

## REFRIGERATOR

N80/N90/N100/N109/N110/N112/N145



### FIGURES FOR INSTALLATION

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Monteringsanvisningar

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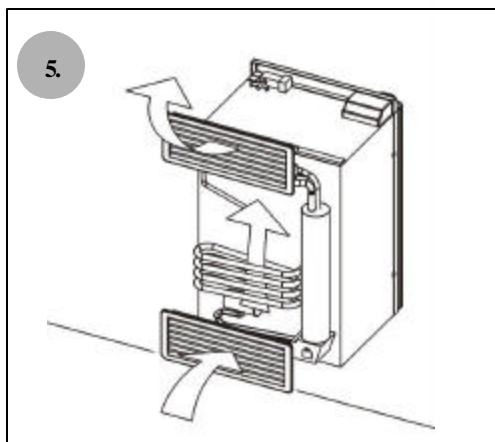
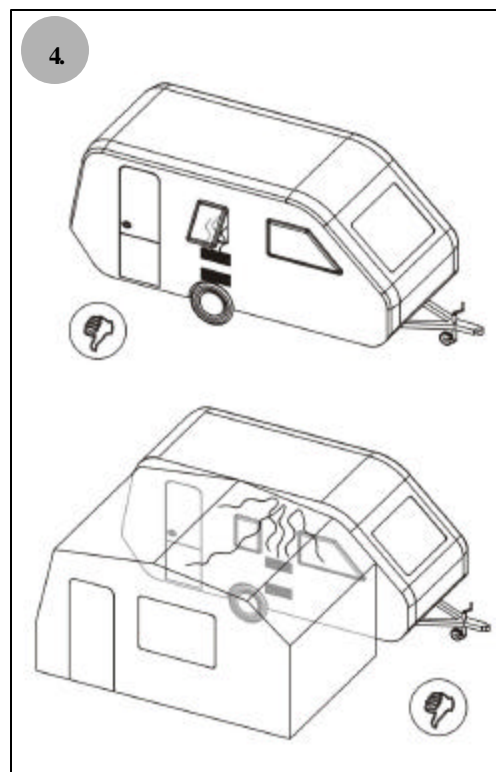
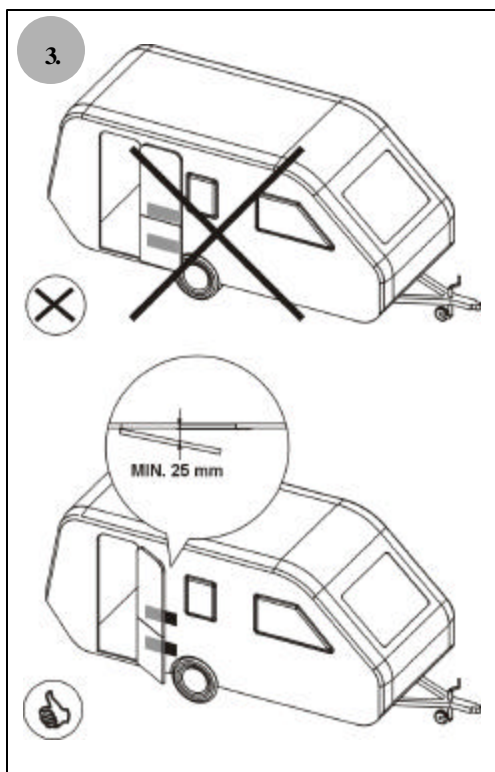
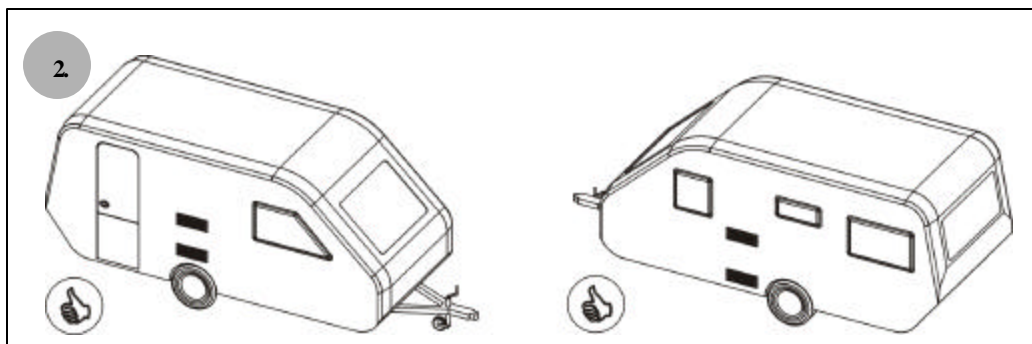
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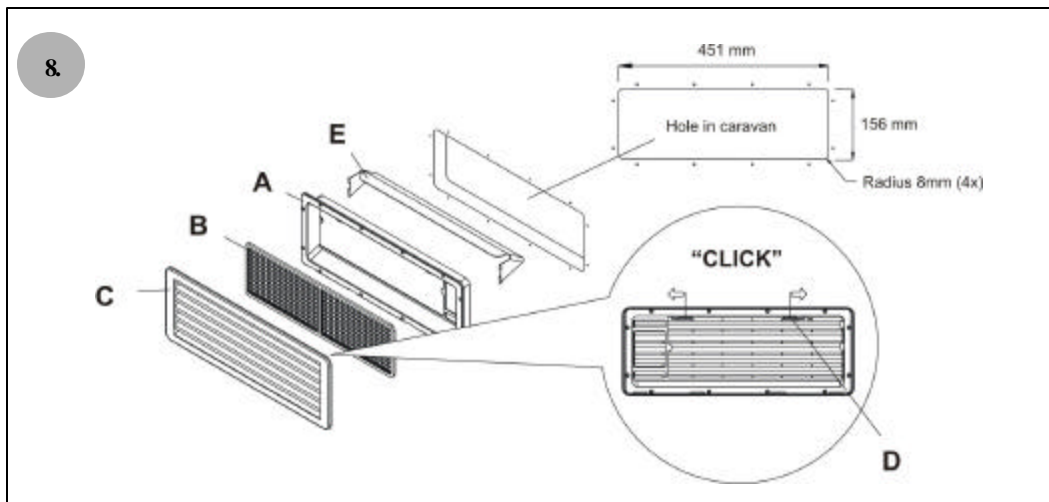
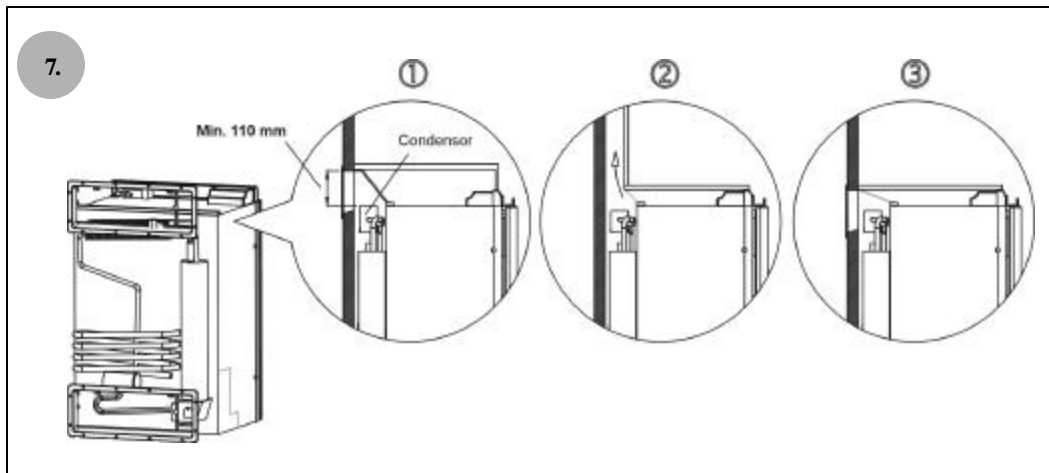
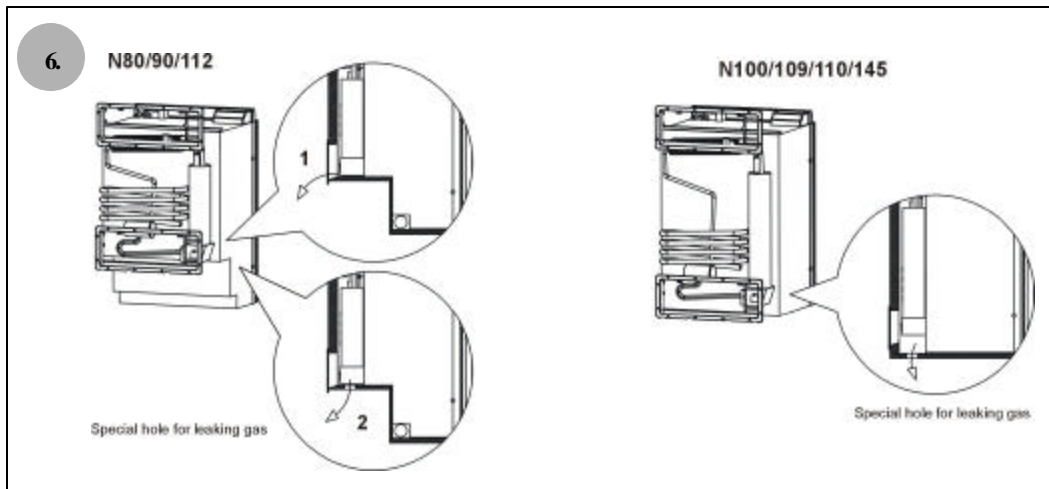
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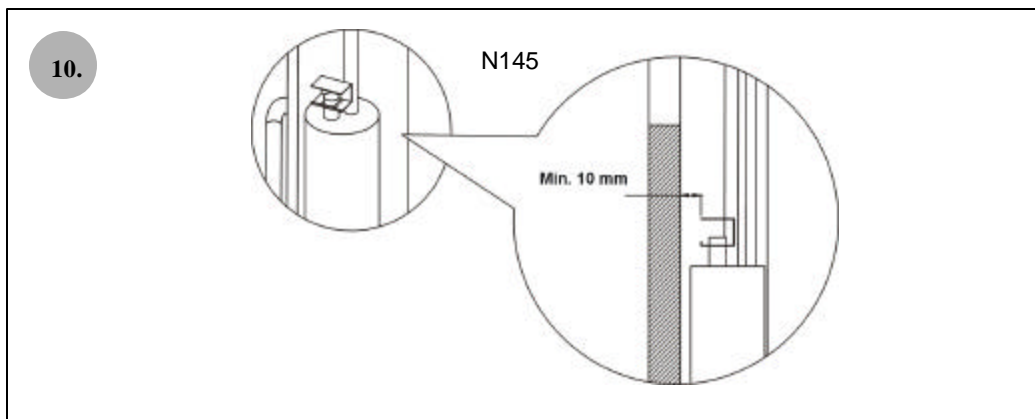
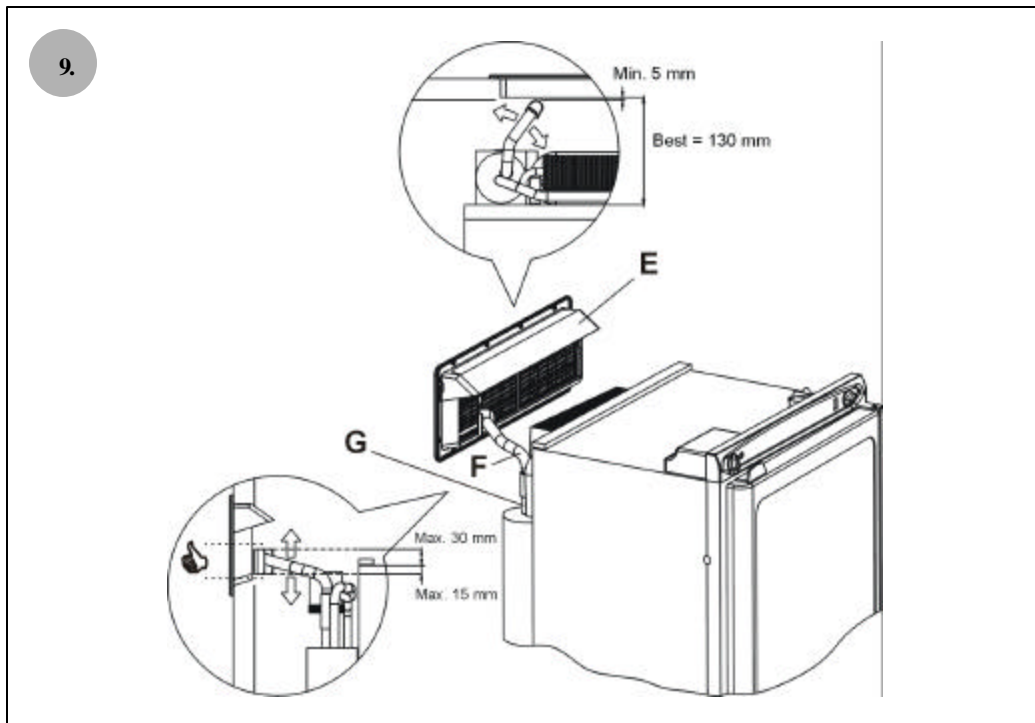
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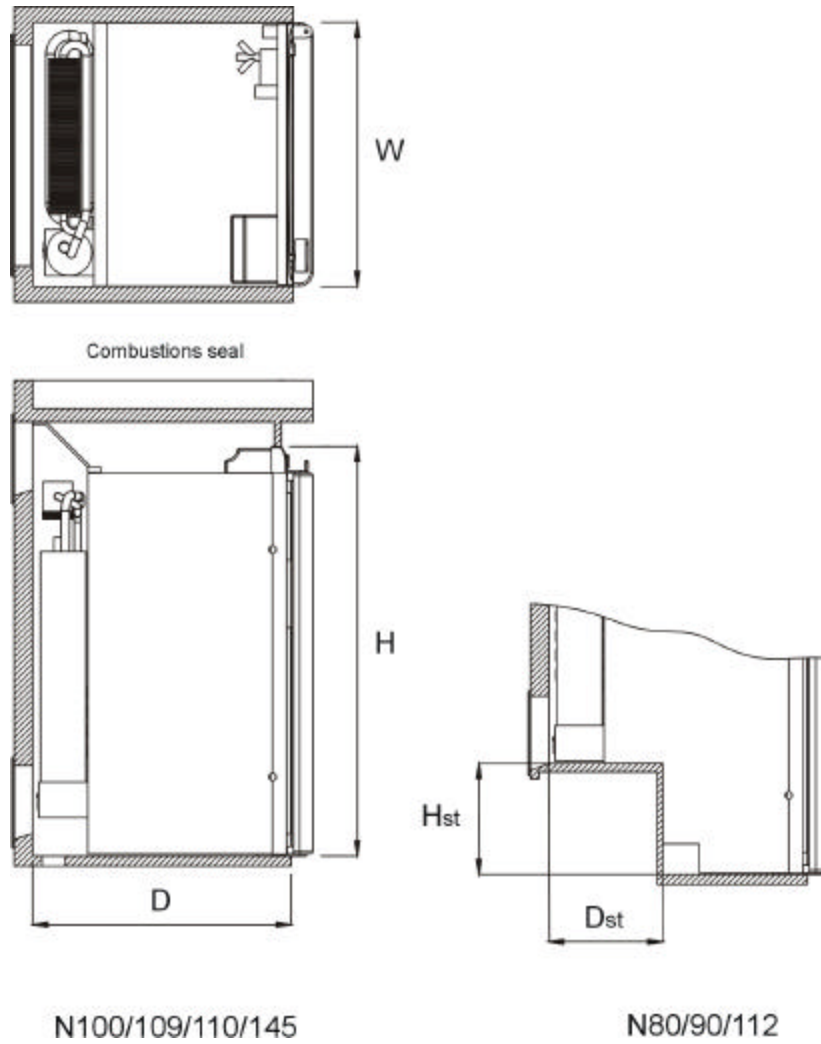
A	B	C	D	E	F	G	H	I
Model	Dimensions H x B x D (mm) Depth incl. door	Gross volume incl. freezer (L)	Net volume incl. freezer (L)	Volume freezer (L)	Input ** (kWh/24h)	Input ** (gr./24h)	Net weight (kg)	Operation
