Autonics

TEMPERATURE CONTROLLER

TD4LP SERIES

M A N U A L

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;
⚠ **Warning** Serious injury may result if instructions are not followed.
⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ caution: Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machineries(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device, or contact us.**
   It may cause fire, human injury or property loss.
2. **Install the unit on a panel.**
   It may cause an electric shock.
3. **Do not connect, inspect or repair when power is on.**
   It may cause an electric shock.
4. **Wire properly after check terminal number.**
   It may cause a fire.
5. **Do not disassemble the case. Please contact us if it is required.**
   It may cause an electric shock or a fire.

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock.
2. **When connect wire, no.20AWG(0.50mm²) should be used and screw bolt on terminal block with 0.74N・m to 0.90N・m strength.**
   It may cause a malfunction or fire due to contact failure.
3. **For crimpled terminal, select following shaped terminal.**

4. **Please observe the rated specifications.**
   It might shorten the life cycle of the product and cause a fire.
5. **Do not use beyond of the rated switching capacity of relay contact.**
   It may cause insulation failure, contact melt, contact failure, relay broken and fire etc.
6. **In cleaning unit, do not use water or an oil-based detergent and use dry towels.**
   It may cause an electric shock or a fire.
7. **Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration and impact etc.**
   It may cause a fire or an explosion.
8. **Do not inflow dust or wire dregs into the unit.**
   It may cause a fire or a malfunction.
9. **Please wire properly after check the terminal polarity when connect temperature sensor.**
   It may cause a fire or an explosion.
10. **In order to install the units with reinforced insulation, use the power supply unit which basic insulation level is ensured.**

▣ Ordering information

T D 4 LP − 1 4 R

Control output	R	Relay output+SSR drive output
	C	Current output+SSR drive output
Power supply	4	100−240VAC 50/60Hz
Alarm output	1	Alarm1 output
Size	LP	DIN W96×H96mm Alarm setting type
Digit	4	9999(4 Digit Type)
Setting type	D	Set by digital switch
Item	T	Temperature Controller

▣ Parts description

① Temperature display
It shows current temperature(PV) in RUN mode and parameter and set value for each setting group in parameter change mode.
② Temperature unit(℃/℉) indicator
−It shows current temperature unit.
−Temperature unit(℃ or ℉) display lamp will be flickering during AT function.
③ Control/sub output indicator
−OUT: It will be ON when control output is ON.
※In case of current output type, it will be OFF when output level is under 2%, and ON when output level is over 3%.
−AL: It will light up when ALARM SET output is on.
④ MODE Key: Used when entering into parameter setting group, returning to RUN mode, moving parameter and saving setting values.
⑤ Adjustment: Used when entering into set value change mode, Digit moving and Digit Up/down.
Press ▽+△ key at the same time to move Digit or to operate [`StoP`] function.
⑥ Digital switch: Used for SV setting or for ALARM SV setting.

※The above specifications are subject to change without notice.

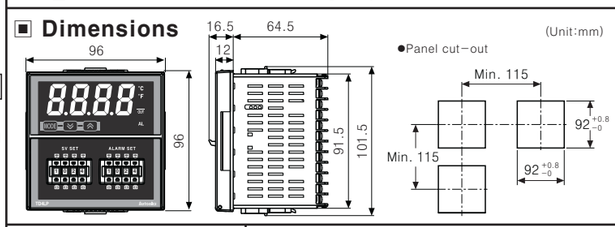
▣ Specifications

Series		**TD4LP**
Power supply		100−240VAC 50/60Hz
Allowable voltage range		90 ~ 110% of rated voltage
Power consumption		Max. 5VA
Display method		7 Segment(Red), Other display(Green, Yellow, Red LED)
Character size		H22mm×W11mm
Input type	RTD	DIN Pt100Ω(Allowable line resistance max.5Ω per a wire)
	TC	K(CA), J(IC)
Display accuracy	RTD	**(※1)** (PV ±0.5% or ±1℃ higher one) rdg ±1Digit
	TC	☞Based on normal temperature(23℃ ± 5℃)
Control output	Relay	250VAC 3A 1a
	SSR	24VDC ±3V 20mA Max.
	Current	DC4 − 20mA (Load resistance Max. 600Ω)
Alarm output		AL Relay: 250VAC 1A 1a
Control method		ON/OFF and P, PI, PD, PID control
Hysteresis		1 ~ 100 ℃/℉
Proportional band(P)		0.1 ~ 999.9 ℃/℉
Integral time(I)		9999 sec.
Derivative time(D)		9999 sec.
Control period(T)		0.5 ~ 120.0 sec.
Manual reset		0.0 ~ 100.0%
Sampling period		100ms
Dielectric strength		2000VAC 50/60Hz for 1min.(Between input terminal and power terminal)
Vibration		0.75mm amplitude at frequency of 5~55Hz in each X, Y, Z directions for 2 hours
Relay life cycle	Control output	Mechanical: Min. 10,000,000 operations, Electrical: Min. 100,000 operations
	Alarm output	Mechanical: Min. 5,000,000 operations, Electrical: Min. 100,000 operations
Insulation resistance		Min. 100MΩ(500VDC megger)
Noise immunity		Square−wave noise by noise simulator(pulse width 1㎲) ±2kV R−phase and S−phase
Memory retention		Approx. 10 years (When using non−volatile semiconductor memory type)
Ambient temperature		−10 ~ 50℃(at non−freezing status)
Storage temperature		−20 ~ 60℃(at non−freezing status)
Ambient humidity		35 ~ 85%RH
Insulation type(※2)		⧈
Approval		CE cULus
Unit weight		Approx. 185g

