TERMOMAT 1

MOUNTING AND OPERATING INSTRUCTIONS FOR ART.NO 8001, 8011, 8012, 8014 AND 8015

TERMOMAT 1 is a differential temperature control and performance monitor designed to charge a storage tank and collect the heat back to the heating boiler. TERMOMAT 1 controls the charging pump and the heat-collecting pump.

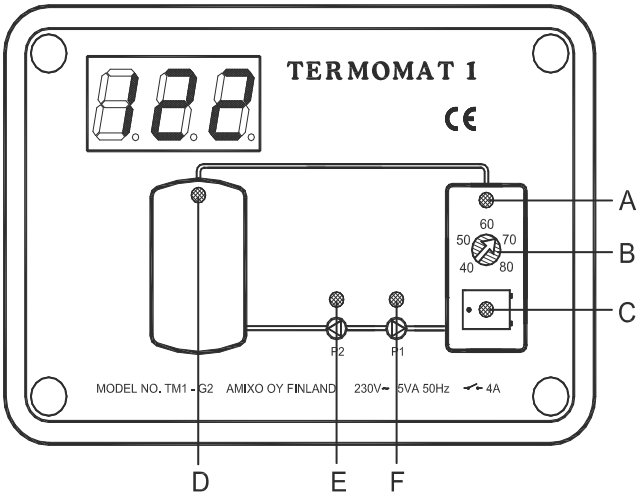
TERMOMAT 1 has a relay to automatically operate an additional heat source. It has a 3-digit display for boiler and tank temperatures and five LED lights for indication. All essential settings are adjustable.

DELIVERY PARTS

1. Electronic control unit TM1-G3
2. Temperature sensor for heating boiler (Tk) 3 m
3. Temperature sensor for storage tank (Ta) 5 m
4. Two sensor housings Rp½" x 90 mm
5. TERMOVAR 10 valve set Rp 1" with a thermic valve 72ºC and three union valves. Included in art.no 8011 and 8012
6. Two Grundfos UPS 25 – 60 circulating pumps. Included in art.no 8012 and 8015
7. TERMOBAC DB40 double-acting return flow preventer. Included in art.no 8014 and 8015

