



SERVICEHANDBOOK



Absorption - Refrigerators for Recreational Vehicles

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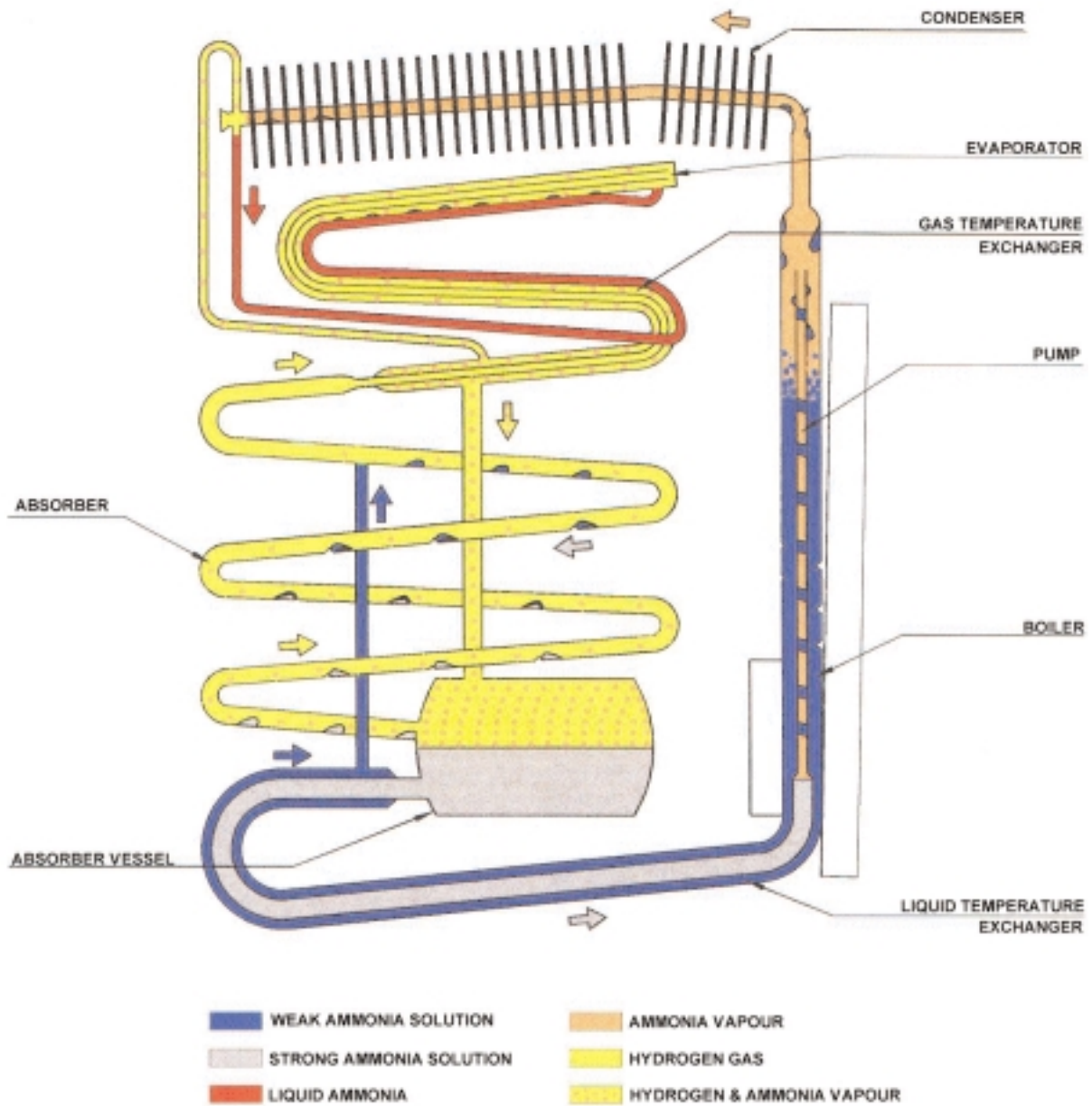
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Introduction

