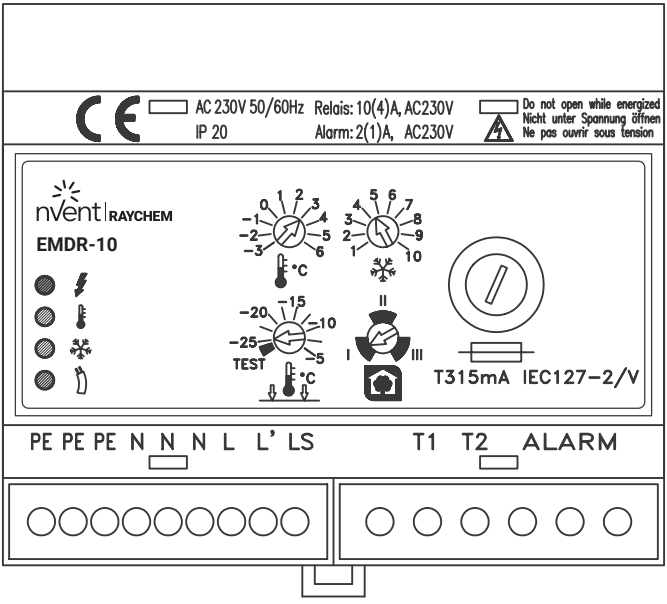
EMDR-10

Version 4, SW5.0 or higher

Installation, operation and maintenance manual



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ENGLISH

Supplied Items

Control Unit (nVent RAYCHEM EMDR-10-Cont)
Air Temperature Sensor (Via-Du-A10)
Moisture Sensor (Hard-45)
Fixing Brackets (Hard-46)
Label
Manual

ENGLISH

EN

1. DESCRIPTION

1.1 Intended Purpose

The electronic control unit nVent RAYCHEM EMDR-10 is specifically designed for the control of nVent RAYCHEM gutter heating systems. Depending on outdoor temperature and moisture in the gutter the heating cable will only be switched on if necessary to ensure a correct drain of the snow water.

1.2 Technical Data

Control Unit

Supply voltage	230 VAC, ±10%, 50Hz
Power consumption	max. 4 VA
Max. Switching capacity	Imax 10(4)A / 230 VAC, SPST,potential 230 VAC
Temperature	–3°C to +6°C (factory setting +2°C)
Lower limit temperature test	–25°C to –5°C (factory setting adjustment range –15°C)
Operating differential	±0.5 K
Measuring accuracy	±1.5 K
Moisture adjustment range	1 (max. sensitivity) to 10 (min. sensitivity) (factory setting 5)
Post heating time adjustment range	60 minutes (only in temperature range < +1,5°C)
Alarm relay	Imax 2(1)A / 230 VAC, SPDT, potential-free
Moisture sensor (output)	Imax 1A / 230 VAC, SPST potential 230 VAC with fuse 5 x 20mm T 315mA according to IEC127-2/V
Mounting	DIN rail according to DIN EN 50022-35
Low voltage directive	EN 60730
EMC	EN 50081-1 (emission) and EN 50082-1 (immunity)
Terminals	2.5 mm^2 (stranded conductors), 4 mm^2 (solid conductors)
Protection class	II (panel mounted)

Housing

Ambient temperature range*	0°C to +50°C
Ingress protection	IP20
Housing material	Noryl (self-extinguishing according to UL 94 V-0)
Weight	approx. 350 g
Dimensions	106 x 90 x 58 mm

* Continuous operation must be assured and the device must be protected from the penetration of moisture.

