

# IndorTec<sup>®</sup> THERM-C

## Carbon wall heating

Ideal for ceramic/natural stone coverings, fillers and plaster systems



### Product properties and area of application

#### IndorTec<sup>®</sup> THERM-C

- Thin-film low-voltage wall heating
- Multifunctional, use under ceramic/natural stone, fillers and plaster systems
- Simple connection without additional electrical installation
- In renovation projects, wall heating can be retrofitted at any time without great effort.
- Individually shortenable and editable

#### Indoor use

- For heating/temperature control in the wall area (e.g. shower) and/or as an invisible towel warmer

#### Suitable substrates:

- Masonry, stud walls with wood or plasterboard, old wall coverings

#### Substrate requirement:

- Substrates must be level and load-bearing

#### Coverings:

- Ideal for ceramic/natural stone coverings, fillers and plaster systems



## Substrates

Substrates must be level, pressure-resistant, load-bearing, vibration-free and deflection-free. In principle, the requirements of the relevant regulations for the corresponding covering apply. Adhesion-reducing components on the surface must be removed. Before laying IndorTec® THERM-C, any unevenness must be leveled out with suitable levelling compounds matched to the substrate.

### Permitted substrates

- Masonry
- Stud walls with wood
- Stud walls with gypsum plasterboard or gypsum fiberboard
- Coated polystyrene building boards
- old wall coverings

## General information

### Bonding & filling

Suitable materials  
Suitable adhesive mortars or wall fillers must be used for bonding and filling IndorTec® THERM-C. Appropriate products can be requested from the manufacturer or can be found in the installation recommendations at [www.gutjahr.com](http://www.gutjahr.com).

### Coverings

Suitable coverings  
Suitable coverings are those recommended by the covering manufacturer for the respective area of application.  
Unsuitable coverings  
Covering materials that tend to deform when exposed to moisture and temperature-sensitive coverings are unsuitable.

### Joints

Joints in the joint area of drywall panels or wood-based panels must be crack-bridging. The distance between the heating foil and expansion joints must be at least 20 mm.

### Heating foil, temperature sensor and thermostat

The copper strip of the heating foil must be installed on the wall side. The installation of the connecting cables to the heating foil, safety transformer, temperature sensor, thermostat and switching relay must comply with the national and/or local electrical regulations. The factory-fitted connection cable (2 x 2.5 mm<sup>2</sup>) from the heating foil to the safety transformer is approx. 0.5 m and can be extended to a maximum total length of 10 m using the twin connection cable (2 x 2.5 mm<sup>2</sup>) included in the set. Longer supply cables must be dimensioned accordingly (e.g. 2 x 6 mm<sup>2</sup> up to max. 25 m connection length).

The temperature is controlled with 1 thermostat incl. temperature sensor. The temperature sensor is installed under the heating foil in accordance with the specifications.

There are separate installation and operating/programming instructions for the IndorTec® THERM-C thermostat, which are enclosed in the packaging or can be downloaded from the product page on the Internet.

### Extracts from relevant regulations

The electrical installation may only be carried out by qualified persons in accordance with the applicable legal requirements.

Heating foils and temperature sensors must be checked for damage and overall resistance before and during installation as well as after installation of the covering in accordance with the acceptance report and recorded therein.

Before installation, we recommend drawing up an installation plan showing the position of the heating foil, temperature sensors, cut-outs/boreholes, connecting cables and other installations.

Electric heating foils require free air circulation for optimum heat dissipation, and this must be guaranteed at all times. Covering the heating foil completely and permanently can cause heat build-up, which can damage the IndorTec® THERM-C. Failure to do so may invalidate the warranty.

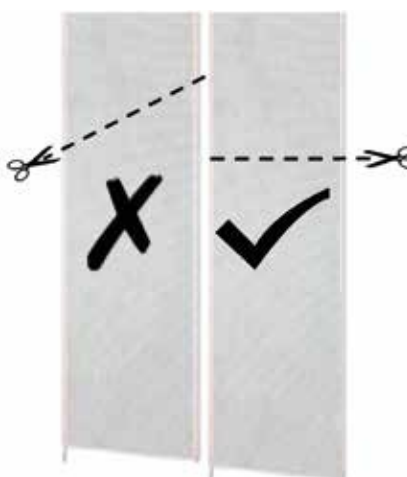
The earliest possible time for commissioning the panel heating and any settings of the maximum operating temperature are carried out in accordance with the regulations and the installation guidelines of the corresponding plaster, mortar, covering and/or adhesive manufacturers.