In 1922, the Swedish engineers Baltzar v. Platen and Carl Munters developed a continuously working absorption cooling unit which is not subject to mechanical wear and tear (i.e. does not have any moving parts), and which uses an auxiliary gas (hydrogen) as its pressure-equalising gas. Until the present day, absorber aggregates have been utilising this principle. An absorption unit unit consists of steel pipes, which are welded together to form a complex pipe system which generates the different thermodynamic conditions required for the absorption process. The success of these refrigerators results from their silent operation, long life span (no moving parts), and the different methods for powering them (mains operation: 120-230 V, battery operation: 12V, operation by gas, oil and alternative energy sources). This feature makes these refrigerators ideally suited for use in hotels or leisure vehicles.

THE ABSORPTION SYSTEM



Description of Function

1. Boiler: The strong ammonia solution is heated and ammonia gas goes to the condenser. The weak ammonia solution returns through the liquid heat exchanger to the absorber.
2. Condenser: The ammonia gas is condensed to liquid by heat dissipation.
3. Evaporator: The liquid ammonia flows into the evaporator. The evaporation of the ammonia in the hydrogen atmosphere absorbs heat. The heavier ammonia/hydrogen mixture flows down to the absorber vessel.
4. Absorber: The rising ammonia gas is absorbed by the weak solution, which flows down to the absorber vessel. Hydrogen is separated from ammonia and rises to the evaporator.

Important

The cooling unit needs ventilation!

The cooling performance depends on the air circulation.

The condenser component affected by heat. Heat accumulation leads to performance losses.

Correct installation of the Electrolux ventilation grilles ensures best possible performance (see fig. 1).

Features of the optimum installation:

- Ventilation grilles with a free cross section =250 cm².
- Upper ventilation grille positioned above the condenser.
- Distance between cooling unit and wall must be approx. 20-25mm.
- Heat deflector to the upper grille, to guide heated air out.

Depending on the model, the cooling unit function is more or less dependent on position. When checking function the cooling unit should be level both ways.

Description of Components

Electric Thermostat:

Senses with the capillary tube temperature and switches power to the heater on and off.

Gas Thermostat:

Senses with the capillary tube temperature and opens or closes the main gas supply (bypass remains open constantly because of the pilot flame).

Thermocouple:

When the thermocouple tip is heated by the gas flame electricity is generated.

This feeds the safety valve solenoid which keeps the valve open as long as the flame burns.

Gas Control Valve (Safety Valve):

In conjunction with a gas thermostat, this gas control device allows either an open or closed position. A Zero, Min, Mid and Max Position. Valve is used in products not having gas thermostats. Both valve types have a built in safety device. By pressing the safety valve button the gas flow to the burner is opened. When the flame is lit, the thermocouple powers the valve solenoid and the valve remains open. If the flame is extinguished the valve will close.

Gas Filter:

It is positioned in the gas supply pipe and may obstruct the gas flow if it is dirty or damp. This obstruction can result in poor cooling or no cooling in gas mode.

Piezo Ignition:

Pressure produces a high voltage in the piezoelectric crystal. The high voltage gives via an ignition cable and an electrode a spark in the burner where the gas is lit.

Burner:

Consists of burner housing, mixing chamber and burner jet. The burner jets are marked with numbers. Only jets with correct number for the model in question must be used.

Re-igniter:

An electronic re-igniter, powered by a supply voltage of approx. 12V generates via an ignition cable and an electrode creates a spark in the burner where the gas is lit.

The re-igniter automatically repeats this operation until a "Feedback" signal to the electronics registers the presence of a flame. On the re-igniter, there is a voltage supply connection, which is powered via the re-igniter switch.

There is also a connection for the switch control light.