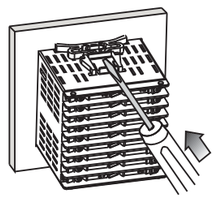
※ **1**: (PV ±0.5% or ±2℃ higher one) rdg ±1Digit, in case, out of normal temperature range.
※ **2**: "⧈" Mark indicated that equipment protected throughout by double insulation or reinforced insulation.

▣ Dimensions

(Unit:mm)

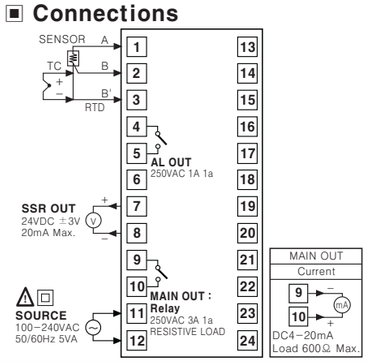


▣ Product mounting



※Insert product into a panel, fasten bracket by pushing with tools as shown above.

▣ Connections



▣ Input sensor and range[`In-t`]

●Select proper input sensor type by user' application.

Input sensor			Display	Input range (℃)	Input range (℉)
ThermoCouple	K(CA)		`KCA`	−50 ~ 1200	−58 ~ 2192
	J(IC)		`JIC`	−30 ~ 500	−22 ~ 932
RTD	DIN rated	DPt100Ω	`Pt`	−100 ~ 400	−148 ~ 752

●Setting range: [`KCA` / `JIC` / `Pt`] (Default: [`KCA`])

▣ Factory default

●**First setting group**

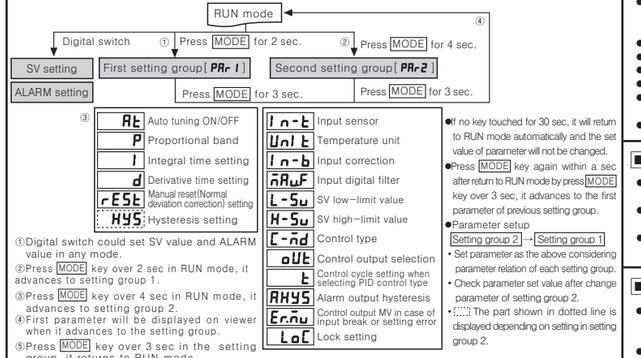
Parameter		Factory default
`At`	Auto Tuning	`oFF`
`P`	Proportional Band	100
`I`	Integral time	0
`d`	Derivative time	
`rESt`	Reset	500
`HYS`	Hysteresis	2

※Default for [`t`] ☞ Relay contact output: 20.0 sec./ SSR output: 2.0 sec.

●**Second setting group**

Parameter		Factory default	Parameter		Factory default
`In-t`	Input sensor	`KCA`	`C-Fd`	Control type	`PId`
`Unit`	Temperature Unit	℃	`oUt`	Output output type	`rLY`
`In-b`	Input correction	0	`AHYS`	Alarm output hysteresis	1
`FAuF`	Input Digital Filter	0.1	`t`	Control cycle	200
					20
`L-Su`	SV low−limit value	-50	`Er.Fu`	Control output MV for input break error or setting errir	0.0
`H-Su`	SV high−limit value	1200			
`o-Ft`	Control output operation	`HEAt`	`LoC`	Lock setting	`oFF`

