

TEMPERATURE CONTROLLER

Farnell Order Code: 4408455

Manufacturer Part No: MP- 4T2A0

www.multicomp-pro.com

150 Armley Road, Leeds, LS12 2QQ.
Riverside One, Sir John Rogerson Quay, Dublin 2



CAUTION

- Do not touch the terminals while power is being supplied.
- Tighten terminal screws with the specified torque.
- Always follow instructions stated in product leaflet.
- Before installation, check to ensure that specifications agree with intended application.
- During installation, keep 10mm distance on both sides of product from adjacent devices.
- Suitable dampers should be provided in the event of excessive vibrations.
- Only qualified persons are authorized to install the product.
- Use slow blow fuse of 250mA rating in series with product supply.
- Device should be kept away from wet, dust & humidity environments.
- When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring
- Use of contactors is recommended if load exceeds the contact rating Please see Inductive load category
- When replacing the sensor, please turn OFF the power
- Device manufacturer will not be responsible if any incident occur due to negligence of cautions.

FEATURES

- Compact Size, Lower depth of 65mm
- Wide auxiliary supply voltage range 90 -270V AC/DC.
- Configurable Output : Relay or 12V, 50mA SSR drive.
- Universal Input Capability: Thermocouple & Pt100.
- IP-65 Front panel Protection.
- Sensor Break, Over Range & Under range detection, SSR short circuit.
- Auxiliary output for Alarm indication.
- Indication for Relay output, Autotune.
- Confirms to CE and EMC directive.

TECHNICAL SPECIFICATIONS			
Supply Characteristics			
Rated Supply voltage (Un)		90V to 270V AC/DC	
Supply frequency		47/ 63 Hz	
Typical Power Consumption		6VA @240VAC	
Functional Characteristics			
Sensor Inputs (IEC)		1) Thermocouple (J, K, T, R & S) 2) RTD (Pt-100, 3-wire, 2-wire) For 2 wire RTD short terminal number 9-10	
Sensor Measurement Range	J-type	°C °F	-199 to 750 -326 to 1382
	K-type	°C °F	-199 to 1350 -326 to 2462
	T-type	°C °F	-199 to 400 -326 to 752
	R & S- type	°C °F	0 to 1750 32 to 3182
	RTD (PT-100)	°C °F	-200 to 850 -328 to 1562
Resolution		For J,K,T & PT100 : 0.1/1°C For R& S : 1°C Fixed -5 to 60 mV: 0.01/0.1/1°C	
Measurement Accuracy		TC: ±0.5% of PV or ±2°C (Higher one) ±1 digit. R & S: ±0.5% of PV or ±2°C (Higher one) ±1 digit. RTD: ±0.5% of PV or ±3°C (Higher one) ±1 digit. mV :±0.1% of FS	
Signal Sampling Time		50 mS	
Key De-bouncing time		30 mS	
Error Indications	SErr	Sensor open/Break error	
	oUr9	Over range error	
	Unr9	Under range error	
	ERt	Error in auto tune	
	SSr	SSR short circuit detection	

NOTE

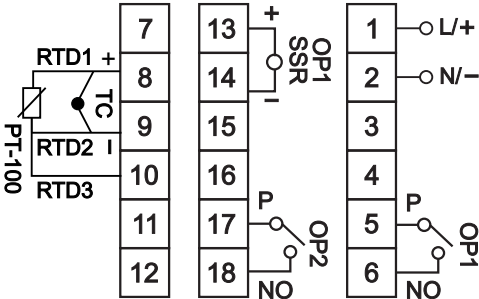
- 20 Min Warm-up time for all Thermocouple sensor
- Accuracy ±10°C over the temperature range & under influence of electromagnetic environment .
- Product innovation being a continuous process, we reserve the right to alter specifications without any prior notice
- Ensure that the input sensor connected at the terminals and the input type set in the product configuration are the same.
- To allow the heat to escape, do not block the area around the product.
Do not block the ventilation holes around the product.
- To avoid inductive noise, do not wire power lines together with or parallel along with sensor cables

Environmental Parameters	
Operating Temperature	0 °C to 60 °C
Storage Temperature	-20 °C to 75 °C
Humidity	85% RH (Without condensation)
Altitude	2000 meters (Max)
Pollution Degree	2
Over voltage category	II
Mechanical Parameters	
Degree of protection	Front fascia -IP 65 , Enclosure - IP 30 & Terminals- IP 20
Housing	UL94-00
Mounting	Panel Mounting
Dimensions (L X W X D)	48 x 48 x 65 in mm
Weight (Unpacked)	95 gm Approx.

