

## THE PACKAGE CONSISTS OF THE FOLLOWING COMPONENTS:

- |                                   |        |
|-----------------------------------|--------|
| 1. LF BROS Engine Pre Heater Unit | 1 sat. |
| 2. Plastic T-Connector            | 2 pc.  |
| 3. Steel Hose Clamps              | 2 pc.  |
| 4. User Guide and Warranty        | 1 pc.  |

## INSTALLATION INSTRUCTIONS & USER GUIDE. LF BROS ENGINE PRE HEATERS

### NOTE: READ THE MANUAL CAREFULLY BEFORE INSTALLATION

1. LF BROS is an all-purpose Engine Pre Heater employing an internal circulation pump. It is used to heat cylinder block in passenger cars, delivery trucks, heavy goods vehicles, agricultural and construction equipment. Prevents problems cold engines failing to start. Must not be used for other purposes.
2. Read the instructions carefully during installation and use.
3. In no case (even for testing purposes) should the pre heater be connected to power supply before the installation is completed, filling with coolant and cooling system de-aeration. Otherwise, it may cause damage and a loss of warranty.
4. Improper use poses risk to health and life.
5. Once the pre heater is connected it must not be touched or checked manually.
6. Protect the pre heater against getting wet during car or engine washing.

### OPERATING PRINCIPLE

LF BROS Engine Pre Heater is designed to heat water-cooled engines. The engine coolant is heated by an electrical heating element and forced through an internal circulation pump. An integrated pump provides uniform heating throughout the engine and the engine warm-up phase is reduced to the minimum. With the pre heater unit the engine can be started in winter conditions as easily as in Summer time. Starting of preheated engines minimizes engine wear, reduces fuel consumption and protects the environment with lower emissions. Pre heater housing is die-cast aluminium one. The pump is equipped with an efficient brushless DC motor. In contrast to standard heating coil some models are equipped with a modern (ribbed) heating plate increasing heating capacity by more efficient heat dissipation. The pre heater is

equipped with an internal thermostat to turn off the heating element if coolant temperature is close to 70°C a re-start it when the same reaches ca. 60°C. This

temperature is achieved by an internal thermostat. Due to heat transmission losses the engine is heated up to ca. 35-45 °C. If the flow in the cooling system is restricted,

the pre heater will be stopped automatically after several seconds. Lack of coolant in the pre heater may cause damage and a loss of warranty.

**NOTE:** the pump in the pre heater is a rotary vane pump with a rotor lubricated by engine coolant. Before turning on the pre heater unit make sure that it is filled with engine coolant (dry pump will not be capable of drawing in liquid). Pump operation without coolant (dry run) will cause damage and a loss of warranty. Before installation it is recommended to replace the coolant with a new one free from any impurities.

### COMPLETE SAFETY

The pre heater is rated in accordance with international safety standards EC 60335-1 (equivalent of CE EN 60335.1).

So as to avoid hazards related with the use of electrical equipment, read the installation instructions and user guide before installation. The pre heater must be connected to a suitable protective earthing system with overload protection. The pre heater unit must not be activated while the engine is in operation. It is also prohibited to activate the pre heater when not filled with coolant. The pre heater must not be used in technically malfunctioning vehicles, in particular with a defective or leaky cooling system. The pre heater must not be left unattended. Unsuitable plugs and plug adapters must not be used. The pre heater must not be used if the power cable has been damaged. The warranty does not cover any interference in the item electrical system or modifications of power line. The housing must not be dismantled and the pre heater must not be used by unauthorized individuals without necessary qualifications after dismantling or installation thereof. If the power line cannot be detached or the plug is damaged, the pre heater becomes unusable.

Pre-heater unit must not be used by inexperienced individuals without sufficient knowledge about the equipment, unless supervised and following user guide provided by people responsible for their safety.

Keep children away from the item!

### INSTALLATION, VERY IMPORTANT!!!

With its compact design LF BROS pre heater may be easily installed in engine bay. Connector diameters fit most of passenger cars and trucks. It allows for all-purpose use and simple installation. The heater may be connected into cooling system in series or in parallel. T-connectors facilitate parallel connection of the heater into cooling system. If the heater is to be connected to hoses with larger diameters this may be done by means of additional T-connectors. Diameters of additional T-connectors range from 18 to 70 mm. These are subject to a separate order. If the heater is equipped with a holder then it should be mounted to vehicle body. Check cooling system before installation. Vehicle must be functional. Any leaks in the cooling system prevent installation of the pre heater. Chemical radiator sealers impede proper operation of the pre heater. Engine oil leaks into the cooling system impede proper operation of the pre heater. Coolant must be free from any sediments and contaminants. Contaminants in the coolant may lead to "gelling" of the coolant, pump rotor blocking, and finally to stoppage and damage of the pre heater. Before installation of the pre heater it is recommended to replace the coolant with a new one. Pump operation with contaminated coolant will not be subject to warranty service.

