TT109 / TT107 / TT104
AUTO-TUNE PID TEMPERATURE CONTROLLER & TIMER

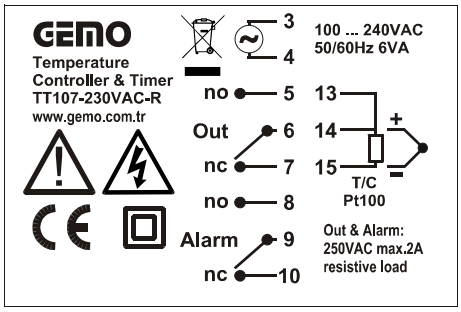
Attention, Risk of, Danger, Warning	High Voltage, Risk of Electric Shock	Double / Reinforced Insulation	NOT Litter	CE Mark

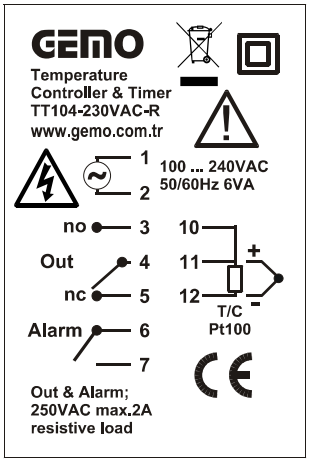
TECHNICAL SPECIFICATION

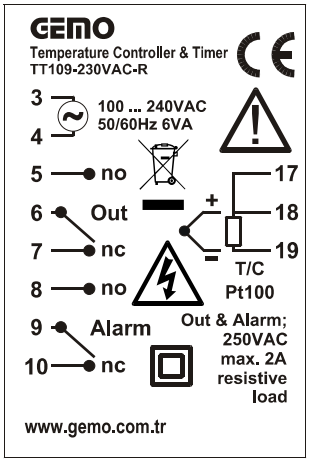
- **Dimensions** : TT109:96x96, TT107:72x72, TT104:48x48mm
- **Panel Cut-out** : TT109:91x91, TT107:68x68, TT104:45,5x45,5mm
- **Display** : 4 Digits 7 Segment (PV), 4 digits 7 Segment (SV)
- **Sensor Type** : J,K,T,S,R type T/C, Pt100 selectable
- **Measuring Scale** : -100 .. 600 °C, J type T/C, (Inpt=J), -100 .. 1300 °C, K type T/C, (Inpt=k)
  -100 .. 400 °C, T type T/C, (Inpt=t), 0 .. 1750 °C, S type T/C, (Inpt=S)
  0 .. 1750 °C, R type T/C, (Inpt=r), -100 .. 600 °C, Pt100, (Inpt=Pt)
  -99.9 .. 600.0 °C, Pt100, (Inpt=Pt.0)
- **Resolution** : ± 1 °C or ± 0.1 °C
- **Accuracy** : ± 0.3 % (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 TT104)
- **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** : 1 .. 1250 / 1.5 .. 125.0 °C (t.Hys)
- **Heat SET** : Lower Limit .. Upper Limit °C (H.Set)
- **Heat Hysteresis** : 0 .. 50 / 0.0 .. 5.0 °C (H.Hys); PID is active if set to 0
- **Proportional Band** : 1 .. 130 °C (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** : 4 .. 200 sec. (Ct)
- **Offset** : -100..+100 °C / -10.0 .. +10.0 °C (oFFS)
- **Cold. Junc. Comp.** : 0 .. 50 °C (T/C)
- **Line Comp.** : 10 Ohm max. (3 wire Pt100)
- **Sensor Failure** : ALARM output is always OFF, OUT output 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 output is OFF if Perr is 0)
- **Supply Voltage** : 100..240VAC, 50-60Hz or 24VDC/AC (isolation voltage: 40VAC max.)
- **Power Consumption** : < 8VA
- **Humidity** : 80% up to 30°C, then linearly decreases to 50% at 50°C (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 °C
- **Storage Temperature** : -10°C .. 60°C (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: (TT109:**17-18**, DT107: **13-14**, DT104: **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.
- TT109 / TT107 / TT104 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 TT109 / TT107 / TT104 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.

