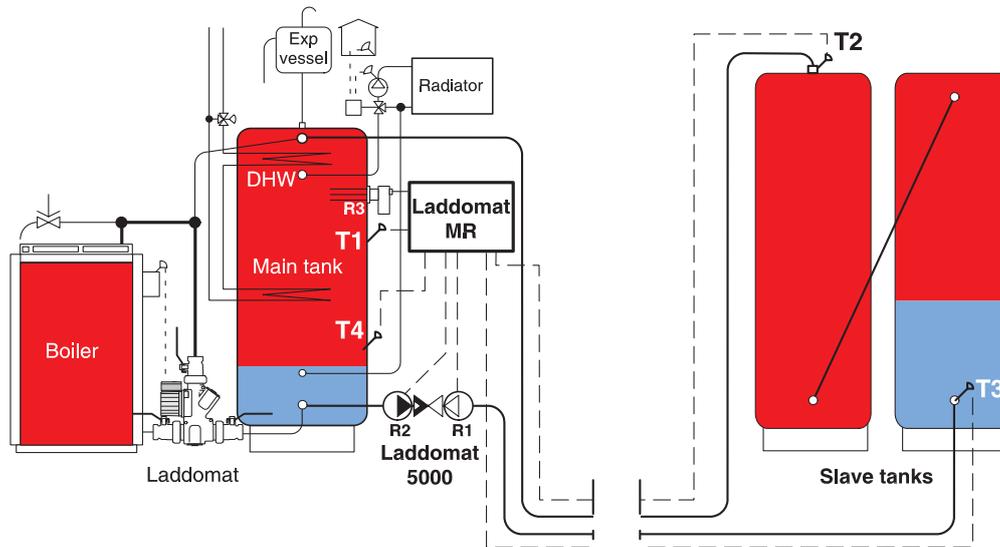


# LADDOMAT® MR 50

## Installation instructions



### Scope of delivery

#### Valve package Laddomat 5000 with:

- Patented dual action non-return valve, Swedish pat. no. 469 854
- 2 pumps, Laddomat LM6A-130. Non ErP 2015 pumps are available outside EU only.
- 2 shut-off valves Cu28 or R32.
- 3 x 3-bulb submersible tubes for bulbs with D=6 mm. R15, L=150 mm
- 2 x sensor holders and hose ties for pipe fitting



#### Electronic charging regulator

- Laddomat MR, complete with 4 sensors and with relay outputs for 2 pumps and booster heating
- DIN rail for wall mounting of AC and 2 bags with screws and plugs MP and AC are also included.



## **Settings, temperatures**

Settings are described on page 5–8.

### **Function Sys 50**

When the boiler heats the main tank so that sensor T1 in the main tank is hotter than the set temperature, charge pump R1 starts to pump hot water into the slave tanks. Sensor T3 stops the charging if the slave tanks are fully charged, i.e. exceed the set value.

When T1 is under the set temperature, the discharge pump R2 starts and pumps over hot water from the top of the slave tanks to the main tank. This transfer takes place slowly so that a sharp junction is created between hot and cold water, so-called layering. The discharge pump is started and stopped at intervals, as the heat is consumed in the main tank.

Discharge continues until sensor T2 in the top of the slave tanks is lower than the set temperature. The recommended setting is 0–5°C below the discharge temperature. The discharge pump then stops and any booster heating R3 in the main tank starts automatically. NB! Booster heat can only be started if the temperature is higher at T2 than T1, i.e. the slave tank is hotter than the main tank.

### **Function Sys 51**

Sensor T4 in the main tank can be used to force the charge pump R1, in this way optimise any solar heating or to ensure that the entire system is fully charged.

### **Patented double non-return valve, DBV**

A double non-return valve is fitted in order to prevent involuntary circulation between the tanks. This has an integrated choke of the flow during discharge that ensures optimum layering.

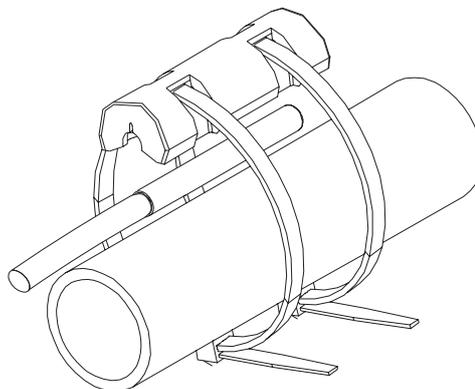
As the non-return valve is spring-loaded in both directions it is completely mode-independent.

