

# LADDOMAT® MR

## Installation and instructions for use

Laddomat MR is a control device with separate Connection Centre (CC) with a total of three relays and 4 temperature sensor inputs. A number of different control schemes/options are available. All settings are made in the separate Control Panel (CP).

### **Technical data**

The connection centre has:

3 relay outputs, one of which is potential free. 250V, 5A.

4 x temperature sensor inputs, NTC 10 or 50 kOhms @ 25°C (selectable in the service menu, 50 kOhms is the default)

Permissible ambient temperature for operation: 0–55°C, 95% RH

### **The following control options are available:**

- Sys 0 (page 4) – **Temperature display.** Display up to four different temperatures.
- Sys 10 (page 5) – **Burner control.** To control the start/stop of burners (eg. oil or pellets) for batch charging of tank/tanks. This provides long operation times and fewer starts/stops of the burner.
- Sys 30 (page 6) - **Culvert control.** Batch culvert charging from, e.g. a main tank in a separate boiler room into a slave tank in the living areas. Batch charging significantly reduces heat losses in the culvert.
- Sys 31 (page 7) - **Culvert control with return charge.** Culvert control can be supplemented for return charge with an extra sensor and pump. This will start the return charge, for example, if a solar coil is in the slave tank and it overheats. The surplus heat is returned to the main tank in the boiler room.
- Sys 40 (page 8) - **Charge/discharge between boiler/tank.** Charging from the boiler with an integrated water heater and mixing valve to "clean" accumulator tank/tanks. Charging occurs from the tank when the boiler drops in temperature. When the tank is cold, booster heating may be connected.
- Sys 41 (page 9) - **Charge/discharge between boiler/tank with burner control.** To increase water volume for e.g. pellet boilers with built-in hot water heater and mixing valve.
- Sys 50 (page 10) - **Charge/discharge between tank/tank.** Charging from the main tank to the extra slave tank/tanks. Charging can be stopped if the slave tank is fully charged. Discharge from the slave tank occurs when the main tank drops below the set temperature. Used to easily expand the accumulator volume with one or more tanks, even if they are not directly located next to the main tank.
- Sys 51 (page 11) - **Charge/discharge between tank/tank with extra charging.** With e.g. a solar coil in the main tank, this system is used to optimise the efficiency of solar panels. By filling the tanks in two stages, the charge volume is also maximised. It is also possible to use this to prevent the system from overheating, for example when burning wood.
- Sys 60 (page 12) – **Pump control + Temperature display.** Control of charge pump from boiler plus display of boiler temperature and three tank temperatures.
- Sys 70 (page 13) – **Differential control.** Control of for example a charge pump by using the difference in temperature between two sensors.
- Sys 90 (page 14) – **Thermostat function.** Possibility to control start/stop of up to three different units. Each relay can be controlled by optional sensor.
- Sys 99 (page 15) – **"Free" function.** Possibility to use optional sensor for optional relay. Up to eight different settings are possible to program.

### **Content:**

#### **Page:**

2-3	Connection / Introduction and explanation / Settings
4-15	Description and settings for each system
16-18	Settings
18	Troubleshooting



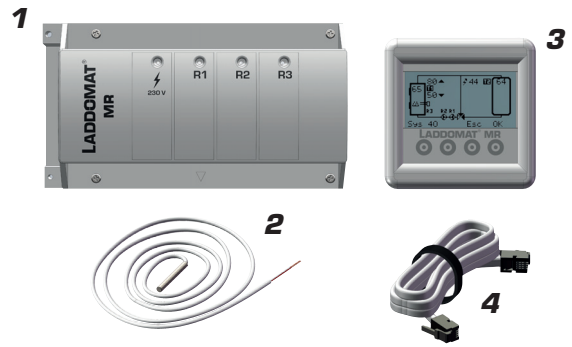
## Delivery scope

1. Connection Centre (CC)
2. Sensor, 3 m, NTC 50k @ 25°C. 4 pcs included.
3. Control Panel (CP)
4. Connection cable for CP

Also included:

Screws and plugs for CC and CP. 2 bags included.

DIN rail for CC



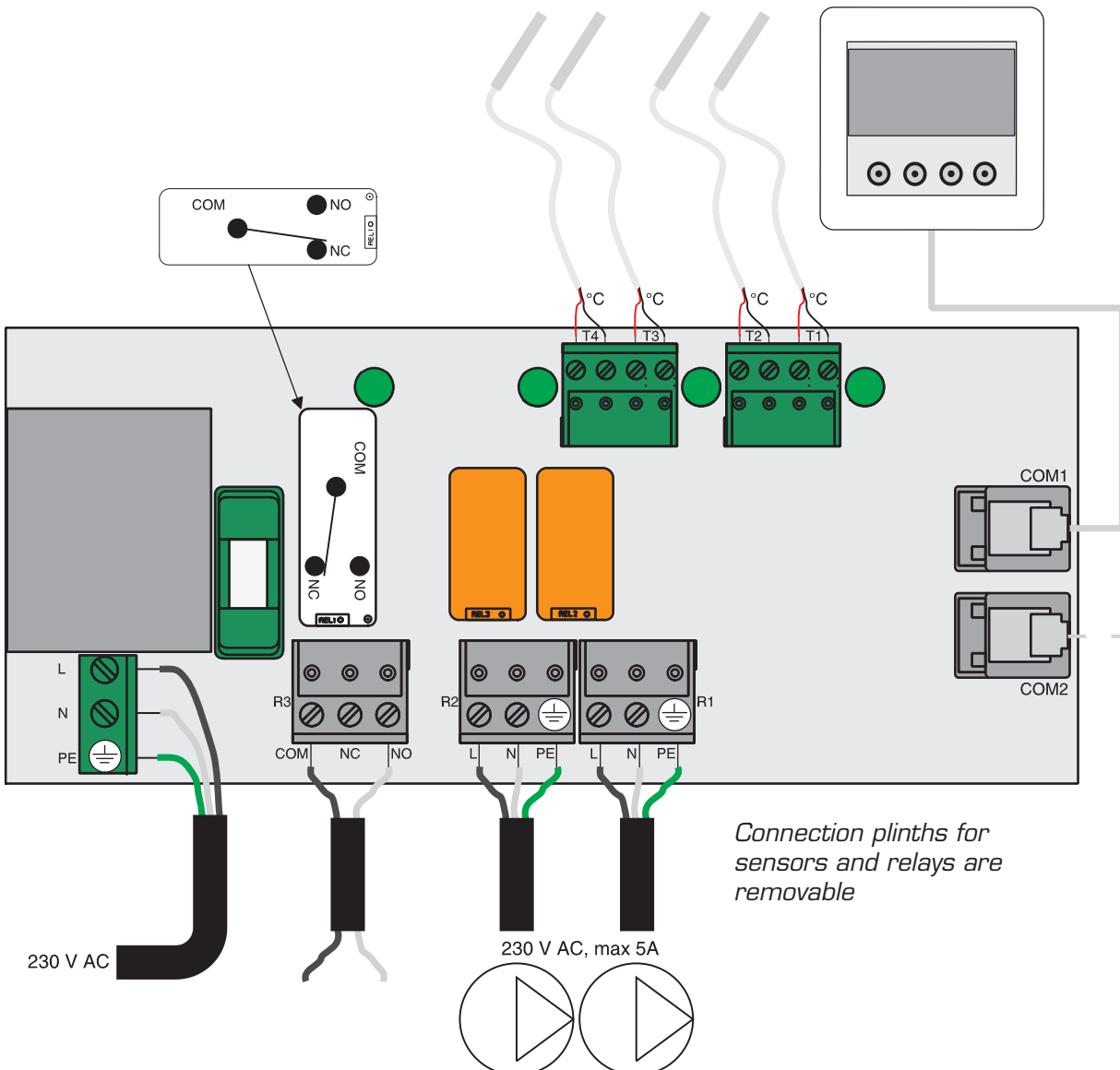
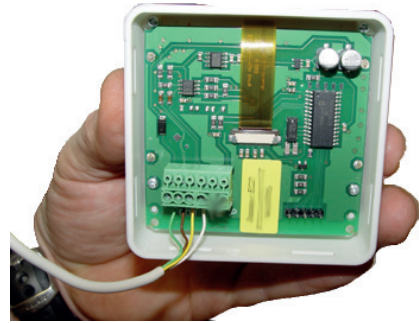
## Dimensions:

CC: H = 88 mm, W = 160 mm, D = 60 mm

CP: H = 78 mm, W = 78 mm, D = 35 mm

## Connection

Connect the Control Panel with the attached cable

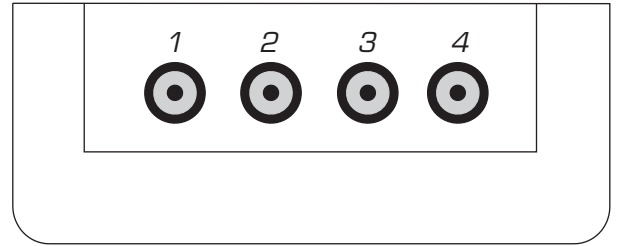


# Introduction and explanation

## Controls

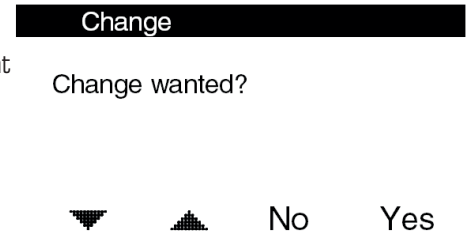
### A.

Press any of the buttons to start the display. The buttons' function is then displayed above the respective buttons. See the pictures on this page for examples.



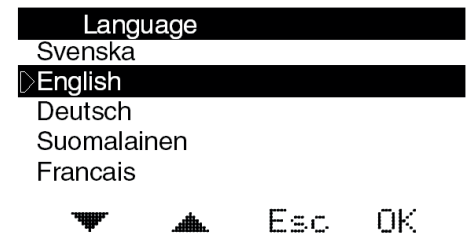
### B.

**NB! None of the values can be changed "by mistake".** In all of the modes in which it is possible to change a value, you will be prompted whether you are sure that you want to make the change before the value is actually changed.

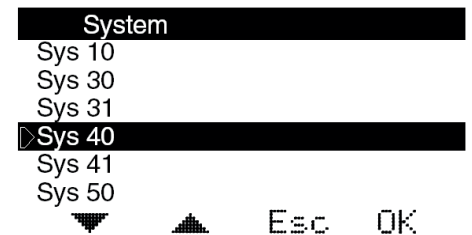


## Initial start-up - Choice of language and system schedule:

The first time LMR is started (and after factory reset), LADDOMAT is displayed first. Press OK to move to the next menu for language selection. The factory default language is English. Press Esc to proceed.



The next menu is the selection of system schedule. The factory preset schedule is Sys 40. Press Esc to proceed.



Once this is done you will see the main menu that shows the selected system schedule.

## Main Menu

The main menu shows all set point settings and current actual values of the sensors. Even if only 2 or 3 sensors are used for control, there is always the option to connect up to 4 sensors. If other sensors are not connected, this is not shown in the display. If a sensor that is included in chosen control system is not connected, a sensor error will be indicated.

T1 = Main sensor 1

T2 = Main sensor 2

T3 + T4 = Optional extra sensors. Displayed in the temperature menu.

The sensors can be installed in submersible tubes or on the outside of a pipe.

R1 = Pump 1, 230V 5A

R 2 = Pump 2, 230V 5A

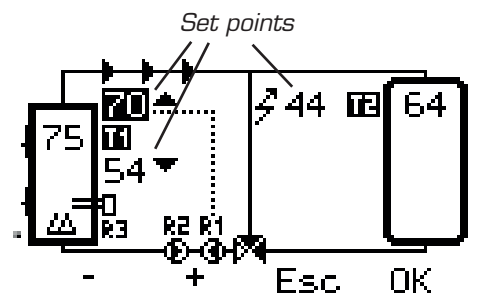
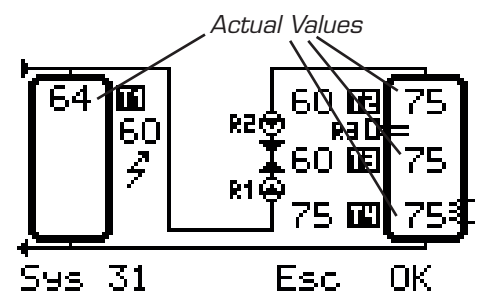
R3 = Booster (potential-free relay), alternating NO/NC, max 250V 5A

S1-S5 = Set point settings 1-5

## Main menu settings

Pressing any button lights the display and pressing the OK button activates the menu. First, the set point flashes, along with a dotted line until the set point starts or stops. Use the arrow keys to move between the set points.

To change a set point, press OK so the value is marked with a black box (see picture on right). Use the +/- buttons to change the value and press OK to save.



# Sys 0

## Temperature display

### **Basic mode**

The menu shows all current actual values of the sensors.

T1-T4 = Current actual values for each sensor.

Temperatures shown from 0°C and up.

*Actual Values*

T1 16°C	T2 111°C
T3 60°C	T4 61°C

Sys 0

# Sys 10

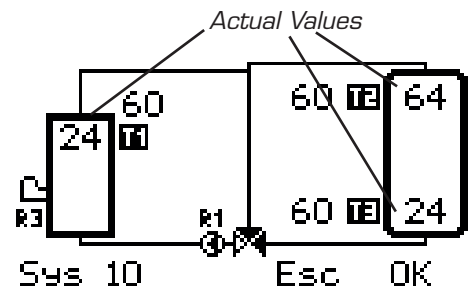
## Burner control

### Basic mode

The menu shows all set point settings and current actual values of the sensors. Thermal valve type Laddomat 11 must be fitted for optimum performance. Laddomat 11 ensures that the boiler quickly achieves and maintains a high working temperature and protects the boiler from corrosion.

T1 = Temperature Boiler  
 T2 = Tank Top Temperature  
 T3 = Tank Bottom Temperature  
 T4 = Optional additional sensors

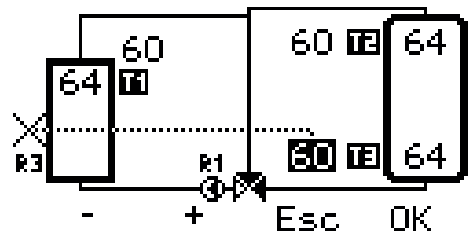
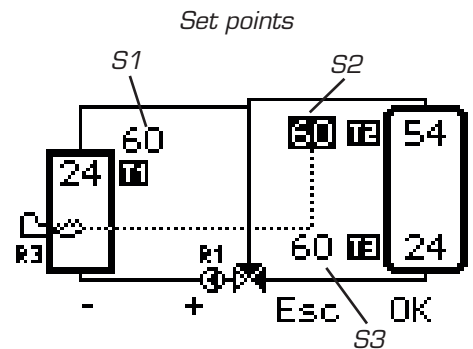
R1 = Charge Pump  
 R3 = Burner  
 S1 = Charging temperature setting  
 S2 = Burner start temperature setting  
 S3 = Burner stop temperature setting



### Burner start + stop

Burner R3 starts when the sensor T2 at the top of the tank is under the set value for Start burner S2. Selectable values are from 30 to 90°C. The factory setting is 60°C.

The burner stops when the sensor T3 in the tank bottom is above the value set for Stop burner S3. Selectable values are from 30 to 90°C. The factory setting is 60°C.



