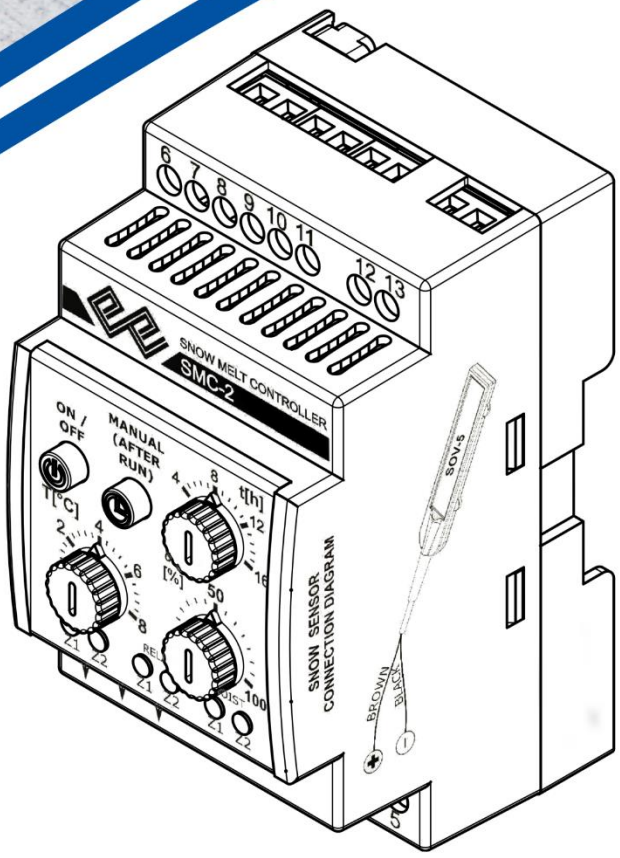
EN

User manual

SMC-2



Snow melt controller

Ground snow & ice melting application

Gutter snow & ice melting application

elpos.hr

Professional solutions for electrical heating

V1R4

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Content

Legend

Graphic	Meaning
	The button light indicator is turned off
	Button light indicator is turned on and lights in green color
	Button indicator flashes in green color
	Button indicator flashes quickly in green color
	The button indicator is turned on and lights in red color
	Button indicator flashes in red color
	Button indicator flashes in orange color
	The light indicator is 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 controlling snow and ice melting processes of 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. damage to 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 (ground sensor) and SOV-5 (gutter sensor). The SMC-2 can also be connected with an outdoor air temperature sensor type SZT-10 via dedicated terminals.

Because of the advanced and reliable detection methods implemented in the PSL-1 ground and SOV-5 gutter sensors, the SMC-2 controller will (when snow, ice and/or water that can freeze disappears) turn off the heating of the protected surface 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 will send this information to the SMC-2 controller. The SMC-2 will then check whether the air temperature is lower than the setpoint. If the air temperature is low enough the SMC-2 will turn on one of the two output relays that control the electrical heating cables.

By activating an individual relay, the heating of the surface that needs to be protected from snow accumulation and/or ice formation begins.

⚠ NOTE

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

When the sensors detect that there is no more snow, ice, or water, or when the air temperature becomes higher than the set value, the SMC-2 will deactivate the corresponding output relay, thus stopping the heating of the outdoor 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 ground sensor is mounted in a plastic holder, which is supplied together with the sensor, and is installed in the outdoor surface that is being heated. A typical example

of a heated surface is a garage ramp whose freezing must be prevented in order for cars to safely enter and exit the garage during winter.

- Gutter sensors - SOV-5

The gutter sensors are elongated in shape and are mounted at the bottom of the gutter near the drain, at the lowest point of the gutter. They are installed 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 recess on their surface where water, snow, or ice accumulates. The sensor then measures the state of its surface using a contactless method, thus detecting the percentage of the surface covered by snow, ice, or water. In addition to the coverage percentage, the sensor can distinguish whether there is snow, ice, or water on the surface.

1.2 Output relays, sensors and zones

In outdoor surface heating systems or gutter and drain heating systems, it is often necessary to heat two surfaces (e.g., heating the garage entrance and heating the gutter), but not simultaneously.

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

- Relay 1: changeover contact, 25A, terminals 1, 2, and 3 (1-3 normally closed contact, 2-3 normally open)
- Relay 2: normally open contact, 8A, terminals 12 and 13

The device also has two independent inputs for connecting snow and ice sensors.

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

⚠ NOTE

It is possible to connect up to 3 sensors in parallel to each sensor input (terminals 8/9 or 10/11). The cable length of an individual sensor must not exceed 50 meters.

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

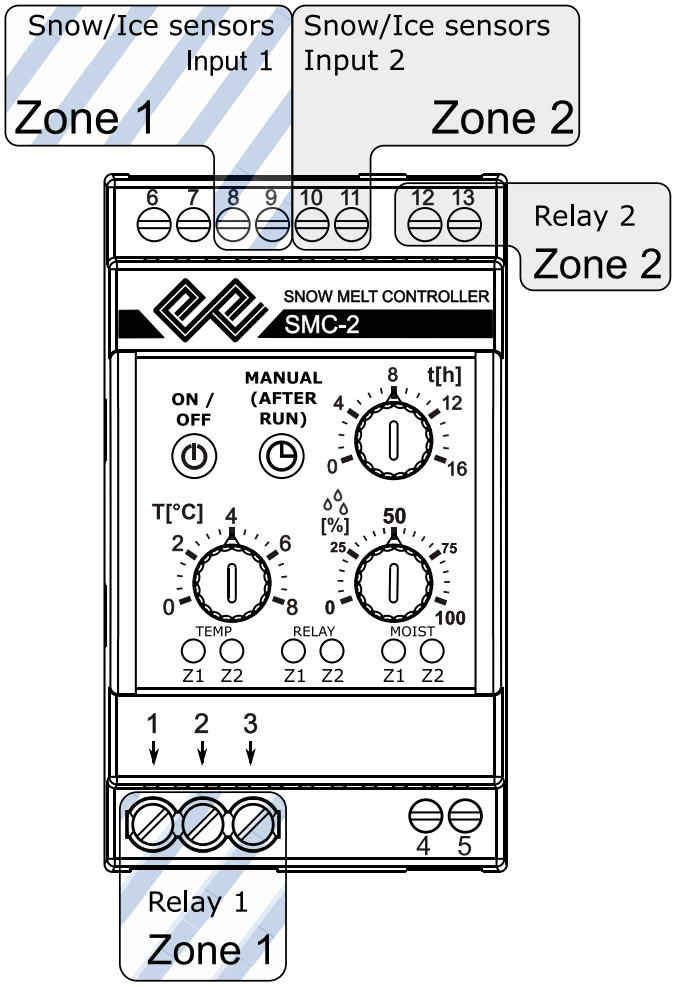
The combination of a sensor input and an output relay is called a Zone. This means that the device has two zones that can operate independently of each other.

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

⚠ NOTE

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

It is important to note that the user can connect heating cables for outdoor surface heating or gutter heating to any zone.



⚠ NOTE

When the power, i.e., the nominal current of the heater in a single zone, is greater than the switching capacity of the output relay, it is necessary to connect an electromagnetic contactor to the output relay of the SMC-2 controller. Heating cables are connected via the contacts of the electromagnetic contactor, while the control coil ("solenoid") of the contactor is connected through the output relay of the SMC-2 device.

RECOMMENDATION

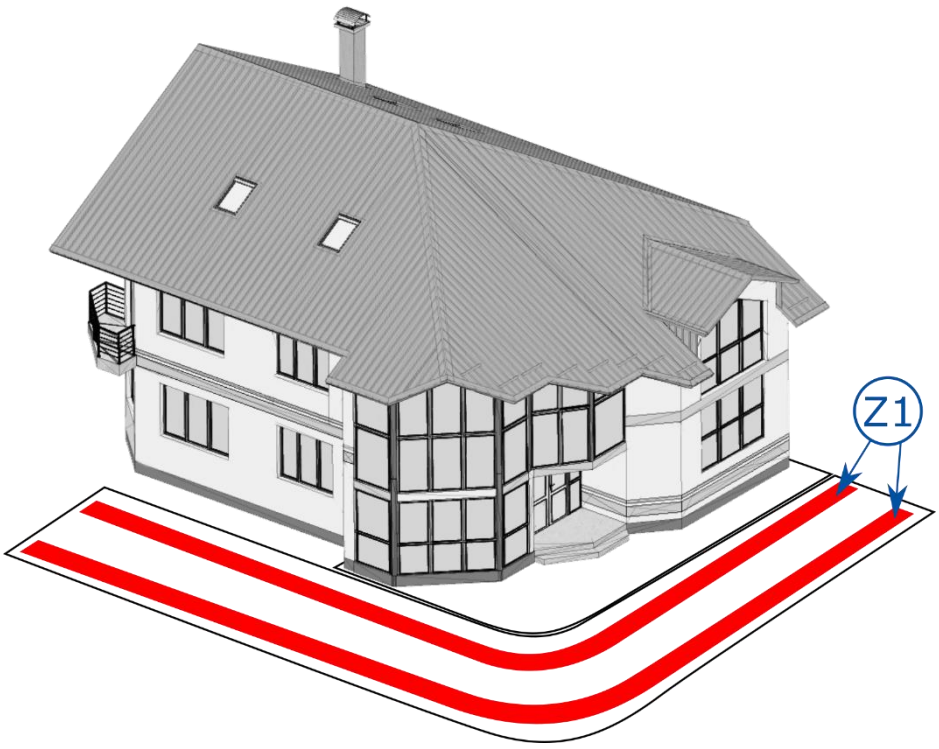
Since the relay of Zone 1 has a higher switching capacity than the relay of Zone 2 (Zone 1 - 25A, Zone 2 - 8A), Zone 1 is typically used for controlling the heating of outdoor surfaces such as parking lots, garage ramps, sidewalks, etc., while Zone 2 is used for controlling gutter and drain heating (the power required for heating gutters and drains is significantly lower than the power required for heating outdoor surfaces).

