Heated Cat Shelter

PROJECT 01 | Illustrated construction documentation





Wood, knowledge and heart.

WW-001 • 1.0 • November 2026

Project purpose

WEKI WoodWorks aims to make affordable, insulated shelters available for outdoor and stray cats. An electronics technician and DIY enthusiast, the builder has been making shelters and beds for several years without payment. He shares his experience free of charge and is happy to demonstrate the construction process in person whenever possible.

The shelter can also be built without heating. Such a version has already been made for a location without mains electricity. The 5 cm insulation alone provides valuable protection against cold and wind.

Important information about the heated version

The homemade 230 V design shown here has not undergone formal electrical safety assessment, has no electrical shock protection certification, and its thermal safety has not been verified. The builder makes it to the best of his knowledge; anyone reproducing it does so at their own risk. Mains electrical work requires appropriate qualifications and must only be performed with the supply disconnected. Before use, the electrical safety and overheating protection of the individual unit must be checked; a disclaimer does not replace these checks. The unheated version requires no mains wiring.

Contents

Specifications and cutting list • Materials and tools • Illustrated construction • Heating and wiring • Measurements and settings • Placement, maintenance and experience.

The photographs show the actual construction process.

Specifications and dimensions

Feature	Value
External dimensions (W × D × H)	60 × 50 × 50 cm, including feet
Internal dimensions	50 × 40 × 35 cm
Entrance	15 × 17 cm
Insulation	5 cm EPS 100
Floor	6 mm MDF or OSB, 60 × 50 cm
Base frame	3 × 5 cm roofing batten
Heating	D205 PTC, 230 V, approx. 25 W
Thermostat	XH-W3001, two switching thresholds
Thermal fuse	TZ-D-077, 77 °C, 250 V, 10 A

Cutting list

Component	Dimensions / quantity
Frame	2 × 60 cm, 2 × 44 cm
Feet	2 × 50 cm
EPS base	54 × 44 cm
Floor panel (MDF/OSB)	60 × 50 cm
Walls	35 cm high, 5 cm thick; cut to suit corner joints
Roof	60 × 50 cm, 5 cm EPS
Probe protection strip	5 × 20 cm, 6 mm MDF

A total of 3.08 m of roofing batten is required, but the cost estimate allows for one full 4 m length. The upper floor layer is MDF or OSB, with the heating film beneath it, followed by EPS insulation.

Materials and tools

Material	Quantity / shelter
EPS 100	1.4 m²; 3 boards (100 × 50 cm)
MDF / OSB	0.3 m²; MDF cut to size, OSB full sheet
Roofing batten	1 length, 4 m
D205 heating film	**0.25 m; minimum order 1 m**
Film connectors	2 pcs
Insulating tape	**0.30 m; minimum order 1 m**
Thermostat / thermal fuse	1 each
Helia IP54 junction box	1 pc, 85 × 85 mm
WAGO 221-412	5 pcs
PUR adhesive foam	approx. 1/10 can
Stretch film	4.11 m²; full roll
Superglue, screws, cable, plug, tape	Grouped items as listed in Excel

The estimated material cost of one shelter is approximately HUF 14,000. If all materials must be purchased from scratch, minimum order quantities and full packages increase the initial expenditure to around HUF 27,000 for MDF or HUF 31,000 for OSB. Leftover materials can be used to build further shelters. The estimate excludes delivery, tools and any MDF cutting fees.

Tools

To build the structure, you will need a tape measure, pencil, square, hand saw, utility knife, drill/driver, drill bits, driver bits, screwdriver and parallel clamp. Electrical work requires combination pliers, side cutters, wire strippers and a suitable crimping tool; a continuity tester or multimeter can be used for basic checks. A circular saw, jigsaw, mitre saw, planer, router with a 6 mm bit and EPS cutter can make the work easier but are not essential for mechanical construction. A foam gun is only needed for gun-applied adhesive foam.

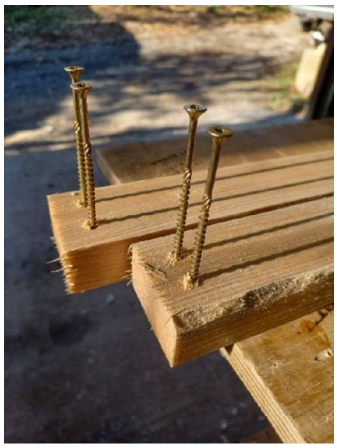
01 / Base frame

The recommended internal dimensions are 45–50 cm wide, 35–45 cm deep and 35–40 cm high.



The shelter is based on a timber frame measuring 60 × 50 cm externally, made from 3 × 5 cm roofing battens (Bramac battens). Two 60 cm and two 44 cm lengths are required to assemble the frame.





Pilot holes help prevent the timber from splitting during assembly. I used 4 × 80 mm screws here.

Planing is optional; rough roofing battens can also be used.

02 / EPS insert

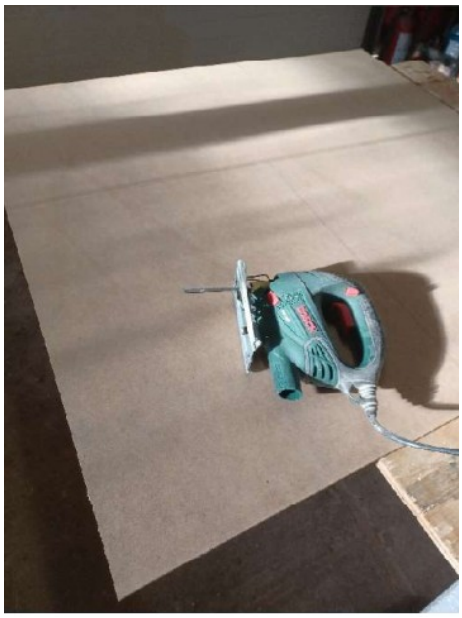




The base is insulated with 5 cm thick, load-bearing EPS 100 expanded polystyrene, which crumbles less when cut. The insert measures 54 × 44 cm and must fit the frame accurately. Before fastening the last batten, pull the structure together with a parallel clamp, then screw the batten into place.



03 / Floor panel and mains cable





Place the assembled frame on the 6 mm MDF sheet, trace its outline and cut out the floor panel using a jigsaw, circular saw or hand saw. The heated example shown uses a mains cable with a conductor cross-section of 0.75 mm², cut to the required length, with a plug at one end and conductors prepared for the thermostat connection at the other.



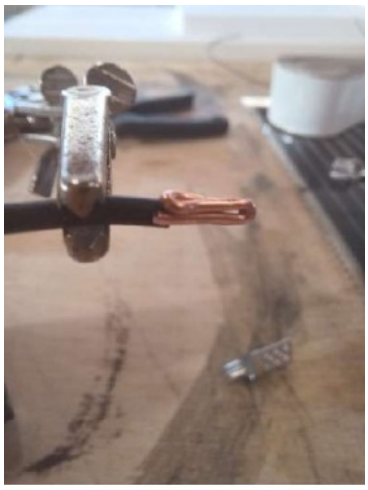
The mains cable type, insulation and mechanical protection must suit the installation environment; conductor cross-section alone does not establish suitability.

04 / Preparing the heating film and connectors





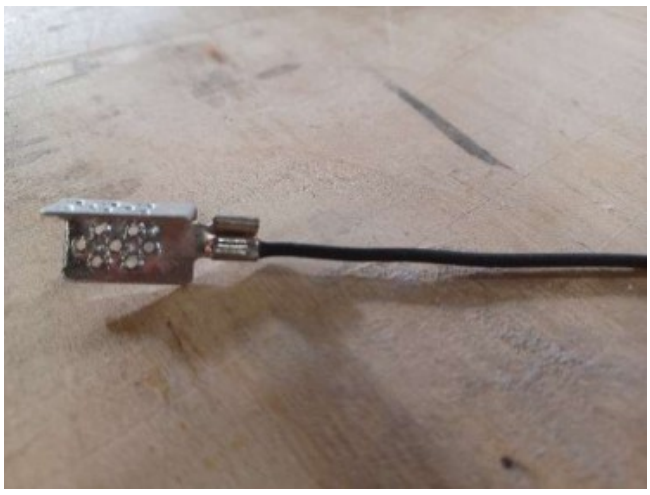
The D205 heating film shown can be cut in 25 cm increments; the shelter contains one such section. The workshop photograph shows a ruler, utility knife, 0.5 mm² wire, wire strippers, side cutters, crimping tool, film connector and insulating tape.



