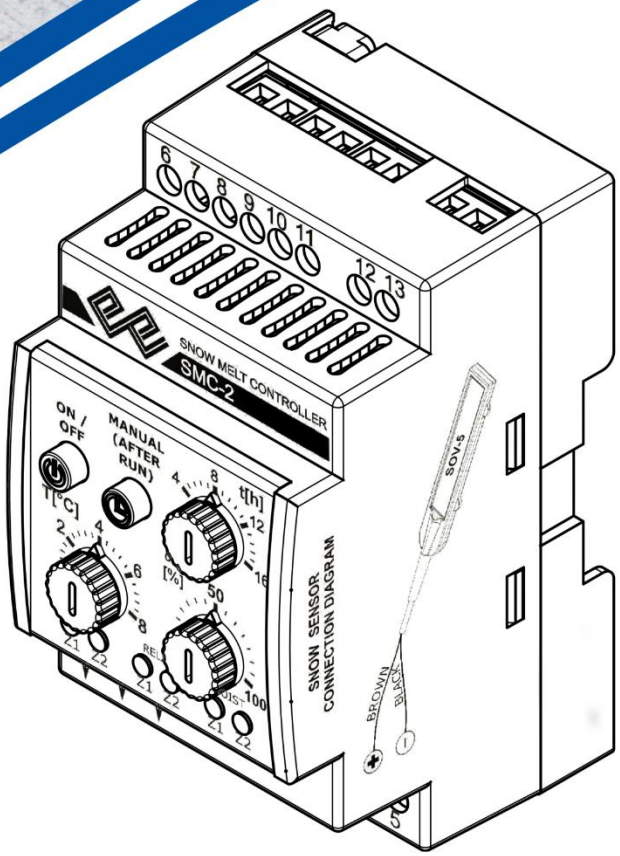
EN

User manual

SMC-2



Snow melt controller

Ground snow & ice melting application

Gutter snow & ice melting application

elpos.hr

Professional solutions for electrical heating

V1R3

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Content

Legend

Diagram	Meaning
	The button indicator does not light up
	Button indicator lights up green
	Button indicator flashes green
	Button indicator flashes quickly green
	The button indicator lights up in red
	Button indicator flashes red
	Button indicator flashes orange
	The light indicator's off
	The light indicator lights up in green
	Light indicator flashes red
	The light indicator flashes green

1. Description

SMC-2 is a compact electronic controller for guiding snow and ice melting processes on the outdoor ground surfaces and/or gutters and drains. The purpose of the device is to timely turn on the heating system that will melt snow and/or prevent the formation of ice on the surface to be protected. This prevents possible damage (e.g. cracking gutters due to the spread of ice) and allows unhindered and safe movement on the outdoor ground surfaces to be protected (e.g. entrances to garages, sidewalks, etc.).

To detect snow, ice or water, SMC-2 uses smart digital sensors PSL-1 (outdoor ground sensor) and SOV-5 (gutter sensor). The SMC-2 can also be connected to the SMC-2 with an outdoor air temperature sensor SZT-10.

Also, due to advanced and reliable detection methods for outdoor ground sensor PSL-1 and gutter sensor SOV-5, the SMC-2 controller will, when snow, ice and/or water that can freeze disappear, turn off the heating of the protected surface equally in a timely manner and thus significantly reduce the amount of electricity consumed for heating.

The SMC-2 controller communicates with PSL-1 and/or SOV-5 sensors. If sensors detect snow, ice or water on their detection surfaces, they send information to the SMC-2 controller. SMC-2 then checks whether the air temperature is less than allowed and, if so, includes one of the two output relays with voltage-free contacts.

Turning on an individual relay starts heating the surface that is intended to be protected from accumulating snow and/or ice formation.

⚠ NOTE

PSL-1/SOV-5 sensors must be embedded/positioned in the heated surface

When sensors detect that there is no more snow, ice or water, or when the air temperature becomes higher than set, SMC-2 will turn off the associated output relay and thereby interrupt the heating of the outdoor ground surface or gutter.

1.1 Snow and ice sensors

It is possible to connect two types of snow and ice sensors to the SMC-2.

- Outdoor ground sensor - PSL-1

The outdoor ground sensor is mounted in a plastic bracket, which is supplied together with the sensor, and is installed in the outdoor ground surface to be heated. A typical example of a surface to be heated is a garage ramp whose freezing must be prevented so that cars can safely enter and exit the garage in winter.

- Gutter sensors - SOV-5

The gutter sensors are oblong in shape and are mounted in the bottom of the gutter near the drain, at the lowest point of the gutter. They are mounted between the traces of the heating cable, which must be mounted in the same gutter as the sensor itself.

Both types of sensors have a snag on their surface that collects water, snow or ice. The sensor then, using the contactless method, measures the condition of its surface and thus detects what percentage of the surface is covered with snow ice or water. In addition to the percentage of coverage, the sensor can discern whether there is snow, ice or water on the surface.

1.2 Output relays, sensors and zones

In heating systems of outdoor ground surfaces or heating gutters and drains, it is often necessary to heat two surfaces (e.g. heating the entrance to the garage and heating gutters), but not at the same time.

The SMC-2 device has two output voltage-free relays that allow heating two surfaces independently of each other.

- Relay 1: folding contact, 25A, ports 1, 2 and 3 (1-3 calm contacts, 2-3 working contacts)
- Relay 2 : working contact, 8A, ports 12 and 13

The device also possesses two independent inputs to connect snow and ice sensors.

- Input 1: ports 8 and 9 (8 -, 9 +)
- Input 2 : connectors 10 and 11 (10 -, 11 +)

⚠ NOTE

Up to 3 sensors can be connected to individual sensor inputs (8/9 and 10/11 connectors, respectively). The cable length of each sensor should not exceed 50 m.

Sensors connected to input 1 (ports 8 and 9) will control relay 1 (ports 1, 2 and 3), while sensors connected to input 2 (ports 10 and 11) will control relay 2 (ports 12 and 13).

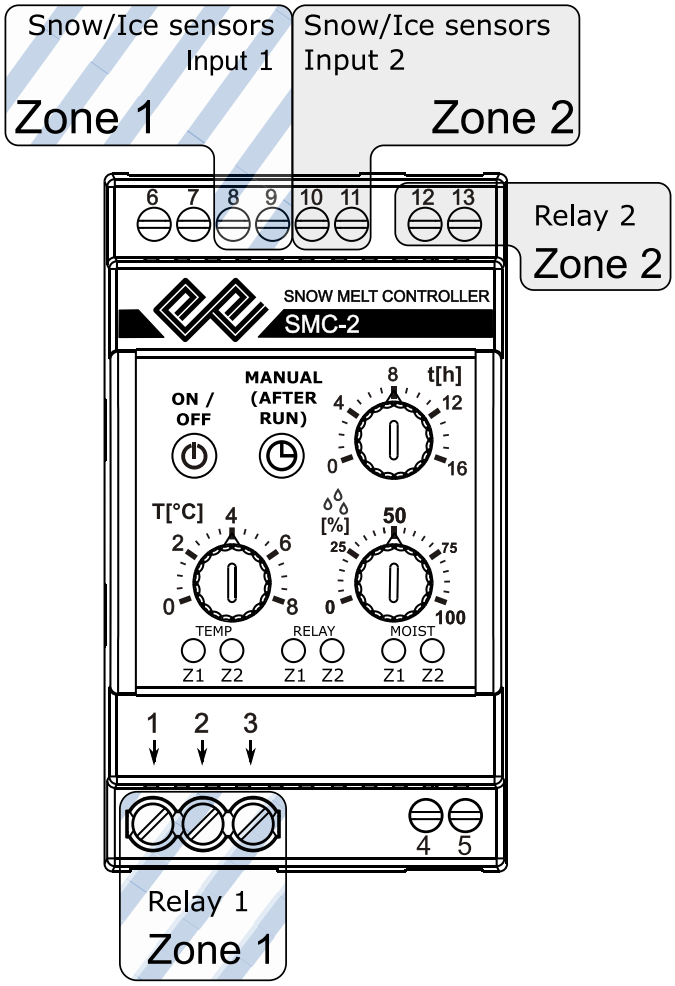
The combination of sensor input and output relay is called **Zona**. This means that the device possesses two zones that can operate independently of each other.

- Zone 1: relay 1 (ports 1,2 and 3) and sensor input 1 (ports 8 and 9)
- Zone 2 : relay 2 (ports 12 and 13) and sensor input 2 (ports 10 and 11)

⚠ N**OTE**

It is not recommended to connect two different types of sensors to a particular zone. All sensors that are connected to a particular zone must be either outdoor ground sensors (PSL) or gutter sensors (SOV).

It is important to point out that the user can connect heating cables to any zone for heating the outdoor ground surface or heating gutters.



⚠ NOTE

Whenthe power, i.e. the nominal current of the heater in each zone is greater than the switching power of the output relay of the relay of the SMC-2 controller, it is necessary to connect the electromagnetic contactor. The heating cables are connected via the contacts of the electromagnetic contactor while the control winding ("spool") of the contactor is connected via the output relay of the SMC-2 device.

RECOMMENDATION

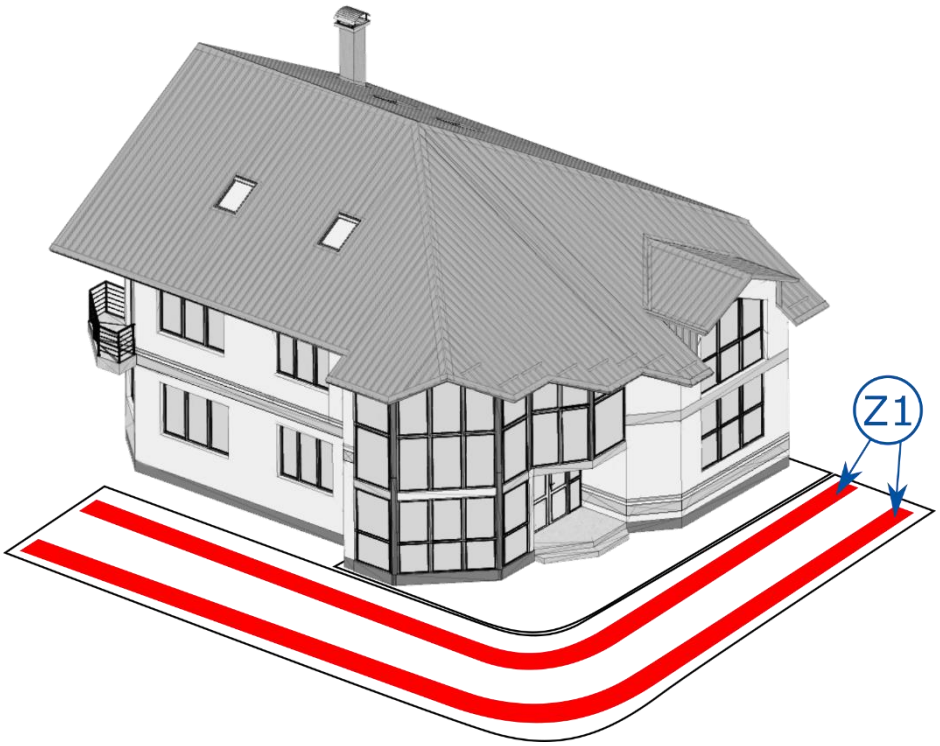
Since the Zone 1 relay has a higher folding power than the Zone 2 relay (Zone 1 - 25A, Zone 2 - 8A) Zone 1 is usually used to control the heating of outdoor ground surfaces such as parking lots, garage ramps, sidewalks, etc., while Zone 2 is used to control the heating of gutters and drains (the power required to heat gutters and drains is significantly less than the power required to heat outdoor surfaces).