1.3 Examples of connecting heaters by zones

The following are examples of how heated surfaces can be grouped into zones.

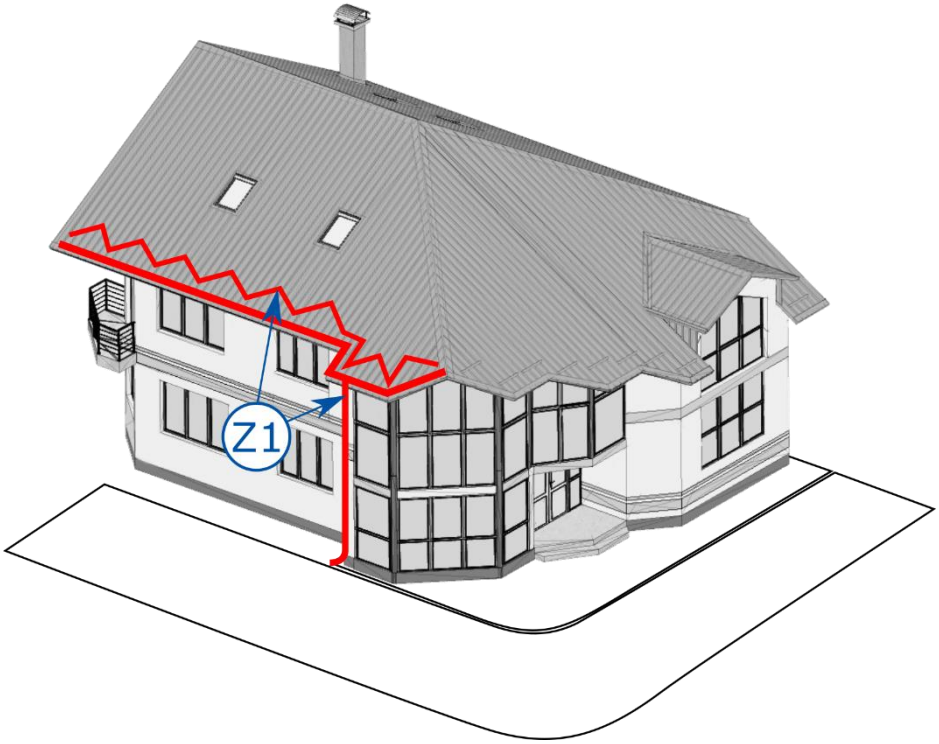
Configuration 1

Heating of the driveway for accessibility and preventing snow and/or ice accumulation. Tire tracks are heated, so there are two heating traces. Both heating traces are connected to the relay of zone 1 (Zone 1 - Z1). At least one PSL-1 sensor is installed in the heating trace.



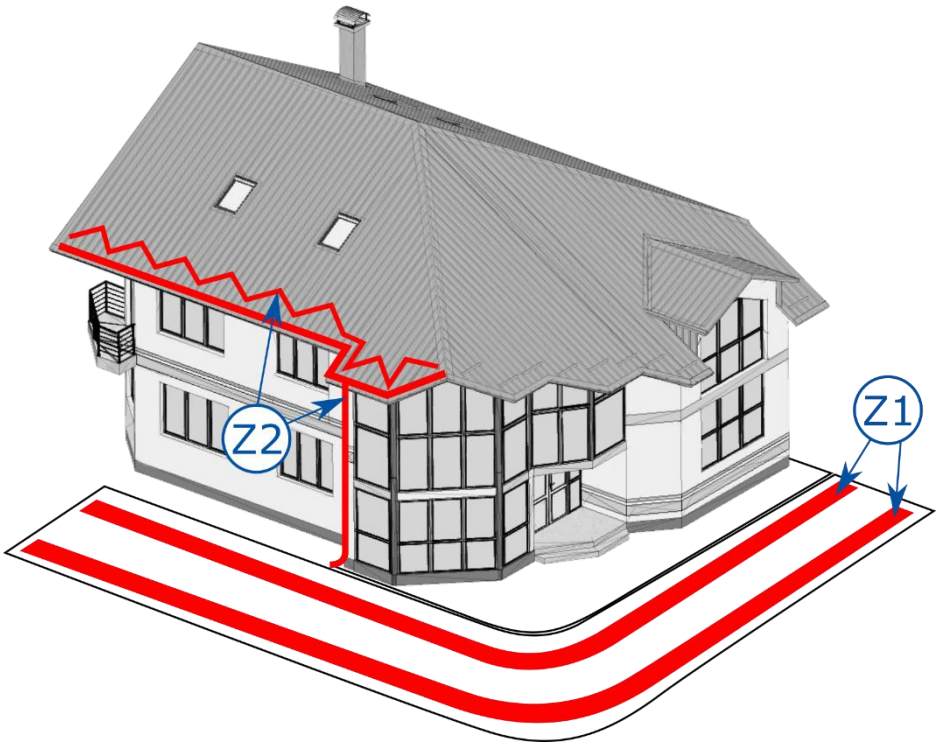
Configuration 2

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



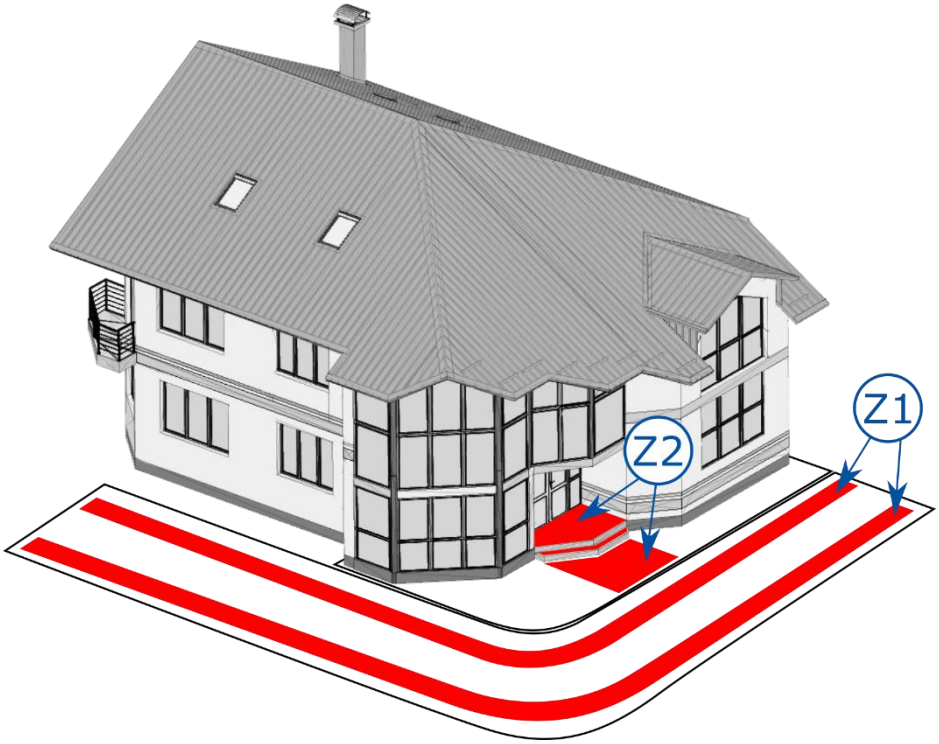
Configuration 3

Dual zone heating control. The heating traces, installed for heating the driveway of the building, require higher power (current) and are connected to the relay of zone 1 (Z1). The heating cables in the gutter require less power and are connected to the relay of zone 2 (Z2). At least one PSL-1 sensor is installed in one of the heating traces (Z1). At least one SOV-5 sensor is installed in the gutter (Z2).



