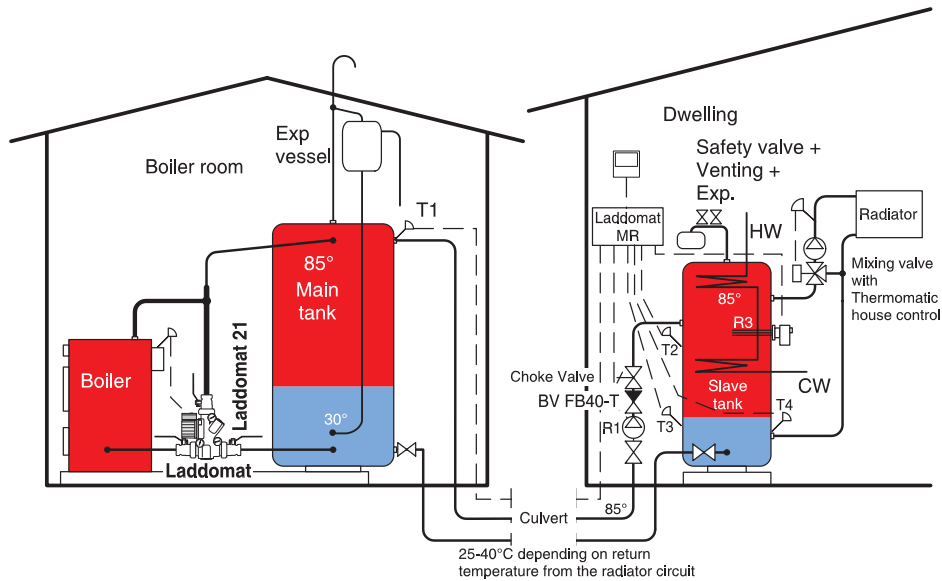


LADDOMAT® MR 30

Installation instructions



Scope of delivery

Sys 30:

Art no. 11 34 31 02

- Laddomat MR, complete.
- Spring-loaded non-return valve BV FB40-T
- Charge pump LM9A-130, with 2 x shut-off valves Cu28 with lever.
Non ErP 2015 pumps are only available outside EU.

Art no. 11 34 31 12

As above but also with an adaptor for PEX culvert with temperature limiter:

- Laddomat MR, complete.
- Charge pump LM9A-130, with 2 x shut-off valves Cu28 with lever.
Non ErP 2015 pumps are only available outside EU.
- Thermal valve Laddomat 31-200 with built-in non-return valve, 72°C, with 3 x shut-off valves Cu28 and EPP insulation. Cartridge with 78°C opening temperature is supplied.

Sys 31:

Art no. 11 34 31 03

- Laddomat MR, complete.
- Laddomat 5000 double non-return valve, with 2 pumps LM9A-130 and shut-off valves Cu28. Non ErP 2015 pumps are only available outside EU.

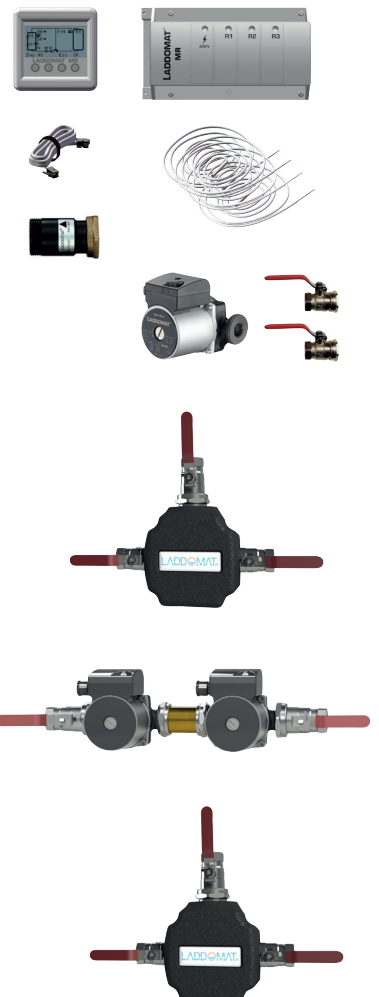
Art no. 11 34 31 14

As above but also with an adaptor for PEX culvert with temperature limiter:

- Thermal valve Laddomat 31-200, as above but adapted for return flow.

For sensor installation, the following are always included:

- 4 x 3-bulb submersible tubes for bulbs with D=6 mm. R15, L=150 mm, and 2 x sensor holders and hose ties for pipe fitting.