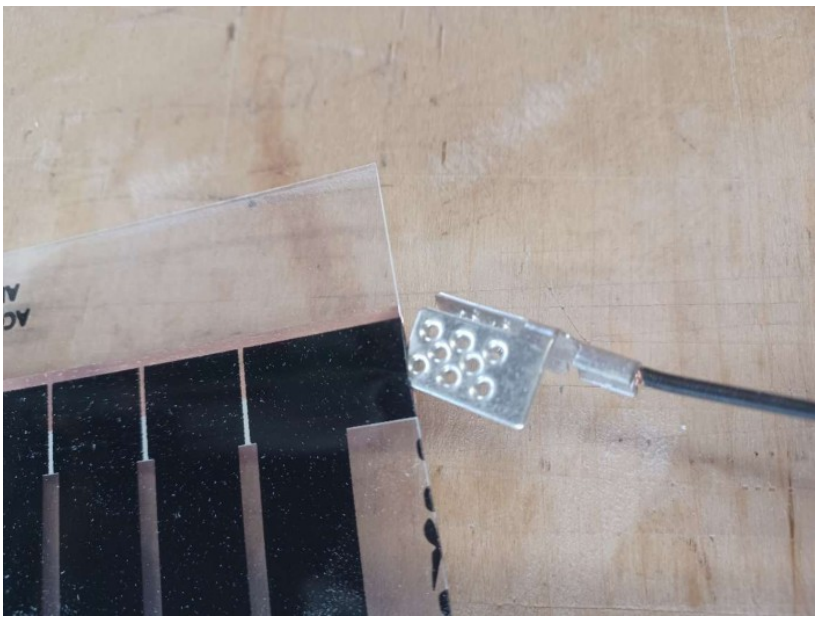




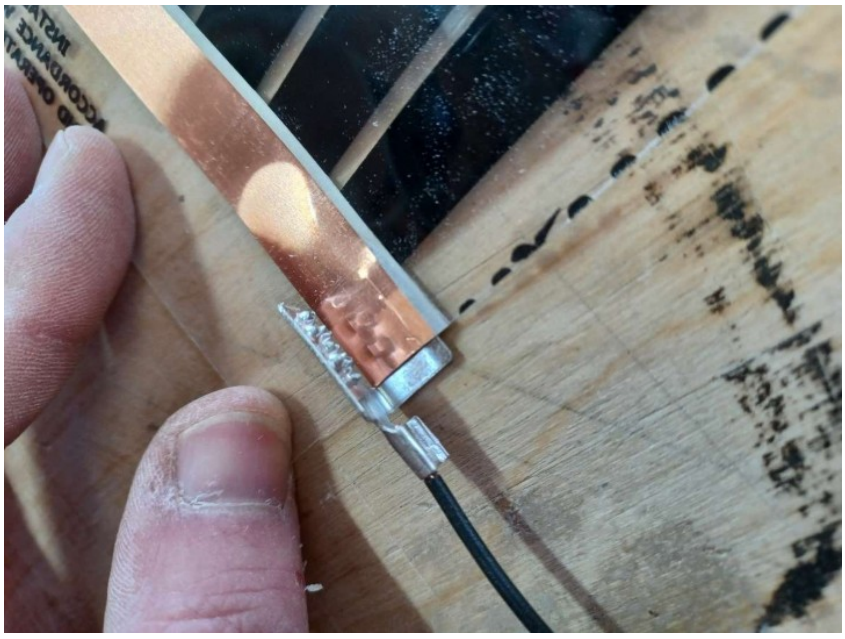
In the workshop, the end of the 0.5 mm² wire was folded back to obtain the thickness needed for the crimped connection. This is unnecessary with thicker wire. The essential point is that the wire must be securely held; the conductor crimp must not grip the insulation, and unnecessarily long bare sections must not remain.



05 / Positioning the connector



At the copper conductor strip, the two layers of film can be separated using the edge of the connector. The connector can be inserted into this pocket.



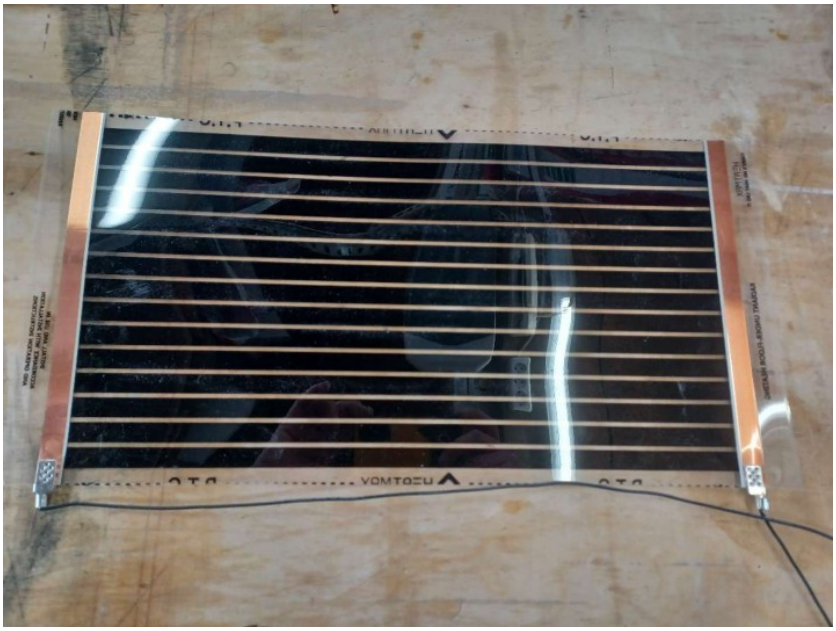
The photographs show the connector inserted fully between the two film layers at the copper conductor strip.

Use the crimping tool and wire specified by the connector manufacturer. The photograph shows the workshop method.

06 / Crimping the connectors

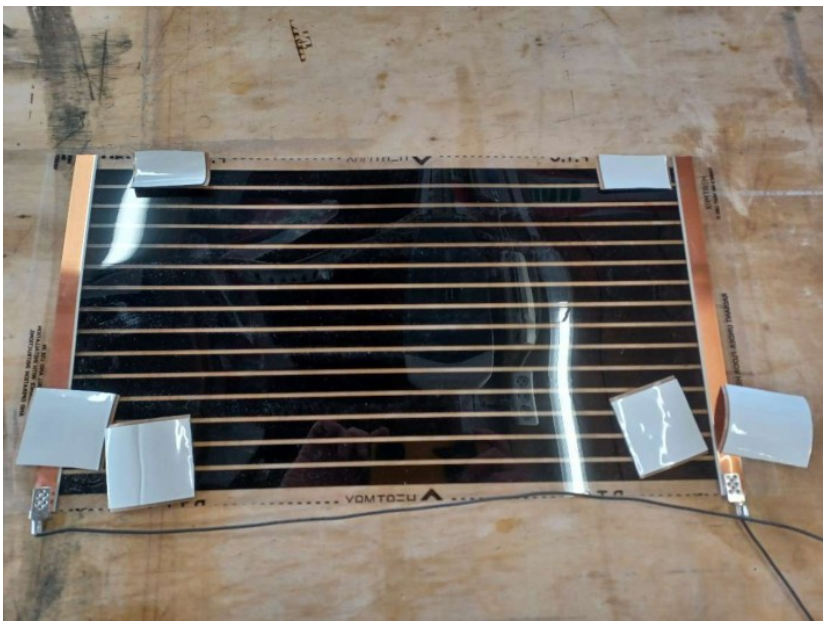


The crimped connection shown establishes electrical contact with the conductor strip through the two halves of the connector and the film between them. Flat-jaw crimping pliers were used in the workshop. Mechanical stability of the connection is important.

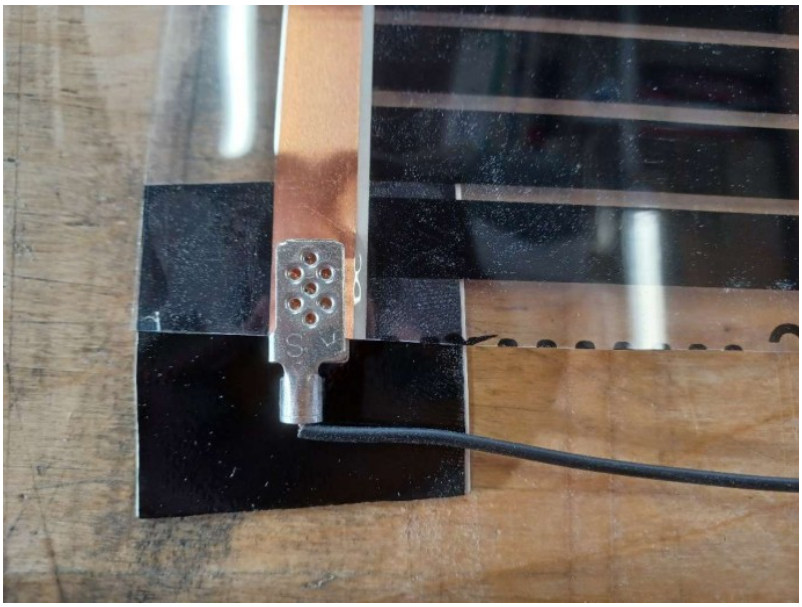


The photograph shows the connectors on both conductor strips. The left-hand wire is longer so both wires can exit at the same point.

