# Controller TS-55T + 2 (use software TS-plus2)
# Heating of 4 rounds radiators from boiler.

## Electric scheme



controller TS-55T+2

Outputs: 3A 220V AC

Sensors S1,S2,S3,S5 и S6
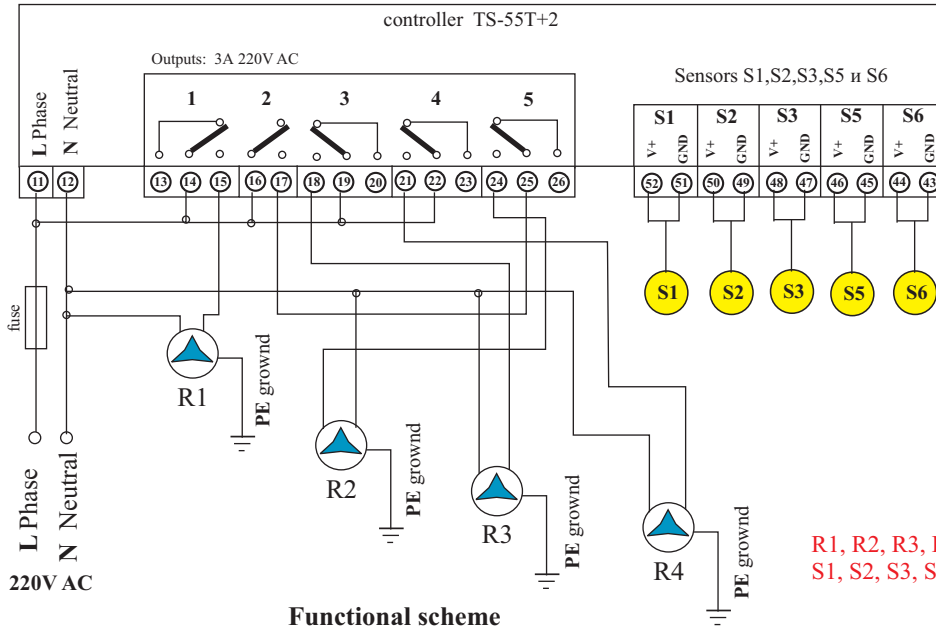
R1, R2, R3, R4 - Heat pumps.
S1, S2, S3, S5, S6 - Sensors.

