MT Series PID+Fuzzy Temperature Controller

FUZZY PID CONTROLLER

※ **Artificial Intelligence <AI> Control**
Fuzzy+PID Control

※ **Enhanced Autotunning Method**
AT BIAS VALUE SETTABLE

※ **Multi-Input Type**
K/J/PT SELECTABLE

※ **Alarm Function**
15 MODES SELECTABLE

※ **RUN/STOP Function**
OPERATED ON THE PANEL EASILY

※ **Communication Function**
RS-485 OPTIONED



■ Guiding of Model／型號索引

EX. MT-4896-R-RS-mA
① ② ③ ④ ⑤

① **Series／系列代號**
MT Series Temperature Controller

② **Outline／外型尺寸**
4896=48<W>x96<H> mmxmm
48=48<W>x48<H> mmxmm
72=72<W>x72<H> mmxmm
96=96<W>x96<H> mmxmm
20=48(W)x 96(H) mmx mm
21=96(W)x 48(H) mmx mm

③ **Output Method／輸出方式**
R=Relay Output
V=Voltage Pulse Output
L=Linear 4~20 mA Output

④ **Other／其他**
Non=Standard
RS=RS-485
CT=Current Transmitter
S:PV Resender

⑤ **Input／輸入**
Non=K/J/PT
mA=mA
V=0～10V
VR=Variable Resisfance



■ Nomenclature／圖示說明

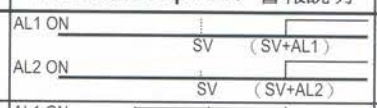
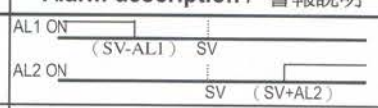
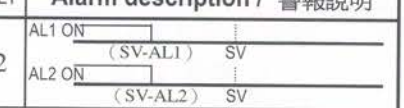
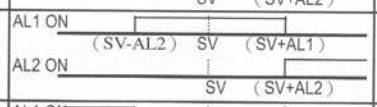
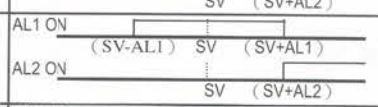
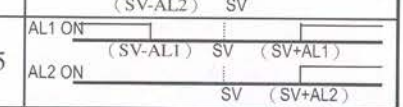
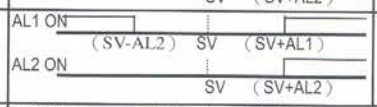
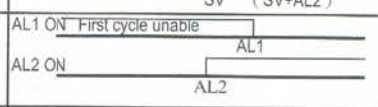
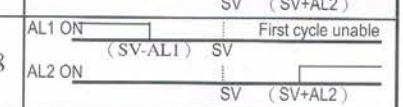
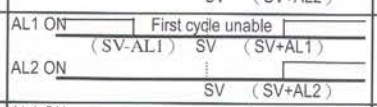
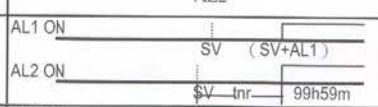
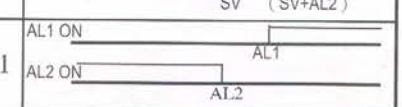
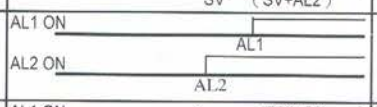
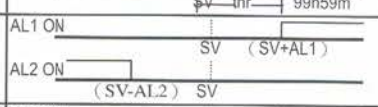
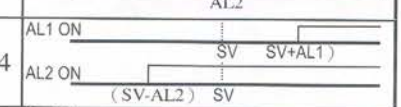
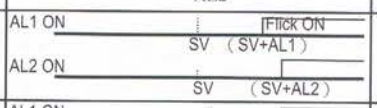
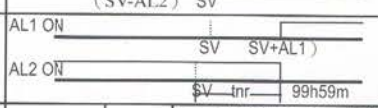
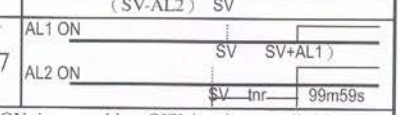
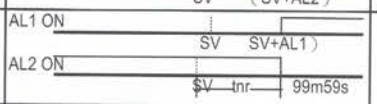
PV:Display of The Process Value 顯示現在值
SV:Display of The Setting Value 顯示設定值
SET :Key of Setting 設定鍵
F :Key of Shift & Function 功能鍵及移位鍵
▲ :Key of Increasing or Autotunning 上加鍵及自動演算鍵
OFF :Key of Decreasing & ON/OFF 下減鍵及開關鍵

