperature condition: 20°C)		100,000 operations min. (at rated load and switching frequency of 1,800 times/h)

Transistor Output

Maximum load voltage	12 to 24 VDC (+10%, -15%)
Maximum load current	50 mA
OFF leakage current	100 μ A max.
ON residual voltage	1.5 V max.

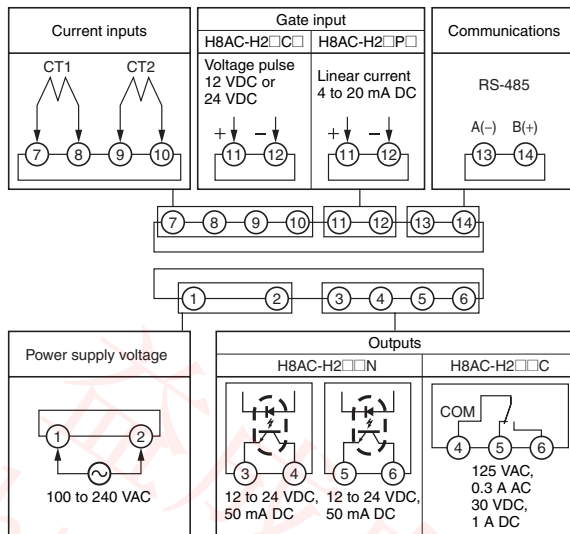
Communications Specifications

Item	Communications	RS-485
Transmission method		Two-wire, half-duplex
Synchronization method		Start-stop synchronization
Baud rate		1,200, 2,400, 4,800, 9,600, or 19,200 bps
Transmission code		ASCII

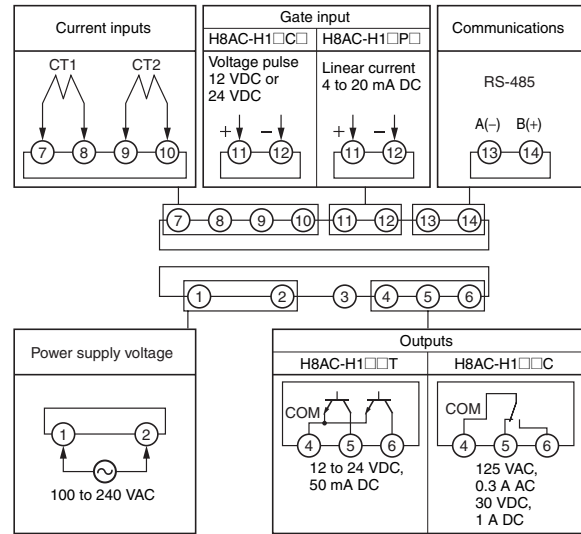
Connections

Terminal Arrangement

K8AC-H2□□□-FLK



K8AC-H1□□□-FLK

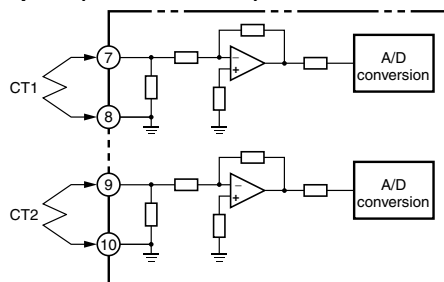


Terminals	Name	Description	Applicable models
1 to 2	Power supply voltage	Connect to the operating power supply.	All models
3 to 4, 5 to 6	Outputs	Outputs SSR open or short circuit detection results.	K8AC-H2□□N (transistor output)
5 to 4, 6 to 4		Outputs heater burnout or layer short circuit detection results.	K8AC-H1□□T (NPN open-collector output)
5, 6 to 4		Outputs an OR of the status of all alarms.	K8AC-H□□C (relay output)
7 to 8 9 to 10	Current inputs	Connect to CT1. Current input from CT1 secondary-side output.	All models
		Connect to CT2. Current input from CT2 secondary-side output.	
11 to 12	Gate input	Connect to gate signal (voltage pulse).	K8AC-H□□C□
		Connect to a 4 to 20-mA gate signal.	K8AC-H□□P□
13 to 14	Communications	Connect to host device for RS-485 communications.	All models

- Note:** 1. Terminals 4 to 6: Alarm output terminals. Depend on the output type (relay contact output or transistor output).
2. Terminals 11 and 12: Gate input terminals. Depend on the heater control type (ON-OFF/SSR control or cyclic/phase control).

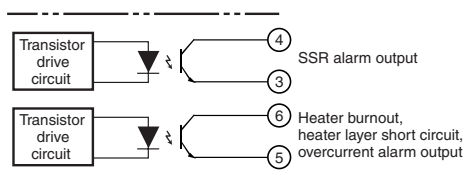
Current Input Circuits

CT Inputs (Heater Current)

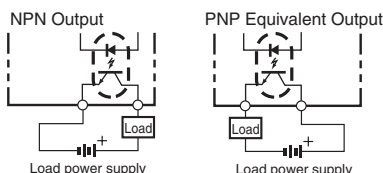


Transistor Output

K8AC-H2□□N-FLK

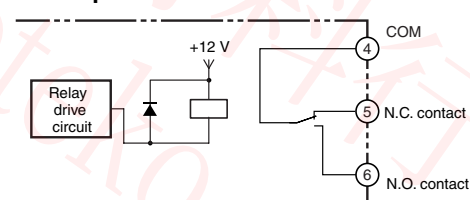


The transistor output of the K8AC-H2□□N uses a photocoupler for isolation with the internal circuits, and so either an NPN open-collector output or a PNP equivalent output can be used.



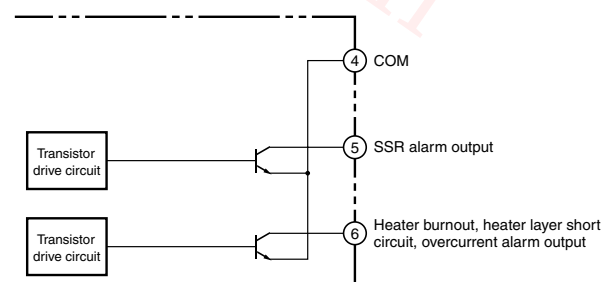
Output Circuits

Contact Outputs



Note: For contact outputs, the same outputs are used for SSR error and for heater burnouts and heater layer short circuit alarm outputs.