Function Sys 30

Laddomat MR starts charge pump R1 when the sensor T1 in the top of the main tank exceeds the set value, at the same time as sensor T2 in the slave tank's top is less than the set value. In order to optimise the charge you can set a delay time before the charging can be started. In that way, you get a greater volume of hot water that can be charged into the slave tank in the start sequence.

Charging continues until sensor T3 in the bottom of the slave tank exceeds the set value.
The pump restarts when the sensor T2 in the top of the slave tank is less than the set value.

After completed firing in the boiler the main tank will be drained gradually. When it is completely drained and the temperature at sensor T1 in the top of the main tank is below the set value, the charge pump is stopped and, if necessary, booster heat R3 in the slave tank starts.

Function Sys 31

If a fourth sensor, T4, is used, it is possible to start the return charge pump R2 to send heat back to the main tank, e.g. if there is a solar coil in the slave tank. The surplus is sent to the main tank and the solar heating can give the maximum heating all of the time to the slave tank. If the slave tank cools again, the heat is sent back to the main tank.

See Fig. 7 on the next page for sensor location, etc.

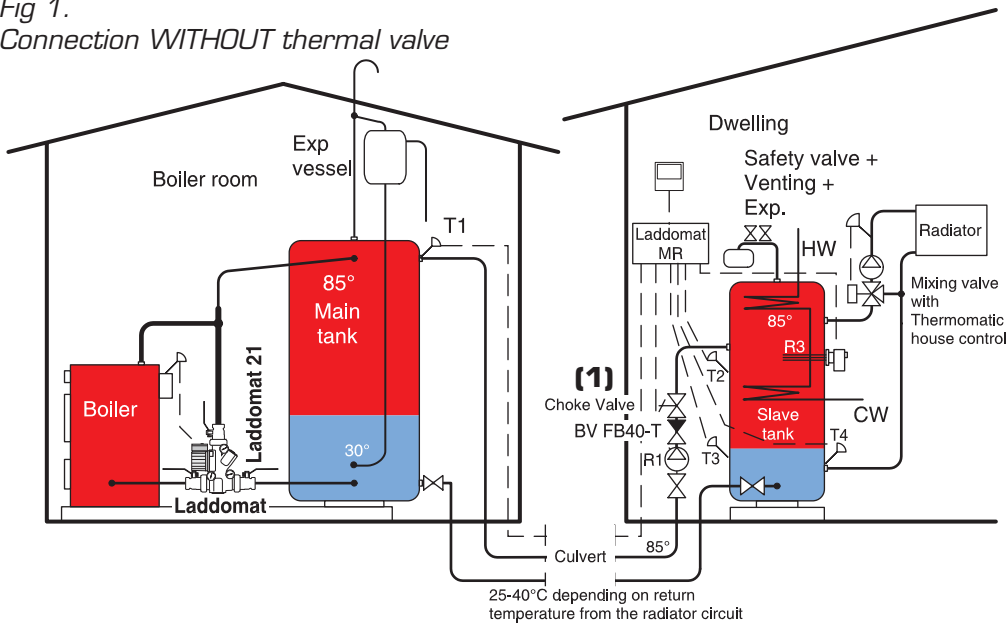
Advantages

- Reduces the culvert losses
- Increases accumulation capacity
- Automatic start of reserve heating when the main tank is empty.
- Non-return valve and automatic stop of the charge pump guarantees that reserve heating does not heat the main tank.
- There is an option to customise to send heat back to the main tank, e.g. if the slave tank has a solar coil.

Conditions/requirements for good function:

- Pump as hot water as the culvert between the main tank and slave tank can stand when this gives more energy per overpumping. The fewer overpumpings, the smaller the losses.
- The Laddomat 31-200 mixing valve is installed if the culvert's maximum permitted operating temperature risks being exceeded. The valve ensures that the water to the culvert is not too hot.
- If Laddomat 31-200 is not used, the non-return valve BV FB40-T is fitted to prevent self-circulation. There is otherwise a risk that the heat in the slave tank is returned to the main tank, or that the culvert is kept warm unnecessarily, due to potential self-circulation.
- The slave tank should be 750 l or larger for best layering.
- Good insulation in the tank — 90 mm PUR or 200 mm or more mineral wool.
- That the tanks have the outlets that they require, preferably separate connections for the culvert pipes. See Figs. 1 and 2 on the next page.
- Double hot water coils in the slave tank or flat heat exchanger for domestic hot water.
- Mixing valve automatics – e.g. Thermomatic – and adjusted radiator circuit for lowest possible return temperature.
- No high temperature system in the radiator circuit (>60°C on the return).
- Choke valve on the culvert. See **(1)** in Figs. 1 and 2 on the next page.