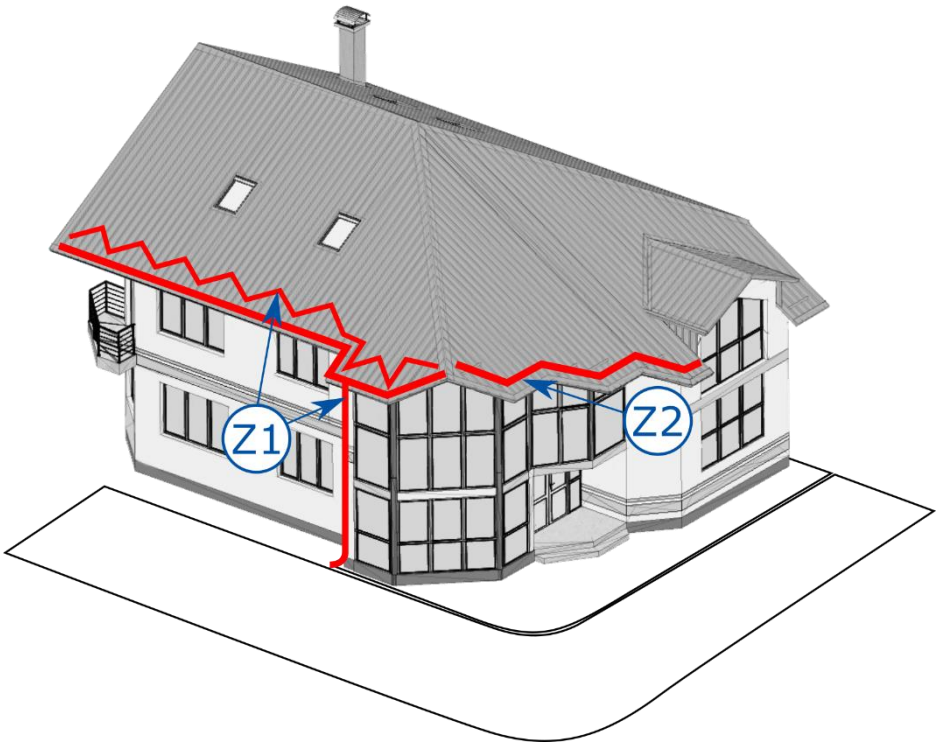
Configuration 4

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



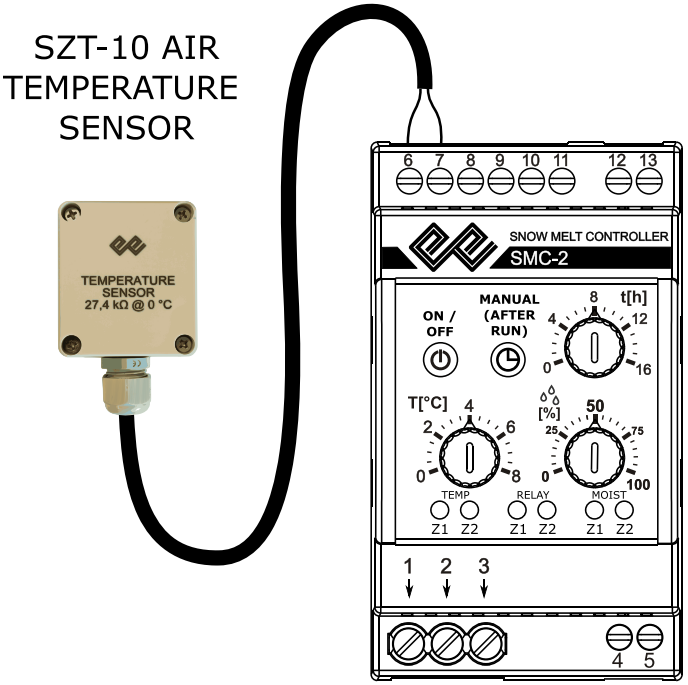
Configuration 5

Dual zone heating control. The heating cables in the longer gutter require higher power, so they are connected to the relay of zone 1 (Z1). The heating cables in the shorter gutter, on the south side of the building where snow melts faster, are connected to the relay of zone 2 (Z2). At least one SOV-5 sensor must be installed in each zone, i.e., gutter.



1.4 Air temperature sensor

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



The air temperature sensor SZT-10 is connected to terminals 6 and 7 (the polarity of the wires is not important). The temperature sensing element of the SZT-10 sensor consists of an NTC thermistor with a resistance of 10 kΩ at 25°C (27.4 kΩ at 0°C).

RECOMMENDATION

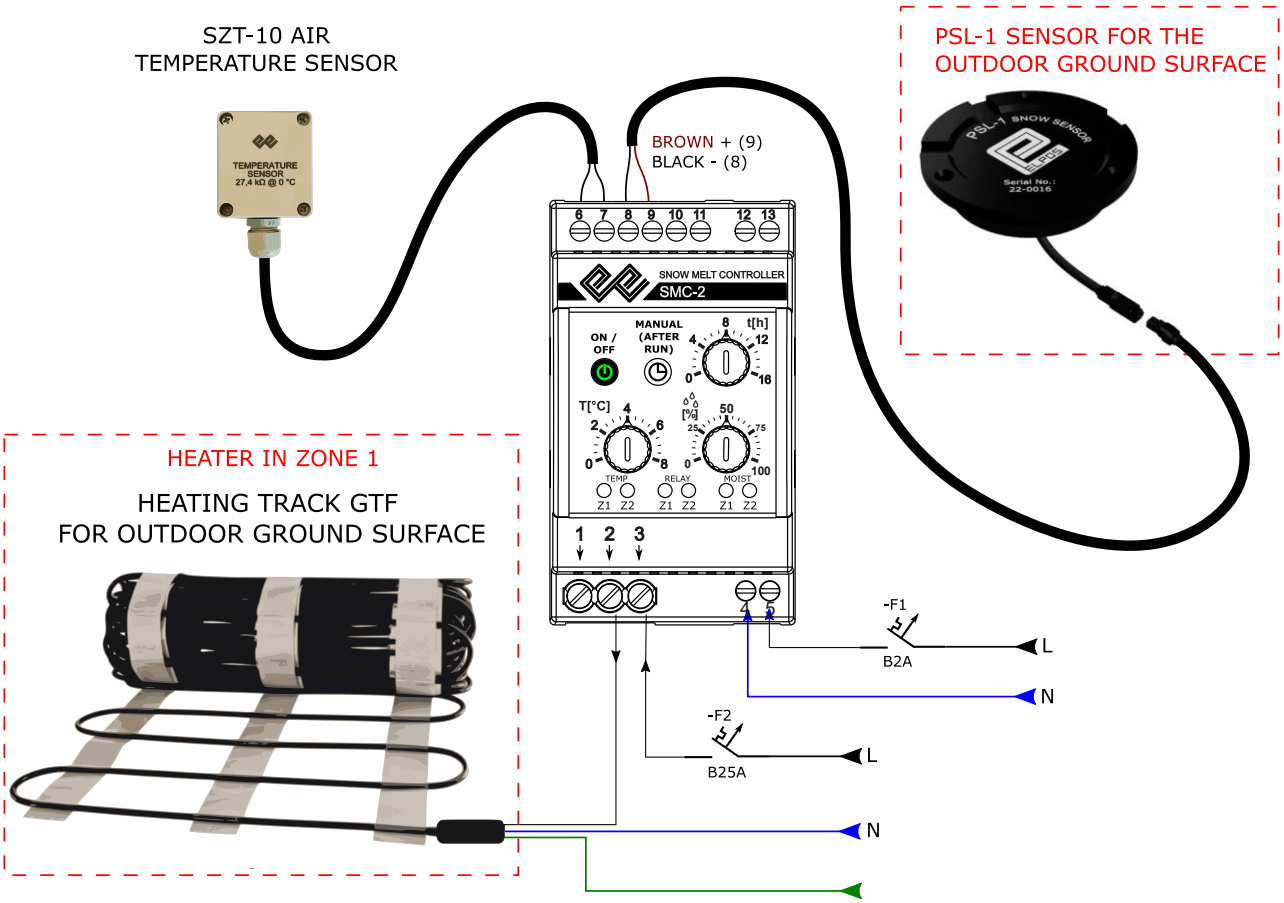
Although the snow and ice sensors SOV-5/PSL-1 measure the temperature in the gutter/ground, it is recommended to use a separate sensor for measuring air temperature. Practice shows that the temperature in the gutter or on the ground can significantly deviate from the air temperature. Using the SZT-10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

⚠ NOTE

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

2. Operating mode

The operating mode is described using a graphical representation of an outdoor surface heating system, e.g., a garage ramp, in which one smart PSL-1 sensor, an SZT-10 air temperature sensor, and an electric heating cable shaped into a GTF-type heating trace are used. The explanations in the following text also apply when using the smart SOV-5 sensor as a sensor.



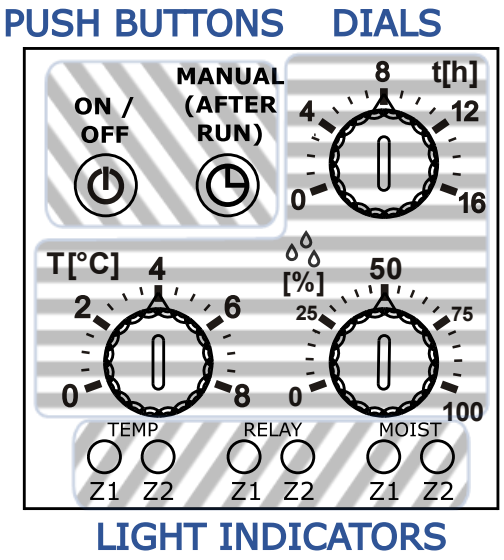
For the device to get a power supply, it is necessary to bring an AC voltage of 230V to pins 4 and 5 (voltage from 100V to 240V AC 50/60Hz).

The PSL-1 ground sensor is connected to terminals 8 and 9 (Black - 8, Brown + 9), which are assigned to Zone 1. The GTF heating trace is connected to the NO (normally open) contact of relay 1 (terminal 2), which is also assigned to Zone 1. The phase conductor, which will power the heating trace through an automatic circuit breaker of the appropriate value not exceeding 25A B characteristics, is connected to terminal 3.