1.3 Examples of connecting heaters by zones

Below are examples of how surfaces that are heated can be grouped into zones.

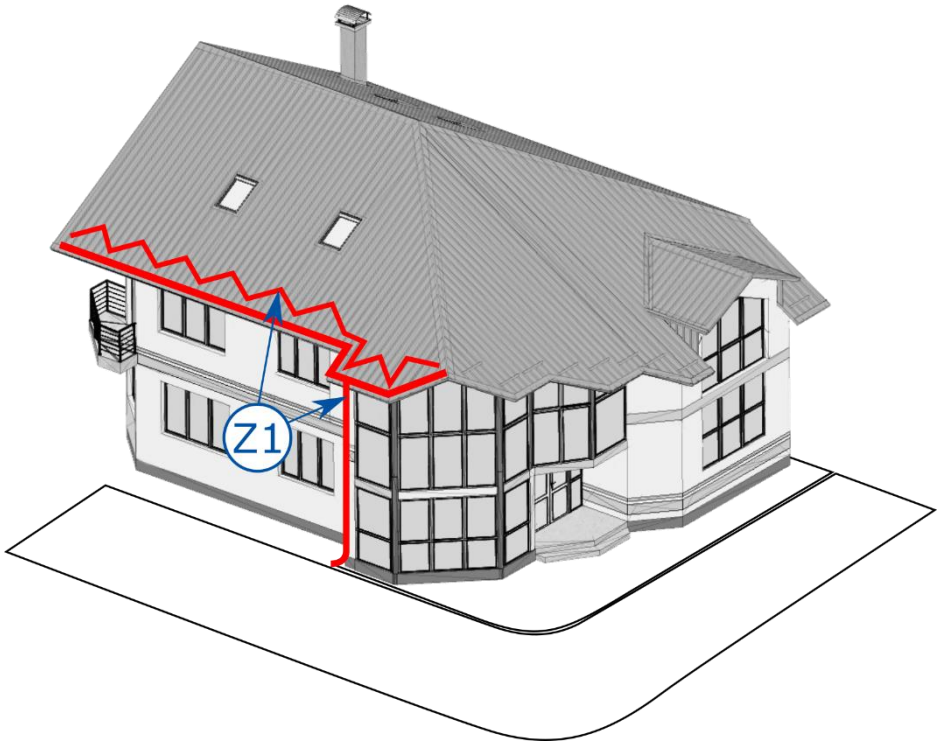
Configuration 1

Heating of the road access of the facility for passability and to prevent the accumulation of snow and/or ice. Tire tracks are heated, so there are two heating tracks.
Both heating tracks are connected to zone 1 relay (Zone 1 - Z1). At least one PSL-1 sensor is installed in the heating track.



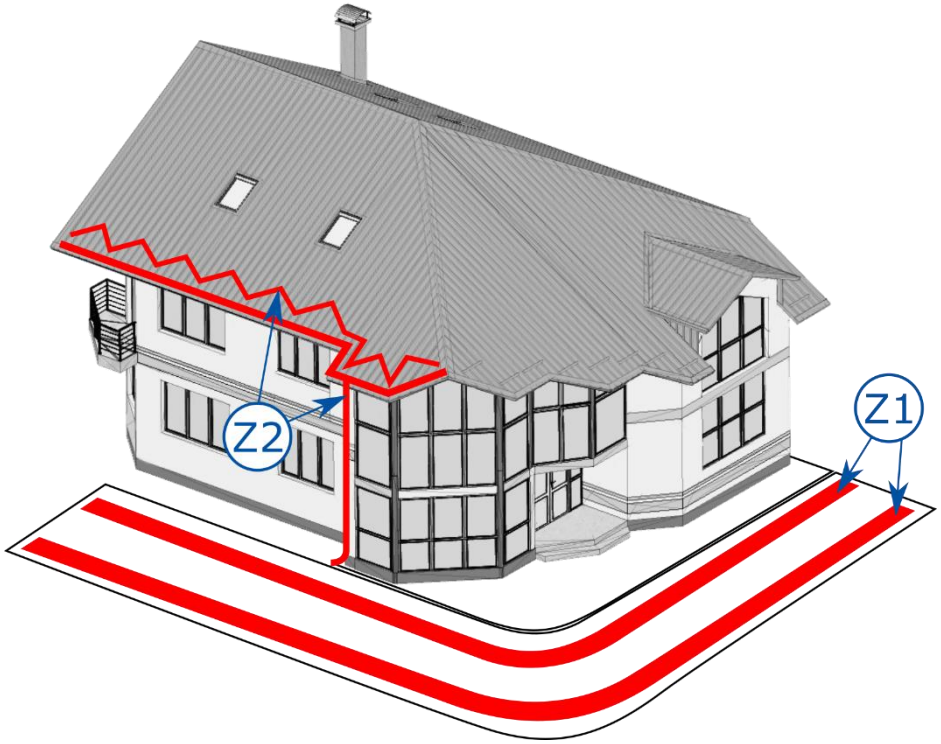
Configuration 2

Gutter heating to prevent the formation of ice in the gutter. One or more heating cables are installed in the gutter. All heating cables are connected to zone 1 relay (Zone 1 - Z1). At least one SOV-5 sensor is installed in the gutter.



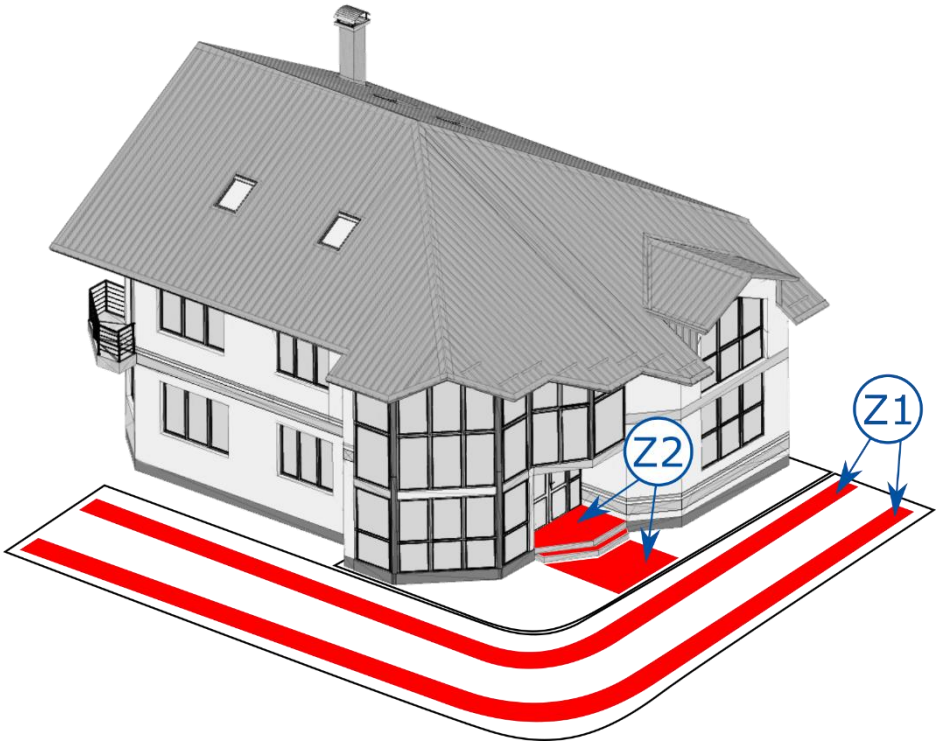
Configuration 3

Dual-zone heating control. Heating tracks, installed to heat the road access to the facility, require more power (electricity) so they are connected to the relay of zone 1 (Z1).
Heating cables in the gutter require less power and are connected to zone 2 (Z2) relay.
At least one PSL-1 sensor is installed in one of the heating tracks (Z1).
At least one SOV-5 sensor is installed in the gutter (Z2).



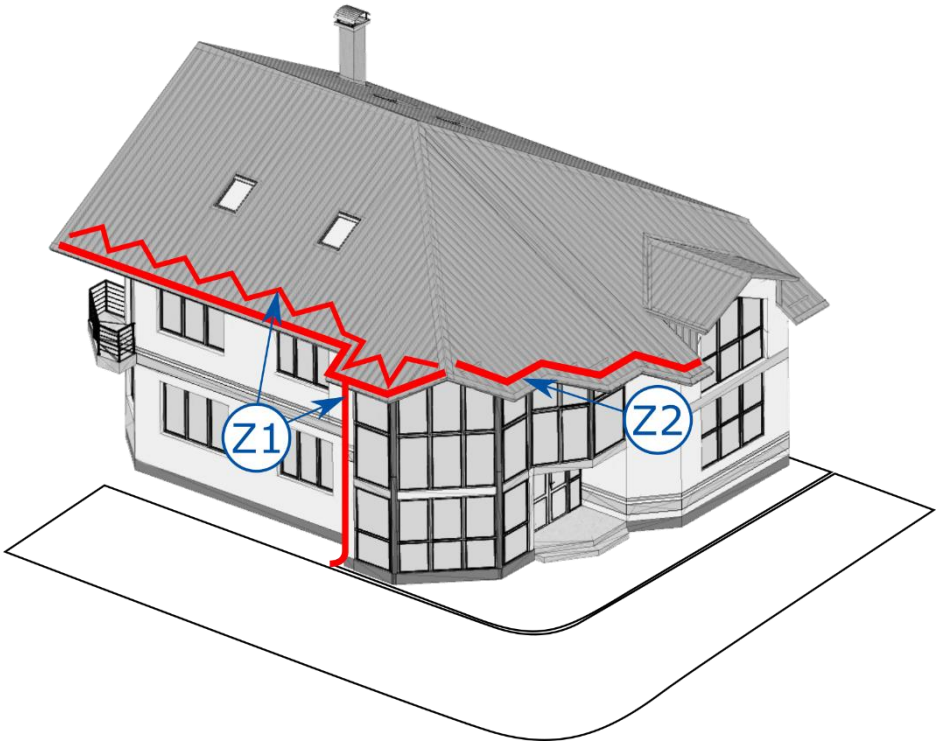
Configuration 4

Dual-zone heating control. The heating tracks require more power, so they are connected to the zone 1 (Z1) relay. The entrance to the building is heated in walking width and is connected to the zone 2 (Z2) relay. At least one PSL-1 sensor must be installed in each zone.