07 / Insulating the connectors

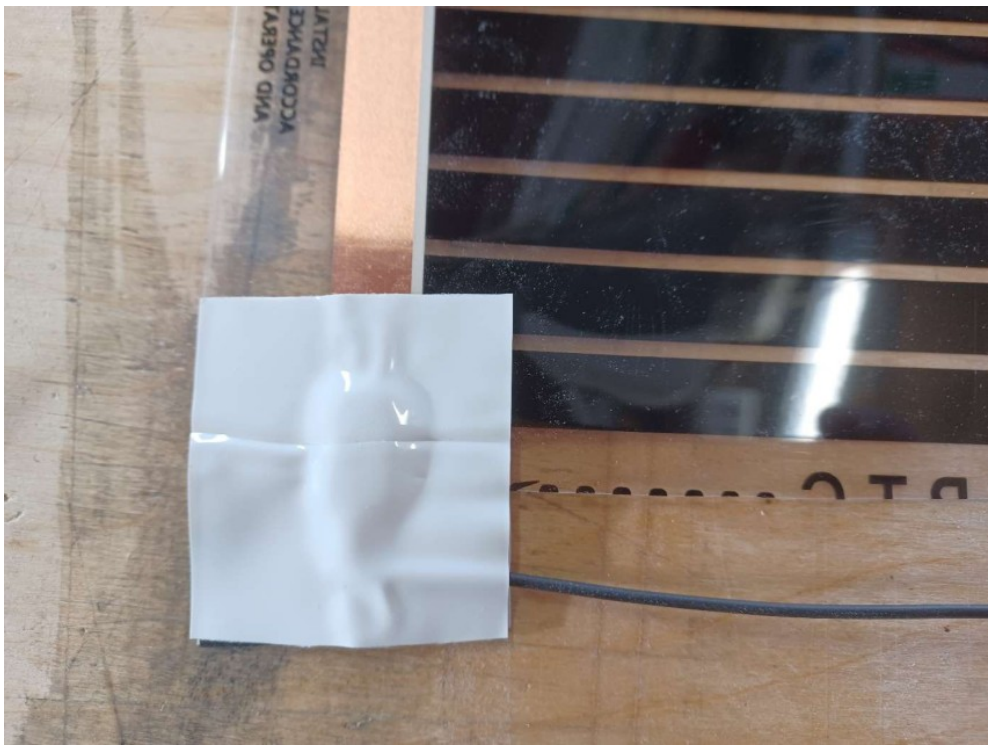


Waterproof insulating tape intended for the film was used to insulate the contacts and exposed cut surfaces of the example. Four square pieces were placed on both sides of the two connectors, and two rectangular pieces were folded over the opposite cut end of the film.

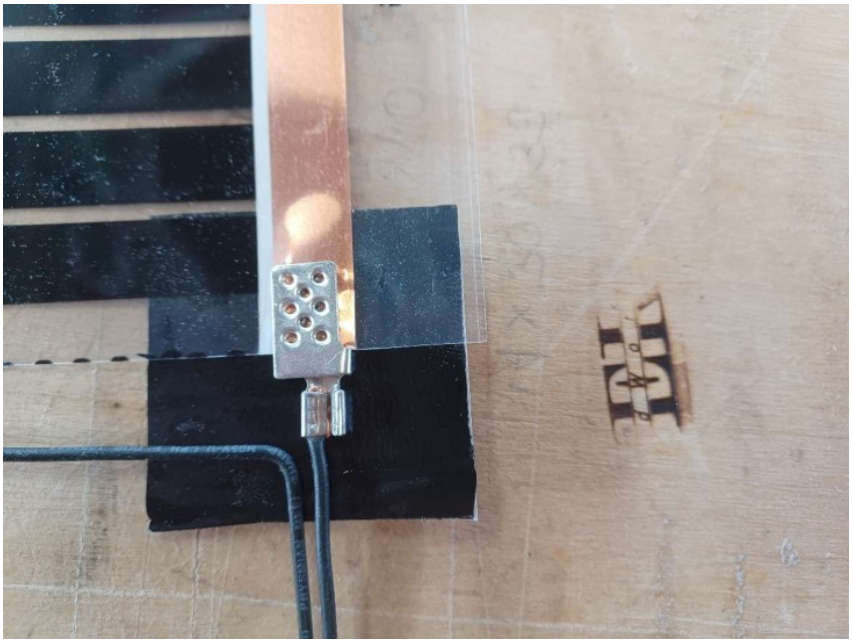


The photograph shows the tape placed beneath the connector after removal of the backing paper. The connector is centred on the tape so the insulating material can cover it completely.

08 / Sealing the insulation

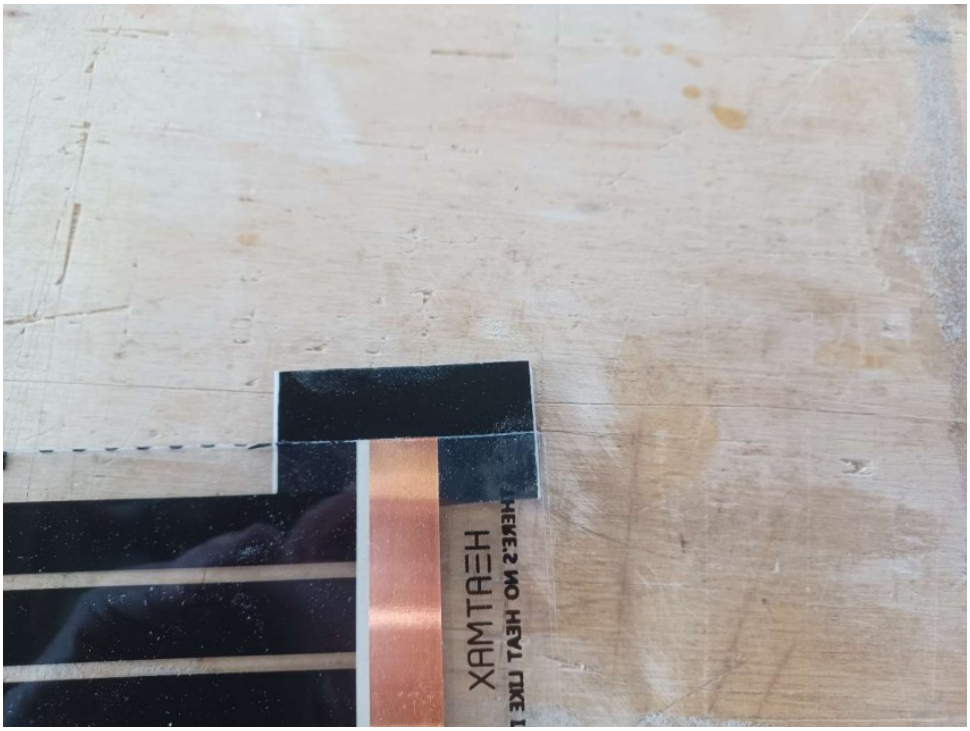


In the photograph, tape also covers the connector from above, with the two adhesive surfaces pressed together. Visible gaps, bubbles and the wire exit were checked visually in the workshop. This does not replace electrical insulation testing.

