FOTEK

Fuzzy + PID Intelligent Temperature Controller

Model guiding / 型號索引

Ex. NT – 48 R – CT – RS
(1: 2 3: 4: 5)

1	Series (系列名稱)	NT: New generation Temperature controller
2	Outline (外形) (Unit: mm)	10: 24*48*100 20: 48*96*60 21: 96*48*60 22: 22.6*75*100 32: 34*75*65 48: 48*48*72(1/16 DIN) 72: 72*72*60 96: 96*96*60(1/16 DIN)
3	Output method (輸出方式)	R: Relay (3A/250VAC) ; NT-10R(0.25A/250VAC) V: SSR (30mA/12V) L: Linear output (4~20mA)
4	Optioned (附加功能)	CT: With Heater break detecting ; NT-10R(0.25A/250VAC) 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

1. 「Temperature setting status」: Press「**SET**」key instantaneously to enter into the temperature setting status.
2. 「Auto-tuning status」: Press「▲」key 3 sec to set「Auto-tuning」,then press「▲」key 3 sec to reset it.
3. 「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**」
4. 「Display mode selecting」: Press「**SET**」key 3 sec to select display mode
   4-1.Without CT type: Display「Output volume」(u.xx)→then press「**SET**」key 3 sec → to display「Temperature set value」
   4-2. 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」
5. 「Parameter setting status」:Press「**F**」key 3 sec to enter into the parameter setting status.
6. 「Alarm setting status」:Press「**SET**」&「**F**」key 3 sec to enter into the Alarm setting status.
7. 「Communication stetting status」:Press「**SET**」&「▼」key 3 sec to enter into the Communication stetting status.
8. 「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.
9. 「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.
10. 「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.

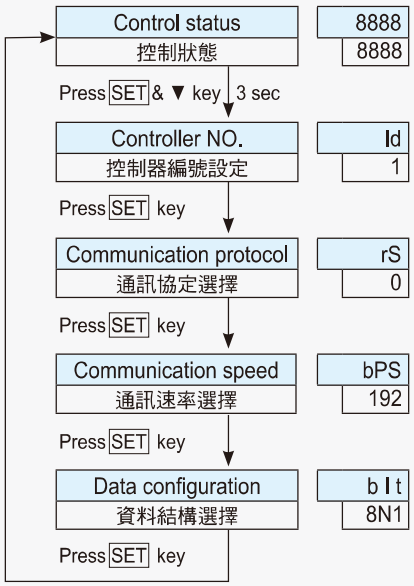
1. 「溫度值設定狀態」：按「**SET**」鍵一下就可進入「溫度值設定狀態」
2. 「自動演算狀態」：按「▲」鍵3秒可進入「自動演算狀態」；再按「▲」鍵3秒解除「自動演算狀態」
3. 「手動輸出控溫狀態」：按「▼」鍵3秒關閉輸出（顯示「OFF」），再按「**SET**」鍵3秒後可設定「手動輸出量」（顯示n.xx），完成手動輸出量設定後如果再按「▼」鍵3秒可解除「手動輸出控溫狀態」回複自動控溫狀態。。
4. 「顯示模式選擇」：按「**SET**」鍵3秒
   4-1. 無CT型：「輸出量顯示」（**u.xx**）→再按「**SET**」鍵3秒→「溫度設定值顯示」
   4-2. CT型：「輸出量顯示」（**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」
5. 「參數設定」：按「**F**」鍵3秒：進入「參數設定」狀態
6. 「警報設定」：按「**SET**」&「**F**」鍵3秒：進入「警報設定」狀態
7. 「通訊參數設定」：按「**SET**」&「▼」鍵3秒：進入「通訊參數設定」狀態
8. 「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。
9. 「加熱速率控制」：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。
10. 「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」。