Additional insulation layers behind the heating foil reduce heat loss and improve heat transfer into the room. The thin-layer IndorTec® THERM-E thermal barrier or suitable pressure-resistant insulation materials can be used for this purpose. In order to avoid a possible dew point shift, additional internal insulation layers on external walls should be professionally dimensioned.

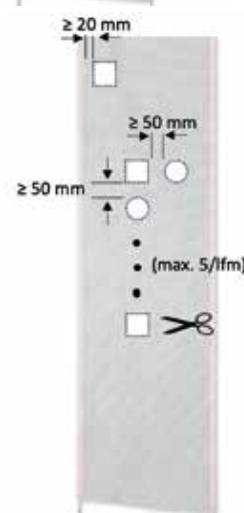
## Assembly guideline

### Cutting and processing

Cutting  
The cut is made with a utility cutter or scissors and must be at right angles to the heating foil.



Editing  
Round cut-outs are permitted up to a maximum diameter of 70 mm, square or rectangular cut-outs are permitted up to a maximum of 70 x 70 mm. A minimum distance to the copper strips of 20 mm and a minimum distance between the cut-outs of 50 mm must be maintained. A maximum of 5 cut-outs are permitted per 1 m of heating foil. Cut-outs must be documented in the installation plan.



### Subsequent processing

Screws may only be inserted into the heating surface if they are installed with plastic plugs for electrical insulation. Do not connect metal screws to electrically conductive material such as metal shelving systems, metal frames or similar. Nails or dowels made of electrically conductive material are not permitted. Damage to the conductive copper strip will lead to a defect in the heating foil.

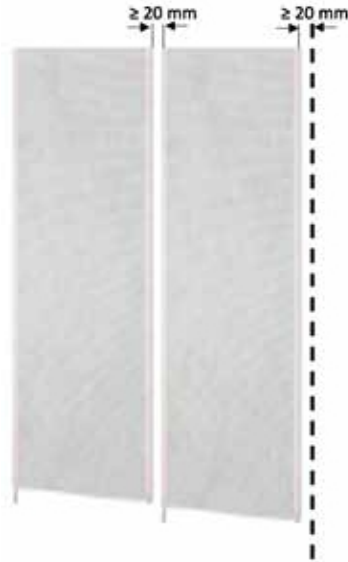
Resistance measurement after cutting/processing the heating foil:

After cutting or processing the heating foil, measure the resistance of the heating foil again and record this in the acceptance report and on the rating plate label of the heating foil, observing the guide values in the "Heating foil resistance measurement values" table from the acceptance report. Attach the type plate label of the heating foil to the acceptance report and then deposit it in the electrical distribution board.

### Minimum distance

Distance for expansion joints and multiple heating foils A minimum distance of 20 mm must be maintained to expansion joints.

If more than one heating foil is used, a minimum distance of 20 mm must also be maintained between them.



### Distance to floor/ceiling

In the plinth area and adjacent ceilings, it is advisable to allow sufficient clearance (approx. 150 mm) between the heating foil and the building components so that subsequent work in the plinth or ceiling area can be carried out without restriction.

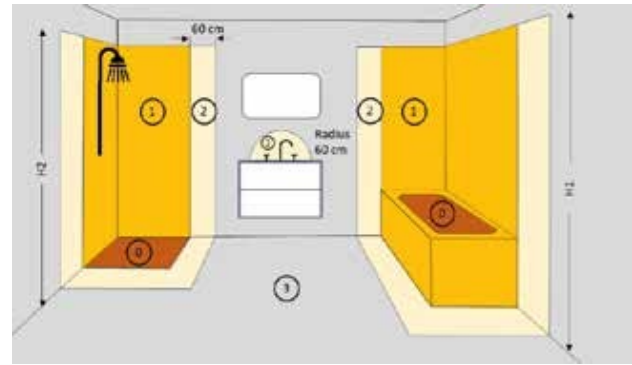


### Sealing

#### Wet area/waterproofing

When installing in wet areas (e.g. showers), the composite seal must be positioned above the heating foil. Cut-outs in the heating foil (e.g. water connections, penetrations, recesses, etc.) must be made before the composite seal; subsequent penetration of the composite seal (e.g. drill holes) is not permitted. When used in damp/wet rooms, the requirements of DIN VDE 0100 Part 701 must be observed. All components of the IndorTec® THERM-C set are suitable for use in damp and wet rooms. The heating foil and the associated connections can be installed within protection areas 1 and 2, taking into account the sealing; all other components must be installed outside protection area 2.

