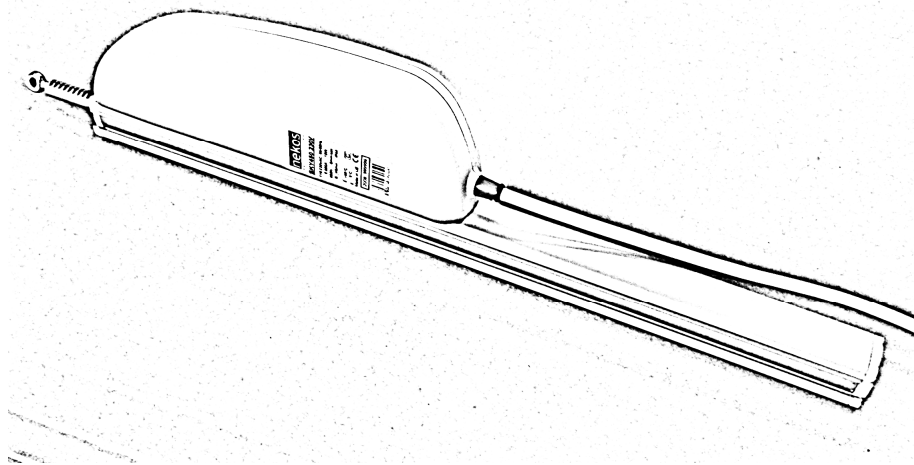


# SKY 450

## RACK OPERATED ACTUATOR

**FORCE 450 N - TRUCKS 180, 230, 350, 550, 750, 1000 MM**  
**VOLTAGE 110/230V~ (A.C.)**



**MANUAL FOR INSTALLATION AND USE**

The machine described in this manual has been manufactured in accordance with safety standards and conforms to the stipulations of current standards in force. When correctly assembled, installed and used according to the present instructions, it will not generate any danger for persons, animals or items.

Products subject to EU directives comply with the essential requirements stipulated by the latter. **CE** markings mean that our products can be sold and installed throughout the European Union without any further formality.

The **CE** marking on the product, packaging and indications for use provided with the product indicate 'presumed conformity to the directives' issued by the European Community.

The manufacturer holds the technical archive with documentation providing that products have been examined and evaluated for conformity to directives.

### Symbols used in the manual



**DANGER**

*This indication draw the attention about potential dangers for safety and health of peoples and animals.*



**INFORMATION**

*This information give further suggestions.*



**ATTENTION**

*This indication draw the attention about potential dangers for the product itself.*



**WARNING**

*This indication draw the attention about potential damages to goods.*



**ENVIRONMENTAL INSTRUCTION**

*Environmental indication draw the attention about potential dangers for the environment.*



English



## Contents

1. Safety indications .....	4
2. Formulas and recommendations for installation .....	5
2.1. Calculation of opening / closure force.....	5
2.2. Maximum opening in accordance with sash height.....	6
3. Technical information about function .....	6
4. Technical data.....	6
5. Id plate and marking data .....	7
6. Construction and standards.....	7
7. Electrical power supply.....	8
8. Instructions for assembly.....	8
8.1. Preparation of actuator for assembly .....	8
8.2. Assembly for top hung windows opening outwards .....	9
8.3. Assembly on light domes or dormer windows.....	9
8.4. Assembly with bottom hung windows .....	10
8.5. Assembly on louvre windows without mechanical lock or on sunshades.....	10
8.6. Assembly in tandem with connection bar.....	11
9. Electrical connections.....	12
10. Stroke-end.....	13
10.1. Stroke-end at opening and closure .....	13
10.2. Stroke adjustment where required .....	13
11. Checking for correct assembly .....	13
12. Emergency manoeuvres, maintenance and cleaning .....	13
13. Environmental protection.....	14
14. Certificate of guarantee .....	14
15. Declaration of conformity.....	15

## 1. Safety indications



**ATTENTION** BEFORE INSTALLING THIS APPLIANCE, ENSURE ALL SAFETY INDICATIONS HAVE BEEN READ CAREFULLY AND UNDERSTOOD IN ORDER TO PREVENT CONTACT WITH ELECTRICITY, INJURY OR ANY OTHER INCIDENT. THE MANUAL SHOULD BE CONSERVED FOR FURTHER CONSULTATION AT A LATER DATE.

