

## Ice and Snow Detector 1873-ESM, Single Unit Configuration

### Installation and Adjustment Instructions



## Content

<b>Overview</b> .....	<b>4</b>
<b>Terms and functions</b> .....	<b>6</b>
<b>Installation and commissioning</b> .....	<b>10</b>
Connection diagram .....	11
Required settings.....	12
Further basic settings .....	12
<b>User interface</b> .....	<b>14</b>
<b>Settings</b> .....	<b>21</b>
<b>Troubleshooting</b> .....	<b>31</b>
<b>Technical data</b> .....	<b>37</b>
<b>Available accessories</b> .....	<b>40</b>

## Important note:

This documentation only contains information related to the Ice and Snow Detector 1873 in the “Single Unit” configuration.

For the “System” and “Multi Channel” configurations, refer to the complete documentation “Ice and Snow Detector 1873-ESM and 1875-ESM” (ME-1873~5-ESM-EN).



## Safety instructions

Always observe the attached safety instructions and the general regulations for electrical installation during installation and operation of the device!

## Scope of delivery



Ice and Snow Detector  
1873-ESM



Installation and Adjustment In-  
structions:  
Ice and Snow Detector 1873,  
Single Unit Configuration



Safety instructions



tekmar pencil  
(Rubber end can be used to operate  
the touch display)

## Overview

Tekmar ice detection systems use their combi sensors to measure temperature and moisture in heated outdoor areas such as open spaces, roofs and gutters. This means that they operate in a particularly energy-efficient way, since the heating is only switched on when it is cold or if there is water, ice or snow.

The 73 ice detection system is an all-round system wherever it is necessary to keep an area free of ice and snow: It is flexible, maintenance-free and inexpensive. It can be modularly extended to form a multi-channel system and can be used in a cloud environment or in building management systems.

All system 73 control devices are easy to install and commission. They are characterised by intelligent factory settings and a straightforward commissioning function. The sensors and the control units can be freely combined so that the system can be optimally adapted to the operating conditions. All control units are designed for one combi sensor and one heating circuit.

### Ice and Snow Detector 1873-ESM

The Ice and Snow Detector 1873 is a single-channel device that can be used for all applications in the field of ice and snow detection.

It is operated and adjusted via an illuminated touch graphic display, which is also used to set the parameters of all the other devices in a system. A three-level password protection is available for the multi-lingual menu.

A comprehensive alarm management checks both the internal device functions and those of the connected sensors. Furthermore, the function of the heating relay and a downstream contactor can be monitored.

### Sensors

The System 73 sensors use a measuring principle based on the thermal capacity of the sensor surface and the water on it, possibly in the form of ice or snow. This measuring principle was developed by tekmar and has already proven itself over many years. Only one sensor is required to measure moisture and temperature, making installation very simple and cost-effective.

System 73 offers two types of sensors: The 3356 sensor is ideally suited for installation in open spaces such as roads, walkways or staircases. The 3354 sensor can be mounted, for example, in gutters and on roof surfaces thanks to its design

with axial cable connection. Both sensors are characterised by a compact and robust design, which is achieved by the casing made of high-quality, corrosion-resistant brass and the microbe-proof, longitudinally watertight cable.

The sensors can be used for a wide variety of requirements due to the comprehensive range of accessories for their installation and mounting. This also optimises installation and maintenance costs.

### Documentation

Other relevant documentation:

- Safety instructions
- I-187x-ESM-Sensor-EN, summarised extract from M-MES-Sensorik (Installation instructions for sensors of the T, TF-E und TF-S systems, available in German only)

## Terms and functions

### Ice detection channel

An ice detection channel is a unit consisting of a heating circuit with its output relay, a combi sensor and the associated evaluation logic.

Functions of an ice detection channel:

- control and monitoring of one sensor and one heating circuit
- continuous temperature monitoring in the heated area
- activation of the moisture measurement if the temperature falls below the activation temperature
- start of the minimum heating time if the moisture threshold is exceeded on the sensor (alternatively triggered by an external signal at the control input)
- deactivation of the heating if the temperature falls below the switch-off temperature (lower temperature limit)
- monitoring of the heating circuit output for interruptions in the heating circuit and internal faults of the relay

### Operating mode

The basic operation of an ice detection channel can be selected via the operating mode.

#### Temp. → Moisture

This is the normal operating mode of an ice detection channel. In this mode the temperature must first fall below the activation point, and a sufficiently high moisture measurement then activates the heating circuit.

#### Temperature



In the temperature mode, only the temperature is measured but not the moisture. The heating will be active if the temperature of the heating area is below the activation temperature.

#### Emergency mode



In addition to the automatic activation of the emergency mode, it can also be activated manually in the event of malfunctions around the system. Also refer to the explanations under "Emergency mode" on page 8.