Fuzzy + PID Intelligent Temperature Controller

General Specification / 共同規格

Fixed method		Panel type						Rail type	
Model	型號	NT-10	NT-48	NT-20	NT-21	NT-72E	NT-96E	NT-22	NT-32
Outline (U t: mm)	外形尺寸	24*48*100	48*48*72	48*96*60	96*48*60	72*72*60	96*96*60	22.6*75*100	34*75*65
Alarm output	警報輸出	Single alarm	Two alarm					Single alarm	Two alarm
Power supply	工作電壓	90~265 VAC/ 50/60 Hz or 24VDC/AC （Optioned）							
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 （Optioned）							
Control method	控制方式	Fuzzy + PID or ON / OFF selectable							
Control output	控制輸出	Relay or SSR or 4~20mA (Optioned)							
Alarm output	警報輸出	Relay 1a（3A/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℃ ~ 80℃ ;35%~85% RH							
EMC standard		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
	-200 ~ 9999 1 ~ 255 0 ~ 1 96 / 192 / 384 8N1 / 8O1 / 8E1 8N1 / 7O1 / 7E1	 1> Range：1~255 1>「rs=0」：Modbus-RTU 2>「rs=1」：Modbus-ASCII 1>「bPS =96」：9600 bps 2>「bPS =192」：19200 bps 3>「bPS =384」：38400 bps 1>「b I t =8N1」：8 bit non parity 2>「b I t =8O1」：8 bit odd parity 3>「b I t =8E1」：8 bit even parity 4>「b I t =8N2」：8 bit non parity 5>「b I t =7O1」：7 bit odd parity 6>「b I t =7E1」：7 bit even parity

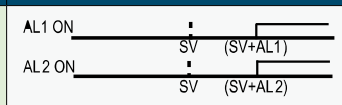
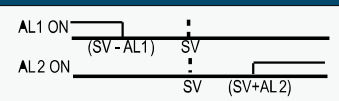
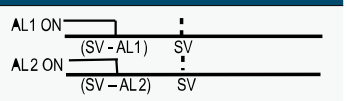
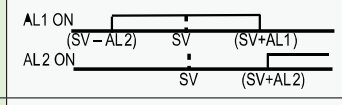
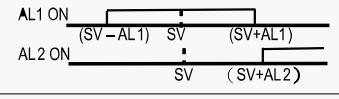
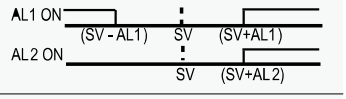
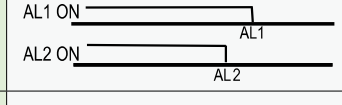
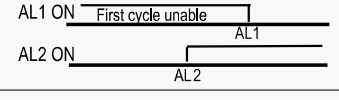
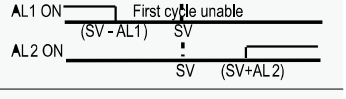
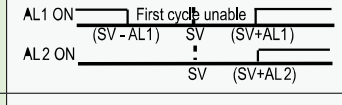
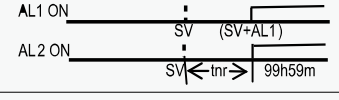
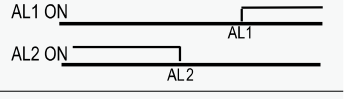
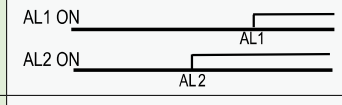
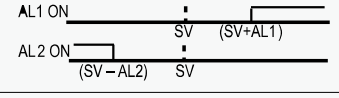
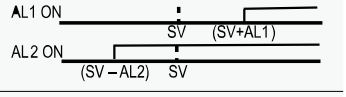
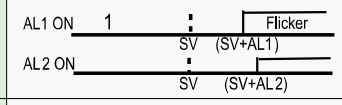
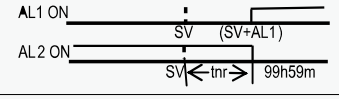
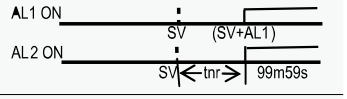
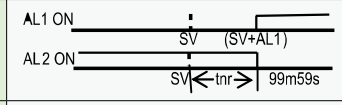
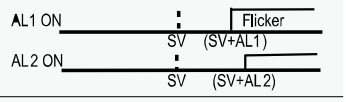
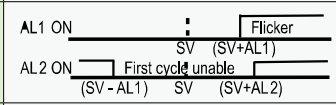
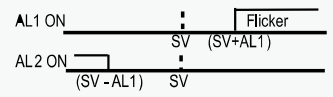
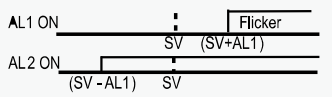
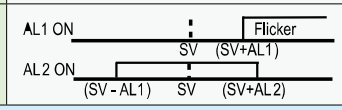
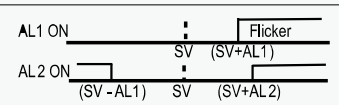
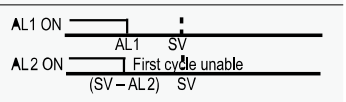
Setting of parameter / 參數設定

