

## 1. Role, purpose

**1.1** The electrical rod-shaped heaters with posistor heating elements are destined for diesel fuel heating during pre-starting and cruise operating regime in filters-separators of Mann-Hummel PreLine® PL 270 and PL 420 models, Fleetguard FuelPro and Fleetguard DieselPro systems and other analogues used in various medium and heavy duty cargo trucks and other motor vehicles with diesel engines.

**1.2** The heaters are destined for heating standard European diesel fuel types (DIN-EN 590 and DIN 51606), as well as other types of diesel fuel.

**1.3** The PS-202 heater, equipped with external and internal electronic temperature sensors is a stand-alone device with its own electronic MOSFET temperature control unit. It switches on at the temperature of below + 5°C and switches off at the temperature of over +5°C.

**1.4** The PS-202 heater is universal. It can be used on any diesel fuel engine with 24V power circuit and the fuel consumption rate of up to 420L/hour.

## 2. Completeness

(please check the completeness for missing or broken parts and, if any, notify your dealer)

The heater assembled <sup>(1)</sup>	1 pc.
Wiring kit <sup>(2)</sup>	1 pc.
Ring 023-027-25-2-2 STATE NORM 9833	1 pc.
Ring 006-009-19-2-2 STATE NORM 9833	1 pc.
Adapter for the external temperature sensor M16x1,5	1pc.
Copper spacer 16x22x1,5	1 pc.
Screw M3-6gx8 STATE NORM 17473	2 pc.
Spacer STATE NORM 6402	2 pc.
User manual	1pc.
Package box	1 pc.

(1) – Type and completeness of the heater is mentioned on the package

(2) – Wiring kit for connecting PS-202 to the vehicle electrical 24V circuit: electrical cable (wire №1 S=0,75 mm<sup>2</sup> – blue, №2 S=0,75 mm<sup>2</sup> – red, №3 S=0,75 mm<sup>2</sup> – yellow, №4 S=2,5 mm<sup>2</sup> – red, №5 S=2,5 mm<sup>2</sup> – black, thermal insulation of wires: up to +125 °C), connector AMP, LED indicator, fuse 20A.

## 3. Technical parameters

Index name	PS-201	PS-202
Power voltage of the direct current, V	24±3	
Nominal power rating, W,	150	350
- pre-starting regime		
- cruise regime		
Maximal electric current, Amp, not more then	20	
Threshold fuel temperature for MOSFET trigger, °C	+ 5 ± 2	
Encapsulation level	dustproof, dirtproof, waterproof Ip55	
Ambient operating temperature, °C	from - 40 to + 80	
Heating control	Controlled manually	Automatic control
Working regimes	pre-starting regime of 1-10 min from the battery and cruise regime from vehicle alternator	

## 4. Safety measures

**4.1** The installation of PS-202 heater should be done according to the general safety rules of automobile electronic equipment installation and also this user manual.

**4.2** Only the personnel that had trained and studied its construction and safety rules shall be admitted to the installation of this device.

**4.3** During the installation it is vital to make sure about the thermal compliance of wires with to ambient operating temperature in the engine compartment, the correct core diameter of wires, to provide reliable cable strapping on each clamp, to insulate the device from the short circuit and overloading.

**4.4** To ensure the safety measures it is PROHIBITED

- to use the device in engines systems running on petrol or on mixture of diesel and petrol.

- PROHIBITED to use the device to heat anything else which is not mentioned in the present user manual;

- PROHIBITED to repair or inspect the device while it is connected

to a live electrical circuit or an alternator of a working engine;

- PROHIBITED to activate the device while there is no fuel in the fuel system;

- PROHIBITED to activate the device on air or without proper installation into the fuel system of an engine.

**4.5** During the installation or de-installation it is important to comply to the safety measure related to the diesel fuel spills, ensuring the maximal occupational hygiene.

## 5. Installation procedure

**5.1** ATTENTION ! Installation should be executed either at the special service centers or maintenance facilities that can provide skilled personnel in the domain of electronic equipment installation for cars and trucks.

**5.2** In the holding body of the filters - separators Mann-Hummel PreLine® PL270 / PL420, or other similar models there is an opening destined for mounting the PS-201/202 heaters. The installation of the heater is done by two screws M6x12. You can also use the screws M6x12 (4) which are the ones that are usually left after dismantling the sealing plug from the opening of the filter-separator.