The SZT-10 air temperature sensor is connected to terminals 6 and 7 (polarity is not important) and is used for the SMC-2 to accurately measure air temperature.

2.1 Control Panel Description

The control panel is divided into three groups consisting of two buttons, three dials, and six indicators.



The switches are used to turn the device on/off and to start/stop manual (MANUAL) or after-run (AFTER RUN) operation mode. The buttons light in green or red color, depending on the state of the device.

The dials are used to set the temperature below which the relay is allowed to turn on (temperature dial), for setting the percentage of sensor coverage by snow/ice/water (percentage dial), and for determining the duration of the after-run time (dial with a time scale in hours).

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

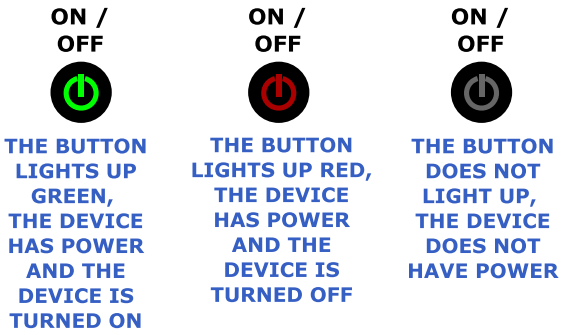
For example, if the TEMP Z1 indicator glows green, it means that the temperature in Zone 1 is lower than the temperature set on the temperature knob scale, i.e., the temperature condition is met. If the TEMP Z1 indicator is not lit, it means that the temperature in Zone 1 is higher than the set value,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

2.2 Turning on the device

After connecting the system according to the above example, it is necessary to enable power supply to the SMC-2 device by raising the fuse -F1 from the previous example.

When the SMC-2 receives power at terminals 4 and 5 within 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 brief buzzing sound will also be heard. The purpose of this procedure is to check whether all the light/sound indicators are functioning correctly.

After the light indicator check procedure is completed, the power button will light up in either green or red, 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 operation of the device is turned off. To enable the device's operation, press the button and hold it for 1 second.

After pressing the power button, the device will behave as if its power supply has been re-enabled, i.e., it will check the functionality of all light indicators, and then the power button will light up green.

2.3 Sensor recognition

After switching on, SMC-2 will begin checking how many PSL-1 and/or SOV-5 smart sensors are connected to the device, and to which zone these sensors are connected. The sensors are powered by the SMC-2 device (terminals 8 and 9, and 10 and 11), and the sensor supply voltage is 24V DC.

SMC-2 performs this recognition by first enabling power to the sensors connected to the Zone 1 terminals, which means that a 24V DC voltage will appear at terminals 8 and 9. During this time, power to the sensors connected to the Zone 2 terminals is not enabled (the voltage at terminals 10 and 11 will be 0V). To inform the user that the device is checking which sensors are connected to Zone 1, the power button will flash green twice per second (slow flashing).

⚠ NOTE

When the 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 flashing).

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

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

⚠ NOTE

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

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

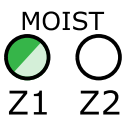
2.4 Notification of the number of sensors found

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 by flashing the MOIST Z1 indicator green as many times as the number of sensors found when it wants to inform the user how many sensors are connected to Zone 1.

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

⚠ NOTE

When the SMC-2 informs the user of the number of sensors found in Zone 1, the MOIST Z1 indicator flashes green as many times as the number of sensors found in Zone 1.



After that, the device will flash the MOIST Z2 indicator in green as many times as the number of sensors found in Zone 2.

⚠ NOTE

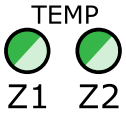
When the SMC-2 informs the user of the number of sensors found in Zone 2, the MOIST Z2 indicator flashes green as many times as the number of sensors found in Zone 2.

If the device did not find any sensors in Zone 2, the MOIST Z2 indicator will not flash at all.

Finally, the device will indicate whether it has found the SZT-10 air temperature sensor connected to terminals 6-7. If the SMC-2 has found the air temperature sensor, TEMP Z1 and Z2 indicators will simultaneously flash green.

⚠ NOTE

If the SMC-2 has detected that the user has connected the SZT-10 air temperature sensor to terminals 6 and 7, TEMP Z1 and Z2 indicators will flash green.



2.5 Operating settings and relay activation

After the process of finding all the sensors connected to the device, the SMC-2 will begin collecting data from the connected sensors and compare this data with the settings of the buttons on the front panel. For the SMC-2 to activate the heating, i.e., turn on 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 lower than the temperature set on the temperature scale dial T[°C]. This is called meeting the temperature condition.

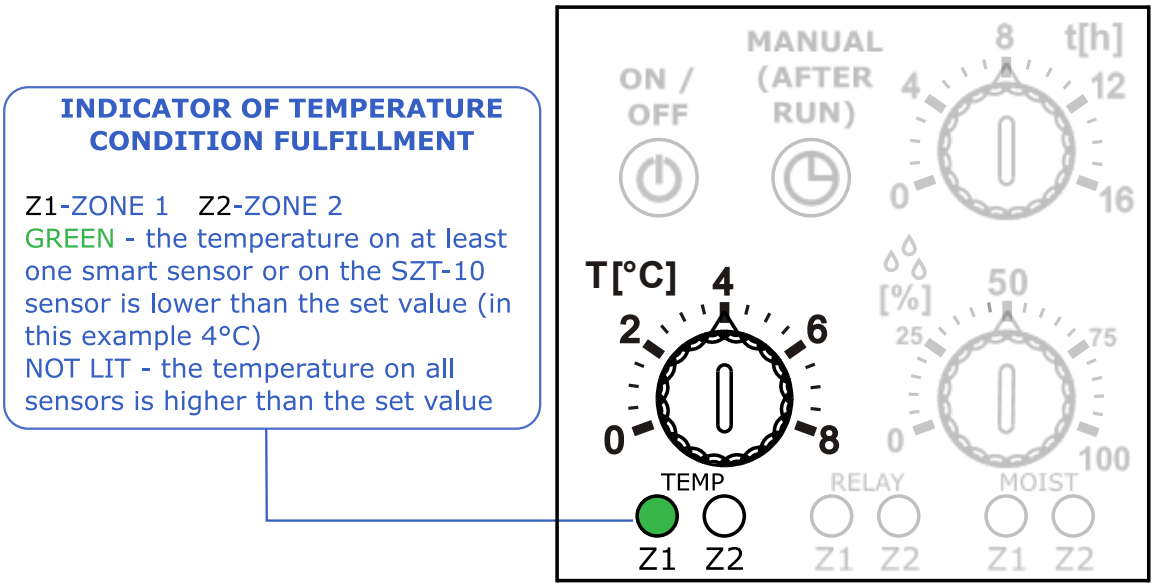
The second condition is that the percentage of sensor coverage with water, snow, or ice must be greater than the percentage set on the dial with the scale [%]. This is called meeting the moisture condition.

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

In the following text, the cases of how these conditions are met are described in more detail.

2.5.1 Temperature setting

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



In the example above, the temperature dial is set to 4°C. The TEMP Z1 indicator lights up green, meaning that at least one sensor in Zone 1 measures a temperature lower than 4°C.

Similarly, if the temperature on any sensor in Zone 2, including the air temperature sensor SZT-10, becomes lower than the set temperature, the green light indicator TEMP Z2 will turn on.

⚠ NOTE

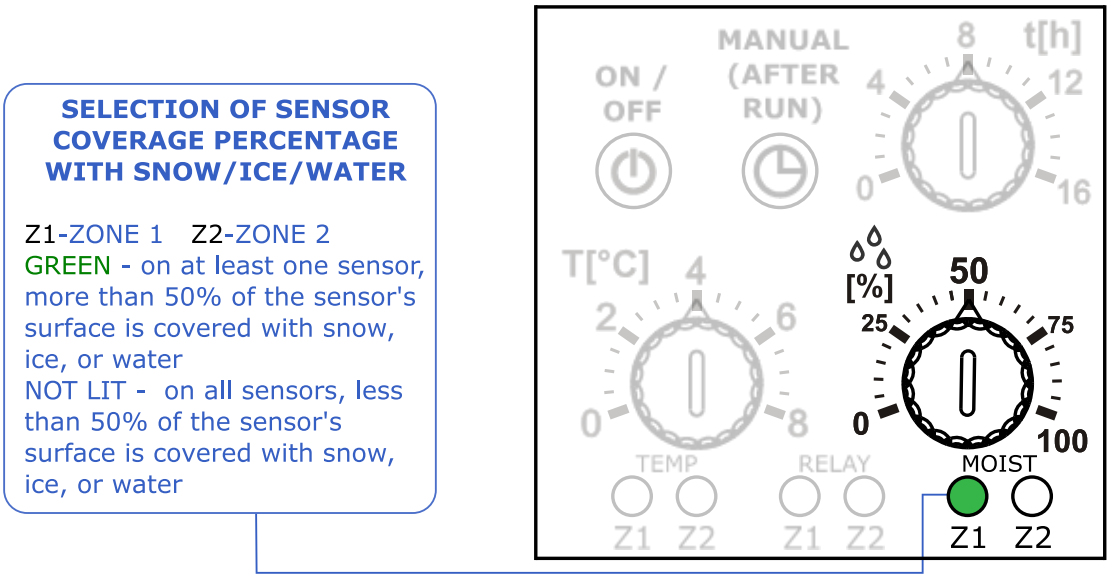
The air temperature data from the SZT-10 sensor is shared by both zones. This means that if the air temperature falls below the set value on the scale, both TEMP Z1 and Z2 indicators will light up green.