Protection area according to DIN VDE 0100-701



Protected area	Meaning
0	Protection area 0
1	Protection area 1
2	Protection area 2
3	Protection area 3
H1	Height 225 cm
H2	Height to water outlet

### Processing guidelines for heating foil

#### Processing temperature

The minimum processing temperature is 5 °C, the maximum processing temperature depends on the manufacturer's processing guidelines for the further layer application, but max. 40 °C.

#### Minimum overlap

The minimum overlap to fulfill the electrical contact protection is 2 mm above the heating foil. This can be achieved with an appropriate layer of covering, plaster, filler or mortar.

### Processing guidelines Power supply unit

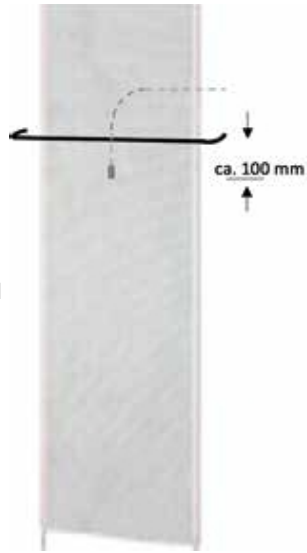
Only switch on the power supply unit with the heating foil connected. The power supply unit can be used for flush-mounted or surface-mounted installation in closed rooms. Protect from moisture, dust and vapors and ensure sufficient heat dissipation and ventilation. Minimum distance to other components  $\geq 50$  mm, ambient temperature max. 40 °C. Max. 300 W heating power may be connected per power supply unit.

### Processing guidelines for thermostat and switching relay

We recommend providing a separate supply line with a 16 A circuit breaker with C characteristic for the connection. Thermostats and switching relays must be installed by a certified electrician. must be connected in accordance with the enclosed connection diagram and national and/or local electrical regulations. Both products can be installed together in a sufficiently dimensioned flush-mounted or cavity wall box to save space.

Processing guidelines for temperature sensors

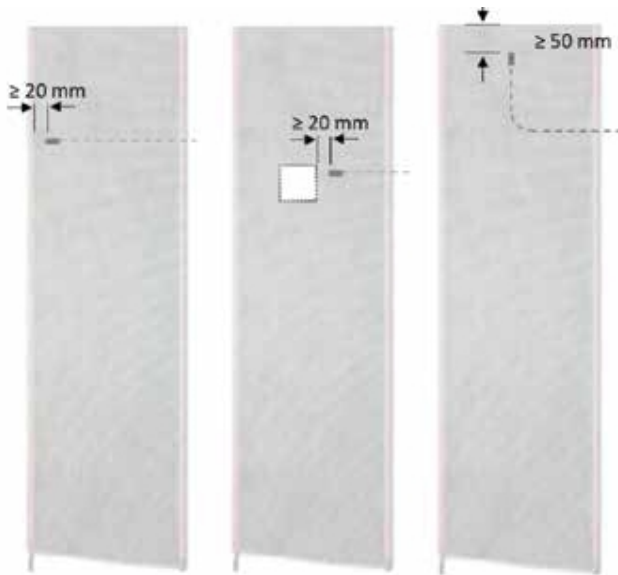
**Towel warmer**  
When using the IndorTec® THERM-C as an invisible hand towel warmer, the temperature sensor must be positioned centrally under the heating foil and approx. 100 mm below the hand towel bar.



**Wall heating**  
When using the IndorTec® THERM-C as wall heating, the temperature sensor must be installed below the active heating foil. The following distances must be maintained:

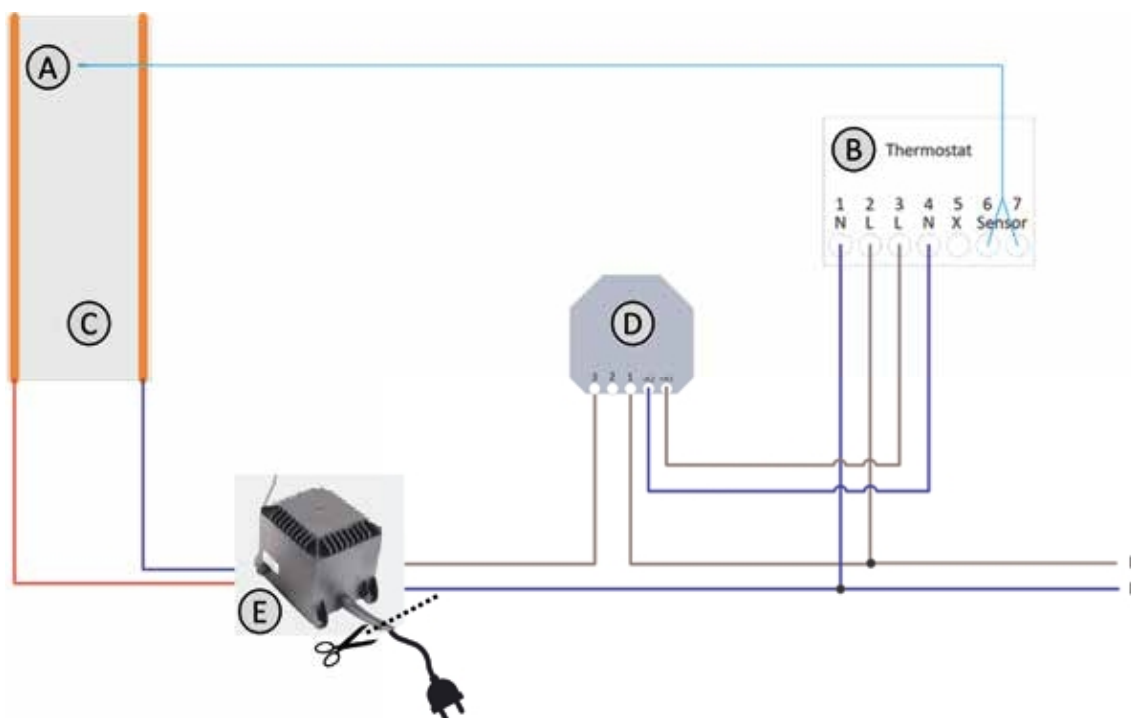
- 20 mm to the copper strip
- 20 mm to recesses
- 50 mm to the edge of the heating foil

The electrical cables must be laid in accordance with the currently valid DIN VDE 0100.

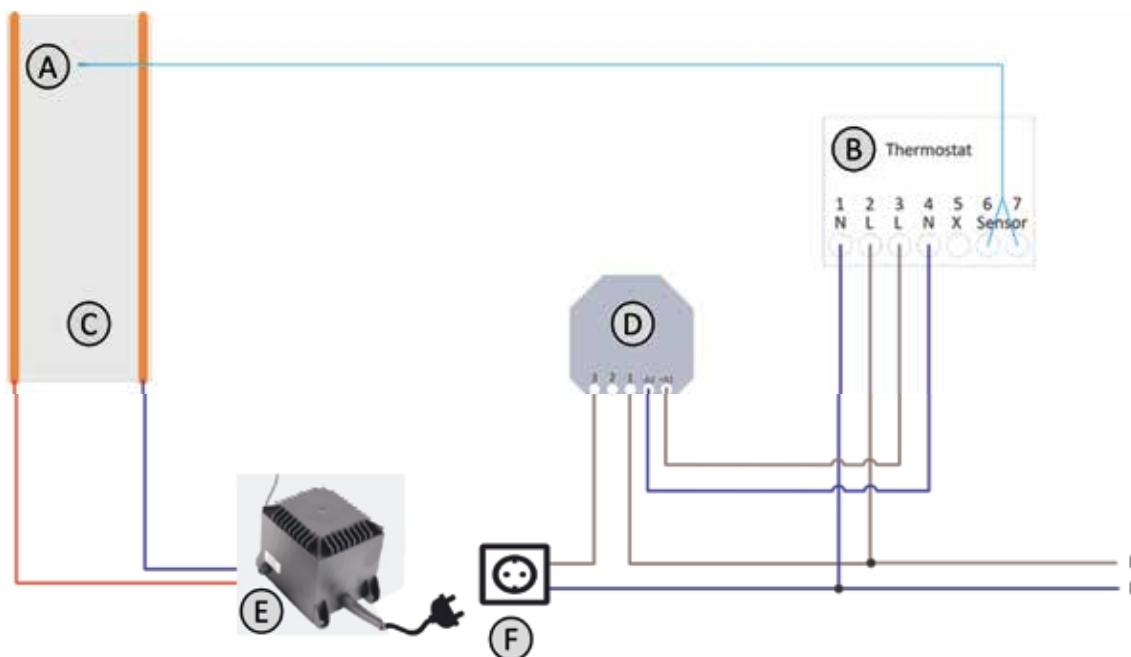


## Electrical connection

Fixed connection to the room thermostat via switching relay



Connection to the room thermostat using a socket and switching relay



Labeling	Description
A	Temperature sensor
B*	IndorTec® THERM-E TD Thermostat
C	IndorTec® THERM-C heating foil
D*	Eitako ER61-US switching relay
E	IndorTec® THERM-C power supply unit 300 W
F	230 V earthed socket outlet