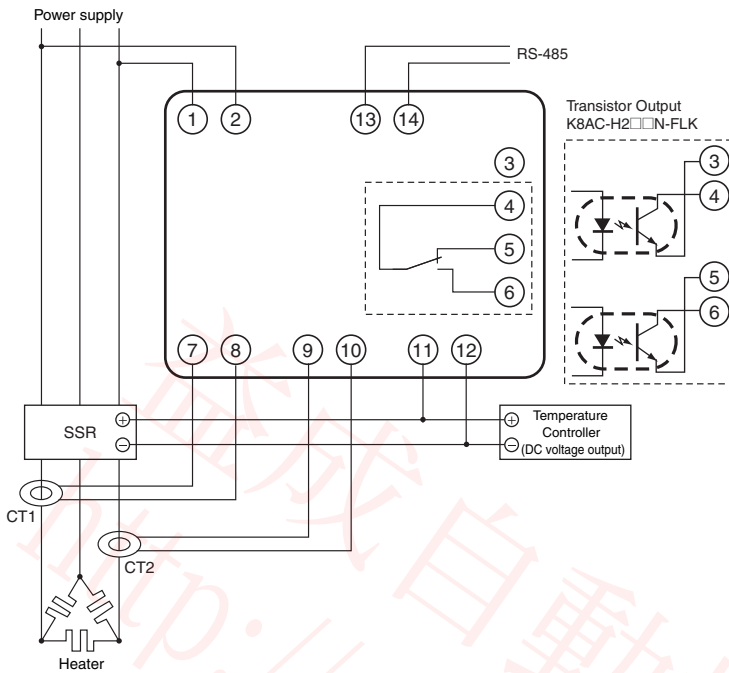
K8AC-H1□□T-FLK



K8AC-H

External Connection Example

Wiring Method When Using the K8AC-H with SSR Control Heaters



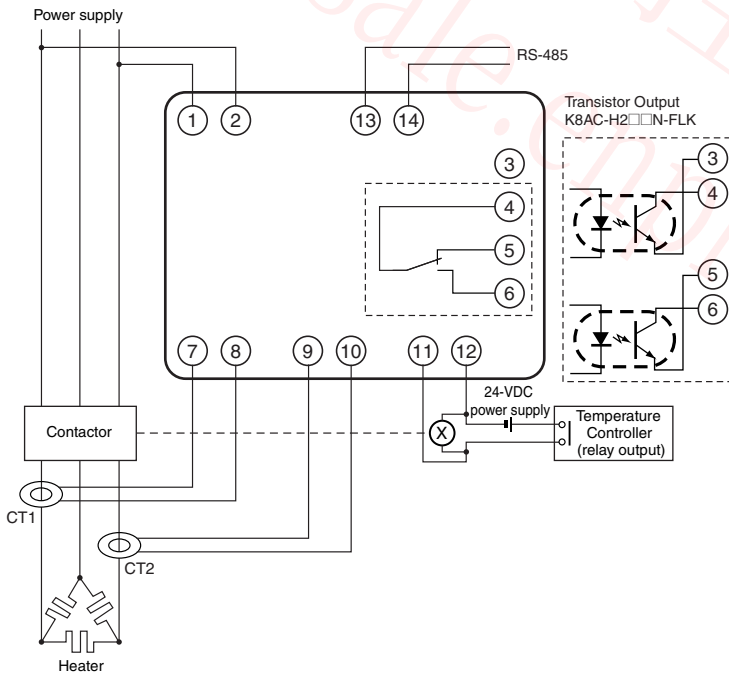
Operation Description

- If the heater current detected at either CT1 or CT2 falls below the burnout alarm set value, an alarm is output. The burnout alarm set value can be set separately for CT1 and CT2. No burnout alarm is output, however, when the temperature controller control output is OFF. Burnouts are detected only while the temperature controller control output is being input to the gate input terminals (11 and 12). Faulty outputs do not occur because heater burnout detection is linked with the temperature controller.
- The minimum burnout detection time is 200 ms. Shorter burnouts are not detected.
- Turn ON the voltage fluctuation compensation function (default: OFF) to detect power supply voltage fluctuations and automatically compensate the burnout alarm value. Also, turn ON the voltage fluctuation compensation function to detect minor current fluctuations.

Correct Usage

- Always take the power supply voltage from the primary side of the SSR.
- Use temperature controllers with a 12 or 24-VDC voltage output (30 VDC max.).
- CT1 and CT2 are special products. Use the K8AC-CT□□.
- The CTs do not have polarity.
- Connect only one CT for single-phase heaters. Connect two CTs for three-phase heaters.
- For three-phase heaters, always set the burnout alarm set values for both CT1 and CT2.

Wiring Method When Using the K8AC-H with ON/OFF Control Heaters



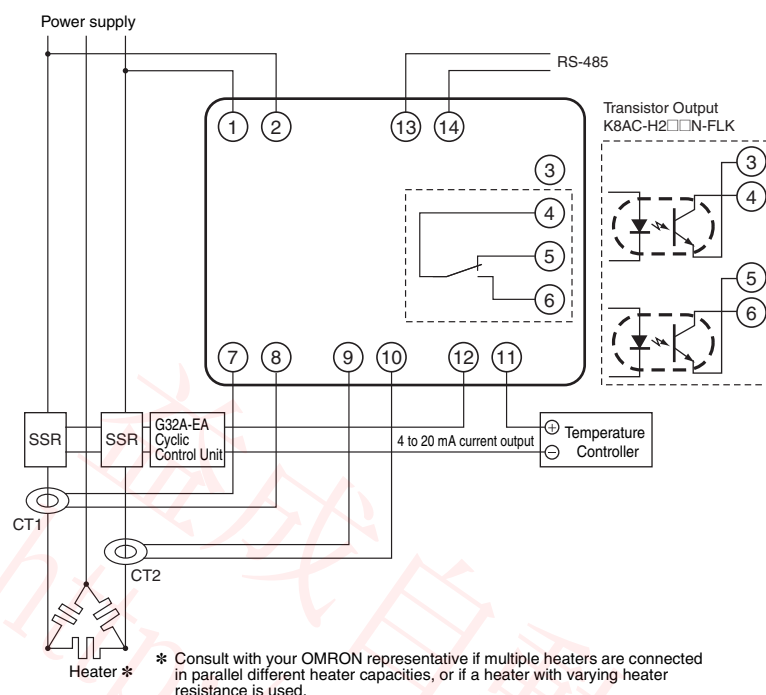
Operation Description

- If the heater current detected at either CT1 or CT2 falls below the burnout alarm set value, an alarm is output. The burnout alarm set value can be set separately for CT1 and CT2. No burnout alarm is output, however, when the temperature controller control output is OFF. Burnouts are detected only while the temperature controller control output is being input to the gate input terminals (11 and 12). Faulty outputs do not occur because heater burnout detection is linked with the temperature controller.
- The minimum burnout detection time is 200 ms. Shorter burnouts are not detected.
- Turn ON the voltage fluctuation compensation function (default: OFF) to detect power supply voltage fluctuations and automatically compensate the burnout alarm value. Also, turn ON the voltage fluctuation compensation function to detect minor current fluctuations.

Correct Usage

- Always take the power supply voltage from the primary side of the SSR.
- Use a temperature controller with relay output.
- The input to the gate input terminals (11 and 12) must be a DC voltage input, so wire the 24-VDC power supply as shown in the diagram to the left.
- CT1 and CT2 are special products. Use K8AC-CT□□.
- The CTs do not have polarity.
- Connect only one CT for single-phase heaters. Connect two CTs for three-phase heaters.
- For three-phase heaters, always set the burnout alarm set values for both CT1 and CT2.

Wiring Method When Using the K8AC-H with Cyclic Control Heaters



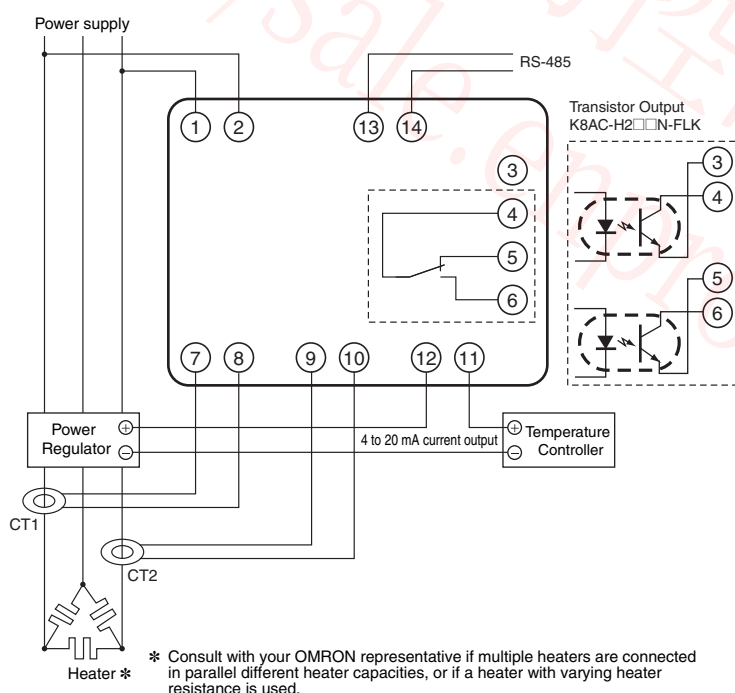
Operation Description

- If the heater current detected at either CT1 or CT2 falls below the burnout alarm set value, an alarm is output. The burnout alarm set value can be set separately for CT1 and CT2. No burnout alarm is output, however, when the temperature controller control output is OFF. Burnouts are detected only while the temperature controller control output is being input to the gate input terminals (11 and 12). Burnout is detected with no errors because the automatic adjustment of burnout alarm level is linked to the temperature controller output (4 to 20 mA).
- Burnout is detected when control outputs from the temperature controller are 7 mA min.

Correct Usage

- Always take the power supply voltage from the primary side of the SSR.
- Use a temperature controller with a 4 to 20-mA current output.
- When you adjust the set value for the burnout alarm, make sure that you make the setting with the temperature controller's control output at a 100% output. The burnout detection value is the detection value at 100% output. Therefore, correct operation will not be possible if the setting is made based on a measurement value when the output is not 100%.
- CT1 and CT2 are special products. Use K8AC-CT□□.
- The CTs do not have polarity.
- Connect only one CT for single-phase heaters.
- Connect two CTs for three-phase heaters.
- For three-phase heaters, always set the burnout alarm set values for both CT1 and CT2.

Wiring Method When Using the K8AC-H with Phase Control Heaters



Operation Description

- If the heater current detected at either CT1 or CT2 falls below the burnout alarm set value, an alarm is output. The burnout alarm set value can be set separately for CT1 and CT2. No burnout alarm is output, however, when the temperature controller control output is OFF. Burnouts are detected only while the temperature controller control output is being input to the gate input terminals (11 and 12). Burnout is detected with no errors because the automatic adjustment of burnout alarm level is linked to the temperature controller output (4 to 20 mA).
- Burnout is detected when control outputs from the temperature controller are 7 mA min.