RECOMMENDATION

If the user wants to prevent snow accumulation, it is recommended to set the temperature condition between 3 and 6°C. If the goal is to prevent ice formation, the temperature setting should not be lower than 2°C. Settings below 2°C allow for additional energy savings but pose a risk of late reaction to snow and ice.

2.5.2 Snow/ice/water Coverage Setting

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



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

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

⚠ NOTE

If the percentage coverage dial setting is increased, more snow, ice, or water will be required on the sensors to satisfy the moisture condition. This means that increasing the percentage reduces the sensitivity of detection. If the user wants the SMC-2 to turn on the heating with small amounts of snow, they should decrease the value on the percentage button.

RECOMMENDATION

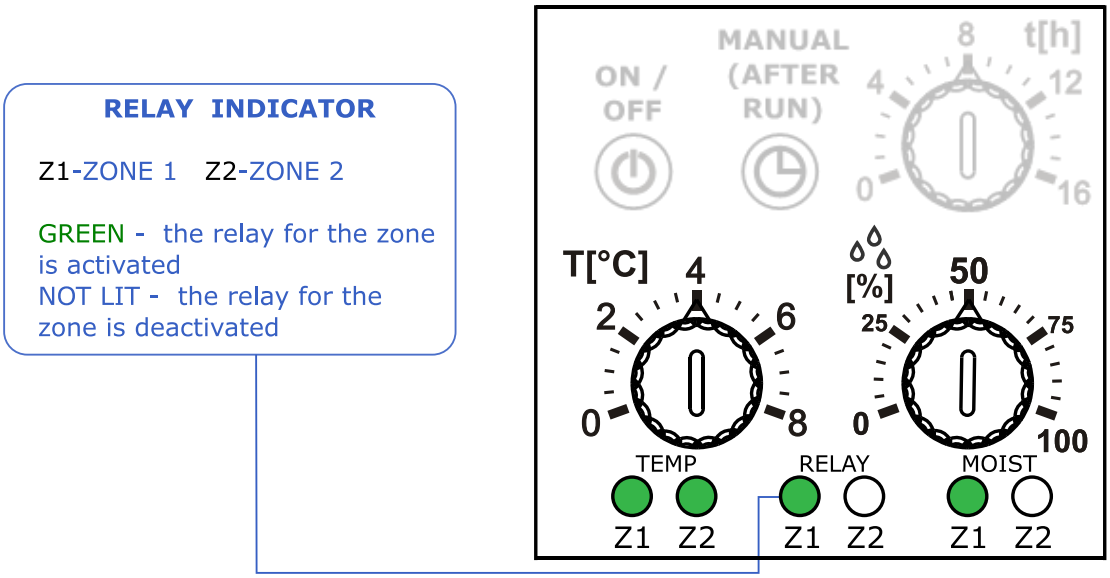
If the SMC-2 is used for gutter heating, it is recommended to set the percentage between 50% and 75%. If the device is used for heating outdoor surfaces, a setting between 25% and 50% is recommended.

⚠ NOTE

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

2.5.3 Activation of the zone relay

The zone relay will be activated when both the temperature and moisture conditions are met simultaneously in the zone.



For example, when both TEMP Z1 and MOIST Z1 indicators light up green, relay 1 of Zone 1 will be activated. The activation of the Zone 1 relay is indicated by the green color of the RELAY Z1 indicator.

In the example above, both conditions are met in Zone 1, and the zone 1 relay is activated. In Zone 2, only the temperature condition is met (TEMP Z2 indicator lights up green), but not the moisture condition (MOIST Z2 indicator is off), so the Zone 2 relay is not activated (RELAY Z2 is off).

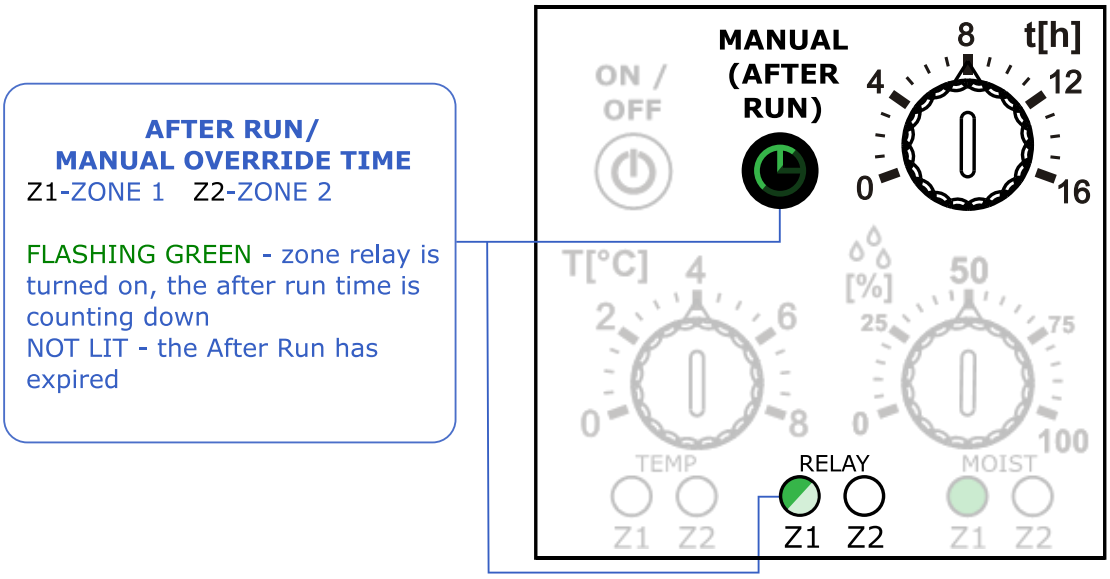
2.5.4 Time setting

In snow and ice melting systems, it is often necessary to heat the outdoor surface or gutter for some time after the sensors no longer have snow/ice/water or after the sensor temperature or air temperature increases above the set value.

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

This mode of operation is called the "AFTER RUN," and it is enabled using the button with the time setting.

The button is used to keep the zone relay activated for up to 16 hours after the temperature and moisture conditions are no longer met.



In the example above, the behavior of the indicators is shown when the temperature in Zone 1 rises above 4°C. When this happens, the TEMP Z1 indicator will stop lighting up, and the after-run time countdown will begin, even though the moisture condition is still met (MOIST Z1 indicator lights up green).

When the after-run time begins, SMC-2 starts counting the elapsed time since the temperature condition or the percentage of snow coverage was lost. To inform the user that the after-run time is active, the MANUAL (AFTER RUN) button and, in this example, the RELAY Z1 indicator blink green in the same rhythm.

RECOMMENDATION

Years of experience show that setting the after-run time shorter than 1 hour is not useful. The optimal setting is between 2 and 6 hours, depending on whether the user is heating a gutter (2 hours) or an outdoor surface, such as a garage entrance (6 hours).
In public facilities, such as above-ground public garages, where cars continuously bring in water or snow on their wheels and where subsequent freezing of water poses a safety issue, a setting of 12 to 16 hours is recommended.

⚠ NOTE

If the user does not want to use the after-run time option, the time dial should be set to 0. In this case, the device will turn off the zone relay as soon as the temperature or moisture condition is no longer met.

The after-run time can be interrupted in four ways:

- If the set after-run time has elapsed

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

- If the user reduces the after-run time setting while it is active

For example, if the after-run time has already been active for 2 hours and the after-run time setting is 6 hours. If the user reduces the time setting to less than 2 hours, the device will immediately stop the after-run time and turn off the zone relay(s).

- If the user presses the MANUAL (AFTER RUN) button during the after-run time

Pressing the button will interrupt (stop) the after-run time.

- If the temperature of all sensors within the zone rises above 12°C

If all sensors within the zone, including the PSL-1 and SOV-5 smart sensors and the SZT-10 air temperature sensor, measure a temperature above 12°C, the device will automatically stop the after-run time and turn off the zone relay.

- If all smart sensors connected to the zone and the air temperature sensor fail during the after-run time

If all sensors stop working, the device will not know the current temperature. The device will therefore stop the after-run time and turn off the zone relay to protect the heating cables from potential burnout.

2.6 Manual Activation

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

By pressing the button, the after-run time countdown is forcibly started, and the relays in both zones are automatically activated. The further behavior of the device is identical to that described in section 2.5.4 Time setting.

RECOMMENDATION

Manual activation is useful when the user wants to shorten the response time of the external heating system. For example, when precipitation (snow or freezing rain) is forecasted, the user can manually activate the heating to preheat the ground. This completely prevents the accumulation of even the smallest amounts of snow or ice.

2.7 Main Zone and Auxiliary Zone

Although the SMC-2 supports heating control in two zones, it is common for users to need heating in only one zone. In these cases, the sensors are connected only to one zone, for example, the user connects two PSL-1 sensors to terminals 8 and 9 (Zone 1), while there are no connected sensors to terminals 10 and 11 (Zone 2).