Function	Range	Description
Control status / 控制狀態 — 8888 / 8888	-200 ~ 9999	
Press F key 3 sec		
Cycle time / 動作週期 — C t / 15	0 ~ 99	1>「**CT = 0**」: ON/OFF control 2> Disappeared in Linear output type
Press SET key		
Auto tuning / 自動演算 — A t / 0	0 ~ 1	1>「**At = 0**」: Control status 2>「**At = 1**」: Auto tuning status
Press SET key		
Auto tuning bias / 自動演算偏差值 — t u / 0	0 ~ 99	1> Auto tuning value =「SV - tu」
Press SET key		
Proportion band / 比例帶 — P / 10	0 ~ 3999	1>「**CT = 0**」→「P」is disappeared
Press SET key		
Integral time / 積分時間 — I / 120	0 ~ 3999	1>「**CT = 0**」→「I」is disappeared
Press SET key		
Derivative time / 微分時間 — d / 30	0 ~ 3999	1>「**CT = 0**」→「d」is disappeared
Press SET key		
Hysteresis / 動作應差 — H y s / 1	0 ~ 99	1>「**CT = 0**」→「Hys」is appeared only 2>「PV＞SV）→ Out ON； 〔PV＜（SV-Hys）〕→ Out OFF
Press SET key		
Gain / 輸出控制增益 — GAn / 1.0	0.1~9.9	1> Gain of output control
Press SET key		
Input selecting / 輸入選擇 — I n t / k	PT / K / J / R / S T / B / E / N / L	1> 10 input type are selectable
Press SET key		
Unit selecting / 單位選擇 — U n t / C	°C / °F	
Press SET key		
Decimal point selecting / 小數點選擇 — d p / 0	0 / 1	1>「**d p = 0**」: Without decimal point 2>「**d p = 1**」: One decimal point
Press SET key		
Input shift setting / 輸入修正 — S h t / 0	-999 ~ 9999	1>「PV」=（PV + Sht）
Press SET key		
Control method setting / 控制方式 — H_C / Htr	Htr / cLr	1>「**Htr**」: Heating control 2>「**cLr**」: Cooling control
Press SET key		
Alarm mode setting / 警報模式 — A L t / 0	0 ~ 26	1> Refer to the mode of Alarm
Press SET key		
Display mode setting / 顯示自動切換設定 — S d c / n	n / A	1>「**n**」: Manual setting 2>「**A**」: Auto setting
Press SET key		