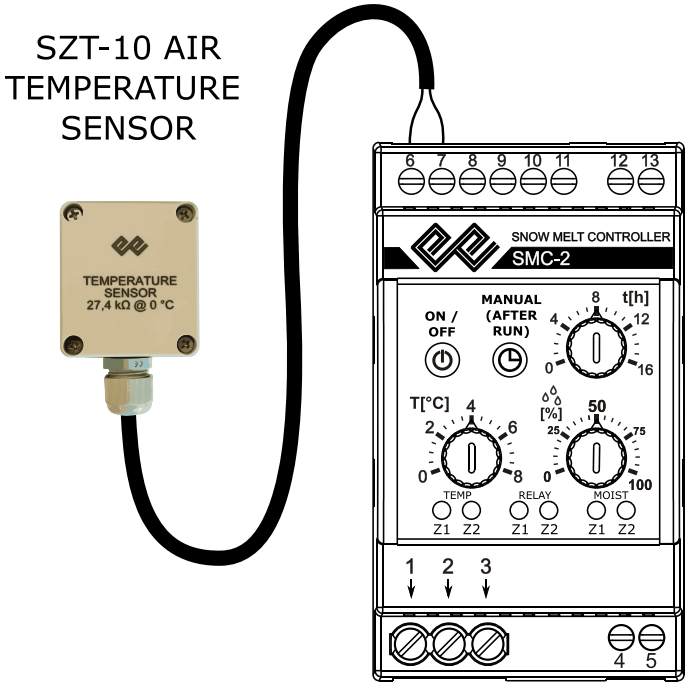
Configuration 5

Dual-zone heating control. Heating cables in a longer gutter require more power, so they are connected to zone 1 (Z1) relay. Heating cables in a short gutter, on the south side of the building, where snow melts faster, are connected to the relay zone 2 (Z2). In every area, i.e. Gutter, at least one SOV-5 sensor must be installed.



1.4 Air temperature sensor

In addition to the sensors used for snow and ice detection (SOV-5 for gutter, PSL-1 for outdoor ground surface) the SMC-2 can also be connected to the SMC-2 air temperature sensor SZT-10.



The SZT-10 air temperature sensor connects to pins 6 and 7 (conductor polarity does not matter). The temperature sensor SZT-10 makes the NTC thermistor with a resistance of 10 kΩ at 25°C (27.4 k Ω at 0°C).

RECOMMENDATION

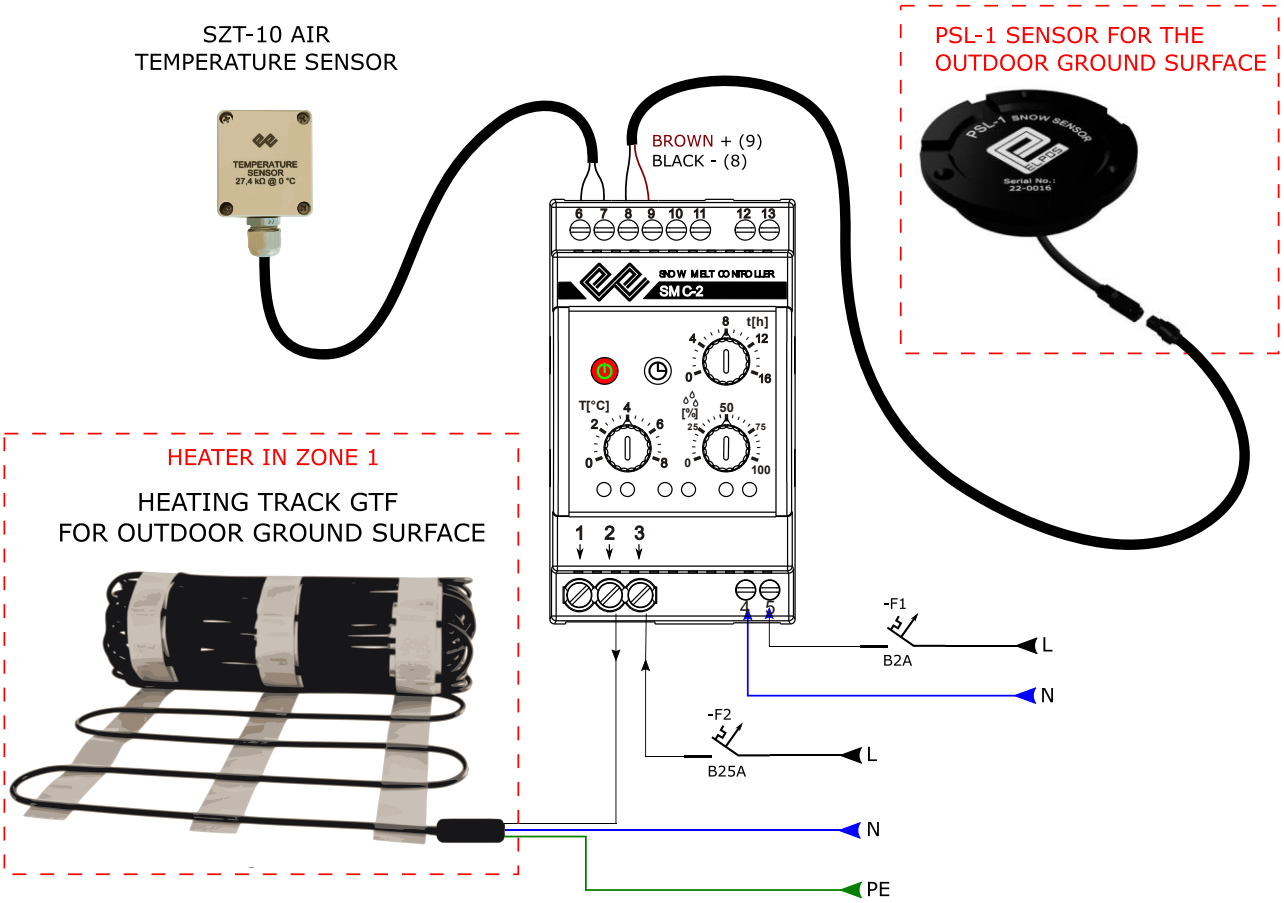
Although snow and ice sensors SOV-5/PSL-1 measure the temperature in the gutter/outdoor surface, it is recommended to use a separate sensor to measure air temperature. Practice shows that the temperature in the gutter or on the outdoor surface can deviate significantly from the air temperature. The use of the SZT-10 sensor further reduces the energy consumed for melting snow and ice.

NOTE

The SZT-10 sensor is not sensitive to the length of conductors connecting SMC-2 and SZT-10, so it is possible to use connecting cables up to 120 m in length (connection cable with a cross-section allocation of 2x0.75 mm^2).

2. Mode

The operating mode is described with the help of a graphical display of the external surface heating system, e.g. a garage ramp, which uses one PSL-1 smart sensor, an SZT-10 air temperature sensor and an electric heating cable shaped into a GTF type heating track. The explanations below are equally valid when the SOV-5 smart sensor is used as a sensor.



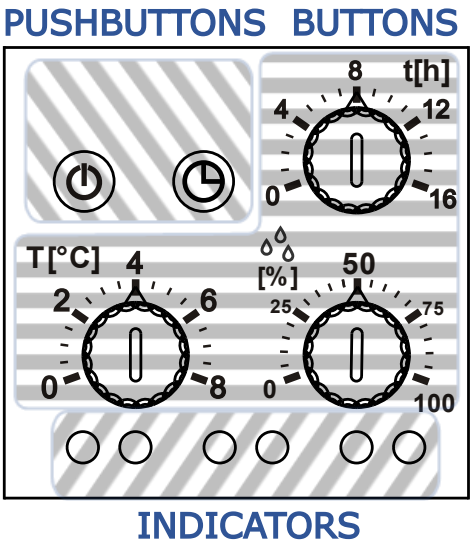
In order for the device to get power supply, it is necessary to bring AC voltage of 230V to pins 4 and 5 (meets from 100V to 240V AC 50/60Hz).

The PSL-1 outdoor ground surface sensor is connected to ports 8 and 9 (Black - 8, Brown + 9), which are assigned to Zone 1. The GTF heating track is connected to the working contact of relay 1 (connector 2) which is also assigned to Zone 1. A phaseconductor is connected to the port 3 from which the heating track will be powered via an automatic fuse of the corresponding value, not exceeding 25A B characteristics.

The SZT-10 air temperature sensor is connected to ports 6 and 7 (polarity does not matter) and is used so that The SMC-2 can accurately measure the air temperature.

2.1 Control Panel Description

The control panel is divided into three groups in which there are two buttons, three buttons and 6 indicators.



The buttons are used for on/off (ON/OFF) of the device and for starting/stopping manual or after run mode. The buttons light up in green or red depending on the condition of the device.

The buttons are used to set the temperature below which the relay is allowed to turn on (temperature scale button), to set the percentage of sensor coverage by snow/ice/water (button with percentage scale) and to determine the duration of subsequent operation (button with time scale in hours).

Indicators are used for feedback on whether the temperature condition is met (TEMP indicators), which relays are included (RELAY indicators) and whether the sensor coverage condition is met (MOIST indicators). The indicators can also glow in two colors, green or red, and have the designations Z1 or Z2 meaning Zone 1 or Zone 2.

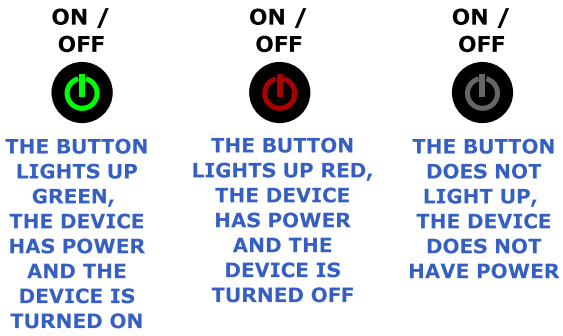
For example, if the TEMP Z1 indicator glows green, it means that the temperature in Zone 1 is less than the temperature set on the temperature knob scale, i.e. that the temperature condition is met. If the TEMP Z1 indicator does not light up, it means that the temperature in Zone 1 is higher than the set temperature, i.e. that the temperature condition is not met.

2.2 Turn on your device

After connecting the system according to the example above, it is necessary to provide the SMC-2 device with power in such a way that the fuse -F1 from the example above is raised.

When SMC-2 on ports 4 and 5 receives power in the range of 100V-240V (50/60Hz), both buttons and all indicators will alternately light up, first in green and then in red, and a buzzer will also be heard briefly. The purpose of this procedure is to verify that all light/sound indicators are correct.

After the light indicator check procedure is over, the power button in green or red will light up depending on whether the device was previously turned on or off.



