

Think Controls

FOTEK

Self-adaptive Fuzzy + PID

Temperature Controller

NT series

- § Intelligence
- § Performance
- § Reliability

- § Easiness
- § Stability
- § Sensitivity

Complete Human-interface & Function

- | | |
|-------------|------------------------------------|
| * 輸出量顯示 | * Output volume display |
| * 負載電流量顯示 | * Load current display |
| * 關閉控溫功能 | * Turn off control function |
| * 快速自動演算鍵 | * Fast auto-tuning setting |
| * 緩衝起動功能 | * Soft start function |
| * 加熱斜率控制 | * Ramp control function |
| * 手動輸出控制 | * Manual output control function |
| * 全機種可附通訊功能 | * Communication function available |

CE RoHs



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Model guiding / 型號索引

Ex. $\frac{NT}{1} - \frac{48}{2} \frac{R}{3} - \frac{CT}{4} - \frac{RS}{5}$				
1	Series (系列名稱)	NT: New generation Temperature controller		
2	Outline (外形) (Unit: mm)	20: 48*96*60 48: 48*48*72	21: 96*48*60 72: 72*72*60	22: 22.6*75*100 96: 96*96*60
3	Output method (輸出方式)	R: Relay (3A/250VAC)	V: SSR (20mA/12V)	L: Linear output (4~20mA)
4	Optioned (附加功能)	CT: With Heater break detecting	mA: DC current input	mV: DC Voltage input
5	Optioned (附加功能)	RS: With RS-485 communication (MODBUS protocol)	S: PV transmitter	

How to set the function or parameter / 如何設定功能及參數

- 「Temperature setting status」: Press 「SET」 key instantaneously to enter into the temperature setting status.
 - 「Auto-tuning status」: Press 「▲」 key 3 sec to set 「Auto-tuning」, then press 「▲」 key 3 sec to reset it.
 - 「Manu-output status」: Press 「▼」 key 3 sec to turn off the output control, then press the 「SET」 key to set the 「Manu-output volume」. If press 「▼」 key 3 sec may to release 「Manu-output status」.
 - 「Display mode selecting」: Press 「SET」 key 3 sec to select display mode
 - Without CT type: Display 「Output volume」 (u.xx) → then press 「SET」 key 3 sec → to display 「Temperature set value」
 - With CT type: Display 「output volume」 (u.xx) → then press 「SET」 key 3 sec → to display 「Load current」 (xx.xx) → then press 「SET」 key 3 sec → to display 「Temperature set value」
 - 「Parameter setting status」: Press 「F」 key 3 sec to enter into the parameter setting status.
 - 「Alarm setting status」: Press 「SET」 & 「F」 key 3 sec to enter into the Alarm setting status.
 - 「Communication setting status」: Press 「SET」 & 「▼」 key 3 sec to enter into the Communication setting status.
 - 「Soft start function」: At the final parameter of 「setting of alarm」, Press 「SET」 key 3 sec to set the **Soft start setting value 「SV2」**.
the fixed output volume is set by the manual output volume.
 - 「Ramping control」: At the 「rAP」 parameter in the 「setting of alarm」 level, if 「rAP = 0」, it has not the ramping control function.
if 「rAP ≠ 0」, it will perform the ramping control function.
 - 「Display mode setting」: At the 「Sdc」 parameter in the 「Setting of parameter」 level, if 「Sdc = n」, it will be kept on the selected display mode, if 「Sdc = A」, it will be returned to the Temperature set value mode after 10 seconds.
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- 「溫度值設定狀態」: 按「SET」鍵一下就可進入「溫度值設定狀態」
 - 「自動演算狀態」: 按「▲」鍵3秒可進入「自動演算狀態」; 再按「▲」鍵3秒解除「自動演算狀態」
 - 「手動輸出控溫狀態」: 按「▼」鍵3秒關閉輸出(顯示「OFF」), 再按「SET」鍵3秒後可設定「手動輸出量」(顯示n.xx), 完成手動輸出量設定後如果再按「▼」鍵3秒可解除「手動輸出控溫狀態」回複自動控溫狀態。
 - 「顯示模式選擇」: 按「SET」鍵3秒
 - 無CT型: 「輸出量顯示」(u.xx) → 再按「SET」鍵3秒 → 「溫度設定值顯示」
 - CT型: 「輸出量顯示」(u.xx) → 再按「SET」鍵3秒 → 「負載電流量顯示」(xx.xx) → 再按「SET」鍵3秒 → 「溫度設定值顯示」
 - 「參數設定」: 按「F」鍵3秒: 進入「參數設定」狀態
 - 「警報設定」: 按「SET」&「F」鍵3秒: 進入「警報設定」狀態
 - 「通訊參數設定」: 按「SET」&「▼」鍵3秒: 進入「通訊參數設定」狀態
 - 「緩衝起動設定」: 在警報設定的最後一個參數時按「SET」鍵3秒可設定「緩衝起動設定值(SV2)」, 固定輸出量由手動輸出量設定。
 - 「溫升速率控制」: 可設定警報設定層的參數「rAP」; 「rAP = 0」時沒有溫升速率控制功能, 「rAP ≠ 0」時執行溫升速率控制。
 - 「顯示自動切換設定」: 可設定參數設定層的參數「Sdc」; 「Sdc = n」時持續顯示「選擇顯示模式」; 「Sdc = A」時10秒後會自動切回「溫度設定值顯示模式」。