**5.3** During the device installation (picture 1)

- install the junk-ring (3) on the flange of the heater (2) having previously greased it with either diesel fuel or motor oil;

- take the original sealing plug out of the opening in the body of the filter's holder (1), insert the heater's rod (2) with the junk-ring in place (3) and screw it with the screws M6x12 (4). The inserting the device must be very gentle and executed with care. Some force should be applied only to overcome the friction of the junk-ring.

**5.4** On the opposite side of the filter body (1) you will find a bolt-hole for the fuel line input with threading M16x1,5. Screw the adaptor (5) in that bolt-hole with the sealing copper spacer (6) in a way so that the sensor opening (7) of the adaptor is pointed downwards. Make sure that the position chosen for the sensor does not hinder the subsequent attachment of the fuel line input. It is recommended to use a thread-sealing compound resistant to diesel fuels for both sides of the adapter (5). The fuel line input is now passed on the other side of the adapter (5) with the same threading M16x1,5

- fit the junk-ring (8) onto on the flange of the sensor (7) having previously greased it with either diesel fuel or motor oil, insert the sensor (7) in the adapter (5) and fix it with two screws (9) and the lock-spacers (10)

- connect the plug of the cable (11) to the plug (12). The plug (12) must be firmly attached to the body of the vehicle.

**5.5** The wire disposition of the plug (12) for the vehicle's electrical grid:

- the blue wire №1, is the positive contact of LED indicator. The negative, black contact of the LED indicator is to be connected to the vehicle's body or negative contact;

- the thin red wire №2 is the heater's control-unit feed, is to be connected to the positive clamp of the ignition lock;

- the yellow wire №3 must be connected to the positive clamp of the vehicle's alternator;

- The thick red wire №4, through the fuse 20A is to be connected to the positive clamp of the vehicles battery;

- the black wire №5 is to be connected on the body of the vehicle or to the negative clamp of the power circuit. The led indicator is to be installed in the driver's cab, somewhere in field of view of the driver.

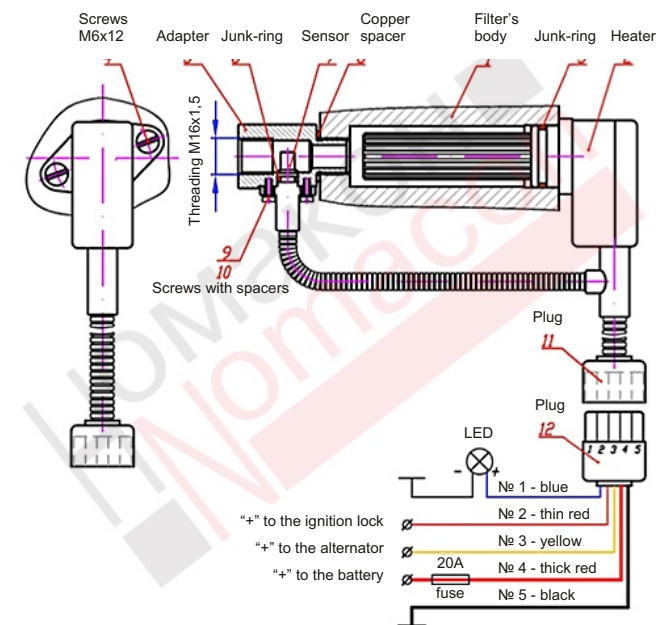


Fig.1

## 6. Function guideline

**6.1** The PS-202 heater is a stand-alone device and functions in free-running, self-controlling mode with a MOSFET control unit built-in. Once the ignition contact is on, even before the engine is started, the control unit of PS-202 is powered up and starts measuring the temperature of the fuel using its external and internal sensors. If the temperature is lower than +5°C the pre-starting regime is launched to last from 1 to 10 minutes depending to the initial fuel temperature in the filter. The heater's activation is confirmed by the LED indicator in the driver's cabin. The fuel and the filter-separator's body is heated up by the special timing algorithm calculated by the control unit to guarantee the diesel fuel warm-up to the given temperature until its fluid - viscosity and the filter's filtering ability is restored.

When the LED indicator is off, the warm-up procedure is finished and it is now possible to start the engine.

