

SPECIFICATIONS

1. INPUT

*Thermocouple	J, K, T, E, B, R, S, N (IPTS68/DIN 43710)
*RTD	Pt100 ohms RTD (DIN 43760/BS 1904 or JIS)
*Linear Voltage (current)	4-20mA, 0-5VDC, 0-10VDC...
*Range	User configurable
*Accuracy	+/-2C for T/C, _+0.2C for RTD, _+0.05% for Linear
*Cold Junction Compensation	0.1% ambient typical.
*Input Impedance	10M ohms for T/C, 100K ohms for Lin. Voltage, 2.7 Ohms for 0 (4)- 20 mA/
*Excitation Current for RTD	0.2mA Max.
*Sample Rate	250mS

2. CONTROL

*Proportional Band	0.0-300.0%
*Rest (Integral)	0-3600 Sec.
*Rate (Derivative)	0-900 Sec.
*Anti Rest Windup	Inhibit integral action outside Proportion Band
*Ramp Rate	0.0-100.0C / minute.
**On-Off	With adjustable hysteresis
*Cycle Time	0-99 seconds.
*Control Action	Configurable for Direct (cool) or Reverse (Heat)

3. OUTPUT

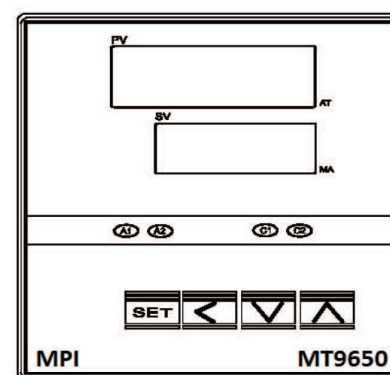
*Relay	5A/240VAC resistive.
*Pulsed Voltage	Isolated 24 VDC 100mA Max.
*Current	Isolated 0 (4) - 20 mA Max load 500 ohms.
*Alarm	Relay output, (SPST) 10A/240VAC resistive.
4. POWER	
*Rating	85 - 265 VAC 50/60Hz 5VA max or 24VDC

5. ENVIRONMENTAL

*Operating Temp	-10 - 50C
*Humidity	- 90%
*Insulation	20M ohms minimum @ 500VDC
*EMC Emission	EN500081-1:1992, EN55022:1994
*EMC Immunity	EN 50082-1:1992, IEC 801-3, IEC 801-4:1988
*Weight	MT4850 180g, MT4950 240g, MT9650 240g

INSTRUCTION MANUAL FOR MT-50 SERIES FUZZY PID

FRONT PANEL DESCRIPTION :



- (1)PV – Process Value
- (2)SV – Setting Value
- (3)AT – Auto tuning LED
- (4)MA – Manual mode LED
- (5)A1 – Alarm 1 LED
- (6)A2 – Alarm 2 LED
- (7)C1 – Control 1 LED
- (8)C2 – Control 2 LED

- (1) – SET KEY. Press once to access the next programmable parameter.
Press this key for 5 seconds to reset alarm timer.
- (2) – UP KEY. Press to increase the set point or parameter value.
- (3) – DOWN KEY. Press to decrease the set point or parameter value.
- (4) – SHIFT KEY. *Press the shift key for 5 seconds to execute Auto Tune process (Yes. 1 mode)*
To abort the Yes. 1 Auto Tune process, press the shift key for 5 seconds.
- (5) – Press the SET and UP keys once to return the normal operation.
- (6) – LEVEL KEY. Press the SET and SHIFT keys simultaneously for 5 seconds to select program level