General Specification / 共同規格

Fixed method		Panel type					Rail type
Model		NT-48	NT-20	NT-21	NT-72E	NT-96E	NT-22
Outline (U t: mm)	外形尺寸	48*48*72	48*96*60	96*48*60	72*72*60	96*96*60	22.6*75*100
Alarm output	警報輸出	Two alarm					Single alarm
Power supply	工作電壓	90~265 VAC/ 50/60 Hz or 24VDC/AC (Optional)					
Power consumption	消耗電流	5 VA max. or 100mA max. (24VDC/AC)					
Input method	輸入方式	PT / K / J / R / S / T / B / E / N / L(Selectable) or 4~mA or 0~10VDC (Optional)					
Control method	控制方式	Fuzzy + PID or ON / OFF selectable					
Control output	控制輸出	Relay or SSR or 4~20mA (Optional)					
Alarm output	警報輸出	Relay 1a (5A/250VAC SPDT)					
Display range	顯示範圍	-999 ~ 9999					
Accuracy of display	顯示精度	± (0.1 % OF F.S. + 1 DIGIT)					
Setting range	設定範圍	-999 ~ 9999					
Memory method	記憶方式	EEPROM					
Insulation resistance	絕緣強度	OVER 50MΩ/500VDC					
Dielectric strength	耐壓強度	OVER 2.5 KV/ 1 MINUTE					
Operating circum.	使用環境	-25°C ~ 80°C ; 35%~85% RH					
EMC standard	EMC 標準	ESD : 8 KV Air Discharge (Level3) / EN-61000-4-2 RF Interference : 10V / M / ENV-50140 Burst test : 2KV / EN61000-4-4					

Setting of Communication / 通訊參數設定

Function	Range	Description
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Control status 控制狀態</div> <div style="margin-left: 20px;">8888</div> </div> <div style="margin-left: 20px;">8888</div> <div style="margin-left: 20px;">Press [SET] & [▼] key 3 sec</div>	-200 ~ 9999	
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Controller NO. 控制器編號設定</div> <div style="margin-left: 20px;">ld</div> </div> <div style="margin-left: 20px;">1</div> <div style="margin-left: 20px;">Press [SET]</div>	1 ~ 255	1> Range: 1~255
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Communication protocol 通訊協定選擇</div> <div style="margin-left: 20px;">rS</div> </div> <div style="margin-left: 20px;">0</div> <div style="margin-left: 20px;">Press [SET]</div>	0 ~ 1	1> 「rs=0」: Modbus-RTU 2> 「rs=1」: Modbus-ASCII
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Communication speed 通訊速率選擇</div> <div style="margin-left: 20px;">bPS</div> </div> <div style="margin-left: 20px;">192</div> <div style="margin-left: 20px;">Press [SET]</div>	96 / 192 / 384	1> 「bPS =96」: 9600 bps 2> 「bPS =192」: 19200 bps 3> 「bPS =384」: 38400 bps
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Data configuration 資料結構選擇</div> <div style="margin-left: 20px;">b l t</div> </div> <div style="margin-left: 20px;">8N1</div> <div style="margin-left: 20px;">Press [SET]</div>	8N1 / 8E1 8O1 / 7O1	1> 「b l t =8N1」: 8 bit non parity 2> 「b l t =8O1」: 8 bit odd parity 3> 「b l t =8E1」: 8 bit even parity 4> 「b l t =8N2」: 8 bit non parity 5> 「b l t =7O1」: 7 bit odd parity 6> 「b l t =7E1」: 7 bit even parity