PID+Fuzzy Temperature Controller MT Series

■ General Specification & Characteristic／共同規格及特性

Specification & characteristic			Data
Power supply		工作電壓	90 ~ 265 VAC 50/60 Hz
Power consumption		消耗電流	5VA max.
Sensor input		測溫體	K / J / PT-100Ω selectable
Control output	Relay	繼電器	3A/250VAC SPDT
	Voltage	電壓	12V / 50mA
	Linear	線性輸出	4~20 mA ; Load: 600Ω max.
Alarm output		警報輸出	3A/ 250 VAC SPDT
Control method		控制方式	Fuzzy + PID or ON / OFF settable
Operating circumstance		工作環境	-20℃~+75℃ ; 25% ~ 85% RH
Display accuracy		顯示精度	±0.1% of FS + 1 digit
Cycle time		動作週期	0 ~ 99 sec
Proportional band (P)		比例帶	0 ~ 999
integral time (I)		積分時間	0 ~ 3999
Derivative time (D)		微分時間	0 ~ 3999
Alarm range		警報範圍	-99 ~ 999
PV sampling time		取樣時間	0.1 sec
Input shift		輸入校正	-99 ~ +99
AT bias (TU)		自動演算偏差量	0 ~ 999
Memory method		記憶方式	EEPROM
Insulation resistance		絕緣阻抗	Over 50MΩ/ 500VDC
Dielecttric strength		耐壓強度	Over 2.5 kV / 1 minute
EMC standard			ESD : 8 KV Air Discharge (Level 3)/EN-61000-4-2 RF Interference: 10V/M/ENV50140 Bursttest:2KV/EN61000-4-4

■ Mode of alarm／警報模式

ALT	Alarm description / 警報說明	ALT	Alarm description / 警報說明	ALT	Alarm 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-use	Note	1>「ALT=15」: t = AL2 flick ON time settable，OFF time is controlled by PID 2>「ALH」is hysteresis of alarm Ex：PV≧（SV+AL1）→ AL1 ON，PV<（SV+AL-ALH）→ AL1 OFF 3>「tnu」= Process time of timer；「tnu≧tnr」→ AL2 is turned ON or OFF