Flue baffle:

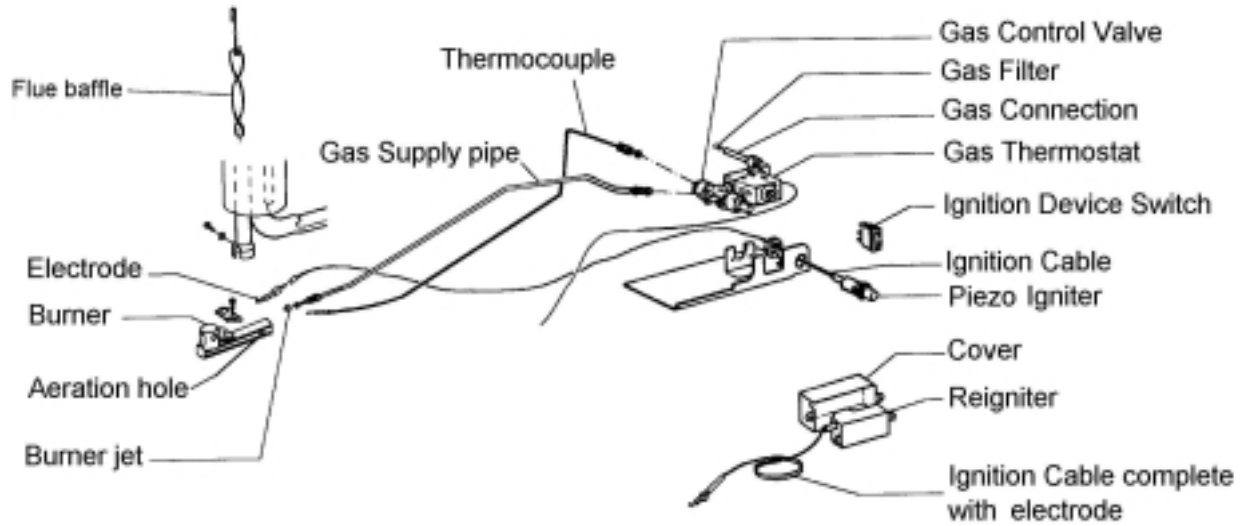
This distributes the heat in the boiler area during gas operation (not required for all model). A performance loss occurs if this baffle is missing. The length of baffle will vary depending on model.

Burner jet:

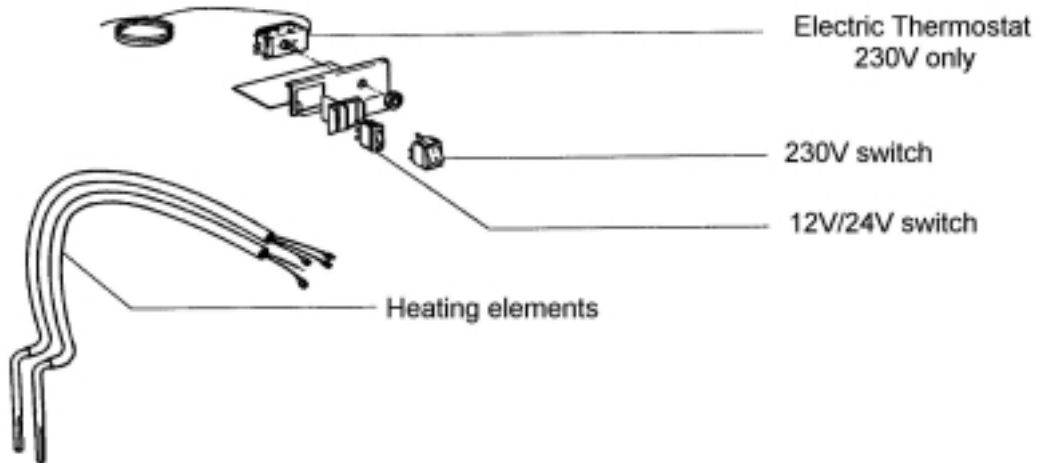
Burner jets are designed for the specific gas operating pressure (28 to 50 mbar). Use only burner jets specified for the model and gas pressure stated on the data plate, must be used.