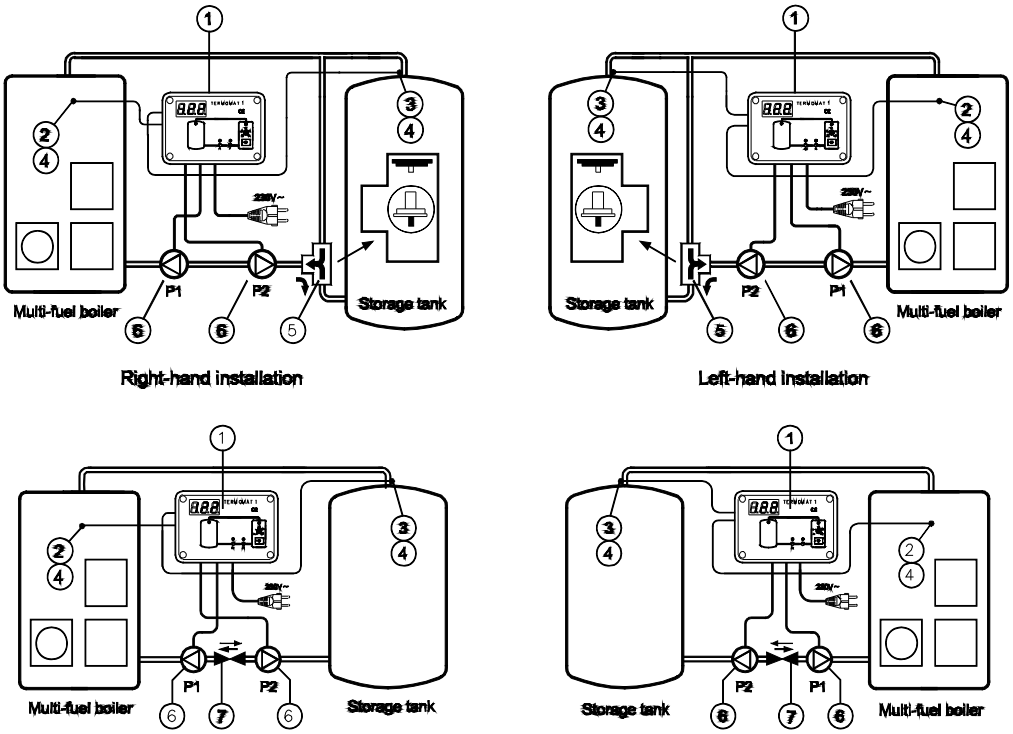
CONTROL UNIT TM1-G3

A LED for boiler temperature Tk
B Setting of boiler temperature Tk
C LED for additional heat source
D LED for storage tank temperature Ta
E LED - pump P2 running
F LED - pump P1 running



EXPLANATORY SKETCH

TERMOMAT 12



TERMOMAT 15

MOUNTING

TERMOMAT 12: TERMOVAR-valve (5) and two pumps (6) are mounted in the return-pipe between the boiler and storage tank according to the explanatory sketch. At delivery the TERMOVAR-valve (5) is for right-hand installation. For left-hand installation the …. and the return flow preventer must be turned 180°.

TERMOMAT 15: Pumps (6) and TERMOBAC DB40 return-flow preventer (7) are mounted in the return-pipe between boiler and storage tank. TERMOBAC DB40 is mounted between pumps. The extra bold arrow must point to the boiler.

Temperature sensor Tk (2) is to be placed inside the sensor housing (4) on the upper part of the boiler.
N.B! The sensor must not be placed on the outgoing pipe as this might disturb the function.

Temperature sensor Ta (3) is placed inside the sensor housing (4) on the upper part of the storage tank. The sensor can also be taped on the outgoing pipe **max 10 cm from the storage tank connection. Thereafter it must be insulated.**

The sensors can be lengthened up to 18 m with factory delivered wires.

FUNCTION

TERMOMAT measures the temperature difference between heating boiler and storage tank. It controls the charging pump and the heat-collecting pump. When a pump is running a LED is on. TERMOVAR-valve ensures a minimum return-water temperature in the boiler. The valve opens at 72°C.
TERMOVAR and TERMOBAC DB40 valves are designed to avoid self-circulation in two directions.

There are two programs for additional heat, **YES** and **NO**. When using more cost-effective additional heat, for example pellets, **YES** is normally selected. For more expensive additional heat, for example an electric element, **NO** is recommended. The program is selected with knob **D**. See page 6.

1. The start of pump **P1** is adjustable with knob **B** from 40°C to 80°C.

   TERMOMAT 12: Recommended setting is 60°C.
   TERMOMAT 15: Recommended setting is 80°C.

   Pump **P1** starts at the selected setting. TERMOVAR-valve opens at 72°C and the charging starts. The charging stops when the boiler temperature drops below 72°C. Pump **P1** stops when the boiler temperature drops 1°C below the selected setting or when the storage tank temperature **Ta** is 1,5°C higher than the boiler temperature **Tk**.

2. The heat-collecting from the storage tank back to the boiler starts when the boiler temperature **Tk** is from 4°C to 8°C lower, depending on selected program, than the storage tank temperature **Ta**. The heat-collecting stops when **Tk** is 2°C or 3°C lower than **Ta**. See program table Page 4. The value **H** (Pump **P2** on) is selected with knob **E** (page 5). Factory setting is **4H 2L**.

3. Pump **P2** stops when the temperature difference **L** between boiler and tank is 2 or 3°C depending on selected program.

4. When the storage tank temperature **Ta** has dropped to 45°C the display alternately shows **LO**, meaning low temperature and the current tank temperature. The charging from tank to boiler continues as long as there is warmer water in tank than in boiler.