### **Advantages**

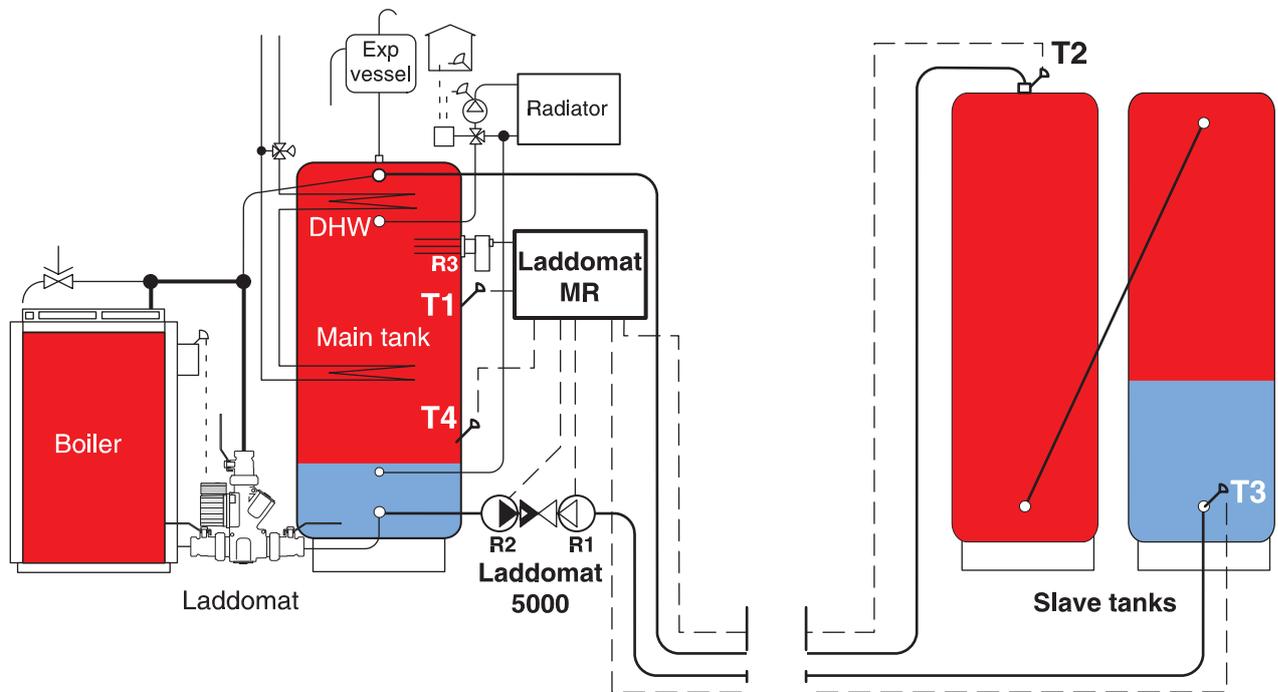
- Extra tanks can be positioned a long way from the main tank
- No involuntary circulation between the tanks
- Pipework uses smaller dimensions = easier and cheaper installation
- Efficient layering = large accumulation capacity
- Optimisation of solar heating, if fitted

## **Installation**

Check flow direction and function of the pumps according to drawings and instructions.



*Example of sensor installation on a pipe*



## **Electrical installation**

See page 4.



**Sensors should not be fitted in fluid-filled submersible pipes.**

### **Fitting main tank sensor T1**

The sensor is fitted at any height (although no higher than the electrical heating cartridge or immersion heater), in submersible tubes or on-shell fitting. To ensure best function use contact paste between the sensor and contact surfaces.

The purpose of this sensor is to start charging when the main tank is warm.

### **Fitting slave tank sensor T2**

Attach the sensor directly to the pipe as close to the tank top as possible, using the sensor holder.

To ensure best function use contact paste between the sensor and pipes. Insulate the pipe around the sensor.

The sensor can also be fitted in a submersible tube in the tank top.

The only task for this sensor is to stop discharge when there is no heat in the slave tank(s) and then start any booster heating.

### **Fitting slave tank sensor T3**

Attach the sensor directly to the pipe as close to the tank bottom as possible, using the sensor holder.