**SKY 450** rack actuators have been designed to move windows and cupolas. **Use for any applications other than those indicated must be authorised by the manufacturer after technical review of the assembly.** The following safety indications should be observed carefully.



The appliance must be installed by competent and qualified technical personnel.



After removing packaging, check for any damage on the appliance.



Plastic bags, polystyrene, small metal parts such as nails, staples etc should be placed out of the reach of children as they constitute a potential source of risk.



Before connecting the appliance, check that the power supply has the same specifications as those indicated on the technical data label on the appliance.



This machine is destined exclusively for the use for which it has been designed and the manufacturer accepts no responsibility for damage incurred by improper use.



The actuator must be installed in accordance with the manufacturer's instructions. Failure to respect these instructions could compromise safety.



Power supply installation must comply with any regulations in force.



To ensure efficient separation from the grid, an approved type of bipolar pulse switch should be used. An omnipolar general power switch with minimum distance of 3 mm between contacts should be installed upstream of the control line.



Do not use solvents or jets of water to wash the appliance. The appliance should not be submerged in water.



Repairs should only be performed by qualified personnel at assistance centres authorised by the manufacturer.



Always request exclusive use of original spare parts. Failure to respect this condition could compromise safety and invalidate the benefits contained in the warranty for the appliance.



In the event of any problems or queries, consult your agent or contact the manufacturer directly.

## ATTENTION



With bottom hung windows injury could be caused if the window accidentally falls. An appropriately sized flexible link arm or fall prevention safety system designed to resist a force equal to at least three times the total weight of the window **MUST** be installed.



Danger of crushing or dragging. During function, when the actuator closes the window, a force of 550N is exerted on the bead of the frame, enough to crush fingers in the event of distraction.



In the event of breakage or malfunction, switch the appliance off at the general switch and call for the services of a qualified technician.

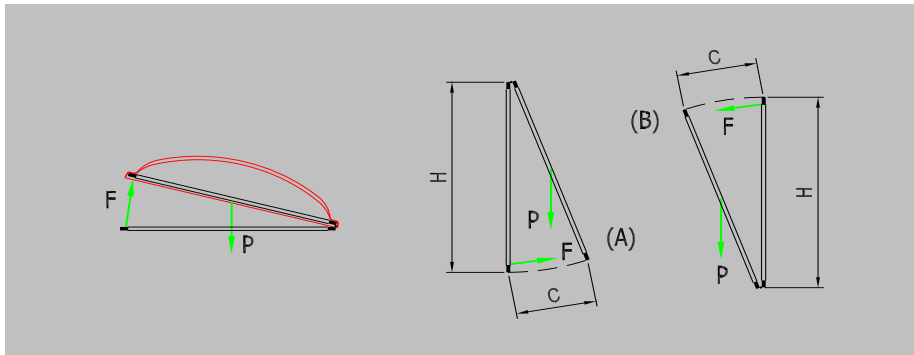
## 2. Formulas and recommendations for installation

### 2.1. Calculation of opening / closure force

Using the formulas on this page, approximate calculations can be made for the force required to open or close the window considering all the factors that determine the calculation.

#### Symbols used for the calculation

F (Kg) = Force for opening or closing	P (Kg) = Weight of the window (mobile sash only)
C (cm) = Opening stroke (actuator stroke)	H (cm) = Height of the mobile sash



#### For horizontal light domes or skylights

$$F = 0,54 \times P$$

(Eventual weight of snow or wind on the cupola should be calculated separately).