If the power button lights up in red, it means that the device has power but the device is turned off. To enable the operation of the device, it is necessary to press the button and hold it down for 1 second.

After pressing the power button, the device will act as if it has been re-enabled with power, i.e. the correctness of all light indicators will be checked, and after that the power button will glow green.

2.3 Sensor recognition

After switching on, SMC-2 will begin checking how many PSL and/or SOV smart sensors are connected to the device and to which zone these sensors are connected. Sensors are powered by SMC-2 devices (ports 8 and 9 and 10 and 11), the voltage of the sensor supply is 24V DC.

SMC-2 this recognition works by first enabling power to sensors connected to zone 1 connectors, which means that a DC voltage of 24V will appear on ports 8 and 9. During this time, the power supply of sensors connected to the Zone 2 connectors is not turned on (on ports 10 and 11 the voltage will be 0V). To let the user know that the device checks which sensors are connected to Zone 1 the power button flashes green twice per second (slow blinking).

⚠ NOTE

When SMC-2 checks how many sensors are connected to Zone 1, the ON/OFF button flashes green at a frequency of 2 times per second (slow flickering).

During the search, SMC-2 initiates communication with sensors connected to Zone 1. During communication, SMC-2 remembers the serial number and type of sensor that is connected to Zone 1. The procedure for checking the number of sensors and communication takes 25 seconds.

When 25 seconds have passed, SMC-2 will begin the same search procedure that the sensors are connected to Zone 2.

⚠ NOTE

When SMC-2 checks how many sensors are connected to Zone 2 the ON/OFF button flickers green at a frequency of 4 times per second (fast flickering).

During the Zone 2 search, the voltage on the connectors 10 and 11 will be 24V, while on the ports 8 and 9 the voltage will be 0V. The search for Zone 2 also lasts 25 seconds.

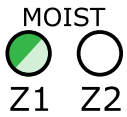
2.4 Notification of the number of sensors found

Once the sensor search in Zone 2 is complete, the device will notify the user of the number of sensors it has found. The device does this in a way that, when it wants to inform the user how many sensors are connected to Zone 1, the MOIST Z1 indicator flickers green as many times as the sensor is found.

For example, if in Zone 1 the device found one sensor then the MOIST Z1 indicator will flicker one time in green. If the device has found two sensors, the MOIST Z1 will then flicker twice. For example, if in Zone 1 the device found one sensor then the MOIST Z1 indicator will flicker one time in green. If the device has found two sensors, the MOIST Z1 will then flicker twice.

⚠ NOTE

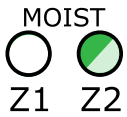
When the SMC-2 informs the user how many sensors were found in Zone 1, the MOIST Z1 indicator flashes green as many times as the sensor was found in Zone 1.



After that, the device will flicker the MOIST Z2 indicator in green as many times as the sensor was found in Zone 2.

⚠ NOTE

When the SMC-2 informs the user how many sensors have been found in Zone 2, the MOIST Z2 indicator flashes green as many times as the sensor was found in Zone 2.

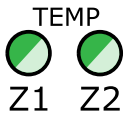


If the device has not found any sensors in Zone 2 then the MOIST Z2 indicator will not flicker once.

Finally, the device will indicate whether the SZT-10 air temperature sensor connected to the 6-7 connectors has been found. If SMC-2 has found an air temperature sensor, the TEMP Z1 and Z2 indicators will simultaneously flicker in green.

⚠ NOTE

If SMC-2 noticed that the user connected the SZT-10 air temperature sensor to ports 6 and 7, then the TEMP Z1 and Z2 indicators will flicker green.



2.5 Operating settings and turning on the relay

After the process of finding all sensors that are connected to the device, SMC-2 will start collecting data from connected sensors and will compare this data with the button settings on the front panel. For SMC-2 to turn on the heating, i.e. included relay 1 in Zone 1 or relay 2 in Zone 2, two conditions must be met.

The first condition is that the temperature in the Zone must be less than the temperature set on the temperature scale button T[°C]. We call this the fulfillment of the temperature condition.

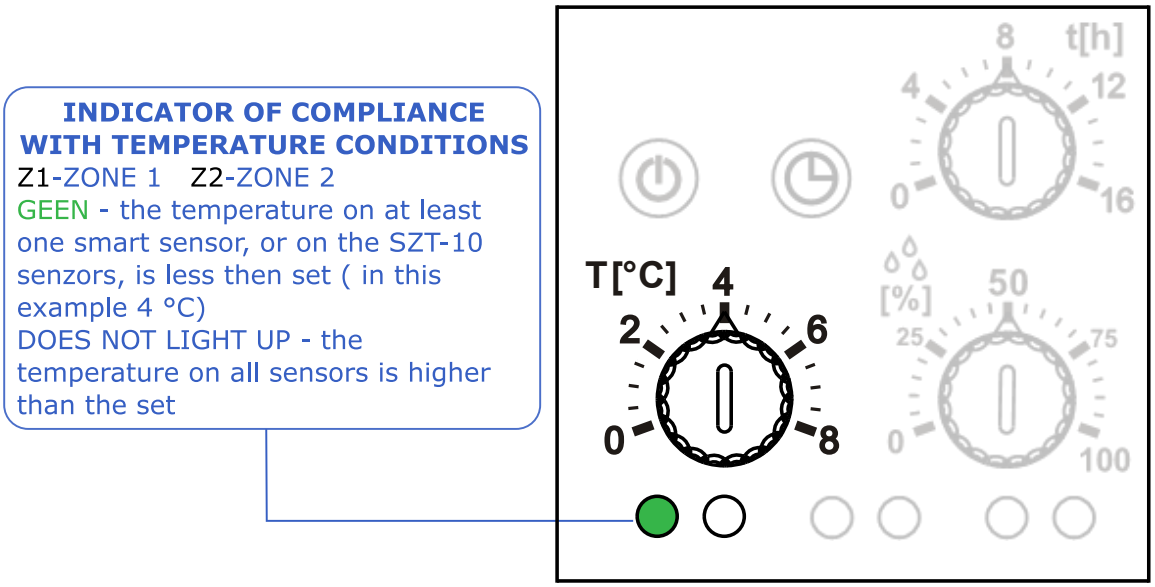
Another condition is that the percentage of sensor coverage with water, snow or ice must be greater than the percentage set on the scale button [%]. This is called meeting the requirements of moisture.

If both conditions are met SMC-2 will turn on the relay in the zone where the conditions are met.

Below are described in more detail the cases of how the aforementioned conditions are met.

2.5.1 Temperature setting

When SMC-2 detects that the temperature on any smart sensor in Zone 1, or on the SZT-10 air temperature sensor, less than the temperature set on the temperature scale button, the GREEN TEMP Z1 light indicator will turn on.



For example, the setting on the temperature scale above is 4°C. The TEMP Z1 indicator glows green, which means that at least one sensor in Zone 1 measures a temperature of less than 4 °C.

Likewise, if the temperature on any sensor in Zone 2, including the SZT-10 air temperature sensor, becomes less than set, the TEMP Z2 green light indicator will be switched on.

⚠ NOTE

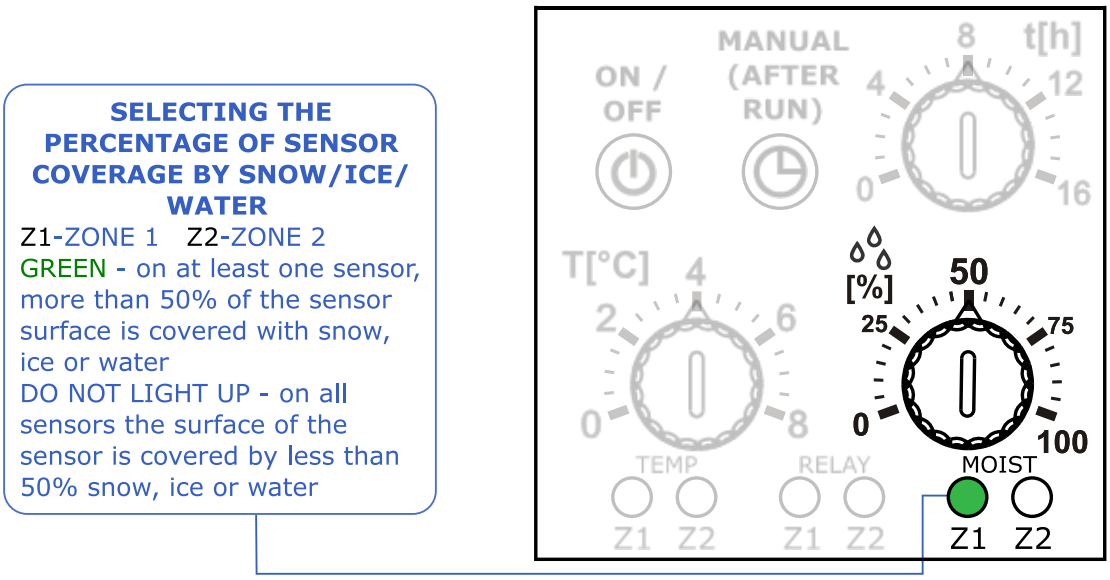
The air temperature data from the SZT-10 sensor is common to both zones. This means that if the air temperature drops below the set scale, both TEMP Z1 and Z2 indicators will glow green.

RECOMMENDATION

If the user wants to prevent the accumulation of snow, then it is recommended to set temperature conditions between 3 and 6 °C. If ice formation is to be prevented, then the temperature setting should not be less than 2°C. Settings less than 2°C provide additional energy savings but pose a risk of a late reaction to snow and ice.

2.5.2 Snow/ice/water cover setting

When the surface of any smart sensor, PSL-1 or SOV-5, becomes covered with snow, ice or water in Zone 1 more than the percentage set on the scale [%], the MOIST Z1 indicator will glow green.



The example above shows that the button with the percentage overlay scale is set to 50%. SMC-2 noted that at least one sensor in Zone 1 was more than 50% covered in snow, ice or water and therefore turned on the MOIST Z1 indicator.

The MOIST Z2 indicator does not light up, which means that in Zone 2 all sensors are less than 50% covered with water.

⚠ NOTE

If the button setting increases by the percentage of coverage, more snow, ice or water will be needed on the sensors to meet the moisture requirement. This means that increasing the percentage reduces detection sensitivity.

Andwhoever wants the SMC-2 to turn on the heating in small amounts of snow must reduce the value on the percentage button.