\*B + D (thermostat and switching relay) can be installed together in a cavity wall/flush-mounted box.

## Technical data

IndorTec THERM-C heating foil	
Material	PET film with carbon fibers and fillers
Surface property	Perforation optimized for crimping
Tension	24 V
Specific power	132 W/m (220 W/m <sup>2</sup> )
Nominal limit temperature	70 °C
Minimum processing temperature	5 °C
Connection cable	2.5 mm <sup>2</sup>
Secondary cable between power supply unit and heating foil	2.5 mm <sup>2</sup> , max. length 10 m
Length	approx. 2200 mm
Width	approx. 590 mm (net heating width approx. 540 mm)
Strength	approx. 0.4 mm
Weight	approx. 315 g (approx. 240 g/m <sup>2</sup> )
Minimum bending radius	R = 10 mm

IndorTec THERM-C power supply unit, 300 W	
Nominal voltage primary	230 V AC 50/60 Hz
Rated voltage secondary	24 V AC (SELV, Safety Extra Low Voltage)
Rated power	300 W
Secondary current	12,5 A
Connection (cable) Primary	approx. 2.0 m with Euro flat plug
Connection (cable) Secondary	approx. 0.5 m with open ends (2 x 2.5 mm <sup>2</sup> )
Ambient temperature	max. 40 °C
Internal safety temperature switch	110 °C automatically resetting
Internal transformer fuse	Miniature fuse T 2.0 A, replaceable
Protective measure	RCD 30 mA (on site)
Insulation class	E
Enclosure protection type	IP56
Dimension, L x W x H	approx. 129 x 91 x 100 mm (without connecting cable)
Weight	approx. 3.4 kg
Design	EI core, encapsulated in plastic housing
Protection class IEC/EN	II Reinforced insulation
EU conformity	CE mark, in accordance with EN 61558-2-6 and European Low Voltage Directive 2014/35/EU, RoHS 2011/65/EU

Eltako switching relay ER61-UC	
Contact us	1 changeover contact potential-free
Tension	8 - 230 V
Switching capacity	10A/250V
Dimensions (H x W x D)	45 x 45 x 18 mm
Weight	approx. 28 g
Protection class	IP30 (housing) / IP20 (connections)
Temperature range	-20 °C to +50 °C

IndorTec® THERM-E TD Thermostat	
Regulatory purpose	Electric panel heating
Type of installation	Wall mounting in flush-mounted or surface-mounted boxes
Power supply	100-240 V AC ±10 % 50/60 Hz
Max. Back-up fuse	16 A
Built-in switch	2-pole, 16 A
Protection class	IP21
Conductor cross-section, terminals	Amperage ≤ 13 A = 1.5 mm <sup>2</sup> single-wire Amperage > 13 to 16 A = 2.5 mm <sup>2</sup> single-wire
ELV limits realized	SELV 24 V DC
Output relay	NO contact - SPST - NO
Output, load	Max. 16 A/3600 W
Control principle	PWM/PI
Standby power consumption	≤ 0,5 W
Battery backup	5 years (storage)
Battery life, typical	5 years (storage), 10 years (operation)
Dimensions (H x W x D)	TD: 84 x 84 x 40 mm
Installation depth	22 mm
Weight	≤ 200 g
Display	176 x 220 pixel TFT - resistive touch display
Degree of soiling	2
Overvoltage category	III
Action type	1.B
Software class	A
Nominal pulse voltage	4 kV
Temperature ball pressure test (TB)	125 °C
EU utility model	DM/082270

Note: At very low temperatures, the display may react to the changes.

## Laying instructions



1 Prepare a level, clean, load-bearing substrate. Drywall boards and wood-based panels must be crack-bridging in the joint area. The IndorTec® THERM-E thermal barrier can be used to improve heat radiation and additionally bridge cracks in the substrate.