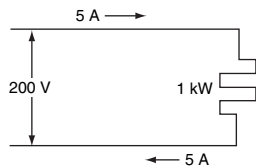
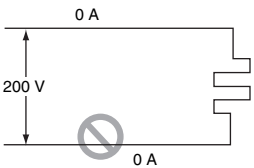
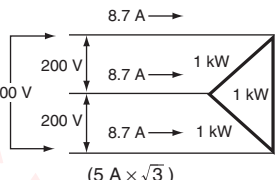
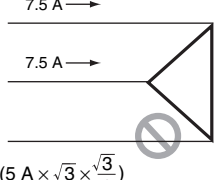
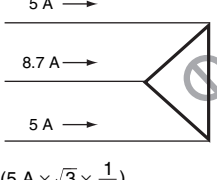
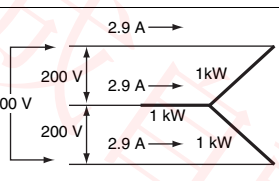
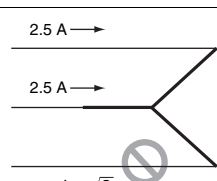
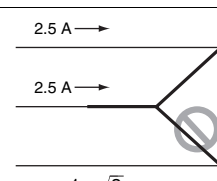
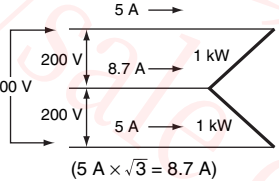
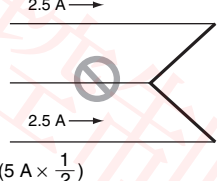
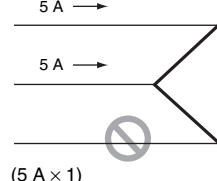
Correct Usage

- Always take the power supply voltage from the primary side of the contactor.
- Use a temperature controller with a 4 to 20-mA current output.
- When you adjust the set value for the burnout alarm, make sure that you make the setting with the temperature controller's control output at a 100% output (20 mA). The burnout detection value is the detection value at a 100% output. Therefore, correct operation will not be possible if the setting is made based on a measurement value when the output is not 100%.
- Adjust the burnout alarm set value at a 100% output for gradient settings as well.
- If using the soft startup function with a power regulator, set the soft startup function on the K8AC-H as well, to prevent malfunctions.
- CT1 and CT2 are special products. Use K8AC-CT□□.
- The CTs do not have polarity.
- Connect only one CT for single-phase heaters. Connect two CTs for three-phase heaters.
- For three-phase heaters, always set the burnout alarm set values for both CT1 and CT2.
- When using the power regulator's gradient settings, change the operation gate current level so that the heater current value is within the measurement range. (The initial value is 7 mA.) For details on operating methods, refer to pages 16 to 18.

K8AC-H

Heater Connection Methods and Current

Depending on the heater connection method, the current when an error occurs will be as shown in the following table. Refer to this table when determining burnout alarm set values.

		Normal condition	Abnormal condition	
Single-phase				
Three-phase	Delta connection			
	Star connection			
	V connection			

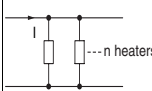
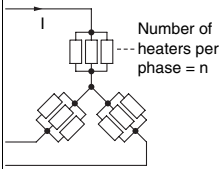
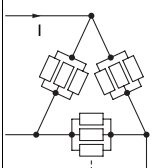
Note: This is the current for when a 200-V, 1-kW heater is used for single-phase or three-phase operation.

Rate of Change for Currents with Parallel Heaters

The following table shows the current change ratios when multiple heaters of the same capacity are connected in parallel and one of the heater elements burns out. Use this table for reference when making corrections.

If five single-phase heaters are connected in parallel, the current change when burnout occurs is 20% per heater.

For example, if the current for a single heater is low and the change ratio is very slight, it may not be detected. Therefore take into account the detection accuracy for the total current when selecting the number of heaters to be connected in parallel.

Connection		n=1	n=2	n=3	n=4	n=5	
Single-phase		With one heater burned out, I is 0.	0.5	0.67	0.75	0.8	
Star connection	 Number of heaters per phase = n	Current in burned-out phase	With one heater burned out, I is 0.	0.6	0.75	0.82	0.86
		Current in other phases	0.87	0.92	0.95	0.96	0.97
Delta connection	 Number of heaters per phase = n	Current in lines near burned-out phase (Same as 2-phase.)	0.58	0.77	0.84	0.88	0.91
		Current in other phases	1	1	1	1	1

Note: 1. The figures in the above table show the current change ratios when burnout occurs for one heater connected in parallel.

2. The numbers represent the current ratio after one heater burns out, with the current prior to the burnout (i.e., the normal current) taken as 1.

3. In actual operation there may be effects from factors such as load (heater) imbalances, so conduct an actual test for confirmation before making adjustments if the current change ratio between normal and abnormal operation is slight.

4. Consult with your OMRON representative if multiple heaters are used with different heater capacities.

Operation

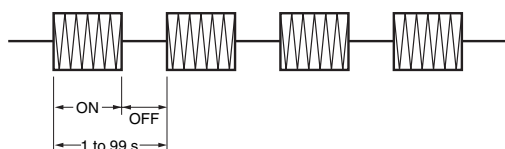
Main K8AC-H Functions

The K8AC-H is a digital heater burnout detector that detects heater burnout by measuring the heater current from various power supply systems. The K8AC-H provides the following functions.

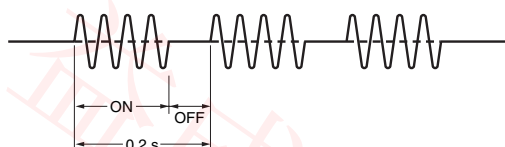
Applicable Heater Control Methods

The following heater control methods can be used.

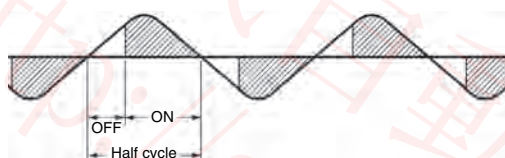
ON/OFF Control (Contactor/SSR)



Cyclic Control

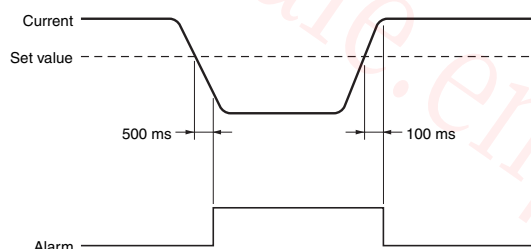


Phase Control (Applicable to 4 to 20 mA Current-output Temperature Controllers)



Heater Burnout Alarm

The preset burnout detection value is compared with the heater current and an alarm is output accordingly.



Transistor output models: ALM indicator lit, ALM transistor output
Relay output models: ALM indicator lit, OR of all detection status output

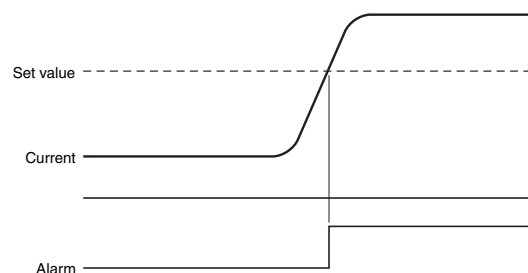
Error Detection

The following errors are detected according to status.

Heater Layer Short Circuit Detection (overcurrent detection).

Layer short circuits can be detected in the heater.

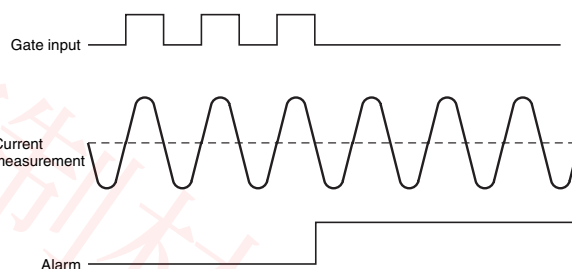
The preset overcurrent detection set value is compared with the heater current and an alarm is output accordingly.



Transistor output models: ALM indicator lit, ALM transistor output
Relay output models: ALM indicator lit, OR of all detection status output

SSR Short Circuit Detection

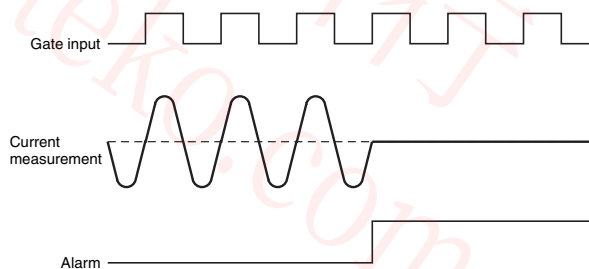
If current is measured when there is no gate input, an SSR short circuit error is detected and an alarm is output.



Transistor output models: SSR indicator lit, SSR transistor output
Relay output models: SSR indicator lit, OR of all detection status output

SSR Open Circuit Detection

If current is not measured during gate input, an SSR open circuit error is detected and an alarm is output.