RECOMMENDATION

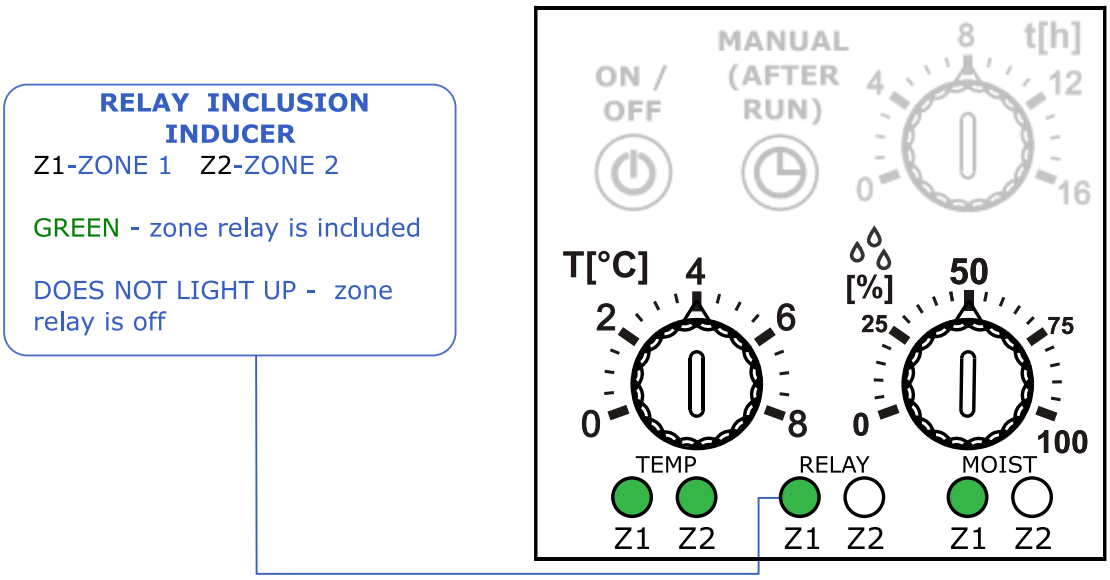
If SMC-2 is used to heat gutters then a setting between 50% and 75% is recommended. If the device is used for heating external surfaces, a setting between 25% and 50% is recommended.

⚠ NOTE

If the percentage button is set to 0% then the humidity requirement will be met even when the PSL-1 or SOV-5 smart sensors are completely dry. In other words, then the device ignores the moisture condition and conducts the heating process exclusively by temperature. It is important to emphasize that in this case the amount of energy consumed will be significantly higher!

2.5.3 Inclusion of zone relays

The zone relay will turn on when the temperature and humidity condition are met simultaneously in the zone.



For example, the moment the TEMP Z1 and MOIST Z1 indicators light up in green, the 1 Zone 1 relay will be turned on. The inclusion of the Zone 1 relay is indicated in the green color of the RELAY Z1 indicator.

In the example above in Zone 1, both conditions are met and the Zone 1 relay is included. In Zone 2, only the temperature condition is met (TEMP Z2 indicator glows green) but not humidity (MOIST Z2 indicator does not light up) so zone 2 relay is not turned on (RELAY Z2 does not light up).

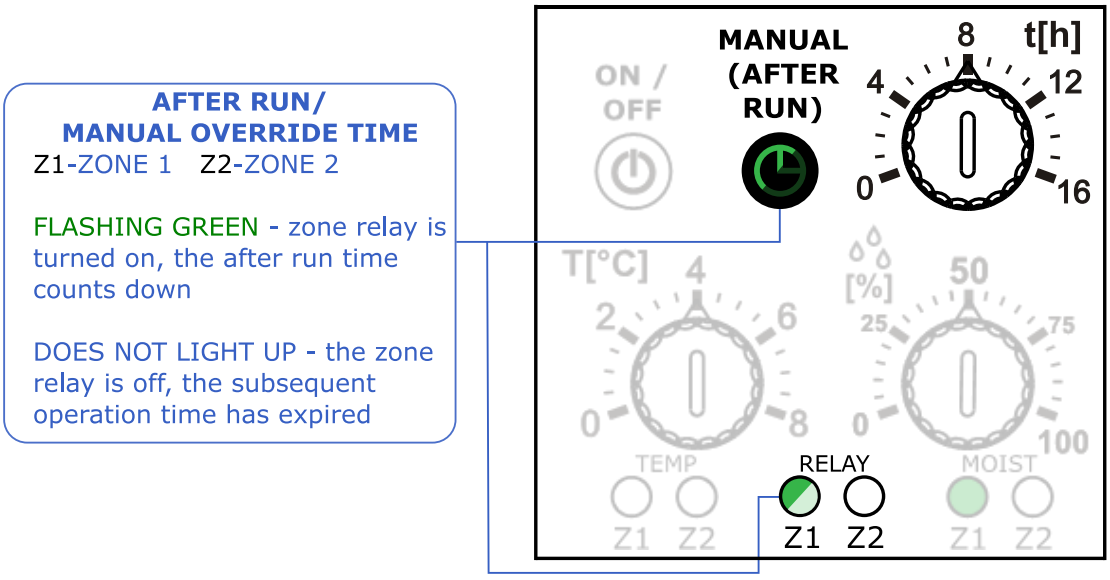
2.5.4 Time setting

In snow and ice melting systems, it is often necessary to heat the outer surface or gutter and for some time after there is no more snow/ice/water on the sensors or after the temperature of the sensor or air temperature has increased above the default.

This ensures that there will be no subsequent accumulation of snow and/or ice if the sensor is placed on a micro-location where snow/ice melts faster.

This type of work is called AFTER RUN, and is enabled using the time setting button.

The button is used to keep the zone relay on for up to 16 hours after temperature and humidity conditions cease to be met.



The example above shows the behavior of the indicator when the temperature in Zone 1 rises above 4°C. When this happens, the TEMP Z1 indicator will stop illuminating and the countdown of the subsequent operation time will begin even though the moisture condition is still met (MOIST Z1 indicator glows green).

When the time of subsequent operation begins, SMC-2 begins to count how much time has elapsed since the temperature condition or the percentage of snow cover age was lost. In order to let the user know that the manual button (AFER RUN) is active and, in this example, the RELAY Z1 indicator flickers green in the same rhythm.

RECOMMENDATION

Many years of experience show that setting a subsequent time of less than 1 hour is not useful. The optimal setting is from 2 to 6 hours depending on whether the gutter is heated (2 hours) or the outside surface, e.g. the entrance to the garage (6 hours).

In public facilities, such as overhead public garages, where cars continuously bring water or snow on wheels and where subsequent water freezing poses a safety problem, a setting of 12 to 16 hours is proposed.

⚠ NOTE

If the user does not want to use the option of subsequent working time, it is necessary to set the time scale button to the value 0. Then the device will turn off the zone relay as soon as the temperature or humidity condition disappears.

The time of subsequent operation can be interrupted in four ways:

- If the time has expired

In this case, the device will automatically turn off the zone relay.

- If during the subsequent work the user shortens the time setting

If the subsequent operation time on the device is already active for 2 hours and the after-work time is set to 6 hours, if then the user reduces the time setting button to less than 2 hours then the device will immediately interrupt the after-operation time and turn off the relay(s) zones.

- If during the subsequent operation the user pressed manual (AFTER RUN)

Pressing a button interrupts the time of subsequent operation.

- If the temperature on all sensors inside the zone rises above 12 °C

If all sensors within the zone, which includes smart sensors PSL-1 and SOV-5 and air temperature sensor SZT-10, measure a temperature higher than 12 °C, the device will automatically interrupt the after-operation time and thus turn off the zone relay.

- If during the subsequent operation there is a malfunction of all smart sensors connected to the zone and failure of the air temperature sensor

If all sensors stop working, the device cannot know the current temperature. The device will therefore interrupt the subsequent operation time and turn off the zone relay to protect the heating cables from potential burnout.

2.6 Manually turn it on

In addition to allowing fully automatic operation, SMC-2 allows the user to manually turn on the zone relay. Zone relays can be manually switched on by pressing the MANUAL (AFTER RUN) button.

Pressing the button forces the countdown of the subsequent working time to be started and automatically turns on the relays in both zones. The further behavior of the device is identical to that described in the section *2.5.4 Time setting*.

RECOMMENDATION

Manual switching is useful when the user wants to shorten the reaction time of the external heating system. For example, when precipitation (snow or freezing rain) is announced in the weather forecast, the user can manually turn on the heating to warm the ground in advance. This completely prevents the accumulation of even the smallest amount of snow or ice.

2.7 Main zone and auxiliary zone

Although SMC-2 supports heating management in two zones, there are frequent cases when the user has the need to heat only one zone. In these cases, the sensors are connected to only one zone, for example, the user connects two PSL-1 sensors to ports 8 and 9 (Zone 1), while on ports 10 and 11 (Zone 2) there are no connected sensors.

When the device, after switching on, notices that there are no connected smart sensors in one of the zones then that zone, in which there are no smart sensors, becomes an auxiliary or SLAVE zone and a zone in which there are smart sensors becomes the main or MASTER.

Na primjer, ako je na Zonu 1 spojeno jedan ili više PSL-1 senzora a u Zoni 2 nema senzora, tada će Zona 1 biti glavna (MASTER) zona a Zona 2 će biti pomoćna (SLAVE) zona.

The behavior of the auxiliary zone relay differs in that the auxiliary (SLAVE) zone relay will monitor the operation of the main (MASTER) zone relay. For example, when the relay in the main zone is turned on at the same time, the relay in the auxiliary zone will be turned on, and vice versa applies. When the relay in the main zone is turned off, the relay in the auxiliary zone will also be turned off.

RECOMMENDATION

This behavior is useful when it is necessary to get feedback whether the device has turned on the heating. Since the auxiliary zone relay monitors the operation of the main zone relay, the user can use the auxiliary zone relay to turn on the light indicator or send a low-voltage signal to the monitoring system, which will be notified when the main zone relay is turned on.

RECOMMENDATION

When the sensors connect to only one zone, it is recommended that they connect to Zone 1. The reason for this is the higher breaking power of the Zone 1 (25A) relay. Then Zone 2 will become an auxiliary zone and the Zone 2 relay will monitor the operation of the Zone 1 relay.

3. Errors

During operation, SMC-2 monitors the condition of sensors connected to the device. If the device detects that one or more sensors have stopped communicating, SMC-2 will treat the event as an error and will notify the user by changing the state of the indicator. In the text below, the types of errors and ways of removing them are described.

	Power button flashes orange
MEANING	Stop working at least one of the sensors connected to the device

DESCRIPTION

The device detected one of the following events:

1. Stop communicating with at least one of the PSL-1 or SOV-5 smart sensors
2. Short circuit or interruption of the SZT-10 air temperature sensor

NOTE

This error occurs when SMC-2 notices that the sensors detected by the device when it is turned on are no longer connected to the device. For example, this error will occur if the user disconnects any sensor (SZT-10, PSL-1, SOV-5) during operation.

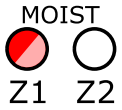
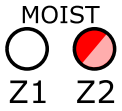
If only one smart sensor is connected to Zone 1, e.g. one PSL-1 is connected to Zone 1 and/or one SOV-5 is connected to Zone 2, then this error means that there has been a malfunction on the SZT-10 sensor.

When an error occurs, the device will continue to operate because there is at least one sensor by which the device will receive information about the amount of snow/ice and temperature values.