Setting of alarm / 警報設定

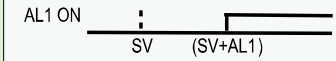
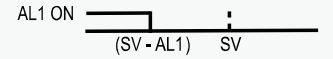
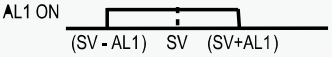
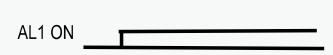
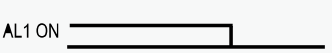
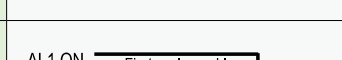
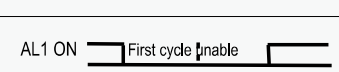
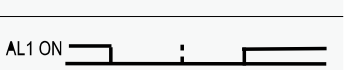
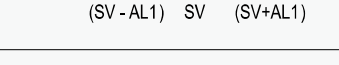
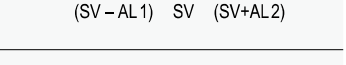
Function	Range	Description
Control status / 控制狀態 — 8888 / 8888 Press SET & F key 3 sec	0 ~ 9999	
Lock setting / 鎖定設定 — L c k / 0 Press SET	0 ~ 3	1>「Lck=0」: Unlock ; Lck=1」: SV settable only 「Lck=2」: SV&AL settable ; 「Lck=3」: All lock
AL1 Limit setting / AL1 警報設定 — A L 1 / 50 Press SET	-999 ~ 9999	1> Refer to the mode of Alarm
AL2 Limit setting / AL2 警報設定 — A L 2 / 50 Press SET	-999 ~ 9999	1> Refer to the mode of Alarm
Hysteresis of alarm / 警報應差值設定 — A L H / 1 Press SET	0 ~ 9999	Ex. PV≧(SV+AL1)→AL1 ON, PV＜(SV+AL1-ALH)→AL1 OFF
Flick timer / 警報閃爍輸出時間設定 — t / 10 Press SET	0 ~ 99	1> Range: 0~99 sec 2> Cycle time of flick timer
Setting limit / 最大設定值限制 — S L h / 400 Press SET	0 ~ 9999	1> SV≦SLH 2> Range of transmitter : 0~SLH→
Output limit / 輸出量限制設定 — O u t / 100 Press SET	0 ~ 100%	1> Output volume = Control output volume * 「Out」
Process output volume / 實際輸出量 — U n / 0.0 Press SET	0 ~ 99.99	1> Display the output volume
Max. display value setting / 最大顯示值設定 — dSPH / 1000 Press SET	0 ~ 9999	1> Current or Voltage input type will be appeared only 2> Max. input value will be transmitted into the dSPH
Min. display value setting / 最小顯示值設定 — dSPL / 0 Press SET	-999 ~ 9999	1> Current or Voltage input type will be appeared only 2> Min. input value will be transmitted into the dSPL
Process current of heater / 實際加熱器輸出電流值 — C t u / 0.00 Press SET	0 ~ 99.99	1> Range: 0.00 ~ 99.99 A
Heater break setting / 加熱器斷線電流設定值 — H b / 1.00 Press SET	0 ~ 99.99	1> Range: 0.00 ~ 99.99 A 2> 「**C t u**」＜「**H b**」→ **AL2 ON**
CT Low limit setting / CT最小值設定 — C t L / 0.00 Press SET	0 ~ 99.99	1> Range: -9.99 ~ 99.99 2> Offset of CT current
CT High limit setting / CT最大值設定 — C t h / 30.00 Press SET	0 ~ 99.99	1> Range: 0.00 ~ 99.99 2> To set the max.CT current
Ramp control setting / 溫升速率控制 — r A P / 0 Press SET	0 ~ 9999	1> Range: 0 ~ 9999 ℃ or ℉ / minute 2> Rap=0: Without Ramp control function
Min. output volume setting / 最小輸出量設定 — L o t / 0 Press SET 3 sec	0 ~ 100%	1> Range: 0 ~ 100% 2> Setting of min. output volume
Soft start setting / 緩起動設定 — SV2 / 0 Press SET	-999 ~ 9999	1>「**SV2**」= 0: Without soft start function 2>「**PV**」<「**SV2**」: output volume is fixed at manual output volume 3>「**PV**」≧「**SV2**」: Output volume is 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	

1.「ALt=15」: t = ON time of AL2 for cooling, OFF time is controlled by PID.
2.「ALH」: Hysteresis of alarm. Ex. PV≧(SV+AL1)→AL1 ON, PV＜(SV+AL1-ALH)→AL1 OFF
3.「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】

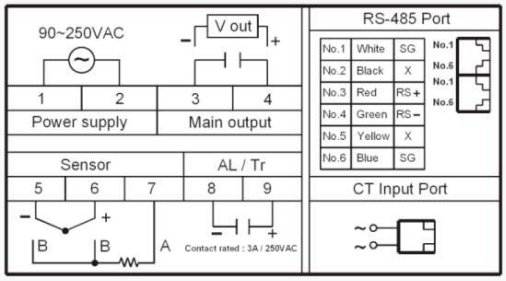
Alt	Description / 警報說明	Alt	Description / 警報說明	Alt	Description / 警報說明
0		1		2	
3		4		5	
6		7		8	
9		10		11	

1>「Alt = 11」: t = ON time of AL for cooling, OFF time is controlled by PID.
2>「ALH」: Hysteresis of alarm. Ex：PV≧（SV+AL1）→ AL1 ON；PV＜（SV+AL1-ALH）→ AL1 OFF
3> NT-22□-CT: HB alarm output is AL1
4> NT-48□-CT: HB alarm output is AL2

