TT109X / TT107X / TT104X
AUTO-TUNE PID TEMPERATURE CONTROLLER & TIMER

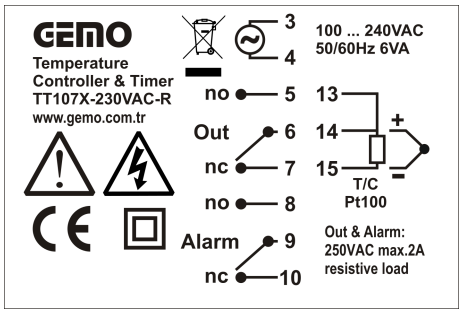
Attention, Risk of, Danger, Warning	High Voltage, Risk of Electric Shock	Double / Reinforced Insulation	NOT Litter	CE Mark

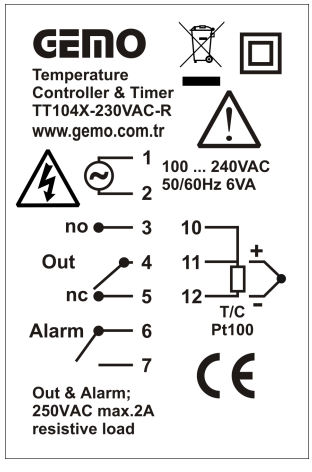
TECHNICAL SPECIFICATION

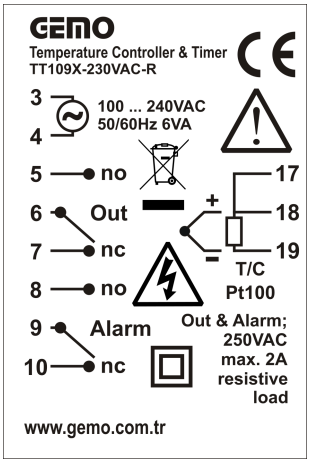
- **Dimensions** : TT109X:96x96, TT107X:72x72, TT104X:48x48mm
- **Panel Cut-out** : TT109X:91x91, TT107X:68x68, TT104X:45,5x45,5mm
- **Display** : 4 Digits 7 Segment (PV), 4 digits 7 Segment (SV)
- **Sensor Type** : J,K,T,S,R type T/C, Pt100 selectable
- **Measuring Scale** : -100 .. 600 ºC, J type T/C, (Inpt=J), -100 .. 1300 ºC, K type T/C, (Inpt=k)
  -100 .. 400 ºC, T type T/C, (Inpt=t), 0 .. 1750 ºC, S type T/C, (Inpt=S)
  0 .. 1750 ºC, R type T/C, (Inpt=r), -100 .. 600 ºC, Pt100, (Inpt=Pt)
  -99.9 .. 600.0 ºC, Pt100, (Inpt=Pt.0)
- **Resolution** : ± 1 ºC or ± 0.1 ºC
- **Accuracy** : ± 1 % (Over full scale)
- **Control Form** : ON-OFF or P, PI, PD, PID - selectable
- **Out Output** : Relay (NO + NC), 250VAC, 2A, Resistive load, (optional SSR)
- **Alarm Output** : Relay (NO + NC), 250VAC, 2A, Resistive load, (only NO for TTX104)
- **Time SET** : 00:00 .. 99:59 hours (t.SET)
- **Timer Resolution** : 1 minute
- **ALARM ON SET** : 00:00 .. 99:59 minutes (A.Off). Set to 00:00 for latch ALARM output
- **ALARM ON SET resol.**: 1 second
- **Timer Accuracy** : ± % 1.5 (of SET or A.Off values)
- **Timer Threshold** : 0 .. UP.L ºC (t.Hys)
- **Heat SET** : Lower Limit .. Upper Limit ºC (H.Set)
- **Heat Hysteresis** : 0 .. 100 ºC (H.Hys); PID is active if set to 0
- **Proportional Band** : 1 .. 130 ºC (Pb.C)
- **Integral Time** : 0 .. 30,0 min. (OFF if set to 0)
- **Derivative Time** : 0.. 10,0 min. (OFF if set to 0)
- **Control Period** : 1 .. 200 sec. (Ct)
- **Offset** : -100..+100 ºC (oFFS)
- **Cold. Junc. Comp.** : 0 .. 50 ºC (T/C)
- **Line Comp.** : 10 Ohm max. (3 wire Pt100)
- **Sensor Failure** : OUT is active according to P.Err and Ct parameters in case of sensor failure, measurement out of range or hardware fails to measure input signal (OUT is OFF if Perr is 0). Alarm output depends on parameter selection.
- **Supply Voltage** : 100..240VAC, 50-60Hz or 24VDC/AC (isolation voltage: 40VAC max.)
- **Power Consumption** : < 8VA
- **Humidity** : < 70% (non-condensing)
- **Altitude** : < 2000 m
- **EMC** : EN 61000-6-1, EN 61000-6-3 (Only light industrial environment)
- **Safety** : EN 61010-1; Pollution degree 1, measurement category I, (Only light industrial environment, double/reinforced isolated, non-conductive pollution environment)
- **Protection Class** : IP20; according to EN 60529
- **Operation Temp.** : 0 .. 50 ºC
- **Storage Temperature** : -10ºC .. 60ºC (no icing)
- **Weight** : < 0.5 kg
- **Torque for screwing** : Max. 0.5 N.m