N80 Px x	821 x 486 x 543	81	75	10	2.5	238	22	Manual (piëzo)
N80 Ex x	821 x 486 x 543	81	75	10	2.5	238	22	Electric
N90 Px x	821 x 525 x 543	91	84	11	2.8	238	26	Manual (piëzo)
N90 Ex x	821 x 525 x 543	91	84	11	2.8	238	26	Electric
N100 Px x	821 x 525 x 543	97	91	11	3.3	340	30	Manual (piëzo)
N100 Ex x	821 x 525 x 543	97	91	11	3.3	340	30	Electric
N100 Ax x	821 x 525 x 543	97	91	11	3.3	340	29.5	Smart Energy Selection
N109 Ex x	821 x 525 x 543	103	95	11	3.3	340	26.5	Electric
N110 Px x	821 x 525 x 603	103	95	11	3.0	340	30.5	Manual (piëzo)
N110 Ex x	821 x 525 x 603	103	95	11	3.0	340	30.5	Electric
N112 Px x	821 x 525 x 632	113	107	11	3.1	340	26.5	Manual (piëzo)
N112 Ex x	821 x 525 x 632	113	107	11	3.1	340	26.5	Electric
N145 Ex x	1300 x 525 x 543	141	138	23	4.2	420	39	Electric
N145 Ax x	1245 x 525 x 543	141	138	23	4.5	420	38	Smart Energy Selection