### Charging

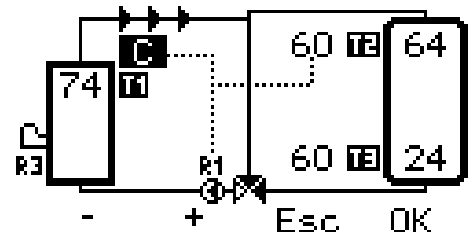
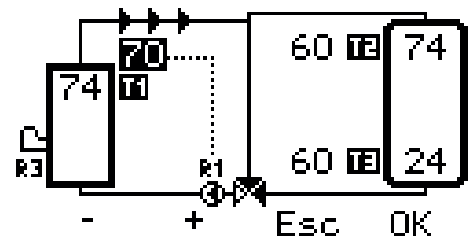
Charging means that heat is sent from the boiler to the tank.

The charge pump R1 can be started in two ways:

- When the boiler temperature T1 is above the value set for Charging S1, the charge pump R1 starts and pumps the heat to the tank.
- In mode C the charge pump runs as long as the burner is running. If the boiler is hot after the burner stops, the pump runs as long as T1 is above 85°C.

Selecting **Optional time 1** in the Service menu allows the pump to run from 0 to 20 minutes after the burner stops, even if T1 is below 85°C. Selectable values are 0-20 minutes. The factory setting is 0.

Selectable values for charging are 50-90°C. The factory setting is 60°C. Mode C is selected by setting the temperature higher than 90°C.



# Sys 30

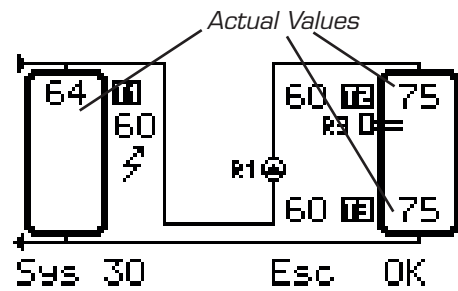
## Culvert control

### Basic mode

The menu lists all the set points and current actual values of the sensors.  
The thermal valve type Laddomat culvert valve can be installed to protect against excessive temperature in the culvert.

- T1 = Main Tank Temperature
- T2 = Slave Tank top temperature
- T3 = Slave Tank bottom temperature
- T4 = Optional additional sensors

- R1 = Charge Pump
- R3 = Booster heat
- S1 = Main tank cold setting
- S2 = Charge start temperature setting
- S3 = Charge stop temperature setting



### Charging start + stop

Charging means that heat is sent from top of the main tank to the top of the slave tank.

In order for charge to start the sensor in Main tank T1 must exceed the set values for Main tank cold S1. It is possible to set a delay time - "Optional time 1" in the Service menu - to start the Charge pump. In this way, the Main tank is filled with hot water for a short time before Charging starts, to ensure that there is a certain volume to send over to the slave tank.

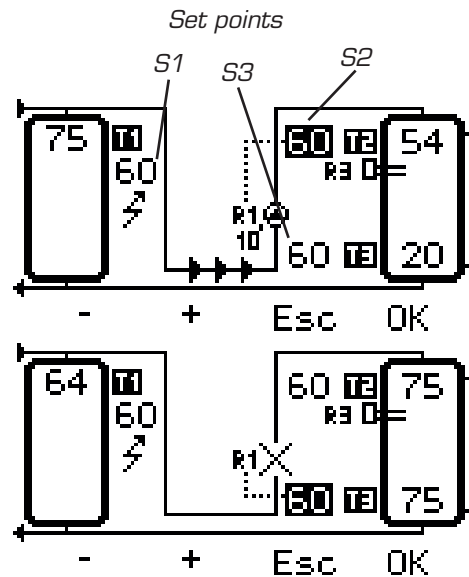
Selectable times are 0-20 minutes. The factory setting is 0.

The charge pump R1 starts when the sensor in the slave tank top T2 is below the set value for Start Charging S2.

Selectable values are from 25 to 90°C. The factory setting is 60°C.

Charge pump R1 is stopped when the sensor in the slave tank bottom T3 exceeds the set value for Stop Charging S3.

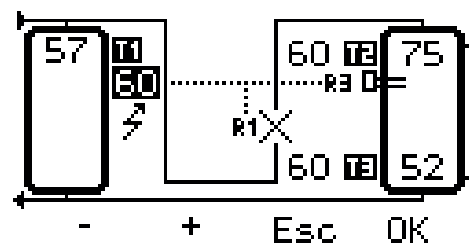
Selectable values are from 30 to 90°C. The factory setting is 60°C.



### Main tank cold / Start Booster

When the sensor in main tank T1 is below the set value S1, Charge pump R1 stops and Booster heat R3 may be started in the slave tank if T2 is colder than the Start Charging S2. The booster heat is stopped again if T2 becomes warmer than S2. It is possible to use **Hysteresis** to get some longer running times for the Booster heat by setting that the temperature rise must be 0-20°C above S2 before the Booster heat is stopped. The factory setting is 0.

Selectable values for the Main Tank cold are 30-90°C. The factory setting is 60°C. The recommended setting is 0-5°C below the set value for Start charging S2. If the setting is too low there is a risk that the charge pump will run unnecessarily when there is no more heat in the main tank.



# Sys 31

## Culvert control with return charge

### Basic mode

The menu lists all the set points and current actual values of the sensors.  
The thermal valve type Laddomat Culvert valve "Sun" can be installed to protect against excessive temperature in the culvert. Otherwise, we recommend the Double check valve Laddomat 5000. This and the Culvert valve "Sun" are adapted to permit pump flow through in either direction.

T1 = Main Tank Temperature  
T2 = Slave Tank top temperature  
T3 = Slave Tank bottom temperature  
T4 = Return temperature

R1 = Charge Pump  
R2 = Return Charge Pump  
R3 = Booster heat  
S1 = Main tank cold setting  
S2 = Start Charge temperature setting  
S3 = Charge stop temperature setting  
S4 = Setting Return Charge setting

### Charging start + stop

Charging means that heat is sent from the top of the main tank to the top of the slave tank.

In order for charge to start the sensor in Main tank T1 must exceed the set values for Main Tank cold S1. It is possible to set a delay time - "Optional time 1" in the Service menu - to start the Charge pump. In this way, the Main tank is filled with hot water for a short time before Charging starts, to ensure that there is a certain volume to send over to the slave tank.

Selectable times are 0-20 minutes. The factory setting is 0.

The charge pump R1 starts when the sensor in the slave tank top T2 is below the set value for Start Charging S2.

Selectable values are from 25 to 90°C. The factory setting is 60°C.

Charge pump R1 is stopped when the sensor in the slave tank bottom T3 exceeds the set value for Stop Charging S3.

Selectable values are from 30 to 90°C. The factory setting is 60°C.

### Main tank cold / Start Booster

When the sensor in main tank T1 is below the set value S1, Charge pump R1 stops and Booster heat R3 may be started in the slave tank if T2 is colder than the Start Charging S2. The booster heat is stopped again if T2 becomes warmer than S2. It is possible to use Hysteresis to get some longer running times for the Booster heat by setting that the temperature rise must be 0-20°C above S2 before the Booster heat is stopped. The factory setting is 0.

Selectable values for the Main Tank cold are 30-90°C. The factory setting is 60°C.

The recommended setting is 0-5°C below the set value for Start charging S2. If the setting is too low there is a risk that the charge pump will run unnecessarily when there is no more heat in the main tank.