Output Characteristics

Output 1 Relay/SSR	SPST, 10A @250VAC/ 24V DC OR SSR 12Vdc, 50mA
Output 2 Relay	SPST, 5A @250VAC/ 24VDC
Contact arrangement	Relay 1 : 1 C/O (5,6) Relay 2 : 1 C/O (17,18)
Contact Material	AgNi
Mechanical Life	1 × 10 ⁷ Operations
Electrical Life	1 × 10 ⁵ Operations
SSR O/P Voltage	12VDC, 50mA (Max)

CONNECTION DIAGRAM



TERMINAL TORQUE AND CAPACITY

Tightening Torque	0.5 Nm(4.5 LB.in) Terminal Screw - M3
	1 × 2.5 mm² Wire with Lug AWG: 1 X 22 to12

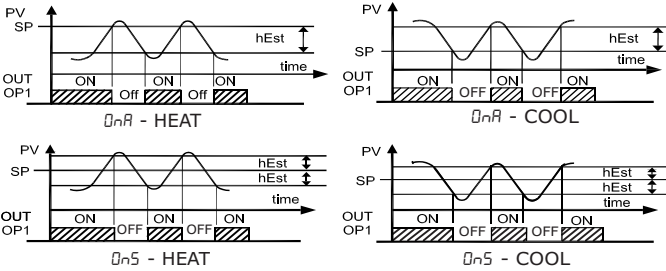
ELECTROMAGNETIC COMPATIBILITY	
Product Standard IEC 61326	
EMI/ EMC TEST	
Harmonic Current Emissions	IEC 61000-3-2 Class A
Voltage Flicker and Fluctuations	IEC 61000-3-3 Class A
ESD	IEC 61000-4-2 Level 3
Radiated Susceptibility	IEC 61000-4-3 Level 3
Electrical Fast Transients	IEC 61000-4-4 Level 4
Surge	IEC 61000-4-5 Level 3
Conducted Susceptibility	IEC 61000-4-6 Level 3
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Voltage Dips & Interruptions (DC)	IEC 61000-4-29
Conducted Emission	CISPR 11 Class A
Radiated Emission	CISPR 11 Class A

SAFETY DATA	
Dielectric strength(Input & Output)	IEC 60255-5 Level 2kV
Impulse Voltage between input and output	IEC 60255-5 Level 4kV
Insulation Resistance	UL 508, >100MΩ
Leakage Current	UL 508, <3.5mA
Single Fault test	IEC 61010-1

ENVIRONMENTAL DATA	
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC60068-2-27
Non-repetitive Shock	IEC60068-2-27

USER GUIDE

CONTROL ACTION:==>
1) ON/OFF Control: Parameters regarding ON/OFF control are placed under DN (Down) in Input menu .This type of control can be set by programming parameter "con"= On5 for ON-OFF action with symmetric hysteresis OR OnR for ON-OFF action with asymmetric hysteresis. It drives the output programmed as COP ,depending on the measured temperature value, on set point, function mode (Fun) and on the hysteresis (H55).In case of reverse action i.e. HEAT being set on par. "Fun" menu, the controller activates the output when the process value "PV" goes below [SP-H55]. It deactivates the output when the PV goes above "SP+H55" in case of symmetric ON-OFF control and above "SP" in case of Asymmetric ON-OFF control. Similarly in case of direct action i.e. COOL being set on par. "Fun", the controller activates the output when the process value "PV" goes above 'SP+H55' & deactivates the output when "PV" goes below 'SP-H55' in case of symmetric ON-OFF control & "SP" in case of Asymmetric ON-OFF control.



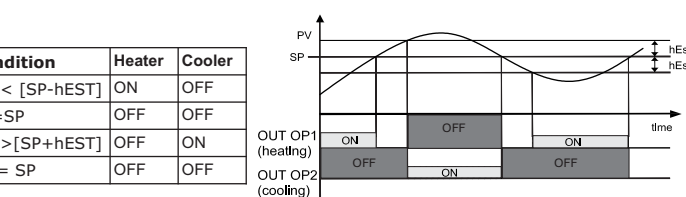
2) PID Control: Parameters regarding PID control are placed under DN (Down) key in Input menu .This type of control can be set by programming parameter "con"= PID. A PID controller depending upon the effective setpoint "SP", function "fun" and on the instrument's PID algorithm the control output is calculated. The PID control algorithm foresees the setting of following parameter: Pb: Proportional band
Int: integral Time
Der: derivative Time
Ct : Cycle time