WHAT TO DO

1. Inspect how many sensors are connected to the device (whether the SZT-10 temperature sensor is connected and how many smart sensors are connected to each zone).
2. Use the ON/OFF key to turn off the device.
3. Disconnect all sensors from the device.
4. Connect only one of the sensors to the device and then turn on the device
   a. If SMC-2 successfully detected the sensor (see *0 During the Zone 2 search, the* voltage on the connectors 10 and 11 will be 24V, while on the ports 8 and 9 the voltage will be 0V. The search for Zone 2 also lasts 25 seconds.
   b.) then the sensor is correct. The sensor can be disconnected and the following sensor can be connected to the device and the action under 4 can be repeated.
   c. If SMC-2 did not detect the sensor then the sensor is defective.

5. The correct sensors connect to the device and the device can be turned on.
6. The faulty sensor must be checked (see *3.1). Sensor check*)

	MOIST Z1 Indicator flashing red
	MOIST Z2 Indicator flashing red
MEANING	Stop working all smart sensors in the Zone whose MOIST indicator flashes

DESCRIPTION

All smart sensors, PSL-1 or SOV-5, in Zone 1 (if moist Z1 flashes) or Zone 2 (if moist Z2 flashes) have stopped communicating with the SMC-2 controller.
SMC-2 no longer receives information about the amount of snow/ice/water on sensors for the zone whose MOIST indicator flickers.

REMARK

If an air temperature sensor (SZT-10) is connected to the SMC-2, the SMC-2 will still guide the heating process in the problem zone but only by temperature. This means that the SMC-2 will include an output relay zone where the smart sensors are malfunctioning when the air temperature becomes less than the set temperature (see *0 Temperature setting*).

If the air temperature sensor (SZT-10) is not connected to the device then the device cannot guide the heating process, which means that there is a risk of freezing gutters or the outer surface. The device draws attention to this danger by turning on the beep.

WHAT TO DO

1. Turn off the device and disconnect all sensors of the zone that is problematic.
2. Measure the resistances of each sensor separately (see *3.1. Sensor check*).
3. Check if there has been a cable break between the regulator and the sensor.
4. If necessary, replace the faulty sensor.
5. Turn on the device to re-detect which sensors are connected.

Power button flashing red

MEANING Termination of operation of all sensors connected to the Zone

DESCRIPTION

The device detected the following events:

1. The SZT-10 air temperature sensor is not connected to the device
2. All sensors that were connected to Zone 1 and/or Zone 2 have stopped working

REMARK

The error occurs when SMC-2 notices that all sensors within one Zone have stopped communicating with the device and that the SZT-10 temperature sensor is not connected to the device or the SZT-10 sensor is also malfunctioning.

Under these conditions, SMC-2 can no longer manage the heating process, which means there is a risk of gutters freezing or the outer surface. The device draws attention to this danger by turning on the beep. When an error occurs, the device cannot continue working until a single correct sensor (SZT-10 or one of the PSL-1/SOV-5 smart sensors) is connected to the device.

WHAT TO DO

1. Use the ON/OFF key to turn off the device.
2. Disconnect all sensors from the device.
3. All sensors must be checked (see 3.1. Sensor check)

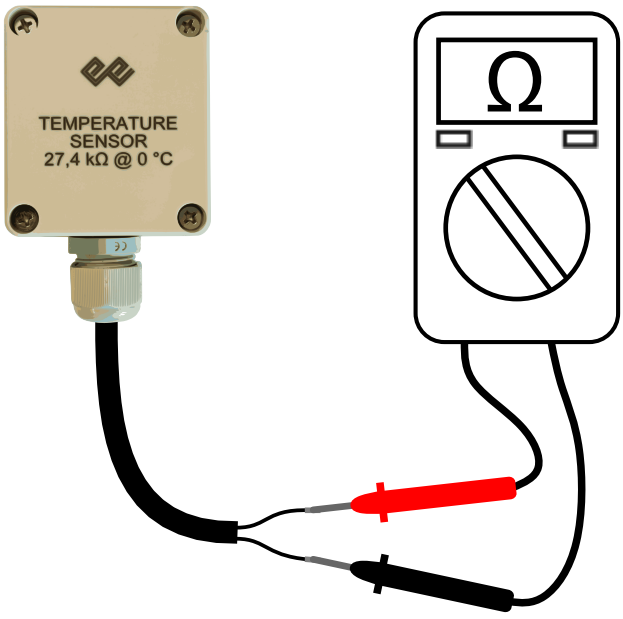
3.1 Sensor check

If an error is detected on the sensor during operation, the problematic sensor needs to be disconnected and checked for its condition. Further text describes in more detail the ways in which the correctness of the SZT-10 and PSL-1/SOV-5 sensors is checked.

3.1.1 Sensor check SZT-10

The SZT-10 air temperature sensor is an NTC resistor whose resistance is 10kΩ at 25°C.

Ispravnost senzora SZT-10 provjerava se mjerenjem trenutnog električnog otpora Ohmmetrom. Tijekom mjerenja nije potrebno paziti na polaritet.



After the measurement is made, it is necessary to find out the approximate air temperature at the location where the SZT-10 sensor is placed. Then, from the table below, for the air temperature read, the resistance value that the SZT-10 sensor should have is estimated.

R-T characteristic of SZT-10 temperature sensor (NTC resistor 10kΩ at 25°C B=3460K)			
TEMPERATURE [°C]	RESISTANCE [Ω]	TEMPERATURE [°C]	RESISTANCE [Ω]
-20	68471	15	14716
-15	53910	20	12099
-10	42739	25	10000
-5	34109	30	8308
0	27396	35	6936
5	22140	40	5819

10 17999	45 4904

If the measured resistance deviates from the nominal resistance in the table by more than 10% from the nominal or for more than 1kΩ the SZT-10 sensor is malfunctioning and needs to be replaced.

⚠ NOTE

Many years of experience have shown that NTC temperature sensor failures are very rare and that failures most often concern cable rupture or short circuit of vessels on the cable connecting SMC-2 and SZT-10.
If the resistance measurement SZT-10 shows that the resistance is very small, e.g. a few Ω, or very large, e.g. a few MΩ, it is almost certainly a cable failure.

After the correctness of the SZT-10 sensor is determined, or the sensor is replaced, it is necessary to connect it to the SMC-2 controller. The regulator must then be switched off and re-switched on for the SMC-2 to try to identify the newly connected SZT-10 (see 0 After pressing the power button, the device will act as if it has been re-enabled with power, i.e. the correctness of all light indicators will be checked, and after that the power button will glow green.

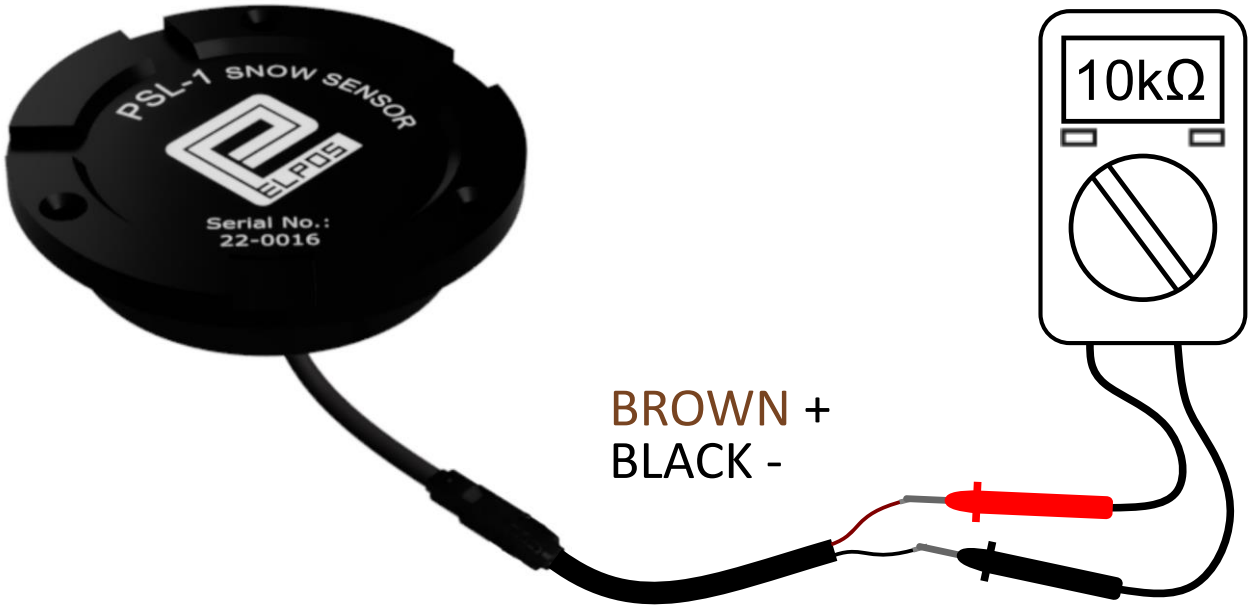
).

3.1.2 PSL-1/SOV-5 sensor check

⚠ NOTE

The PSL-1 and SOV-5 smart sensors are checked identically. Further text describes the verification of the PSL-1 sensor, but the identical procedure also applies to SOV-5 sensors.

In order to check the correctness of the PSL-1 or SOV-5 smart sensors, it is necessary to measure the electrical resistance of the sensor, whereby polarity must be respected.



By measuring with polarity according to the above display, the measured resistance of the correct sensor must be 10kΩ ±300Ω.

⚠ NOTE

If the value of the measured resistance is below 4kΩ, it is possible that the polarity of the sensor conductor has been replaced.

If there was a mechanical failure inside the sensor, or a rupture of the cable, the measured resistance will deviate significantly from 10kΩ.

⚠ NOTE

If the value of the measured resistance is below 20-50Ω or above 1MΩ, it is very likely that there is a failure in the connection cable. If such a failure is confirmed, it is necessary to replace the connection cable, the sensor does not need to be changed.