WARNING: if 2 wire Pt100 is used, connect compensation lead to measuring lead: (TTX109:**17-18**, TT107X: **13-14**, TT104X: **10-11**)

no: normally open
nc: normally closed







INSTALLATION, USE and WARNINGS

- This device and its packing is NOT litter and may NOT be disposed of with domestic waste. Please return this device and its packing to an appropriate recycling point at the end of its service life.
- Please read this user manual carefully and completely before installation and use. Please take into consideration all warnings mentioned in this manual.
- TT109X / TT107X / TT104X are suitable only for permanent panel type mounting
- Installation and use of this device must be done by qualified, authorized and trained technical personnel only.
- Inspect device carefully before installation. Do not install and use broken and defective devices.
- Do not disassemble device. Do not make any repair on any part of the device. There is no accessible part inside the device. Please contact to manufacturer for broken and defective devices.

- Do not use device in environments subject to flammable, explosive and corrosive gases and/or substances.
- This device is designed for applications only in light industrial environments. This device is not suitable for medical and residential use. This device is not suitable for use related with human health and safety. This device is not suitable for automotive, military and marine use.
- Do not allow children and unauthorized people to use this device.
- Before installation and any technical work, disconnect the power supply and mains connections.
- Check the power supply voltage level before power on, and make sure voltage level is in specified limits. Check quality of neutral line. Improper neutral line may give permanent damage to the device.

- Connect an external power switch and an external fuse (1A, 250VAC) to the power supply line that are easily accessible for rapid intervention. Connect an external fuse (2A, 250VAC) for each relay output separately.
- Use appropriate cables for power supply and mains connections. Apply safety regulations during installation.
- Install the device in a well ventilated place. Install the device permanently into a proper panel cut-out. Fix the device with two fasteners supplied with the device. Only front panel must be accessible after installation is completed.
- Do not operate the device other then the environmental conditions given in Technical Specification.
- Do not operate the device in environments that may cause conductive pollution.
- Take precautions against negative environmental conditions like humidity, vibration, pollution and high/low temperature during installation.

- Use correct compensation cables for T/C sensors. Connect T/C cable directly to the device connectors.
- Keep device, signal cables and communication cables away from circuit breakers, power cables and devices/cables emitting electrical noise. Use shielded and twisted signal and communication cables and connect shield to earth ground on device side. Keep length of signal and communication cables less than 3m.
- In your applications, always use separate and independent mechanical and/or electromechanical devices/apparatus to support TT109X / TT107X / TT104X to handle emergency cases.

- Use insulated cable end-sleeves at the end of cables screwed to the device connector terminals.
- Maximum torque for screwing; 0.5 N.m.
- Please check www.gemo.com.tr for latest device and documentation updates regularly. All updates and all information are subject to change without notice.

ALARM MODES / TYPES

- If Timer Alarm Mode (**TAM**) is selected as **no.t.A**, only DT Alarm modes (**AbS, rEL, bnd, bn.i, -AbS, -rEL, -bnd, -bn.i, SnS.o, SnS.F**) become active (refer to **DT10xAX** data sheet).

  <u>With Process Value (PV), SET value (H.SET), Timer Threshold (t.HYS):</u>
- TAM **ht.hd,** is same as **ht.no**, except Alarm output is controlled by selected DT Alarm type.
- TAM **ht.no** and **ht.nc**: Timer starts when PV >= (H.SET-t.HYS). Time value (t.SET) counts down to 0. Once Timer starts, it keeps on counting down until it is reset. At the end of counting down, ALARM output is active
- TAM **St.no** and **St.nc**: Timer starts only with START button.
- TAM **h.S.no** and **h.S.nc**: These modes are combined versions of **ht.no, ht.nc, St.no** and **St.nc**
- TAM **P.o.no** and **P.o.nc**: Timer starts with power on.

--.no modes: Alarm output is OFF during Timer count down, and ON (or flashing ON) after Timer elapses.
--.nc modes: Alarm output is ON during Timer count down, and OFF after Timer elapses.

RESET OF TIMER

- Timer is RESET and ALARM output is inactive in case;
- After power on,
- Continuous pressing of RESET button on front panel for 3 seconds.