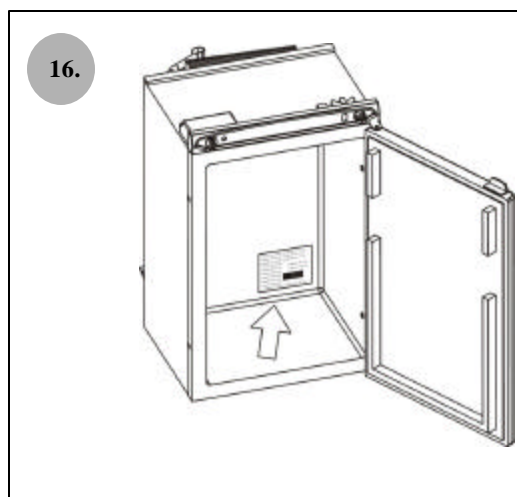
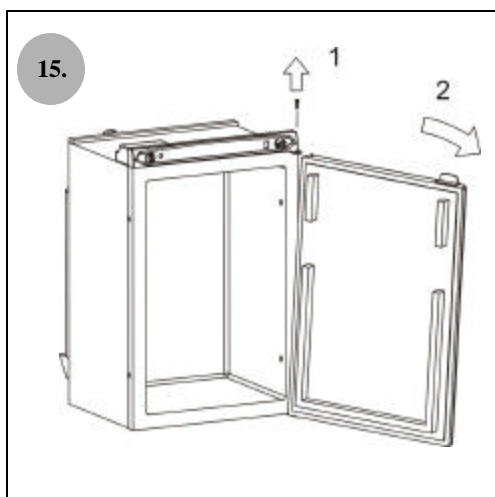
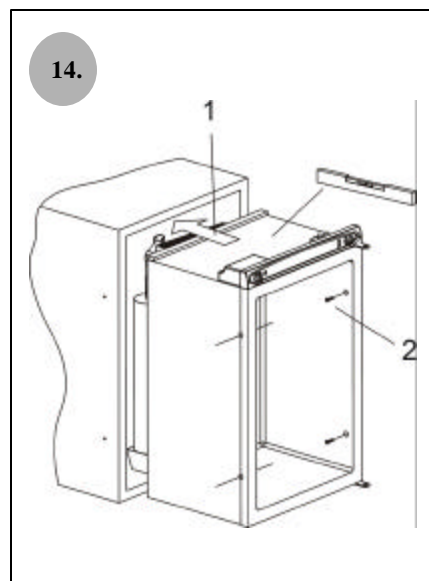
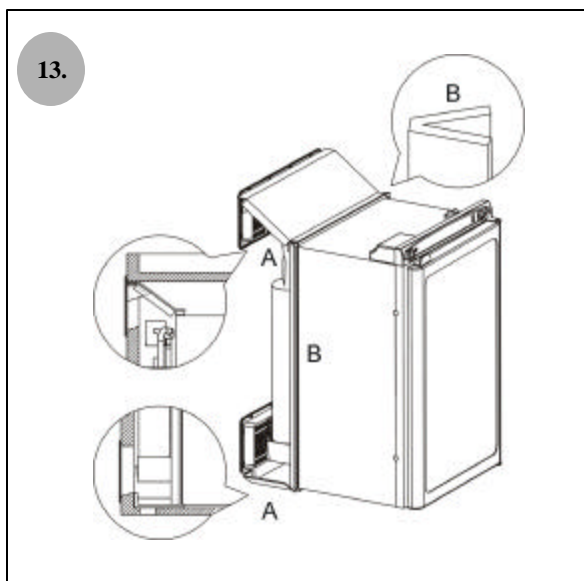