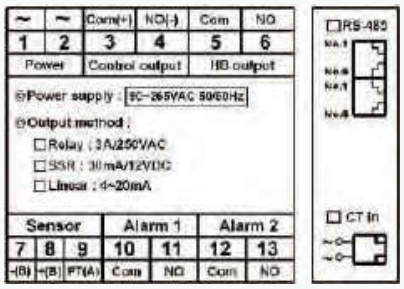
Fuzzy + PID Intelligent Temperature Controller

Connection diagram / 接線圖

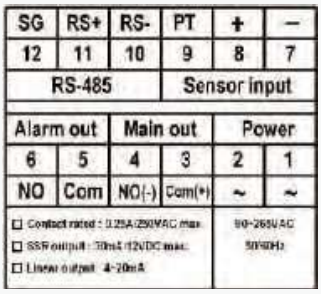
NT - 22-□□



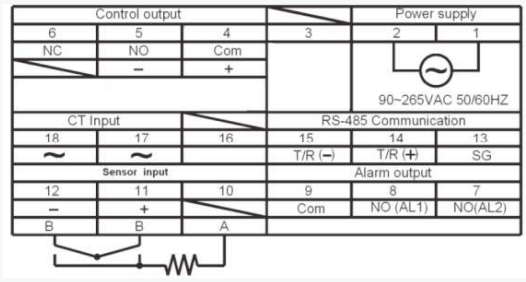
NT – 32-□□



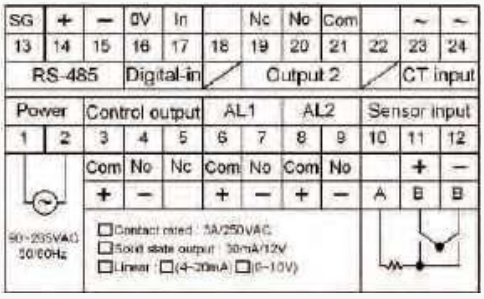
NT - 10-□□



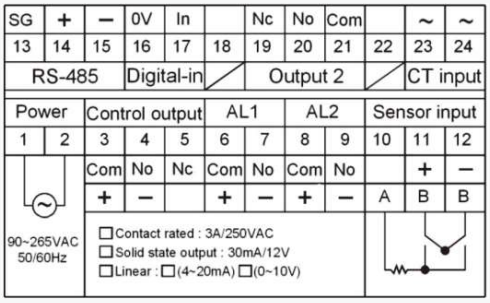
NT – 48-□□



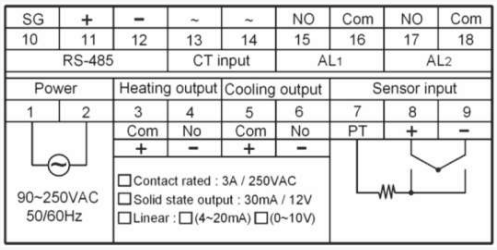
NT - 20-□□



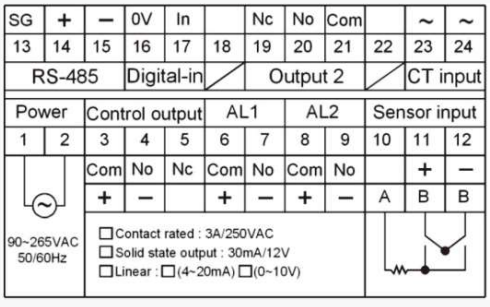
NT – 21-□□



NT – 72-□□E

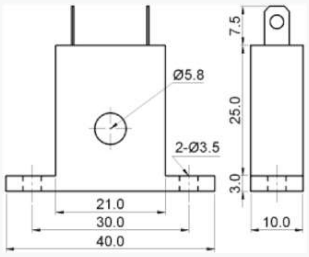


NT – 96-□□E

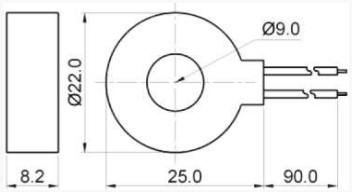


Attachment / 附件

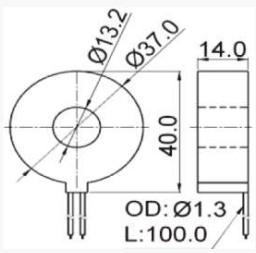
CT-06: Load current 10 A max



CT-09: Load current 30 A max.