Transistor output models: SSR indicator lit, SSR transistor output
Relay output models: SSR indicator lit, OR of all detection status output

K8AC-H

Voltage Fluctuation Compensation

The voltage fluctuation compensation function automatically adjusts the burnout alarm value of the K8AC-H according to voltage fluctuations in the heater circuit.

The operating value for burnout detection when multiple heaters are connected is set very close to the normal value. Thus, a false burnout alarm output will occur if there is a voltage drop in the heater circuit. The voltage fluctuation compensation function prevents this type of false output.

Example: Voltage Drop from 100 V to 95 V in the Heater Circuit

Conditions:

Voltage fluctuation compensation standard value = 100 V

Burnout alarm set value = 10.0 A

If the power supply voltage drops from 100% to 95%, the operating value will also be reduced from 100% to 95%.

Burnout alarm operating value = $10.0 \text{ A} \times 95\% = 9.5 \text{ A}$

Gate Input

The gate input provides a sync signal used to link burnout detection to the control output of the temperature controller.

For SSR control, the voltage output pulse from the temperature controller is input.

For ON/OFF control, 24 VDC linked to a relay contact of the temperature controller is input.

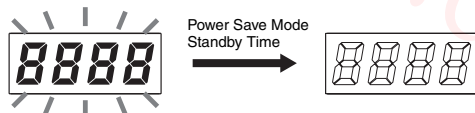
For cyclic or phase control, a 4 to 20-mA control signal is input.

If there is no gate input for a Heater Element Burnout Detector, a heater burnout alarm would be falsely output when the voltage output pulse from the temperature controller turns OFF, and there would be no way to tell whether it was a false output.

Note: The gate input function can be disabled. If it is disabled, Heater Element Burnout Detector operation will not be linked to the temperature controller control signal. (The gate input can be used as a simple undercurrent relay.)

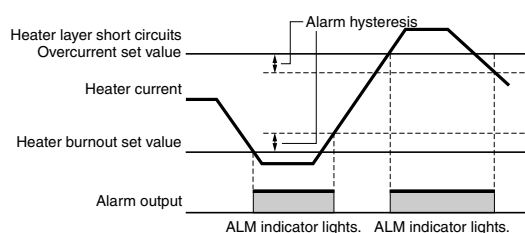
Power-saving Operation

If there are no key operations performed within a preset time period, the display automatically turns OFF.

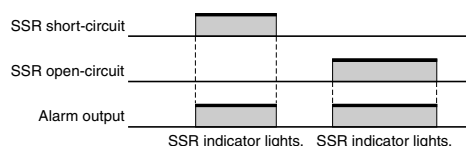


Output Operation Time Charts

Heater Burnout and Heater Layer Short Circuit (Overcurrent) Alarms



SSR Short/Open Circuit Alarm

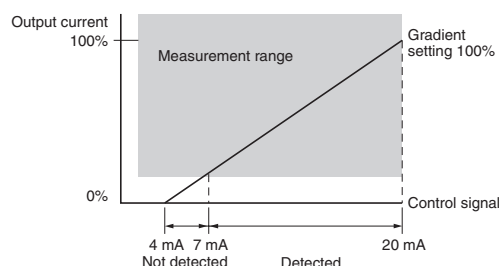


Using the Power Regulator's Gradient Settings

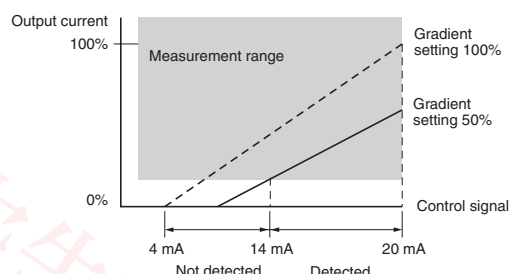
The power regulator's gradient settings can be used to prevent malfunction by setting the operation gate current level. The relationship between the gradient settings and output current depends on the power regulator manufacturer and model, so be sure to check the characteristics of the power regulator being used before setting.

Setting Example

Initial setting: 7 mA



When the power regulator's gradient settings are changed, the operation gate current level is set so that the output current is within the measurement range. (In the following diagram, 14 mA is set.)

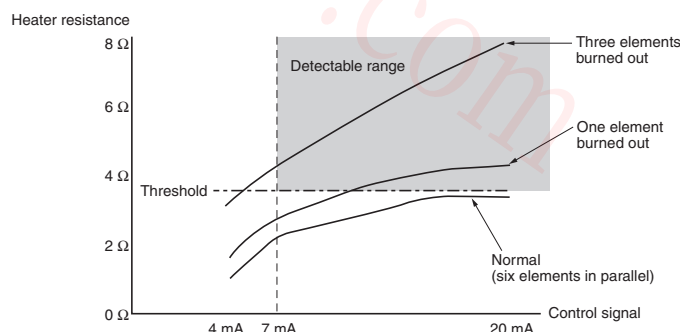


Using Halogen or Other Heaters with Varying Resistance during Phase and Cyclic Control

When phase control is used with halogen heaters or other pure metal heaters, the heater resistance fluctuates according to the control level. As a result, high-precision detection of heater burnout is not possible. The effect on the heater and setting methods depends on the heater being used. Therefore, consult with your OMRON representative before using a heater with varying resistance values.

Halogen Heater Resistance Fluctuation Example

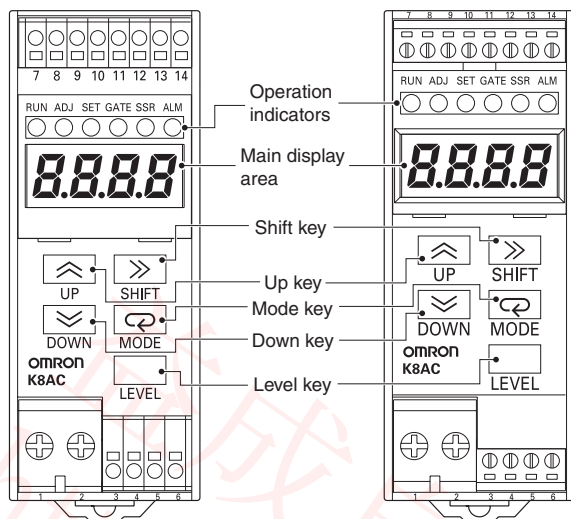
In the following example, burnout of one element in a six-element heater can be detected at a control level of 20 mA, but detection is not possible due to the effect of fluctuating resistance if the control level is any lower.



Nomenclature

Nomenclature and Operations

K8AC-H2□□□-FLK

K8AC-H1□□□-FLK


Name		Operation
Main display		Displays processing values, parameter characters, and set values.
Operation indicators	RUN (Measurement operation)	Lights when the power is turned ON and the measurement operation is in progress. OFF at all other times.
	ADJ (Adjust)	Lights while in Adjust Mode. Flashes while in Test Mode. OFF at all other times.
	SET (Set)	Lights while in Set Mode. OFF at all other times.
	GATE (Gate)	Lights or turns OFF according to gate input status. Gate pulse: Lights for high voltage pulse; OFF for low voltage pulse. Gate signal (4 to 20 mA): Lights for 4 mA or over; OFF for less than 4 mA.
	SSR (SSR error) *	Lights when an SSR error occurs (open or short circuit). OFF when SSR is normal.
	ALM (Alarm) *	Lights for heater burnout or overcurrent. OFF at all other times.
Up key		Increments a set value when the set value is in change status.
Down key		Decrements a set value when the set value is in change status.
Shift key		Used to check set values while parameters are displayed, and to put set values in change status. Used to shift the set value digit when the set value is in change status.
Mode key		Used to switch the displayed parameter.
Level key		Used to change the level.

* Check the specific status using the alarm display parameters on the main display.

Alarm Indicator

Order of priority	Alarm	7-segment display characters	LED indicator	Alarm contents
1	Heater burnout 1	Hb1	ALM indicator lit	CT1 heater burnout detected.
2	Heater burnout 2	Hb2	ALM indicator lit	CT2 heater burnout detected.
3	SSR open circuit	SS-a	SSR indicator lit	SSR open circuit detected (when heater current cannot be detected with temperature control gate output ON).
4	SSR short circuit	SS-S	SSR indicator lit	SSR short circuit detected (when heater current is detected with temperature control gate output OFF).
5	Heater layer short circuit 1	Hr1	ALM indicator lit	CT1 overcurrent detected.
6	Heater layer short circuit 2	Hr2	ALM indicator lit	CT2 overcurrent detected.

Note: 1. As soon as the cause of an alarm is removed, the alarm is reset automatically.
2. If multiple alarms occur simultaneously, the one with the highest priority is displayed.
3. If the mode is changed to Adjust or Set Mode while an alarm is in effect, the alarm output is reset and the ALM and SSR indicators turn OFF.