#### Off

The ice detection channel is switched off.

### **Activation temperature (upper temperature limit)**

If the temperature of the combi sensor - and thus of the heated area - falls below the defined activation temperature, the moisture measurement will be activated and, if necessary, the heating circuit will be switched on. If the temperature rises above the activation temperature, an activated heating circuit will be switched off and the moisture measurement will be deactivated.

### **Moisture threshold**

The moisture threshold can be used to adjust the sensor's sensitivity with regard to the detection of water, ice or snow on the sensor. The moisture threshold can be set within a range of 0.5 to 9.5. Low values mean high sensitivity.

The basic setting for the moisture threshold should be 1 to 2 points above the dry value indicated on the sensor. If no information is available on the sensor, a test measurement can be triggered via the menu when the sensor is dry and the determined value can be used as the dry value.

If the system switches the heating system on too early, i.e. if there is very little moisture or the sensor

is dry, the moisture threshold should be increased. If the system switches on the heating system too late, the moisture threshold should be reduced.



Note: If the moisture threshold is too low, the heating system may be permanently activated during times when the temperature is below the activation temperature. This can lead to an increased energy consumption. In general: the lower the moisture threshold, the higher the energy consumption.

### **Moisture measurement**

Below the activation temperature, the moisture measurement is repeated at regular intervals until a moisture value above the moisture threshold is detected or until the activation temperature is exceeded again. If moisture is detected, the heating circuit switches on for the minimum heating time and the moisture measurement is suspended. Only after the minimum heating time has elapsed is the moisture determined again at regular intervals. Depending on the result of the moisture measurement, the heating circuit remains switched on or is deactivated.

## Terms and functions

The system automatically optimises the duration of a measuring cycle depending on the sensor type and temperature.

### **Switch-off temperature (lower temperature limit)**

In addition to the activation temperature, there is also a lower temperature limit (the switch-off temperature), below which the moisture measurement and, if necessary, the heating are deactivated again.

At very low outside temperatures, dripping condensation no longer occurs in roof areas and snowfall is no longer to be expected in open spaces. (If snow falls, it will be dry, light and not slippery. Since in this case the heating capacity is often not sufficient to completely defrost the surface and it would only be partially thawed instead, the risk of slipperiness would be rather increased by switching on the heating system.)

### **Minimum heating time**

If moisture above the moisture threshold is detected after the temperature has fallen below the activation temperature, the minimum heating time starts, which ensures that the heated area is definitely de-

frosted. During the minimum heating time, no further moisture measurement takes place.

An external button on input A, which is switched to L, can be used to manually activate the defined minimum heating time. When the button is pressed once, the heating is switched on for the duration of the minimum heating time.

### **Follow up time**

After the monitored area has thawed and dried with the help of the heating, i.e. when the combi sensor no longer detects moisture, a follow up time can be activated. In the event that the combi sensor cannot be optimally positioned, the follow up time can be used to ensure that any ice and snow residues are also defrosted, e.g. in shaded areas.

### **Emergency mode**

In the emergency mode the heating circuit output is activated with a PWM (pulse width modulation) behaviour (adjustable interval time and duty cycle). The emergency mode can either be activated manually via the operating mode or automatically if there is a temperature error in the combi sensor.



In case of an error in the combi sensor additionally an alarm will be triggered. If only the moisture unit is affected by the sensor error, the emergency mode will only be activated if the temperature is below the activation temperature. If the temperature unit is also defective, the emergency mode will be activated independently of the outdoor temperature, but only if this has been explicitly enabled in the menu.



Note: The emergency mode should only be activated if the alarm can be registered centrally. An unnoticed emergency mode can possibly lead to extreme energy consumption.

### Heating circuit monitoring

The heating circuit connected to the heating circuit relay is monitored for interruptions and the heating relay itself for malfunctions. The heating circuit is monitored when switched off. An interruption of the circuit results in an alarm message.

Note 1: When using a contactor to increase the switching capacity, only the contactor is monitored, not the heating circuit connected to it.

Note 2: The switching output for relay R1/R2 must be operated at 230 V to detect a switching output error. When using a lower voltage (e.g. 24 V DC),

this function is not guaranteed and an error message may occur.

### Alarm management

The alarm management of the 1873 monitors the sensor and heating circuit output for fault conditions. A detected error is reported via the display and the alarm relay.

Functions of alarm management:

- monitoring of the ice and snow detector, the sensor and the heating circuit output
- adjustable alarm delay
- forwarding of an alarm via the alarm relay

### Alarm relay

The alarm relay is designed as a change-over contact and can therefore be used for both open-circuit and closed-circuit alarm circuits. By inverting the alarm relay in the menu, a power failure can also be reported (alarm inverted and signal loop via the normally open/change-over contact).