2 Before installing the heating foil, the IndorTec® THERM-C wall heating and the IndorTec® THERM-E temperature sensor, the total resistance must be checked and recorded in accordance with the acceptance protocol. The heating foil of the IndorTec® THERM-C wall heating system must not have been processed or shortened.



3 After the resistance test of the heating foil, the IndorTec® THERM-C wall heating, it can be individually processed and cut to size according to the installation guidelines.



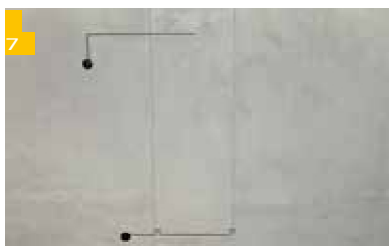
4 After processing or cutting, the resistance of the heating foil, the IndorTec® THERM-C wall heating, must be checked again and recorded on the product label and in the acceptance report.



5 Comparative orientation values can be taken from the resistance list in the acceptance report.



6 Wall surfaces to which the IndorTec® THERM-C wall heating is to be attached must be marked before installation. The same applies to the recesses for supply lines, the contacting of the heating foil, the IndorTec® THERM-C wall heating and the IndorTec® THERM-E TD temperature sensor. The processing guidelines for the temperature sensor must be observed.



7 Recesses of sufficient dimensions must then be made in the wall for the supply line and contacts of the heating foil, the IndorTec® THERM-C wall heater and for the temperature sensor of the IndorTec® THERM-E TD thermostat.



8 Insert the IndorTec® THERM-E TD temperature sensor into the recess provided, run the supply cable into the switch box and fill the recess in the supply cable with adhesive mortar. The position of the heating foil, the supply lines and the temperature sensor must be documented in the installation plan.



9 Apply the adhesive mortar to the marked surface using a suitable notched trowel (e.g. 4 mm notched trowel for a smooth substrate) to match the substrate, ...





...insert the heating foil of the IndorTec® THERM-C wall heating into the adhesive mortar layer and align, the visible copper strip must be laid towards the wall. When using several heating foils of the IndorTec® THERM-C wall heating, keep a distance of at least 2 cm between the foils.



Press the heating foil of the IndorTec® THERM-C wall heating into the adhesive mortar layer using a plastic smoothing trowel, avoiding creases and folds in the foil at all costs.



Then cover the entire surface of the heating foil of the IndorTec® THERM-C wall heating system with a layer of adhesive mortar and smooth it down.



Heating foils from IndorTec® THERM-C wall heating must not be laid over expansion joints. A distance to the movement joint of min. 2 cm must be observed.



Before laying the wall covering, the total resistance of the heating foil, the IndorTec® THERM-C wall heating and the IndorTec® THERM-E TD temperature sensor must be checked and recorded again in accordance with the acceptance report.



The connection cable of the heating foil, the IndorTec® THERM-C wall heater, is connected to the safety transformer (power supply unit). To do this, crimp the connection cable of the heating foil, the IndorTec® THERM-C wall heating, firmly to the twin cable with the enclosed shrink connectors using crimping pliers and



z. Shrink with a hot air dryer, for example. Pay attention to the maximum permissible length of the supply cable. To be on the safe side, we recommend carrying out another check resistance test on the heating foil of the IndorTec® THERM-C wall heating.



Once the adhesive mortar has dried through, the IndorTec® THERM-C wall heating can then be fully covered with a minimum 2 mm thick top layer of filler, a plaster system ...



...be covered with a tile or natural stone covering. Then check and record the total resistance of the heating foil again according to the acceptance protocol.



Once the IndorTec® THERM-C wall heating has dried through and been completed, it can be connected and put into operation by a qualified electrician in accordance with the enclosed wiring diagram.

When used in wet areas, e.g. showers, the IndorTec® THERM-C wall heating system must be sealed in accordance with DIN 18534. Please refer to the manufacturer's instructions for the sealing system.