Ambient temperature sensor (VIA-DU-A10)

Sensor type	PTC
Ingress protection	IP54
Terminals	2.5 mm^2
Sensor cable	2 x 1.5 mm^2, max. 100 m (not included)
Exposure temperature	–30°C to +80°C
Mounting	Wall mounting

Moisture sensor (HARD-45)

Sensor type	PTC
Power consumption	9 W to 18 W
Ambient temperature range	–30°C to +65°C continuous
Supply voltage	230 VAC, ±10%, 50Hz
Connection cable	3 x 1.5 mm^2, 4 m, the connection cable can be extended to max. 100 m at 3 x 1.5 mm^2

1.3 Care and Maintenance

To clean the nVent RAYCHEM EMDR-10 only use a soft and dry cloth.
The use of solvents or other liquids may lead to serious damage of the unit.
The function of the control unit and the heating cable can be checked in the test mode (see item 3.2 parameter adjustments).

2. INSTALLATION

Only for electricians!
Attention: Mistakes during connecting up the device can cause damage to the control unit. The company is not liable for any damage caused by faulty connections and/or incorrect handling.

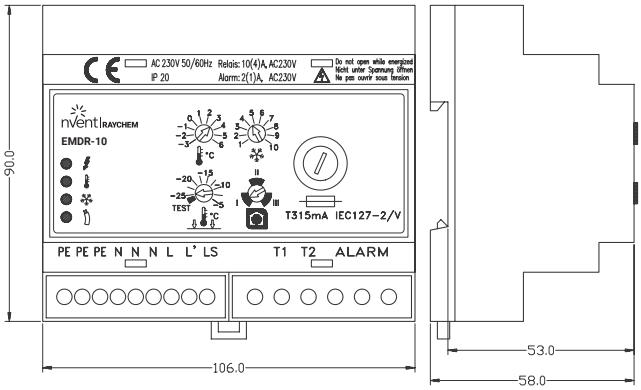
2.1 Safety Remarks

- Before working on the device, switch off the power supply!
- The device may only be connected up and serviced by authorized, trained personnel!
- Electrical connection has to be carried out according to the enclosed connection diagram.
- The device is only designed to be connected to fixed cables.
- The wires of the moisture sensor are carrying mains voltage, the ones of the temperature sensor as well as the alarm contact have to be considered as carrying mains voltage according to VDE.
- The relevant installation regulations must be observed.
- Do not lay sensor cables together with other live wires in order to avoid disturbances.
- Moreover, you must ensure adequate protection against disconnection of all leads in compliance with the requirements of EN 60730, part 1. This can be achieved for example by fixing the cables with cable clips.
- Local standards for electrical connection must be observed.
- If the device does ot work please first check all connections and the mains power supply.

2.2 Installation and Dimensions of the Control Unit

The device is designed for mounting on DIN rail (DIN EN 50022-35) in switchboxes and distribution boxes. The circuit breaker and an eventually necessary contactor can be mounted directly beside the unit.

Dimensions:



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2.3 Installation and Dimensions of the Temperature Sensor

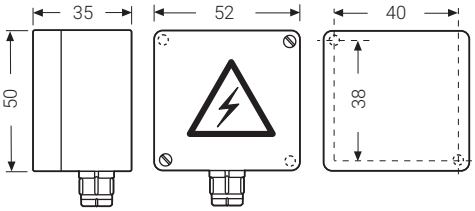
A good positioning of the temperature sensor is crucial for the correct and efficient operation of the snow melting system. The temperature sensor should be placed on the North side of the building, in a position where it will always be away from direct sunlight. Moreover, it must be protected against other influences, i.e. it may not be mounted above doors or windows and not close to lamps or floodlights.

A position on the wall just below a gutter is recommended.

The connection wire of the sensor may be extended to max. 100 m at a lead diameter of 1.5 mm^2.

The wires of the temperature sensor has to be considered as carrying mains voltage according to VDE. The relevant installation regulations must be observed. Connection diagram see item 5.

Dimensions:



2.4 Installation and Dimensions of the Moisture Sensor

A good positioning of the moisture sensor is crucial for the correct and efficient operation of the snow melting system.