ERROR MESSAGE AND TROUBLESHOOTING

Symptom	Probable	Solution
oPEr	-Sensor break error -Sensor not connected	-Replace sensor -Check the sensor is connected correctly
RdEr	-A/D converter damage	-Unit must be repaired or replaced. -Check for outside source of damage such as transient voltage spikes.
ALEr	-Auto tune time out error	Set Pb, ti, td manually.
Keypad no function	-Keypads are locked -Keypads defective	-Set "LoCb" to a proper value -Replace keypads
Process value unstable	-Improper setting of Pb, Ti, Td and CT	-Start AT process to set Pb, Ti, Td automatically -Set Pb, Ti, Td manually
No heat or output	-No heater power or fuse open -Output device defective or incorrect output used	-Check output wiring and fuse -Replace output device
All LED's and display not light	-No power to controller -SMPS failure	-Check power lines connection -Replace SMPS
Process Value changed abnormally	-Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI)	-Suppress arcing contacts in system to eliminate high voltage spike sources. Separate sensor and controller wiring from "dirty" power lines. Ground heaters
Entered data lost	-Fail to enter data to EEPROM	-Replace EEPROM

AUTOMATIC and MANUAL CONTROL

Automatic control is the normal mode of controller operation. In automatic control mode the controller automatically adjust the control output percentage by PID algorithm so that the PV=SV. The PID parameter Pb, Ti and Td can be also calculated by Auto Tune procedure.

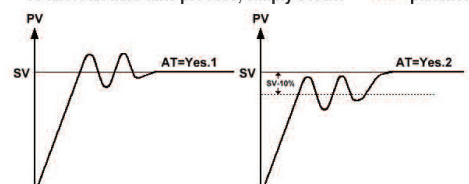
Manual control allows the user to manually drive the output percentage from 0.0 to 100.0%. To access the manual mode, set the "HrMd" parameter to "YES", the rightmost decimal (MA) on SV display will flash. Then the "aUL" parameter will display alternately "aUL" and process value. The output percentage then can be adjusted by pressing UP or DOWN key.

To abort the manual control just simply set the "HrMd" to "no".

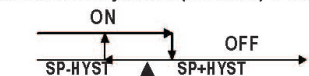
AUTO TUNE

In order to automatically set the PID parameter in PID level ("Pb" proportional band, "ti" integral time or reset and "td" derivative time or rate), first adjust the controller's set point to a value, which closely approximates your application. Set the "AL" parameter to "YES.1" for standard type auto tune or "YES.2" for low PV type auto tune. The right-most decimal point (AT) on the PV display begins flashing. The auto tune procedure will take two cycle oscillations. After that, the controller performs PID control with the "learned" PID value to verify the results. Finally the PID values will be entered into the nonvolatile memory and then start the Fuzzy enhanced PID control. The auto tune process can last from several minutes up to two hours, depending on the system's parameter. A time out error will occur if the auto tune process can not be completed within two hours, in this case, try to set the PID parameters manually.

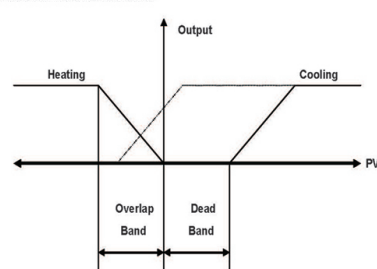
To abort an auto tune process, simply set the "AL" parameter to "no".



The controller can also be set to ON/OFF, PI, PD and P control mode. Set Pb = 0 for ON/OFF control mode. Set ti = 0 for PD control mode. Set td = 0 for PI control mode and ti, td = 0 for P control mode. The Hysteresis (dead band) of ON/OFF control can be set as follow:



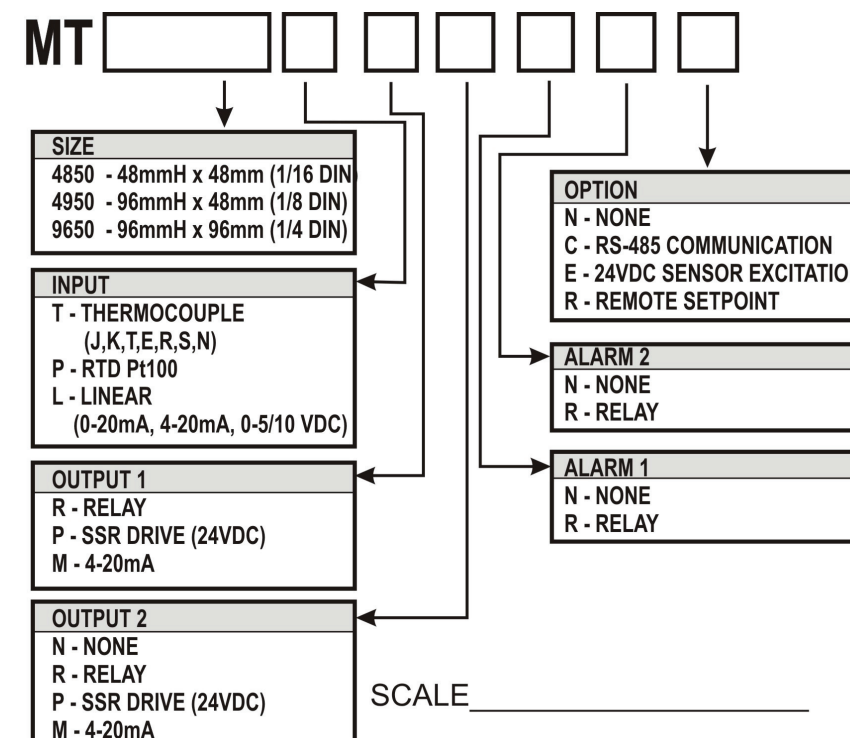
When the second control output (output 2) is equipped the proportional band of output 2 and dead band are defined as follow:



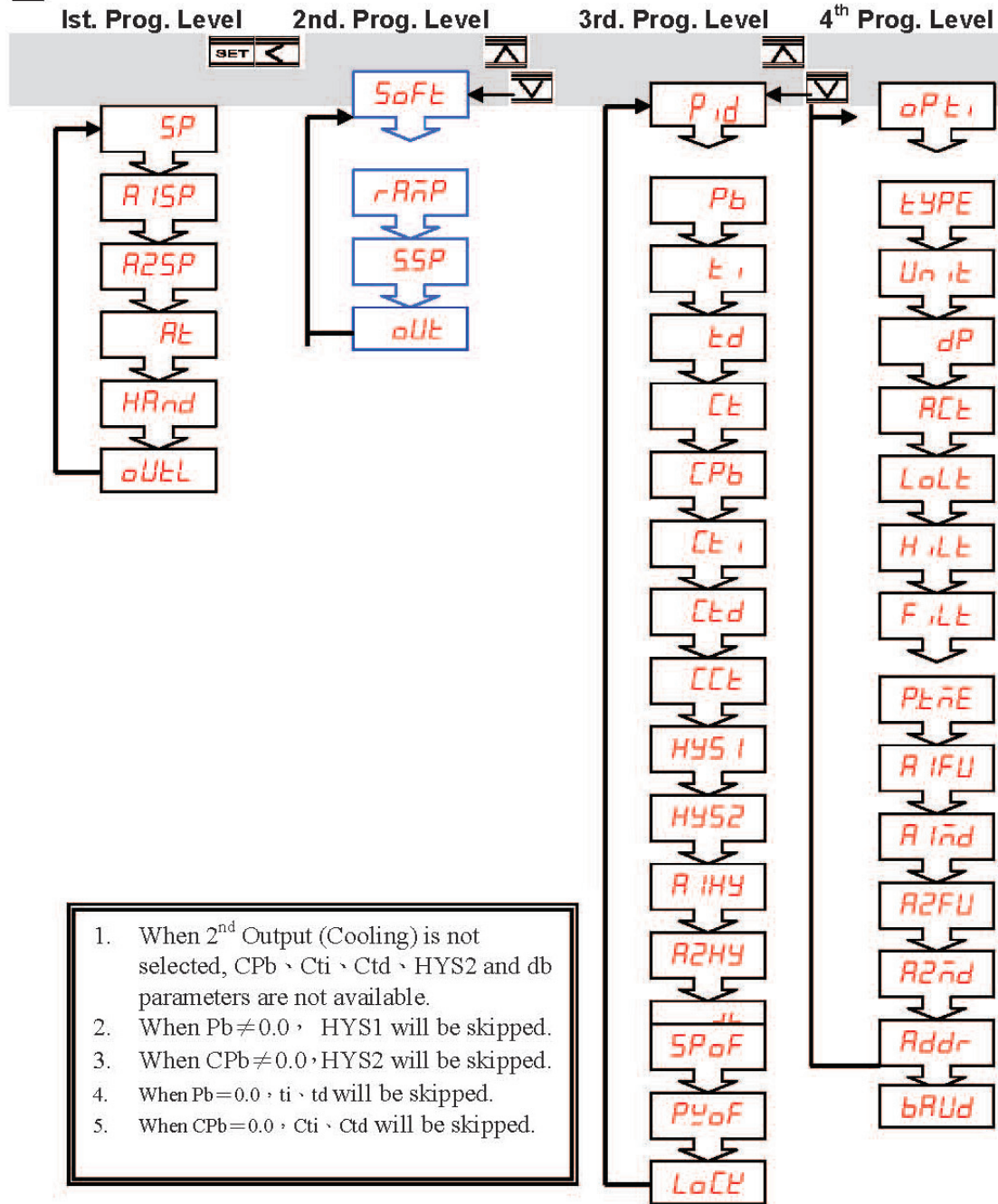
FOR TECHNICAL ASSISTANCE

Please Call:

MORHEAT Inc.
170 Brockport Dr.,
Unit#97(South-Side), Toronto
Ontario, Canada
M9W 5C8
ph 416-675-7329
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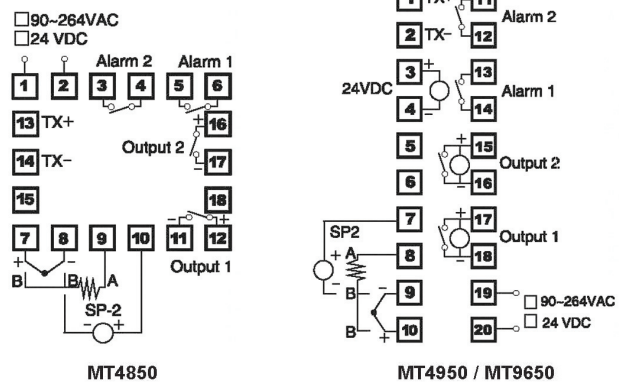


PROGRAMMING LEVEL PARAMETERS

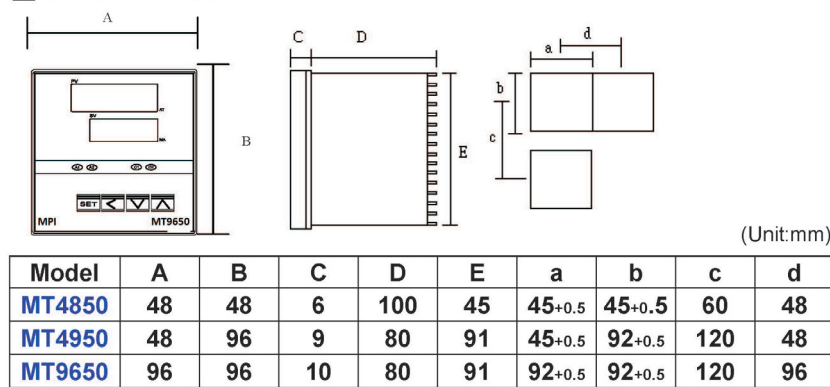


- When 2nd Output (Cooling) is not selected, CPb, Cti, Ctd, HYS2 and db parameters are not available.
- When Pb ≠ 0.0, HYS1 will be skipped.
- When CPb ≠ 0.0, HYS2 will be skipped.
- When Pb = 0.0, ti, td will be skipped.
- When CPb = 0.0, Cti, Ctd will be skipped.

WIRING DIAGRAM



PANEL CUTOUT :



Wiring Precautions:

- Before wiring, verify the controller label for correct model number and option.
- For thermocouple input, use the appropriate compensation wire. And note the polarity of input signal.
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.