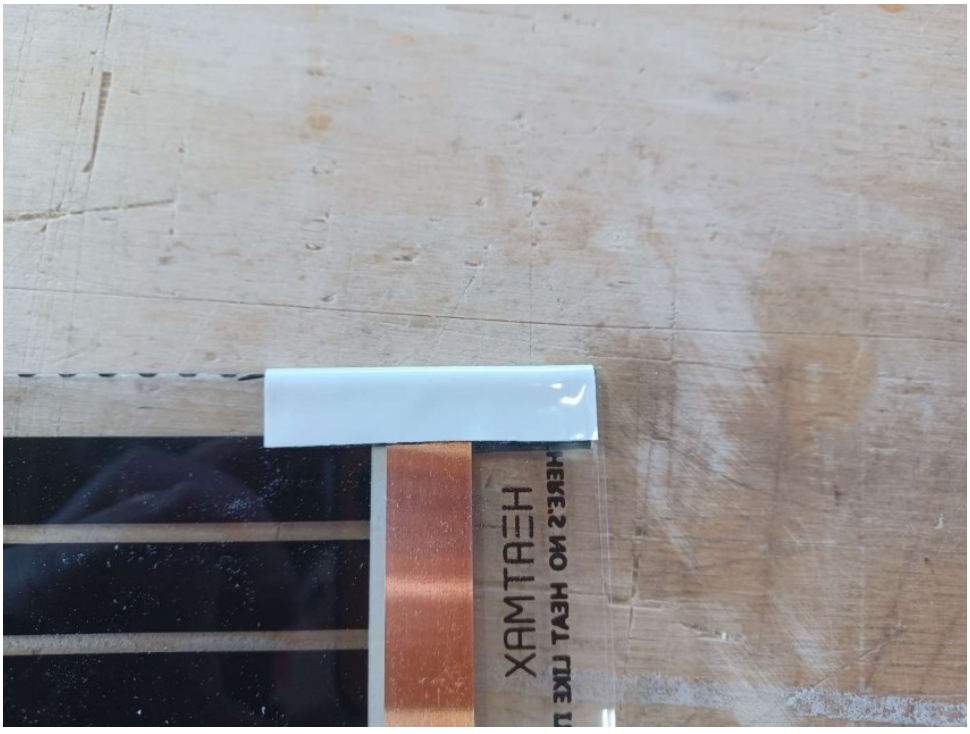


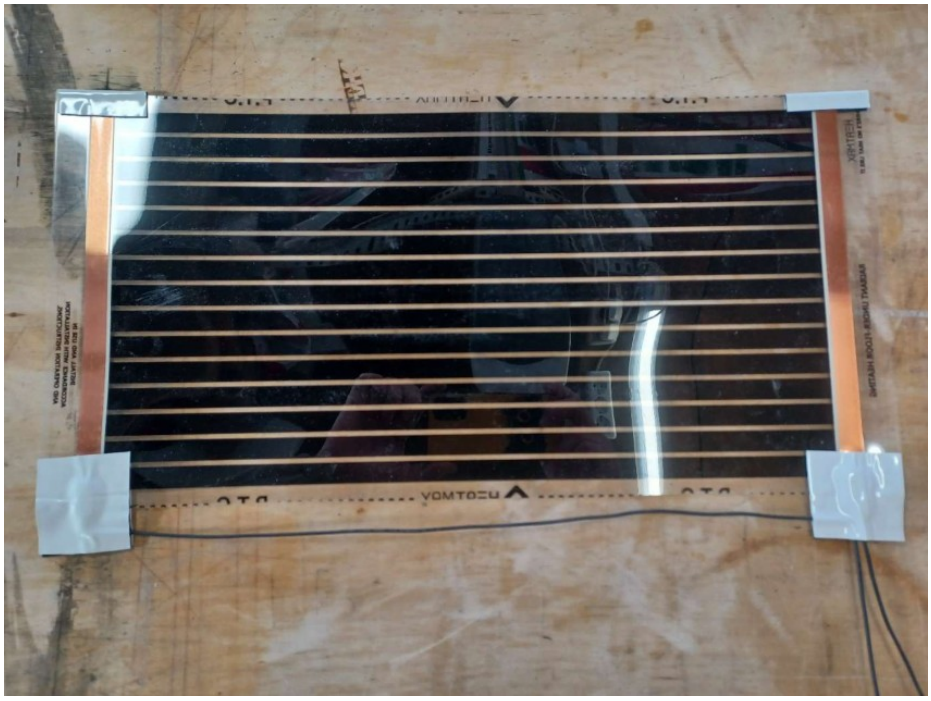
At the other connector, the two wires run side by side towards the common exit.

09 / Wires and film end



At the opposite end of the film, the photographs show the cut ends of the copper conductor strips covered with insulating tape.





The photograph shows the prepared heating film, with both connectors and the opposite film ends covered.

10 / Preparing the thermal fuse

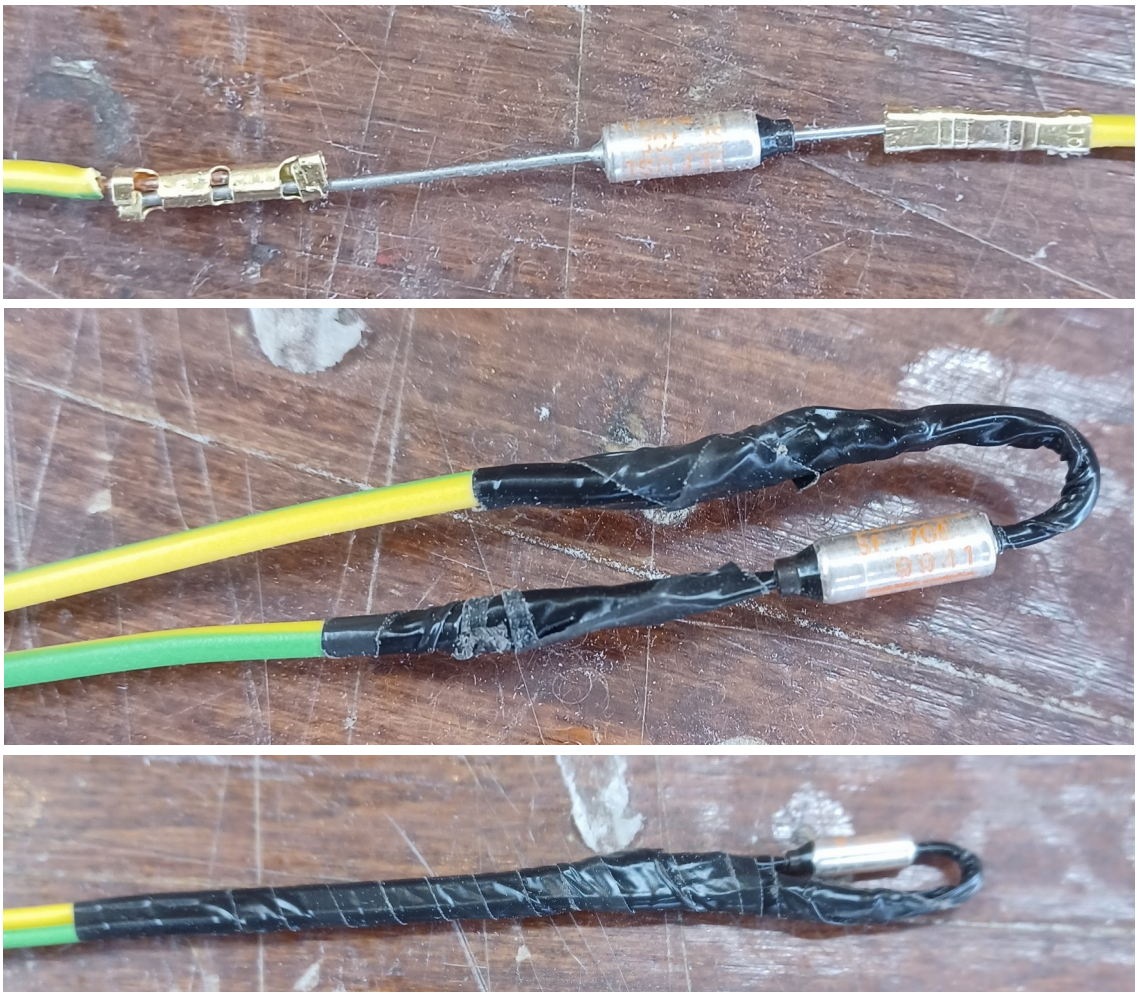
The sample contains a thermal fuse with a rated opening temperature of 77 °C. In the workshop, 0.5 mm² wire, crimp splice connectors and insulating tape were used. Soldering heat can damage or activate the thermal fuse, so the connection shown was made without soldering.



The specific component in the current version is the TZ-D-077 (77 °C). Other thermal fuses cannot automatically be regarded as equivalent. Follow the manufacturer's installation and insulation instructions. The wire colour used here is unfortunate because it is officially reserved for protective earth. However, only black wire was available as an alternative, which would have made it difficult to distinguish the wires in later photographs.