Resistance measured values of the heating foil and temperature sensor

THERM-C heating foil 24 V (L x W) 2200 mm x 590 mm			
Length (in m)	Area (in m <sup>2</sup> )	Performance (in W)	Total resistance (in Ω)*
0,10	0,06	13,20	43,58
0,20	0,12	26,40	21,79
0,30	0,18	39,60	14,53
0,40	0,24	52,80	10,89
0,50	0,30	66,00	8,72
0,60	0,35	79,20	7,26
0,70	0,41	92,40	6,23
0,80	0,47	105,60	5,45
0,90	0,53	118,80	4,84
1,00	0,59	132,00	4,36
1,10	0,65	145,20	3,96
1,20	0,71	158,40	3,63
1,30	0,77	171,60	3,35
1,40	0,83	184,80	3,11
1,50	0,89	198,00	2,91
1,60	0,94	211,20	2,72
1,70	1,00	224,40	2,56
1,80	1,06	237,60	2,42
1,90	1,12	250,80	2,29
2,00	1,18	264,00	2,18
2,10	1,24	277,20	2,08
2,20	1,30	290,40	1,98

The resistance list of the heating foil serves as a guide. The tested total resistance is noted on the rating plate.  
 \*Deviations at ≤ 3 Ω of - 15 % to + 25 %, or at > 3 Ω of ± 15 % to the specifications on the type plate correspond to the specified tolerance limit.

Measured values of the THERM-E/C temperature sensors NTC 12 kΩ			
Temperature°C	Resistance (k-Ohm kΩ)*	Temperature°C	Resistance (k-Ohm kΩ)*
-20	90,12	22	13,53
-10	55,08	23	13,00
0	34,60	24	12,49
5	27,69	25	12,00
10	22,28	26	11,53
11	21,25	27	11,09
12	20,46	28	10,66
13	19,62	29	10,25
14	18,81	30	9,86
15	18,04	35	8,14
16	17,30	40	6,75
17	16,60	45	5,62
18	15,93	50	4,69
19	15,29	55	3,94
20	14,67	60	3,32
21	14,09	70	2,38

\*Deviations of -5 % to +10 % possible

# Acceptance protocol

Object: \_\_\_\_\_

Fabricator: \_\_\_\_\_

Electrical installer: \_\_\_\_\_

Date of installation: \_\_\_\_\_

Date of commissioning: \_\_\_\_\_

Attach type plate label here

## Control measurement on heating foil and temperature sensor by the installer

	before laying and cutting/processing the heating foil	after cutting/process ing the heating foil	after laying the covering
Heating foil Total resistance (Ohm $\Omega$ )			
Temperature sensor total resistance (k-Ohm $\Omega$ )			

## Control measurement on heating foil and temperature sensor by the electrician

before commissioning the IndorTec® THERM-C wall heating system	
Heating foil Total resistance (Ohm $\Omega$ )	
Temperature sensor total resistance (k-Ohm $\Omega$ )	

## Resistance measured values of the heating foil and temperature sensor

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Measured values of the THERM-E/C temperature sensors NTC 12 k $\Omega$			
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20	14,67	60	3,32
21	14,09	70	2,38

\*Deviations of -5 % to +10 % possible

The resistance list of the heating foil serves as a guide. The tested total resistance is noted on the rating plate.  
\*Deviations at  $\leq 3 \Omega$  of - 15 % to + 25 %, or at  $> 3 \Omega$  of  $\pm 15$  % to the specifications on the type plate correspond to the specified tolerance limit.

The warranty claim only comes into effect if the acceptance report has been completed in full and the installation/assembly instructions have been followed in accordance with the manufacturer's specifications.

Date

Signature  
(Fabricator/electrical installer)