GENERAL SPECIFICATION

- This device is designed for basic temperature control applications only in light industrial environments.
- PID temperature controller with built in Timer
- Auto-tuning for PID parameters
- Timer SET (Delay) value; up to 99:59 hours
- Timer ON duration; up to 99:59 minutes
- Selectable automatic OFF for OUT after Timer SET time.
- Sensor type: T/C (J,K,T,S,R), Pt100, selectable, multi-input
- Selectable control type: P, PI, PD, PID or ON-OFF
- Automatic “Overshoot” elimination in PID mode with “Anti-windup”
- Upper and Lower limit for SET setting
- Displays SET and TIMER values
- Cold-junction compensation for T/C
- Line compensation for Pt100
- Excellent linearity with ^{o}C/mV and ^{o}C/Ohm look-up tables
- Input “Offset” feature
- Password protection
- High accuracy
- EEPROM memory to store settings
- Optional SSR output
- Easy connection with plug-in connectors

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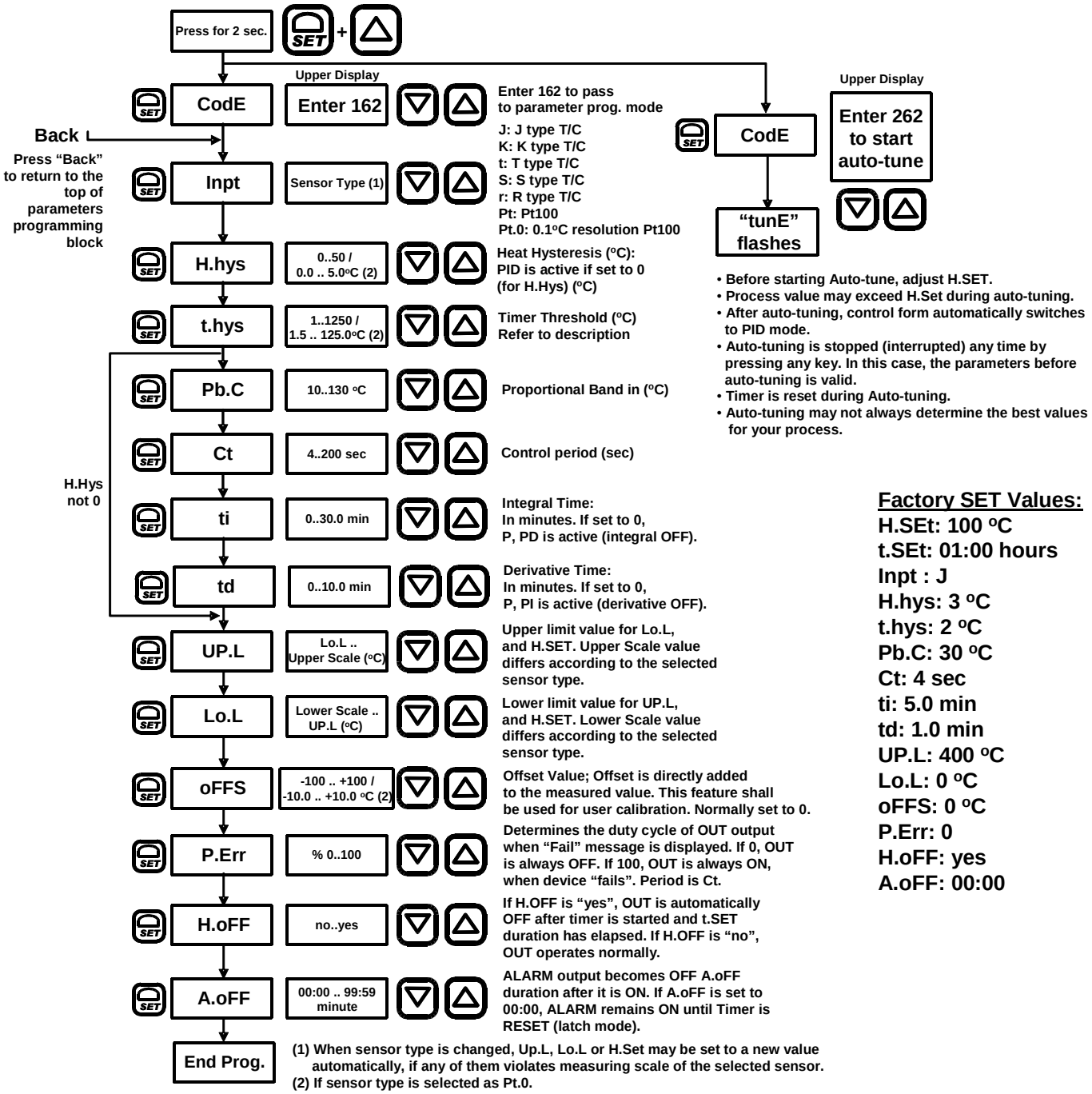
PROGRAMMING PARAMETERS