Fig 1.
Connection WITHOUT thermal valve



Automatic by-pass valves must be installed for the installation to work well.

Each radiator is adjusted for correct flow in relation to size. See page 4.

Fig 2.
Connection WITH thermal valve

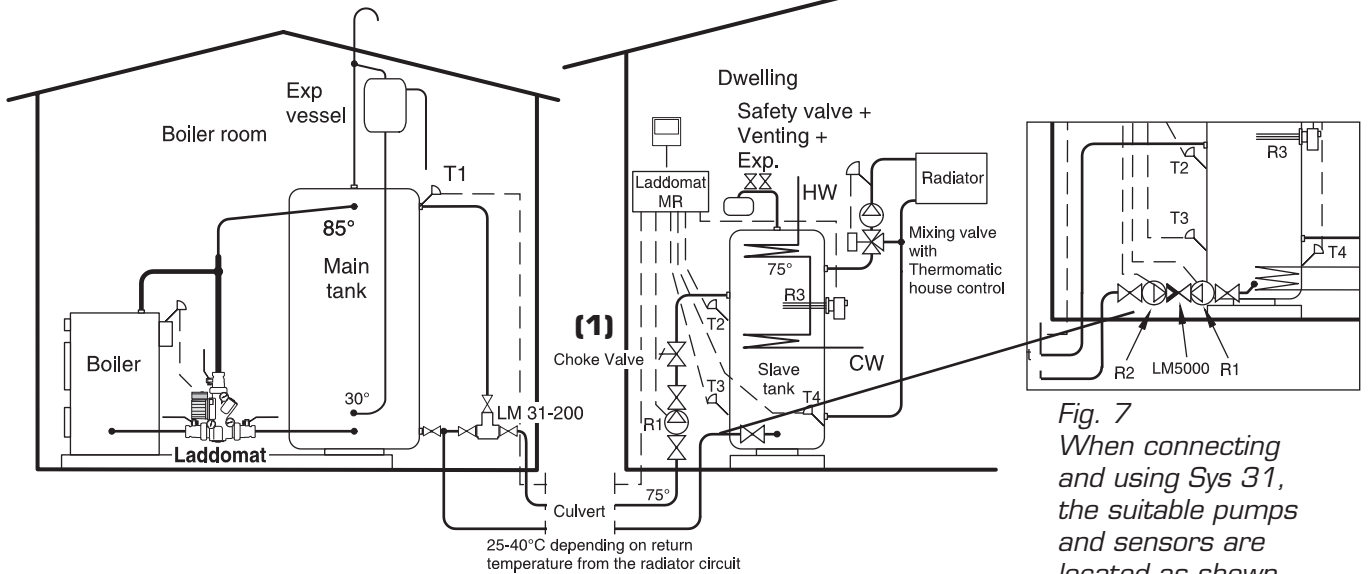


Fig. 7
When connecting and using Sys 31, the suitable pumps and sensors are located as shown above.

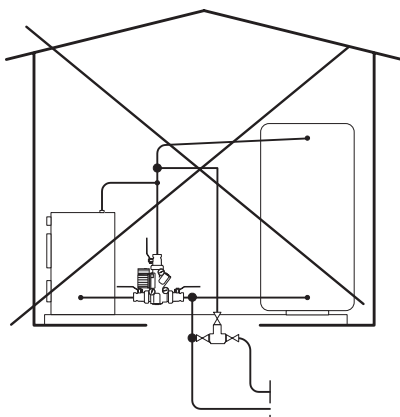


Fig. 3
Incorrect culvert connection

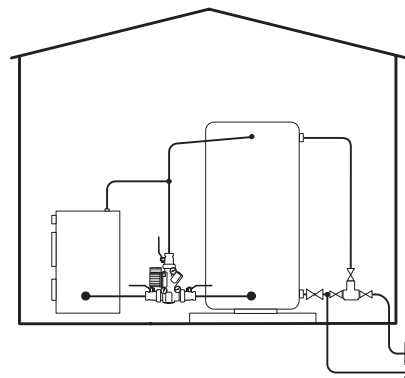


Fig. 4
Correct culvert connection

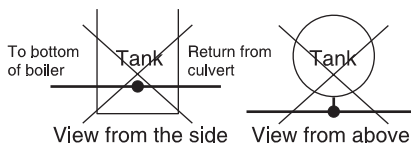


Fig. 5
Incorrect culvert connection to tank

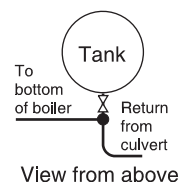


Fig. 6
Correct culvert connection to tank

Adjustment of the radiator system - important for optimum function

- 1. Install by-pass control (e.g. Thermomatic)**
- 2. Adjust the distribution of the water flow between the radiators.**
- 3. Set the pump to low speed or install pressure controlled pump.**
- 4. Install radiator thermostats.**