PARAMETER DESCRIPTION :

LEVEL Selection
Press **SET** **<** keys for at least 5 seconds to access Soft Level. Use **▽** or **▲** key to select programming level. Then press **SET** key to enter this level.

LEVEL	Description
SoFt	Soft Level
Pid	PID Level
oPt1	Option Level

CODE	DESCRIPTION	RANGE	Default
SP	Set point value of control	LoLt - HiLt	500
R1SP	Alarm 1 set point value/Timer set value while A1FU is set to T.on or T. off, the unit can be HLMM or MM.SS. It depends on the "PInE" parameter.	-1999 - 9999/ 00.00-99.59	10
R2SP	Alarm 2 set point value/Timer set value while A2FU is set to T.on or T. off, the unit can be HLMM or MM.SS. It depends on the "PInE" parameter.	-1999 - 9999/ 00.00-99.59	10
Rt	Autotune no: Auto-tuning is disable YES1: Standard type auto-tuning. PV is compared with SV during auto-tuning. YES2: Low PV type auto-tuning. PV is compared with SV-10%FS during Auto-tuning.	no YES1 YES2	no
HRnd	Manual control no: Disable the manual mode YES: Enable the manual mode.	no YES	no
oUeL	Output percentage. Adjustable when "Hand" is set to "Yes"	-100.0 - 100.0	0.0

Code	Description	Range	Default
rARp	Ramp rate for the process value to limit an abrupt Change of process. (°C/min.)	0 - 9999 (0.0 - 999.9)	0.0
SSP	Set point value of soft-start	LoLt - HiLt	0
oUe	Output percentage of soft-start	0.0 - 100.0	100.0

CODE	DESCRIPTION	RANGE	Default
Pb	Proportional band variable. Set to 0.0 for ON/OFF control mode.	0.0-300.0%	10.0
ti	Integral time (Reset). This value is automatically	0-3600sec	240

td	Derivative (Rate). This value is automatically calculated by activating the Auto tune function. If desired, the user can later adjust this parameter to better suit the application. When PB=0.0, this parameter will be not available. When set to zero, Pb & td ≠ 0 for PD control.	0-900sec	60
Ct	Proportional cycle time of output 1.	0-100sec	15
CPb	Proportional band variable for secondary control output (cooling). Set 0.0 for ON/OFF.	0.0-300.0%	10.0
Cti	Integral time for secondary control output. When PB=0.0, this parameter will be not available. When set to zero, Pb & td ≠ 0 for PD control.	0-3600sec	240
Ctd	Derivative time for secondary control output. When Pb=0.0, this parameter will be not available. When set to zero, Pb & ti ≠ 0 for PI control.	0-900sec	60
Ct2	Proportional cycle time of output 2.	0-100sec	15
HYS1	Hysteresis for ON/OFF control on output 1.	0-2000(0.0-200.0)	1
HYS2	Hysteresis for ON/OFF control on output 2.	0-2000(0.0-200.0)	1
R1HY	Hysteresis of alarm 1.	0-2000	1
R2HY	Hysteresis of alarm 2.	0-2000	1
db	Dead band value. This defines the area in which output 1 and output 2 are both active (negative value) or the area in which output 1 and output 2 are both inactive (positive value).	-1000-1000 (-100.0-100.0)	0
SPoF	Set point offset. This value will be added to SV to perform control. It mainly used to eliminate offset error during P control.	-1000-1000 (-100.0-100.0)	0
PyoF	Process value offset. Permits the user to offset the PV indication from the actual PV.	-1000-2000 (-100.0-200.0)	0
LoLc	Parameter lock. This security feature locks out selected levels or single parameters prohibiting tampering and inadvertent programming changes.		0100
	0000 All parameters are locked out.		
	0001 Only SP is adjustable		
	0010 Only USER level is adjustable		
	0011 USER and PID levels are adjustable.		
	0100 USER,PID,OPTI levels are adjustable.		
	0101 USER,SOFT,PID,OPTI levels are adjustable.		