11 / Thermal fuse connection

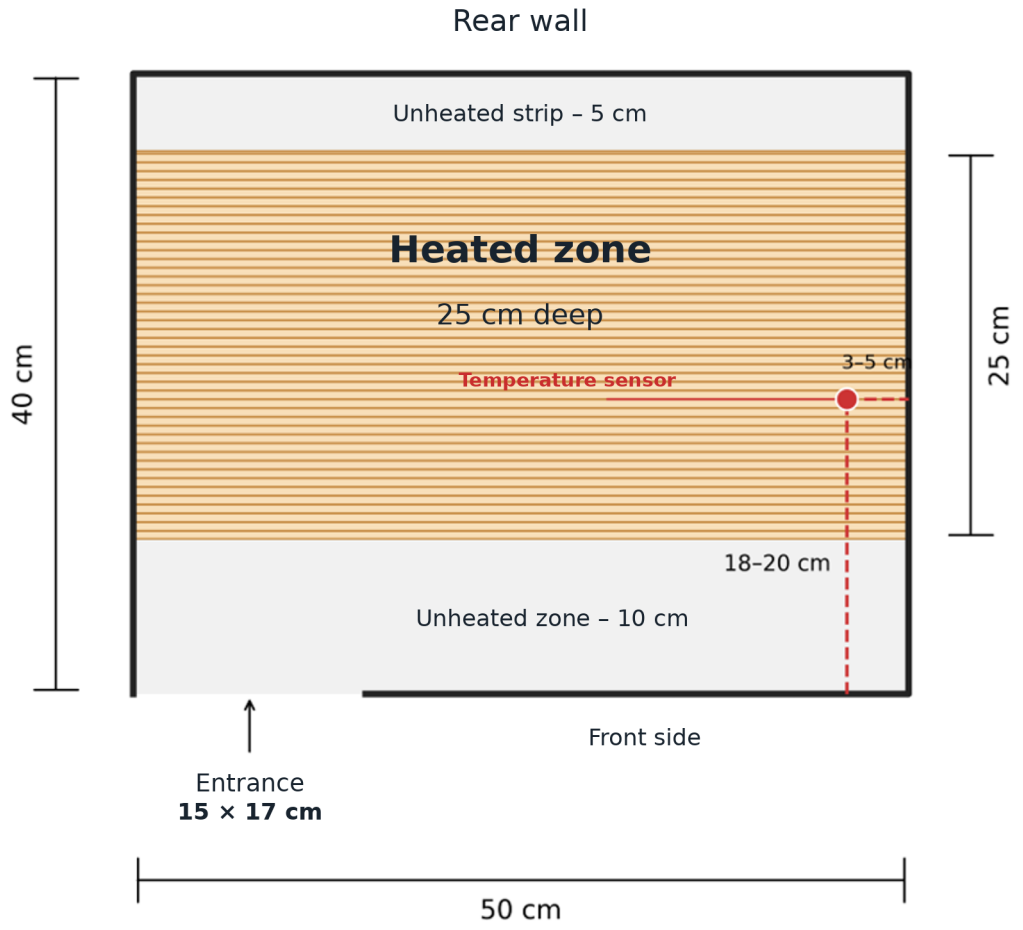
The close-up photograph shows the crimped connection. Mechanical stability is essential: the connection must not slip.

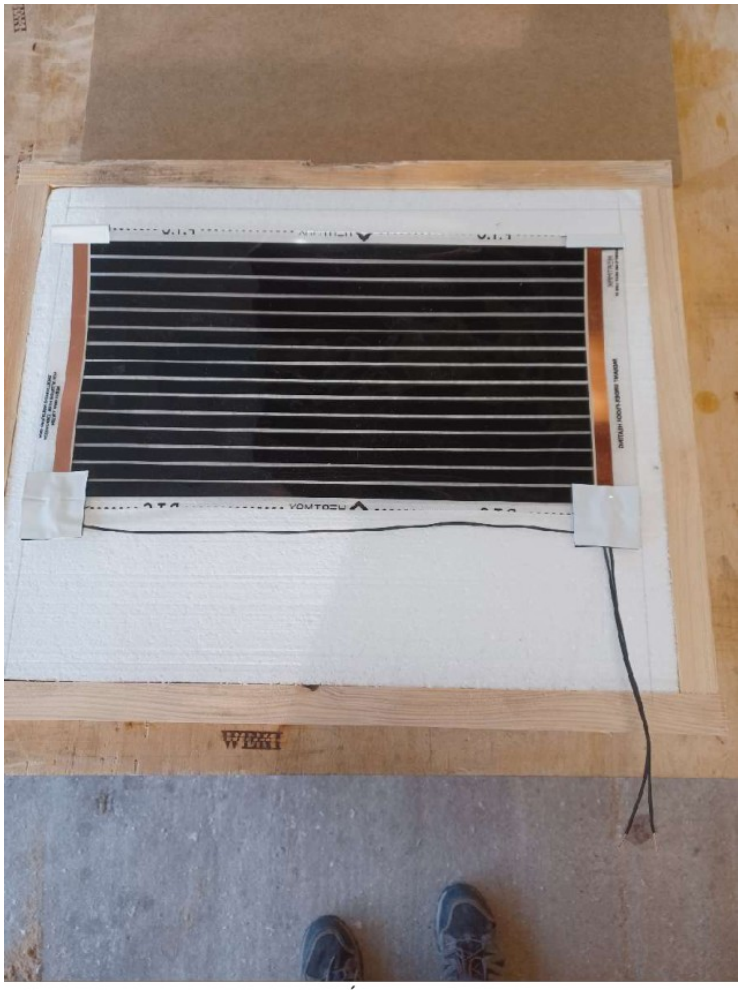


The photographs show the workshop method of insulating bare conductive surfaces. The green/yellow wire in the older photographs is unsuitable for this purpose; this colour is reserved for protective conductors. The revised design uses brown wire.

12 / Marking the heated zone

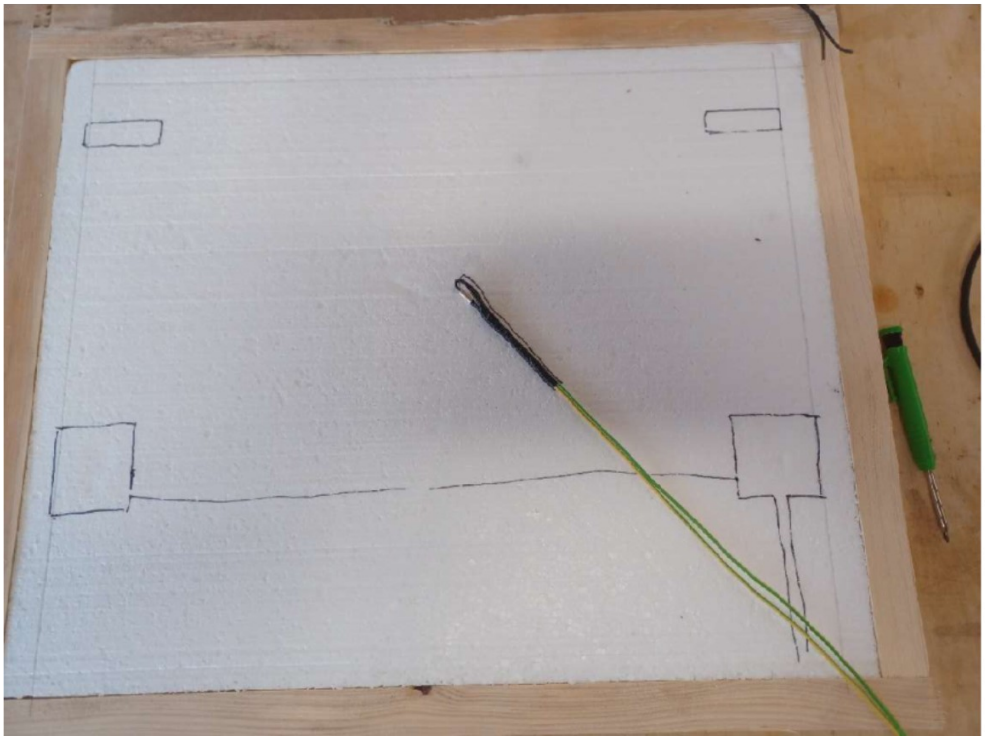
Mark the position of the insulation walls 5 cm from the edge of the frame. In the design shown, the heating film is located towards the rear of the interior and does not extend beneath the walls. Experience suggests that cats prefer the area farther from the entrance.





The photograph shows the film positioned for a trial fit. Recesses in the EPS accommodate protruding connectors, insulation and wires so the floor panel can sit evenly. Trace these protruding areas onto the EPS and recess them.

13 / Thermal fuse location



In the prototype, the thermal fuse is located beneath the central area of the heating film. Its position must also be marked on the EPS and recessed.

The intended design relies on fastening the upper panel to maintain thermal contact. The mechanical load tolerance of the fuse casing and actual activation have not yet been verified.

14 / Recesses and feet



The recesses were made with a utility knife in the workshop. The thermal fuse wires exit through the underside of the EPS; in the arrangement shown, solid wire can be pushed directly through, whereas stranded wire requires a pre-drilled passage.



Screw one 50 cm roofing batten beneath each short side of the frame. These form the feet, preventing the shelter from sitting directly on the cold ground. The photograph also shows the thermal fuse wires exiting underneath.