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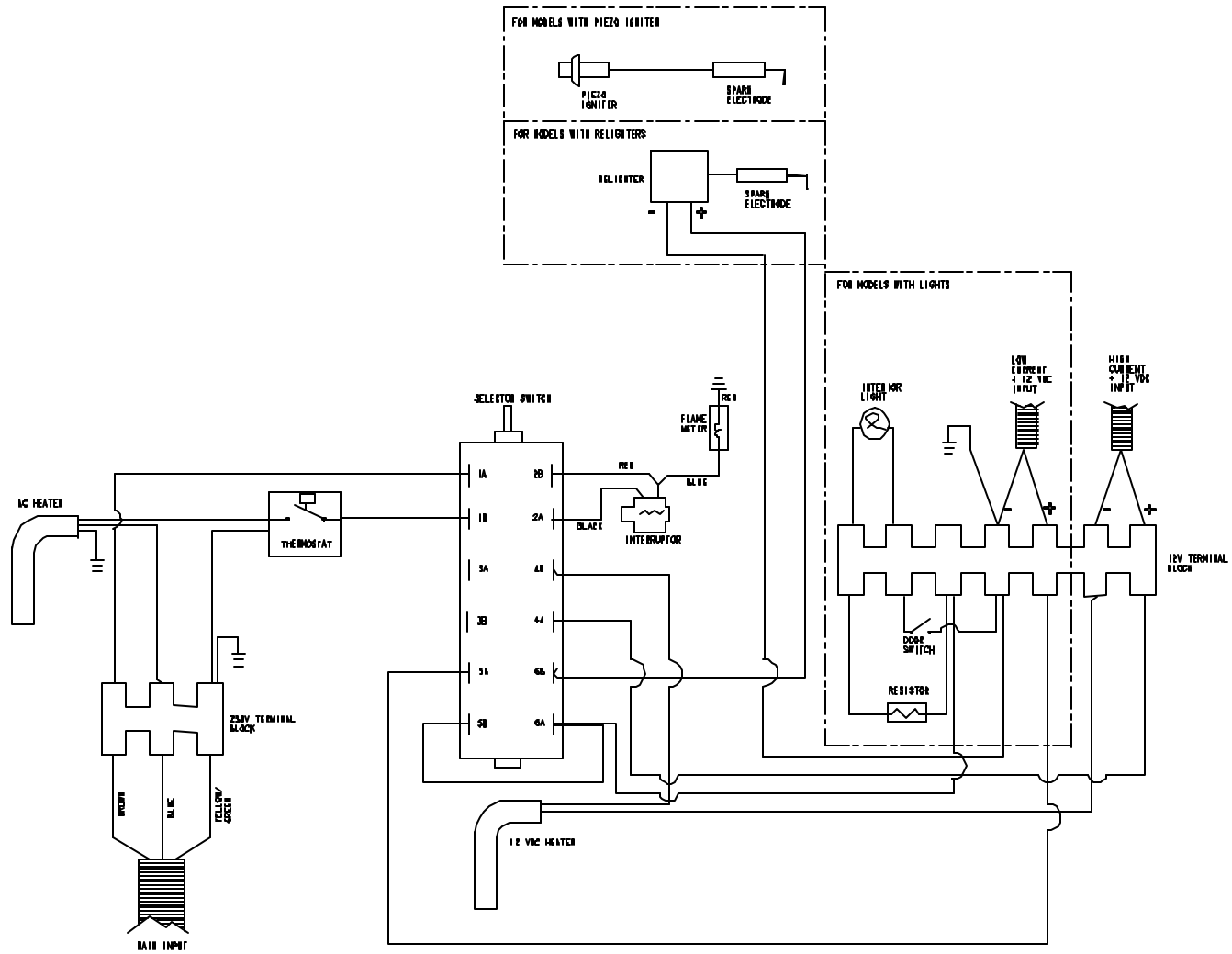