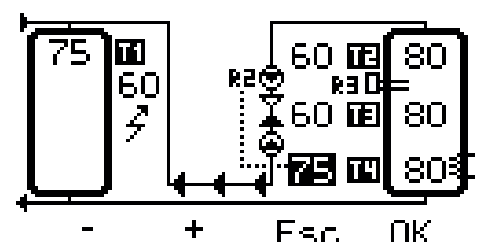
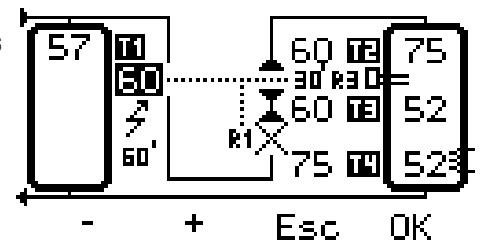
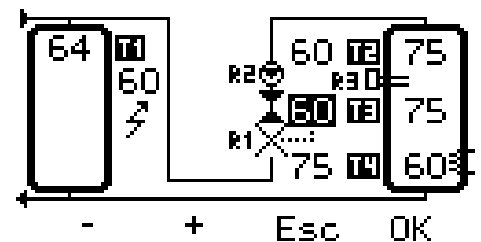
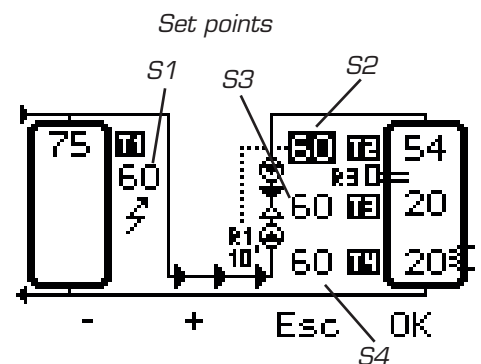
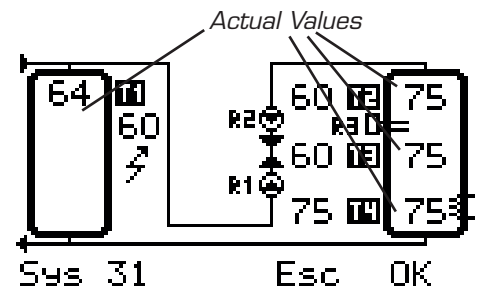
### Return Charge Start

When the sensor in slave tank T4 exceeds the value set for Return Charge Start S4, the Return charge pump R2 starts and transfers surplus heat to the main tank. Selectable values are from 50 to 90°C. The factory setting is 70°C.

The return charge pump either stops as soon T4 drops below the set value S4 or after a user-defined time - **Optional time 2**.

If the slave is emptied so much that the sensor in the tank top T2 is below the set value for Start Charge S2, Return Charge is stopped immediately.

Selectable times are 0-30 minutes. The factory setting is 0.



# Sys 40

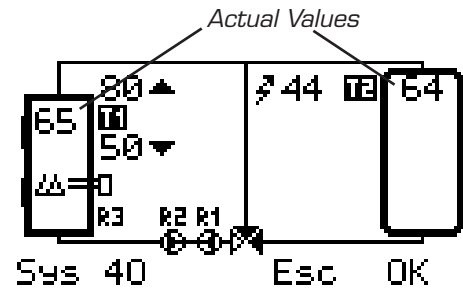
## Charge/Discharge for boiler/tank

### Basic mode

The menu shows all set point settings and current actual values of the sensors. Thermal valve type Laddomat 41-200 must be fitted for optimum performance. Laddomat 41-200 ensures that the boiler quickly achieves and maintains a high operating temperature and has check valves that allow reverse discharge.

T1 = Boiler temperature  
 T2 = Tank temperature  
 T3 + T4 = Optional additional sensors

R1 = Charge Pump  
 R2 = Discharge Pump  
 R3 = Booster heat  
 S1 = Charge temperature setting  
 S2 = Discharge Temperature setting  
 S3 = Stop Discharge setting/Start Booster

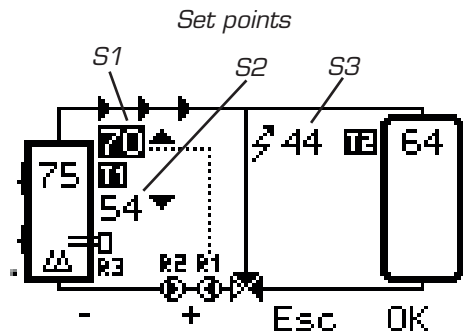


### Charging

Charging means that heat is sent from top of the boiler to the top of the tank.

When the boiler temperature T1 exceeds the set value S1, charge pump R1 starts and pumps heat to the tank.

Selectable start values for charging are 40-95°C. The factory setting is 60°C.



### Discharge

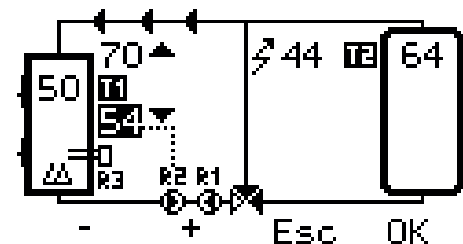
Discharge means that the heat is sent back from the tank top to the top of the boiler when it cools.

When the boiler temperature falls below the set value for Discharge S2, Discharge pump R2 starts and heat is pumped back to the boiler.

The selectable values for Discharge are 25-90°C. The factory setting is 50 °C.

Using **Hysteresis** it is also possible to set how many degrees above the set value that the temperature must rise before the pump stops again. Selectable values for this **Hysteresis** are 0-20°C. The factory setting is 0.

*NB! In order for Discharge to take place, the temperature in boiler T1 must be lower than the tank temperature T2.*

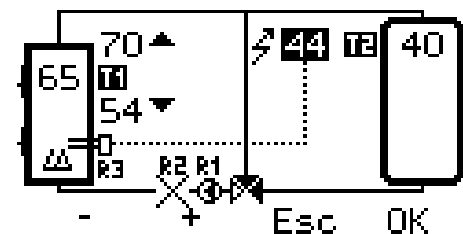


### Stop Discharge/Start Booster

When the sensor in the tank T2 is below the set value for the Stop Discharge S3, Discharge pump R2 is stopped and Booster heat R3 may be started in the boiler.

Selectable values for Stop Discharge are 25-85°C. The factory setting is 45°C. The recommended setting is 1-5°C below the Discharge temperature setting. If the setting is too low there is a risk that the Discharge pump will run unnecessarily when there is no more heat in the main tank.

To avoid, e.g. that the immersion heater switches on and off very often, it is possible to set a **Delay time** for the start of the Booster heat. When T2 is below the set value for S3, the Booster only starts after the set time, 0-10 minutes. The factory setting is 0.





# Sys 41

## Charge/Discharge for boiler/tank with burner control

### Basic mode

The menu shows all set point settings and current actual values of the sensors. Thermal valve type Laddomat 41-200 must be fitted for optimum performance. Laddomat 41-200 ensures that the boiler quickly achieves and maintains a high operating temperature and has check valves that allow reverse discharge.

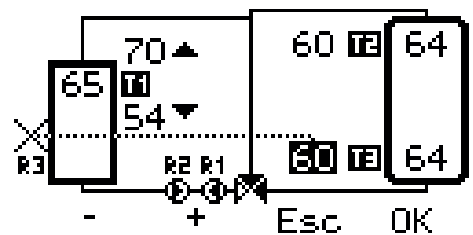
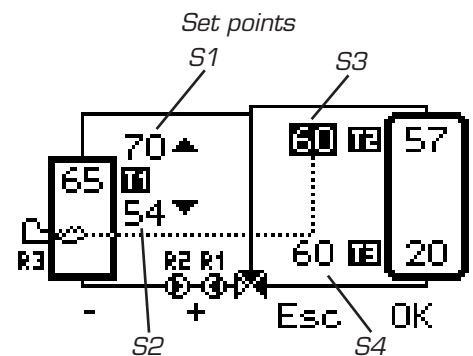
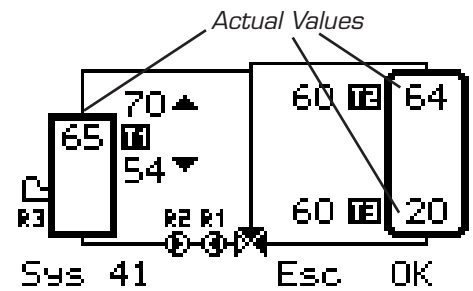
T1 = Temperature Boiler  
 T2 = Tank Top Temperature  
 T3 = Tank Bottom Temperature  
 T4 = Optional additional sensors

R1 = Charge Pump  
 R2 = Discharge Pump  
 R3 = Burner  
 S1 = Charge temperature setting  
 S2 = Discharge temperature setting  
 S3 = Burner start temperature setting  
 S4 = Burner stop temperature setting

### Burner start + stop

Burner R3 starts when the sensor T2 at the top of the tank is under the set value for Start burner S3. Selectable values are from 30 to 90°C. The factory setting is 60°C.