Due to its insulation, the alarm relay can be used for both mains voltage and SELV circuits.

## Installation and commissioning

### Proper use



The device must only be used for the control of electric and water-operated heating systems. It has to be installed in an electric distributor (fuse box or control cabinet) and connected to the existing heating system. When doing so, it is absolutely necessary to observe all Technical data. Any different or improper use of the device may cause defects in the device and/or life-threatening states and situations. Additionally all guarantee claims are forfeited in such a case.

**For the use of the unit, an on-site fuse protection by means of (a) miniature circuit breaker(s) is mandatory. No additional fuse protection is required for the alarm relay if it is connected to a low voltage of up to 30 V maximum. Parameters for fuse protection can be found in the technical data.**

### Installation procedure



Only qualified personnel (electrician or similar qualification) may install the device. The relevant engineering practices and the enclosed safety instructions must be observed!

Disconnect the control cabinet before installation.

Mount the device on a 35 mm mounting rail in a subdistribution unit or another adequate housing. Wire it according to the following illustration.

Protection against contact according to protection class II is guaranteed by the following measures:

Installation in small distribution board according to DIN 57603/VDE 0603 (e.g. distributor of the N-system)

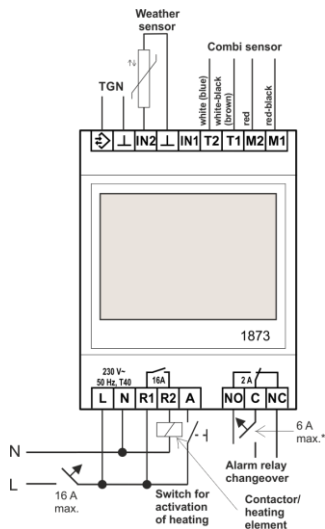
or

DIN 57659/VDE 0659

The regulations according to VDE 0100 must be observed!

### Connection diagram

#### 1873-ESM



\* not required if used with 30 VDC max.

#### Note:

The “TGN” and “Weather sensor” connections are not used if the 1873 is operated as a Single Unit.

In the “System” and “Multi Channel” configurations the TGN bus is used to connect the 1873 with the other devices in the system. The weather sensor is used to gather information on the outside temperature for the base temperature and the pre-heating modes.

For further information, refer to the complete documentation for the 1873-ESM and 1875-ESM (ME-1873~5-ESM-EN).

## Installation and commissioning

### Required settings

When the device is started for the first time, a start screen is displayed in which the menu language must be selected. The default language is German, which must be confirmed or changed.

Menu → Installer → Startup →

During initial startup, all parameters under the menu item mentioned above must be set. These are:

#### Application

The application must be set to “Single Unit”. For information about the “System” and “Multi Channel” applications, refer to the complete documentation for the 1873-ESM and 1875-ESM.

#### Sensor type (Single Unit, System)

The factory setting for the sensor type is “to be defined”. Select the sensor type according to the connected sensor. For further information see page 25.

### Further basic settings

#### Moisture threshold

Menu → Installer →

It should be checked whether the factory-set moisture threshold matches the sensor used and its environment. If no dry value is indicated on the sensor, it can be determined with the help of a test measurement:

1. The sensor must be dry.
2. Start a test measurement.  
Service → ISD channel →  
Start moisture measurement?
3. Add 1.0 to 2.0 to the determined moisture value depending on the desired sensitivity and set this value as the moisture threshold.  
Config. modules → Moisture threshold

Also refer to **Moisture threshold**, page 7.

#### Minimum heating time

Operation

Adjustment of the minimum heating time for the ice detector or the selected ice detection channel. Also refer to **Minimum heating time**, page 8.

### Upper temperature limit

Operation

Adjustment of the upper temperature limit valid for the ice detector or the selected ice detection channel. Also refer to **Activation temperature**, page 7.

### Password protection

Menu → Information → Set passwords

If required, password protection can be set for different menu levels. For further information refer to page 30.

### Idle display



<b>Ready</b>	
<b>Temperat.</b>	<b>8°C</b>
<b>Moisture</b>	<b>0,0</b>
<b>HeatTime</b>	<b>0min</b>
<b>Error</b>	<b>0000</b>
<b>1873-1SD</b>	<b>Menü</b>

- line 1: channel state
- line 2: temperature
- line 3: moisture value
- line 4: remaining heating time
- line 5: error code
- line 6: device type, menu button

## Installation and commissioning

### Connection of a downstream building control system

It is intended to connect the heating circuit to a load contactor or directly to the relay output of the ice and snow detector. If, however, it is connected to a relay interface module, a reliable function cannot be guaranteed. This unintended application does not always work reliably.

tekmar has, with no obligation, developed and tested a solution for a correct function, also in connection with a recommended relay interface module for connection to a building management system:

When using relay interface modules with the 1873-ESM ice and snow detector, a malfunction of the heating circuit monitoring can occur under certain circumstances due to the design. This leads to a faulty evaluation of the heating circuit or a malfunction of the connected relay interface modules. The faulty evaluation can result in an unintentional alarm. However, it would be more serious if the heating circuit(s) were unintentionally activated, which would lead to increased power consumption.