■ Setting of parameter / 參數設定

NT series

CE, RoHS

Function	Range	Description
Control status 控制狀態 8888 Press [F] key 3 sec	-200 ~ 9999	
Cycle time 動作週期 Ct 15 Press [SET]	0 ~ 99	1> 「CT = 0」 : ON/OFF control 2> Disappeared in Linear output type
Auto tuning 自動演算 At 0 Press [SET]	0 ~ 1	1> 「At = 0」 : Control status 2> 「At = 1」 : Auto tuning status
Auto tuning bias 自動演算偏差值 tu 0 Press [SET]	0 ~ 99	1> Auto tuning value = 「SV - tu」
Proportion band 比例帶 P 36 Press [SET]	0 ~ 3999	1> 「CT = 0」 → 「P」 is disappeared
Integral time 積分時間 I 120 Press [SET]	0 ~ 3999	1> 「CT = 0」 → 「I」 is disappeared
Derivative time 微分時間 d 30 Press [SET]	0 ~ 3999	1> 「CT = 0」 → 「d」 is disappeared
Hysteresis 動作應差 Hys 1 Press [SET]	0 ~ 99	1> 「CT = 0」 → 「Hys」 is appeared only 2> 「PV > SV」 → Out ON ; 〔 PV < (SV - Hys) 〕 → Out OFF
Gain 輸出控制增益 GAn 1.0 Press [SET]	0.1~9.9	1> Gain of output control
Input selecting 輸入選擇 Int k Press [SET]	PT / K / J / R / S T / B / E / N / L	1> 10 input type are selectable
Unit selecting 單位選擇 Unt C Press [SET]	°C / °F	
Decimal point selecting 小數點選擇 dp 0 Press [SET]	0 ~ 1	1> 「dp = 0」 : Without decimal point 2> 「dp = 1」 : One decimal point
Input shift setting 輸入修正 Sht 0 Press [SET]	- 99 ~ + 99	1> 「PV」 = (PV + Sht)
Control method setting 控制方式 H_C Htr Press [SET]	Htr / cLr	1> 「Htr」 : Heating control 2> 「cLr」 : Cooling control
Alarm mode setting 警報模式 ALt 0 Press [SET]	0 ~ 26	1> Refer to the mode of Alarm
Display mode setting 顯示自動切換設定 Sdc n Press [SET]	n / A	1> 「n」 : Manual setting 2> 「A」 : Auto setting

Setting of alarm / 警報設定

Function	Range	Description
Control status 控制狀態 8888	0 ~ 9999	
Press [SET] & [F] key ↓ 3 sec Lock setting 鎖定設定 Lck 0	0 ~ 3	1> 「Lck=0」: Unlock ; Lck=1」: SV settable only 「Lck=2」: SV&AL settable ; 「Lck=3」: All lock
Press [SET] AL1 Limit setting AL1 警報設定 AL1 50	-999 ~ 9999	1> Refer to the mode of Alarm
Press [SET] AL2 Limit setting AL2 警報設定 AL2 50	-999 ~ 9999	1> Refer to the mode of Alarm
Press [SET] Hysteresis of alarm 警報應差值設定 ALH 1	0 ~ 9999	Ex. $PV \geq (SV + AL1) \rightarrow AL1$ ON, $PV < (SV + AL1 - ALH) \rightarrow AL1$ OFF
Press [SET] Flick timer 警報閃爍輸出時間設定 t 10	0 ~ 99	1> Range: 0~99 sec 2> Cycle time of flick timer
Press [SET] Setting limit 最大設定值限制 SLH 400	0 ~ 9999	1> $SV \leq SLH$
Press [SET] Output limit 輸出量限制設定 Out 100	0 ~ 100%	1> Output volume = Control output volume * 「Out」
Press [SET] Process output volume 實際輸出量 Un 0.0	0 ~ 99.99	1> Display the output volume
Press [SET] Max. display value setting 最大顯示值設定 dSPH 1000	0 ~ 9999	1> Current or Voltage input type will be appeared only 2> Max. input value will be transmitted into the dSPH
Press [SET] Min. display value setting 最小顯示值設定 dSPL 0	-999 ~ 9999	1> Current or Voltage input type will be appeared only 2> Min. input value will be transmitted into the dSPL
Press [SET] Process current of heater 實際加熱器輸出電流值 Ctu 0.00	0 ~ 99.99	1> Range: 0.00 ~ 99.99 A
Press [SET] Heater break setting 加熱器斷線電流設定值 Hb 1.00	0 ~ 99.99	1> Range: 0.00 ~ 99.99 A 2> 「Ctu」 < 「Hb」 → AL2 ON
Press [SET] CT Low limit setting CT最小值設定 CtL 0.00	0 ~ 99.99	1> Range: -9.99 ~ 99.99 2> Offset of CT current
Press [SET] CT High limit setting CT最大值設定 Cth 30.00	0 ~ 99.99	1> Range: 0.00 ~ 99.99 2> To set the max.CT current
Press [SET] Ramp control setting 溫升速率控制 rAP 0	0 ~ 9999	1> Range: 0 ~ 9999 °C or °F / minute 2> Rap=0: Without Ramp control function
Press [SET] Min. output volume setting 最小輸出量設定 Lot 0	0 ~ 100%	1> Range: 0 ~ 100% 2> Setting of min. output volume
Press [SET] 3 sec Soft start setting 緩啟動設定 SV2 0	-999 ~ 9999	1> 「SV2」 = 0: Without soft start function 2> 「PV」 < 「SV2」: Fixed at manual output volume 3> 「PV」 ≥ 「SV2」: Output volume controlled by PID