3)Double acting PID Control: The double action PID control is used to control processes where there is an element which causes a positive increase in temperature (ex.Heating) and an element which causes a decrease in temperature (cooling). This type of control is selected by setting outputs/Function as HEAT & COOL. The effective set Point "SP" and the instruments algorithm decides the controller output of Double Action PID control. The cycle times "hct" (Heat cycle time: for output acting on heater) and "cct" (cool cycle time: for output acting on cooler) should have low value with frequent intervention of control outputs, so that good stability of process variable can be achieved, in case of fast processes. It is recommended to use solid state relays to drive actuators. The Double Action PID control algorithm needs the programming of following parameters:

Pb: Proportional band
Int: integral Time
Der: derivative Time
hCt: Heat cycle time
cct: Cool cycle time
rS: Manual reset (If Int=0)
coEF: Coefficient Relation between power heating and cooling element. Range between 0.1 to 10.
coEF > 1: Represents that the cooling element is stronger than heating element.
coEF = 1: Represents that the heating and cooling element are equally strong.
coEF < 1:Represents that the heating element is stronger than cooling element.

4) Neutral Zone ON/OFF Control (nr): Parameters regarding to neutral zone ON/OFF control are listed in the input group. This type of control can be set when two outputs configured by parameter OP1 as heater and OP2 as cooler and the parameters "cont" = nrzn. The neutral zone control is used to control processes in which there is an element which causes a positive increase in temperature (eg. Heater, Humidifier etc.) and an element which causes decrease in temperature (e.g. Cooler, de-humidifier, etc.) Depending on measurements of effective set point "SP" and on hysteresis "hEst", the control functions works on programmed outputs. The controller activates the output configured as heater when process value goes below [SP-hEst] and deactivates it once the PV reaches SP. Further it activates the output configured on cooler when process value goes above [SP+hEst]. The cooler output is deactivated when PV reaches SP again.

Note: This type of control is applicable for double acting cat ids only.



cmdc Menu :Compressor duty cycle is used to protect compressor short cycling. It is a time based activation of the compressor. The activation of compressor can be avoided till the time set on parameter "cmdc",thus providing the delay. Time programmed on cmdc is counted starting from last output deactivation and then even if the regulator requires to switch on the corresponding output, the activation is delayed till the time set on "cmdc" elapses.

Note : This menu is visible only when control type is Neutral zone
Auto tuning: Parameters regarding Auto tuning are placed under UP key in regulator (reg) menu.

This Auto tuning can be set by programming parameter "TUNE"= OFF for Auto tune action with Fun = "hEst" if using heater or "cool" if using cooler. It drives the output programmed as coP [in STATUS], depending on the setting:
"TEP" - Tune at every Power ON.
"T1P" - Tune at first power ON.
"TMN" - Tune manually.
"TSP" - Tune at every set point change.
The condition needs to satisfy for to start Auto tune For Ag1 & Ag2:
If "Fun/OP" is "hEst", : PV<[SP - |SP/3|]
PV < [SP - |SP/5|] if soft start is configured
If "Fun/OP" is "cool", : PV>[SP + |SP/3|]
PV>[SP + |SP/5|] If Soft start is configured
If the PV condition is not satisfied at start of auto tune, display will shows "ERL" message and device works according to previous set program of PID.

Rate (-5tE) & Offset (oF5t): Product can be re-calibrated according to application needs, by using par. "oF5t" and "rAtE". If "rAtE" = 1.00, then using par "oF5t", it is possible to set positive or negative offset that is simply added to the value read by the probe. If the offset set is not to be constant for all measurements, it is possible to operate the calibration on any of two points. In this case, in order to decide which values to program on par. "oF5t" and "rAtE", the following formulae must be applied:
"rAtE" = (y2-y1)/(x2-x1)
"oF5t" = y2 - rate*x2

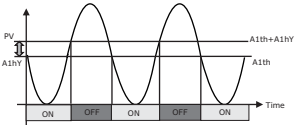
Where, y1 = Measured temperature 1
x1 = temperature displayed by instrument
y2 = Measured temperature 2
x2 = temperature displayed by instrument.
The instrument thus visualizes the temperature as:
y = x * "rAtE" + "oF5t"
where y = displayed value and x = measured value. Offset is placed under DN (Down) in Input menu & rate is placed under enter key in advance "RtP" menu option.

Soft Start: All parameters referring to the soft start functioning are contained in the group "rEg". The soft start functioning allows limitation of output power when instrument is switched on for a limited period of time. Following parameters are needed:
"Sst" - Soft start time in hh: mm
"SStH" - Soft start threshold & "STP" - Soft start power
Soft start functionality will abort when sst or ssth whichever earlier is met.