CT-100: Load current 100 A max.



FOTEK

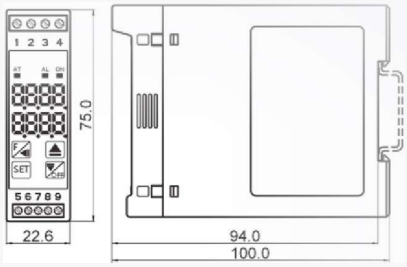
PID + Fuzzy Communication module

NT series

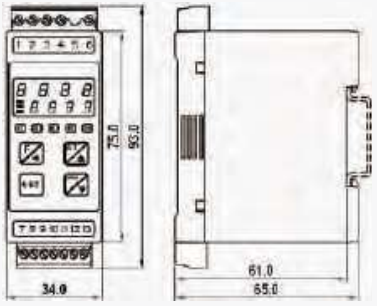
cULus / CE / RoHS

Outline dimension / 外形圖

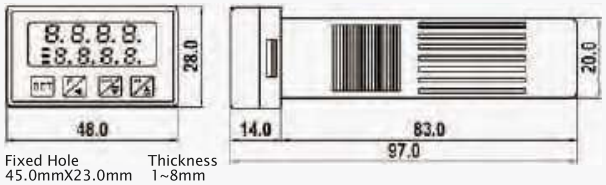
NT - 22-□□



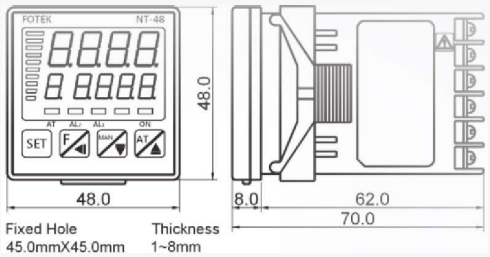
NT – 32-□□



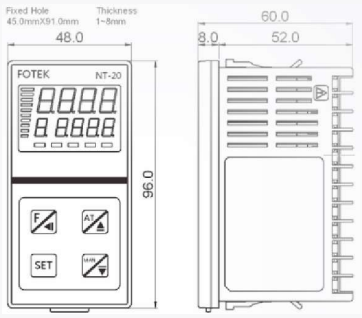
NT - 10-□□



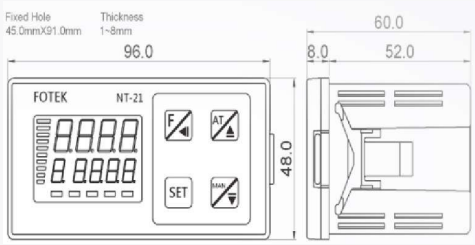
NT – 48-□□



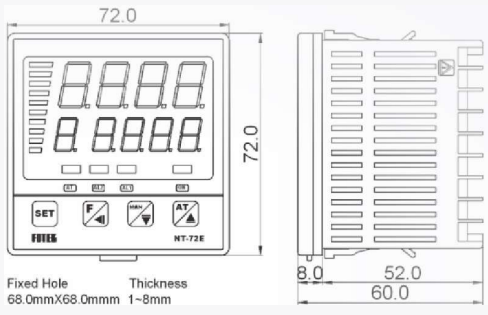
NT - 20-□□



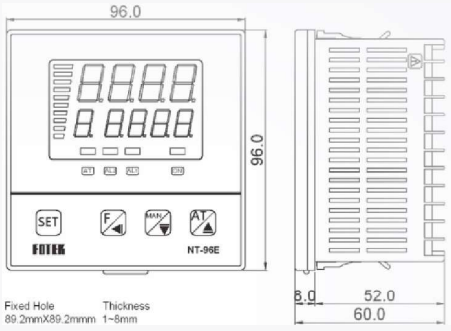
NT – 21-□□



NT – 72-□□E



NT – 96-□□E



Specification may be modified without notice in advance. (2015/5/5)