#### For vertical windows

- TOP HUNG WINDOWS, OUTWARD OPENING (A)
- BOTTOM HUNG WINDOWS (B)

$$F = 0,54 \times P \times C : H$$

(Eventual load of favourable or unfavourable wind on the sash should be calculated separately.)

## 2.2. Maximum opening in accordance with sash height

The actuator stroke should be selected in accordance with the height of the sash and its application. Make sure that the actuator does not touch the profile of the sash when moving along its track, and ensure there are no obstacles blocking the opening and that the rack moves smoothly along the window frame.



**ATTENTION.** For safety reasons, always check application before fixing the actuator to the frame or sash. In the event of difficulty, request assistance from the manufacturer to check application.

## 3. Technical information about function

The rack actuator performs opening and closing movements for the window using a round section steel rack. Movement is powered by electricity that feeds a reduction motor controlled by a functional electronic device.

The opening stroke for the window CANNOT be programmed as it is regulated by the length of the rod on the reduction motor. The electronic control device allows the rack to protrude until it encounters an obstacle that blocks its stroke. This could be provided by the internal lock on the rack or complete closing/opening of the window.

In both outwards and return directions the stroke-end uses a self-defining electronic process with power absorption, and for this reason, no adjustment is required.

## 4. Technical data

Model	SKY 450
Thrust and traction force	450 N
Course lengths	180, 230, 350, 550, 750, 1000 mm (*)
Input voltage	110-230V~ (a.c.) 50/60 Hz
Current absorption at nominal load	0,250 A (110V) / 0,160 A (230V)
Travel speed without load	5,5 mm/s
Length of run without load	In accordance with length of truck run
Double electrical insulation	Yes
Type of service	S <sub>2</sub> of 4 min
Max. and min. temperatures for function	-5 +55 °C
Degree of protection for electrical devices	IP44
Adjustment of socket at casing	Position self regulating
Connection in parallel of two or more motors	Yes
Connection in tandem or in series	Yes
Limit switch stop at opening and closure	At absorption of power
Protection against overload at opening and closure	At absorption of power
Dimensions	103x47x(Course length+135) mm
Weight	Varies according to construction

Information presented in these illustrations is not binding and is also subject to variation without prior notice.

(\*) Technical personnel can shorten track runs by adjusting the internal limit switches.

## 5. Id plate and marking data

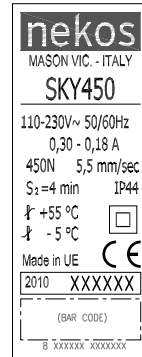
All actuators have **CE** marking and are destined for use in the European Union without further requirements.

The **CE** marking on the product, packaging and indications for use provided with the product indicate 'presumed conformity to the directives' issued by the European Community.

The manufacturer holds the technical archive with documentation providing that products have been examined and evaluated for conformity to directives.

ID plate data are indicated on a polyethylene adhesive label applied externally on the outside of the container, printed in black on a grey background. Values conform to EC requirements in force.

See figure for example of labelling.



## 6. Construction and standards

- The **SKY 450** rack actuator has been designed and manufactured to open and close top hung windows opening outwards, bottom hung windows, dormer windows, light domes, skylights and louvered windows or sun blades. Specific use is for ventilation and airing of areas; any other use must previously be approved by the manufacturer.
- Application is performed using the brackets provided and any other type of assembly should be checked with the manufacturer, who will not accept any responsibility for incorrect or malfunctioning assembly.
- Electrical connections must comply with standards in force on the design and production of electrical appliances.
- The actuator has been manufactured according to European Union directives and conforms to **CE** marking.
- Any eventual service or control device for the actuator must be produced according to standards in force and must comply with the standards issued by the European Community.

