

Operations and maintenance instructions

DESIGN AND FUNCTION PRINCIPLES

LK Snow melting system is built with a ground manifold manufactured in HDPE PN 10, which is provided with an outlet DN 25 for connection of LK Snow melting pipe. The snow melting pipe has a diameter of 25 x 2.3 mm and is laid as per the drawing. In smaller systems, the PE-X pipe, of the dim 20 x 2 mm can be used along with LK Manifold RF or LK Manifold Qmax, placed in-doors.

CONTINUOUS OPERATION

In case of continuous operation, the system is connected when the winter starts, or when considered appropriate. The connection is made automatically or manually. Continuous operation gives, as seen on the whole, longer operation time than intermittent operation. Continuous operation provides a heat buffer in the ground, which can melt snow relatively quickly without having to increase the power.

INTERMITTENT OPERATION

In case of intermittent operation, the system is controlled by a sensor installed in the ground that measures temperature and precipitation and connects the snow melting if necessary. After thawing, the heater is disconnected automatically. This principle means that the ground can be frozen when snowfall begins. The sensor's sensing area should always be kept clean.

RUN-OFF

Consider keeping the street inlets clean, so that the melted water can run off.

HEATING MEDIUM

A frost-protection heating medium must be used. Follow the designed mixing conditions and the supplier specifications. Avoid spillage of the frost-protection medium, use mixing containers.

PRESSURE AND TEMPERATURE

Continuous operational temperature as per the design, however max. 50°C and a max. working pressure of 6 bar.

- Establish an operations journal and make notes on day of inspection, observations and possible measures taken.
- Inspect, where possible, connections and welds so that there is no leakage. Even smaller drips must be corrected immediately.
- Operational pressure as well as temperature must be checked regularly.
- Operations on the ground must be performed only in consultation with the project's construction manager or quality manager.

CONTROL EQUIPMENT, LK CONTROL UNIT FOR INTERMITTENT OPERATION



IMPLEMENTATION

LK Control unit ETO2 is mainly intended to be used as LK Snow melting must be controlled intermittently. The equipment consists of LK Control unit ETO2, LK Ground sensor ETOG and LK Pipe sensor ETF.

FUNCTION

When the ground sensor senses moisture, and the ground temperature is so low that there is a risk of freezing, the control unit starts heating the ground through the impact of control valves through the control motor/actuator. The control unit thereafter keeps the flow temperature constant to the desired level with the help of a flow sensor (LK Pipe sensor ETF). The unit can, if desired, also control start/stop of the snow melting system's circulation pump. When the ground sensor is dry, the snow melting is switched off. The unit is equipped with a controllable post-heating time which ensures that the unit continues to operate for the desired time even if the ground sensor is dry.

The control unit can also be used to send start/stop signals to external control equipment, for example a BMS. In such a case, no flow sensor is connected rather the unit is instead adjusted via the menu to this function, read more in the main instruction.

LK Control Unit ETO2 offers the following:

- Energy effective control of the snow melting system
- Simple menu management
- Clear background-lit display
- Alarm relay

LK GROUND SENSOR ETOG



Function

LK Ground sensor ETOG senses both the temperature and moisture. Usually, it is enough to connect one LK Ground sensor ETOG to the control unit but in some cases, two ground sensors may be required to achieve a satisfactory function, for example a ground area that stretches around the building and thereby extends to both the North and South locations.

Before each season, the sensor must be checked and cleaned, where necessary.

LK PIPE SENSOR ETF



Function

LK Pipe sensor senses a temperature on the snow melting system's supply pipe so that the control unit can control or maintain the supply temperature at the set level.

ACTUATOR

LK Control unit ETO2 sends control signals to impact a 0 to 10 voltage actuator (24 V AC 0-10 V, not an LK item).

PUMP RELAY

The control unit is equipped with three potential-free relays (not powered), which if necessary, can start/stop the system's primary/secondary pumps or be used to start/stop the external control equipment.

Normal view

When the unit is connected to the power source, the display shows a normal view with information on the unit's operation mode. When the MF button is pressed once, the display shows more detailed information about the operation mode. See below a compilation of the information that is displayed in the normal view.

Text in display	Explanation
ZONE 1	ON = Heating activated for zone 1. OFF = Heating deactivated for zone 1.
ZONE 2	ON = Heating activated for zone 2. ON = Heating deactivated for zone 2.
SENSOR 1	Shows the ground temperature for ground sensor 1. Note! Does not show the air temperature.
SENSOR 2	Shows the ground temperature for ground sensor 2. Note! Does not show the air temperature.
MOIST 1	Moisture status for sensor 1, YES, NO or blank value. Blank value is displayed if the temperature is above the set start value or if the unit goes in the Afterrun mode.
MOIST 2	Moisture status for sensor 2, YES, NO or blank value. Blank value is displayed if the temperature is above the set start value or if the unit goes in the Afterrun mode.
OUT TEMP	Outdoor air temperature is not used for snow melting.
SUPPLY W.	Temperature of the supply water.
RETURN W.	Temperature of the return pipe water.

ALARM

If an error occurs in the unit, it is indicated with a blinking LED.

Do the following to see the alarm in clear text:

1. Press once on the MF button, choose ALARM, conform with the MF button.
2. The alarm is now shown in clear text, see the table below.

Alarm	Explanation
RETURN TEMP LOW	Return temperature too low
SUPPLY TEMP HIGH	Supply temperature too high
RETURN SENSOR	Return sensor defect
SUPPLY SENSOR	Supply sensor defect
TEMP SENSOR 1	Ground sensor 1 defect.
TEMP SENSOR 2	Ground sensor 2 defect.
OUTDOOR SENSOR	Outdoor sensor defect
SENSOR HEATER	Short-circuiting of the heating element in the ground sensor
FROST PROTECT	Frost protection activated due to low return temperature.

Stoppage in the ground sensor

If there is a stoppage in the ground sensor, the unit sends an alarm and at the same time shuts down the snow melting system.

FUNCTION CONTROL

1. Increase SET TEMP to max. see heading, *Menus/settings*.
2. Pour water on the ground sensor.
3. Check that the control unit display shows ON
4. Reset SET TEMP to the desired value. (Default + 3 °C)

TECHNICAL DATA

LK Control Unit ETO2	
Article number	538 61 76
Dimensions	170 x 162 x 45 mm
Weight	0.5 kg
Cable protection class	IP20
Ambient temperature	0-50 °C

LK Ground sensor ETOG	
Article number	538 61 77
Dimensions	32 mm x Ø 60 mm
Weight	1.0 kg
Cable protection class	IP68
Ambient temperature	-20 - +70 °C
Cable length	10 m
Max cable length for extension	200 m

Lk Pipe sensor ETF	
Article number	538 61 78
Dimensions	40 mm x Ø 12 mm
Weight	0.1 kg
Ambient temperature	-20 - + 70 °C
Cable length	2.5 m
Sensor element	NTC 12 k @25 C