To ensure best function use contact paste between the sensor and pipes. Insulate the pipe around the sensor.

The sensor can also be fitted in a submersible tube in the tank bottom.

The purpose of this sensor is to stop charging when the slave tank is fully charged.

### **Fitting main tank sensor T4 (Sys 51)**

The sensor is fitted as appropriate in a submersible tube or on the tank shell just above the solar coil, if fitted, or as close to the tank's bottom as possible.

To ensure best function use contact paste between the sensor and contact surfaces. Insulate the pipe around the sensor.

The purpose of this sensor is to restart charging if the selected max. temperature is exceeded.

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

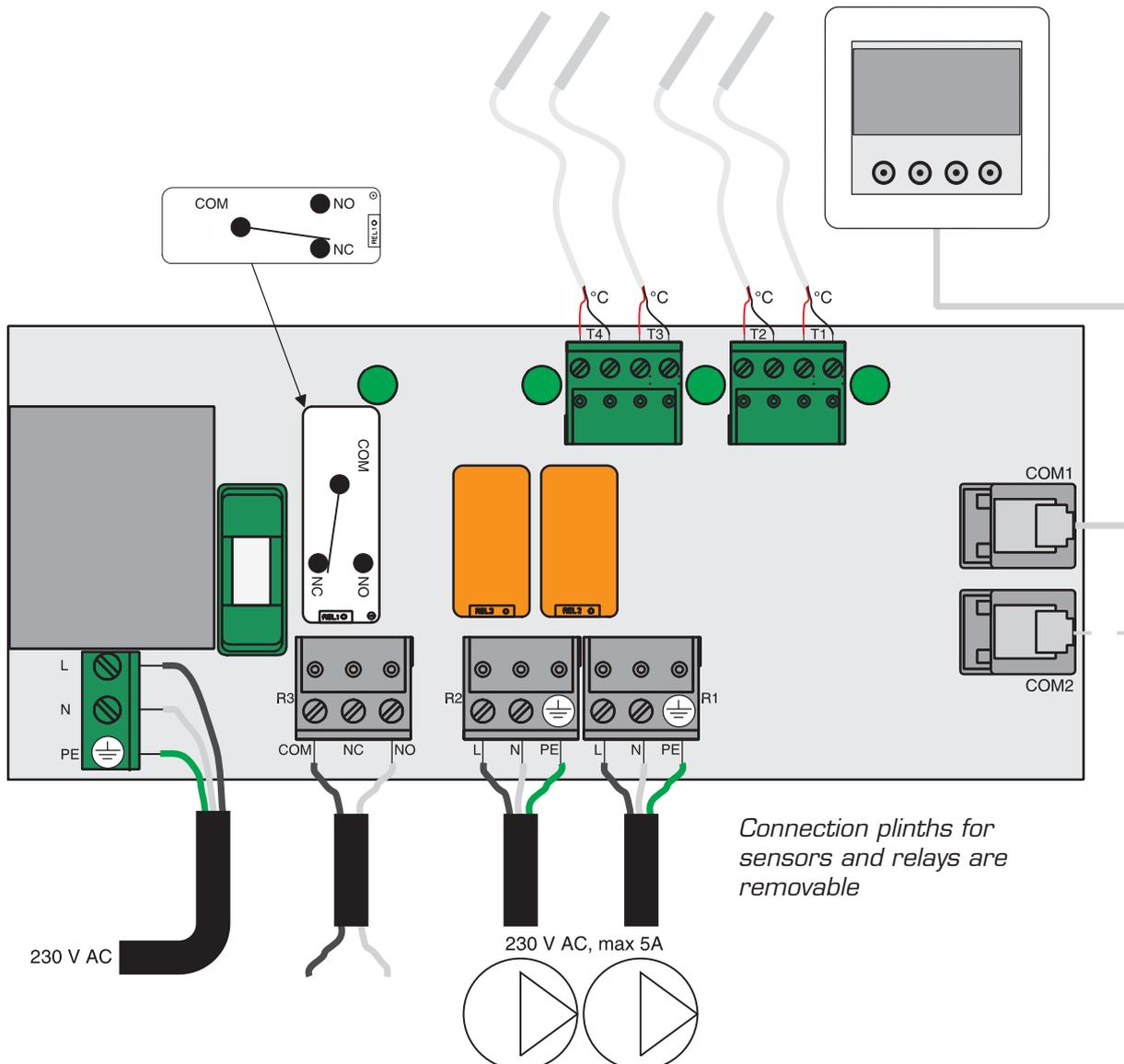
### Dimensions:

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

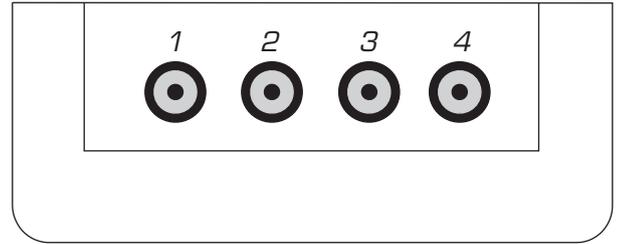


# Introduction and explanation

## Controls

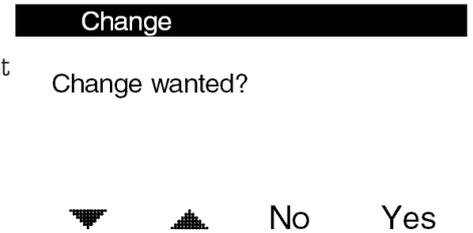
### A.

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.

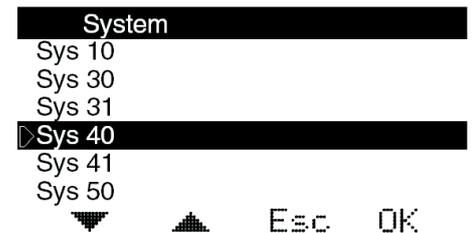
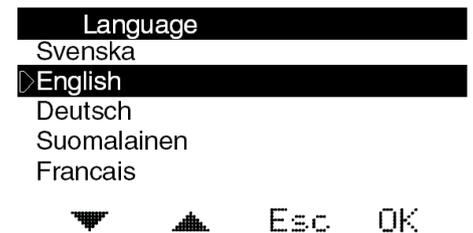


## Initial start-up - Choice of language and system schedule:

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

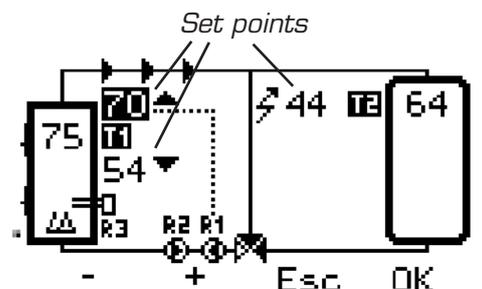
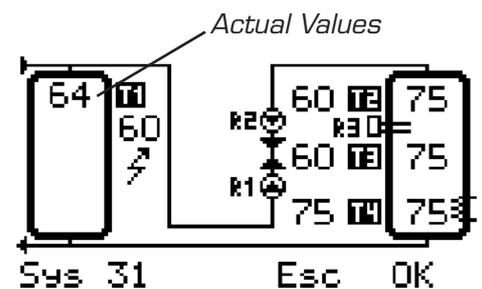
R3 = Booster (potential-free relay), alternating NO/NC, max 250V 5A

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 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.

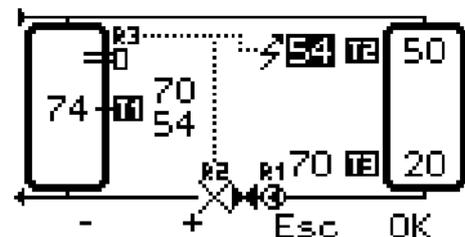
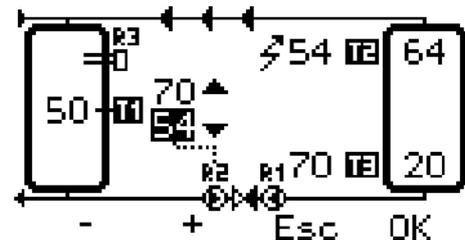
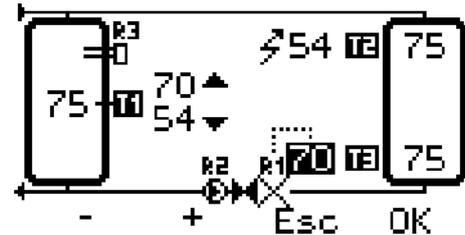
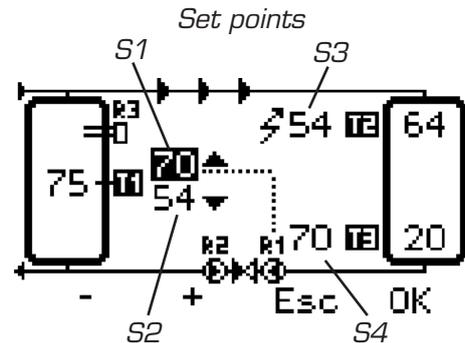
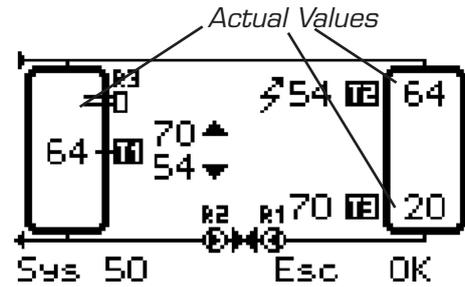
*NB! In order for Discharge to take place, the temperature in main tank T1 must be lower than in slave tank T2.*