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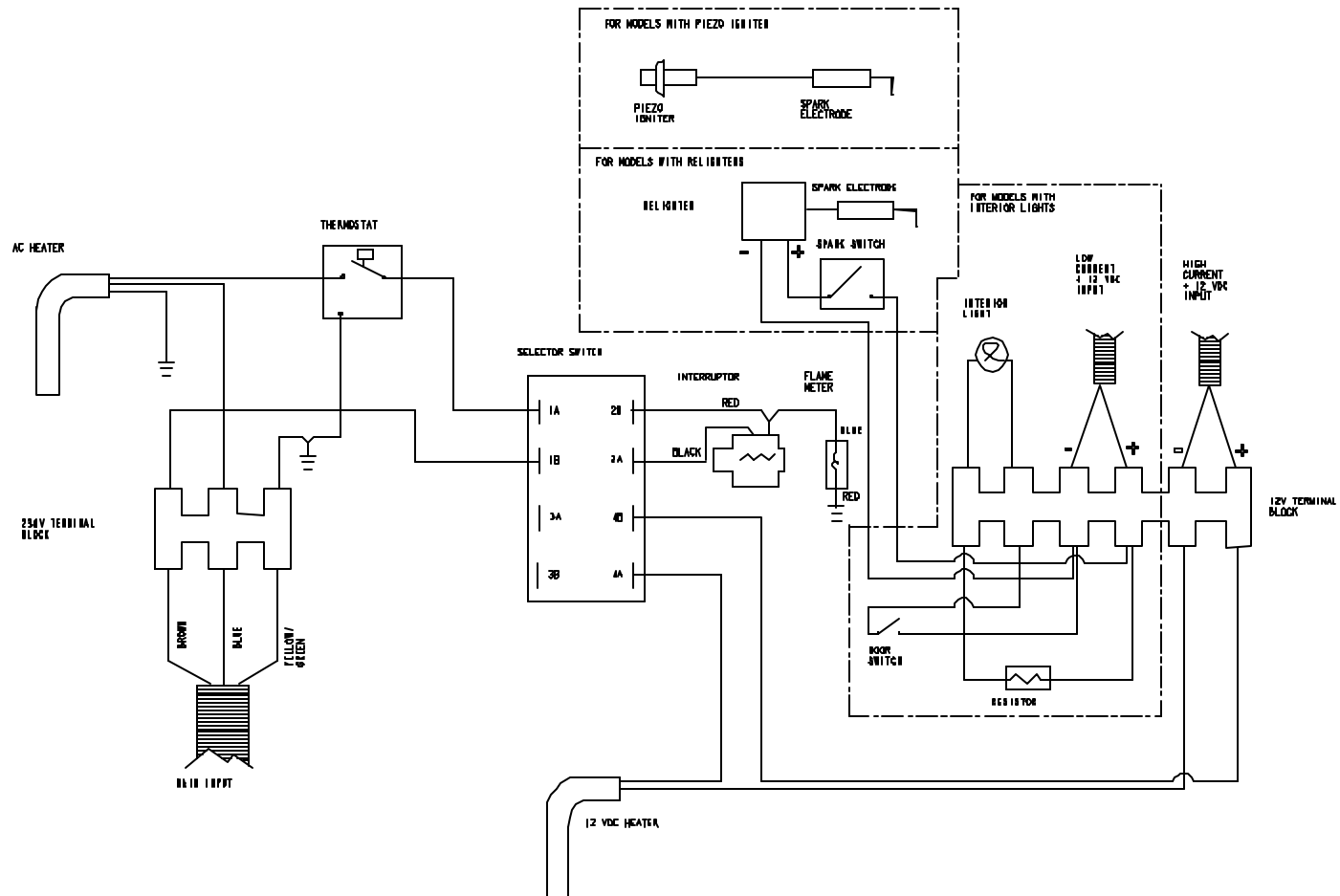
Model	H	W	D	Hst	Dst
N80	825	490	515	220	235
N90	825	529	515	220	235
N100	825	529	515	-	-
N109	825	529	515	-	-
N110	825	529	515	-	-
N112	825	529	568	220	235
N145A	1250	529	515	-	-
N145E	1305	529	515	-	-



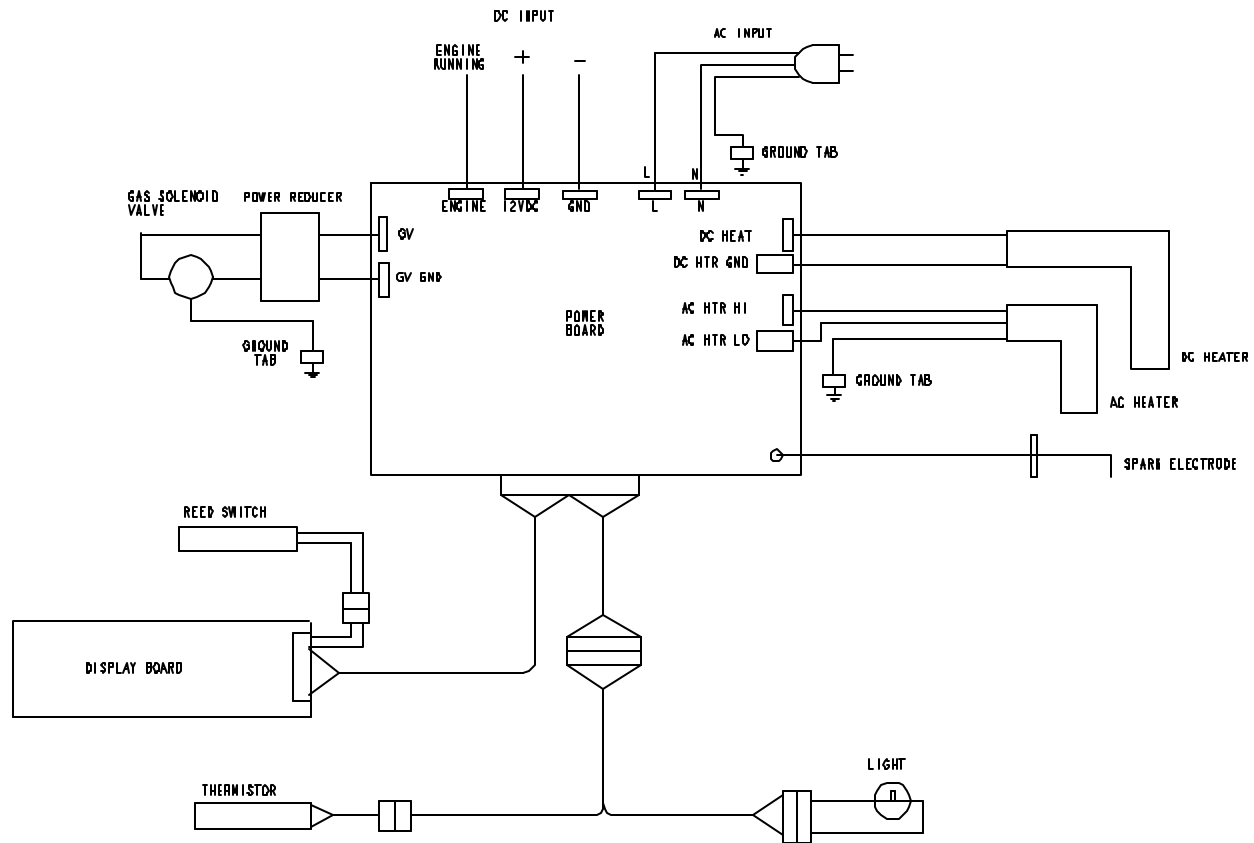
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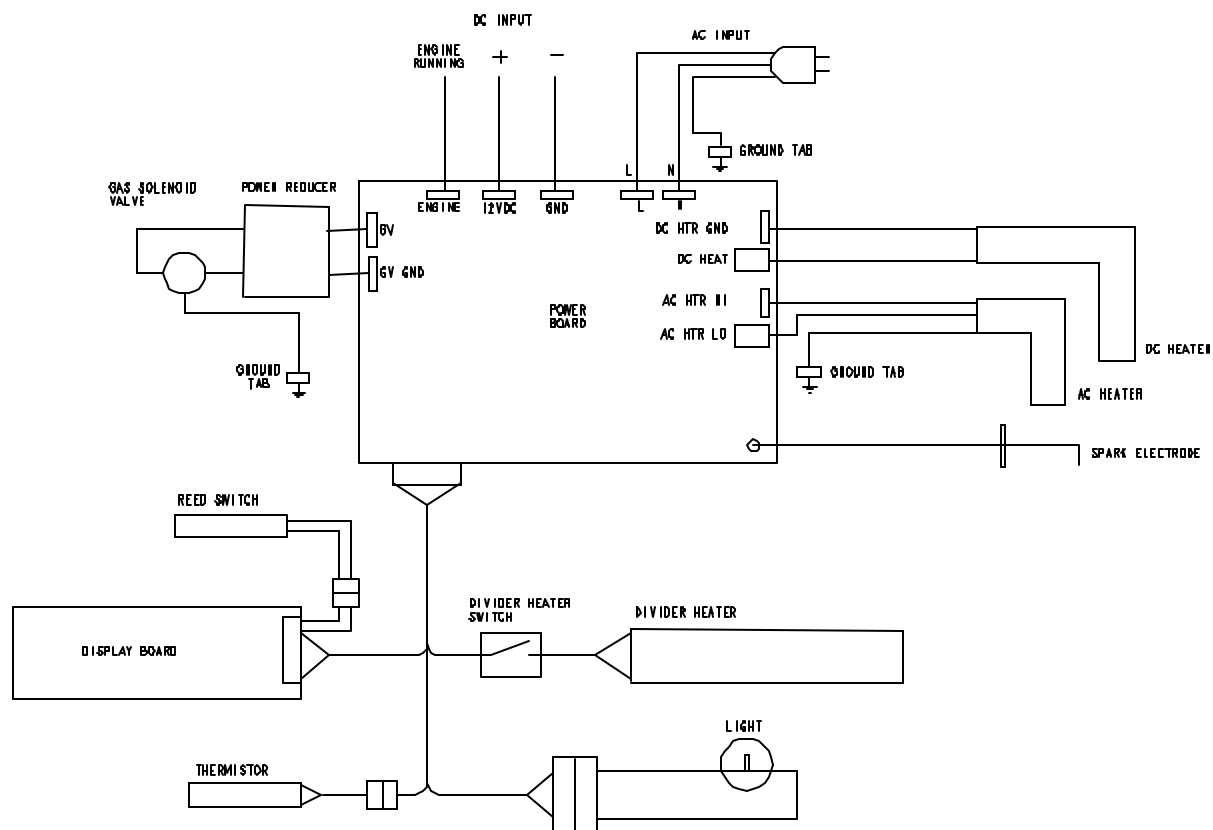