15 / Installing the film

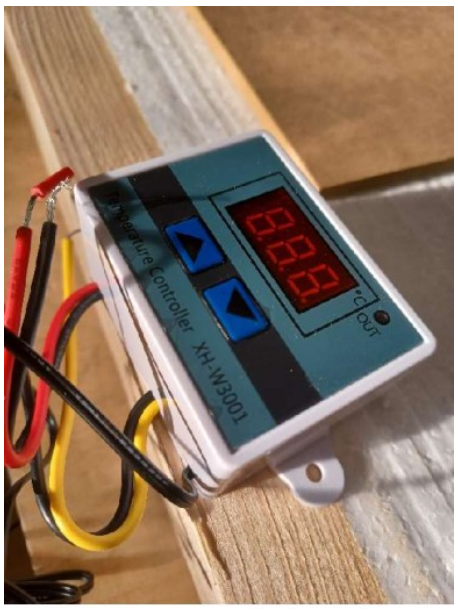


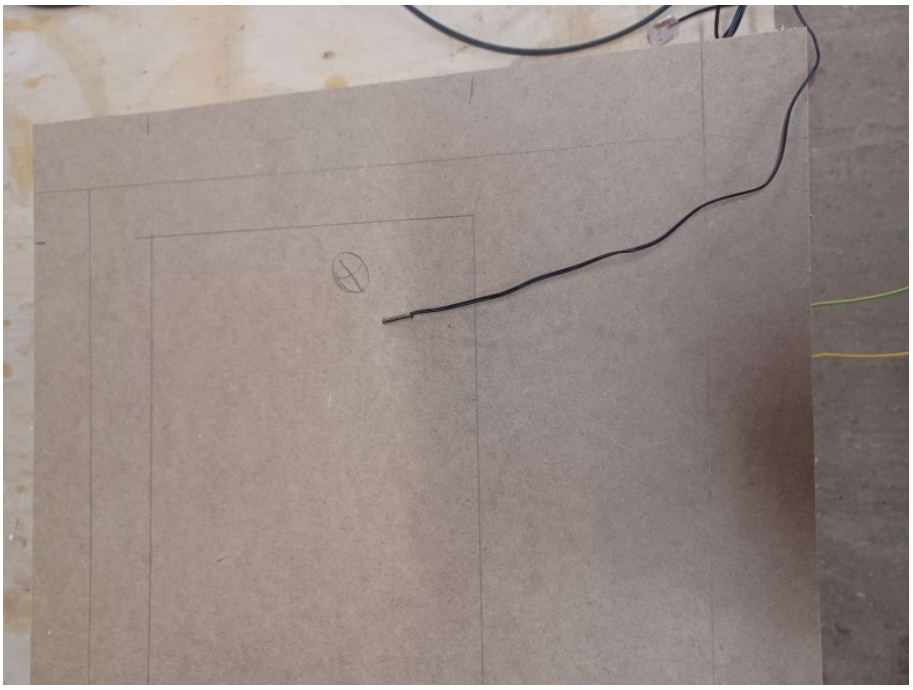
The photograph shows the heating film fitted into the recesses and the cables routed through the EPS to the underside.



In the workshop, adhesive tape temporarily held the film in place until the floor panel was fastened. The thermal fuse is visible beneath the film.

16 / Floor and sensor location





Mark the positions of the 5 cm insulation walls and the heating film beneath the floor panel. These markings illustrate sensor placement: in the prototype, the probe is on the side opposite the entrance, closer to the front, within the heated area. The diagram in section 12 and the X in the photograph indicate its location.

The probe is on the side opposite the entrance, approximately 3–5 cm from the right wall and 18–20 cm from the front wall, at the edge of the heated zone.

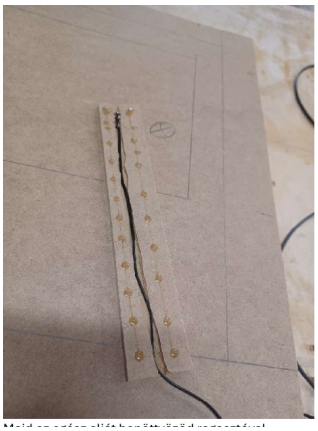
17 / Sensor protection strip







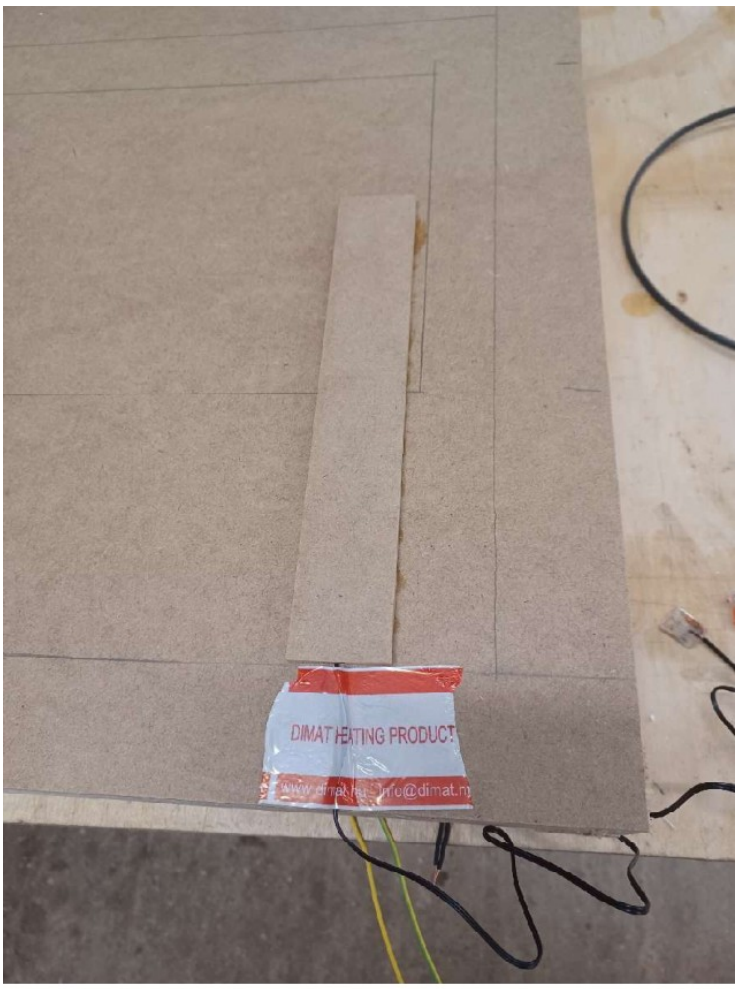
The earlier adhesive-tape sensor mounting eventually came loose, causing the probe to lose contact with the floor and stop measuring the intended surface temperature. In the solution shown, an approximately 5 × 20 cm strip of 6 mm MDF protects the probe and secures it against the heated surface. The groove was made in the workshop using a router with a 6 mm bit; previously, a utility knife was used, taking care not to let the blade slip. The groove is deep enough to prevent the strip from rocking with the probe inserted. The photograph shows the sensor secured with superglue.



Adhesive is applied at several points on the underside of the protective strip.

The metal surface of the probe is in direct contact with the floor.

18 / Securing the probe



The photograph shows the protective strip fitted to the floor. In the workshop, the wire was temporarily secured with adhesive tape while the glue set. During the original build, the floor panel was not screwed down, and this was only noticed after the third wall had been fitted. Fortunately, the adhesive had not fully hardened, so the walls could be removed. This mistake can be avoided by fastening the floor in time. This is the point at which it must be done.





19 / Preparing the walls

The walls of the sample shelter are 35 cm high. Experience suggests that this provides enough room for a cat while keeping the smaller interior easier to heat. A lower ceiling may be uncomfortable. The dimensions are based on the 50 cm width of the EPS board, allowing 35 cm high wall pieces to be cut across it.



EPS can be cut cleanly with little debris using a sharp, new utility knife blade. The builder uses 60-second PUR adhesive foam to attach the walls, allowing fast work and a strong bond.

The film, thermal fuse, thermostat and wiring are omitted in the unheated version.

20 / Gluing the walls



Apply the adhesive foam evenly and in an appropriate quantity. With the product shown, the builder waits 10–15 seconds after application before fitting the wall; follow the product instructions. Press the wall down until the foam protrudes slightly inside and outside, while leaving adhesive between the surfaces. Excess foam can be trimmed after curing.



When gluing the next wall, apply adhesive foam to the joining surfaces of both the floor and the existing side wall. Fit the remaining walls in the same way.