When the device (after powering on) detects that there are no smart sensors connected in one of the zones, the zone without smart sensors becomes the auxiliary or SLAVE zone, and the zone with the smart sensors becomes the main or MASTER zone.

For example, if one or more PSL-1 sensors are connected to Zone 1 and there are no sensors in Zone 2, then Zone 1 will be the main (MASTER) zone and Zone 2 will be the auxiliary (SLAVE) zone.

The behavior of the auxiliary zone relay is different in that the auxiliary (SLAVE) zone relay will follow the operation of the main (MASTER) zone relay. For example, when the main zone relay is activated, the auxiliary zone relay will also be activated, and vice versa. When the main zone relay is deactivated, the auxiliary zone relay will also be deactivated.

RECOMMENDATION

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

RECOMMENDATION

When connecting sensors to only one zone, it is recommended to connect them to Zone 1. The reason for this is the higher breaking capacity of the Zone 1 relay (25A). In this case, Zone 2 will become the auxiliary zone, and the Zone 2 relay will follow the operation of the Zone 1 relay.

3. Errors

During operation, the SMC-2 monitors the state of the sensors connected to the device. If the device detects that one or more sensors have stopped communicating, the SMC-2 will treat this event as an error and inform the user by changing the status of the indicators. The types of errors and ways to eliminate them are described below.

On/Off button flashing orange

MEANING At least one of the connected sensors has stopped working

DESCRIPTION

The device has detected one of the following events:

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

NOTE

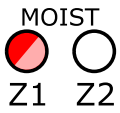
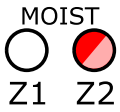
This error occurs when the SMC-2 notices that the sensors detected when the device was turned on are no longer connected. For example, this error will occur if the user disconnects any sensor (SZT-10, PSL-1, SOV-5) during operation.

If only one smart sensor is connected to the Zone, for example, one PSL-1 is connected to Zone 1 and/or one SOV-5 is connected to Zone 2, then this error means that there is a malfunction in the SZT-10 sensor.

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

WHAT TO DO

1. Check 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. Turn off the device using the ON/OFF button.
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 the SMC-2 successfully detected the sensor (see 2.4 Notification of the number of sensors found), then the sensor is working correctly. The sensor can be disconnected, and the next sensor can be connected to the device and step 4 can be repeated.
   b. If the SMC-2 did not detect the sensor, then the sensor is faulty.
5. Connect the working sensors to the device and turn it on.
6. Check the faulty sensor (see 3.1. Sensor check)

	MOIST Z1 Indicator flashing red
	MOIST Z2 Indicator flashing red
MEANING	All smart sensors in the Zone whose MOIST indicator is flashing have stopped working

DESCRIPTION

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

NOTE

If the air temperature sensor (SZT-10) is connected to the SMC-2, the SMC-2 will still control the heating process in the problematic zone, but only by temperature. This means that the SMC-2 will activate the output relay of the zone where the smart sensors are malfunctioning when the air temperature becomes lower than the set temperature (see 2.5.1 Temperature setting).

If the air temperature sensor (SZT-10) is not connected to the device, the device cannot control the heating process, which means that there is a danger of freezing gutters or outdoor surfaces. The device draws attention to this danger by activating an audible signal.

WHAT TO DO

1. Turn off the device and disconnect all sensors from the problematic zone.
2. Measure the resistance of each sensor separately (see 3.1. Sensor check).
3. Check if there is a break in the cable between the controller and the sensor.
4. If necessary, replace the faulty sensor
5. Turn on the device so that it detects which sensors are connected again.

On/Off button flashing red

MEANING All sensors connected to the Zone have stopped working

DESCRIPTION

The device has 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.

NOTE

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

Under these conditions, the SMC-2 can no longer control the heating process, which means that there is a danger of freezing gutters or outdoor surfaces. The device draws attention to this danger by activating an audible signal. When the error occurs, the device cannot continue to operate until at least one working sensor (SZT-10 or one of the smart sensors PSL-1/SOV-5) is connected to the device.

WHAT TO DO

1. Turn off the device using the ON/OFF button.
2. Disconnect all sensors from the device.
3. All sensors must be checked (see 3.1. Sensor check)

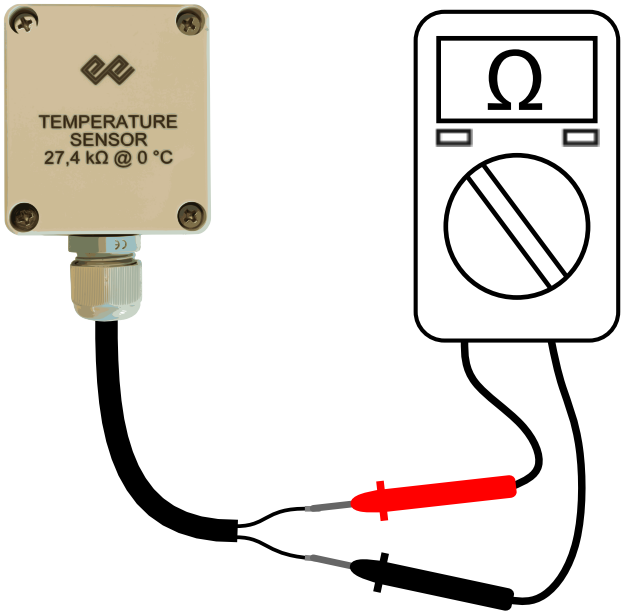
3.1 Sensor check

If an error is detected on a sensor during operation, the problematic sensor must be disconnected and its condition checked. The following text describes in more detail how to check the correctness of the SZT-10 sensor and PSL-1/SOV-5 sensors.

3.1.1 SZT-10 sensor check

The SZT-10 air temperature sensor consists of an NTC resistor with a resistance of 10kΩ at 25°C.

The correctness of the SZT-10 sensor is checked by measuring the current electrical resistance with an Ohmmeter. During the measurement, polarity does not need to be considered.



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

R-T characteristic of the 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% of the nominal or by more than 1kΩ, the SZT-10 sensor is faulty and needs to be replaced.

⚠ NOTE

Long-term experience has shown that NTC temperature sensor failures are very rare and that failures most often involve cable breakage or short-circuiting of wires in the cable connecting the SMC-2 and SZT-10.

If the resistance measurement of the SZT-10 shows that the resistance is very low, e.g. a few Ω, or very high, e.g. a few MΩ, it is almost certainly a cable fault.

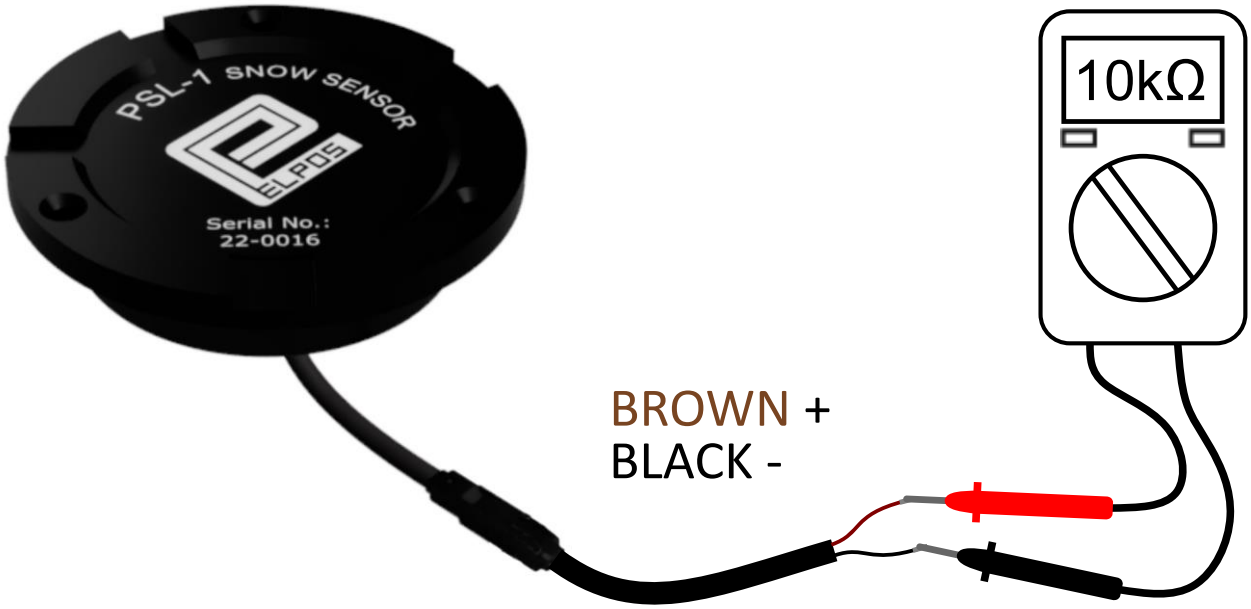
After determining the correctness of the SZT-10 sensor or replacing it, it is necessary to connect it to the SMC-2 regulator. The regulator must then be turned off and on again for the SMC-2 to attempt to recognize the newly connected SZT-10 (see 2.3 Sensor Recognition).