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## 1. INTRODUCTION

This installation manual concerns the Thetford absorption refrigeration models N80, N90, N100, N109, N110, N112 and N145 and serves as a guide for the correct and safe installation of the refrigerator. Thetford refrigerators are a category C11 (EN 1749) product: “appliances with gas as energy source and which need to be installed isolated from the living area”.

Read this installation manual carefully before installing the refrigerator. Referrals to explanatory illustrations at the beginning of this manual are common.

### 1.1 Application

This appliance has been designed for use in caravans and motor homes. When installing in any other vehicle, comply with the requirements set for that particular vehicle.

### 1.2 Technical data

Category C11\*  
 AC 230V (50/60 Hz)  
 DC 12V  
 Gas type I3+ (G30: 28-30/G31: 37 mbar)\* (Countries : BE, FR, IE, LU, PT, ES, GB, GR, IT)  
 I3B/P (G30/G31: 28-30 mbar)\* (Countries : DK, DE, IS, NL, SE, FI, NO)  
 (G30 = Butane, G31 = Propane)

\* EN 732 specifications for liquid gas appliances – Absorption refrigerators

#### 1. FIGURE 1: Specifications of other refrigerator models

A	B	C	D	E	F	G	H	I
Model	Measurements H x B x D (mm) depth incl. door	Gross volume incl. freezer (L)	Net volume incl. freezer (L)	Volume freezer (L)	Input ** (kWh/24 h)	Input ** (gr./24h)	Net weight (kg)	Operation

\*\* average energy use at a surrounding temperature of 25°C and with proper installation

## 2. SAFETY INSTRUCTIONS

### 2.1 Alerts

The following alerts are used in this manual:



“**Warning**” indicates harm to the product or installer if the installer fails to carry out the described procedures carefully. Non-observance may result in serious injury to the installer or damage to the product.



“**Guideline**”, points at a condition that needs to be taken into account during installation.



“**Important**” denotes supplementary information for the installer and alerts the installer to potential problems.



“**Recommended**”, this situation is partially recommended.



“**Discouraged**”, this situation is partially discouraged.



“**Prohibited**”, this situation is not to occur.

## 2.2 Warnings



- Install the refrigerator in accordance with the manufacturer's instructions and local/national laws.
- Incorrect installation or maintenance of the refrigerator may cause physical injury and/or damage to the refrigerator.
- Never use naked flames whilst performing maintenance or repairs on gas lines or when checking fittings for leaks. Gas may ignite and cause an explosion resulting in serious physical injury and/or damage to the product.
- Never reposition or change the electronic or gas components or parts.
- Never open or damage the cooling device at the rear of the refrigerator. The cooling system is pressurized and contains substances harmful to health.
- There are sharp edges and corners at the rear of the refrigerator. Always wear protection against cuts when installing the refrigerator.
- Install the refrigerator somewhere completely isolated (insulated) from the living area of the caravan or motor home. Air for the burner must not be drawn from the living area of the caravan or motor home and combustion gases must not enter the living area. Combustion gases may contain carbon monoxide. Inhalation of this gas may cause tightness of the chest, dizziness and can lead to death.
- Never expose the refrigerator to water or moisture.
- To cool the system and to supply the burner with a sufficient airflow, make sure that there is always sufficient ventilation through the outside vents.
- A qualified installation engineer must install the refrigerator.



- The refrigerator and its extractor must be installed in a way that allows easy access for maintenance and repairs.
- The installation and connections must satisfy the most recent technical regulations.