Components

Gas equipment



Electric equipment



1.0 Poor Cooling in all Modes!

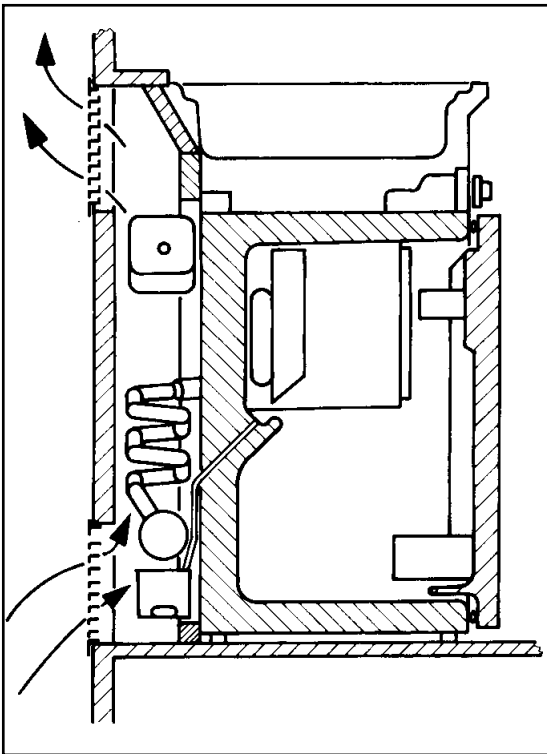


Fig. 1

1. Is the upper ventilation grille positioned above the condenser?
2. Are the ventilation openings sufficient (250cm²)?

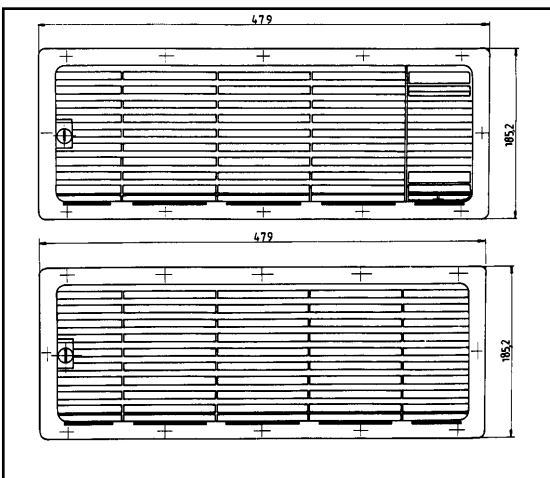


Fig. 2

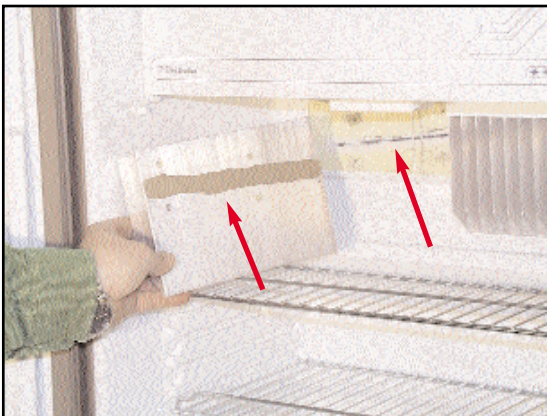


Fig. 3

1. Is the evaporator pipe partially covered with foam?
2. Is thermal mastic applied properly between the evaporator pipe and tins?

Good contact is essential!

2.0 No cooling on 230V AC!

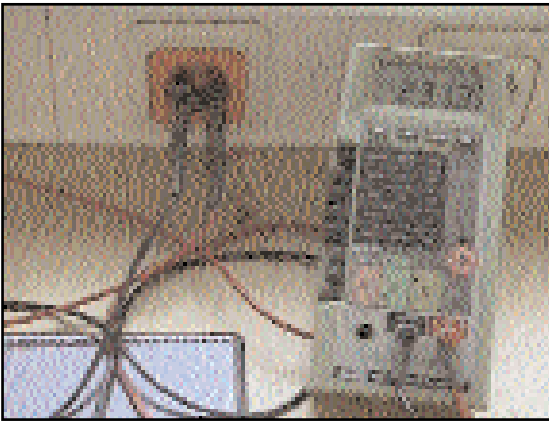


Fig. 4

1. Check the voltage.
2. Check main switch.
3. Check heating element.
4. Check cable connections.
5. Check thermostat (a continuity meter might be used for testing).

Check country-specific voltage!

2.1 Poor cooling on 230V AC!



Fig. 5

1. Check whether there is an accurate voltage. (Some camp do have voltage drops!)
Low voltage has a negative effect on cooling performance!