## Functional scheme
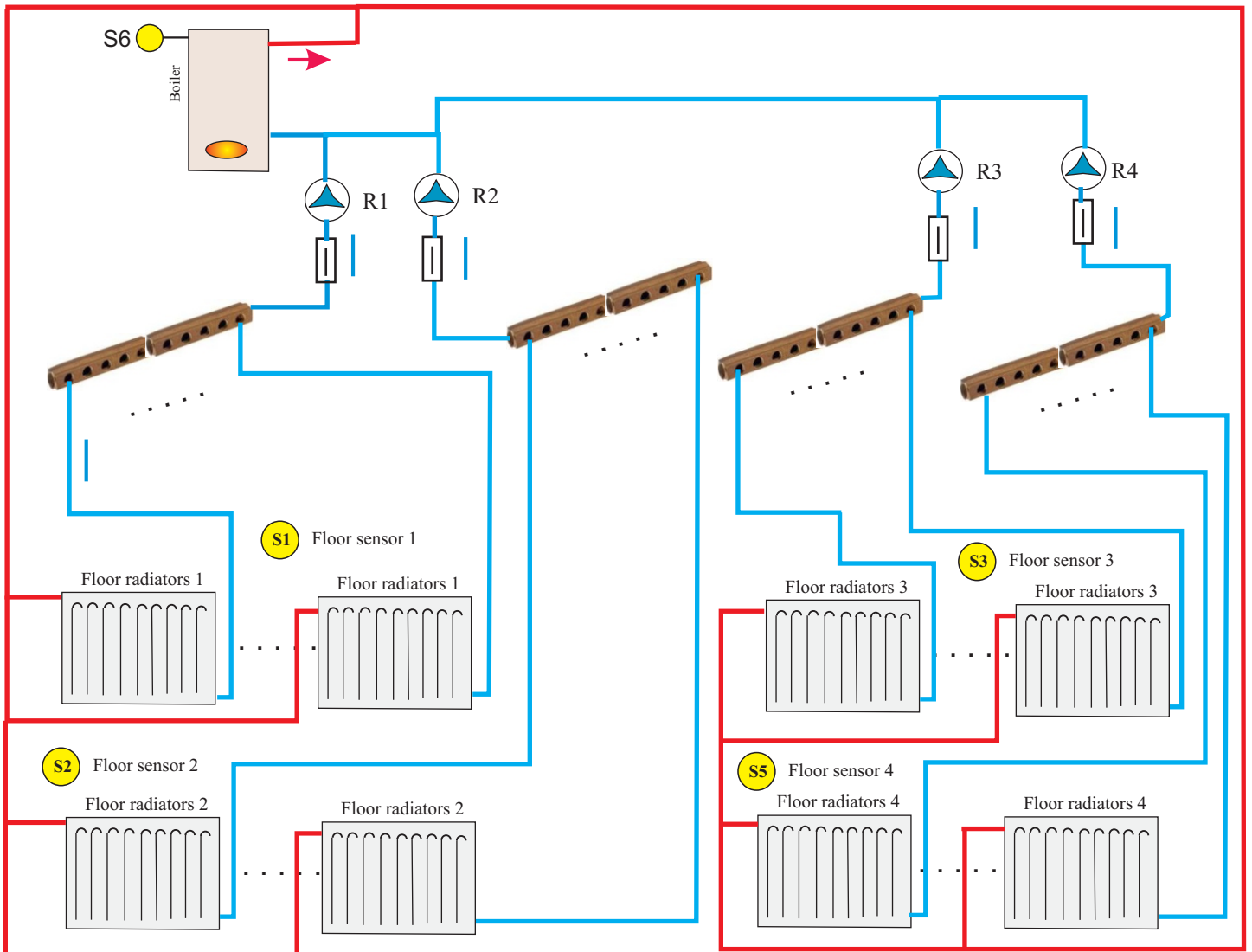
# The program to control variant 1

We will use:
- The condition a differential output of channel 1.
- The condition a thermostat output (upper level) of channel 1.
- Logical function "AND" for channel 1.
- The condition a output of channel 2 to control with weekly temperature timers.
- Logical function "OR" for channel 2.
- The condition a differential output of channel 3.
- The condition a thermostat output (upper level) of channel 3.
- Logical function "AND" for channel 3.
- Conditions differential output channel 4.
- The condition a thermostat output (upper level) of channel 4.
- Logical function "AND" for channel 4.
-The condition a thermostat output (upper level) of channel 5..
- Logical function "OR" for channel 5.

Sensor 2 will be use to control for the other channels. Will artificially increase his testimony by placing it at a height of 0.5 meters, for example in comparison with others. The pumps of the other channels will be TURN ON when (S2-Sx)> 4 and TURN OFF when (S2-Sx) <2. Pump channel (output) 2 will be TURN ON when S2 < Td (desired temperature) and TURN OFF when S2> Td+2.
Mandatory condition for reconnecting a water pump is the boiler temperature S6 > 50 ° C

**Programming:**
1. Set the time and date.
2. Set the timer program if necessary.
3. Write the below two tables into the controller.
4. Perform calibration of the sensors.
5. Select "Automatic mode".

The below 2 rows of functional table must be set as follows:
(You only need to enroll only numbers with circle - the other is established by RESET.)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Td1-8: Td1,Td2,Td3 Td4,Td5,Td6,Td7,Td8 | (23) | (20) | (18) | 05 | 05 | 05 | 05 | 05 |
| U1-8: u1 u2 u3 u4 u5 u6 u7 u8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

u1-u8 are the numbers of outputs, used into timers 1 to 8. If the output is different from '0 ' then the corresponding row is used by the clock time, for set indication output. Ux must be from 0 to 5.