- The refrigerator is designed for powering by liquid gas (butane and propane), 12V DC or 230VAC.
- The performance of the refrigerator may be affected by adjacent heat sources such as an oven or stove. Protect the refrigerator against any heat source by fitting insulation.

## 3. DETERMINING WHERE TO INSTALL THE REFRIGERATOR

Various possibilities exist for positioning the refrigerator in a caravan or motor home. However, the refrigerator's performance depends on good ventilation. Ventilation takes place through two gratings in the wall of the caravan or motor home. When deciding where to position the refrigerator, you must take into account the best place for positioning the ventilation gratings.



Always make sure that the ventilation gratings can never be blocked. Blocked gratings reduce the supply and extraction of air. An insufficient air supply can result in incomplete combustion and the forming of carbon monoxide. Insufficient air extraction can also reduce the refrigerator's cooling performance.

2

**FIGURE 2:** The perfect installation situations occur when the outside vents cannot be covered by e.g. doors.

3.

**FIGURE 3:** When the refrigerator is installed next to the caravan or motor home entry, it is imperative that the door, when open, does not block the ventilation gratings. Allow at least a 25 mm distance between the ventilation gratings and the door.

4.

**FIGURE 4:** In this situation, combustion gases may enter the living area. Such installation situations are thus not recommended.

## 4. VENTILATION

Perfect ventilation is very important to ensure the cooling system works properly. Heat is generated in the cooling system. The heat must be able to escape into the open air. Cold air extraction is necessary to allow the cooling system to cool down again and to maintain the circulation of air.

5.

**FIGURE 5:** The refrigerator is ventilated by means of two openings in the wall of the caravan or motor home across which ventilation gratings are placed. Cold air comes in through the lower grating. The cooling system heats the cold air and it takes out again through the upper grating (chimney effect).

### 4.1 Installation ventilation gratings



- Install the ventilation gratings exactly as described in this manual. Any other method of installation will invalidate the manufacturer's warranty for the refrigerator.
- Always fit the ventilation gratings at the rear of the refrigerator. Fitting them at the side will reduce the refrigerator's cooling capacity.

6.

#### **FIGURE 6: The lower ventilation grating**

Make sure the lower ventilation grating is always placed right behind the combustion chamber. This grating is also used for maintenance access. In case of models with a wheel arch recess (N80 / 90 / 112), the bottom of the lower ventilation grating must be level with the top of the wheel arch.



There must be a hole in the floor. If a leak occurs, this hole will allow the gas to stream outside instead of building up on the floor. A grating is used for this matter with the N80/90/112 models. The other models (N100/109/110/145) have a grating which is situated above floor level and therefore need an extra hole in the floor, with a diameter in conformity with local regulations, but we advice a diameter of at least Ø40 mm.

7.

#### **FIGURE 7: The upper ventilation grating**

The installation of the upper ventilation grating influences the cooling capacity. The best result is achieved when this grating is installed as far above the condenser as possible. Use at least a 110 mm distance. Situation [1] is the preferred installation procedure and creates the optimal cooling capacity. Situation [2] without a ventilation grating, but with a chimney on the roof, is a possibility. Situation [3] is often used, but results in a reduced cooling capacity.

### 4.2 Installation ventilation gratings

8.

**FIGURE 8:** A ventilation system comprises of two sets of a vent frame [A], a vent screen [B], and a vent outer [C]. To install the ventilation gratings, make, using the templates provided, a horizontal rectangular recess in the wall of the caravan or motor home.

1. Use the accompanying template to cut out the ventilation recess.
2. Seal the vent frame [A] in a watertight way by means of sealant or butyl tape.
3. **Only for the upper ventilation grating:** assembly the vent cap together with the vent frame
4. Position the vent frame [A] in place.
5. Place the vent screen [B] in the vent frame.
6. Place the vent outer [C] over the vent frame [A] and fasten it with the two retaining slides.

## 5. EXTRACTION OF COMBUSTION GASES



- The air for the burner must not come from the living area of the caravan or motor home and combustion gases must not enter the living area. The refrigerator must therefore be installed in a place completely separated (insulated) from the living area of the caravan or motor home.
- The fully installed refrigerator must allow the proper and complete discharge of combustion gases. Combustion gases may contain carbon monoxide. Inhalation of this gas may cause tightness of the chest, dizziness and can lead to death.
- The refrigerator is designed for powering by liquid propane gas, butane gas or a mixture.



- A qualified person must install gas components.
- The gas components must be installed in accordance with the latest technical regulations.
- Combustion gases must always be discharged upwards.
- The exhaust of the refrigerator must be installed so that it is always accessible for maintenance and repairs.

### 5.1 Installing the flue exhaust system

9.

**FIGURE 9:** The flue cap [E] has to be assembled together with the vent frame [A]. The exhaust tube [F] takes care of transporting the exhaust fumes and created heat outside the combustion area. The outlet of the exhaust tube has to be close to the bottom-side of the vent. By rotating (see arrows) the exhaust tube and sliding it over the flue [G] you can adjust it so that the outlet of the exhaust is in the position as shown in the drawing below.



- It is important to always keep a distance of 5mm minimum from the vent!
- The outlet of the exhaust tube has to be close to the bottom-side of the vent.
- When positioned correctly, use the clamp to fix the exhaust tube to the flue of the refrigerator.

#### *For refrigerator model N145 only*

*You do not need to install a separate extractor. The combustion gases will automatically be extracted properly via the upper ventilation grating after installation of the refrigerator.*

10.

**FIGURE 10:** Check that the minimum distance between the cover and the sides of the caravan or motor home is at least 1 cm. Make sure that the closed side of the cover faces the refrigerator.

## 6. INSTALLING THE REFRIGERATOR



- The air from the burner must not come from the living area of the caravan or motor home and combustion gases must not enter the living area. The refrigerator must be installed in a place completely separated (insulated) from the living area of the caravan or motor home.



- The performance of the refrigerator is affected by the way it is installed.
- The performance of the refrigerator may be affected by adjacent heat sources such as an oven or stove. Protect the refrigerator against any adjacent heat source by fitting insulation.
- Make sure the floor is solid and even. The floor must be able to take the weight of the refrigerator with its contents.

### 6.1 Fitting margins

11.

**FIGURE 11 / 12:** If you use Thetford combustion seals, the dimensions as mentioned in table 11/12 are required.



## 6.2 Securing the refrigerator

**13. FIGURE 13:** If you use Thetford combustion seals, these need to be fixed in the way shown in the drawing to ensure optimum insulation. Fix the upper and lower flap of the combustion seal. Fix the strips to the sides of the refrigerator in a vertical direction at the rear of the refrigerator. Fix the upper and lower flap of the combustion seal in the way shown in the drawing.