Processing Value Display Ranges and Functions

Processing value name	Display characters	Display range	Unit	Function
Heater 1 current	It 1	0100 to 2300 *1 *2	A	This is the CT1 heater current processing value. Alarm operations such as the heater burnout alarm are determined based on this processing value.
Heater 2 current	It 2	0100 to 2300 *1 *2	A	This is the CT2 heater current processing value. Alarm operations such as the heater burnout alarm are determined based on this processing value.

*1. The decimal point position depends on the input type.

K8AC-H□1□□: 0.100 to 2.300

K8AC-H□2□□: 1.00 to 23.00

K8AC-H□3□□: 10.0 to 230.0

*2. If the display is below 0100, the bar display "----" will be shown.

K8AC-H

Settings Method

Settings Methods for SSR and ON/OFF Control Heaters

Settings Conditions

Detecting burnouts in just one heater when ten 300-W rated heaters are connected in parallel to a single-phase 200-V power supply. The heater is SSR controlled.

Normal Heater Current and Heater Current with One Heater Element Burnout

Normal current = $(300 \text{ W} \times 10 \text{ (heaters)}) / 200 \text{ V} = 15.0 \text{ A}$

Current with one burnout = $(300 \text{ W} \times 9) / 200 \text{ V} = 13.5 \text{ A}$

Heater burnout alarm set value =

$$\frac{(\text{Normal current} + \text{current at malfunction})}{2} = \frac{15.0 + 13.5}{2} = 14.3 \text{ A}$$

Selecting Heater Element Burnout Detector Models

For the above example, K8AC-H12C□-FLK would be selected.

The burnout alarm set value is 14.3 A, so the current input range 2.00 to 22.00 A should be selected.

SSR control is used, so type C should be selected. (Type C is also selected for ON/OFF control.)

Select the appropriate relay or transistor output specifications, depending on the application.

K8AC-H Parameter Setting Procedure

(Only the minimum settings are shown here. Refer to pages 16 to 18 for information on how to set parameters.)

1. Turn ON the power to the K8AC-H. The initial status when power is turned ON is called Run Mode.
2. Press the $\square$ Key for at least 3 s to change from Run Mode to Adjust Mode (the mode for adjusting burnout alarm set values.)
3. Set the burnout alarm set values. (AL-1 = CT1 burnout alarm set value and AL-2 = CT2 burnout alarm set value.)
Set "14.3" to AL-1.
Set the AL-2 burnout alarm set value to "----" so that it will not detect heater burnout, because this is a single-phase heater.
4. Change to Run Mode.
Press the $\square$ Key while in Adjust Mode for at least 1 s to change to Run Mode.
5. Check operation.
Test heater burnout detection by burning out one heater.
Also check that there are no malfunctions during temperature control.

Note: The default setting for functions including the voltage fluctuation compensation function, alarm hysteresis, output ON-delay time, and SSR error detection function is OFF. Turn ON any of these functions as required.

Settings Method for Cyclic and Phase Control Heaters

Settings Conditions

Detecting burnouts in one heater when five 1,000 W-rated heaters are connected to each phase of a three-phase delta-connected 200-V power supply.

A power regulator (phase control) performs heater control.

Normal Heater Current and Heater Current With One Heater Element Burnout

Example: When One of Five Single-phase Heaters (R-S) Burns Out

Normal current = $\sqrt{3} (1,000 \text{ W} \times 5 \text{ (heaters)}) / 200 \text{ V} = 43.3 \text{ A}$

Current with one burnout = $43.3 \text{ A} \times 0.91 = 39.4 \text{ A}$

(Refer to *Rate of Change for Currents with Parallel Heaters* on page 10.)

Heater burnout alarm set value =

$$\frac{\text{Normal current} + \text{current at malfunction}}{2} = \frac{43.3 + 39.4}{2} = 41.4 \text{ A}$$

Selecting Heater Element Burnout Detector Models

For the above example, K8AC-H13P□-FLK would be selected.

The burnout alarm set value is 41.4 A, so the current input range 20.0 to 200.0 A should be selected.

Phase control is used, so type P should be selected. (Type P is also selected for cyclic control.)

Select the appropriate relay or transistor output specifications, depending on the application.

K8AC-H Parameter Settings Procedure

(Only the minimum settings are shown here. Refer to pages 16 to 18 for information on how to set parameters.)

1. Turn ON the power to the K8AC-H. The initial status when power is turned ON is called Run Mode.
2. Press the $\square$ Key for at least 3 s to change from Run Mode to Adjust Mode (the mode for adjusting burnout alarm set values.)
3. Change from Adjust Mode to Set Mode (the default settings mode for all functions). The password "0169" is required to move to Set Mode.
4. Set the heater control method parameter to PH-3 (three-phase control).
The default setting is PH-1 (single-phase control).
Note: Set the parameter to CYCL (cyclic control) when using cyclic control.
5. Press the $\square$ Key for at least 1 s to change from Set Mode to Adjust Mode. Press the $\square$ Key again for at least 1 s to change from Adjust Mode to Run Mode.

Note: The default setting for functions including the voltage fluctuation compensation function, alarm hysteresis, output

ON-delay time, and SSR error detection function is OFF. Turn ON any of these functions as required.

Burnout Alarm Set Value Setting Method

Setting Method

- Wire the K8AC-H, temperature controller (4 to 20 mA current output type), and power regulator (phase control).
- Press the $\square$ Key on the K8AC-H for at least 3 s to change from Run Mode to Adjust Mode.
- AL-1 (CT1 burnout alarm set value) will be displayed when the mode is changed to Adjust Mode. Press the $\boxtimes$ key once when AL-1 is displayed. Next, press the $\boxplus$ Key once. The present heater current value will be displayed on the main display, so note this as the normal current value. Always have the temperature controller output at 20.0 mA at this time (See note 1.)
- Next, disconnect one heater and note the heater current in this burnout state. Alternatively, use the current when one heater is burned out (calculated earlier) as the current during malfunction. It is recommended that the current at an actual burnout is confirmed.
- Set the K8AC-H burnout alarm set value based on the results. The burnout alarm set value is set at the mid-point between the normal current and the current at malfunction, taking errors and variations in heater capacity into consideration.
- In this setting example, the set value for AL-2 (CT2 burnout alarm setting) is the same as the set value for AL-1. (See note 2.)

Note: 1. The K8AC-H automatically adjusts burnout alarm levels to compensate based on the temperature controller current output. The burnout alarm value must be set when the temperature controller output is at 100% (20 mA), so be sure to have the temperature controller at 20 mA output.
2. If the heater capacity is unbalanced, the burnout alarm values for CT1 and CT2 may not be the same.

Measurement Monitor Value Display Ranges and Functions

Other than measuring the heater current, the K8AC-H can measure the power supply voltage, maximum/minimum current, maximum/minimum voltage, and other values. The measurement data can be monitored from a host using RS-485 communications. The measurement monitor value names, display ranges, and functions are given in the following table.

Measurement monitor value name	Display characters	Display range	Unit	Function
Power supply voltage	5EE	0085 to 0264	V	This is the measurement value of the K8AC-H power supply voltage. When the voltage fluctuation compensation function is enabled, the heater burnout determination based on this voltage is automatically compensated.
Heater 1 maximum current *	ñññ I	0100 to 2300	A	These hold the maximum and minimum values for each processing value. • The maximum and minimum heater currents after the power is turned ON or after a maximum or minimum reset are displayed. • The values are not saved when power is interrupted. • The current values are not refreshed when startup lock is in effect and when the gate input is enabled but the gate input is OFF. • Measurement values for power supply voltages are always refreshed.
Heater 1 minimum current *	ñññ I	0100 to 2300	A	
Heater 2 maximum current *	ñññ 2	0100 to 2300	A	
Heater 2 minimum current *	ñññ 2	0100 to 2300	A	
Maximum power supply voltage *	ñññ 5	0085 to 0264	V	
Minimum power supply voltage *	ñññ 5	0085 to 0264	V	
Number of alarm outputs	ññññ	0000 to 9999	Outputs	This value counts the total number of alarms output for heater burnout, SSR open and short circuits, and heater layer shorts. • The count is refreshed each time an alarm is output, and it is saved in non-volatile memory. • The value is saved when power is interrupted. • The number of outputs is not counted for the test function.
Processing value for alarm output	ññññ	0100 to 2300	A	This holds the CT1 or CT2 processing value when a heater burnout alarm is output. • This is the most recent processing value, and it is refreshed each time a heater burnout alarm occurs. • The value is not saved when power is interrupted.
Run time	ññññ	0000 to 9999	× 10h	This is the total run time value from when power is turned ON or the processing value is reset until an alarm occurs. • The total time is recorded in non-volatile memory approximately once per hour. If power is interrupted within the hour, however, the data since the beginning of the hour is lost and the total starts over from when the time was last saved. • The total is stopped during heater burnout alarm output. When the alarm is cleared, the total resumes from the time just before the alarm occurred.
Heater 1 input shift display current	ñññ I	–999 to 999	digit	This is the shift value for displaying the CT1 heater current measurement set in measurement parameter CT1. • The value is saved when power is interrupted.
Heater 2 input shift display current	ñññ 2	–999 to 999	digit	This is the shift value for displaying the CT2 heater current measurement set in measurement parameter CT2. • The value is saved when power is interrupted.