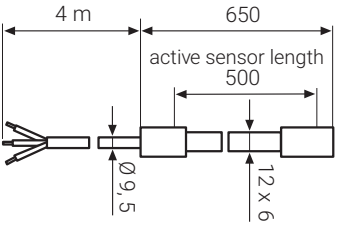
The moisture sensor and heating cable(s) served / controlled by the same control unit should be positioned in the same roof area. The moisture sensor is usually placed in a gutter at the lowest position in the system adjacent to one of the drainpipes. This is usually where water / snow is last cleared from the gutter, hence ensuring that the whole protected area is cleared before the heating system turns off. The exact positIoning will depend on the particular building and the prevailing weather conditions. If experience shows that the system shuts down before snow is removed from a key area, then the sensor should be moved to that area.

For mounting the sensor in the gutter use the fixing brackets (Hard-46) to fix the sensor adjacent and parallel to the heating cable. Ensure that the sensor remains flat and is not in contact with the heating cable.

The connection wire of the moisture sensor may be extended to max. 100 m at a lead diameter of 3 x 1.5 mm^2. Connection diagram see item 5.

The wires of the moisture sensor are carrying mains voltage!

Dimensions:



2.5 Electrical Layout

- The length of the heating cable determines number and size of the fuse.
- The use of a a RCD (30 mA) is required by the manufacturer.
- Local standards for electrical connection must be observed.
- The device may only be connected up by an authorized electrician.
- Use C-characteristic circuit breaker!

Maximum heating cable length for –10°C start-up temperature at 230 VAC

Heating cable	GM-2X / GM2-XT	Frostop-Black
6 A (directly connected)	25 m	30 m
10 A (directly connected)	40 m	50 m
13 A (with contactor)	50 m	65 m
16 A (with contactor)	60 m	80 m
20 A (with contactor)	80 m	-

3. FUNCTION

The control unit has four LEDs for indication of the operating conditions and four dials for the adjustment of different parameters.

The air temperature is measured by means of a temperature sensor. When the air temperature falls below the value adjusted at the control unit, then the corresponding yellow LED will light up and after approx. 10 minutes the moisture sensor is activated.

If moisture is present at the sensor then the corresponding yellow LED will light up, the heating is switched on, and the red LED will light up. The heating cable remains on until

- the air temperature rises above the set value
- the moisture falls below the set value
- the air temperature falls below the adjusted lower temperature limit and the set post-heating period has elapsed.

3.1 Display Elements

The LEDs indicate following operating conditions:

LED green
Device in operation (mains voltage)

LED yellow
Adjusted air temperature threshold fallen below
LED flashes in case of fault at the air temperature sensor (break or short circuit)

LED yellow
Adjusted moisture threshold exceeded
LED flashes in case of fault at the moisture sensor (break)

LED red
Heating cable energized

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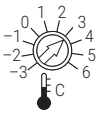
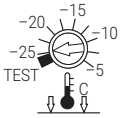
3.2 Parameter Adjustments

The following parameters can be set by means of the respective dial:



Adjustment of the air temperature threshold.
The moisture sensor is being put into operation below this value.

Adjustment of the moisture threshold.
Above this value the heating cable is being energized, if the air temperature is below the setpoint.
1 = max. sensitivity, 10 = min. sensitivity



Adjustment of the lower temperature limit.
Below this value the heating cable will be switched off. At the same time the moisture measurement will be switched off.
In addition this dial can be used to test the unit by turning the potentiometer shaft to the left stop. After that the heating cable (resp. contactor) will be energized for max.
10 minutes. If the shaft is turned to the right again during these 10 minutes then the TEST will be stoped and the unit works in normal operation mode with the adjusted lower temperature limit.
If the potentiometer is left in the TEST position then the unit will automatically return to normal operation mode after the test period of 10 minutes and works with a lower temperature limit of −25°C.
This lower temperature limit can be set to a different value at any time.

A new test period can be activated by turning the shaft from the left stop to the right (minimum to −20°C) and then back again to the left stop.

Energy saving feature activation

Position I: Default value : 100% Normal operation without extra activation of the energy saving features.