21 / Fastening the floor – important sequence

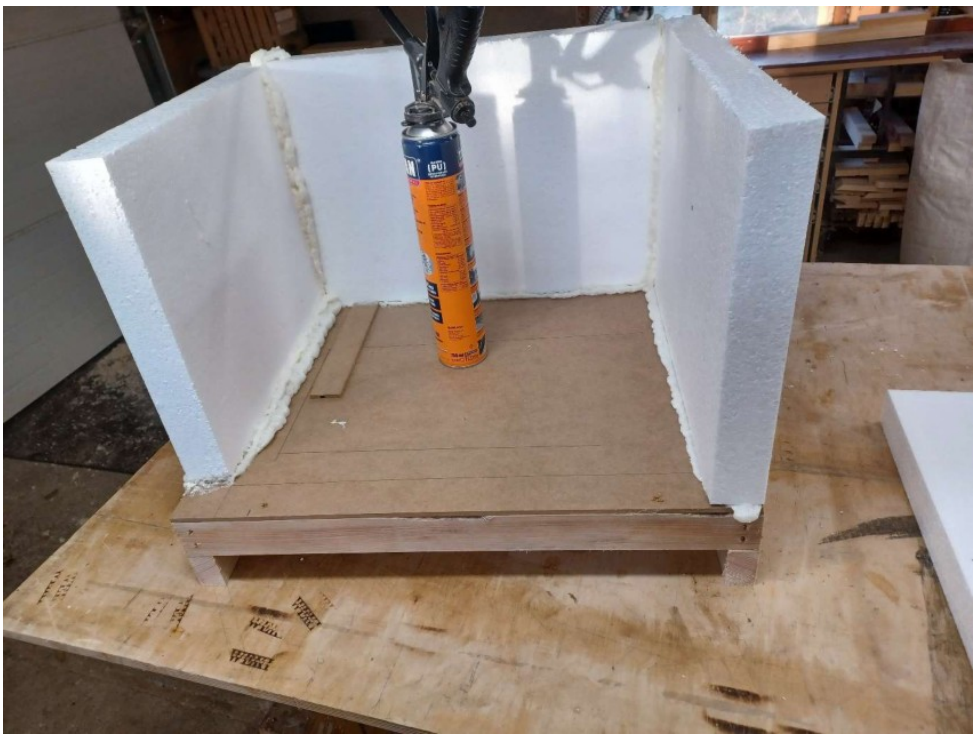


Before gluing the walls, be sure to screw the floor panel to the timber frame. Otherwise, the glued walls will have to be removed.



The photograph shows the fastening screws omitted during the original build.

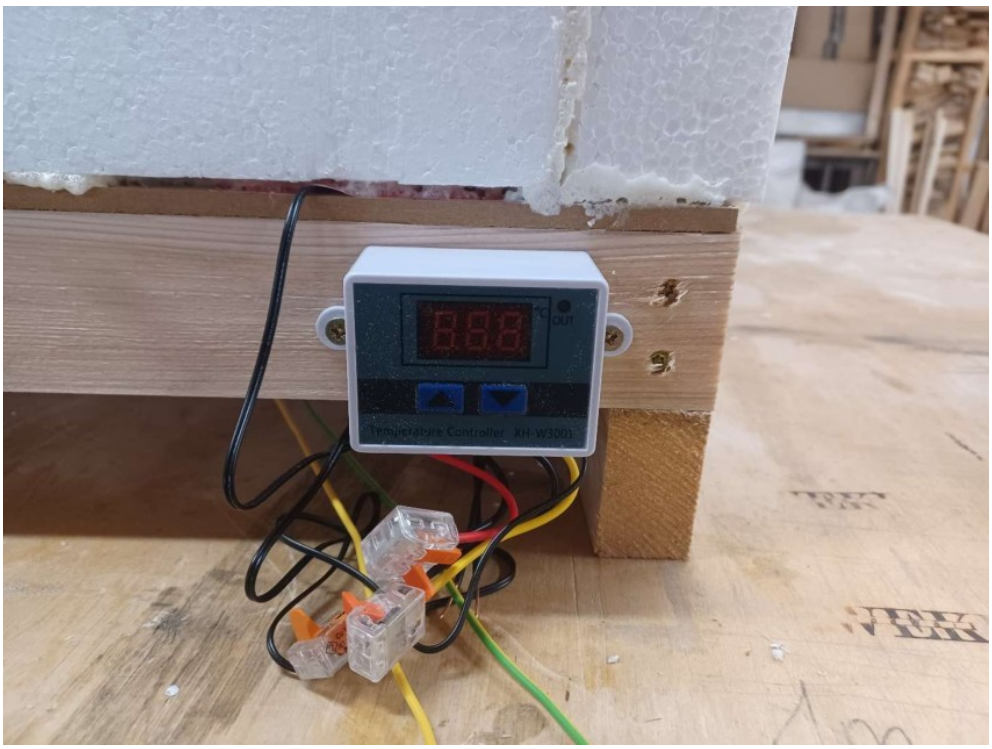
22 / Assembling the walls





Attach the roof with PUR adhesive foam in the same way as the side walls. Additional foam may be needed to fill any height differences.

23 / Thermostat and entrance



The thermostat of the example shown is outside, on the side where the heating film, thermal fuse and sensor wires exit.



Cut the entrance into the front wall. In the builder's experience, an opening 15 cm wide and 17 cm high is suitable.

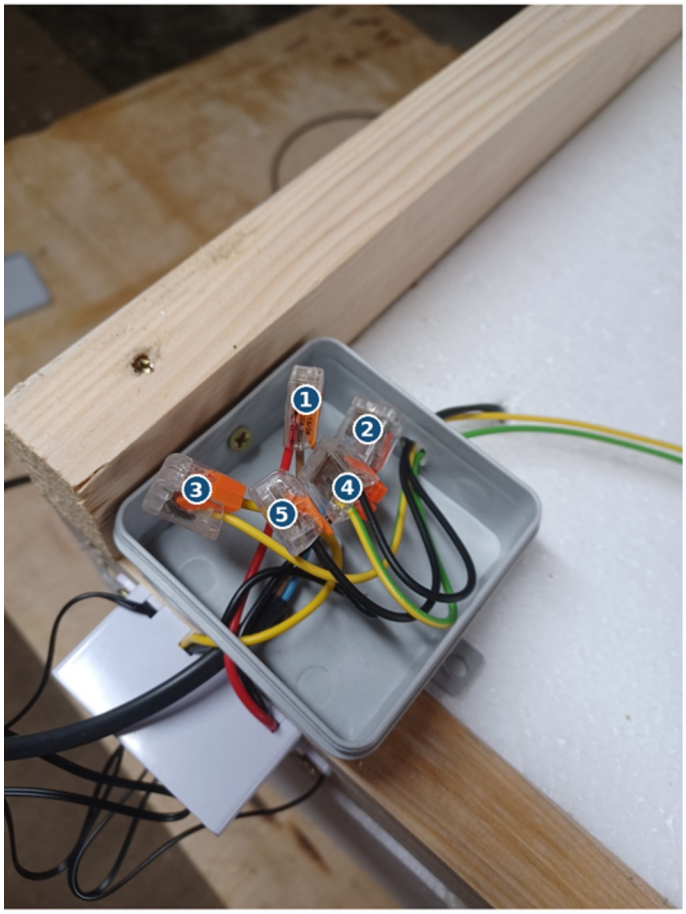
24 / Junction box

The shelter was turned upside down to illustrate the junction box location.



An 85 × 85 mm junction box on the underside of the prototype accommodates the connections.

Heated bed – junction box wiring



1. **230 V live (L)**
   Brown → red, thermostat input
2. **230 V neutral (N)**
   Blue → black, thermostat input
3. **Switched live**
   Yellow → one thermal fuse lead
4. **Thermal fuse output**
   Green/yellow → black, heating film
5. **Heating film neutral (N)**
   Black → black, thermostat output

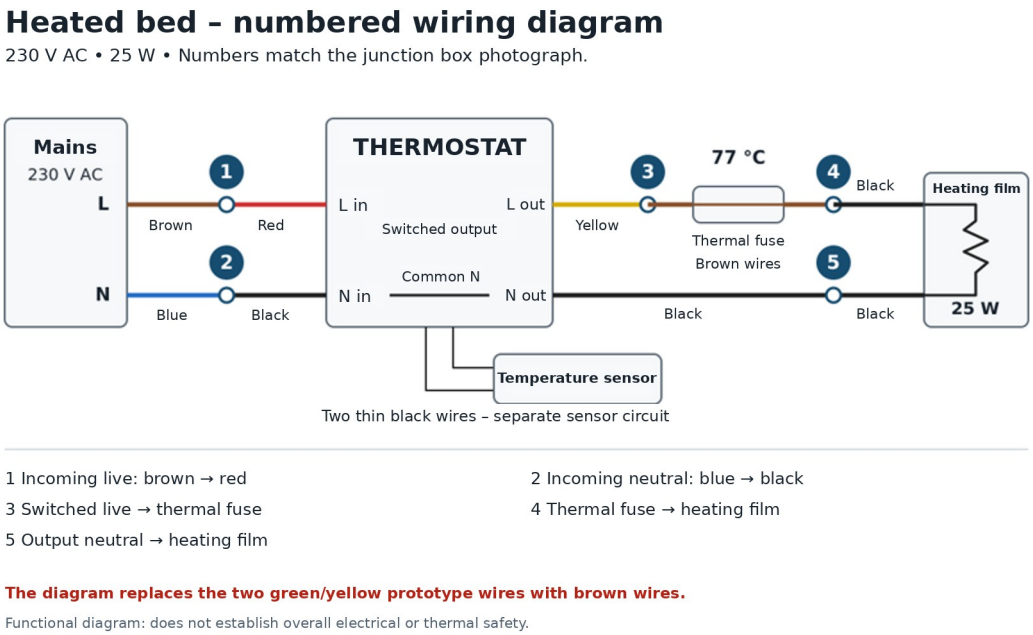
PROTOTYPE – different wire colours
Both green/yellow thermal fuse wires must be replaced with wires of an appropriate live conductor colour.
Green/yellow must not be used as live.