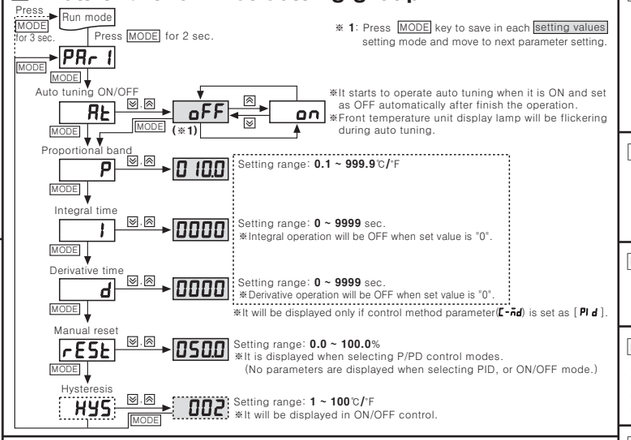
▣ Flow chart for setting group



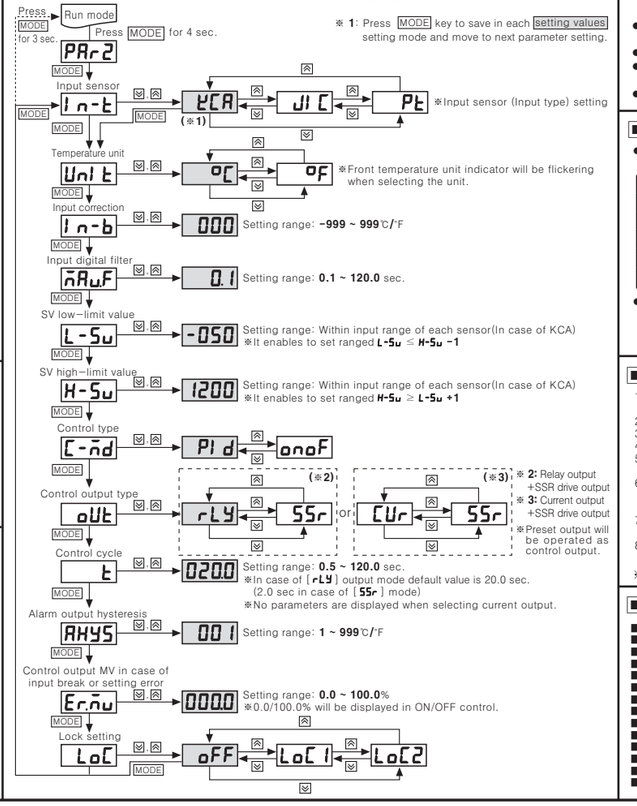
①Digital switch could set SV value and ALARM value in any mode.
②Press MODE key over 2 sec in RUN mode, it advances to setting group 1.
③Press MODE key over 4 sec in RUN mode, it advances to setting group 2.
④First parameter will be displayed on viewer when it advances to the setting group.
⑤Press MODE key over 3 sec in the setting group, it returns to RUN mode.

●If no key touched for 30 sec, it will return to RUN mode automatically and the set value of parameter will not be changed.
●Press MODE key again within a sec after return to RUN mode by press MODE key over 3 sec, it advances to the first parameter of previous setting group.
●Parameter setup
Setting group 2 → Setting group 1
• Set parameter as the above considering parameter relation of each setting group.
• Check parameter set value after change parameter of setting group 2.
• ⬚ The part shown in dotted line is displayed depending on setting in setting group 2.

▣ Flow chart for first setting group



▣ Flow chart for second setting group

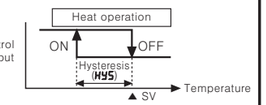


▣ Auto tuning[`At`]

●When setting [`At`] parameter to [`on`], front temperature unit display(℃ or ℉) lamp will be flickering during Auto tuning. After completing auto tuning, temperature unit display lamp returns to normal operation and [`At`] parameter automatically becomes [`oFF`].
●Set as [`oFF`] to stop auto tuning. ※It keeps previous P, I, D set values.
●If SV is changed during auto tuning mode, auto tuning is stopped.
●PID time constants figured out thru auto tuning function can be changed.
●If control type is [`onoF`] mode, no parameters are displayed.
●Finish auto tuning when error(`oPEn`) occurs during the operation.
※In case of [`oPEn`] error, auto tuning is not applicable.
●Setting range: [`oFF` / `on`] (Default: [`oFF`])

▣ Hysteresis[`HYS`]

●In case of selecting ON/OFF control mode, it is required to set hysteresis.
●Related parameters are displayed only if selecting ON/OFF control mode.
●Setting range: [`1` ~ `100`] (Default: [`2`], Unit: ℃/℉)

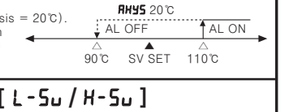


▣ Digital filter[`FAuF`]

●A function to filter input signals for more stable PV display in order to provide stable control output. If noise occurs on input signals or PV value keeps changing, it gets difficult to perform high accuracy control.
●Setting range: [`0.1` ~ `1200`](Default: [`0.1`]sec.)