Position II: 30% reduction of operation time within temperature range > +1,5 °C.

Position III: 30% permanent reduction of operation time; The 30% reduction of the operation time will be achieved by activation of a 10 min duty cycle (7 min ON; 3 min OFF). The selection of the energy savings features by the operator is dependent on the local weather conditions, the location and the requested heating power.

Note: A contactor is required to use energy efficiency settings, Position II and III, with all self-regulating cables, including GM-2X/GM2-XT with cable length less than 40 m (which may be directly connected to the controller when using Position I only).

Use the following table as a guide:

Description	Suggested setting
Air temperature threshold	+2°C
Moisture threshold	5
Lower temperature limit	−15°C
Energy saving feature:	Position II

Periodic inspection: It is recommended to inspect and test the control unit as well as the heating cable circuits annually.

3.3 Moisture Sensor Fuse

The control unit is equipped with a fuse in the output for the moisture sensor which protects this output against overload and short circuit. In case this fuse has to be replaced you may exclusively use a fuse (5 x 20 mm) type T315mA according to IEC127-2/V.
Other fuse types are not permissible and may lead to serious damage of the unit.

4. FAULT MESSAGES AND TROUBLE SHOOTING

The following faults are being detected by the control unit:

Fault	Reaction
Break or short circuit of the temperature sensor	LED “temperature“ flashes, alarm relay and load relay switch off
Break of the moisture sensor Short circuit of the moisture sensor	LED “humidity” flashes, alarm relay and load relay switch off Additionally, under short circuit conditions, moisture sensor fuse will rupture.
Power failure	Alarm relay and load relay switch off

Notice:

- A short circuit at the moisture sensor leads to the triggering of the fuse.
- By that a short circuit is being detected as well because it leads to a break of the sensor circuit.

In case of a fault at the moisture sensor the moisture measuring circuit will be switched off. The LED “moisture” will continue to flash. After repair of the moisture sensor the fault signal has to be cleared by activating the TEST mode (turn the potentiometer for the lower temperature limit to the left stop and shortly after that back again to the requested lower temperature limit). When the air temperature falls below the value adjusted at the control unit, then the moisture sensor is activated and tested again after approx. 10 minutes.

Trouble shooting:

Symptoms	Probable causes	Correction
Heating cable not heating (snow is not melting)	Moisture sensor not positioned correctly (e.g. not flat in the gutter)	Re-position following the instructions in the “Assembly of the Moisture Sensor” section of this manual
	Temperature sensor located in direct sunlight	Re-position following the instructions in the “Assembly of the Temperature Sensor” section of this manual
Temperature below set point, but heating cable fails to operate	Moisture not detected	This is normal operation: low temperature AND moisture must be detected before the heating cable is energized
	Less than 10 minutes have elapsed since the temperature fell below the setpoint below the setpoint	The moisture sensor is not checked for the presence of moisture until 10 minutes after the temperature falls
Snow present, but heating cable fails to operate	Moisture dial set too high	Set the moisture dial to a lower value
	Poor positioning of the moisture sensor	Re-position following the instructions in the “Assembly of the Moisture Sensor” section of this manual
Snow begins to clear, but the heating cable turns off too soon	Poor positioning of the moisture sensor	Re-position following the the instructions in the “Assembly of the Moisture Sensor” section of this manual
	Moisture dial set too low	Set the moisture dial to a higher value
	Temperature has fallen below minimum temperature setpoint	This is normal operation