This kind of relay is normally only used in case of a downstream building management system.

For the recommended relay interface modules, proper function is only ensured if a base load ele-

ment is connected in parallel with the relay interface module. In addition, the heating circuit monitoring function (**menu item Monitoring heating output active**) of all channels with a connected relay interface module must be deactivated in this case.

### Recommended components:

Relay interface module		
Manufacturer	Article	Type
Finder	38.51 230V (Series 38)	1 x 6 A
Finder	48.52 230V (Series 48)	2 x 8 A
Finder	49.72 230V (Series 49)	2 x 8 A
Base load device		
Eltako	EAN 4010312900970	



## User interface

### Touch display with softkey buttons

The touch display of the 1873 may be operated by using up to four softkeys at the bottom of the screen, pressing them either with the finger or the rubber end of a pencil. The rest of the display does not have a touch function. The following table shows the possible functions of the softkeys.

After pressing the *Menu* button several menu items are available.

The plus and minus buttons (+ and -) as well as the arrow keys (> and <) have an auto-repeat function in case the buttons are pressed for a longer time.

If the menu does not receive an answer to a data request, the display will show the character string "~~~" (3x tilde) instead of the parameter value.

When the device is taken into use for the first time, the menu language (e.g. German or English) needs to be selected. For further information refer to page 24.

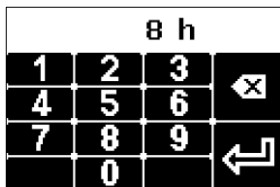
Menu	launch menu
>>	next menu level
<<	one menu level back
>	next (to select one of several parameters)
<	back (to select one of several parameters)
↓	one line down
↑	one line up
+	increase value
-	decrease value
Chng	change
OK	confirm
Esc	escape
Add	add entry
Del	delete entry
Edit	edit entry
Act	activate entry
0..9	numeric keypad
⊗	delete character (numeric keypad)
↵	confirm entry (numeric keypad)



### Menu structure

The individual menu items are explained in detail in the chapters *Settings* and *Operation*. The menu items under *Menu* → *Installer* are reserved for the qualified installation technician. Some settings appear under several menu items because this will save time jumping back and forth in different menu levels during installation. The menu items under *Installer* → *Startup* can, for example, also be found under *Installer* → *Config. modules*.

### Numeric keypad



Several values can be entered via a numeric keypad. In this case the display's touch function is extended to all keys of the numeric keypad.

## User interface

### Menu

Level 1	Level 2	Level 3	Level 4	Page	
Operation	Operating mode			21	
	Upper temperature limit			21	
	Moisture threshold			21	
	Minimum heating time			22	
	Start minimum heating time?			22	
Information	Channel state			22	
	Temperature moisture area			22	
	Last moisture measurement			23	
	Remaining heating time			23	
	Operating time			23	
	Energy consumption			23	
	Device data	Serial number			23
		Version			24
	Set passwords	Set level 1		Set password for level 1	24
		Set level 2		Set password for level 2	
Set level 3			Set password for level 3		
Setup	Language			24	
	Display	Contrast		24	
		Brightness menu		24	
		Brightness idle		24	

Installer	Startup	Application		25	
		Sensor type		25	
	Information	Channel state		22	
		Error code		25	
		Temperature heating area		22	
		Last moisture measurement		23	
		Remaining heating time		23	
		Remaining inhibition time moisture		25	
		Operating time		23	
		Operating time total		26	
		Energy consumption		23	
		Energy consumption total		26	
		Device data	Serial number		23
			Version		24
	Config. modules	Operating mode		21	
		Sensor type		25	
		Upper temperature limit		21	
		Lower temperature limit		27	
		Moisture threshold		21	
		Minimum heating time		22	
		Follow up time		27	
		Heating output		27	

## User interface

		PWM interval time		27	
		Emergency duty cycle		28	
		Alarm delay		26	
		Alarm relay inverted		26	
		Emergency mode with error temperature		28	
		Blocking protection active		28	
		Operating time: Reset counters		28	
	Service	ISD channel	Start minimum heating time?		22
			Stop heating?		29
			Start moisture measurement?		29
			Sensor temperature		29
			Last moisture measurement		23
			Remaining inhibition time moisture		25
			Restart		29
		Factory settings		29	

## Settings

### Operating mode

Operation | Installer → Config. modules

Adjustment of the operating mode for the ice detector or the selected ice detection channel.