The actuator comes packaged in a cardboard container which contains two pieces. Each package contains:

- Nr. 2 110÷230V~(a.c.) 50/60Hz electrical actuators
- Nr. 2 Standard support brackets with respective grips and fixing screws. (*Grips and fixing screws are inside small part packaging*).
- Nr. 2 Brackets for fixing to the frame.
- Nr. 2 Small part packaging.
- Nr. 1 Instruction manual.

## 7. Electrical power supply

SKY450 is commercially available in one single version:

- **SKY450 230VAC:** runs on grid tension of 110/230V~ (a.c.), 50/60Hz, with a three wire cable (**LIGHT BLUE**, common neutral; **BLACK**, phase open; **BROWN**, phase closed).

## 8. Instructions for assembly

**These indications are for specialised technical personnel and basic work and safety techniques are not indicated.**

All preparatory, assembly and electrical connection operations must be performed by specialised technical personnel to guarantee optimal function and service of the actuator.

Check that the following fundamental conditions have been met:



Actuator specifications must be sufficient for movement of the window without encountering any obstacle. The limits indicated in the technical data table must not be superseded (*page 6*) and the most appropriate actuator should be selected. Calculations should be checked using the formula indicated on *page 5*.



Attention. Check that the electrical power supply corresponds to that indicated on the TECHNICAL DATA label on the machine.



Ensure that the actuator has not been damaged during transport, first visually and then by powering in both directions.



For bottom hung window frames injury could be caused by accidental falls of the window. An appropriately sized flexible link arm or fall prevention safety system designed to resist a force equal to at least three times the total weight of the window **MUST** be installed.

### 8.1. Preparation of actuator for assembly

Before starting assembly of the actuator, prepare the following material for completion, equipments and tools.

- ◆ For fixing onto metal window frames: M5 threaded inserts (*6 pieces*), M5x12 flat headed metric screws (*6 pieces*).
- ◆ For fixing onto wooden window frames: self threading screws for wood Ø4.5 (*6 pieces*).
- ◆ For fixing onto PVC window frames: self threading screws for metal Ø4.8 (*6 pieces*).
- ◆ Equipment and tools: measuring tape, pencil, drill/screwdriver, set of drill heads for metal, insert for screwing in, electricians pliers, screwdrivers.

## 8.2. Assembly for top hung windows opening outwards

- A. Pencil in the middle line for the window frame on both mobile and fixed parts (Fig. 1).
- B. Place the motor support bracket in position at the edge of the fixed part in line with the centre line pencilled in earlier and pencil in the four openings to be used for fixing (Fig. 2).
- C. Use the appropriate drill head to perforate the window frame and assemble the motor support bracket, taking care to tighten all screws well (Fig. 3 and Fig. 3bis).
- D. Place the front rod in line with the centre line of the mobile part of the window frame and trace out the three fixing openings (Fig. 4).
- E. Use the appropriate drill head for perforation and assemble the front bracket, taking care to tighten all screws well (Fig.5 and Fig. 5bis).
- F. Take the clamp screws and assemble them onto the motor support bracket. Leave at least two turns of leeway.
- G. Slide the swallow tailed profile of the actuator onto the clamp screws, and check they have been inserted correctly into the socket of the profile to ensure the actuator runs smoothly along its axis.
- H. Position the actuator so the eyebolt head is inserted into the front bracket. Insert the M6x25 screw into the bracket and eyebolt and fix the self-locking nut into position using two 10 keys.
- I. Manually move the actuator along its axis to close the window and press firmly against the seals. Tighten the clamp screws previously only placed and set the actuator in line with the window frame. Suggested tightening torque is 5÷7 Nm.
- J. The actuator may now be powered up for a complete trial of opening and closing of the window. After closure, make sure that the window is completely closed and check the pressure on all seals.
- K. The stroke-end for the actuator is automatic. The appliance exerts a traction force of over 550 N, which guarantees perfect pressure on seals even for windows with large dimensions.