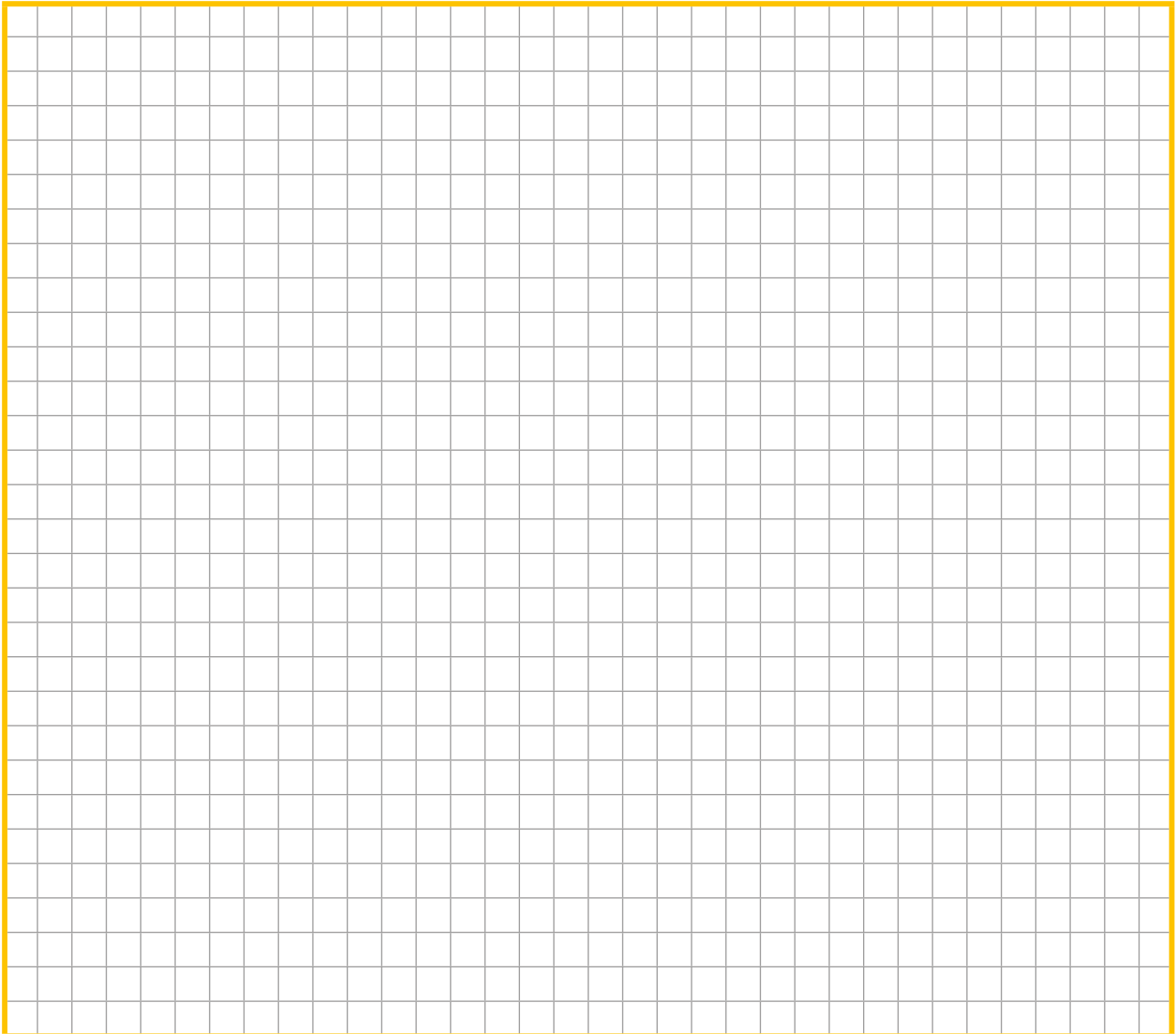
Company stamp  
(fabricator/electrical installer)

Status 02\_2024

## Assembly plan

Room: \_\_\_\_\_ Date: \_\_\_\_\_ Processor: \_\_\_\_\_

The position of the heating foil, temperature sensor, cut-outs/drill holes, connecting cables and other installations must be precisely documented with dimensions.



### IMPORTANT:

Please attach the completed installation plan and the completed acceptance report to the electrical distribution board.

\_\_\_\_\_ date

\_\_\_\_\_ Signature (processor)

\_\_\_\_\_ Company stamp (processor)

## System accessories

### IndorTec® THERM-C Carbon wall heating set



IndorTec® THERM-C  
Carbon wall heating set Set, consisting of

- ① PET film with carbon fibers, fleece-coated on both sides with factory-fitted supply cable, 2.20 m x 0.59 m; 0.4 mm thick
- ② Safety transformer 300 W, 230 V AC 50/60 Hz - 24 V AC 12.5 A, IP 56, CE mark, in accordance with EN 61558-2-6 and European Low Voltage Directive 2014/35/EU, RoHS 2011/65/EU
- ③ Twin connection cable, 2 x 2.5 mm<sup>2</sup> in 10 m length for individual shortening. The cable and the matching connectors connect the heating foil to the transformer. IndorTec®
- ④ THERM-E TD Touch thermostat with temperature sensor, 3 m long
- ⑤ Switching relay: 1 changeover contact potential-free, 10 A/250 V energy-saving, space-saving installation in flush-mounted or cavity wall box

## System components

IndorTec® THERM-E  
thermal barrier



IndorTec® THERM-E  
TS Smart  
Thermostat



Aperture  
set  
Anthracite



Additional temperature sensor



AquaDrain® Drain  
mat shear