For further information on the operating modes, also refer to **Operating mode**, page 6.

Factory setting: Temp.→Moisture,

possible settings: Off, Temp.→Moisture, Temperature, Emergency op.

### Upper temperature limit

Operation | Installer → Config. modules

Adjustment of the upper temperature limit (activation temperature) valid for the ice detector or the selected ice detection channel. Below this temperature the moisture measurement will be activated. Also refer to **Activation temperature**, page 7.

Factory setting: +3 °C, possible settings: -3 to +5°C

### Moisture threshold

Operation | Installer → Config. modules

Adjustment of the moisture threshold for the ice detector or the selected ice detection channel. A setting of 0.5 is very sensitive, i.e. the heating may react if the sensor is completely dry. A setting of 9.5 is very insensitive, i.e. the heating only reacts if a large amount of moisture has accumulated. Also refer to **Moisture threshold**, page 7.

Factory setting: 5.0, possible settings: 0.5 to 9.5

## Settings

### Minimum heating time

Operation | Installer → Config. modules

Adjustment of the minimum heating time for the ice detector or the selected ice detection channel. The minimum heating time is started once moisture is detected in standby mode. Also refer to **Minimum heating time**, page 8.

Factory setting: 90 min, possible settings: 30 to 600 min

### Start minimum heating time?

Operation | Installer → Service → ISD channel

One-time activation of the heating for the duration of the minimum heating time.

Factory setting: No, possible settings: No, Yes

### Channel state

Information | Installer → Information

Display of the current state of the ice detection channel.

Possible states are: Reset, StartUp, Deactivated, Ready, Active, Heating min.time, Heating on demand, Add. heating, Temp. operation, Emerg. operation, Error.

### Temperature heating area

Information | Installer → Information

Display of the temperature in the heating area in °C. Usually this value corresponds to the current sensor temperature. However, during the sensor inhibition time after a measurement the temperature from before the last measurement will be displayed.

### **Last moisture measurement**

Information | Installer → Information | Installer → Service → ISD channel

Display of the last measured moisture value. The higher the value, the more moisture was on the sensor surface during the measurement. Also refer to **Moisture measurement**, page 7.

Possible values: undefined, 0.0 to 10.0.

### **Remaining heating time**

Information | Installer → Information

Display of the remaining heating time including the post heating time in minutes, i.e. the time until the heating is switched off.

### **Operating time**

Information | Installer → Information

Display of the operating hours of the heating circuit accumulated since the last reset of the counter. This counter can be compared to the trip meter in a car. The counter can be reset at a specific point in time (e.g. before the winter) in order to be checked at a later point in time (e.g. at the end of the winter in order to find out how many operating hours have accumulated during the winter).

### **Energy consumption**

Information | Installer → Information

Display of the heating energy consumed since the last reset of the operating time counter. This value is the product of the heating output and the value of the resettable operating time counter (in kWh).

### **Serial number**

Information → Device data | Installer → Information

Display of the ten-digit serial number of the device.

## Settings

### Version

Information → Device data | Installer → Information

Display of the software version and build number (four digits).

### Set passwords

Information

Possibility to set up password protection.

For a detailed description refer to **Password protection**, page 30.

Factory setting: 0000 for levels 1, 2 and 3

### Language

Setup

Adjustment of the menu language.

Factory setting: German, possible settings: German, English

### Contrast

Setup → Display

Adjustment of the contrast of the display.

### Brightness menu

Setup → Display

Adjustment of the brightness of the display when the menu is displayed.

### Brightness idle

Setup → Display

Adjustment of the brightness of the display in idle mode.



### Application

Installer → Startup

The application must be set to "Single Unit. For further information on the applications "System" and "Multi Channel", refer to the complete documentation for the 1873-ESM and 1875-ESM.

### Sensor type

Installer → Startup | Installer → Config. modules

Adjustment of the type of combi sensor connected to the respective ice detection channel.

The sensor type must be set for each ice detection channel during commissioning. If the "to be defined" factory setting is maintained, an error message with an alarm will be displayed.

Factory setting: to be defined, settings: to be defined, 3354, 3356, 3355

### Error code

Installer → Information

Display of the current error code of the ice detection channel.

For a description of the individual codes, refer to **Error codes and alarm messages** from page 31 onwards.

### Remaining inhibition time moisture

Installer → Information | Installer → Service → ISD channel

Display of the remaining inhibition time of the sensor in minutes. During a moisture measurement the sensor is heated up and has to cool down again for up to 30 minutes before taking the next measurement. The remaining inhibition time shows when the next measurement can start at the earliest.