ALARMS

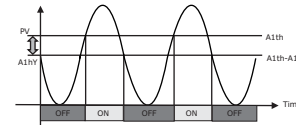
1. Absolute low ("AbLO" on display): Alarm is activated if PV goes below A1th and is deactivated if PV goes above (A1th+A1hy).

Menu	Sub menu	Option
AL1/AL2	A1tY	AbLo



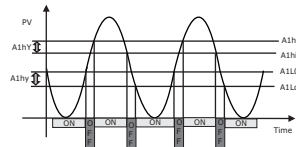
2. Absolute high ("AbhI" on display):Alarm is activated if PV goes above A1th and is deactivated if PV goes below (A1th-A1hy).

Menu	Sub menu	Option
AL1/AL2	A1tY	Abhi



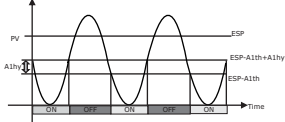
3. Absolute band ("AbbA" on display): Alarm is activated if PV goes above A1hi or below A1Lo. It is deactivated if it goes below (A1hi-A1hy) or above (A1Lo+A1hy).

Menu	Sub menu	Options
AL1/AL2	A1tY	AbbA



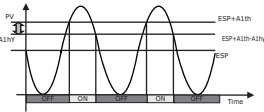
4. Deviation low ("dELo" on display): Alarm is activated if PV goes below (Effective Set Point(ESP) - A1th) and is deactivated when it goes above (Effective Set Point (ESP)-A1th + A1hy).

Menu	Sub menu	Options
AL1/AL2	A1tY	dELo



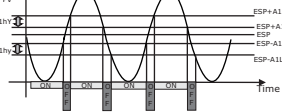
5. Deviation high("dEhi" on display):Alarm is activated when PV goes above Effective Set Point(ESP) +A1th) and is deactivated When it goes below (Effective Set Point(ESP) + A1th-A1hy).

Menu	Sub menu	Option
AL1/AL2	A1tY	dEhi



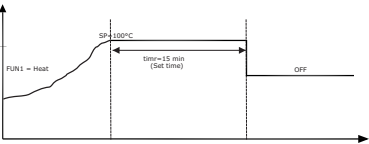
6. Deviation band ("dEbA" on display): Alarm is activated when PV goes above (Effective Set Point(ESP) + A1hi) or below (Effective Set Point(ESP) - A1Lo) and is deactivated when PV goes below (Effective Set Point (ESP)+ A1hi - A1hy) or above (Effective Set Point(ESP) - A1Lo + A1hy).

Menu	Sub menu	Option
AL1/AL2	A1tY	dEbA



Timer: 1) When PV value reach or cross to SP then the timer will start, during this process FUN1= Heat will be in controlling action.

2)Timer functionality works in both PID & in ON-OFF mode. For e.g: When PV reaches to SP=100°C then the timer will start, Timer will be on for timr=15 minutes then after completing timer time Op1 will be continues OFF and "ovEr" will displays on lower display.



Output in case of measurement error: In case of measurement error (over range/under range/sensor break), the instrument supplies the power as programmed on parameters "oPP". In case of PID control, the power output is as a percentage of cycle time. In case of ON/OFF control, the Cycle time is automatically considered as 20s ("e.g. In event of probe error with ON/OFF control and "oPP = 50" the control output will be activated for 10s and deactivated for 10s till measurement error remains.)

If No Error

Controller	Output Power
PID	As per % of cycle time
On/Off	20 Secs

If Error

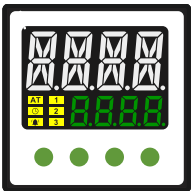
Controller	Output Power
Any	As per programmed in opp

Information on waste disposal for consumers of electrical and electronic equipment:



When this product has reached the end of its life it must be treated as Waste Electrical & Electronic Equipment (WEEE). Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Contact your local authority for details of recycling schemes in your area.