Settings and installation

Temperatures

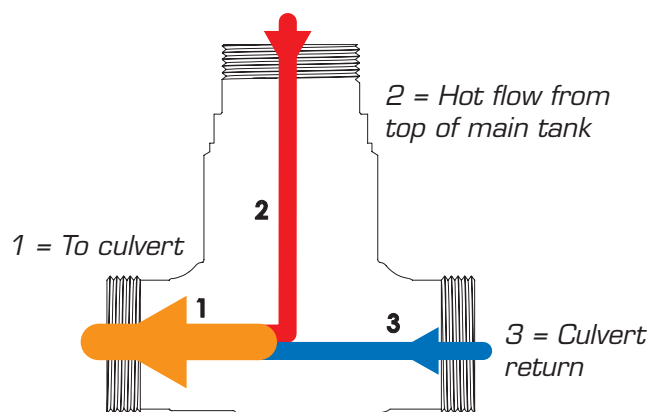
Recommended settings are described on page 7-10.

In those installations that have a radiator return that exceeds 50°C in cold weather, S2 and S3 are set to 70°C.

NOTE. If there is a thermal valve, for example Laddomat 31-200, it must in this case have an opening temperature of at least 78°C.

Pipe routing and connections

Pipe connection according to figures 1 or 2 on the previous page.



The culvert's connection to the main tank must be made directly against the tank. If there is not an outlet for this the T-pipe must be installed as close to the tank as possible, or there is a risk that the culvert pump will provide unwanted circulation in the boiler circuit. See Figs 3-6 for example. Shut-off valves are installed in the bottom of the tanks.

It is an advantage if the slave tank is arranged as in figures 1 and 2. HW coil as high as possible. Outlet to the mixing valve at the same height as lower edge of the HW coil. When the heat is finished and the supplementary heater has not started, there is always a little hot water left over at the top, which, thanks to layering, does not go to the heating. The electric immersion heater is located 10 cm under the mixing valve outlet so that it gives heating to both radiators and hot water.

It is an advantage if the water that has stood and cooled in the culvert does not cool the top water in the slave tank when the next charge phase is started. This is achieved if the culvert is connected 30–40 cm under the tank's top.

Avoid air pockets in the form of high points. If this cannot be avoided install vents.

The culvert pipes are sized so that the flow covers the heating requirement for the coldest day.

If several houses are connected to a main tank a Laddomat MR is installed at each slave tank and (if necessary) a culvert valve at the main tank. With the Laddomat KV-100, the water temperature to the slave tank is kept at a reasonable level.

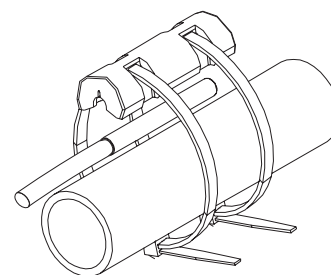
Location of sensors

Sensor T1 in the main tank should be fitted in a submersible tube immediately below the end of the culvert pipe, or directly on the pipe where this comes out of the tank. Insulate carefully when routing pipework.

Sensor T2 in the slave tank top should be installed in a submersible tube, level with or no more than around 10 cm below the culvert pipe connection.

Sensor T3 in the bottom of the tank is fitted in a submersible tube directly in the tank or clamped into place on the return pipe to the main tank. The submersible tube must be positioned at least 10 cm above the bottom outlet. Otherwise charging might not stop as it should.

Sensor T4 (Sys 31) is only used if you want to pump the return charge back to the main tank. If the slave tank is fitted with a solar coil, T4 should be placed at the same height as the top of the coil. T4 must be placed lower than T3. See Fig. 7 on page 3.