MT Series PID+Fuzzy Temperature Controller

■ Setting of Parameter／參數設定

Function 參數設定	Symbol 參數符號	Range 範圍	Remarks 備註
Control status 控溫狀態	1999 / 1999	1>-999~9999	
Cycle Time 動作週期	CT / 15	0~99	① CT=0 ON/OFF控制 CT=0 ON/OFF Control ② 線性輸出型不顯示 Linear Type Disappeared
Auto Tunning 自動演算	AT / 0	0 or 1	① AT=0 控溫狀態 AT=0 Control Status AT=1 自動演算狀態 AT=1 Autotunning Status
Autotunning Bias 演算偏差值	tu / 0	0~999	① 演算值＝SV-Tu Autotunning Value=SV-Tu
Proportional Band 比例帶	°C/°F → P / 25	0~999	① CT=0 P值不顯示 CT=0 P Disappeared
Integral Time 積分時間	SEC → I / 150	0~3999	① CT=0 I值不顯示 CT=0 I Disappeared
Derivative Time 微分時間	SEC → d / 41	0~3999	① CT=0 D值不顯示 CT=0 D Disappeared
Hysteresis 應差設定	°C/°F → HYS / 2	-99~999	① CT=0 才顯示 CT=0 Appeared only
Input Selecting 輸入選擇	InT / J	K/J/Pt	① K:0~1372°C ② J:0~1200°C ③ PT:-200~850°C
Unit Selecting 單位選擇	Unt / °C	°C/°F	
Decimal Selecting 小數點選擇	dP / 0	0 or 1	① dp=0 No Decimal Point ② dp=1 One decimal Point
Code 通信碼選擇	rS / 0	0~2	① Communication type appeared only ② RS=0: BCD code (8N1) ③ RS=1:ASCII code (8N1) ④ RS=2: ASCII code (7O1)
BPS 傳輸速率	bPS / 192	96 or 192	①「96」:9600bps ②「192」:19200bps
Input Shift 輸入校正	°C/°F → Sht / 0	-99~999	
Alarm Mode 警報模式	ALt / 0	0~15	① 參考警報模式 Prefer to the mode of Alarm
Contoller No. 控制器編號	Id / 00	0~99	① 附RS-485才顯示 Communication Type Appeared Only

Press ↔ Key ↓ 3 sec

Press SET Key ↓

Press SET Key

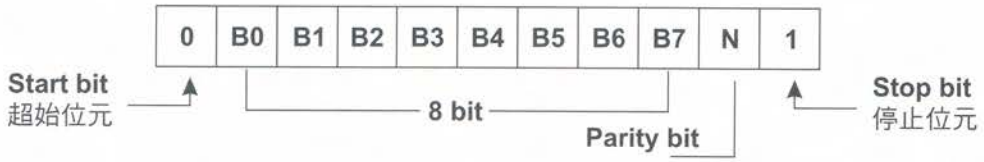
■ Setting of Alarm／警報設定

Function 參數設定	Symbol 參數符號	Range 範圍	Remarks 備註
Control status 控溫狀態	1999 / 1999	-999~9999	
Press SET Key 3 sec			
Lock setting 鎖住設定	LcK / 0	0~3	①「Lck=0」:Unlock ②「Lck=1」:SV settable only ③「Lck=2」: SV & AL settable only ④「Lck=3」: All lock
Press SET Key			
AL1 alarm setting AL1 警報值設定	AL1 / 50	-999~9999	
Press SET Key			
AL2 alarm setting AL2 警報值設定	AL2 / 50	-999~9999	① Refer to mode of alarm
Press SET Key			
Hysteresis of alarm 警報值應差設定	ALH / 1	0~9999	Ex. Alarm mode=「0」 「PV>(SV+AL1)」→AL1 ON 「PV≦(SV+AL1-ALH)」→AL1 OFF
Press SET Key			
Heater break setting 加熱器斷線值設定	Hb / 10.0	0.0~「CTH」	①「CT」Type appeared only ②「ctu」<「HB」→AL2 ON At heating status
Press SET Key			
Heating current 加熱器實際電流值	ctu / 20.0		①「CT」Type appeared only
Press SET Key			
Max. CT value 最大電流值設定	ctH / 30.0	0.0~999.9	①「CT」Type appeared only
Press SET Key			
Limit of setting 設定值上限設定	SLH / 400	-999~9999	① SV≦「Limit of setting」
Press SET Key			
Limit of output 最大輸出量設定	Out / 100	0~100%	① Ton≦「Limit of output」 (Ton=Heating time)

MT Series PID+Fuzzy Temperature Controller

■ Setting of Communication／通信協定

Communication Standard	EIA RS-485	Communication Speed	「9600」or「19200」bps
Bits	16 bits	Communication Station	0~99
Communication configuration	8N1 (RS=0 or 1) 7O1 (RS=2)	Communication Code	BCD (RS=0) ASCII (RS=1 or 2)



Process of Protocal

Read command:

@	ID	R	Address	FCS	CR

Reesponse:

@	ID	R	Response code	Data	FCS	CR

Write command:

@	ID	W	Address	FCS	CR

Response:

@	ID	W	Response code	FCS	CR

Address:Parameter Address
位　　址：參數位址

NO 號碼	Description 說　明
00	AL1:Alarm # 1(Range:-99~999)
01	AL2:Alarm#2 (Range:-99~999)
02	Non-use
03	SLH:Limit of set (Range:0000~9999)
04	HYS:Hysteresis (Range:0000~9999)
05	Non-use
06	Non-use
07	CT Cycle Time (Range:00~99)
08	P:Proportion band (Range:0000~0999)
09	I:Integral time (Range:0000~3999)
10	D:Dervative time (Range:0000~3999)
11	INT:Input type(K:0000、J:0001、PT:0002)
12	UNT:Unit(℃:0000、℉:0001)
13	SHT:Input shift(Range:-99~0099)
14	ALT:Alarm mode (Range:0000~0015)
15	Non-use
16	Setting value (Range:-99~9999)
17	TU:Autotunning (Range:-99~0999)
18	ID:Station No (Range:0000~0099)
19	RV:Process Value (Range:-99~9999)
20	LCK:Setting lock (0000、0001、0002、0003)
21	AT:Setting of autotunning (AT OFF:0000、AT ON:0001)
22	Value of SV & PV
23	Status of OUT/AL1/AL2
24	Decimal point setting (Non:0000、One:0001)
25	ON/OFF setting (ON:0000、OFF:0001)

Remarks:

@:Start code / 起始碼
CR: Stop code / 停止碼
ID:Station munber / 控制器編號
R:Read command / 讀取指令
W:Write command / 寫入指令
Address: Parameter address / 參數位址
Data: Data for reading or writing / 讀寫資料
FCS: Checking Sum / 查核碼

Response code:回應碼

00:Command completed / 指令完成
01:Address error / 位址錯誤
02:Data error / 資料錯誤
03:FCS error / 查核碼錯誤
04:Command error / 指令錯誤
05:Lock / 未開放

EX: To read the PV=31 of temperature controller (ID=0)

Read command:	@	ID	R	Address	FCS	CR

RS=1 or 2:@ 0 0 R 1 9 1A 0D 「FCS=40*30*30*52*31*39=**1 A**」

RS=0 :40 00 52 19 0B 0D 「FCS=40*00*52*19=**0 B**」

Read response:	@	ID	R	Response code	Data	FCS	CR

RS=1 or 2:@ 0 0 R 00 00 31 0D

RS=0 :40 00 00 00 31 23 0D

EX: To write the SV=100 of temperature controller (ID=1)

Write command:	@	ID	W	Address	Data	FCS	CR

RS=1 or 2:@ 0 1 W 1 6 0 1 0 0 10 0D 「FCS=40*30*31*57*31*36*30*31*30*30=**1 0**」

RS=0 :40 01 57 16 01 00 01 0D 「FCS=40*01*57*16*01*00=**0 1**」

Write response:	@	ID	W	Response code	Address	Data	CR

RS=1 or 2:@ 0 1 W 00 16 0D

RS=0 :40 01 57 00 16 0D

Note: 【FCS=□□*□□*□□ ; 「*」=「XOR」】

Symbol	Description	ASCII Code	Symbol	Description	ASCII Code	Symbol	Description	ASCII Code
@	Start code	40	C	HEX	43	4	HEX/BCD	34
R	Read	52	D	HEX	44	5	HEX/BCD	35
W	Write	57	E	HEX	45	6	HEX/BCD	36
CR	Stop Code	0D	F	HEX	46	7	HEX/BCD	37
–	Minus	2D	1	HEX/BCD	31	8	HEX/BCD	38
A	Hex	41	2	HEX/BCD	32	9	HEX/BCD	39
B	Hex	42	3	HEX/BCD	33			

Status of OUT/ AL1/AL2 (Address=23)