* Each measurement value can be individually reset. Refer to the *K8AC-H Digital Heater Element Burnout Detector User's Manual* (Cat. No. N132) for operating procedures.

Modes

Groups of setting items are called “modes.” The K8AC-H has five modes.

Mode	Function	Alarm operation
Run Mode	This is the normal operating mode, used for receiving inputs, executing heater burnout outputs, etc. Operation goes into Run Mode immediately after power is turned ON.	Executed
Adjust Mode	This mode is used to change comparatively frequently set parameters, such as alarm value settings. This also the mode for entering the password to move to the Set Mode.	Stopped
Set Mode	This mode is used to make the initial settings for the various functions.	Stopped
Protection Settings Mode	This mode is used to make settings to prevent unintended key operations. The protected modes are not displayed, preventing changes to set values.	Stopped
Test Mode	This mode is used to simulate inputs with key operations to test alarm outputs.	Executed
Gate Mode	This mode sets the gate current value that stops an alarm or detection.	Executed

Note: If more than five minutes elapses with no operations performed in the Protection Settings Mode, Adjust Mode, or Set Mode, the status will return automatically to the processing value display. If this occurs while settings are in progress, it may cause unintended operations in the processing value display. Be careful not to allow this to happen.

Settings Data Notation

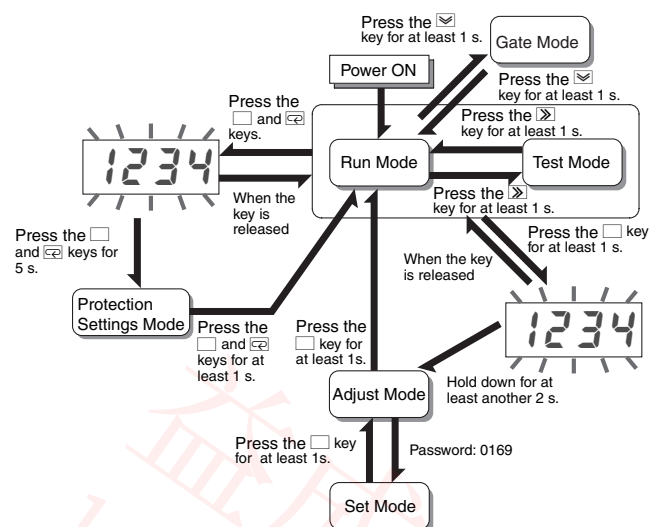
The letters of the alphabet in settings data are displayed as shown below.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

K8AC-H

Operating Procedures

Moving between Modes



To Adjust Mode

When the key is pressed for one second in Run Mode, the 7-segment display will begin to flash. If the key is held down for another two seconds, the mode will be switched to Adjust Mode. To return to Run Mode from Adjust Mode, press the key for at least one second.

To Protection Settings Mode

When the and keys are pressed for one second in Run Mode, the 7-segment display will begin to flash. If the keys are held down for another five seconds, the mode will be switched to Protection Settings Mode. To return to Run Mode from Protection Settings Mode, press and keys for at least one second.

To Gate Mode

When the key is pressed for at least one second in Run Mode, the mode will be switched to Gate Mode. To return to Run Mode from Gate Mode, press the key for at least one second.

To Test Mode

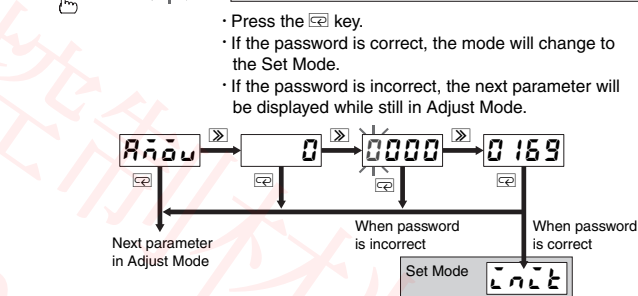
When the key is pressed for at least one second in Run Mode, the mode will be switched to Test Mode. To return to Run Mode from Test Mode, press the key for at least one second.

To Set Mode (Password Input)

A special operation is required to move to the Set Mode. Use the following procedure.

Procedure

- Move to the Adjust Mode and use the key to display the parameter for moving to the Set Mode.
The parameter characters are "Rn00".
- Press the key to display the set value (password).
- Press the key again to enable changing the password.
- Use , , and keys to set the password. The password is 0169.



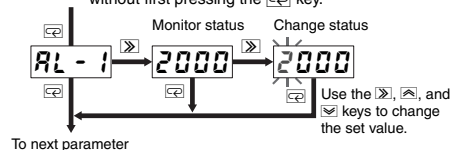
Setting the Parameter

The value set for each parameter is called the "set value." Set values include both numbers and characters. The status when a set value is displayed is called "monitor status," and when it can be changed it is called "change status." Use the following procedure to display and change set values.

Procedure

- Press the key while a parameter is displayed to go into monitor status. The set value for that parameter will be displayed.
 - If the set value is not to be changed, press the key while in monitor status to switch to the next parameter.
 - Press the key again while in monitor status to enable the changing set value.
- The place where the set value can be changed will begin to flash.
- Use the , , and keys to change the set value.
 - Press the key to save the changed set value in internal memory and switch to the next parameter.

Changed set values will not be saved in memory if the mode is changed by another key operation without first pressing the key.

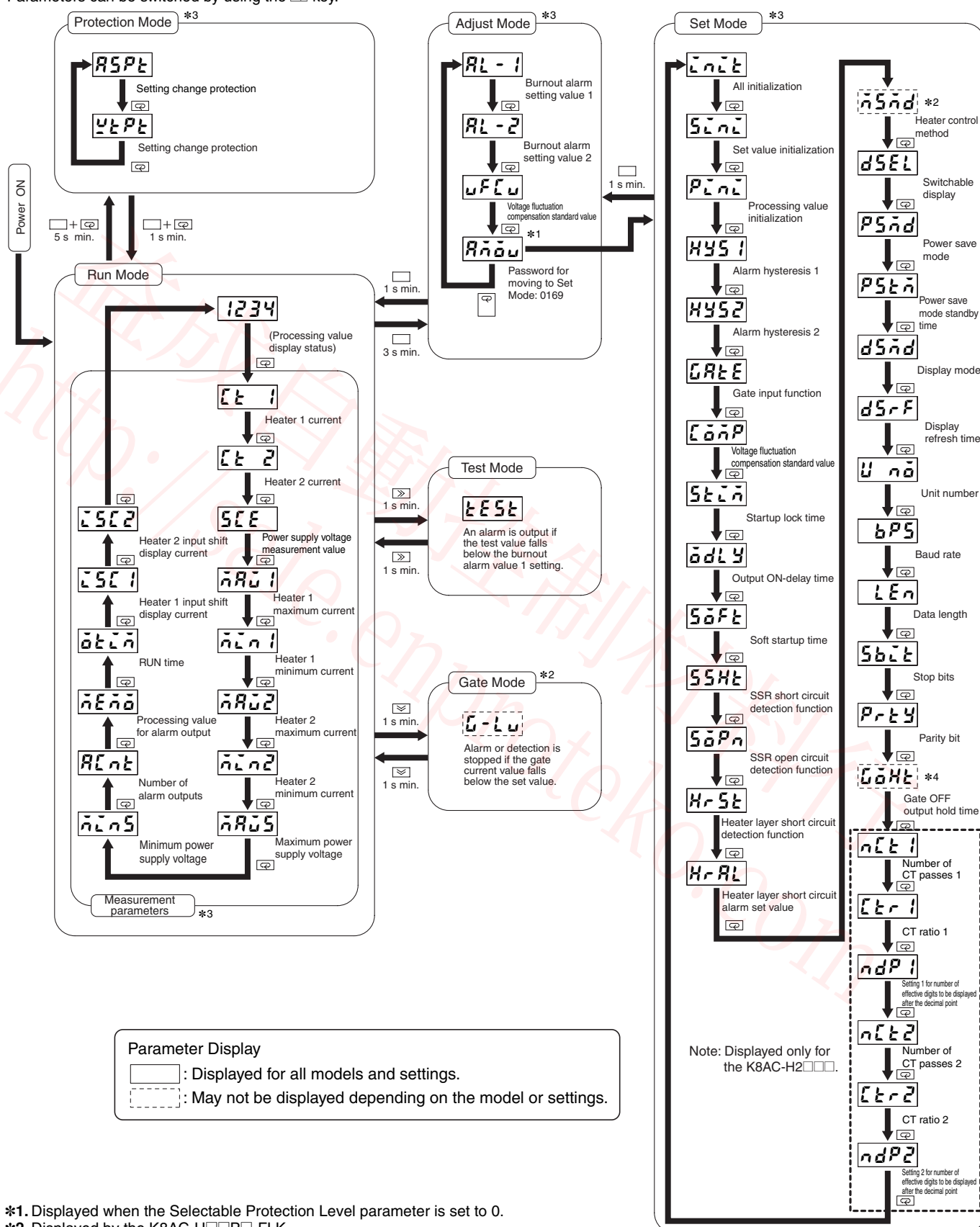


Note:

If a set value is out of range, either too high or too low, the maximum or minimum value will automatically be set. For models with a current input of 0.200 to 2.200 A, for example, the maximum value is 2.200 and the minimum value is 0.200.