## Settings

### Operating time total

Installer → Information

Display of the total operating hours a heating circuit has accumulated since the device has last been reset to its factory settings.

### Energy consumption total

Installer → Information

Display of the total heating energy used since the device has last been reset to its factory settings. This value is the product of the heating output and the value of the resettable operating time counter (in kWh).

### Alarm delay

Installer → Config. modules

Adjustment of the alarm delay. An alarm will only be passed on if this time has passed. Also refer to **Alarm management**, page 9.

Factory setting: 60 min, possible settings: 0 to 300 min

### Alarm relay inverted

Installer → Config. modules

Adjustment of the alarm relay's operating mode.

Usually the relay will be activated in case of an alarm, i.e. in case of an error the relay will be deactivated and an error will be signalled. In case of inverted function, the relay is activated if there is no error. In case there is an error, the relay is deactivated. Also refer to **Alarm relay**, page 9.

Factory setting: No, possible settings: No, Yes

### **Lower temperature limit**

Installer → Config. modules

Adjustment of the lower temperature limit for the channel. Also refer to **Switch-off temperature**, page 8.

Factory setting: -15 °C, possible settings: -30 to -5°C

### **Follow up time**

Installer → Config. modules

Adjustment of the follow up time. This is the time during which the heating will continue to be active even if the regular heating time has run out and the moisture value is again below the defined moisture threshold. Also refer to **Follow up time**, page 8.

Factory setting: 0 min, possible settings: 0-180 min

### **Heating output**

Installer → Config. modules

Adjustment of the heating output for mathematical assessment of the used heating energy (operating hour counter multiplied by heating output equals heating energy).

Factory setting: 0 W, possible settings: 0 to 100000 W

### **PWM interval time**

Installer → Config. modules

Adjustment of the time interval for the emergency mode, during which the control circuit is switched on and off again once.

Note: Do not to set the PWM interval time at a lower value than necessary because a short PWM interval time may have a negative effect on the lifetime of the heating circuit relay.

Factory setting: 60 min, possible settings: 30 to 240 min

## Settings

### Emergency duty cycle

Installer → Config. modules

Adjustment of the duty cycle (i.e. the time during which the heating is switched on in relation to the interval time) of the PWM in emergency operation. For further notes refer to **Emergency mode**, page 8.

Factory setting: 0 %, possible settings: 0 to 100 %



**If > 0% considerable energy consumption possible!**

### Emergency mode with error temperature

Installer → Config. modules

Possibility to define for each channel if an emergency mode is to run if there is an error in the temperature measurement. For further notes relating to the emergency mode refer to **Emergency mode**, page 8.

Factory setting: No, possible settings: No, Yes



**If “Yes” and Emergency duty cycle > 0% considerable energy consumption possible!**

### Blocking protection active

Installer → Config. modules

Activation of a pump blocking protection for water-based heating systems. If the blocking protection is active, the relay for the pump will be switched on once a day for 40 seconds.

Factory setting: No, possible settings: No, Yes

### Operating time: Reset counters

Installer → Config. modules

Possibility to reset the operating hour counter.

Factory setting: No, possible settings: No, Yes

### **Stop heating?**

Installer → Service → ISD channel

Possibility to switch off the heating during an ongoing minimum heating time.

Factory setting: No, possible settings: No, Yes

### **Start moisture measurement?**

Installer → Service → ISD channel

Activation of a moisture test measurement for the combi sensor allocated to the ice detection channel, independent from the current ground temperature. Also refer to **Moisture measurement**, page 7.

Factory setting: No, possible settings: No, Yes

### **Sensor temperature**

Installer → Service → ISD channel

Display of the current combi sensor temperature in °C. During the measurement this value can be up to 20 °C above the current ambient temperature of the sensor.

### **Restart**

Installer → Service → ISD channel

Possibility to restart the device without cutting the power.

### **Factory settings**

Installer → Service → ISD channel

Possibility to reset the device to its factory settings.

## Settings

### Operation in detail

#### Password protection

Information → Set passwords

Passwords can be set for three menu levels (Level 0, *Information*, is always available without restriction). This is useful, for example, to ensure that only qualified installation staff configure the control device. The password consists of four digits and may be different for each of the three levels.

Password protection of the menu items:

*Information*    Level 0

*Operation*     Password level 1

*Setup*         Password level 2

*Installer*     Password level 3

A higher-level password is also valid for the lower levels. This means that someone who has access to a higher level will automatically also be able to access the levels below, even if he or she does not know the lower-level passwords.

In case a password has been forgotten or is no longer available for any other reason (such as

change of installation technician) all passwords can be deleted with the help of a super password in order to regain access. In the retail partner's area on the tekmar website, the device's serial number can be entered and the super password retrieved. Please contact the tekmar technical service in case of problems.