Data	Out	AL1	AL2
00 00	OFF	OFF	OFF
00 01	ON	OFF	OFF
00 02	OFF	ON	OFF
00 03	ON	ON	OFF

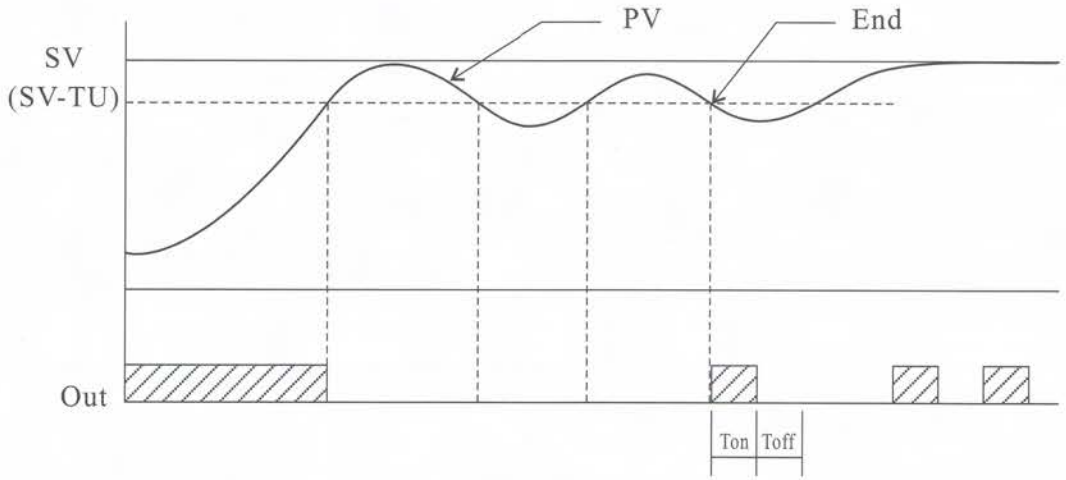
Data	Out	AL1	AL2
00 04	OFF	OFF	ON
00 05	ON	OFF	ON
00 06	OFF	ON	ON
00 07	ON	ON	ON

■Illustration/功能說明

Cycle Time<CT>動作週期

CT=Ton+Toff
Ton=Time of Heater ON 加熱時間
Toff=Time of Heater OFF 不加熱時間

Auto Tunning<AT> 自動演算



Autotunning Value=SV-TU　　<TU=Autotunning Bias>

Input Shift<SHT>輸出校正

To Correct The Difference Between The Actual Value And The PV Value
可修正實際值和顯示值的誤差

PV Resender 顯示值再傳送

The Range of Transmitter Is Set By The SLH.
Ex. SLH=200,0～200 Will be Transmitted To 4～20mA

"OFF" Key 關閉鍵

To Turn OFF All Output Of Temperature Controller,Only Display
The Value of PV.
可關閉溫控器所有輸出，只顯示實際溫度值。

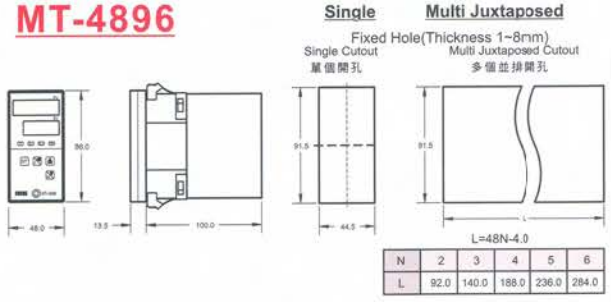
Atuo Tunning Key 自動演算鍵

If Press The ▲ Key 3 Seconds,It May Enter To The Status of Auto Tunning.
按▲鍵3秒，可以進入自動演算狀態。