3.1.2 Checking PSL-1/SOV-5 sensors

⚠ NOTE

Smart sensors PSL-1 and SOV-5 are checked the same way as the SZT-10 sensor. The following text describes the verification of the PSL-1 sensor, but the same procedure applies to SOV-5 sensors as well.

To check the validity of smart sensors PSL-1 or SOV-5, it is necessary to measure the electrical resistance of the sensor while respecting polarity.



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

⚠ NOTE

If the value of the measured resistance is below 4kΩ, it is possible that the sensor wire polarity is reversed.

If there is a mechanical failure within the sensor or a cable break, the measured resistance will significantly deviate from 10kΩ.

⚠ NOTE

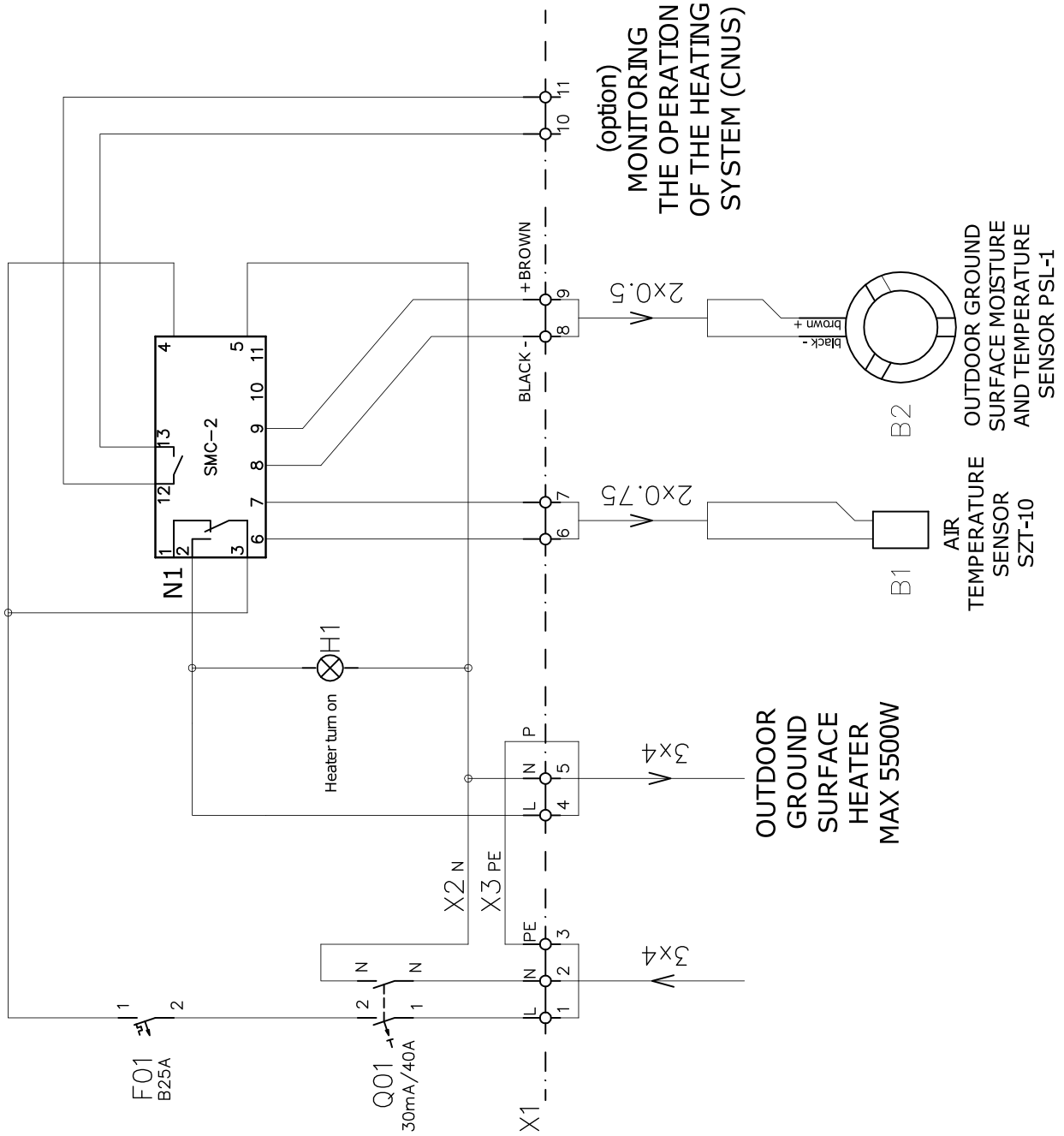
If the value of the measured resistance is below 20-50Ω or above 1MΩ, it is very likely that there is a fault in the connecting cable. If this fault is confirmed, the connecting cable needs to be replaced, and there is no need to change the sensor.

If the cable's validity is confirmed, and the measured resistance is still not 10kΩ, the sensor needs to be replaced. After replacement, the sensor needs to be connected to the SMC-2 regulator. The regulator must then be turned off and on again for the SMC-2 to recognize the newly connected sensor (see 2.3 Sensor Recognition)

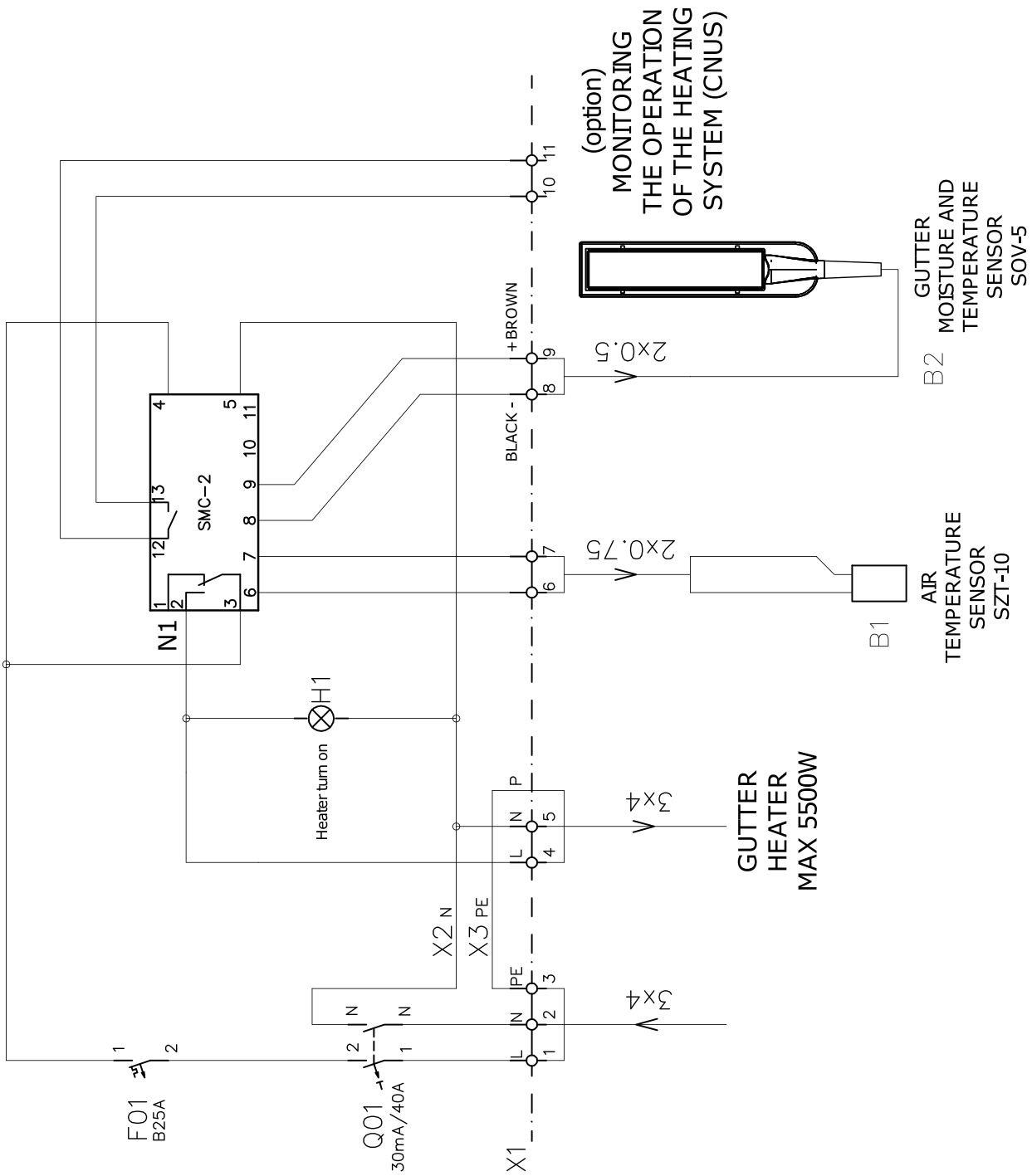
4. Installer instructions

The following sections show electrical schemes of the most common heating system configurations controlled by the SMC-2 regulator.