Check country-specific mains voltage!

2. If the voltage is low, recommend the customer to use gas instead.



Fig. 6

1. Check that thermostat capillary tube is correctly positioned! (Insertion length is approx. 10cm!)

3.0 No cooling on 12V DC!



Fig. 7

1. Check voltage at terminal with an instrument when 12V switch is activated.
2. Check 12V switch.
3. Check heating element.
4. Check cable connections.
5. Check cable cross section and cable length (if there is a voltage drop).

Recommended cross sections:

- 2.5mm² < 4m length
- 4.0mm² ≤ 6m length
- 6.0mm² > 6m length

3.1 Poor cooling on 12V DC!

ELECTROLUX SIEGEN GMBH			
TYPE	C 40/110	CLIMATE CLASS	SN
MOD. No.	RN 4481 LM	PROD. No.	321877381
SER. No.			
BRUTTOINHALT	VERDAMPFERFACH	NUTZINHALT	
TOTAL CAP. 188 L	FREEZER COMP. 12 L	USEFUL CAP. 92 L	
VOLUME BRUT	VOLUME COMPT BT	VOLUME NET	
~ 230 V / 135 W	LPG	Q _n : 8,252 kW[HS]	
~ 12 V / 138 W		h : 18,3 g/h	
BE,ES,FR,IE,IT,PT,GR	13+	28-38/37 nbar	
DE,CH,AT,DK,FI,NL,SE,NO	13B/P	28-38 nbar	
CE 8885 A08718	G30 3+/38/P	p+ 38 nbar	
ABSORBER	NH ₃ 135 g	p _{max} = 35 bar	
FKW.FCKW FREI/CFC.HCFC FREE			MADE IN GERMANY

Fig. 8

1. Check if 12V is available at terminal block (12V element switched on!). A voltage drop has a negative effect on the cooling performance. If the voltage is below 12V, an insufficient cable cross section could be the reason. (Measure at battery and compare!)
2. Is the heating element in the correct position?
3. Is the wattage correct? See data plate.
4. Using 12V and gas at the same time, leads to a reduced cooling performance or no cooling at all. The cooling unit will be damaged after a short time.

4.0 No cooling on gas but cooling on 230V AC!

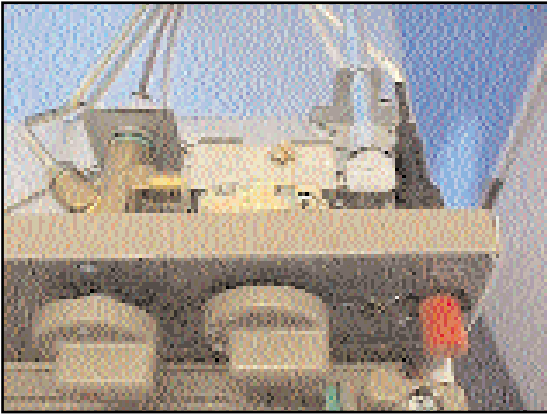


Fig. 9

1. Is gas available? (e.g. switch on the cooker)
2. Are all valves open?



Fig. 10

1. Is there an ignition spark?
If no spark is generated, see section 4.1.
2. Does the flame stay on after the gas control or safety valve button has been released?
If this is not the case, see section 4.2.

4.1 Flame does not ignite!

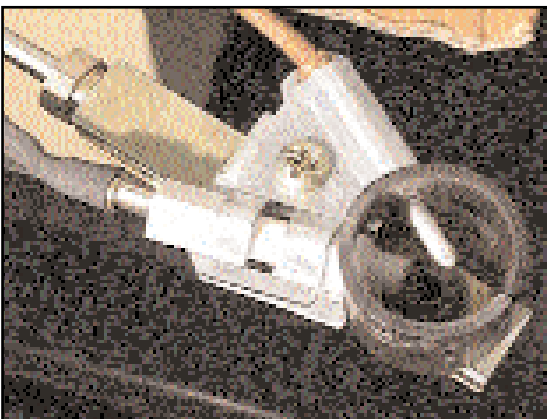


Fig. 11

1. Is the electrode in correct position?
2. Is the electrode clean and dry? (carbon deposits, moisture)
3. The spark should jump to the thermocouple!
4. The ignition cable properly connected to the electrode and to the igniter?
5. Is the ignition cable undamaged?
6. Does the igniter generate a spark?