Mode of alarm / 警報模式【NT-□□】

Alt	Description / 警報說明	Alt	Description / 警報說明	Alt	Description / 警報說明
0		1		2	
3		4		5	
6		7		8	
9		10		11	
12		13		14	
15		16		17	
18		19	Non-used	20	
21		22		23	
24		25		26	

- 「Alt=15」: t = ON time of AL2 for cooling, OFF time is controlled by PID.
- 「ALH」: Hysteresis of alarm. Ex. $PV \geq (SV+AL1) \rightarrow AL1 ON$, $PV < (SV+AL1-ALH) \rightarrow AL1 OFF$
- 「tnu」 = Process time of tnr, if 「tnu ≥ tnr」 → AL2 is turned ON or OFF

Mode of alarm / 警報模式【NT-□□-CT & eTC-48 & NT-22】

Alt	Description / 警報說明	Alt	Description / 警報說明	Alt	Description / 警報說明
0		1		2	
3		4		5	
6		7		8	
9		10		11	

- 「Alt = 11」: t = ON time of AL for cooling, OFF time is controlled by PID.
- 「ALH」: Hysteresis of alarm. Ex: $PV \geq (SV+AL1) \rightarrow AL1 ON$; $PV < (SV+AL1-ALH) \rightarrow AL1 OFF$
- NT-22□-CT: HB alarm output is AL1
- NT-48□-CT: HB alarm output is AL2