Note: A password for a lower level can only be set if all passwords of the higher levels have already been set.

## Troubleshooting

### Error codes and alarm messages

Installer → Information

In case of an error the alarm relay is activated and an alarm is raised. The corresponding error code is shown on the display in idle mode and can also be found under the above menu items.

In the four-character error value, e.g. "00A2", several error codes are combined in the individual positions, if need be. These can be determined with the help of the adjacent table:

The example above, "00A2", can be segmented from right to left into

Position 1 = 2 → code xxx2,  
Position 2 = A → code xx2x + code xx8x  
Position 3 and 4 = 0 → no errors

Thus the errors xxx2 (configuration error), xx2x (voltage too high) and xx8x (temperature too high) are active.

Display Position 1 - 4	Codes Position 1 - 4
0	
1	1
2	2
3	1 2
4	4
5	1 4
6	2 4
7	1 2 4
8	8
9	1 8
A	2 8
B	1 2 8
C	4 8
D	1 4 8
E	2 4 8
F	1 2 4 8

## Troubleshooting

<b>Error code</b>	<b>Description</b>	<b>Explanation/measure</b>
E xxx1	internal error	Unforeseen software error, reason cannot be determined. → Restart device.
E xxx2	configuration error of the module	Defined sensor type does not match the measurement values. → Check sensor type/configuration.  Note: The error also occurs if the device has not been configured yet or has been reset to its factory settings and the sensor type is still set to "to be defined".
E xxx4	temperature sensor cannot be evaluated	Temperature cannot be measured. → Check sensor connection.
E xxx8	error voltage measurement	Voltage at sensor cannot be measured. → Check sensor connection. If not successful, return device to the tekmar Service to be checked.
E xx1x	error current measurement	Current through sensor cannot be measured or current is too low for the defined sensor type. → Check sensor connection. If not successful, return device to the tekmar Service to be checked.



Error code	Description	Explanation/measure
E xx2x	error current too high in idle mode	Current in idle mode too high, i.e. also outside the measurement cycle current flows through the sensor heating. This indicates an error in the device. → Return device to the tekmar Service to be checked.
E xx4x	error upon start of moisture measurement	Error when moisture measurement is started. Possible reasons: an invalid sensor type is defined, an already started measurement is still ongoing, the temperature measurement is faulty or the supply voltage is too high. → Set the correct sensor type, wait for the ongoing measurement to finish, check sensor connection.
E xx8x	temperature too high upon start of measurement or during measurement	Temperature at start of measurement (>30 °C) or during the measurement (>55 °C) too high; evaluation impossible. → Wait until the temperature is at a suitable level and repeat measurement then.
E x1xx	moisture could not be determined	Moisture determination during the measurement impossible. → Check connection/resistance values of the sensor. If not successful, the sensor has to be checked (resistance check) either on site or at tekmar.

## Troubleshooting

Error code	Description	Explanation/measure
E x2xx	error heating output	<p>Monitoring of the heating output signals an error, i.e. it may be that the heating element could not be switched on/off. In parallel to the relay in the device there is an electrical circuit which continuously monitors the output (even when switched off).</p> <p>An error occurs if the output is not or incorrectly connected.</p> <p>→ Check installation on site: Check whether the heating element or downstream contactor is defective. Check whether the connection terminals are correctly fastened.</p> <p>→ If the installation is OK, the internal relay may be defective. In this case, the device must be replaced.</p> <p>→ The error message can also occur briefly for a few seconds when the operating status is changed. This is not an error but due to the signal runtime.</p> <p>Note: The output cannot easily be tested with an ohmmeter, as the internal circuit influences the measurement result.</p>

There are events that can trigger several errors, e. g. an interruption in the sensor. In this case not all errors may be displayed, but only the first error that caused a measurement to terminate.

### Problems with the device

If the controller identifies an internal error, this will be shown via the display and the relay for the switching output will no longer be activated. If this error cannot be solved by resetting the device (power off/on), the device needs to be replaced.

Only if the same error persists after the power has been switched on again, contact the tekmar Service.

### Problems with the sensor

The connected sensor is monitored continuously. The emergency operation mode will be automatically activated if the parameter "Emergency mode with error temperature" is set to "Yes" and the parameter "Emergency duty cycle" is greater than 0 %. Alternatively the "Emergency mode" can be manually set as the operating mode.

Note: In the Emergency mode, heating takes place regardless of the prevailing temperatures. Depending on the set control value, this can result in high electricity costs.

In case of an error the sensor can be checked with the help of an ohmmeter. In order to do so, the sensor must be disconnected from the power and the ice and snow detector. The values in the following tables show the resistance values of the sensor units.