This table should be write into the controller as using functional table (see TS-plus2).
You only need to enroll only numbers with circles (the other is established by RESET).

| Row from the table for programming | Output number: | | | | | Note |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| Top Level - °C Top level thermostats XX=2 до 90°C | (50) | 90 | (50) | (50) | (50) | Temperature to TURN ON the conditional output of the thermostat |
| Top Level-Sensor S Sensor for thermostat top level S=0-6 | (6) | 0 | (6) | (6) | (6) | |
| Low Level - °C Low level thermostats XX=2 до 90°C | 05 | (17) | 05 | 05 | 05 | Temperature to TURN ON the conditional output of the thermostat |
| Low Level-Sensor Sensor for thermostat top level S=0-6 | 0 | (2) | 0 | 0 | 0 | |
| Differential regulator ON TEMPERATURE 2 - 90°C | (04) | 05 | (04) | (04) | 05 | Temperature difference ST-SP to TURN ON the conditional output of the regulator |
| Differential regulator OFF TEMPERATURE 2 - 90°C | (02) | 02 | (02) | (02) | 02 | Temperature difference ST-SP to TURN OFF the conditional output of the regulator |
| Differential regulator sensor ST   0 - 6 | (2) | 0 | (2) | (2) | 0 | Sensor heat source            * |
| Differential regulator sensor SP   0 - 6 | (1) | 0 | (3) | (5) | 0 | Sensory hot-receiver            * |
| Used logical function AND, OR | (A) | 0 | (A) | (A) | 0 | A(AND) / O(OR) |

Table setup of the differential regulators, logical functions and thermostats.

**\* - Do not put ST = SP !**

Enter in the functional table "SET TIMER" to program the timers 1.2 and 3:

| | |
|---|---|
| **Timer 1** | **Td1 ON/OFF1**<br>**DAY 1234567**     Choice of day (s) of the week<br><br>**Td1 ON1 HR MN**  Hour and minutes for the establishment Td=Td1.<br>        **07 00**<br><br>**Td1 OFF1 HR MN**  Hour and minutes for the establishment Td=17.<br>        **09 00** |
| **Timer 2** | **Td2 ON/OFF2**<br>**DAY 1234567**     Choice of day (s) of the week<br><br>**Td2 ON2 HR MN**  Hour and minutes for the establishment Td=Td2.<br>        **09 30**<br><br>**Td2 OFF2 HR MN**  Hour and minutes for the establishment Td=17.<br>        **16 00** |
| **Timer 3** | **Td3 ON/OFF3**<br>**DAY 6**         Choice of day (s) of the week<br><br>**Td3 ON3 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **17 00**<br><br>**Td3 OFF3 HR MN**  Hour and minutes for the establishment Td=17.<br>        **23 30** |
| **Timer 4** | **Td4 ON/OFF4**<br>**DAY 6**         Choice of day (s) of the week<br><br>**Td4 ON4 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **?? ??**  Not used.<br><br>**Td4 OFF4 HR MN**  Hour and minutes to TURN OFF of the output.<br>        **?? ??**  Not used. |
| **Timer 5** | **Td5 ON/OFF5**<br>**DAY 6**     Избор на ден(дни) от седмицата<br><br>**Td5 ON5 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **?? ??**  Not used.<br><br>**Td5 OFF5 HR MN**  Hour and minutes to TURN OFF of the output.<br>        **?? ??**  Not used. |
| **Timer 6** | **Td6 ON/OFF6**<br>**DAY 6**         Choice of day (s) of the week<br><br>**Td6 ON6 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **?? ??**  Not used.<br><br>**Td6 OFF6 HR MN**  Hour and minutes to TURN OFF of the output.<br>        **?? ??**  Not used. |
| **Timer 7** | **Td7 ON/OFF7**<br>**DAY 6**         Choice of day (s) of the week<br><br>**Td7 ON7 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **?? ??**  Not used.<br><br>**Td7 OFF7 HR MN**  Hour and minutes to TURN OFF of the output.<br>        **?? ??**  Not used. |
| **Timer 8** | **Td8 ON/OFF8**<br>**DAY 6**         Choice of day (s) of the week<br><br>**Td8 ON8 HR MN**  Hour and minutes for the establishment Td=Td3.<br>        **?? ??**  Not used.<br><br>**Td8 OFF8 HR MN**  Hour and minutes to TURN OFF of the output.<br>        **?? ??**  Not used. |