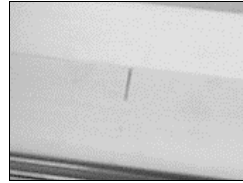


Fig. 1



Fig. 2

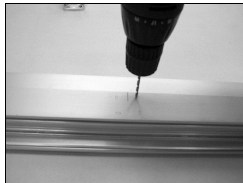


Fig. 3



Fig. 3 bis

## 8.3. Assembly on light domes or dormer windows

First, check the actuator has been applied correctly and check positioning of the brackets on both frame and sash.

(Follow the instructions set out in "Assembly for outward opening windows").

## 8.4. Assembly with bottom hung windows

- A. Pencil in the centre line for the window on both mobile and fixed parts (Fig. 1).
- B. Position the motor support bracket at the edge of the frame of the mobile part in line with the centre line and trace in the four openings to be used for fixing (Fig. 2).
- C. Use an appropriately dimensioned drill head to perforate the window frame and assemble the motor support bracket, taking care to fix the screws securely into position (Fig. 3 and Fig. 3bis).
- D. Position the front bracket in line with the centre line on the fixed part of the frame and trace in the three openings for fixing (Fig. 4).
- E. Use an appropriate size of drill head for perforation and assemble the front bracket, taking care to fix the screws securely into position (Fig. 5 and Fig. 5bis).
- F. Take the clamp screws and assemble them onto the motor support bracket. Leave at least two turns of leeway.
- G. Insert the swallow tailed profile of the actuator onto the clamp screws, taking care to insert correctly into the socket of the profile to ensure the actuator runs smoothly along its track.
- H. Position the actuator so the eyebolt head is inserted into the front bracket. Insert the M6x25 screw into the bracket and eyebolt and fix the self-locking nut into position with two fixed 10 keys.
- I. Manually move the actuator along its axis to close the window and press firmly against the seals. Tighten the clamp screws previously only placed and set the actuator in line with the window frame. Suggested tightening torque is 5÷7 Nm.
- J. The actuator can now be powered up for a complete trial of opening and closing the window. After closing, check the window is completely shut and check pressure on the seals.
- K. The stroke-end of the actuator is automatic. The appliance exerts a traction force of over 550 N to guarantee perfect pressure against the seals even for large dimension windows.



Fig. 4

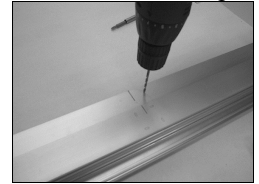


Fig. 5



Fig. 5 bis

## 8.5. Assembly on louvre windows without mechanical lock or on sunshades

To perform this assembly, the actuator must be powered electrically. Check the technical data label on the motor for the appropriate form of electricity.

- A. Connect the actuator to the power supply and activate so the rod protrudes until the maximum opening stroke-end steps in.
- B. Set the louvres to closed position by manually adjusting the casement levers.



- C. Position the eyebolt head of the actuator in the middle of the two levers (or in line with the lever opening where there is only one lever), insert the pin and lock into position using the nuts.
- D. Take the clamp screws and assemble them onto the motor support bracket, taking care not to screw them into their final position.
- E. Assemble the motor support bracket onto the profile of the actuator, inserting the clamp screws correctly into the socket of the profile and positioning it into the tail of the actuator (Fig. 7).
- F. Keep the louvres or sunshades closed, position the bracket against the vertical side of the window, ensuring that the axis of the actuator is parallel to the lever and perpendicular to the connecting pin, with the bracket in the tail of the actuator.
- G. Trace in the four fixing openings for the motor support bracket.
- H. Use an appropriate size of drill head for perforation, insert the screws and fix the motor support bracket to the casement.
- I. Tighten the clamp screws. Suggested tightening torque is 5÷7 Nm.
- J. The actuator can now be powered up for a complete trial of opening and closing procedures.