Example of sensor installation on a pipe

Electrical installation (See page 6)

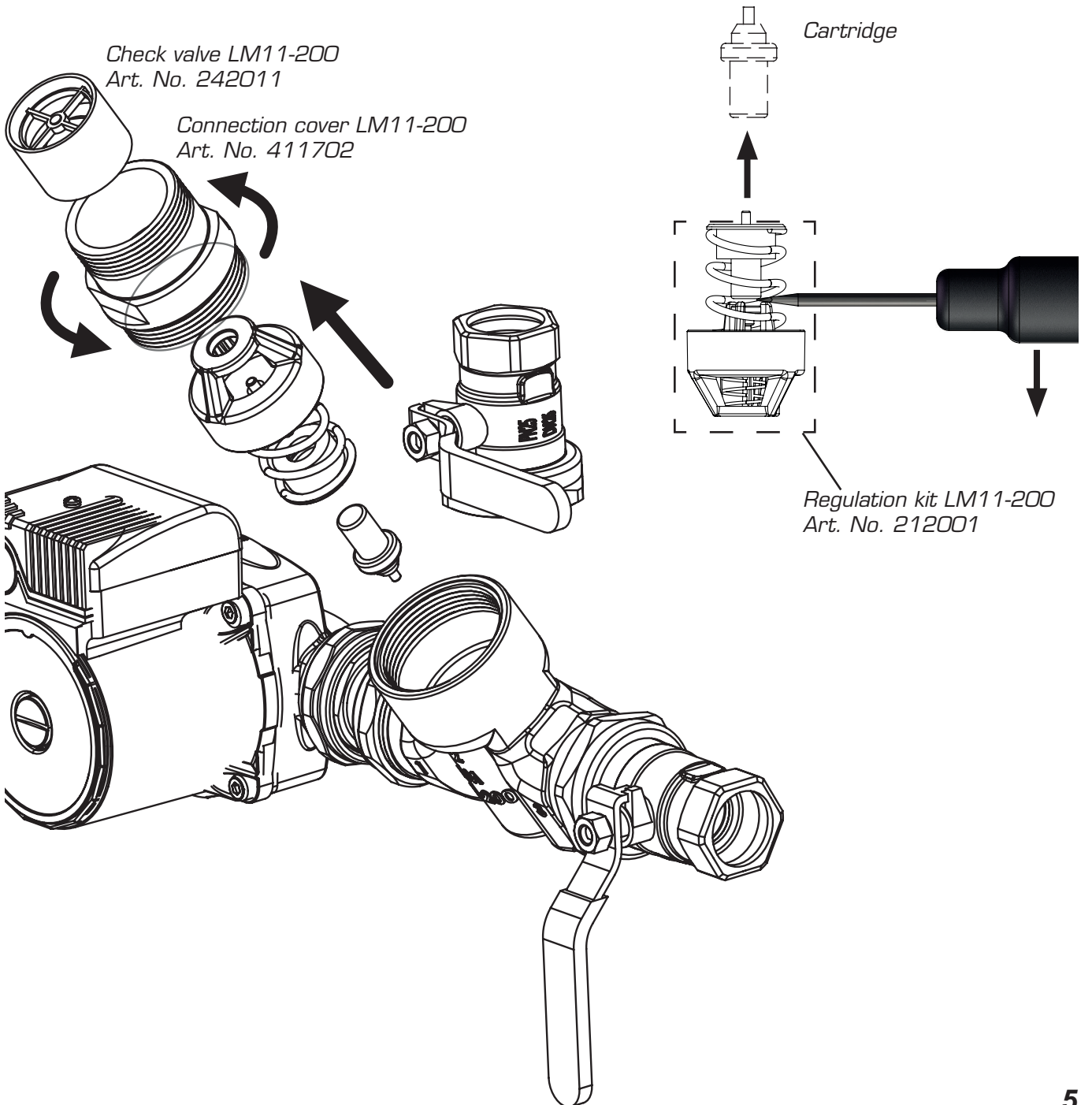
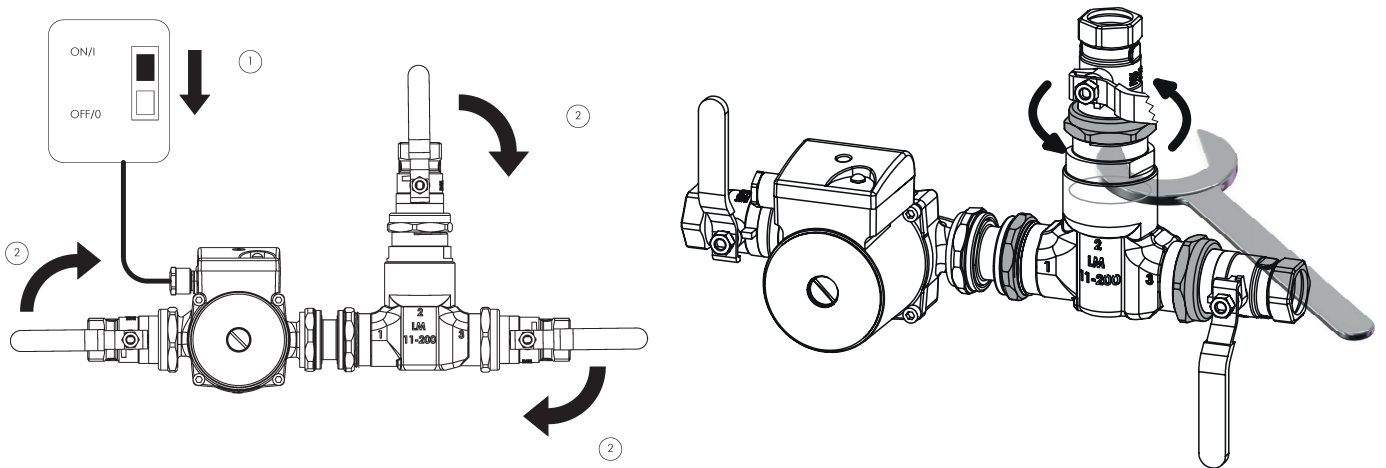
Sensors are not sensitive to cable type. If sensor cable is installed together with power cable, shielded cable should be used.