### 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.

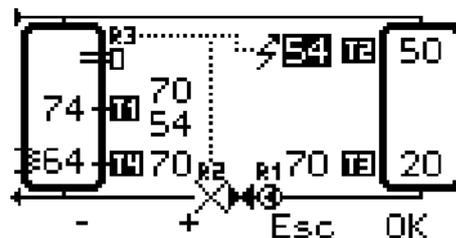
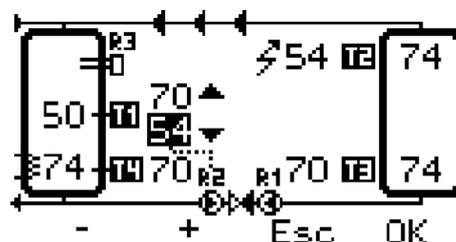
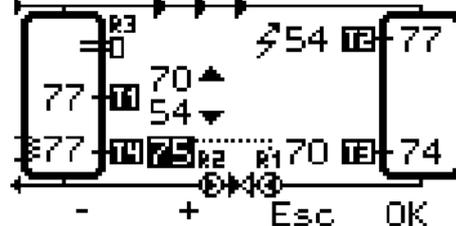
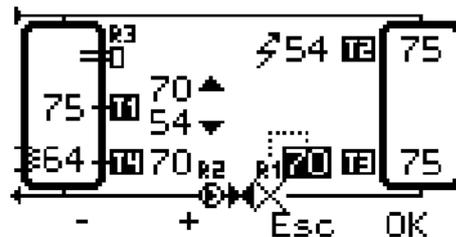
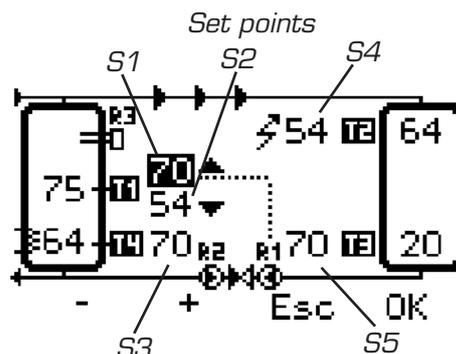
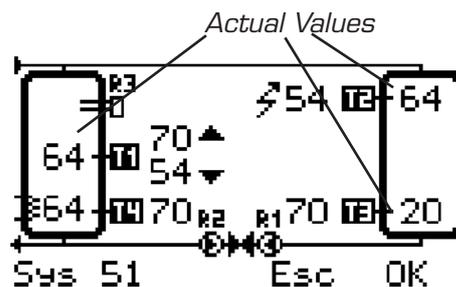
*NB! In order for Discharge to take place, the temperature in main tank T1 must be lower than in slave tank T2.*

### 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.



## 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

#### 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.

#### 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.

Save/Restore set.	
▶Save settings	
Restore prev	
Restore Factory	

▼ ▲ Esc OK

#### 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.

Manual Test	
▶R1	Off
R2	Off
R3	Off

▼ ▲ Esc OK

#### 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.

Security code	
▶ --	
1 + 2	
1 + 3	
2 + 4	
2 + 3	
3 + 4	

▼ ▲ Esc OK

#### Languages

### Troubleshooting

In the event of any malfunction it is easy 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.