## Troubleshooting

### Resistance values of the temperature unit

After the sensor cables connected to the T1 und T2 terminals have been disconnected, the temperature unit can be checked at the wire end ferrules. The measurement must be done between the white and white/black wires (or between blue and brown) of the sensor.

The following table shows the comparison values from temperature to resistance for a functional temperature unit.

°C	Ω	°C	Ω	°C	Ω
-35	32,197	-10	8,941	15	2,970
-30	24,532	-5	7,070	20	2,431
-25	18,851	0	5,634	25	2,000
-20	14,616	5	4,520	30	1,657
-15	11,383	10	3,652	35	1,379

### Resistance values of the moisture unit

After the sensor cables connected to the M1 und M2 terminals have been disconnected, the moisture unit can be checked at the wire end ferrules. The measurement must be done between the red and red/black wires of the sensor. For a functional moisture unit the resistance value is:

Type	Ω
3354	77 to 94
3356	71 to 81

Further information on troubleshooting can be found under: [www.tekmar.de](http://www.tekmar.de).

## Technical data

### Ice and Snow Detector 1873-ESM

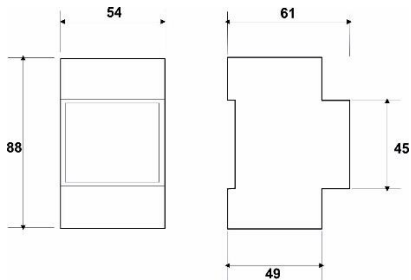
Moisture sensor/combi sensor:	tekmar Type 3354, 3356 (or 3355 with conversion kit)
Optional temperature sensor:	tekmar Series 31, e. g. 3154
Temperature measuring range:	-30 °C to +80 °C
Load output/primary relay:	<ul style="list-style-type: none"><li>- potential-free normally open contact</li><li>- rated current 16 A (resistive load)</li><li>- on-site fuse protection by means of miniature circuit breaker (MCB) required, rated current max. 16 A, tripping characteristic class B</li></ul>
Signalling output/alarm relay:	<ul style="list-style-type: none"><li>- potential-free change-over contact</li><li>- maximum switching voltage 230 VAC or 30 VDC</li><li>- rated current 2 A (resistive load)</li><li>- SELV-compliant with appropriate external wiring</li><li>- when using supply voltage on-site fuse protection by means of miniature circuit breaker (MCB) required, rated current max. 6 A, tripping characteristic class B</li></ul>
Rated voltage:	230 VAC, 50 Hz
Acceptable voltage range:	195 V to 253 V
Power consumption:	3 W or approx. 11 W during moisture measurement
Connecting terminals:	cage clamp terminals for 2.5 mm <sup>2</sup> , tightening torque ≤ 0,5 Nm
Rated surge voltage:	4000 V
Pollution degree:	2 (normal)

## Technical data

Action type:	Type 1.B (Type 1.C when using the alarm relay with 230 VAC)
Degree of protection:	IP 20 (according to EN 60529)
Protection class:	II if installed properly
Area of operation:	up to 2000 m above sea level
Enclosure:	rail-mounted device 3 HP (according to DIN 43880)
Mounting:	mounting rail TH-35 according to DIN EN 60715
Weight:	approx. 0.25 kg
Heat and fire resistance:	Category B/D
Ball pressure test:	+125 °C
Operating temperature:	-15 °C to +40 °C, no condensation
Storage temperature:	-20 °C to +70 °C, no condensation

## Technical data

### Dimensions



### Regulations

The product corresponds to the following rules and regulations:

EMC Directive

Radio Equipment Directive

Low-voltage Directive




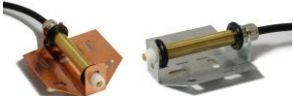

RoHS Directive

WEEE-Reg.-No.: DE 75301302



## Notes

### Available accessories

 A cylindrical brass sensor with a black cable extending from the bottom.	Ground sensor 3356 for combined measurement of moisture and temperature values in open areas
 A cylindrical brass socket with a semi-circular cutout on the side.	Ground installation socket for sensor 3355/3356
 A brass sensor with a black cable, featuring a small yellow tip.	Gutter sensor 3354 for combined measurement of moisture and temperature values
 Two mounting plates: one is copper-colored and the other is silver-colored. Both have a hole for the sensor and a cable entry point.	Mounting plate for sensor 3354 (copper or zinc)
 A small, rectangular metal component with four screw terminals on top and bottom.	Conversion kit for ground sensor 3355 in case of replacement of an old tekmar ice and snow system 1773





## Notes



# tekmar

tekmar Regelsysteme GmbH  
Möllneyer Ufer 17  
D-45257 Essen  
mail@tekmar.de  
www.tekmar.de

<ME-1873E-ESM-EN>  
Status 2022-09

Subject to change without notice

© 2022 tekmar Regelsysteme GmbH