Electric immersion heaters/electric boilers must have equipment for external control of, for example, contactors, ripple control and bridging.

See the relevant manufacturer's wiring diagram.

Service

To replace the cartridge, see images.



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.

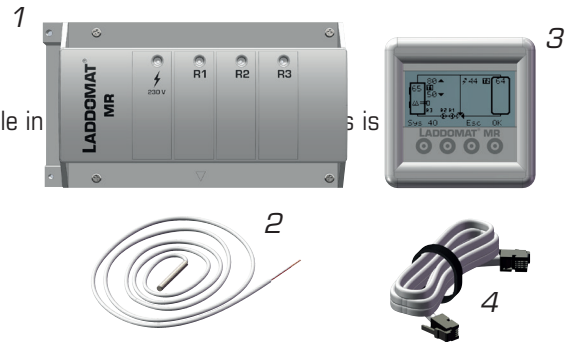
4 x temperature sensor inputs, NTC 10 or 50 kOhms @ 25°C (selectable in CP)

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

Dimensions:

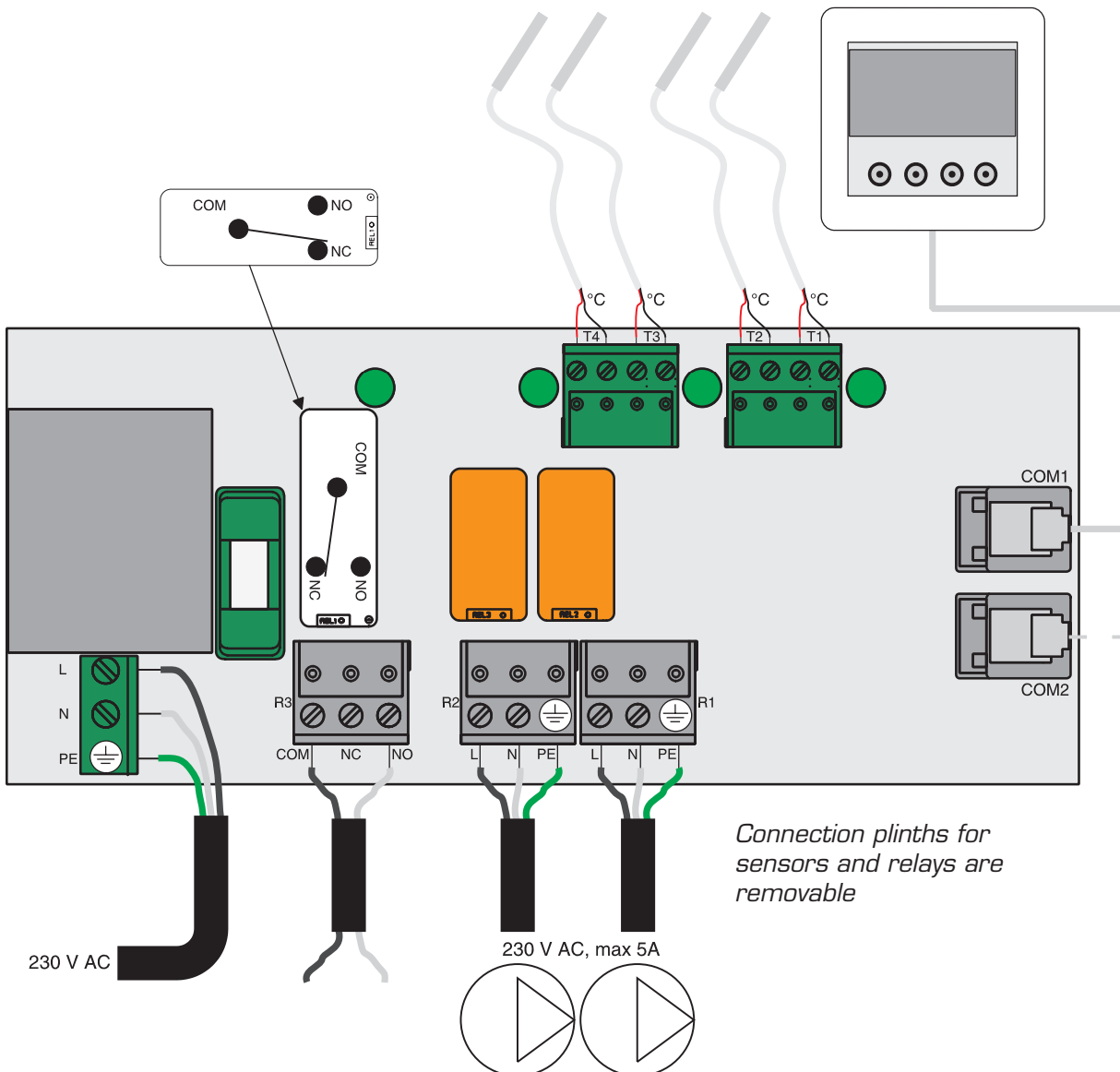
CC: H = 88 mm, W = 160 mm, D = 60 mm