▣ Alarm output function

●When PV is higher than or equal to ALARM SV, alarm output will be ON and it becomes OFF according to [`AHYS`] setting when PV is lower than ALARM SV.
• ALARM output hysteresis[`AHYS`]
The figure represents the example of ALARM output operation(ALARM SV=110℃, ALARM output hysteresis = 20℃). ALARM output hysteresis(`AHYS`) is to represent alarm output ON / OFF cycle. It is allowed for users to set ALARM output hysteresis.



▣ SV High/Low Limit Setting[`L-Su` / `H-Su`]

●A function to set high / low limit for SV(※ [`L-Su` > `H-Su`] cannot be set.)
●Users can set / change SV within the range of [`H-Su`]~[`L-Su`].
●In case of ALARM setting, no temperature range limit exists.
●When changing input sensors(`In-t`), [`H-Su`] and [`L-Su`] are automatically reset to Max / Min. of input sensor temperature range.

▣ Control output selection[`oUt`]

●In case of Relay output type models, both Relay output and SSR drive output are available.
●In case of current output type models, both current output(4~20mA) and SSR drive output are available.
●Setting range: [`rLY/SSr`], [`CUr/SSr`]

▣ RUN/STOP function[`StoP`]

●Press front key (▽+△) for 3 sec at the same time to perform RUN/STOP function [`StoP`]
●RUN/STOP function [`StoP`] is to make control output stop in RUN mode by force.
●In case power is off while [`StoP`] mode, [`StoP`] mode will be kept after Power is supplied again.
●Press FUNC key (▽+△ key) for 3 sec to return to RUN mode.

▣ Control output MV[`Er.Fu`] for sensor break[`oPEn`] and setting error[`Er.Su`] modes

●A function to set control output MV when sensor breaks / setting errors occur.
(In case of open error, alarm output is ON.)
●It executes control output by set MV regardless of ON/OFF or PID control output.
●ON/OFF control setting range: [`00`](OFF) / [`1000`](ON)
PID control setting range: [`00`]~[`1000`]
●Default: [`00`] (Unit: %)

▣ Error

●Error mark will flash(every 1sec.) in PV viewer when error occurs during the control operation.

Display	Description
`Er.Su`	If SV digital switch setting goes beyond setting range
`Er.AL`	If ALARM digital switch goes beyond setting range
`oPEn`	If input sensor is disconnected or sensor is not connected.
`HHHH`	If measured sensor input is higher than temperature range.
`LLLL`	If measured sensor input is lower than temperature range.

●As soon as error causing factors get solved (by connecting input sensors / by making sensor input within the rated range), error mark [`oPEn` / `HHHH` / `LLLL`] will be disappeared and returning to normal operation mode.

▣ Lock setting[`LoC`]

●A function to prevent changing SV and parameters of each setting group.
●Parameter setting values are still possible to check while Lock mode is ON.

Display	Description
`oFF`	Lock off
`LoC 1`	Lock setting group 2
`LoC2`	Lock setting group 1, 2

●Setting range : [`oFF` / `LoC 1` / `LoC2`] (Default : [`oFF`])

▣ Caution for using

1. Installation environment
   ①It shall be used indoor. ②Altitude Max. 2000m. ③Pollution Degree 2. ④Installation Category Ⅱ.
2. Please install power switch or circuit−breaker in order to cut power supply off.
3. The switch or circuit−breaker should be installed near by users.
4. Do not use this product as Volt−meter or Ampere−meter, this is a temperature controller.
5. Be sure to use compensating wire when extends wire from controller to thermocouple, otherwise the temperature deviation will be occurred at the part where wires are connected to each other.
6. In case of using RTD sensor, 3 wire type must be used. If you need to extend the line, 3wires must be used with the same thickness as the line. It might cause the deviation of temperature if the resistance of line is different.
7. In case of making power line and input signal line closely, line filter for noise protection should be installed at power line and input signal line should be shielded.
8. Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, large capacity SCR controller)

※It may cause malfunction if above instructions are not followed.

▣ Major products

■ Proximity sensors
■ Area sensors
■ Door/Door side sensors
■ Counters
■ Rotary encoders
■ Power controllers
■ Panel meters
■ Graphic/Logic panels
■ Temperature controllers
■ Tachometer/Pulse(Rate) meters
■ Temperature/Humidity transducers
■ Stepping motors/drivers/motion controllers
■ Laser marking system(CO_2, Nd:YAG)
■ Laser welding/soldering system
■ Photoelectric sensors
■ Fiber optic sensors
■ Pressure sensors
■ Timers
■ Display units
■ Sensor controllers

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