4.1 Flame does not ignite!

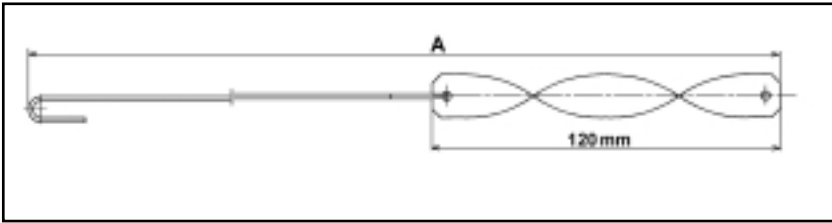


Fig. 12

1. Check the position of the flue baffle!

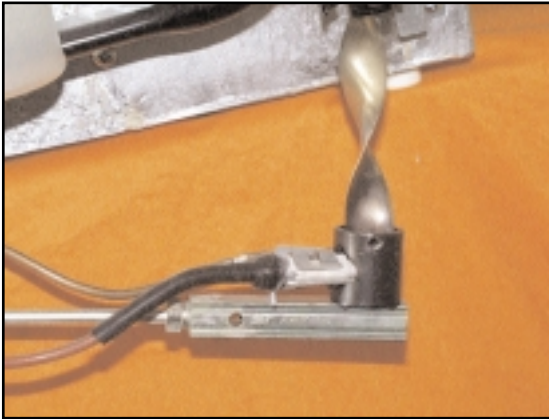


Fig. 13

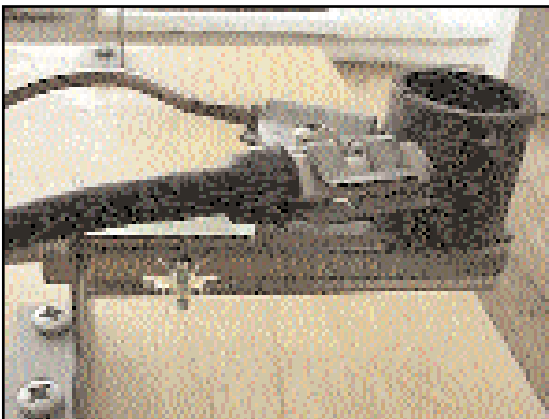


Fig. 14

1. Is the burner dirty?
2. Is the burner jet blocked? (Clean burner jet using liquid and compressed air - no mechanical cleaning!) Jet should be replaced.
3. Is the burner's aeration hole blocked? (insects)



Fig. 15

1. Is the gas filter in the gas inlet pipe dirty?

4.1 Flame does not ignite!

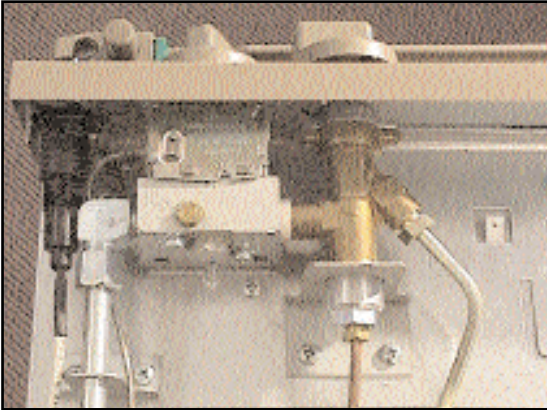


Fig. 16

1. Is the gas control valve defective?

4.2 Flame does not stay on!

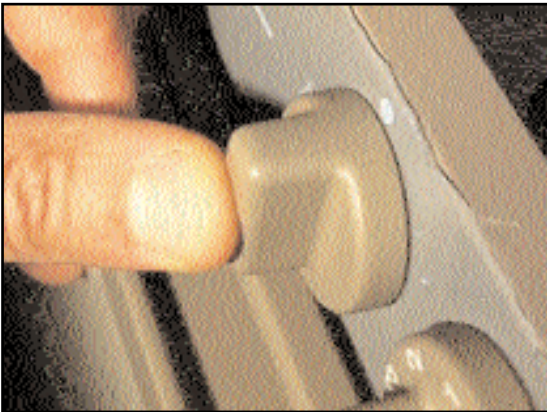


Fig. 17

1. Is the control knob obstructed by the control panel? (Lengthen axis, for example, by inserting a washer into the control knob!)