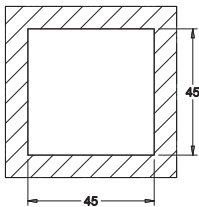
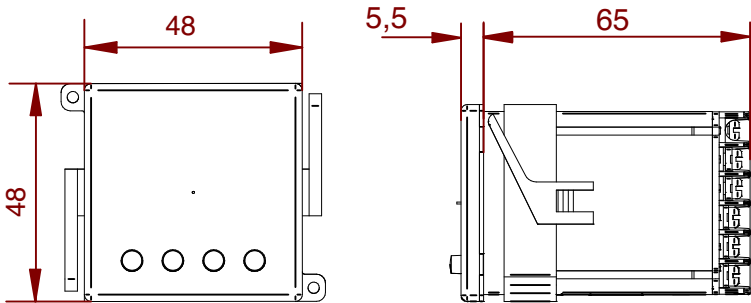
FRONT FACIA



Front Keys Description		
1	ESC (Escape key)	To exit from main menu. To return to home screen. To abort changed value or parameter. Press 2 sec to display SP menu.
2	DN (Down key)	Press once to display the effective set value. To decrement the value.
3	UP (Up key)	Press once to display the set value. To increment the value.
4	ENT (Enter key)	Press 2 sec to enter into the main menu. To save & move to next parameter. To acknowledge alarm condition.

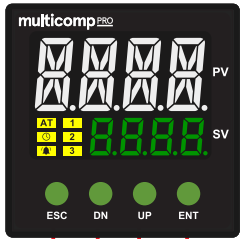
Sr.no	Display/Indications	Description
1	PV	To display the Process Value
2	SV	To display the Set Value
3	OP/[1]	To indicate the LED for Output 1
4	OP/[2]	To indicate the LED for Output 2
5	OP/[3]	To indicate the LED for Output 3
6	AT	To indicate the LED for Auto tuning process
7		To indicate that Timer functionality is in process
8		To Indicate Alarm status

MOUNTING DIMENSION (mm)



RECOMMENDED PANEL CUTOUT
45 mmX 45 mm +0.5 mm

Menu flow



Press ENT key 2 Sec
Main menu

Display value	Parameter Description	Default value	Range
INP	Input menu		Refer INP menu flow
REG	Regulator menu		Refer REG menu flow
PWD	Password	DIS	DIS/EN EN : 0 to 9950
F.RST	Factory reset	N	NO/YES (If yes, DNE will display & product will be factory reset)
ADV	Advance menu	N	NO/YES

Press ESC key for 2 Sec

Display value	Parameter Description	Default value	Range
SP1	Set Point 1	- - -	SPLL to SPHL
SP2	Set Point 2	- - -	SPLL to SPHL
SP3	Set Point 3	- - -	SPLL to SPHL
ESP	Effective Set Point	SP1	SP1,SP2,SP3

Note : SP1, SP2 & SP3 range will be updated as per Select sensor SPLL & SPHL.

Press DN key for 2 Sec
Input menu (INP)

Display value	Parameter Description	Default value	Range
SENS	Sensor	J	J/K/T/R/S/PT1
EOP	Controller Output	RLY	RLY/SSR
CONT	Control action	PI	PID/ONFS/ONFA
FUN1	Function 1	HEAT	HEAT/COOL/OFF
UNIT	Unit	C	°C/°F
DP	Decimal Point	.	1/0.1
FUN2	Function 2	OFF	HEAT/COOL/OFF/ALM
OFFST	Offset	0	-1999 to 9999
Note : Below Alarm menus will be visible if FUN2=ALM			
ALM	Alarm	.	ABLO/ABHI/ABBA/DELO/DEHI/DEBA
AL0	Alarm Low	0	-1999 to AHI
AHI	Alarm High	100	ALO to 9999
ALTH	Alarm threshold	0	-1999 to 9999
ALHY	Alarm Hysteresis	0	0 to 9999

Press UP key for 2 Sec
Regulator menu (REG)

Display value	Parameter Description	Default value	Range
TUNE	Auto tune	TOFF	TOFF/TMN/T1P/TSP/TEP
ALGO	Controlling Algorithm	AG1	AG1/AG2/AG3
PB	Proportional Band	10	1 to 9999
INT	Integral time	120	0 to 9999 S
DER	Integral time	30	0 to 9999 S
CYT	Cycle time	10	1 to 130 S
ECT	Cool cycle time	15	1 to 130 S
RS	Manual reset	0.0	Double Acting: -100.0 to 100.0 Single Acting: 0.0 to 100.0
RS menu will be visible if Int=0			
TIMER	Timer time	OFF	OFF to 9999 m
SPLL	Set point low limit	-100	Low value of Selected sensor
SPHL	Set point high limit	100	to High value of Selected sensor
RATE	RATE	1.000	0.001 to 2.000
DUR	Display update rate	1	1 to 100
DISP	Lower Display Configurable	SP	SP,COP,Timr, Unit,CJC
Hyst menu will be visible if CONT= ONFS or ONFA			
HYST	Hysteresis	0	0 to 9999