If the correctness of the cable is confirmed, and the measured resistance is still not 10kΩ, it is necessary to replace the sensor. After replacement, the sensor needs to be connected to the SMC-2 controller. The controller must then be switched off and reactivated for the SMC-2 to recognize the newly connected sensor (see 0 After pressing the power button, the device will act as if it has been re-enabled with power, i.e. the

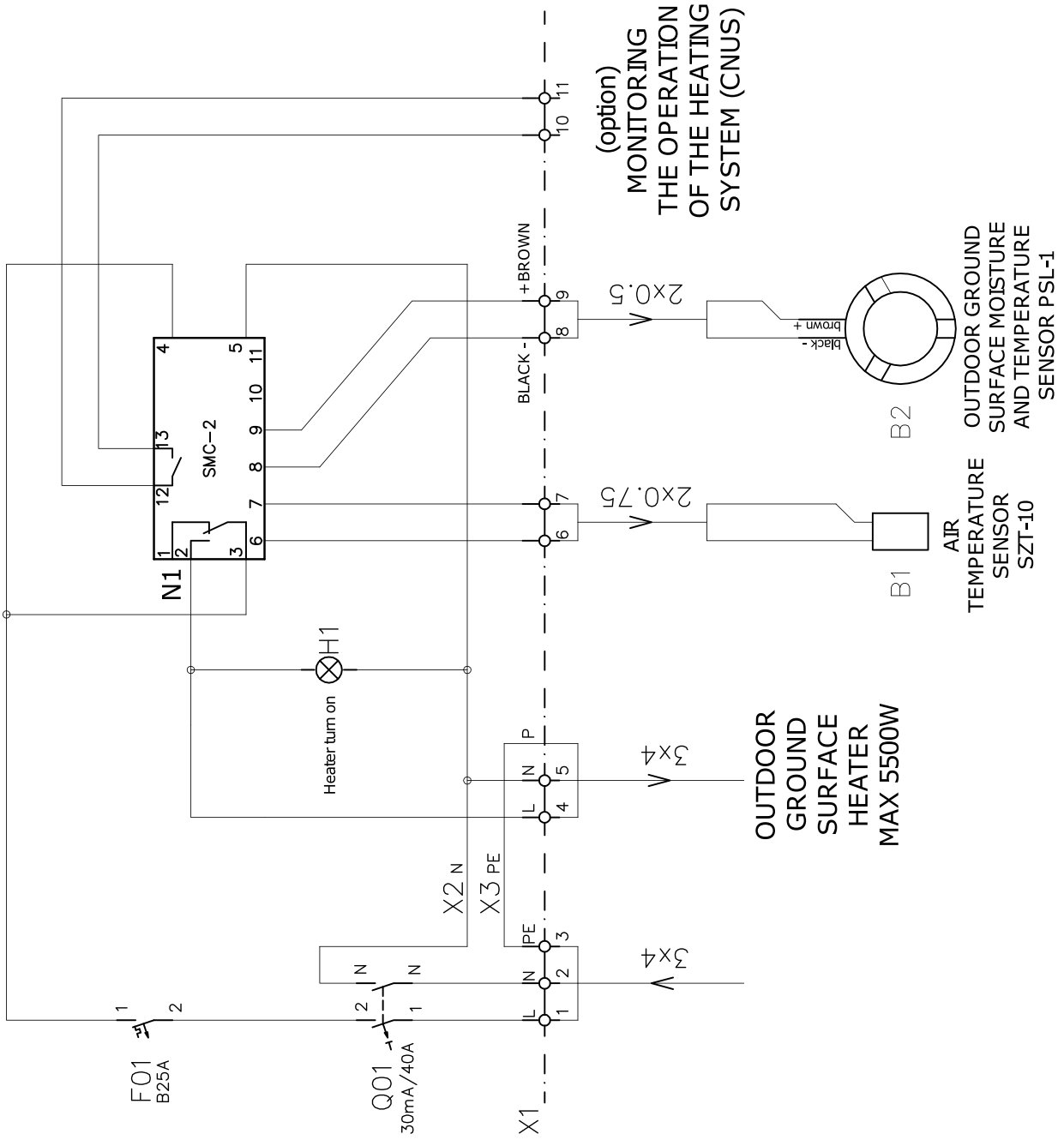
correctness of all light indicators will be checked, and after that the power button will glow green.

).

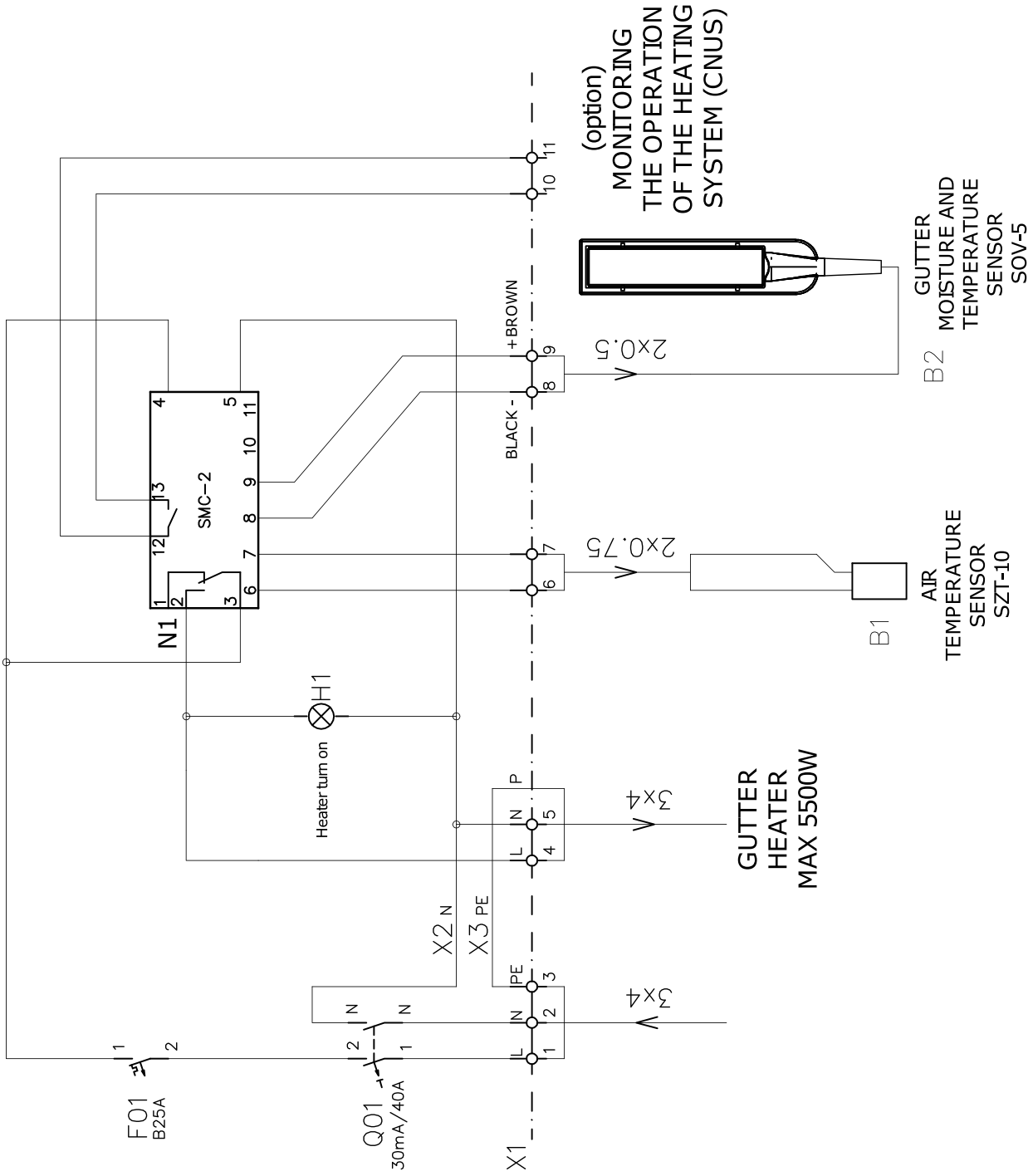
4. Instructions for installers

Below are the electrical schemes of the most common configurations of heating systems controlled by the SMC-2 controller.

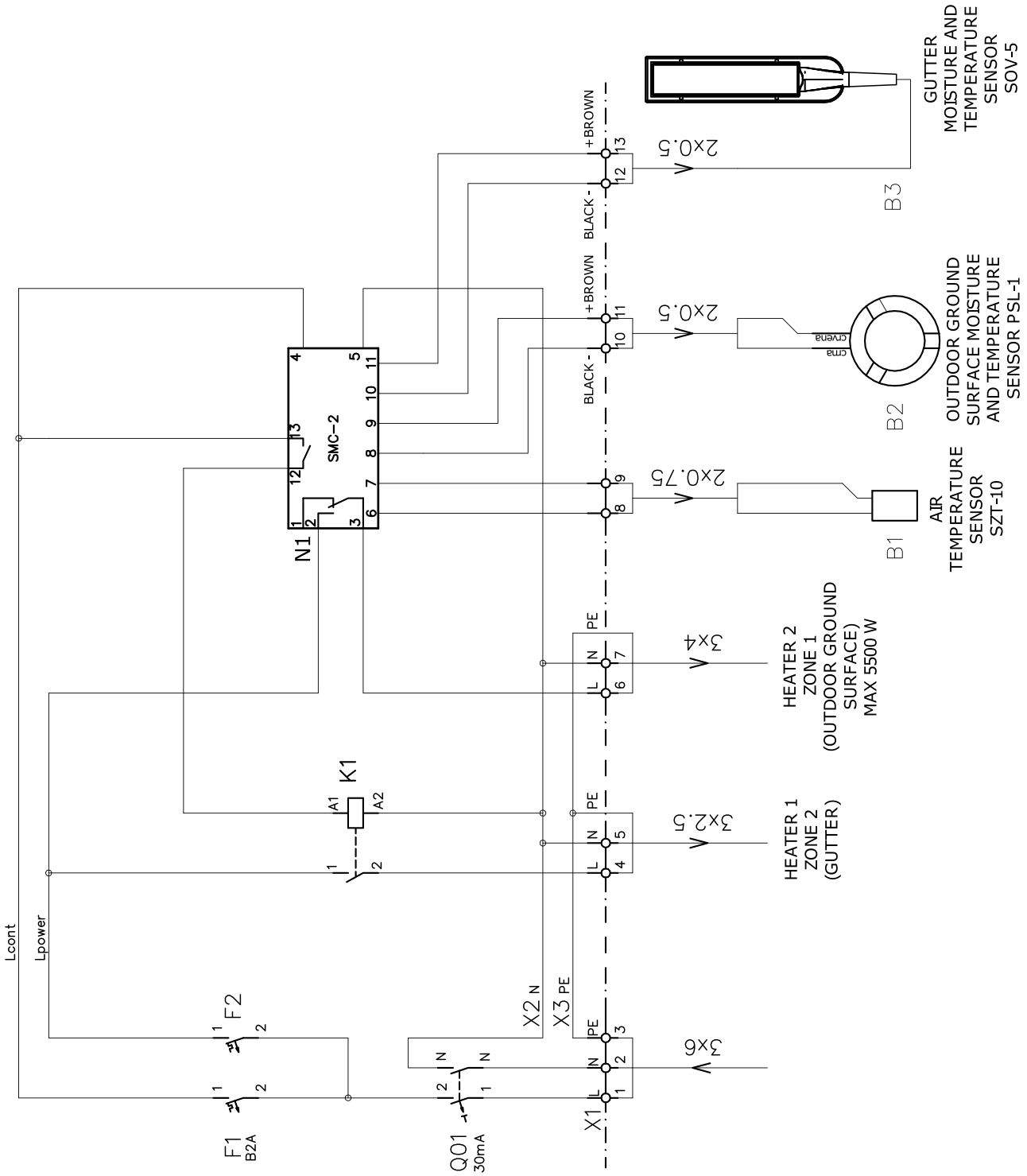
4.1 Electrical scheme for outdoor surface heating systems