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



Connection

Connect the Control Panel with the attached cable

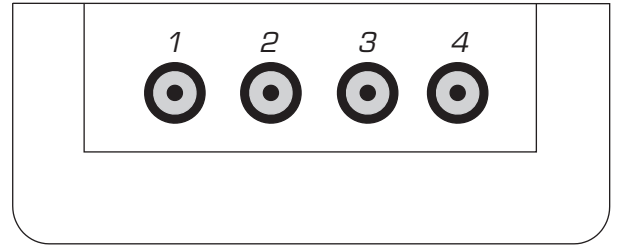


Introduction and explanation

Controls

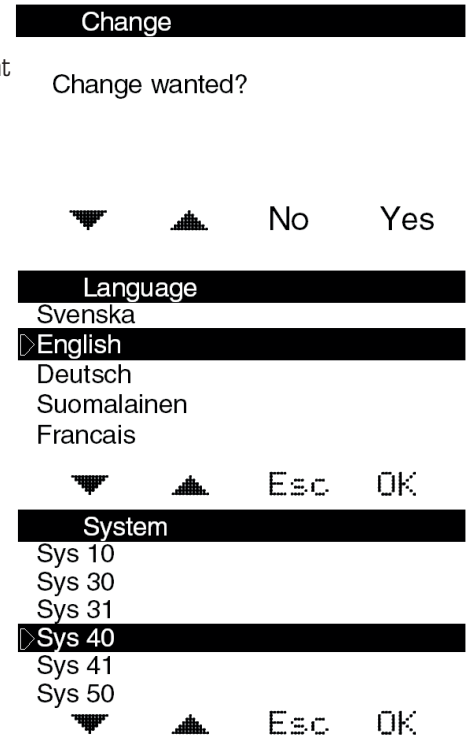
A.

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

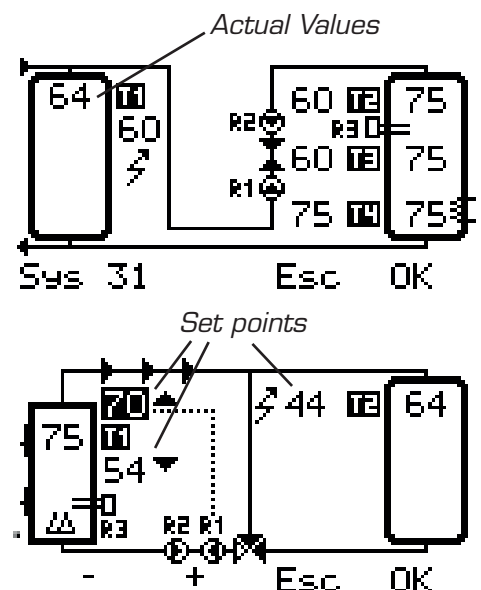
R3 = Booster (potential-free relay), alternating NO/NC, max 250V 5A

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 30

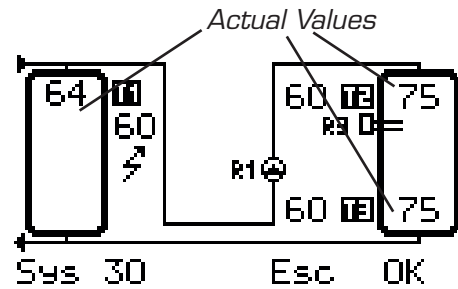
Culvert control

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.