In the days Monday to Sunday timer 1 will set in 7.00 hours Td = 23 ° C (desired room temperature, measurement from sensor S2).
At 9.00 hours timer 1 will establish Td = 17 ° C

In the days Monday to Sunday timer 2 will set in 9.30 hours Td = 20 ° C
At 16.00 hours timer 1 will establish Td = 17 ° C

In the days Monday to Sunday timer 3 will set at 17.00 hours Td = 18 ° C.
At 23.30 hours timer 3 will establish Td = 17 ° C

# The program to control variant 2

We will use:
- The condition a thermostat output (low level) of channel 1.
- The condition a timer output of channel 1, controlled by timer 4.
- The condition a timer output of channel 1, controlled by timer 5.
- Logical function "AND" for channel 1.
- The condition a output of channel 2 to control with weekly temperature timers.
- Logical function "OR" for channel 2.
- The condition a thermostat output (low level) of channel 3.
- The condition a timer output of channel 3, controlled by timer 6.
- The condition a timer output of channel 3, controlled by timer 7.
- Logical function "AND" for channel 3.
- The condition a thermostat output (low level) of channel 4.
- The condition a timer output of channel 4, controlled by timer 8.
- Logical function "AND" for channel 4.
- The condition a thermostat output (upper level) of channel 5.
- Logical function "OR" for channel 5.

**Programming:**
1. Set the time and date.
2. Set the timer program if necessary.
3. Write the below two tables into the controller.
4. Perform calibration of the sensors.
5. Select "Automatic mode".

The below 2 rows of functional table must be set as follows:
(You only need to enroll only numbers with circle - the other is established by RESET.)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Td1-8: Td1,Td2,Td3 Td4,Td5,Td6,Td7,Td8 | (23) | (20) | (18) | 05 | 05 | 05 | 05 | 05 |
| U1-8: u1 u2 u3 u4 u5 u6 u7 u8 | 0 | 0 | 0 | (1) | (1) | (3) | (3) | (4) |

u1-u8 are the numbers of outputs, used into timers 1 to 8. If the output is different from '0 ' then the corresponding row is used by the clock time, for set indication output. Ux must be from 0 to 5.

This table should be write into the controller as using functional table (see TS-plus2).
You only need to enroll only numbers with circles (the other is established by RESET).

| Row from the table for programming | Output number: | | | | | Note |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| Top Level - °C Top level thermostats XX=2 до 90°C | (50) | 90 | (50) | (50) | (50) | Temperature to TURN ON the conditional output of the thermostat |
| Top Level-Sensor S Sensor for thermostat top level S=0-6 | (6) | 0 | (6) | (6) | (6) | |
| Low Level - °C Low level thermostats XX=2 до 90°C | (23) | (17) | (23) | (23) | 05 | Temperature to TURN ON the conditional output of the thermostat |
| Low Level-Sensor Sensor for thermostat top level S=0-6 | (1) | (2) | (3) | (5) | 0 | |
| Differential regulator ON TEMPERATURE 2 - 90°C | 05 | 05 | 05 | 05 | 05 | Temperature difference ST-SP to TURN ON the conditional output of the regulator |
| Differential regulator OFF TEMPERATURE 2 - 90°C | 02 | 02 | 02 | 02 | 02 | Temperature difference ST-SP to TURN OFF the conditional output of the regulator |
| Differential regulator sensor ST 0 - 6 | 0 | 0 | 0 | 0 | 0 | Sensor heat source * |
| Differential regulator sensor SP 0 - 6 | 0 | 0 | 0 | 0 | 0 | Sensory hot-receiver * |
| Used logical function AND, OR | (A) | 0 | (A) | (A) | 0 | A(AND) / O(OR) |