The burner stops when the sensor T3 in the tank bottom is above the value set for Stop burner S4. Selectable values are from 30 to 90°C. The factory setting is 60°C.



### Charging

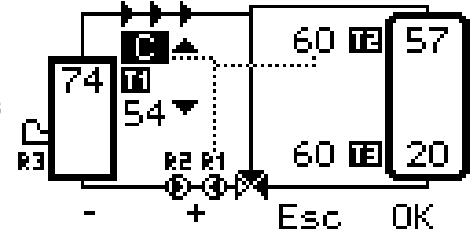
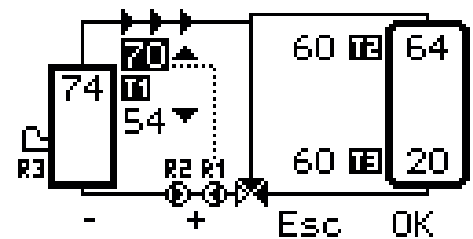
Charging means that heat is sent from the boiler to the tank.

The charge pump R1 can be started in two ways:

- When the boiler temperature T1 is above the value set for Charging S1, the charge pump R1 starts and pumps the heat to the tank.
- In mode C the charge pump runs as long as the burner is running. If the boiler is hot after the burner stops, the pump runs as long as T1 is above 85°C.

Selecting **Optional time 1** in the Service menu allows the pump to run from 0 to 20 minutes after the burner stops, even if T1 is below 85°C. Selectable values are 0-20 minutes. The factory setting is 0.

Selectable values for charging are 50-90°C. The factory setting is 60°C. Mode C is selected by setting the temperature higher than 90°C.



### Discharge

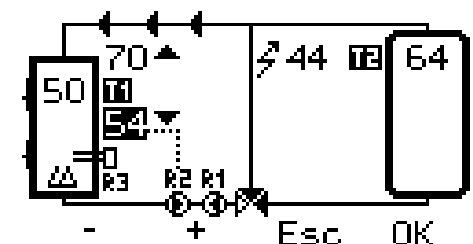
Discharge means that the heat is sent back from the tank to the boiler when it cools.

When the boiler temperature falls below the set value S2 the Discharge pump R2 starts and heat is pumped back to the boiler.

The selectable values for discharge are 25-90°C. The factory setting is 50°C.

Using **Hysteresis** it is also possible to set how many degrees above the set value that the temperature must rise before the pump stops again. Selectable values for this **Hysteresis** are 0-20°C. The factory setting is 0.

*NB! In order for Discharge to take place, the temperature in boiler T1 must be lower than the tank temperature T2.*



# Sys 50

## Charge/Discharge for tank/tank

### Basic mode

The menu shows all set point settings and current actual values of the sensors. Thermal valve type Laddomat 5000 should be fitted for optimum performance. Laddomat 5000 is a spring-loaded double check valve which permits flow in two directions when either pump is in operation.

T1 = Main Tank Temperature  
 T2 = Slave Tank top temperature  
 T3 = Slave Tank bottom temperature  
 T4 = Optional additional sensors

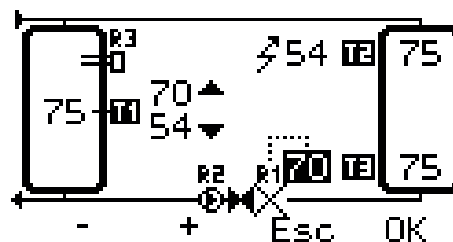
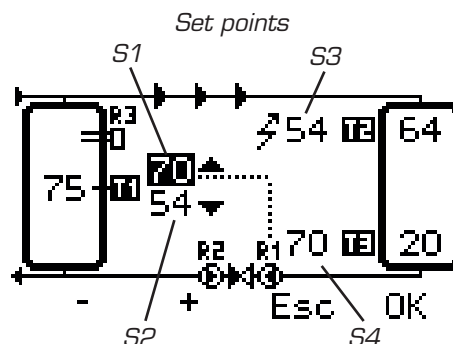
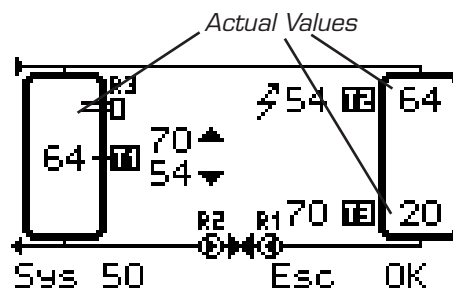
R1 = Charge Pump  
 R2 = Discharge Pump  
 R3 = Booster  
 S1 = Charge temperature setting  
 S2 = Discharge Temperature setting  
 S3 = Stop Discharge/Start Booster setting  
 S4 = Stop Charge setting

### Charging

Charging means that heat is sent from the top of the main tank to the top of the slave tank.

When the main tank temperature T1 exceeds the set value S1, Charge pump R1 starts and pumps heat to the slave tank. Selectable start values for Charging are 30-95°C. The factory setting is 60°C.

By setting Stop Charge S4 Charging can be stopped if the bottom of the slave tank T3 exceeds the set temperature. Selectable start values for Stop charging are 30-95°C. The factory setting is 70°C.



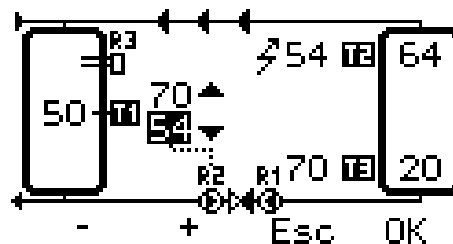
### Discharge

Discharge means that the heat is sent back from the top of the slave tank to the top of the main tank when it cools.

When the main tank temperature T1 falls below the set value S2, the Discharge pump R2 starts and heat is pumped back to the main tank. The selectable values for Discharge are 25-90°C. The factory setting is 50°C.

Using **Hysteresis** it is also possible to set how many degrees above the set value that the temperature must rise before the pump stops again. Selectable values for this **Hysteresis** are 0-20°C. The factory setting is 0.

*NB! In order for Discharge to take place, the temperature in main tank T1 must be lower than in slave tank T2.*

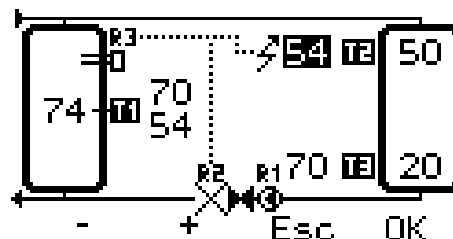


### Stop Discharge/Start Booster

When the sensor in slave tank T2 is lower than set value S3, Discharge pump R2 stops and Booster heat R3 may be started in the main tank.

Selectable values for Stop Discharge are 25-85°C. The factory setting is 45°C. The recommended setting is 1-5°C below the Discharge Temperature S2 setting. If the setting is too low there is a risk that the Discharge pump will run unnecessarily when there is no more heat in the slave tank.

To avoid, e.g. that the immersion heater switches on and off very often, it is possible to set a **Delay time** for the start of the Booster heat. When T2 is below the set value for S3, the Booster only starts after the set time, 0-10 minutes. The factory setting is 0.