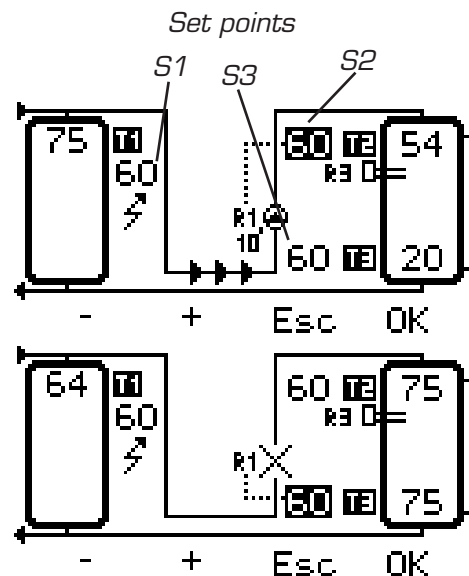
Selectable times are 0-20 minutes. The factory setting is 0.

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.

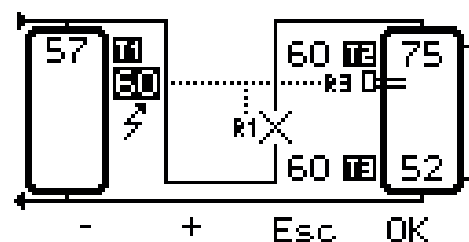
Selectable values are from 30 to 90°C. The factory setting is 60°C.



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.

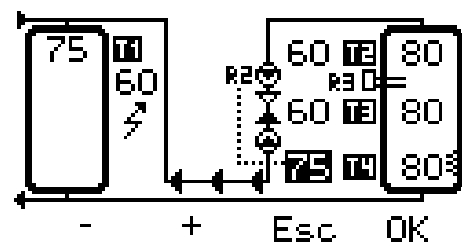
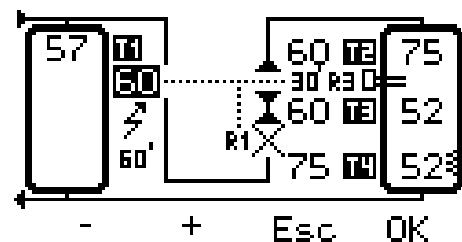
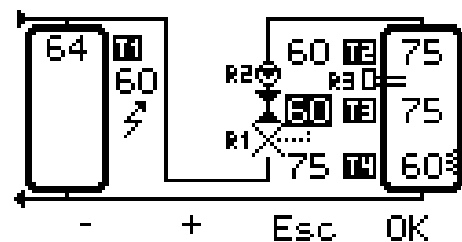
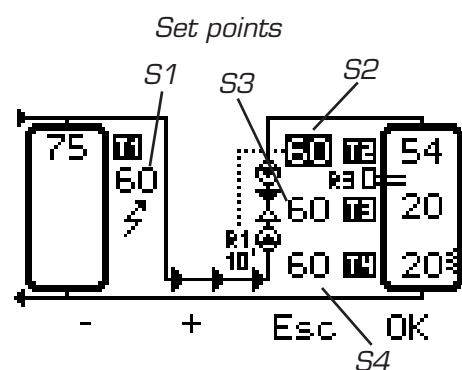
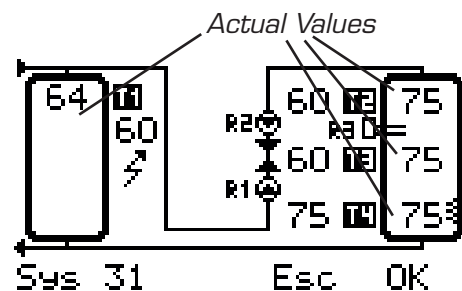
Return Charge Start

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.



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.

Settings

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.

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.

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.

Manual Test	
R1	Off
R2	Off
R3	Off

▼ ▲ 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.

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

▼ ▲ Esc OK

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.

10 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.