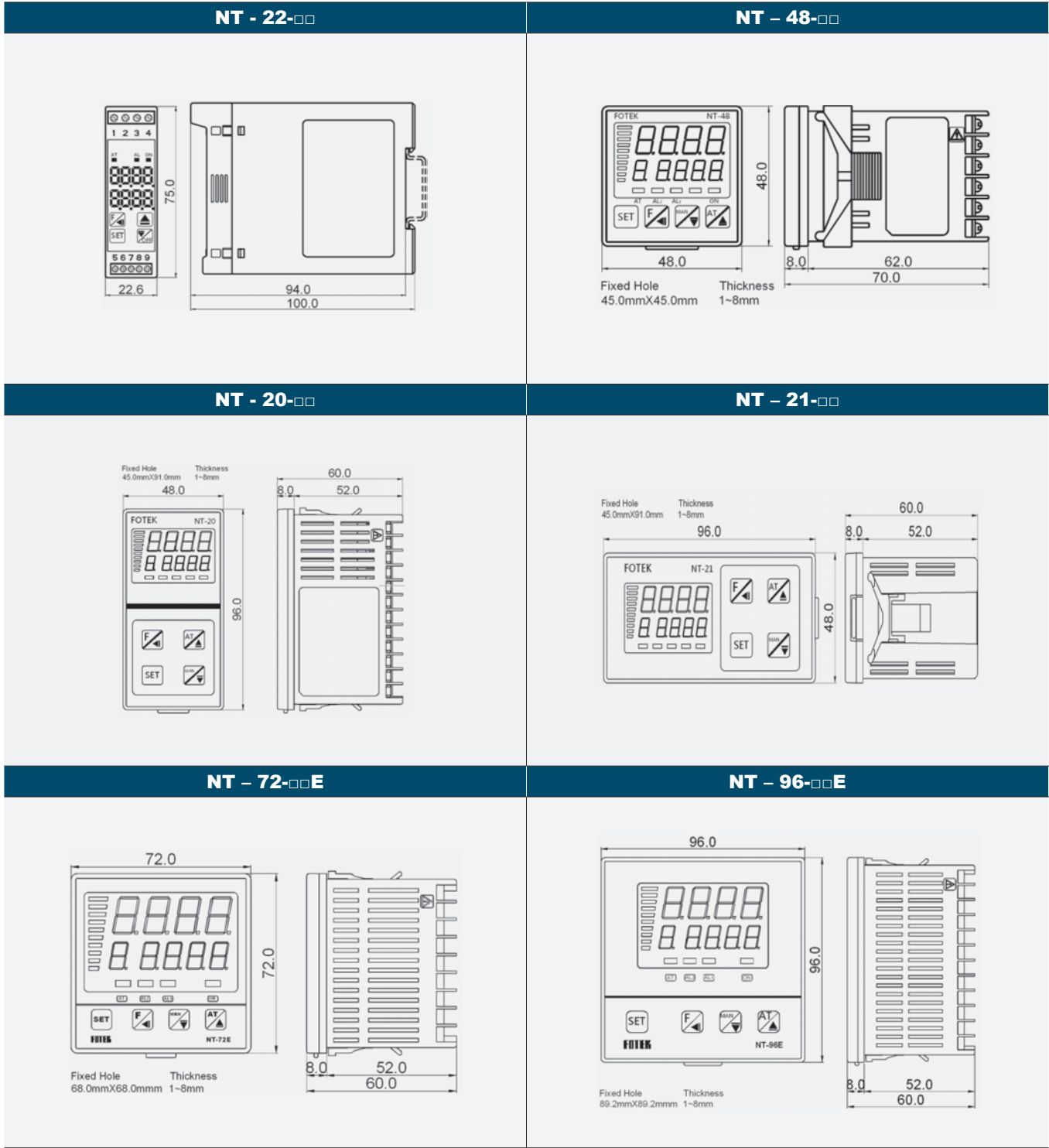
■ Connection diagram / 接線圖

NT - 22-□□	NT - 48-□□																																																																																																																																																																																						
<p>90~250VAC</p> <p>1 2 3 4</p> <p>Power supply Main output</p> <p>Sensor AL / Tr</p> <p>5 6 7 8 9</p> <p>RS-485 Port</p> <table border="1"> <tr><td>No.1</td><td>White</td><td>SG</td><td>No.1</td></tr> <tr><td>No.2</td><td>Black</td><td>X</td><td>No.6</td></tr> <tr><td>No.3</td><td>Red</td><td>RS+</td><td>No.1</td></tr> <tr><td>No.4</td><td>Green</td><td>RS-</td><td>No.6</td></tr> <tr><td>No.5</td><td>Yellow</td><td>X</td><td></td></tr> <tr><td>No.6</td><td>Blue</td><td>SG</td><td></td></tr> </table> <p>CT Input Port</p> <p>Contact rated : 3A / 250VAC</p>	No.1	White	SG	No.1	No.2	Black	X	No.6	No.3	Red	RS+	No.1	No.4	Green	RS-	No.6	No.5	Yellow	X		No.6	Blue	SG		<p>Control output</p> <table border="1"> <tr><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr><td>NC</td><td>NO</td><td>Com</td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>Power supply</p> <p>90~265VAC 50/60HZ</p> <p>CT Input</p> <table border="1"> <tr><td>18</td><td>17</td><td>16</td><td>15</td><td>14</td><td>13</td></tr> <tr><td>~</td><td>~</td><td>~</td><td>T/R (-)</td><td>T/R (+)</td><td>SG</td></tr> </table> <p>RS-485 Communication</p> <p>Sensor input</p> <table border="1"> <tr><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td></tr> <tr><td>-</td><td>+</td><td>+</td><td>Com</td><td>NO (AL1)</td><td>NO (AL2)</td></tr> </table> <p>Alarm output</p> <p>Contact rated : 3A / 250VAC</p>	6	5	4	3	2	1	NC	NO	Com										18	17	16	15	14	13	~	~	~	T/R (-)	T/R (+)	SG	12	11	10	9	8	7	-	+	+	Com	NO (AL1)	NO (AL2)																																																																																																																				
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■ Attachment / 附件

CT-06: Load current 10 A max	CT-09: Load current 30 A max.	CT-100: Load current 100 A max.
<p>Dimensions: 21.0, 30.0, 40.0, 2-Ø3.5, 25.0, 7.5, 10.0, Ø5.8</p>	<p>Dimensions: 8.2, 25.0, 90.0, Ø22.0, Ø9.0</p>	<p>Dimensions: 14.0, 40.0, OD: Ø1.3, L: 100.0, Ø13.2, Ø37.0</p>

■ Outline dimension / 外形圖



Specification may be modified without notice in advance. (2012/10/12)