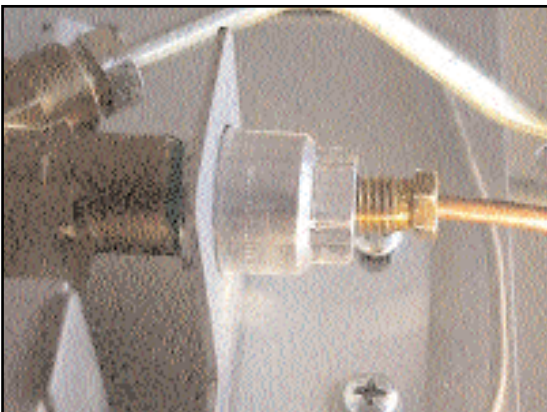


Fig. 18

1. Check thermocouple connections.
2. Check thermocouple and replace if necessary.

4.2 Flame does not stay on!



Fig. 19

1. Does the pressure regulator function properly? (e.g. overpressure)
2. The pressure regulator is correct for the product? (See data plate).

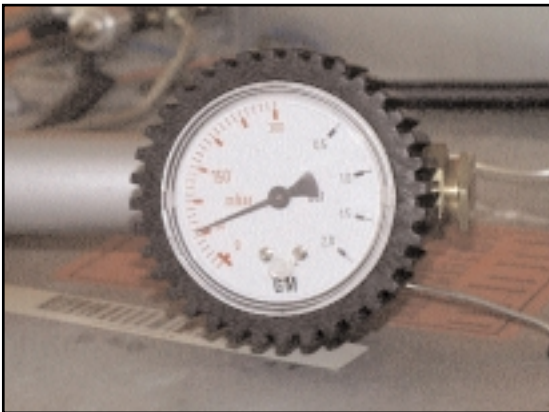


Fig. 20

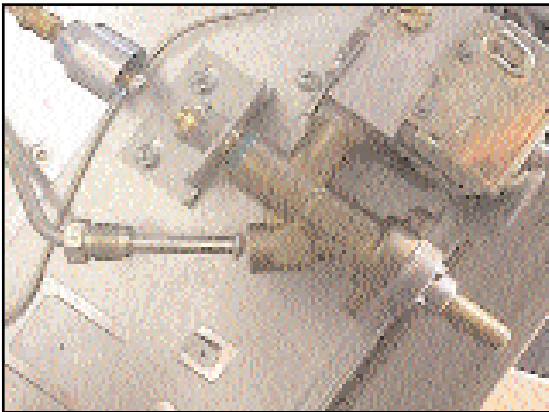


Fig. 21

1. Replace the complete gas control valve.
2. For appliances with a gas thermostat - check the function of the thermostat. (Position 1 min. - Position 7 max.)