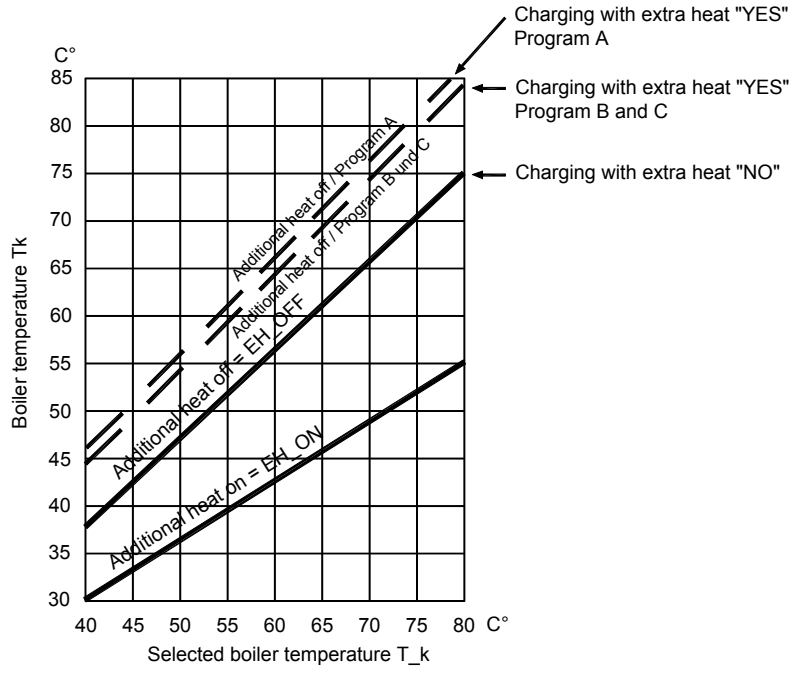
5. **Charging with additional heat, NO:** The starting temperature for additional heat is dependent on the boiler temperature **T-k** which is selected with knob **B** according to table 1.
   With a selected boiler temperature of for example 60°C the additional heat is on at 43°C and off at 57°C.

   Charging with additional heat, YES: The starting temperature for additional heat is dependent on boiler temperature **T-k** which is selected with knob **B** according to table 1. The charging continues either until the thermostat of the additional heat stops the charging or until the boiler temperature has reached the upper graphs of the selected program.

   When boiler temperature **Tk** is below graph **EH-ON** the additional heat starts. At this moment pumps **P1** and **P2** are shut off. The blue LED **C** is on and the display flashes **Tk** and **EH** (extra heat).
   The charging to the tank does not start until the boiler temperature has reached the selected temperature.

   If the boiler temperature should not reach the selected setting because no additional heat is connected or does not work and the temperature difference between the boiler and tank is higher than the selected value **H**, the normal charging goes on. The charging continues until the temperature difference in below **H**. Thus all energy is taken from tank to boiler.

6. Table 1: Additional heat on **EH-ON** and off **EH-OFF** according to the graphs



PROGRAM

TERMOMAT 1 has three programs for charging. The program is selected with knob **E** (page 6).
The factory setting is program **C 4H 2L**. The value **LO** = 45°C is a fixed temperature.

Programming of temperature differences		P2 ON	P2 OFF	LO	EH_ON EH_OFF	Charging "YES" EH_OFF
Trimmer position	Code display	[°C]	[°C]	[°C]	[°C]	[°C]
A 	8H 3L	8	3	45	See graph page 3	T_k +6 °C
B 	6H 2L	6	2	45	See graph page 3	T_k +4 °C
C 	4H 2L	4	2	45	See graph page 3	T_k +4 °C

DIGITAL DISPLAY

A 3-digit display alternately shows the current temperature in boiler **Tk** (LED A) and in tank **Ta** (LED D).
At every startup of TERMOMAT 1 the display shows a short program information as follows:

1. The progam of the microprocessor, for example **P1**
2. Two times the selected boiler temperature **Tk**, for example **80**
3. Two times **4H**, **6H** or **8H** depending on selected program
4. Two times **2L** or **3L** depending on selected program

When the boiler temperature **Tk** is above 110°C the display alternately flashes **I--I** and the current tank temperature **Ta**. The green LEDS A and D show which temperature is displayed.