Parameter List

The setting items in each mode are called "parameters."
Parameters can be switched by using the  key.



*1. Displayed when the Selectable Protection Level parameter is set to 0.

*2. Displayed by the K8AC-H□□P□-FLK.

*3. If more than five minutes elapses with no operations performed in Protection Settings Mode, Adjust Mode, Set Mode, or for a measurement parameter, the status will return automatically to the processing value display.
If this occurs while settings are in progress, it may cause unintended operations to be performed in Run Mode (i.e., with measurement values displayed). Be careful not to allow this to happen.

*4. Displayed by the K8AC-H□□C□-FLK.

K8AC-H

Parameter Defaults and Descriptions

Note: Shaded parameters must always be set regardless of the measurement method.

Item Mode	Parameter name		Description	Parameter	Setting range	Default
Protection Mode	Setting Change Protection		Restricts access to Adjust Mode or Set Mode from Run Mode. 0: Access enabled to both Adjust Mode and Set Mode. 1: Access enabled to Adjust Mode and disabled to Set Mode. 2: Access disabled to both Adjust Mode and Set Mode.	RPt	0 to 2	0
	Setting Value Change Prohibition		Prohibits changes to set values.	YtPt	ON/OFF	OFF
Adjust Mode	Burnout Alarm Value 1	K8AC-H□1	Sets the output operation value for the burnout alarm. The burnout alarm function can be disabled by setting the set value to “-”.	RL - 1	0.200 to 2.200 A	1.000 A
		K8AC-H□2			2.00 to 22.00 A	10.00 A
		K8AC-H□3			20.0 to 200.0 A	100.0 A
	Burnout Alarm Value 2	K8AC-H□1	Sets the output operation value for the burnout alarm. The burnout alarm function can be disabled by setting the set value to “-”.	RL - 2	0.200 to 2.200 A	1.000 A
		K8AC-H□2			2.00 to 22.00 A	10.00 A
		K8AC-H□3			20.0 to 200.0 A	100.0 A
Set Mode	Voltage Fluctuation Compensation Standard Value		Sets the standard voltage used by the voltage fluctuation compensation function. The fluctuation compensation function operates in respect to this set value.	uFLu	100 to 240 VAC	100 V
	All Initialization		Returns all set values and measurement values to their default settings.	LnLt	ON/OFF	OFF
	Set Value Initialization		Returns all set values to their default settings.	SLnLt	ON/OFF	OFF
	Processing Value Initialization		Returns all measurement values to their default settings.	PLnLt	ON/OFF	OFF
	Alarm Hysteresis 1		Sets hysteresis for the alarm output value for burnout detection (undercurrent) and heater layer short circuits (overcurrent) for CT1.	HY51	1 to 999	10
	Alarm Hysteresis 2		Sets hysteresis for the alarm output value for burnout detection (undercurrent) and heater layer short circuits (overcurrent) for CT2.	HY52	1 to 999	10
	Gate Input Function		Turns the gate input function ON and OFF. If the gate input is turned OFF, application as a simple ammeter is possible.	GRtE	ON/OFF	ON
	Voltage Fluctuation Compensation Reference Value		Turns the voltage fluctuation compensation function ON and OFF.	FLnR	ON/OFF	OFF
	Startup Lock Time		Sets the lock time for the startup lock.	StLn	0 (OFF) to 255 s	0 (OFF)
	Output ON-Delay		Sets the output delay time. Set this parameter to set the operating time.	OdLn	0.0 (OFF) to 99.9 s	0.0 (OFF)
	Soft Startup Time		Sets the soft startup time. Set this parameter only when using a soft start function with the power regulator.	SSSt	0.0 (OFF) to 99.9 s	0.0 (OFF)
	SSR Short Circuit Detection		Turns the SSR short circuit detection function ON and OFF.	SSHt	ON/OFF	OFF
	SSR Open Circuit Detection		Turns the SSR open circuit detection function ON and OFF.	SSOn	ON/OFF	OFF
	Heater Layer Short Circuit Detection (Overcurrent Detection)		Turns the heater layer short circuit (overcurrent) detection function ON and OFF.	HLSt	ON/OFF	OFF
	Heater Layer Short Circuit Alarm Level (Overcurrent Alarm Set Value)	K8AC-H□1	Sets the operating level for heater layer short circuit (overcurrent) alarms.	HLRL	0.200 to 2.200 A	2.000 A
		K8AC-H□2	The heater layer short circuit alarm level is the same for both CT1 and CT2.		2.00 to 22.00 A	20.00 A
		K8AC-H□3			20.0 to 200.0 A	200.0 A
	Heater Control Method #1		Sets the control method of the cyclic/phase control heater.	nSnd	PH1, PH3, CYCL	PH1
	Switchable Display		Sets the CT for which to normally display the current.	dSEL	CT1, CT2	CT1
	Power Save Mode		Turns entering the power save mode ON and OFF.	PSnd	ON/OFF	OFF
	Power Save Mode Standby Time		Sets the time to enter power save mode.	PSSt	10 to 300 s	60 s
	Display Mode		Sets a 7-segment (NORM), full-span comparison (CMP), or bar (BAR) display.	dSnd	NORM, CMP, BAR	NORM
	Display Refresh Time		Sets the refresh time for the display.	dSrF	0.2 s, 0.5 s, 1.0 s, FAST	0.5 s
	Unit Number		Sets the unit number for RS-485 communications.	U nā	0 to 64	0
	Baud Rate		Sets the baud rate for RS-485 communications.	dPS	1200, 2400, 4800, 9600, 19200	9600
	Data Length		Sets the data length for RS-485 communications.	LEn	7, 8	7
	Stop Bits		Sets the number of stop bits for RS-485 communications.	SBt	1, 2	2
	Parity Bit		Sets the parity for RS-485 communications.	Prty	EVEN, ODD, NONE	EVEN
	Gate OFF output hold time #2		Sets the time from when the gate signal goes OFF until the burnout alarm output turns OFF.	GOHt	0 to 999 s	2 s
	Number of CT passes 1		Sets the number of times the conductor for CT1 is passed through the current transformer.	nLt 1	1 to 99 times	1 time
	CT Ratio 1		Sets the CT ratio for CT1.	Ltr 1	1 to 999	1
	Setting 1 for number of effective digits to be displayed after the decimal point		Sets the number of effective digits to be displayed after the decimal point for the CT1 current display.	ndP 1	0 to 3 places	Depends on the model.
	Number of CT passes 2		Sets the number of times the conductor for CT2 is passed through the current transformer.	nLt 2	1 to 99 times	1 time
	CT Ratio 2		Sets the CT ratio for CT2.	Ltr 2	1 to 999	1
	Setting 2 for number of effective digits to be displayed after the decimal point		Sets the number of effective digits to be displayed after the decimal point for the CT2 current display.	ndP 2	0 to 3 places	Depends on the model.
Gate Mode	Gate Current Level #1		Sets the gate current value that stops an alarm, detection, or output. (This setting is only valid when phase control is selected as the heater control method.)	G-Lu	7.0 to 20.0 mA	7.0 mA

*1. Displayed by the K8AC-H□□P□-FLK.

*2. Displayed by the K8AC-H□□C□-FLK.

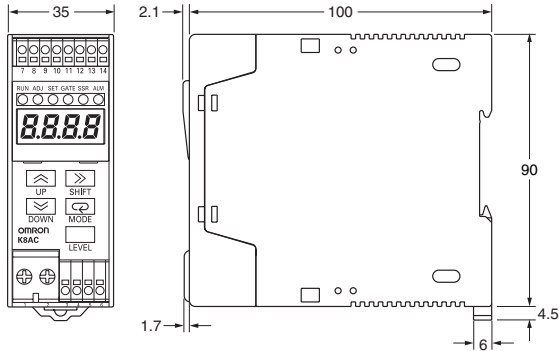
K8AC-H

(Unit: mm)

Dimensions

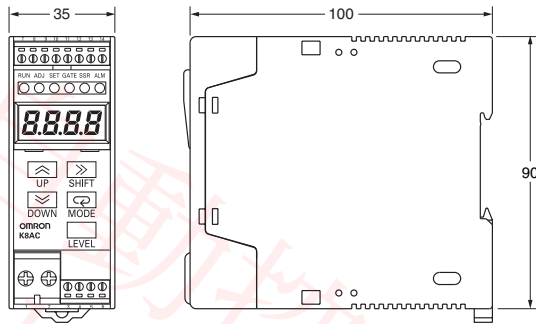
Digital Heater Element Burnout Detectors

K8AC-H2-FLK



To remove a wire, insert the recommended flat-blade screwdriver straight into the hole under the screwless clamp terminal of the wire, and simply release the wire.