**14. FIGURE 14:** The refrigerator is installed in the unit using four screw holes on the sides (the N145 models have got six screw holes).

1. Place the refrigerator completely straight in the unit (when the caravan or motor home is level, the refrigerator should also be level).
2. Put screws through the holes on the inside of the refrigerator and screw it through the wall of the refrigerator into the unit.
3. Place the white caps over the holes.



If the size of the unit is such that the combustion seal fails to seal properly, use a different kind of sealing to keep hazardous combustion gases out of the living area of the caravan or motor home.

## 6.3 Technical drawings

Technical drawings are available for every type of refrigerator. These are precise A1 (scale 1:5) drawings stating all relevant measurements of the refrigerator and its surrounding. If wished for, Thetford is able to send you the technical drawing of your refrigerator model.

## 6.4 Fitting the door panel

**15. FIGURE 15:** In order to fit the door panel, the refrigerator's door needs to be demounted [1] Open the door, unfasten the screw from the top hinge point with a screwdriver and remove the screw. [2] Hold the door at a slight angle and lift the door from the lower hinge pin. [3] Remove the 3 screws with which the lower cover is attached to the door. [4] Remove the cover and slide the panel into the holder. [5] Repeat steps [1] / [2] and [3] in reversed order.

## 7. ELECTRICAL COMPONENTS



- The electrical connections have to comply with EN 60335-1
- A qualified person must install the electrical connection.
- The electrical components must be in accordance with the latest technical regulations.
- Wiring must be installed so that wires cannot come into contact with hot or sharp parts.

### 7.1 Connecting to the mains (230 V)



- Connecting the 230v cable to a properly earthed power point will increase the safety aspect.
- Make sure the power point is in a position that is easy to reach.
- Position the 230v power lead in such a way that it cannot come into contact with hot or sharp parts.



- The mains connection must be fitted with a 3 A fuse.
- In case of a damaged power lead with one of the SES models (Smart Energy Selection, see figure 1), this must be replaced with a Thetford power lead.

ENG

### 7.2 Connecting to a DC power supply (12 V) for all piezo and electric models (fig. 1)

These models have two 12V connection points to prevent the battery from being discharged by the refrigerator when the engine is not running.

- **The high-current power supply** (red cable +, white cable -) provides current to the 12v heating element of the cooling system. This connection point may supply 12v only when the engine of the car or motor home is running.
- **The low-current power supply** (purple cable +, black cable -) provides a continuous current of 12v for ignition of the burner and the light in the refrigerator. The 12v supply is obtained via the connection to the car or motor home battery or via the 230v AC → 12v DC transformer.

Make sure the power point is in a position that is easy to reach.



- Minimize voltage drops by thoroughly fixing the wires.
- Position the 12v power lead so that it cannot come into contact with hot or sharp parts.
- In connection with voltage drops in high-power supply, the diameter of the lead depends on the lead length: Leads longer than 6 m → for optimum performance the lead diameter should be 6 mm<sup>2</sup> (with a minimum of 4 mm<sup>2</sup>).
- The high-current power supply must be fitted with a 15 A fuse, the low-current power supply must be fitted with a 1 A fuse.

### 7.3 Connecting to a DC power supply (12 V) for all SES models (see figure 1)

The description below applies to the installation in motor homes. Please contact Thetford if you wish to install in any other vehicle.

The refrigerator is provided with a 3 wire 12v input cable:

- red: +
- white -
- black: E+ (powerless Engine+ signal, to prevent 12v power supply from entering the heating device of the refrigerator whenever the engine of the vehicle is not running)

#### To connect the + and - pole

Connect the red and white wire directly without any breakers (e.g. contact) to one of the vehicle's 12v power sources.

The 12v connection is protected on the PCB by a 30 A fuse. The control current part of the PCB is protected by a 5 A fuse.

#### To connect the E+ pole

Connect the E+ pole to a 12v connecting point that shows that the vehicle's engine is running (engine running: 12v, engine not running: no voltage= 0v)



- Position the connecting point so that it is easy to reach.
- Make sure that all connections are properly fastened to minimize voltage drops.
- Use wires with a diameter of 10 mm<sup>2</sup> (with a minimum of 6 mm<sup>2</sup>) to ensure optimum performance of the refrigerator.
- Position the 12 V power lead in such a way that it cannot come into contact with hot or sharp parts.

## 8. CONNECTING THE GAS SYSTEM



- The gas connection has to comply with EN 1949 and EN 732
- Gas components may be installed only by a qualified installer. Be sure to use high-quality approved parts.
- The gas components must be installed in accordance with the latest technical regulations.
- Gas pipes or hoses must be fitted so that they cannot come into contact with hot or sharp parts.
- Keep flammable materials well away from the refrigerator.
- The refrigerator's gas supply must be fitted with a gas valve that allows the gas supply to be switched off. The gas valve must be readily accessible by the user.
- Make the connections airtight by means of an approved connector in accordance with local regulations.
- If you use a gas hose, make sure it is of an approved type in accordance with local regulations.
- Position the hose in such a way that it is not twisted, cannot turn and cannot buckle.
- A gas hose has a limited service life. Therefore, install the hose in a way that allows its easy replacement. Check the hose regularly for breaks, cracks, and ageing. Replace the hose if you are in any doubt. Take notice of the maximum life of the hose and replace it on time subject to the limits specified by the manufacturer or local regulations.
- If the lower ventilation grating is not at floor level or slightly lower, make a hole in the floor at the rear end of the refrigerator (see figure 7). If a leak occurs, this hole will allow the gas to stream outside instead of building upon the floor. This hole must have a diameter of at least Ø40 mm and must be in conformity with local regulations.
- At places where metal gas lines enter the floor, affix a watertight and airtight rubber band around the pipe to prevent vibration and wear.
- Check the gas connection for leaks after the complete installation of the refrigerator.

16.



- **FIGURE 16:** Refer to the type plate on the inside of your refrigerator and to the table at the front of this booklet when choosing a gas type.
- Refer to the type plate on the inside of the refrigerator for the pressure setting of the gas pressure control.

## 9. WIRING DIAGRAMS

17.

**FIGURE 17:** Wiring diagram N80P, N80E, N90P, N90E, N100P, N100E, N110P, N112E (to June 1, 2002).

18.

**FIGURE 18:** Wiring diagram N80P, N80E, N90P, N90E, N100P, N100E, N109E, N110P, N112E, N145P, N145E (from June 1, 2002).

19.

**FIGURE 19:** Wiring diagram N100A.

20.

**FIGURE 20:** Wiring diagram N145A.