When the tank temperature **Ta** is below 46°C the display alternately flashes **LO** and the current boiler temperature **Tk**.

When the boiler temperature **Tk** is below **EH-ON**-value (for example 37°C) and the tank temperature **Ta** is below 46°C (for example 39°C) the display flashes alternately **37 EH** and **39 LO**.

When the sensor temperature is below 15°C the display shows **-II-**.

If the display shows -II- and the sensor temperature is above 15°C the sensor is short-circuited.

If the display shows I--I and the sensor temperature is not above 110°C the sensor is broken or not connected.

SENSOR RESISTANCE

The sensors are of type KTY-83-110. Sensor resistance is measured at the two middle wires of the 4-wire cable contact.

1000 Ω	25ºC	1390 Ω	70ºC
1039 Ω	30ºC	1489 Ω	80ºC
1120 Ω	40ºC	1593 Ω	90ºC
1205 Ω	50ºC	1696 Ω	100ºC
1295 Ω	60ºC	1720 Ω	110°C

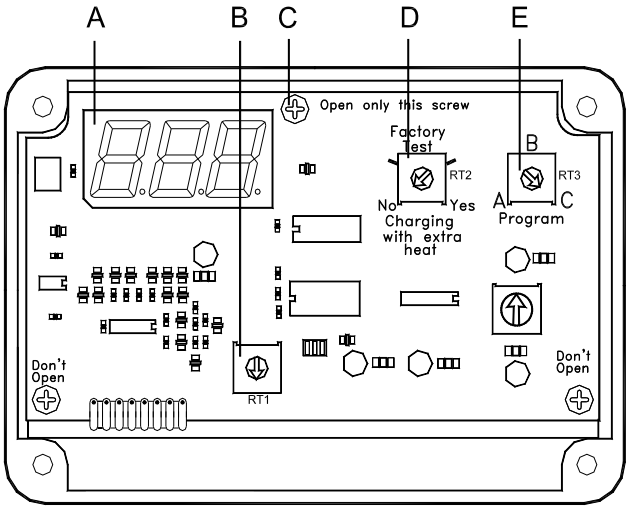
ABBREVIATIONS

LO	Low energy	Low temperature in tank
EH	Extra heat	According to graphs in Table 1
H	Higher	Higher temperature difference Pump P2 starts
L	Lower	Lower temperature difference Pump P2 stops
Tk	Temperature	Heating boiler temperature
T-k	Temperature	Selected heating boiler temperature
Ta	Temperature	Storage tank temperature
P1	Pump	Pump P1 for charging
P2	Pump	Pump P2 for heat collecting

TECHNICAL DATA

Type of control	On-off, microprocessor
Voltage	230 VAC 50 Hz
Power consumption	3 VA
Output relay contact ratings	2 A, 250 VAC, max. 100 W
Relay protection	VDR 250 VAC
Sensors	Type KTY-83-110, Tk = 3 m, Ta = 5 m. Lengthening max. 18 m with factory delivered wires
Temperature range of sensors	From -30°C to +120°C
Main wire	Earthed plug contact, length 1,3 m
Wires	Max. Ø10,3 mm, 3 x 1,5 mm2
Digital display	Measuring range from +10ºC to +110ºC, LED 3-digits
LED indicators	Green LED – temperature boiler or tank Red LED – pump P1 or P2 runs Blue LED – additional heat is on
Protection class	IP40
Dimensions	75 mm x 90 mm x 130 mm
Weight	0,9 kg

CONTROL UNIT



A. Digital display

B. Knob for calibration of sensors

C. Screw for upper card

D. Selector for additional heat

E. Program selector

WIRING

WARNING! SHUT OFF THE VOLTAGE BEFORE OPENING THE CONTROL UNIT.

To reach the terminal blocks screw C must be loosened.