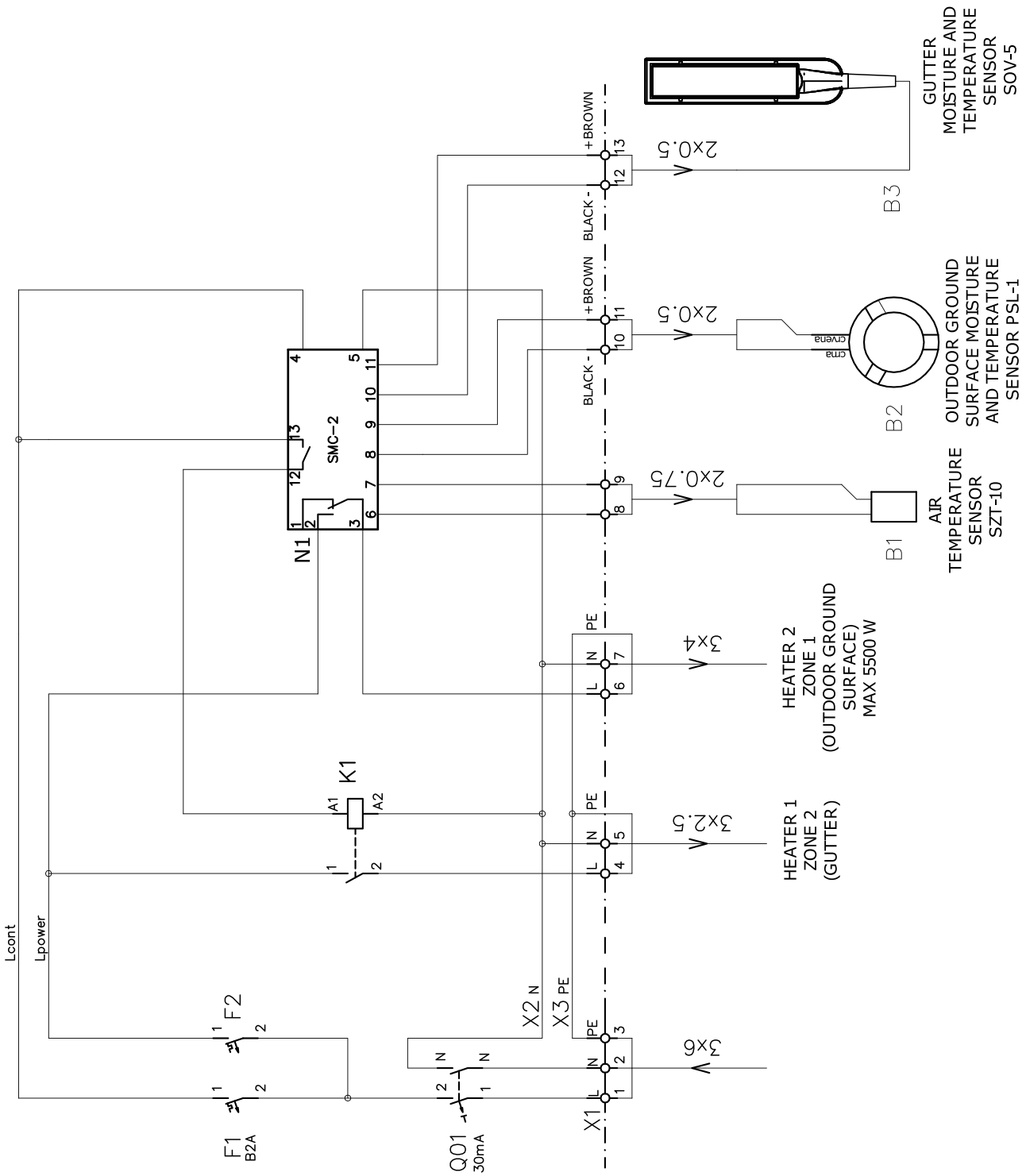
4.1 Electrical scheme for outdoor floor heating



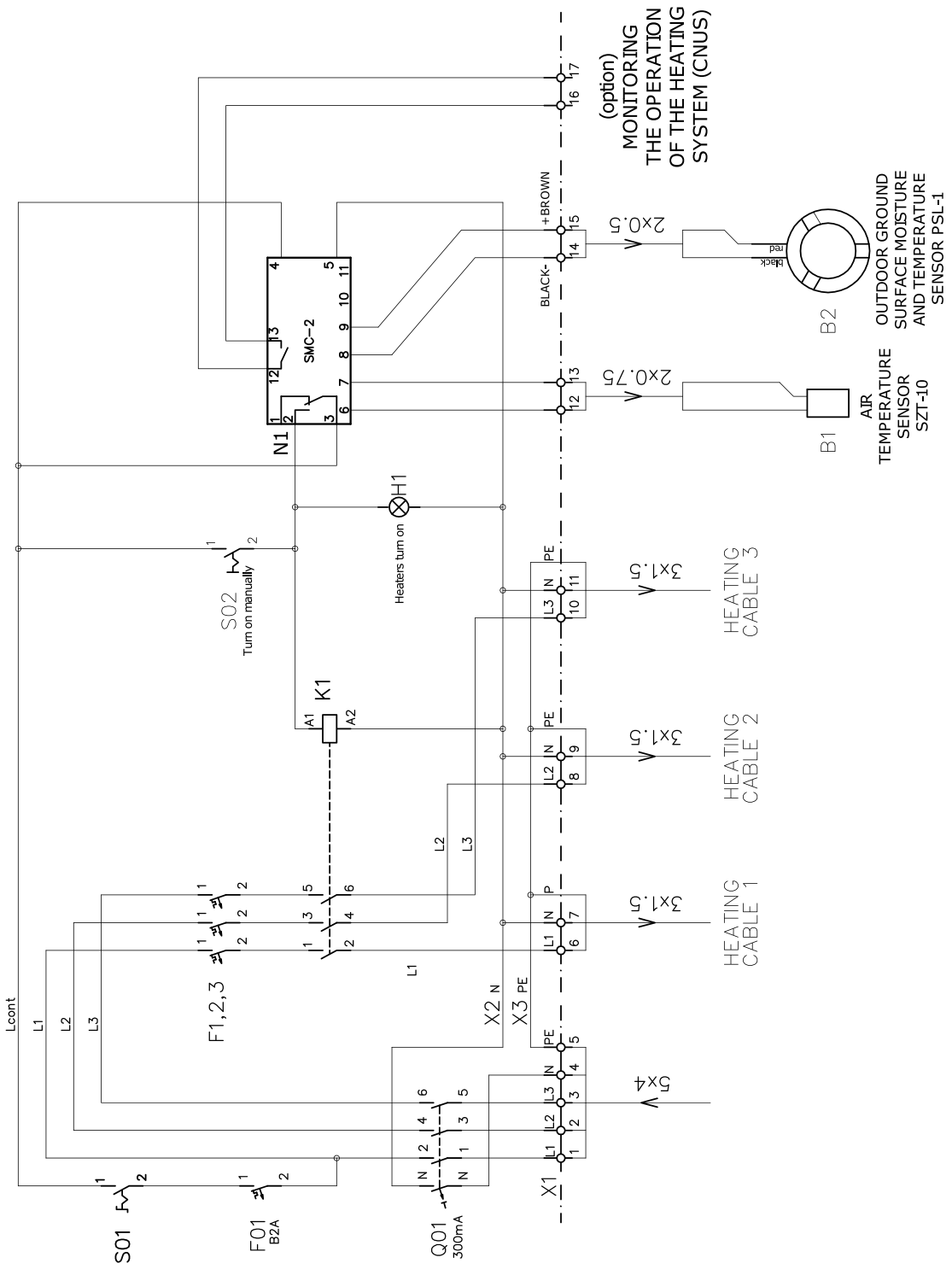
4.2 Electric scheme for gutter heating



4.3 Electrical scheme for dual-zone outdoor floor and gutter heating



4.4 Electrical scheme for three-phase heating cables



5. Basic technical data

Parametar	Value / Description
Name	SMC-2
Functionality	Snow melt controller
Mounting method	DIN rail 35 mm (according to EN 60715) or mounting on a plate
Power supply voltage	from ~ 100 V to ~ 240 V, 50 Hz / 60 Hz
Power supply terminals	4 (L) - 5 (N)
Own consumption	< 15 W
Output of Zone 1	Relay SPDT (Normally open, Normally closed)
Current switching capacity of Zone 1 relay	25 A continuous (40A instantaneous), ~250 V / cosφ ≥ 0.8
Output Zone 2	Relay (working contact)
Current switching capacity of Zone 2 relay	8 A continuous (20A instantaneous), ~250 V / cosφ ≥ 0.8
Cross-section of wires of relay terminals	Zone 1 ≤ 4 mm^2 Zone 2 ≤ 2.5 mm^2
Cross-section of wires of power supply terminals	≤ 1,5 mm^2
Sensor terminals Zone 1	8 (BUS-) , 9 (BUS+)
Sensor terminals Zone 2	10 (BUS-) , 11 (BUS+)
Air temperature sensor	SZT-10 sensor (NTC 10kΩ /B3435) terminals 6 – 7
Snow and ice sensors	**SOV-5 gutter sensor** **PSL-1 outdoor floor sensor**
Number of sensors	3 sensors per zone
Permissible ambient temperature	from -20 °C to +55 °C

Degree of protection	IP 40 control panel IP 20 terminals
Overvoltage category	III
Pollution degree	2
Dimension	D= 90,6 mm, W= 52,4 mm, H= 62,1 mm (3 DIN modules)
Weight	300 g
Standard	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 Certificate

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