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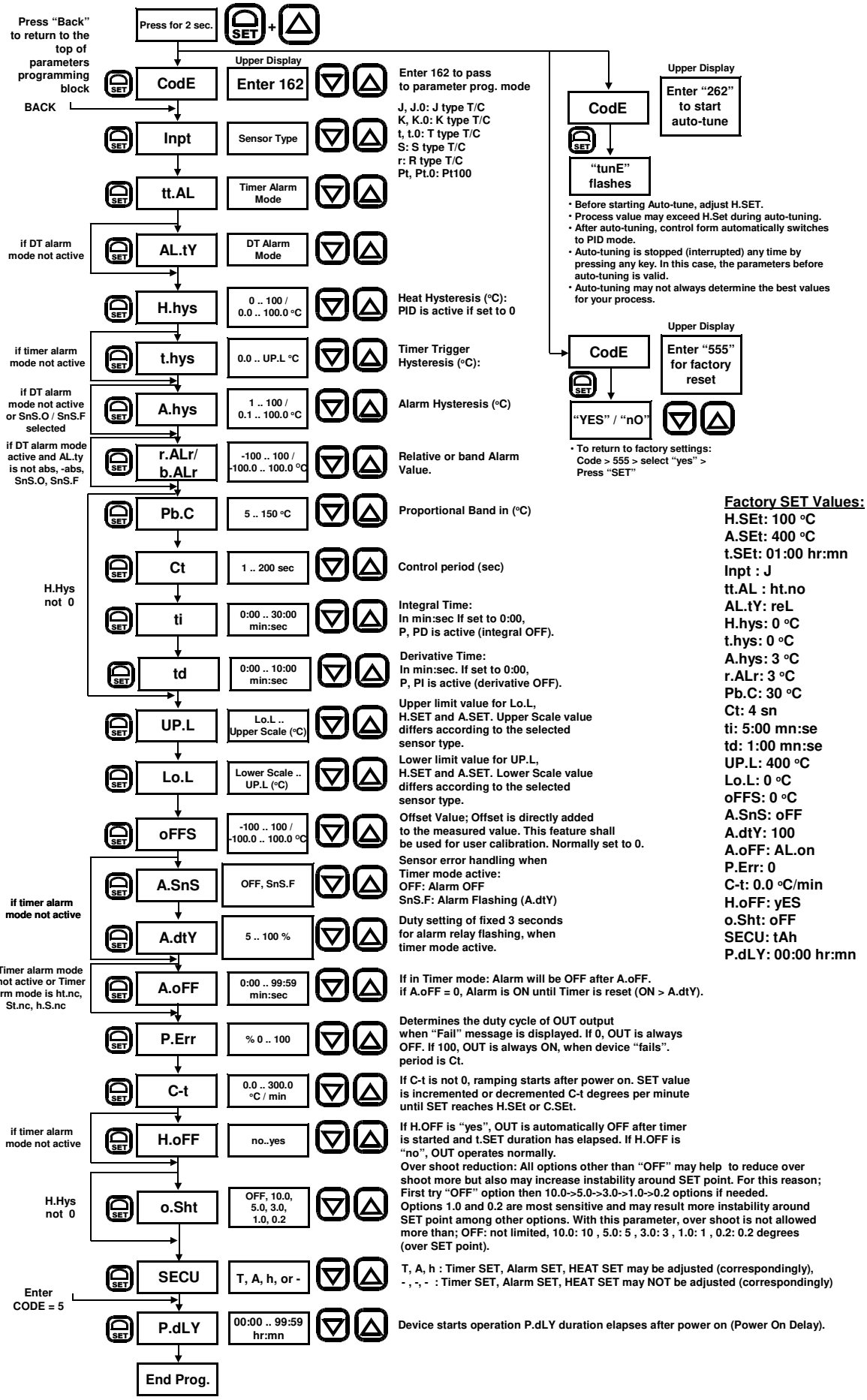
PROGRAMMING PARAMETERS



Factory SET Values:

H.SEt: 100 °C
A.SEt: 400 °C
t.SEt: 01:00 hr:mn
Inpt : J
tt.AL : ht.no
AL.tY: reL
H.hys: 0 °C
t.hys: 0 °C
A.hys: 3 °C
r.ALr: 3 °C
Pb.C: 30 °C
Ct: 4 sn
ti: 5:00 mn:se
td: 1:00 mn:se
UP.L: 400 °C
Lo.L: 0 °C
oFFS: 0 °C
A.SnS: oFF
A.dtY: 100
A.oFF: AL.on
P.Err: 0
C-t: 0.0 °C/min
H.oFF: yES
o.Sht: oFF
SECU: tAh
P.dLY: 00:00 hr:mn

Note: When sensor type is changed, Up.L, Lo.L, H.Set, A.Set, H.hys, A.hys, r.Alr, b.Alr, oFFs may be set to a new value automatically, if any of them violates measuring scale of the selected sensor.