4.3 Poor cooling on gas but normal cooling on 230V AC!



Fig. 22

1. Check height of flame! (maximum flame height: 5-6 cm, Siegen products)



Fig. 23

1. Check height of flame! (minimum flame height: 1.5-2 cm, Siegen products)

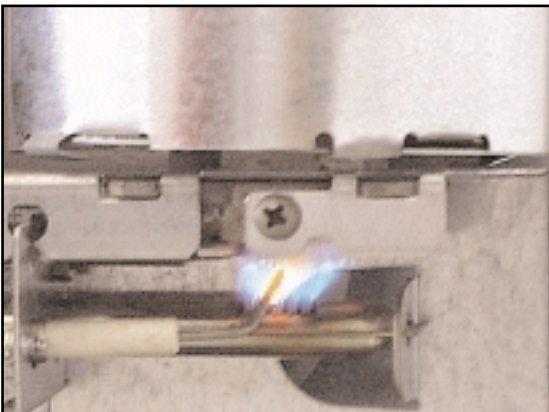


Fig. 22a

1. Check height of flame! (maximum flame height: 3-4 cm, refrigerators > 103l, Motala products)

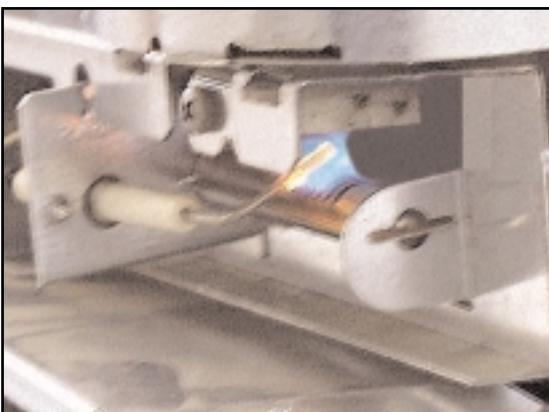


Fig. 23a

2. Check height of flame! (minimum flame height: 1-1,5 cm, refrigerators > 103l, Motala products)

4.3 Poor cooling on gas but normal cooling on 230V AC!



Fig. 24

1. Is the gas pressure correct?
2. Check that data plate and pressure regulator show the same values.



Fig. 25

1. Is the burner or burner jet dirty? (Clean burner jet with liquid and compressed air no mechanical cleaning!)
2. Replace burner jet.
3. For refrigerators with a gas thermostat check thermostat for correct function.
4. Flue baffle missing, or incorrect length of baffle used for model?

5.0 Too cold!

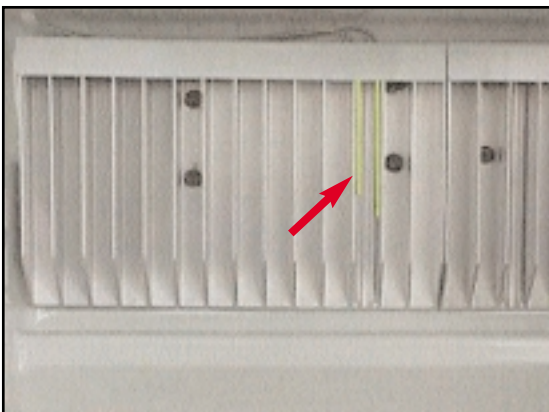


Fig. 26

1. Check thermostat setting.
2. Is the thermostat defective?
3. Is the ambient temperature too low? (Fit winter cover!)
4. Check position of thermostat capillary tube! (Insertion length of capillary tube approx. 10 cm!)

8.0 Freezer flap does not close!



Fig. 33

1. Unscrew freezer flap!



Fig. 34

2. Remove expanding screws!



Fig. 35

3. Turn the freezer flap hinge until the stop touches the freezer compartment.



Fig. 36

4. Insert and screw hinge on to freezer flap.

5. Turn the hinge to the appropriate position!

Fault finding chart

No cooling on 230V AC	Bad cooling on 230V AC	No cooling on 12V/24V DC	Poor cooling on 12V/24V DC	No cooling on gas	Poor cooling on gas	No cooling on any energy source	Poor cooling on any energy source	Too cold	
X	X	X	X	X	X	X	X		How long since start?
	X		X		X		X		Installation ok?
				X					Gasbottle empty?
X		X							Voltage ok?
X		X							Switches on?
	X		X						Low voltage?
X		X							Heating elements ok?
				X	X				Gas pressure ok?
X	X	X	X						Electrical connections ok?
				X	X				Gasburner clean?
				X	X				Burner-jet ok?
				X	X				Restricted gas flow?
				X	X				Gas regulator ok?
				X					Gas control or safety valve ok?
X	X			X	X			X	Thermostat ok?
				X					Thermoelement k?
				X					Ignition electrode/cable ok?
				X					Ignition device ok?
					X				Flue baffle in position?
	X		X		X		X		Thermal mastic ok?
						X			Cooling unit ok?
							X	X	Ambient temperature too high or too low?