# Sys 51

## Charge/Discharge for tank/tank with extra charge

### Basic mode

The menu shows all set point settings and current actual values of the sensors. Thermal valve type Laddomat 5000 should be fitted for optimum performance. Laddomat 5000 is a spring-loaded double check valve which permits flow in two directions when either pump is in operation.

T1 = Main Tank Temperature  
 T2 = Slave Tank top temperature  
 T3 = Slave Tank bottom temperature  
 T4 = Extra charge temperature

R1 = Charge Pump  
 R2 = Discharge Pump  
 R3 = Booster  
 S1 = Charge temperature setting  
 S2 = Discharge Temperature setting  
 S3 = Start extra charge/Start Booster setting  
 S4 = Stop Discharge/Start Booster setting  
 S5 = Stop Charge setting

### Charging

Charging means that heat is sent from the top of the main tank to the top of the slave tank.

When the main tank temperature T1 exceeds the set value S1, Charge pump R1 starts and pumps heat to the slave tank. Selectable start values for Charging are 30-95°C. The factory setting is 60°C.

By setting Stop Charge S4, Charging can be stopped if the bottom of the slave tank T3 exceeds the set temperature. Selectable start values for Stop charging are 30-95°C. The factory setting is 70°C.

Start Extra Charge S3 can be used to force start the Charge pump if the entire system is fully charged. Selectable values are from 30 to 95°C. The factory setting is 80°C.

### Discharge

Discharge means that the heat is sent back from the top of the slave tank to the top of the main tank when it cools.

When the main tank temperature T1 falls below the set value S2, the Discharge pump R2 starts and heat is pumped back to the main tank. The selectable values for Discharge are 25-90°C. The factory setting is 50°C.

Using **Hysteresis** it is also possible to set how many degrees above the set value that the temperature must rise before the pump stops again. Selectable values for this **Hysteresis** are 0-20°C. The factory setting is 0.

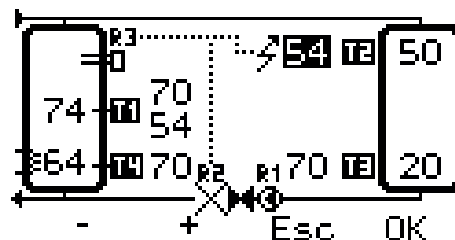
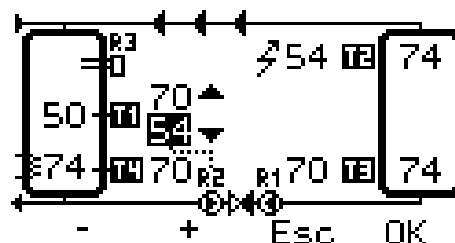
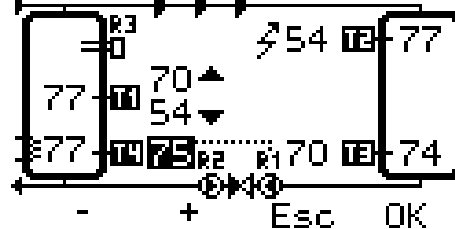
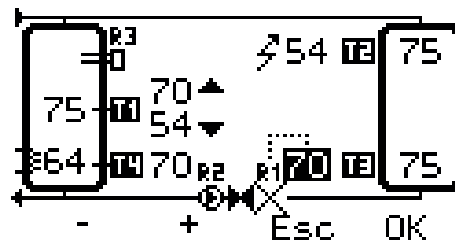
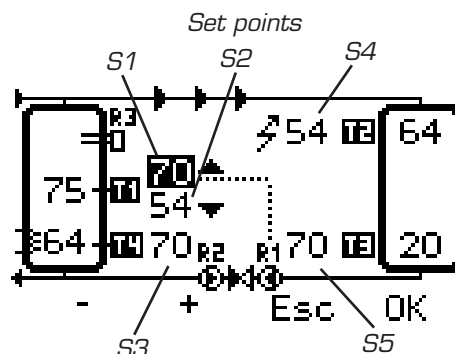
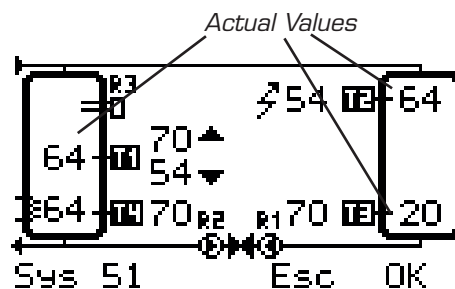
*NB! In order for Discharge to take place, the temperature in main tank T1 must be lower than in slave tank T2.*

### Stop Discharge/Start Booster

When the sensor in slave tank T2 is lower than set value S4, Discharge pump R2 stops and Booster heat R3 may be started in the main tank.

Selectable values for Stop Discharge are 25-85°C. The factory setting is 45°C. The recommended setting is 1-5°C below the Discharge Temperature S2 setting. If the setting is too low there is a risk that the Discharge pump will run unnecessarily when there is no more heat in the slave tank.

To avoid, e.g. that the immersion heater switches on and off very often, it is possible to set a **Delay time** for the start of the Booster heat. When T2 is below the set value for S4, the Booster only starts after the set time, 0-10 minutes. The factory setting is 0.



# Sys 60

## Pump control and temperature display

### Basic mode

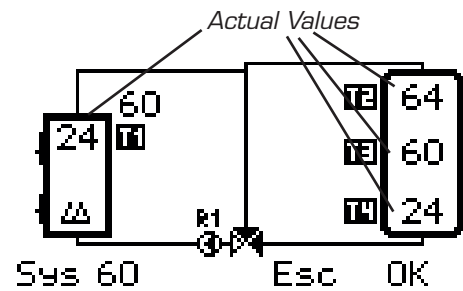
The menu shows all set point settings and current actual values of the sensors.

T1 = Temperature Boiler

T2 – T4 = Temperature Tank

R1 = Charging pump

S1 = Set point Charging temperature



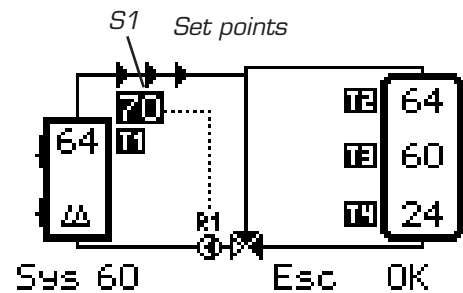
### Charging

Charging means that heat is sent from the boiler to the tank.

The charge pump R1 is started when the boiler temperature T1 is above the value set for Charging S1

Selectable values for charging are 25-90°C. The factory setting is 60°C.

Using **Hysteresis** it is also possible to set how many degrees below the set value that the boiler temperature is allowed to fall before the pump stops again. Selectable values are 0-20°C. The factory setting is 0.



# Sys 70

## Differential control

### Basic mode

The menu shows all set point settings and current actual values of the sensors.

T1-T2 = Temperatures, actual value

T3+T4 = Optional additional sensors

R1 = Relay 1

R3 = Relay 3

S1 = Setting Start Above, >, or Below, <, set Differential temperature

S2 = Setting Differential temperature Start

S3 = Setting Differential temperature Stop

S4 = Setting Absolute Stop Above, >, or Below, <, set temperature

S5 = Setting Absolute Stop temperature R1

S6 = Setting Absolute Start R3 Above, >, or Below, <, set temperature

S7 = Setting Absolute Start temperature R3

### Function

R1 is started when the difference between T1 and T2 is larger, >, or smaller, <, than the set value for S1/S2 and is stopped when the difference is smaller or larger than set value for S3.