**Table setup of the differential regulators, logical functions and thermostats.**

* - Do not put ST = SP !

| | |
|---|---|
| **Timer 1** | **Td1 ON/OFF1**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td1 ON1 HR MN** Hour and minutes for the establishment Td=Td1.<br>        07   00 |
| | **Td1 OFF1 HR MN** Hour and minutes for the establishment Td=17.<br>        09   00 |
| **Timer 2** | **Td2 ON/OFF2**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td2 ON2 HR MN** Hour and minutes for the establishment Td=Td2.<br>        09   30 |
| | **Td2 OFF2 HR MN** Hour and minutes for the establishment Td=17.<br>        16   00 |
| **Timer 3** | **Td3 ON/OFF3**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td3 ON3 HR MN** Hour and minutes for the establishment Td=Td3.<br>        17   00 |
| | **Td3 OFF3 HR MN** Hour and minutes for the establishment Td=17.<br>        23   30 |
| **Timer 4** | **Td4 ON/OFF4**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td4 ON4 HR MN** Hour and minutes to TURN ON of the output.<br>        06   30 |
| | **Td4 OFF4 HR MN** Hour and minutes to TURN OFF of the output.<br>        12   00 |
| **Timer 5** | **Td5 ON/OFF5**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td5 ON5 HR MN** Hour and minutes to TURN ON of the output.<br>        17   00 |
| | **Td5 OFF5 HR MN** Hour and minutes to TURN OFF of the output.<br>        23   40 |
| **Timer 6** | **Td6 ON/OFF6**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td6 ON6 HR MN** Hour and minutes to TURN ON of the output.<br>        04   00 |
| | **Td6 OFF6 HR MN** Hour and minutes to TURN OFF of the output.<br>        10   00 |
| **Timer 7** | **Td7 ON/OFF7**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td7 ON7 HR MN** Hour and minutes to TURN ON of the output.<br>        14   00 |
| | **Td7 OFF7 HR MN** Hour and minutes to TURN OFF of the output.<br>        22   00 |
| **Timer 8** | **Td8 ON/OFF8**<br>**DAY 1234567**        Choice of day (s) of the week |
| | **Td8 ON8 HR MN** Hour and minutes to TURN ON of the output.<br>        05   00 |
| | **Td8 OFF8 HR MN** Hour and minutes to TURN OFF of the output.<br>        23   30 |

In the days Monday to Sunday timer 1 will set in 7.00 hours Td = 23 ° C (desired room temperature, measurements with sensor S2).
At 9.00 hours timer 1 will establish Td = 17 ° C

In the days Monday to Sunday timer 2 will set in 9.30 hours Td = 20 ° C
At 16.00 hours timer 1 will establish Td = 17 ° C

In the days Monday to Sunday timer 3 will set at 17.00 Td = 18 ° C.
At 23.30 hours timer 3 will establish Td = 17 ° C


**TURN ON / TURN OFF outputs:**
**Output 1:**
If S6>50° C и S1<23° C and the timer output=1  then the output is TURN ON.
If S6<50° C или S1>25° C or the timer output=0  then the output is TURN OFF.
**Изход 2:**
In accordance with the timer program.
If S2<Td° C  then the output is TURN ON.
If S2>Td+2° C  then the output is TURN OFF.
**Изход 3:**
If S6>50° C и S3<23° C and the timer output=1  then the output is TURN ON.
If S6<50° C или S3>25° C or  the timer output=0  then the output is TURN OFF.
**Изход 4:**
If S6>50° C и S5<23° C and  the timer output=1  then the output is TURN ON.
If S6<50° C или S5>25° C or  the timer output=0  then the output is TURN OFF.
**Изход 5:**
In accordance with the timer program.
If  S6>50° C then the output is TURN ON.
If  S6<50° C then the output is TURN OFF.