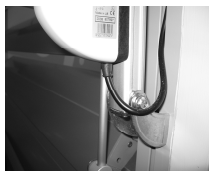


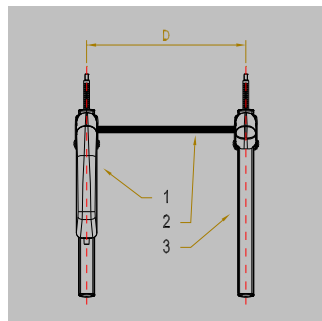
Fig. 7

### 8.6. Assembly in tandem with connection bar (1 – actuator, 2 – bar, 3 – rod)

SKY450 actuators can be connected in tandem with a mechanical connection bar. Two pressure points can be obtained using one single motor.

The movement of the motorised actuator (1) is connected to the rod (3) (no motor) mechanically for the window to move evenly at a steady speed.

The illustration to the side indicates the layout and inter-axes that should be used during assembly. The length of the connection bar (2) is expressed by “D” (*Interaxis for actuators*) + 5 mm.



INTERAXES FOR CONNECTION BARS			
Code	Description	Bar length (mm)	“D” (± 1.5 mm) Interaxis for actuators (mm)
4010009	Connection bar 1000 mm	1.035	1.030
4010010	Connection bar 1500 mm	1.535	1.530

For assembly, proceed as follows:

- A. Trace the interaxis for assembly for the two actuators onto the frame according to the dimensions in the above table.
- B. Position and assemble the support frames for the actuator (*see detailed explanation in the paragraph entitled “assembly for top hung windows opening outwards”*).

- C. Position the brackets onto the sash, trace in the points for the openings, perforate the window frame and assemble the brackets onto the sash.
- D. Assemble the motorised actuator (1), inserting the clamp screws slightly into the profile and lightly fix the screws into position. Check the rack is in “stroke-end return” (*rack in full return position*) position.
- E. Take the rod (3) in one hand and use the other hand to insert the connection bar into the opening provided (2). Insert the other end of the connection bar into the opening on the motorised actuator (1).
- F. Assemble the rod (3), inserting the clamp screws slightly into the profile and lightly fix the screws into position. Check the rack is aligned with that of the motorised actuator.
- G. Loosen the clamp screws and place the eyebolt heads into the brackets assembled onto the sash. At each point, insert the M6x25 screw into both bracket and eyebolt and fix the nut in position using two 10 mm keys.
- H. Manually move the actuator along its axis to close the window correctly and firmly against the seals. Tighten the clamp screws right in and align the actuator with the casement.
- I. The actuator can then be powered up for a complete trial of opening and closure. After closure is complete, check that the window is completely shut and check pressure on the seals.
- J. The stroke-end of the actuator is automatic. The appliance exerts a traction force of over 550N to ensure perfect pressure against seals even for large dimension windows.

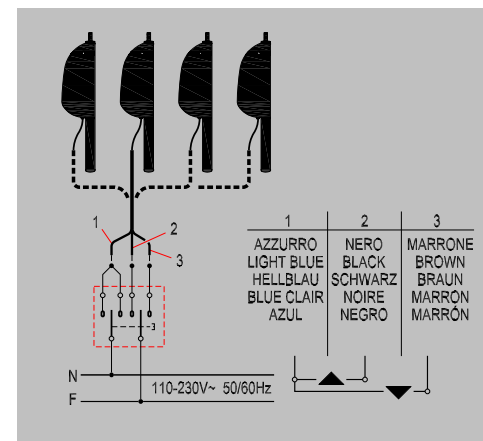
## 9. Electrical connections

Appliances are equipped with cable manufactured in accordance with safety standards and protection against radio disturbances. It is three wired BLUE (*SHARED*), BLACK (*OPENS*), BROWN (*CLOSES*), and is 1 m (±5%) long

After connecting the electricity supply to the control button (bipolar with arrows if possible), check that the up key function opens the window frame and the and down key function closes it.