#### Example:

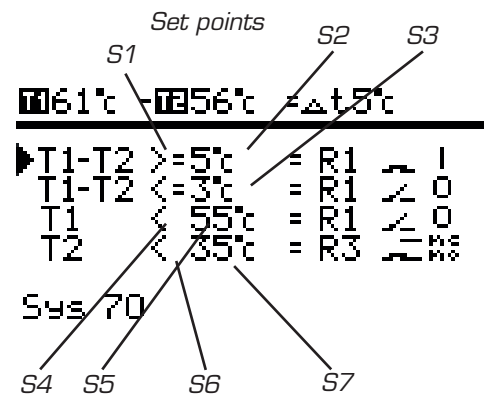
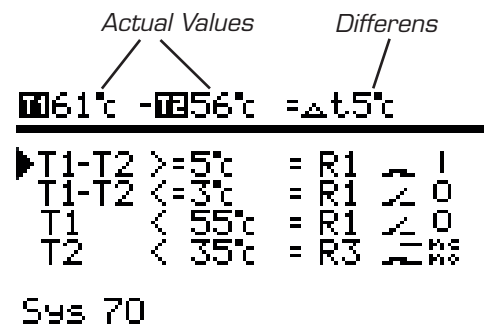
The Charging pump R1 is started when the boiler temperature T1 is 5°C above the tank temperature T2. The pump is then stopped when the difference is smaller than 3°C.

If the boiler temperature T1 is below S4/S5, i.e. <55°C, the pump is forced to stop, no matter the difference in temperature.

Selectable values are 0–99°C. The factory setting is <55°C.

If the tank temperature T2 is below S6/S7, i.e. <35°C, R3 can be used to start additional heating in the tank.

It's also possible to use **Hysteresis** – When R3 is started, it's possible to set how many degrees the temperature T2 is allowed to rise or fall before R3 is stopped. Selectable values are 0-20°C. The factory setting is 0.



# Sys 90

## Thermostat function for up to 3 relays

### Basic mode

The menu shows all set point settings and current actual values of the sensors. It's possible to control one, two or three relays/units.

T1-T4 = Optional sensor used to control each relay.  
T- means the setting is inactivated.

R1-R3 = Relay controlled by each setting.

S1 = Setting which sensor to use for Relay 1

S2 = Setting Start Above, >, or Below, <, set temperature S3

S3 = Setting Start temperature for Relay 1

S4 = Setting which sensor to use for Relay 2

S5 = Setting Start Above, >, or Below, <, set temperature S6

S6 = Setting Start temperature for Relay 2

S7 = Setting which sensor to use for Relay 3

S8 = Setting Start Above, >, or Below, <, set temperature S9

S9 = Setting Start temperature for Relay 3

S10 = Setting Hysteresis for Relay 1

S11 = Setting Hysteresis for Relay 2

S12 = Setting Hysteresis for Relay 3

### Function

It's possible to make one setting for each relay. Setting 2 and 3 are activated by choosing which sensor to use. "T-" means the setting is inactive.

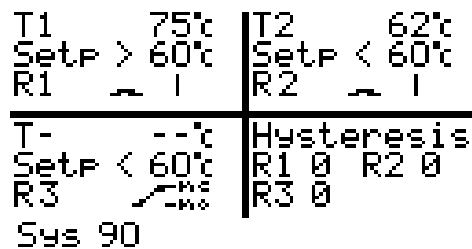
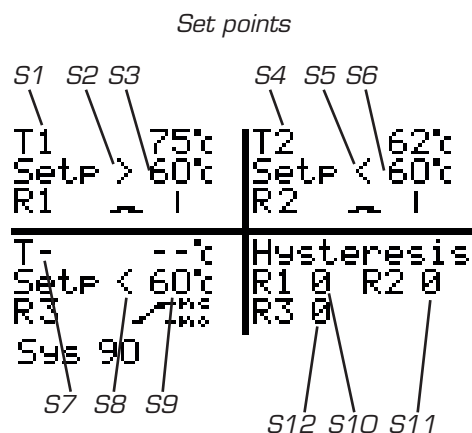
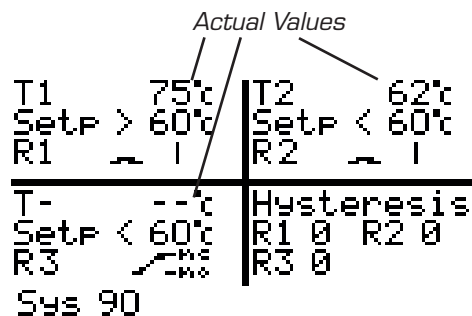
First setting is which sensor to use. T1-4 is selectable for each relay. Second setting is if the relay should be activated by rising/above, >, or falling/below, <, set temperature and the last setting is the desired start temperature.

Hysteresis for R1-3 is Hysteresis allowed for each relay. Selectable values are 0-20°C. The factory setting is 0.

### Example:

R1 is started when T1 rise above 60°C. R1 is then stopped when T1 falls below 57°C.

R2 is started when T2 falls below 60°C. R2 is then stopped when T2 rise above 65°C.



# Sys 99

## "Free" programming of sensors and relays

### Basic mode

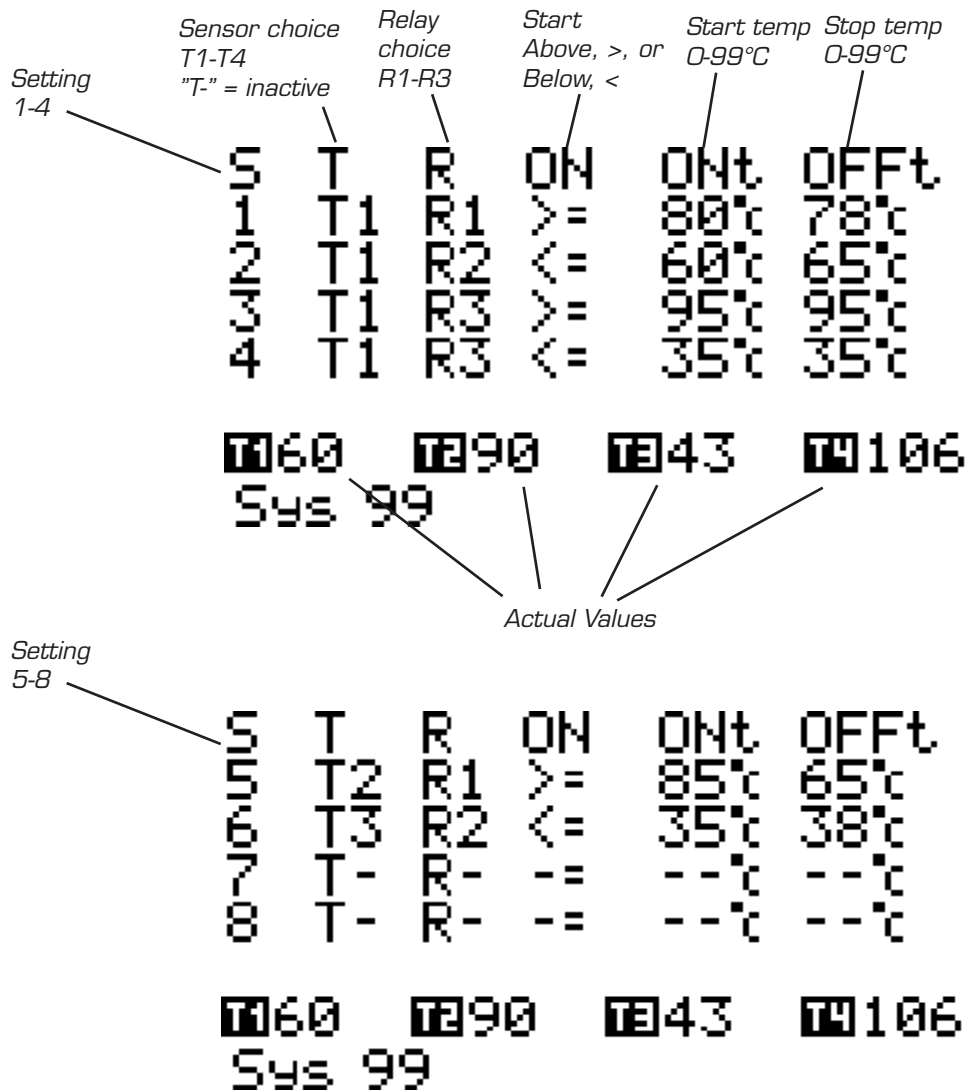
The menu shows all set point settings and current actual values of the sensors.  
It's possible to program up to 8 different settings/rows.