CODE	DESCRIPTION	RANGE	Default	
tYPE	Input type selection.			
	J	RANGE(°C) -50 ~ 1000 RANGE(°F) -58 ~ 1832		Refer to figure. K
	K	-50 ~ 1370 -58 ~ 2498		
	T	-270 ~ 400 -454 ~ 752		
	E	-50 ~ 750 -58 ~ 1382		
	B	0 ~ 1800 32 ~ 3272		
	R	0 ~ 1750 32 ~ 3182		
	S	0 ~ 1750 32 ~ 3182		
	N	-50 ~ 1300 -58 ~ 2372		
	C	-50 ~ 1800 -58 ~ 3272		
	D-PT	-200 ~ 850 -328 ~ 1652		
	J-PT	-200 ~ 650 -328 ~ 1202		
LINE	-1999 ~ 9999			
Unit	Unit of process value oC: Degrees C. oF: Degrees F. EnG: Engineer unit for linear input.	oC oF EnG	°C	
dP	Decimal point selection. 0000: No decimal point. 000.0: 0.1 resolution 00.00: 0.01 resolution, used for linear input only. 0.000: 0.001 resolution, used for linear input only. After change decimal point, please reconfirm the parameter.	0000 000.0 00.00 0.000	0000	
ACt	Output 1 control action. rEY: Reverse action for heating. dIr: Direct action for cooling.	rEY dIr	rEY	
LoLc	Low limit of span or range. Set the low limit lower than the lowest expected SV and PV display.	Full range	0	
HiLc	High limit of span or range. Set the high limit higher than highest expected SV and PV display.	Full range	1000	
FiLc	Software filter.	0.0-99.9	10.0	
PLeE	Time scale for timer alarm. HHrM Minutes:Minutes; rSS Minutes:Seconds	00.00-99.59	00.00	
A1FU	Alarm 1 function. Refer to alarm function section for detail. If A1FU=None, it means alarm function is cancelled.	None, Hi, Lo, dif.H, dif.L, bd.Hi, bd.Lo, ton, toFF	dIFH	
A1nd	Alarm 1 mode. Refer to alarm mode section for detail.	none, Stdy, Lath, St.La	nonE	
A2FU	Alarm 2 function. Refer to alarm function section for detail. If A2FU=None, it means alarm function is cancelled.	none, Hi, Lo, dif.H, dif.L, bd.Hi, bd.Lo, ton, toFF	dIFL	
A2nd	Alarm 2 mode. Refer to alarm mode section for detail.	none, Stdy, Lath, St.La	nonE	
Addr	Address of controller when communication with master device.	0 - 255	0	
bRUd	Communication baud rate. 2.4k=2400bps, 4.8k=4800 bps, 9.6k=9600 bps, 19.2k=19200 bps	2.4k, 4.8k, 9.6k, 19.2k	9.6k	

ALARM FUNCTION

A1FU/A2FU	ALARM TYPE	ALARM OUTPUT OPERATION
nonE	Alarm function OFF	Output OFF
Hi	Process high alarm	ALSP → PV
Lo	Process low alarm	ALSP → PV
dIFH	Deviation high alarm	SP+ALSP → PV
dIFL	Deviation low alarm	SP+ALSP → PV
bdHi	Band high alarm	OFF → PV
bdLo	Band low alarm	OFF → PV
ton	On-timer	ALSP → PV
toFF	Off-timer	ALSP → PV

ALARM MODE

A1MD/A2MD	DESCRIPTION
nonE	Normal alarm mode/ When timer function is selected, PV<SV timer function is not available.
Stdy	Standby mode When selected, in any alarm function, prevents an alarm on power on. The alarm is enabled only when the process value reach alarm set point. Also known as "Startup inhibit" and is useful for avoiding alarm trips during startup.
LrLc	Latch mode. When selected, the alarm output and indicator latch as the alarm occurs. The alarm output and indicator will be energized even if the alarm condition has been cleared unless the power is shut off. When Timer function is selected, PV<SV timer function is available.
StLA	Standby and latch mode