(option)
MONITORING
THE OPERATION
OF THE HEATING
SYSTEM (CNUS)
+BROWN
BLACK -
2x0.5
2x0.75
N1
SMC-2
B2
OUTDOOR GROUND
SURFACE MOISTURE
AND TEMPERATURE
SENSOR PSL-1
brown +
black -
B1
AIR
TEMPERATURE
SENSOR
SZT-10
H1
Heater turn on
OUTDOOR
GROUND
SURFACE
HEATER
MAX 5500W
3x4
X2 N
X3 PE
X1
F01
B25A
Q01
30mA/40A

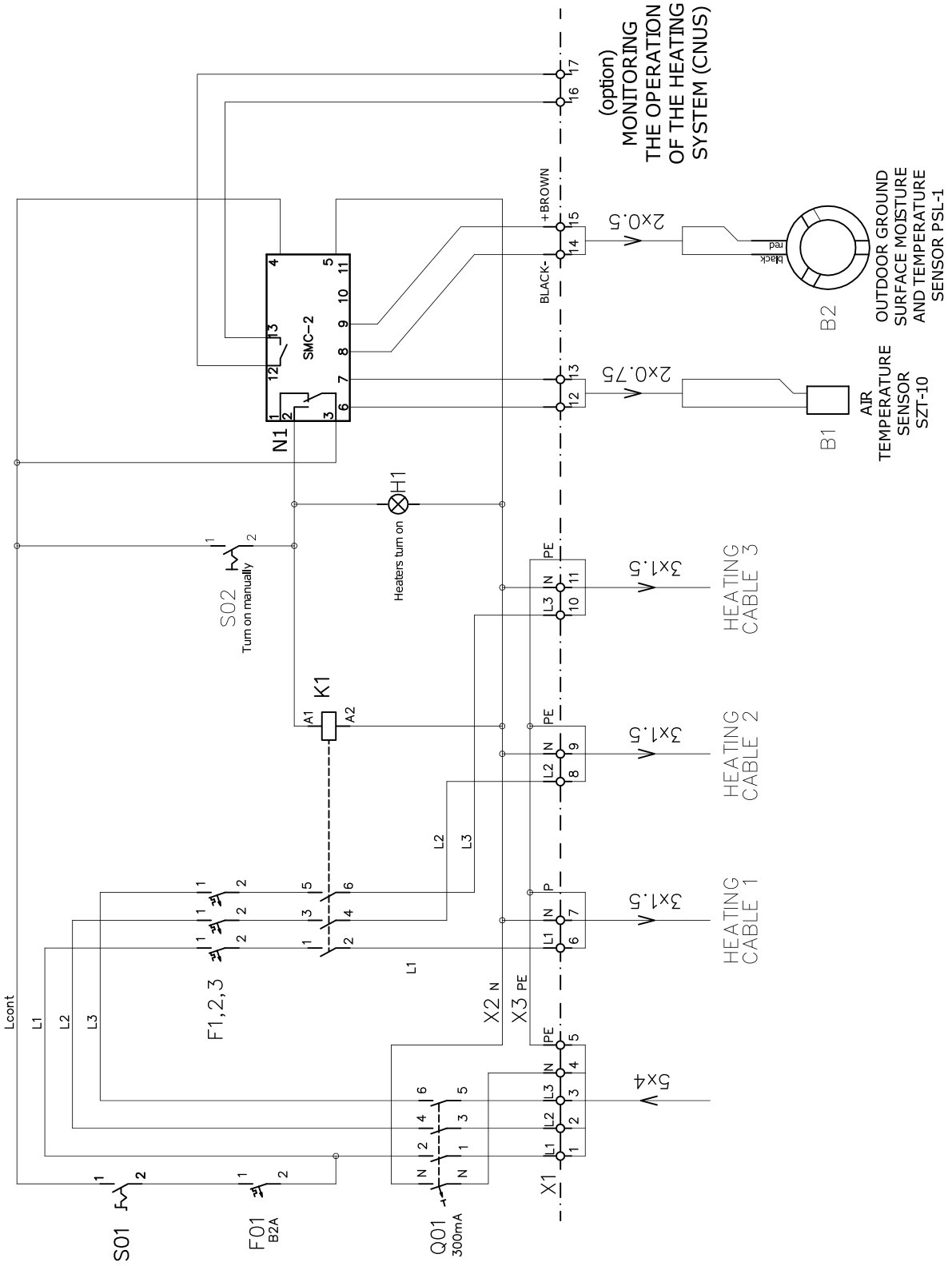
4.2 Electric scheme for gutter heating systems



4.2 Electrical scheme for double-zone heating systems of outdoor surface and gutters



4.3 Electrical scheme for three-phase heating cables


(option)
MONITORING
THE OPERATION
OF THE HEATING
SYSTEM (CNUS)
OUTDOOR GROUND
SURFACE MOISTURE
AND TEMPERATURE
SENSOR PSL-1
AIR
TEMPERATURE
SENSOR
SZT-10
B2
B1
2x0.5
2x0.75
+BROWN
BLACK-
black
red
N1
SMC-2
H1
Heaters turn on
S02
Turn on manually
K1
HEATING
CABLE 3
HEATING
CABLE 2
HEATING
CABLE 1
3x1.5
5x4
F1,2,3
X1
X2 N
X3 PE
Lcont
L1
L2
L3
PE
N
S01
F01
B2A
Q01
300mA

5. Basic technical data

Parametar	Value / Description
Name	SMC-2
Funkcionalnost	Snow and ice melt controller
Mounting method	DIN profile bracket 35 mm (according to EN 60715) or mounting on the board
Power supply voltage	od ~ 100 V to ~ 250 V, 50 Hz / 60 Hz
Power pins	4 (L) - 5 (N)
Own consumption	< 15 W
Output Zone 1	Relay (normally closed, normally open contact)
Breaking power of Zone 1 relays	25 A continuous (40A currently), ~250V/cosφ ≥ 0.8
Output Zone 2	Relay (working contact)
Zone 2 Relay Breaking Power	8 A continuous (20A currently), ~250V/cosφ ≥ 0.8
Cross-section of relay connection lines	Zone 1 ≤ 4 mm^2 Zone 2 ≤ 2.5 mm^2
Cross-section of power supply lines	≤ 1,5 mm^2
Zone 1 sensor connectors	8 (BUS-) , 9 (BUS+)
Zone 2 sensor connectors	10 (BUS-) , 11 (BUS+)
Air temperature sensor	SZT-10 Sensor (NTC 10kΩ /B3435) connectors 6 – 7
Snow and ice sensors	**SOV-5 gutter sensor** **PSL-1 outdoor ground sensor**
Number of sensors	3 sensors per zone
Permissible ambient temperatures	od -20 °C to +55 °C

Level of protection	IP 40 control panel IP 20 connectors
Overvoltage category	III
Pollution level	2
Dimension	L= 90,6 mm, W= 52,4 mm, H= 62,1 mm (3 DIN modules)
Mass	300 g
Norm	EN 60730-1, EN 60730-2-9

6. Declaration of conformity

ELPOS Ltd.
Address: RADNOVAC, Radnovac 1G, 34000 POŽEGA, Croatria
VAT number: HR95986746518
+385 34 257 235 elpos@elpos.hr www.elpos.hr
IBAN: HR1124020061100667851 (Erste)
HR4123600001102242933 (ZABA)
HR7425000091102136202 (Addiko)

EC DECLARATION OF CONFORMITY

number: 3-08-22

manufacturer: Elpos d.o.o.
Radnovac, Radnovac 1G
34000 Požega, CROATIA

product: **Snow and ice melt controller SMC-2**

description: A compact electronic controller to control the snow and ice melt system designed to turn on the melting system as soon as snow starts to fall or ice begins to form. Its operating temperatures range from 0 to 8 °C, the sensitivity of the snow detector can be adjusted from 0 to 100%, and the time of extended or manual operation lasts from 1 to 16 hours. It works in pairs with Sensors SOV-5 and / or PSL-1 and SZT-10, and has the ability to control the operation of heating systems in two separate zones. It is adapted to mount on the DIN 35 bracket and takes up space of 3 DIN modules (52.4 mm).

Product conforms to the following directives:

Low voltage directive (LVD)

2014/35/EC

Electromagnetic compatibility directive (EMC)

2014/30/EC.

Conformance with the above stated directives is based on the implementation of the following harmonized standards:

EN 60730-1:2019 + A1:2019
EN 60730-2-9:2010 + A1:2019

Signed for and on behalf of:

ELPOS d.o.o.
Radnovac 1G
34000 POŽEGA
OIB: 95986746518

Željka Grcić, dipl. ing. el.

In Požega, 4.4.2022.

7. Warranty card

ELPOS ELECTRONICS
ELPOS d.o.o., Radnovac 1G,
34000 Požega, Croatia
tel.: +38534 257 235, www.elpos.hr
e-mail: elpos@elpos.hr

WARRANTY CARD

manufacturer:	Elpos d.o.o. Radnovac 1G 34000 Požega, Croatia
product:	Snow and ice melt controller **SMC-2**
basic technical characteristics:	- Working voltage: od 100 V~ do 250 V~, 50 Hz / 60 Hz - Operating temperature: 0 – 8 °C - Sensitivity of snow and ice sensors: 0 – 100 % - After run time / manual operation: 1 – 4 h - Own consumption: < 15 W - Output relay zone 1 normally closed/normally open contact; 25 A continuous / 40 A current zone 2 working; 8 A continuous / 20 A current - Cross-section of relay connection lines: zone 1 ≤ 4 mm²; Zone 2 ≤ 2,5 mm² - Cross-section of power supply lines: ≤ 1,5 mm² - Air temperature sensor: SZT-10 (NTC 10 kΩ / B3435) - Snow and ice sensors: SOV-5 (the outdoor ground sensor), PSL-1 (gutter sensor) - Permissible ambient temperature: -20 °C do +55 °C - Degree of protection: IP 40 control panel; IP 20 connectors - Overvoltage category: III - Dimension: L= 90,6 mm, W= 52,4 mm, H= 62,1 mm (3 DIN moduls)

The quality guarantee of snow and ice melt controller SMC-2 lasts for 3 years from the day of its sale.

The warranty is realized by reporting a defect to the manufacturer upon presentation warranty card and the Invoice.

THE WARRANTY DOES NOT INCLUDE:

- failures that occurred due to careless handling i.e. due to non-compliance with the handling instructions written by the manufacturer
- failures caused by environmental influences unfavorable to the operation of the device
- failures caused by mechanical damage (breakage, drilling, crushing...) due to unauthorized modifications.
- failures caused by surge surges in the electrical network and lightning strikes

licensed service: • Elpos d.o.o., Radnovac 1g, 34308 Jakšić, Croatia tel. +38534 257 235

Invoice No.	Factory number

..... potpis i pečat

..... datum prodaje

Bilješke