**6.2** Starting the engine is also possible before the warm-up procedure is finished and does not derange or harm the usage and functionality of the PS-202 heater. This, although, might not guarantee the smooth engine start, especially if the ambient temperature was lower than +5°C.

**6.3** While the engine is running the heater enters the cruise operating regime. The control unit is constantly monitoring the temperature of the fuel at the input nozzle and inside of the filter-separator and activates the heater once the temperature falls below +5°C and cuts it off once it goes above +5°C.

The heater's activation is confirmed each time by the LED indicator in the driver's cab.

**6.4** If the ignition key is on but the engine is not started, the pre-starting regime will stay activated, as long as the ignition key is on and the control of the temperature will continue to function, with periodic activation and deactivation of the device to keep the fuel's viscosity at the constant and appropriate for the engine level.

**6.5** ATTENTION! Long lasting pre-starting regime without working engine may lead to the premature battery discharge.

**6.6** The PS-202 never functions if the ignition contact is off.

**6.7** The PS-202 is equipped with its own emergency system to prevent overheating. The overheating may occur if the normal heating environment is infringed. For example air bubbles inside of the fuel line during the pre-starting or cruise regime, unauthorized activation of the device on open air and so on.

In this case, if the temperature of the heating element reaches 130 °C, the control unit turns the heater off and blocks itself. Normally the heater will un-block automatically after 10 seconds, but if the heating environment is still infringed, it will block again immediately.

### ATTENTION!

The emergency blocking is represented by the LED indicator blinking in the driver's cab.

**6.8** To unblock the heater manually it is necessary to turn the ignition key off for 10 - 15 seconds and on again. If it doesn't unblock itself, turn the ignition off for 60 sec.

**6.9** The blocked heater as such does not represent any danger to the fuel line or to the fuel supply of the engine, but it does serve as an indicator that something went wrong inside of the fuel line and if blocking occurs even once, it is required to stop the engine and eliminate the root of the problem.

**6.10** The fact of blocking does not signify the malfunction of the PS-202. It does not reduce its life-time, does not affect its functional capabilities and does not require replacement of the PS-202.

**6.11** During every maintenance of the vehicle equipped with the PS-202, it is necessary to inspect the correct installation of all the device's parts for fuel spills or leaks as well as all the electric connections of the PS-202.

**6.12** The body of PS-202 is sealed and is not designed to be opened and repaired if malfunctioned.

**6.13** If malfunction occurs during the warranty time the device can be replaced through the local dealer, on the condition of complying with warranty terms.

## 7. Storage, disposal

**7.1** When stored or transported to the installation facilities the heater must be properly packed in the package provided by the manufacturer or the dealer.

**7.2** The PS-200 series heaters do not contain any substances that are harmful in any way to the environment or to a human body.

## 8. The content of precious and non-ferrous metals

**8.1** Precious metals: not present.

**8.2** Non-ferrous metals: aluminium – 58 g, copper – 1,3 g, tin – 0,5 g

## 9. Warranty

**9.1** The manufacturer guarantees the adequacy of the PS-200 series heaters to the description in the present reference documentation if complied with the conditions of storage, transport, installation and usage.

**9.2** Storage period – 2 years from the manufacturing date.

**9.3** Usage warranty – 18 months from the date of purchase or from the date of manufacture if the purchase date is not known.

**9.4** During the warranty period the consumer has a right to replace the malfunctioned heater by sending back all pieces of it to the local dealer with the copy of the purchase invoice. Postage costs are not refunded to the consumer. (It is recommended to include a short description in English language concerning the circumstances of the malfunction). The local dealer in its turn will send the new heater to the consumer.

**9.5** Warranty claim will be refused if:

- the malfunctioned device is not sent or delivered to the local dealer;
- the malfunctioned device is sent without a proof of purchase such as purchase invoice;
- the device is sent with some of its pieces missing (no cables or sensor)
- the device has mechanical damage or scratches that do not normally occur during its usage. For example after a road accident;
- any indications of non-compliance with the conditions of storage, transport, installation and usage are the reasons for the warranty claim refusal.

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# ROD-SHAPED POSISTOR DIESEL FUEL HEATERS for filter-separators

## NOMACON™ PS-202

### USER MANUAL