VIA-DU-A10 PTC Characteristic

Temperature in °C	Resistance in Ohm
–20	1335
–10	1459
0	1592
+10	1732
+20	1879

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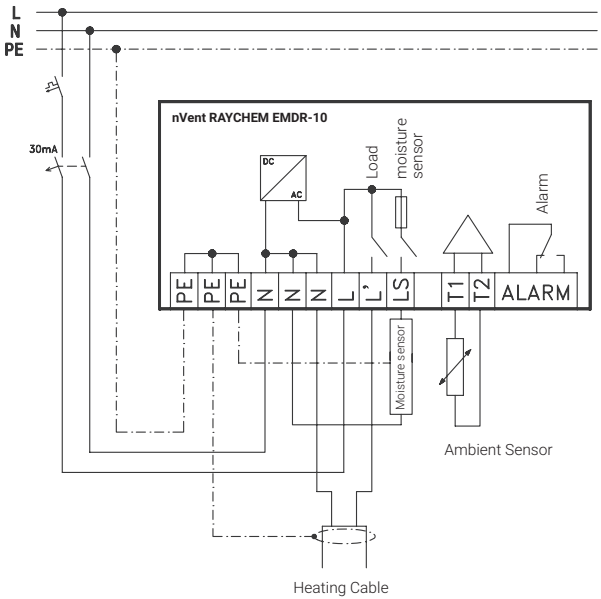
5. CONNECTION DIAGRAMS

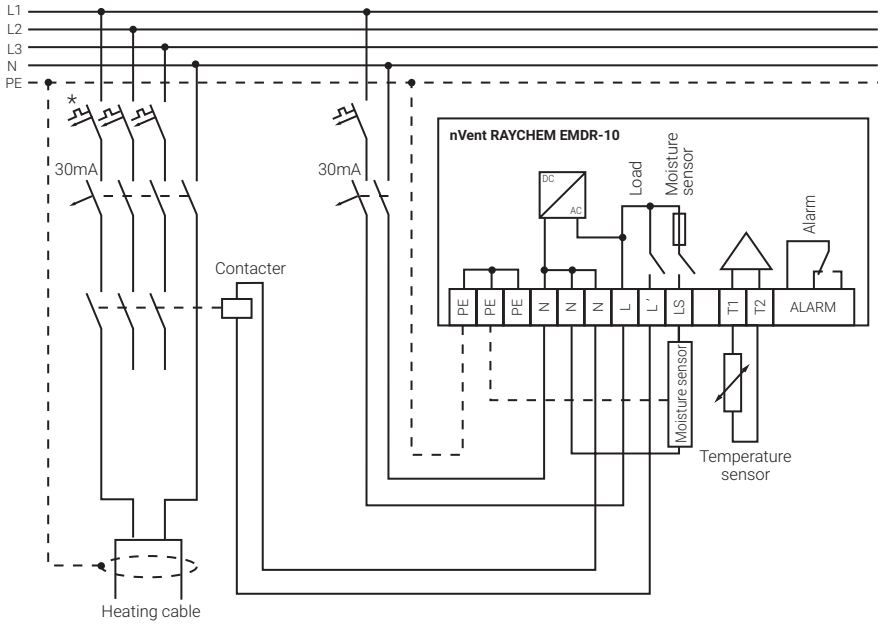
5.1 nVent RAYCHEM EMDR-10 with directly connected Heating Cable

Attention: max. heating cable length 40 m, circuit breaker max. 10A (C-characteristic)



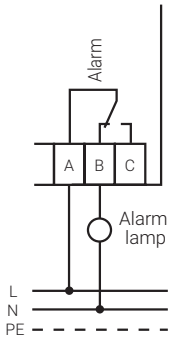
5.2 nVent RAYCHEM EMDR-10 with Contactor

Attention: circuit breaker for nVent RAYCHEM EMDR-10 max. 10A

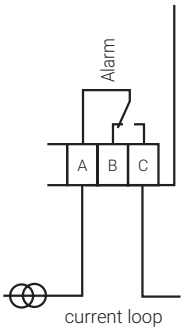


* Circuit breaker according to maximum heating cable length (see item 2.5)

5.3 Alarm Output



Connection of an alarm lamp (diagram) or horn (rest position)



Connection of a current loop (rest position)

Notice: The alarm relay is always active (switched on) as long as there is no fault.
The alarm relay is potentialfree but not suitable for the switching of safety low voltage (SELV) as there is no double insulation in the device.

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