In the event of incorrect function, invert the two wires marked BLACK and BROWN.

For harness, please follow the diagram by the side.



## 10. Stroke-end

### 10.1. Stroke-end at opening and closure

The stroke-end at opening and closure is automatic, electronic and cannot be programmed. The actuator is stopped by the absorption of power encountered when the window is completely open or completely closed, or when the absorbed power is 20% over nominal. In this case, at maximum load, the actuator exerts a force of around 550N.

### 10.2. Stroke adjustment where required

Strokes shorter than the stroke produced during manufacture can be created at will to suit the protrusion length of the rod.

This operation should be performed on the bench using the appropriate equipment by qualified technical personnel with the ability to perform each operation with maximum diligence and safety.

Work phases are as follows:

1. Remove the four screws on the front head of the actuator.
2. Remove the body of the actuator and the rack from the rod.
3. Unscrew the two screws locking the two limit switch block pieces.
4. Move the rubber stopper and block to the required position.
5. Screw the two screws used for fixing the block into position back in again.
6. Reassemble everything onto the actuator rod.
7. Screw in the four screws on the front head and check the settings for the new track run.

## 11. Checking for correct assembly



Check that the frame has closed completely, even at the corners, and check there are no obstacles caused by assembly in the wrong position.



Make sure the actuator is aligned with the axis of the window at 90° to the window itself, otherwise the rack will exert incorrect pressure on the rod and consume more voltage.



Check the lead is not too tight, as this could damage the actuator during rotation, opening and closing of the window.



Check all screws and nuts have been properly tightened.

## 12. Emergency manoeuvres, maintenance and cleaning

Should the window have to be opened manually in the event of no electricity, mechanical failure, or for normal maintenance or cleaning of the external surface of the window frame, the following instructions should be followed:

1. Unscrew the nut from the pin screw fixing the eyebolt head to the front shaft.
2. Hold the window with one hand and use the other hand to remove the pin screw (*This operation should be performed with the window open at least 10 cm to make it easier to remove the screw*).

3. Manually open the window.



**ATTENTION:** RISK OF THE WINDOW FALLING OUT; THE SASH IS IN DANGER OF FALLING OUT AS IT IS NO LONGER HELD IN PLACE BY THE RACK.

4. After maintenance and/or cleaning operations are complete, repeat points 1 and 2 in reverse order.

In the event in which the cable of feeding it is damaged, to make to replace it from the constructor or a qualified technician.

## 13. Environmental protection



All materials used in the manufacture of this appliance are recyclable. We recommend that the device itself, and any accessories, packaging, etc. be sent to a centre for ecological recycling as established from laws in force on recycling.

The device is mainly made from the following materials: aluminium, zinc, iron, plastic of various type, cuprum. Dispose materials in conformity with local regulations about removal.

## 14. Certificate of guarantee

The manufacturer will guarantee good function of the appliance. The manufacturer shall undertake to replace defective parts due to poor quality materials or manufacturing defects in accordance with article 1490 of the Civil Code.

The guarantee covers products and individual parts for **2 years** from the date of purchase. The latter is valid as long as the purchaser possesses proof of purchase and completion of all agreed conditions of payment.



Guarantee of good function of appliances agreed by the manufacturer implies that the latter undertakes to repair or replace free of charge and in the shortest period possible any parts that break while under warranty.

The purchaser is not entitled to any reimbursement for eventual direct or indirect damage or other expenses incurred. Attempt to repair by personnel unauthorised by the manufacture shall render the warranty null and invalid.

The warranty does not cover fragile parts or parts subject to natural wear and tear or corrosion, overload, however temporary etc. The manufacturer will accept no responsibility for eventual damage incurred by erroneous assembly, manoeuvre or insertion, excessive stress or inexpert use.

Repairs performed under guarantee are always "ex factory of the manufacturer". Respective transport expenses (out/back) are the responsibility of the purchaser.