PID+Fuzzy Temperature Controller MT Series

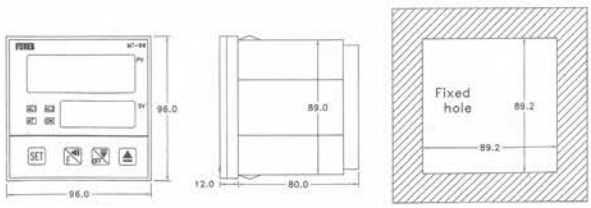
■Outline & Fixed Hole/外型及固定孔尺寸圖

MT-4896

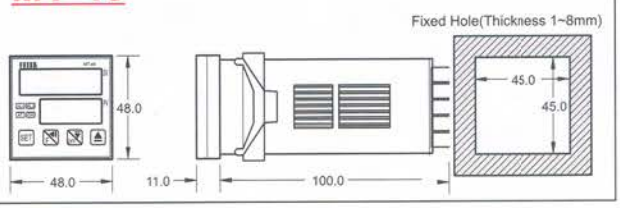


N	2	3	4	5	6
L	92.0	140.0	188.0	236.0	284.0

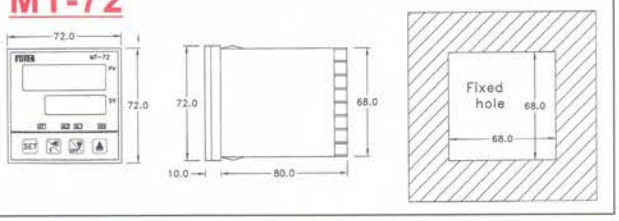
MT-96



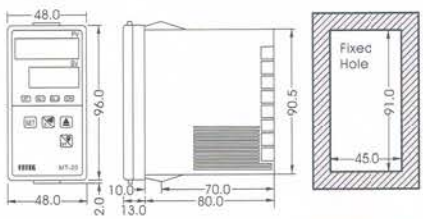
MT-48



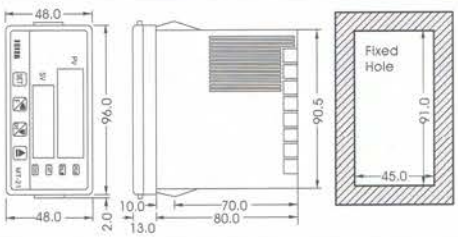
MT-72



MT-20

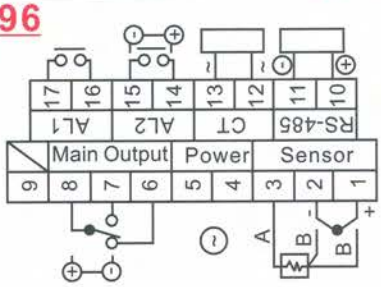


MT-21

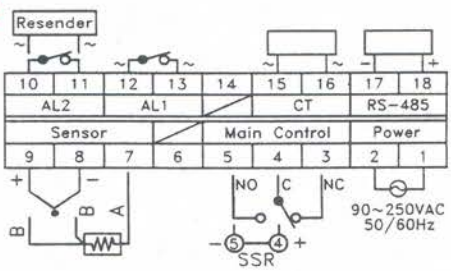


■Connection Diagram/接線圖

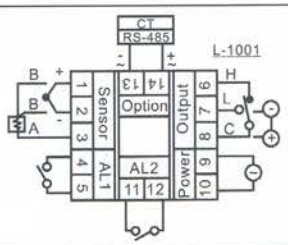
MT-4896



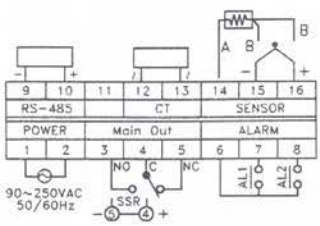
MT-96



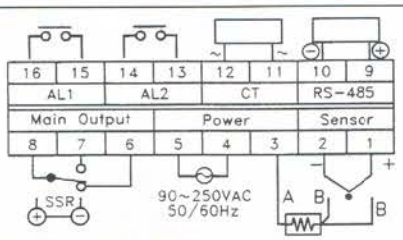
MT-48



MT-72



MT-20



MT-21