1. In standard applications the pre heater is connected in series on the so-called short cooling system between engine and heater.
2. If unrestricted flow in the cooling system is not possible, then the pre heater is parallel connected between hoses of the heater (by means of T-connectors provided), or between the heater and radiator (by means of a larger T-connector; to be ordered separately). Such connection allows to by-pass flow restricting elements in the cooling system, such as an additional thermostat or solenoid valves of the heating element. A check (one way) valve may be used to ensure proper direction of coolant flow when the engine is in operation and the pre heater is off. Check (one way) valve available on request.
3. In order to avoid pre-heater air locking it must be installed below the upper level of the heated liquid in the heater, in a position allowing for an automatic gravitational de-aeration of the heating chamber. Air in the heating chamber may cause damage to the heating element and loss of warranty.
4. Flow must be directed towards the engine as marked on the pre heater.
5. Pre heater must be installed in a position not lower than 50 cm from the highest level of coolant.
6. Pre heater must be positioned in such a way as not to be in contact with any hot elements of engine, e.g. Exhaust collector, or with any movable parts in the engine bay.
7. After installation refill the coolant. Check against any leaky connections. Start the engine and allow it to run until all engine thermostats open. It is necessary to eliminate air from the cooling system and the pre heater system. Check if the level of coolant is correct.
  - Power cable must be moved away from hot and rotary elements.
  - In the period from Spring to Autumn, when the pre heater unit is not used, it must be activated twice a month so as to remove deposits that may block pump rotor.

Pre heater unit must be installed by individuals with knowledge of cooling system operation in certain type of vehicle. It is recommended to have it installed by an authorized service centre.

It is the responsibility of the user and installer to decide about where and how to install the pre heater unit. The following drawings provide general outline of the cooling system and may be used as a guidance when deciding about the manner and place of installation as well as about any additional elements, such as T-connectors, hoses and valves, however, they cannot constitute a basis for any potential claims resulting from improper operation of the unit after an installation method is selected.

### PRE-HEATER TEST AND REMOVAL OF POTENTIAL DEFECTS

1. Fill the cooling system and make sure that the pre heater unit is filled with coolant.
2. Start the engine so as to de-aerate the cooling system and the pre heater unit in accordance to guidelines referred to above.
3. Let the engine cool down; connect power cable to three-pole socket outlet in order to carry out short test.
4. If the pre heater unit operates correctly the pump will make a gentle hum.
5. Monitor the first heating cycle until the pre heater is switched off by a thermostat. The pre heater unit will be in operations until thermostat opens (temperature of ca. 65°C inside the pre heater unit).
6. Depending on ambient temperature, engine size, and type of pre heater unit, the engine warm-up phase may take from 30 to 180 minutes.
7. If the pre heater unit operation is not as specified above, i.e. it turns off after a short period of time (several to several dozen seconds) it means that the flow between the pre heater unit and the engine block is restricted. This may be caused by the second thermostat in the small circuit, heating valve in closed position, installation on improper hose, or other restriction in the cooling system. Immediately eliminate any such restriction of flow, check if the pre heater unit is energized, verify if fit is installed in accordance with installation guidelines, check if the level of coolant is correct, make sure that the pre heater unit is filled with liquid and that the coolant is not frozen.
8. If restricted flow results from other reasons, e.g. the second thermostat in the small circuit, then consider parallel installation of the pre heater unit as specified above in order to ensure unrestricted flow of coolant between the pre heater unit and the engine block.

### TECHNICAL SPECIFICATION OF PRE-HEATER UNIT

Model	Little Q	Little Dragon	King	Decepticon	Explorer	Brother
Capacity	1500-1850W	1900W	3000W	3000W	3000	2900W
Automatic turn-off temp	65 °C – 70 °C					
Delivery head	50cm					
Connector diameter	17 mm					
All models are rated for 50 Hz 230 V						
All models: Class I insulated, protection rating IP40, CE certified						
Item weight [g]	824	1064	1256	1202	1160	1300
Item length, [cm]	11,8	18,2	22	20	20,2	20
Item width, [cm]	7,7	8,2	9	9	12,6	8
Item height, [cm]	8	7,1	6,3	8,1	8	11

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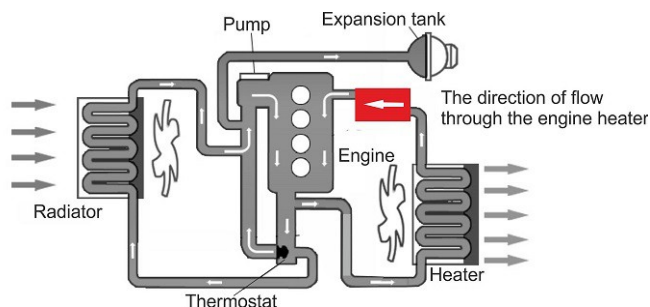
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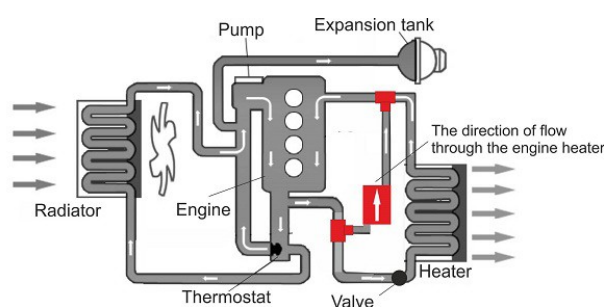


Each user can contribute to protect the environment. It is neither difficult nor expensive. For this purpose, the waste electrical and electronic equipment marked with a crossed-bin, the user is obliged to return to the point of collection of waste equipment, as contained in the device components can be hazardous for the environment. Packaging cardboard waste paper. Do not dispose it with other household waste.

### Series connection



### Parallel connection by means of standard T-connectors



### Parallel connection by means of additional T-connector and a check (one way) valve