The example shown uses WAGO wire connectors. The following diagram illustrates the functional arrangement of the system.

The current junction box is an 85 × 85 mm Helia IP54 model. The box's IP rating does not mean the entire assembly is waterproof.

Electrical system diagram

The circuit refers to the specific XH-W3001 thermostat shown. Wire colours may differ on other models. The actual terminal assignments and manufacturer's documentation must be checked.



1 Incoming live: brown → red
2 Incoming neutral: blue → black
3 Switched live → thermal fuse
4 Thermal fuse → heating film
5 Output neutral → heating film

The diagram replaces the two green/yellow prototype wires with brown wires.

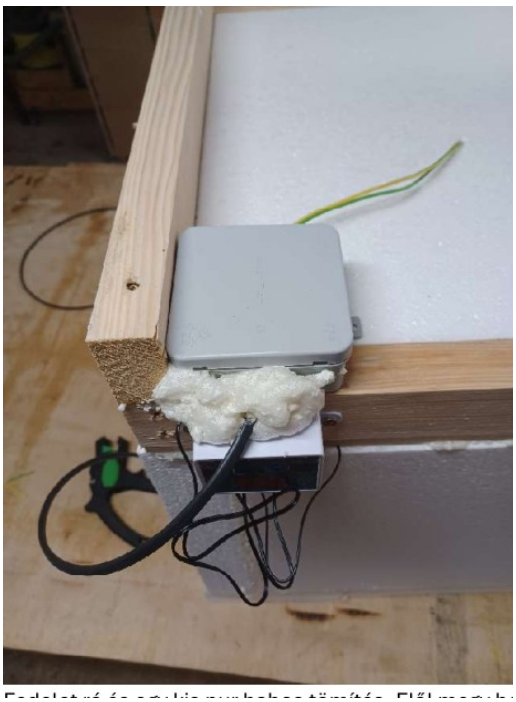
Functional diagram: does not establish overall electrical or thermal safety.

The thermostat relay switches the heating film circuit, and the thermal fuse is an independent interrupter in series with the film. The two thick black wires share a common neutral point in the thermostat shown. The two thin black wires belong to the sensor.

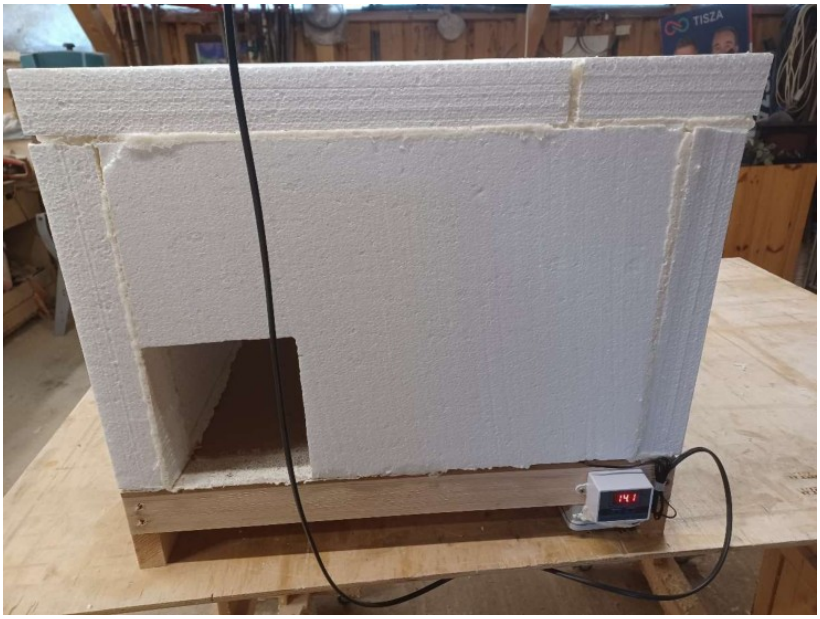
With a reversible mains plug, single-pole switching does not ensure isolation from the supply.

The circuit diagram is functional and does not establish protection against electric shock in the finished assembly. Suitable insulation, strain relief and environmental protection are required for mains components. A 30 mA residual current device (RCD) is strongly recommended and mandatory where regulations require it.

25 / Wiring and initial test



The photograph shows the closed junction box. The four mains wires of the thermostat and the supply cable enter at the front, while the heating film and thermal fuse wires enter at the rear. PUR foam was used in the workshop to fill the openings.



During the functional test, the builder used an upper threshold of 32 °C and observed whether the thermostat switched off when the set temperature was reached. His experience-based settings for outdoor shelters are a lower threshold of 20 °C and an upper threshold of 27 °C.

PUR foam is not a certified cable entry or strain relief device. Separate mechanical cable fastening is necessary. A functional test does not replace electrical safety checks.

Once the adhesive foam has fully cured, trim off the protruding excess.

26 / Outer covering



Turn the shelter onto its side and wrap it in three or four layers of stretch film, available for example from OBI. Secure the start of the film with adhesive tape. Clean film adheres well to itself and can be wrapped tightly. Apply three or four separate layers to the roof, leaving an overlap all around and smoothing it down onto the side walls.

27 / Strip curtain



Secure the film joints and lower edge with adhesive tape. Transparent tape gives a neater finish.



Cut the film covering the entrance into vertical strips to form a strip curtain. For the first two or three days, the strips can be folded up and smoothed against the outer film while the cat becomes accustomed to its new shelter. Then release the strips to reduce the entry of wind and cold air.

28 / Finished shelter



Finished shelters can be placed outdoors, but only in covered locations protected from direct rain and snow. The electrical components are on the more sheltered side, closer to the wall. The shelter is not waterproof.

29 / Shelter in use





The photograph shows the shelter's first resident, with the entrance curtain still folded up.

Measurements and thermostat settings

The thermostat operates with two separate thresholds: it switches on at the lower threshold and off at the upper threshold. The builder's experience-based settings for outdoor shelters are 20/27 °C. Settings are retained after a power outage.

Continuous heating experiment:

Time	Film temperature
10 min	44 °C
30 min	77 °C
60 min	approx. 90 °C, still rising

The 25 W film operated continuously between two 3 cm EPS sheets at an ambient temperature of approximately 10 °C, with a 5–6 kg load pressing down and a probe measuring at the centre. The PTC characteristic did not limit the temperature to 44 °C. This prompted the introduction of a separate thermal fuse.

In another experiment, with 6 mm MDF and 3 cm XPS, the underside of the film was approximately 44 °C when the floor surface reached 32 °C. In the workshop, the floor reached 32 °C from 10 °C in 10–15 minutes. A single measurement of total system power during heating was 30–32 W.

At the 20/27 °C thresholds, thermal inertia caused an undershoot of 1–2 °C and an overshoot of 1–3 °C on empty, uncovered MDF. The temperature of a covered floor is unknown. At 32 W continuous operation, the upper estimate is 0.768 kWh/day; actual consumption with thermostat control may be lower.

Placement, maintenance and experience

Place the shelter in a covered location protected from direct rain and snow. The thermostat was previously inside the space occupied by the cat, where warm, humid air and cooling caused condensation and controller failure. It has since been placed outside, on the sheltered side closer to the wall.

A blanket, towel or cloth can make the shelter more comfortable.

During summer, the shelter can remain in place with the power disconnected. In autumn, inspect the covering, cables, plug, connectors, thermostat and settings. Do not energise damaged or wet electrical components. The thermostat can be replaced; replacing the film requires partial dismantling of the walls and floor.

The builder has made more than one hundred beds and shelters over three years. Earlier experience cannot automatically be applied to the new thermal-fuse version. There has been a thermostat failure and wires have pulled out of two plugs. The method of replacing the thermal fuse and sensor behaviour in the event of an open or short circuit have not yet been verified.

Source and version

This documentation is based on the original 29-page illustrated HeatedStrayCatShelter.pdf, revisions to earlier Word versions, technical discussions in November 2026 and the Excel v2 material estimate. Edition 1.0 incorporates the author's corrections and standardised wording.