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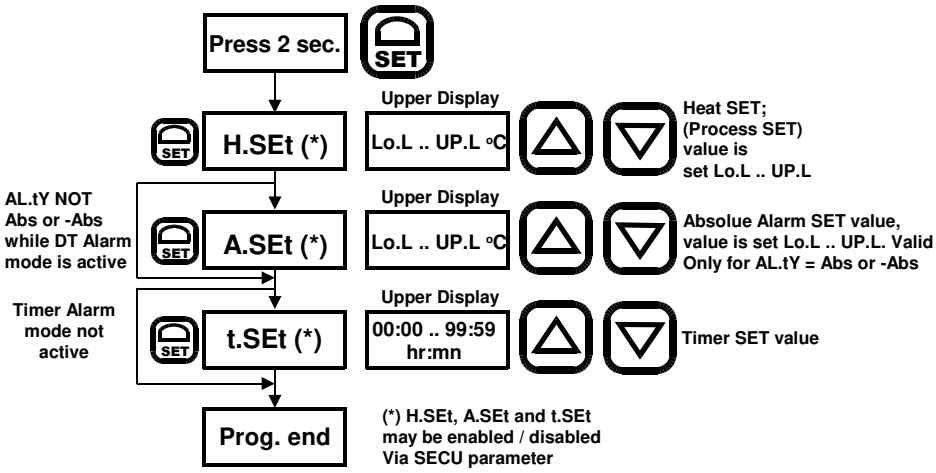
PROGRAMMING HEAT SET, ALARM SET AND TIMER SET VALUES

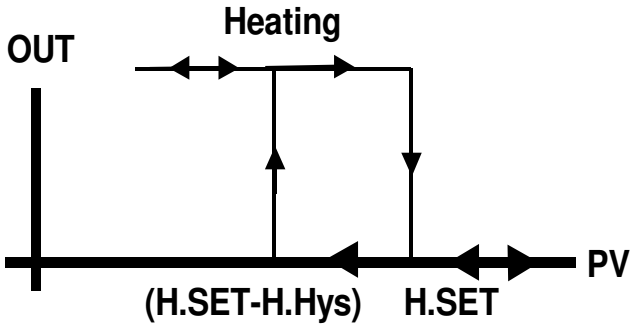


MESSAGES

- **hEAt**: Timer waits for a Start by measurement.
- **h-St:**Timer either waits for manual Start or Start by measurement
- **End**: Timer elapsed
- **P.dLY:** Power on delay is active
- **rAPn:** Soft-start is active
- **Strt:** Timer waits for manual Start
- **FAIL**: Sensor error or measurement fails.
- **tunE:** Auto-tune is active
- **Err, E.FLS, E.CAL, E.EPr**: Hardware failure.

OUT OUTPUT (ON-OFF CONTROL)

ON-OFF is active when **"H.Hys"** is other then 0.



PID PARAMETERS

- P, PI, PD, PID is active when **"H.Hys"** is set to 0 (only for heating; h-C is set to "HEAt")

- PbC: Proportional band in ºC.

- Ct: Control period for PID control. Prefer 4-10 sec.

- Ti: Integral time; Set in minutes. Determines how fast controller reacts to compensate the offset between SET point and the process value. If set to 0, integral part is OFF. If set too low, process value may oscillate.

- **Td:** Derivative time; Set in minutes. If set to 0, derivative part is OFF. Determines how sensitive the controller is to changes of the offset between SET point and the process value. If set too high, process value may oscillate or overshoot.

POWER ON DELAY (P.dLY)

"Power On Delay" feature is valid if P.dLY is different from 0. "Power On Delay" mode is active after Power On or "Back" key is kept pressed for 5 secs, if P.dLY is not 0. Device starts operating automatically after P.dLY counts down to 0. Keep "Back" key pressed for 5 secs. to switch between "Power On Delay" and "Operation" modes (without waiting for time to elapse). P.dLY starts counting down from the beginning, if switched back to "Power On Delay" mode. All relays are kept OFF during, Parameter entry is not allowed during "Power On Delay" mode, only "Back" key is operational. P.dLY parameter may be programmed via CODE -> 162 or CODE -> 5 (short-cut). P.dLY starts from the beginning after power on or in case of a power interruption.

CLAEANING

Do not use any solvents (alcohol, thinners, benzine, acid, etc.) or corrosive substances to clean the device. Use only a dry and clean non-abrasive cloth. Before cleaning, disconnect the power supply and mains connections.

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