(1) When sensor type is changed, Up.L, Lo.L or H.Set may be set to a new value automatically, if any of them violates measuring scale of the selected sensor.
(2) If sensor type is selected as Pt.0.

Factory SET Values:

H.SEt: 100 ºC
t.SEt: 01:00 hours
Inpt : J
H.hys: 3 ºC
t.hys: 2 ºC
Pb.C: 30 ºC
Ct: 4 sec
ti: 5.0 min
td: 1.0 min
UP.L: 400 ºC
Lo.L: 0 ºC
oFFS: 0 ºC
P.Err: 0
H.oFF: yes
A.oFF: 00:00

MESSAGES

- **hEAt** : Timer has not been started yet.
- **End** : Timer elapsed and Alarm is ON.
- **FAIL** : Displays "FAiL" message in case of sensor failure, measurement out of range or hardware fails to measure input signal.
- **Err** : Hardware failure.

LOWER DISPLAY

Lower display cycles SET value (H.SET) and Timer status/remaing time value, 3 seconds each. Timer status;

- If "heat" is displayed, Timer has not been started and system is heating,
- If "End" is displayed, counting down ended and ALARM output is ON for "A.Off" duration (remaing ON duration is displayed periodically) or latch ON if "A.Off" is set to 00:00, or
- Timer has started and counting down continues. In this case, remaing time is displayed.

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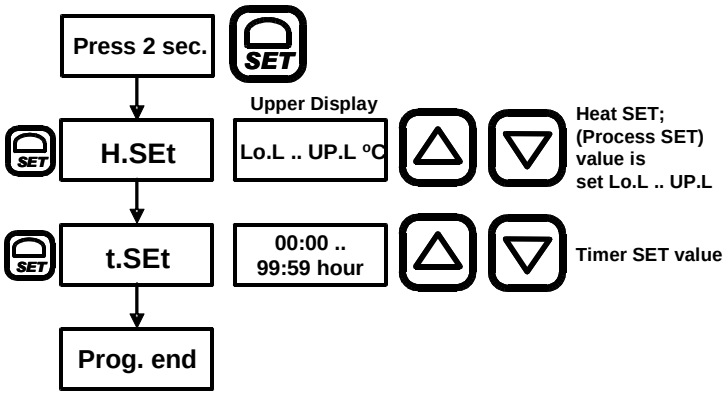
PROGRAMMING HEAT SET VE TIMER SET VALUES



START OF TIMER

Proses Value (PV), SET value (H.SET), Timer Threshold (t.HYS);

- 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 ON.
  Example; Let H.SET=180, t.HYS=2. When process value is greater or equal to 180-2=178 oC, Timer starts counting down.

RESET OF TIMER

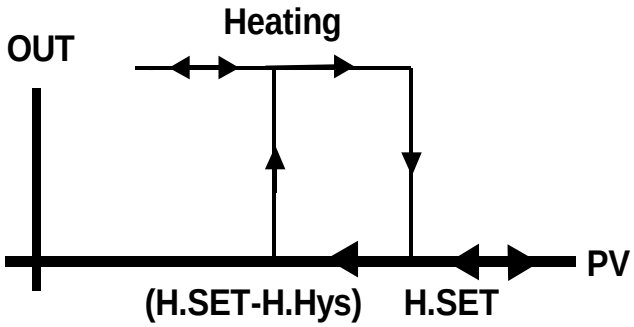
Timer is RESET and ALARM output is OFF in case;

- After power on,
- Continuous pressing of RESET button on front panel for 3 seconds.

For sensor type “Pt.0“, t.HYS may be set in interval 1.5 °C ... 5.0 °C. For other sensor types t.HYS may be set in interval 1 °C..50 °C.

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 °C.

- 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.

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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