**NOTE! This system has no locked values etc, which means it's possible to make incorrect settings.**

T1-T4 = Which sensor to use for each setting.

T- means the setting is inactivated.

R1-R3 = Relay controlled by each setting.



### Example (see pictures above)

1. The pump R1 is started when the sensor T1 rise above 80°C. The pump is then stopped when T1 falls below 78°C.
2. The pump R2 is started when the sensor T1 falls below 60°C. The pump is then stopped when T1 rise above 65°C.
- 3-4. When the sensor T1 rise above 95°C or falls below 35°C, R3 is used to send an alarm signal for too high/low temperature.
5. The pump R1 is started when the sensor T2 rise above 85°C. The pump is then stopped when T2 falls below 65°C.
6. The pump R3 is started when the sensor T3 falls below 35°C. The pump is then stopped when T3 rise above 38°C.

# Menus and Settings

## Temperature

This menu displays the read temperatures for all sensors.  
NB. The figures in parentheses in the middle show a possible calibration for each sensor, but this is only displayed if you activate the row.  
Press OK to activate the menu, then press the arrow keys up/down and OK once more to change the calibration.  
Selectable values are - 10 to + 10°C. The factory setting is 0.

Temperature		
▶T1	(+0)	48°C
T2	(+0)	55°C
T3	(+0)	47°C
T4	(+0)	38°C

▼ ▲ Esc OK

## Service

Basic settings are made in the Service menu.

Service	
▶Settings	
Save/Restore set.	
Manual Test	
Security code	
Language	

▼ ▲ Esc OK

## Settings system by system

### Settings Sys 0

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

### Settings Sys 10

**Optional time 1** – When the pump is in Constant mode "C", you can set the pump to continue to run for a given time after the burner is stopped. Selectable values are 0-20 minutes. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

### Settings Sys 30

**Hysteresis** – When the Booster heat is started, you can set that it will run until the sensor in the Slave tank top T2 rises a specified number of degrees above the setting for Charging S2. Selectable values are from 0 to 20°C. The factory setting is 0.

**Optional time 1** – How long time to go from the main tank T1 gets hot until the Charge pump starts. In this way, you get a volume of hot water in the Main tank before charging starts. Used to avoid Charge starting, but is stopped so that the Main tank gets cold again if the flow in the culvert is greater than the inflow of warm water into the Main tank.  
Selectable values are 0-20 minutes. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

### Settings Sys 31

**Hysteresis** – When the Booster heat is started, you can set that it will run until the sensor in the Slave tank top T2 rises a specified number of degrees above the setting for Charging S2. Selectable values are from 0 to 20°C. The factory setting is 0.

**Optional time 1** – How long time to go from the main tank T1 gets hot until the Charge pump starts. In this way, you get a volume of hot water in the Main tank before charging starts. Used to avoid Charge starting, but is stopped so that the Main tank gets cold again if the flow in the culvert is greater than the inflow of warm water into the Main tank.  
Selectable values are 0-20 minutes. The factory setting is 0.

**Optional time 2** – How long time the Return charge pump should go after the sensor T4 in the slave tank has become cold. Used to get a little longer operating time when the pump is running.  
Selectable values are 0-30 minutes. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.



## ***Settings Sys 40***

**Hysteresis** – When Discharge starts, you can set that the temperature in Boiler T1 should increase a specific number of degrees above the set temperature before Discharge is stopped again. Selectable values are 0-20°C. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

**Delay time** – Used to wait a time after there is no more heat in tank T2 before Booster heat is started. This is to reduce the risk of frequent on/off's if the temperature in the Tank "swings" up and down. Selectable values are 0-10 minutes. The factory setting is 0.

## ***Settings Sys 41***

**Hysteresis** – When Discharge starts, you can set that the temperature in Boiler T1 should increase a specific number of degrees above the set temperature before Discharge is stopped again. Selectable values are 0-10 °C. The factory setting is 0.

**Optional time 1** – When the pump is in Constant mode "C", you can set the pump to continue to run for a given time after the burner is stopped. Selectable values are 0-20 minutes. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

## ***Settings Sys 50 och 51***

**Hysteresis** – When Discharge starts, you can set that the temperature in Main tank T1 should increase a specific number of degrees above the set temperature before Discharge is stopped again. Selectable values are 0-20°C. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

**Delay time** – Used to wait a time after there is no more heat in Slave tank T2 before Booster heat is started. This is to reduce the risk of frequent on/off's if the temperature in the Tank "swings" up and down. Selectable values are 0-10 minutes. The factory setting is 0.

## ***Settings Sys 60***

**Hysteresis** – When the charge pump is started, it's possible to set how many degrees the boiler may fall in temperature before the pump is stopped. Selectable values are 0-20°C. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

## ***Settings Sys 70***

**Hysteresis** – When R3 is started, it's possible to set how many degrees the temperature T2 is allowed to rise or fall before R3 is stopped. Selectable values are 0-20°C. The factory setting is 0.

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

## ***Settings Sys 90***

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

## ***Settings Sys 99***

**NTC Sensor Type** – The type of sensor to be used; NTC 10k or 50k @ 25°C. The factory setting is 50k.

## Save/Restore Settings

Used to save the user's settings, restore your settings or restore factory settings. Reset to factory settings is the only way to change the system after initial start-up. NB: to avoid factory reset by mistake, the "Yes" button must be held in for 1 second.

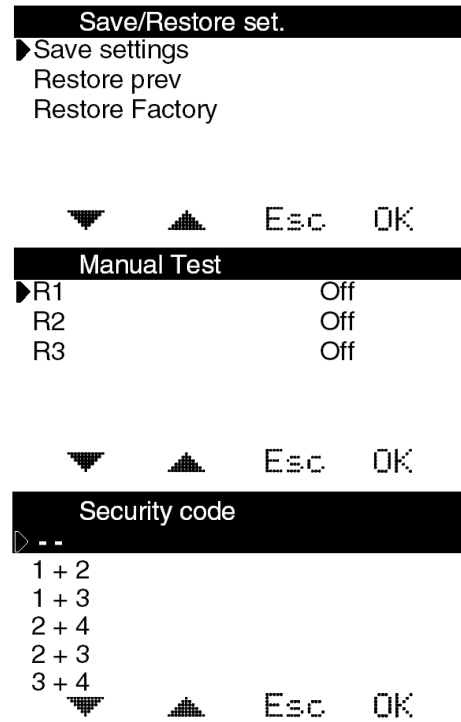
## Manual test

Used to run each relay manually. When a relay is activated but not deactivated, this is active for 10 minutes or until you leave the menu.

## Security code

If you want to prevent unauthorised persons from accessing other than the Basic menu, you can set a button combination that must be pressed to make changes. The lock is activated 30 seconds after the last button press.

## Languages



## Troubleshooting

In the event of any malfunction it is possible to see from the display if any of the temperatures are not correct. In addition, all the features of Laddomat MR will be deactivated.

If there is a communication error between the Control panel and Connection Centre "COMM ERROR" will appear on the display. This may be due to a fault on the cable or a connector is not properly inserted.

If there is a sensor fault (or the temperature is outside the normal range), two different characters will be displayed, depending on the type of sensor fault.

At short circuit or too high temperature "--" is displayed instead of the temperature.

If there is an open circuit or too low temperature "XX" will be displayed instead of the temperature.