K8AC-H1-FLK



Recommended Tools

Recommended Flat-blade Screwdriver

Manufacturer: Phoenix Contact
Model number: SZF0.4 × 2.5

Crimper for Bar Terminals (Crimping Tool)

Manufacturer: Phoenix Contact
Model number: CRIMPF0X UD6
Recommended power line diameters: AWG10 to AWG24

Recommended Crimp Terminals

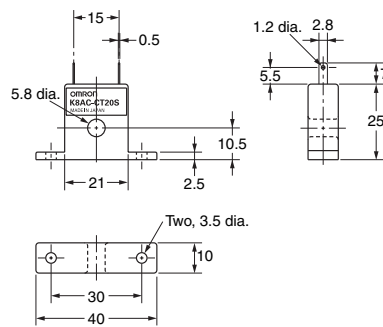
Terminals	Recommended crimp terminals	Recommended wire gauge
1 and 2	M3 crimp terminals (Width: 5.8 mm max.)  	AWG16 to AWG18
3 to 14	M2 bar terminals: AI 0.34-8TQ (Phoenix Contact) M2 bar terminals: AI 0.5-8WH (Phoenix Contact) M2 bar terminals: AI 0.75-8GY (Phoenix Contact)	AWG22 AWG20 AWG18

Note: Securely tighten the terminal screws to the following torque:
Power supply terminals: 0.5 N·m
I/O terminals: 0.23 N·m

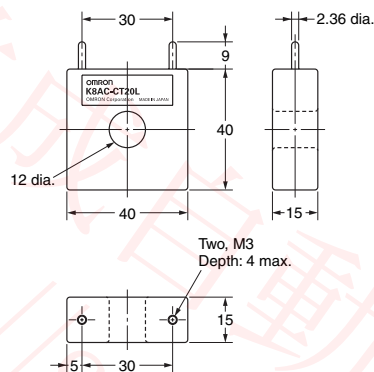
K8AC-H

Optional Parts (Sold Separately)

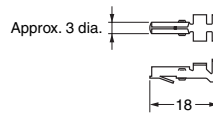
Current Transformer K8AC-CT20S



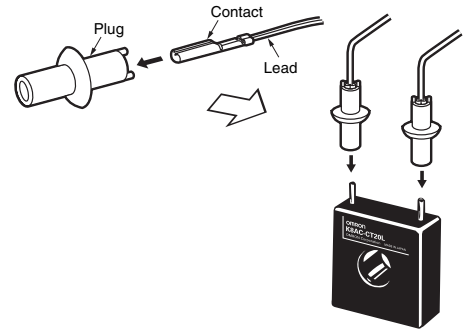
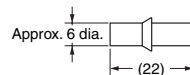
Current Transformer K8AC-CT20L



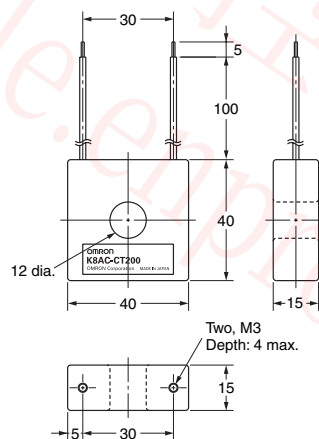
Accessories with K8AC-CT20L: Connection Example Contact



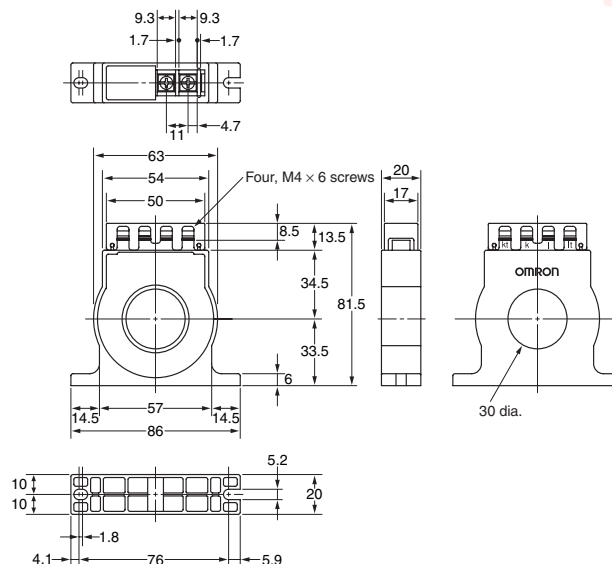
Plug



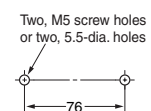
Current Transformer K8AC-CT200 (Pre-wired Leads)



Current Transformer K8AC-CT200L



Mounting Hole Dimensions



Safety Precautions

Precautions for Safe Use

The following precautions are essential to ensure safety. Always heed these precautions.

- Do not use or store the Product in the following locations.
 - Outdoors or in locations subject to direct sunlight, wind, or rain
 - Locations subject to dust, metal powder, or corrosive gases (in particular, sulfuric or ammonia gas)
 - Locations subject to static electricity or noise
 - Locations subject to flooding or exposure to oil
- Use DIN Track for installation and mount the Product in the correct direction.
- Do not touch the terminals when power is being supplied. Electric shock may occasionally occur.
- Be sure you understand the contents of the Instruction Sheet and User's Manual and handle the Product according to the instructions provided.
- Check all terminal numbers and polarity when wiring and wire all connections correctly.
- Tighten terminal screws to the following torque.
Power supply terminals: 0.5 N·m
- Use the Product within the specified temperature and humidity ranges.
- Do not use the product in locations subject to flammable or explosive gases. Explosions may occasionally occur if the product is used in such locations.
- Do not install the Product in any way that would place a load on it.
- Use the Current Transformer specified by OMRON.
- Install an external switch or circuit breaker that complies with applicable IEC60947-1 and IEC60947-3 requirements and label it clearly so that the operator can quickly turn OFF the power.
- The product must be handled by personnel who have knowledge of electrical systems.

Precautions for Correct Use

The following precautions are essential to ensure correct use. Always heed these precautions.

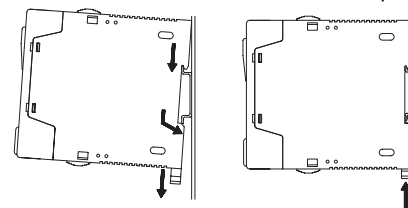
- Do not use the product in the following locations.
 - Places subject to radiant heat from heat generating devices.
 - Places subject to vibrations or physical shocks.
- Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
- Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
- When discarding, properly dispose of the product as industrial waste.
- To measure correct values, perform aging for approximately 15 minutes.
- Only use this product within a board whose structure allows no possibility for fire to escape.

Installation

- When wiring, use only recommended crimp terminals.
- Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)

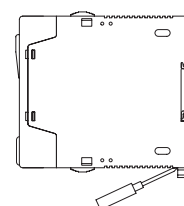
Mounting the K8AC-H

- Pull down the hook on the bottom of the K8AC-H, and then catch the hook on the top of the K8AC-H onto the DIN Track and press the K8AC-H onto the DIN Track until it locks into place.



Removing the K8AC-H

- Pull down on the hook with a flat-blade screwdriver and lift up on the K8AC-H.



Noise Countermeasures

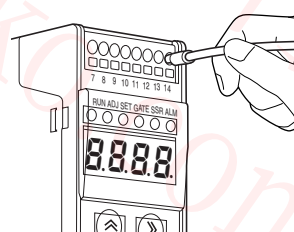
- Do not install the product near devices generating strong high frequency waves or surges.
 - When using a noise filter, check the voltage and current and install it as close to the product as possible.
 - In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
- Other measures for reducing noise include running lines along separate ducts and using shield lines.

Wiring

- Do not touch terminals or perform wiring while power is supplied to the product. Doing so may result in injury or malfunction.
- Wire to the correct terminal number. Incorrect wiring may result in damage to or burning of components.

Wiring the Screw-less Clamp Terminals

- Directly insert the ferrule in the hole of the terminal to be wired.



Removing Wires from the Screw-less Clamp Terminals

- Insert the recommended flat-blade screwdriver straight into the hole to pull out the wire.

